Natural Gas Markets in the Caribbean Region: A general description and case studies for LNG projects

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Natural Gas Markets in the Caribbean Region:
A general description and case studies for LNG projects"

Lesson Learned

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Glossary

AES	AES Corporation
AIDS	Acquired Immune Deficiency Syndrome
ALNG	Atlantic LNG Company of Trinidad and Tobago Ltd
ANGLEC	Anguilla Electricity Company Limited
BBE	Bahía de Bizkaia Electricidad
BBL	Barrels
BCF	Billion Cubic Feet
BCF/D	Billion Cubic Feet per Day
BG	British Gas Group plc
BL&P	Barbados Light & Power Company Limited
BNOCL	Barbados National Oil Company Limited
BNTCL	Barbados National Terminal Company Limited
BOE	Barrels of Oil Equivalent
BOE/D	Barrels of Oil Equivalent per Day
BP	British Petroleum plc
BPD	Barrels per day
BPTT	British Petroleum Trinidad and Tobago Ltd
C.I.F.	Cost Insurance Freight
CARICOM	Caribbean Community
CARILEC	Caribbean Electric Utility Service Corporation
CCCT	Combined Cycle Combustion Turbine
CDB	Caribbean Development Bank
CEIS	Caribbean Energy Information System
CIA	[US] Central Intelligence Agency
CIDA	Canadian International Development Agency
CNG	Compressed Natural Gas
CPI	Consumer Price Index
CREDP	Caribbean Renewable Energy Development
DCF	Discounted Cash Flow
DOMLEC	Dominica Electricity Services Limited
DSM	Demand Side Management
ECCB	Eastern Caribbean Central Bank
ECCU	Eastern Caribbean Currency Union
ECMA	East Coast Marine Area
EE	Energy Efficiency
EIA	Energy Information Agency
EIU	Economist Intelligence Unit

EPC	Engineering, Procurement and Construction Contract
F.O.B.	Freight on Board
FDI	Foreign Direct Investment
FEED	Front End Engineering Design
GCT	General Consumption Tax
GdE	Gas de Euskadi
GDP	Gross Domestic Product
GoB	Government of Belize
GoSKN	Government of St. Kitts and Nevis
GRENLEC	Grenada Electricity Services Limited
GSEII	Global Sustainable Energy Islands Initiative
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HIV	Human Immunodeficiency Virus
HRSGs	Heat Recovery Steam Generators
IDB	Inter-American Development Bank
IEA	International Energy Agency
IMF	International Monetary Fund
IRC	Independent Regulatory Commission
JPSCO	Jamaica Public Service Company
KCT	Kingston Container Terminal
KV	Kilo Volt
KWH	Kilowatt-hour
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LUCELEC	St. Lucia Electricity Services Limited
M&E	Monitoring and Evaluation
MBOPD	Thousand Barrels of Oil Per Day
MBPD	Million Barrels Per Day
MCF	Thousand cubic feet
MMBTU	Million British Thermal Unit
MMCF	Million Cubic Feet
MMSCF/D	Million Standard Cubic Feet per Day
MTPA	Million Tonnes per Annum
MW	Mega Watt
NCMA	North Coast Marine Area
NGC	National Gas Company of Trinidad and Tobago Ltd
NOx	Nitrogen Oxide
NYMEX	New York Mercantile Exchange
OAS	Organisation of American States
OECS	Organisation of Eastern Caribbean States

OPEC	Organization of the Petroleum Exporting Countries
P.A.	Per annum or every year
PDVSA	Petróleos de Venezuela S.A.
PREPA	Puerto Rico Electric Power Authority
PSIG	Pounds Per Square Inch Gauge
PWC	PricewaterhouseCoopers
RE	Renewable Energy
ROR	Rate of Return
SCT	Special Consumption Tax
SVG	St. Vincent and the Grenadines
T&T	Trinidad & Tobago
T&TEC	Trinidad & Tobago Electricity Commission
TCF	Trillion Cubic Feet
UN	United Nations
US	United States
USAID	United States Agency for International Development
USSR	Union of Soviet Socialist Republics
USVI	United States Virgin Islands
UWI	University of the West Indies
VINLEC	St. Vincent Electricity Services Limited
VIZ	As Follows
WTI	West Texas Intermediate

Conversion Table

1 Cubic Meter	=	35.3147 Cubic Feet
1 BOE	=	6,000 Cubic Feet of Gas

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www.olade.org

1 Abstract

This study presents an overview of Caribbean energy supply/demand for the period 1990 to 2008 leading to key issues facing regional governments. Government policies to address these energy issues are discussed that yield conclusions on the form and extent of technical assistance required to meet government objectives. Major trends from the data were evaluated, and forecasts of energy demand were determined on a regional basis under the scenarios of successful government policies and un-successful government policies.

The Caribbean region in 2008 contains approximately 40 million inhabitants with a total economy of US$136 billion. Tourism, agriculture and remittances make up a major part of these countries revenue. In terms of industry, Jamaica has bauxite/alumina, Cuba has nickel and Trinidad and Tobago oil, gas, petrochemicals and LNG. Average regional economic growth rate was 6.2% in 2007 but varies widely from country to country. In terms of GDP, the Bahamas generated US$6.6 billion, Trinidad and Tobago US$23.0 billion and Barbados US$3.7 billion in 2007.

The Caribbean region consumed 821,000 barrels of oil equivalent per day in 2008. The region is a net importer of 647,000 barrels of oil equivalent per day since demand far outstrips supply. Petroleum producing countries in the region are Trinidad and Tobago, Cuba and Barbados that together have a combined total oil supply of 174,000 boepd. Shortfall in energy supplies come from Trinidad and Tobago, Venezuela, Mexico and other international export sources. Since 2005, Venezuela through its PetroCaribe financing plan has displaced Trinidad and Tobago as one of the major energy suppliers to the region. Other supplies come from the San José Accord between Mexico and Venezuela as suppliers, to the islands of Barbados, Jamaica, Dominican Republic and Haiti as respondents. The regional petroleum producers have a combined estimated 1.468 billion barrels of crude oil and 25.96 trillion cubic feet of natural gas as proven reserves as at 1st January 2008, the majority of which being held in Trinidad and Tobago.

Imported energy is used for power generation, road, railway,sea and air transportation and, to a lesser extent, industry and commerce and residential purposes. The smaller islands such as Barbados and Grenada show an almost even percentage for power generation because their

main economic drivers are tourism and agriculture. Growth in electricity is shown to be in direct relationship to population and GDP increase. Energy demand grew in past years but has now shown a flattening and small decline.

Energy prices in the Caribbean are among the highest in North and South America and are very high by world standards. Prices in all countries are linked to international crude oil prices, except in Trinidad and Tobago where subsidies in varying amounts for gasoline, diesel and LPG are still prevalent. The net effect is that Trinidad and Tobago has the lowest retail price for gasoline and diesel in the region and on the hemispheric scale has the second lowest retail price in South America. Retail fuel prices in other countries are generally based on the purchased F.O.B. price of imported oil or oil products, which is directly related to world crude oil prices, processing and distribution costs. All governments impose taxes and charges on the sale of fuel products through which government revenue is generated. Over 90% of the electrical power generated in the Caribbean is derived from imported fuels via thermo-electric generated power plants. Electricity prices are among the highest in the world.

Energy and electricity prices were compared against the US benchmark price to determine the trends and the variation above the benchmark price results in taxes and values below the benchmark price in subsidies.

The results of the analysis show that over 90% of the Caribbean's energy consumption is crude oil based, with all other forms of energy making up the remainder. The fossil fuel of choice is crude oil or its derivative products, since it is easily transported to the island ports. Only Puerto Rico and the Dominican Republic use LNG (liquefied natural gas) for a portion of each island's power generation.

Common energy issues for regional governments were gathered under the categories of energy security, efficiency improvement and environmental concerns. Under the headings of energy security are three areas of concern, namely oil dependence, diversification of energy sources and renewable energy sources. Oil dependence underscores the fact that Caribbean islands are 90 to 100% dependent upon oil or natural gas (fossil fuels) as their energy source.

As at 2008, the relevant priority concerns of Caribbean governments[1], as identified in their respective budget speeches, include the high price of crude oil and natural gas, security of long-term supply, major differences in energy prices for each island, renewable energy sources and applicability, conservation and efficiency and affordable electricity. The region also does not appear to be able to meet the World Energy Council mandate to achieve 10% from renewable sources by 2010.

The study concludes that crude oil and natural gas energy sources from the region are finite; and that supply will be limited to exports from Venezuela, Mexico and Trinidad and Tobago. Trinidad and Tobago has an estimated Reserves-to-Production Ratio for crude oil of 14 years, and 13 years for natural gas, based on present reserves and production rate trends. The Caribbean region however has abundant solar, wind and, to a lesser extent, hydroelectric and geo-thermal energy sources - the feasibility of expansion of which has to be determined.

Assumptions were made for two scenarios - one in which all governments policies were successful and the other if the policies fail. The net result is a decrease in regional consumption of 69,000 barrels of oil equivalent per day for the successful scenario and 70,000 barrels per day oil equivalent per day increase over present day consumption rates. Notably, it is expected that consumption rates would remain stagnant for about two years before consumption begins to increase due to the recent precipitous fall in crude oil prices and the on-going global financial crisis.

Pre-Feasibility of LNG as an Energy-Substitute

The study also investigated the possibility of the use of LNG as a clean, environmentally acceptable energy source for the main consumers of Caribbean energy, and power generation for the islands of Barbados, Cuba, Grenada, Haiti and Jamaica. Gas to Power models exist in the islands of Puerto Rico and the Dominican Republic in which LNG is transported from Trinidad and Tobago, re-gasified and converted into electricity for supply into the country's national grid.

[1] Caribbean Leaders 2008 Budget Speeches.

The transportation, re-gasification and storage of Liquefied Natural Gas (LNG) require several favorable naturally-occurring support facilities for its sustained safe use. Noteworthy is the fact that the islands are generally mountainous and of volcanic origin. Earthquakes are relatively frequent since the Caribbean Plate is actively moving. In addition, most of the islands lie in the path of hurricanes. The sheltered ports lie on the western side of the islands.

General Development Plan

The following general development plan was used for capital estimates and cash flows were run un-escalated without taxes or interest

- Install 100,000 or 200,000 cubic meter LNG storage tank(s) for receiving LNG imports
- Construct a Re-Gasification Terminal for conversion of the imported LNG back into natural gas
- Build a dedicated deep water harbor and jetty for un-loading LNG tankers
- Install a pipeline connection between the Re-gasification plant and the Power generation Plant
- Purchase and install new Combined Cycle Generation Turbine facilities to improve conversion efficiency

These installations are estimated to take up to five years from a final investment decision. Preliminary estimates of LNG port and terminal costs, pipeline connections to end using power generating plants, shipping costs and LNG sources were determined. LNG will be purchased from Atlantic LNG in Trinidad and Tobago at FOB prices and transported within the region. Five countries were analyzed viz. Barbados, Cuba, Grenada, Haiti and Jamaica. Natural gas prices were determined for the base case of each country as US$7.75, 4.92, 9.67, 2.92 and 4.20 per million btu respectively. Inclusion of combined cycle power generation facilities were used to check on the effect of natural gas prices. The results show a natural gas price increase to US$10.70, 6.24, 10.44, 6.24 and 6.98 per million btu respectively. The calculated natural gas price data was compared to retail diesel prices per million btu for each island.

The contractual arrangement between the Trinidad and Tobago government and the shareholders of Atlantic LNG Trains I, II, III, IV will be the major challenge to the supply of Liquefied Natural Gas to the Caribbean islands. This situation is both complex and historical.

2 Scope of Work Request

OLADE (Organización Latinoamericana de Energía) contracted Samury Limited to conduct a study of energy consumption and supply trends of the Caribbean region in general, with particular emphasis on five (5) countries, namely Barbados, Cuba, Grenada, Haiti and Jamaica. Political and economic issues and trends are addressed in the first part of the research document. Following the regional evaluation, the study looks at the Pre-Feasibility of LNG supply into the region for these five (5) countries. The study is based upon published data sources and took approximately six (6) months to complete.

3 Introduction

The Caribbean Region, for the purposes of this study, is defined as the islands starting from the Bahamas in the north and following the archipelago at the edge of the Caribbean crustal plate down to Trinidad and Tobago in the south. Figure 1 is a map of the area of study for this work. There are 13 independent island nations as well as territories of France, the Netherlands, the United Kingdom, and the United States of America. The independent nations are Cuba, Jamaica, Haiti, Dominican Republic, The Bahamas, St Kitts & Nevis, Antigua & Barbuda, Dominica, St Lucia, St Vincent and the Grenadines, Barbados, Grenada and Trinidad and Tobago. Guadeloupe and Martinique, Puerto Rico and the US Virgin Islands, have their administrative/historic centers as France and the US respectively, while the Netherlands Antilles is a fully autonomous constituent country of the Kingdom of the Netherlands. The islands have an estimated total population of 40 million in 2008 and are collectively part of a total US$136 billion economy.

Figure 1: Map showing Area of the Study

Historical diversity has lead to much cultural disparity that adversely affects the islands' ability to form a coherent Caribbean single market.

The region's economies depend largely on remittances, agriculture and tourism, since all the countries are heavily service based. Only a few islands have mineral resources capable of being exploited, such as oil and gas in Trinidad, bauxite in Jamaica and nickel in Cuba.

3.1 Purpose of Study

The main aim of this study was the identification of trends in energy consumption, supply, prices, taxes over the period 1990 to 2008 leading to present-day energy related issues for the Caribbean region as a whole and as island separately. The area of study for this work comprises primarily island states of CARICOM, Cuba, Haiti and the Dominican Republic. Data collected can be requested to mauricio.medinaceli@olade.org or can be found in www.olade.org

3.2 World Energy Environment

During the past 10 years world energy markets have experienced unprecedented growth in four distinct periods starting in 1998 when oil prices hit an inflation-adjusted low of US$8.51 per barrel as a result of a combination of OPEC increasing its supply quota by 2.5 million bpd and an Asian economic crisis decreasing demand. From 2001 to 2006, oil prices experienced sustained increases which began when OPEC instituted a 3.5 million bpd reduction on September 1st 2001. The attack on September 11 and the oil strikes in Venezuela eliminated 4 million barrels of excess capacity. In the second half of 2006, oil prices began to retreat from a peak of about US$77 per barrel, falling to US$49 per barrel. The prime drivers were a relatively mild winter in OECD countries, gradual build up of US inventory and a 1.8 million bpd increase in non-OPEC supply that surpassed global demand growth. The subsequent period from mid 2007 to the end of 2008 is characterized by a relentless price increase that culminated in a record daily quoted $147 per barrel, followed by a sharp fall in prices below the US$40 per barrel threshold. This period, unlike the others, was partially driven by financial speculation. It is most probable that crude oil prices will maintain a much higher level than the historical average of US$25 per barrel price since the costs of exploration and production have risen considerably. The net effect is that energy costs for energy-importing countries have risen dramatically and constitute a major part of their import bill. This will continue to be a major fiscal concern for the immediate future.

Unlike oil, natural gas prices are driven by regional demands. Specifically by growing demand from power producers who are being compelled to find a cleaner alternative fuel to coal. In the caribbean, natural gas plays a minor role in the region's energy consumption. This is mainly attributed to the lack of infrastructure in place to accommodate the transportation and storage of natural gas. Only the Dominican Republic and Puerto Rico currently consume natural gas beyond what is domestically produced. While Puerto Rico secures natural gas through a long-term LNG contract, the Dominican Republic struggles to maintain consistent supplies because of its floundering sovereign credit rating and the difficulties its electrical utilities face with collecting payments.

4 Regional Energy Overview

This section sets the overall picture of energy supply and demand as a whole for the Caribbean region and for individual countries, as appropriate. The information is then discussed in relation to the Caribbean governments' energy policy and security. "Energy" as used in this study comes from primary sources such as petroleum, solar, hydro, geothermal, wood and bagasse (bio-mass). Some discussion on electricity is also included.

4.1 Data Sources

Data was obtained from published reports as outlined in the References. In the process of drafting the Energy Diagnosis, acquiring timely and relevant data proved to be a challenge. This has been reinforced by recommendations from Caricom, which state that it is imperative to strengthen the capacity of the Caribbean Energy Information System (CEIS) and other research bodies in order to provide harmonized data on the energy sector of individual Caribbean countries and the region as a whole. The IEA, CIA, EIA, IMF, UN and CEIS provided additional information on several countries of the Caribbean. OLADE and CARICOM reports were found to be invaluable in respect of energy policy and security issues. Information was also obtained from various governmental agencies and Ministries within the individual Caribbean countries.

4.2 Energy Trends 1990 to 2008

Trends in Energy production and consumptions are provided below for six (6) countries. Three of these countries produce some or all of their energy requirements. These are

- Trinidad and Tobago - produce and export
- Barbados - produce but supplement with import
- Cuba - produce but supplement with imports

The other three (3) countries import exclusively i.e. Jamaica, Haiti and Grenada.

The year 2005 was chosen as the base case year in selecting the IEA data used to compile the energy balance for production and consumption by categories for years 1990, 1995, 2000, 2007.

Data obtained for the five core countries plus Trinidad and Tobago on their production and consumption exhibits a variety of both common trends and unique traits. The energy balance capture the relevant data on each country over four time periods from 1990 to 2007. The format of the table mimics the IEA energy balance table that was available for many of the countries in the region for the year 2005. The data was compiled from numerous sources with the primary source being the EIA for energy data such as oil, gas and coal production and consumption as well as electricity consumption and refining production. We also used country specific and regional macro economic data from the World Bank, CARICOM and IEA and news articles to extrapolate the other key production and consumption data that were not available.

Based on the above template for the subject countries, assumptions in trends for the various pertinent classification of domestic energy production, imports exports and consumptions were made. Overall, regional and extra regional market forces along with the local economic drivers dictated the composition of each country's energy requirements as some countries such as Cuba supplements its domestic production with imports. Others like Jamaica and Grenada are fully dependent on foreign supply to meet its growing energy demand. While Haiti's prolonged economic malady forces it to depend on renewable from heavily overstripped forests to meet the majority of its energy needs.

An analysis of Cuba indicates that although its energy consumption has increased over the period its dependence on imported oil has decreased. This is attributed to the dramatic downturn in the country's economy forced on by the precipitous fall in subsidized oil imported from the USSR which is captured in the comparative period of 1990 versus 1995. Cuba, in its recovery, focused on dramatically increasing domestic oil and gas supplies as well as combustible and renewable energy sources. Cuba has also achieved greater energy efficiencies when comparing 2007 to 1990 as the country's population and economic output has surpassed its overall energy consumption. This is a result of greater efficiencies from industrial and government users. The government was able to increase energy supply to residential customers by a factor of eight (8) over the period. Even with the advent of PetroCaribe, Cuba has continued to seek out ways to diversify itself away from one energy source and one primary foreign energy supplier.

An analysis of Jamaica indicates that although the country has increased its production of energy from renewable sources by a factor of 10 over the period 1990 to 2007, the country continues to be heavily reliant on the importation of crude oil to meet its growing consumption. Electricity and transportation are the two major energy consumers. This is attributed to the growth of hotels on the island and the transshipment/bunkering operations at the Kingston Container Terminal (KCT). In less than a decade, KCT has become the busiest port in total tonnage in all of Latin American and one of the 15 busiest ports in the world. The growth of these two sectors make up for the decline in industrials as a result of maturing of the bauxite industry and the dramatic fall off of the textile industries set up in the 1990's.

An analysis of Haiti indicates that the country continues to be heavily reliant on "renewable" wood and plant sources as it primary energy supply, supplemented by a small but growing importation of crude oil. Though crude oil importation has increased by a 2.5 over the period 1990 to 2007, Haiti's heavy reliance on wood and plants has exacerbated the country's widespread deforestation and increased its vulnerability to frequent natural disasters. It will continue to be difficult to change this until the economy can find a way to become stabilized.

An analysis of Barbados indicates that the country's economy is highly influenced by global market forces and is among the countries in the region that is quickest to adapt. The country shows a steady increase in energy consumption from 1990 to 2000 as oil prices declined, but substantial reductions by 2007 as oil prices increased. By 2007, the country's oil import was similar in volumes to 1990. However, domestic oil and gas production continued to increase in each of the periods we examined. On the consumption side, although electricity continually consumed an ever increasing portion of the country's overall demand, greater efficiencies and the increased use of new technology to limit energy wastage (solar heaters to hotels, card control lighting) has led the country to becoming one of the leaders in the region on energy conservation and renewable. The country's free market approach to quickly pass down global prices to the consumers forces both government and businesses to seek ways to become more efficient.

An analysis of Grenada indicates that the country is highly dependent on the importation of crude oil. The signing of the PetroCaribe accords led to a significant increase in consumption unlike Barbados who remains against signing the accord. Although the county has made a vast foray into embracing renewable energy (grown by a factor of 8 over the period 1990 to 2007), this energy source still makes up less than 4 percent of the total consumption. The increased consumption is mainly attributed to the development of the tourism and maritime (yachting) industries.

In conclusion, we observed that although each of the core countries are affected by global macroeconomic forces, the composition of their domestic economy together with each island's respective economic policies (free market versus restricted versus heavily subsidized) have a greater long term effect on their consumption and supply patterns.

4.3 Energy Supply Sources

The Caribbean has always depended significantly on extra-regional sources to supplement its energy demands as depicted in the bar graphs of Figure 2. Cuba, in 1990, relied heavily on Russia to meet its import needs, while the CARICOM countries relied on Trinidad and Tobago. With the fall of communism in Russia in 1990 and the subsequent deep recession that followed, Russia could no longer afford to meet historical production demands and barter oil for sugar with Cuba. The sudden reduction in exports from Russia had an immediate impact on the Cuban economy after the dissolution of the USSR. With the US trade embargo in full force, Cuba did not find an adequate and hospitable source of oil until the Chavez administration took office in Venezuela. Since 1999, Cuba has received an increased supply of crude oil from Venezuela, especially after the formation of PetroCaribe in 2005. Currently, Cuban imports from Venezuela peaked at 86,000 bpd out of a total of 130,000 barrels per day.

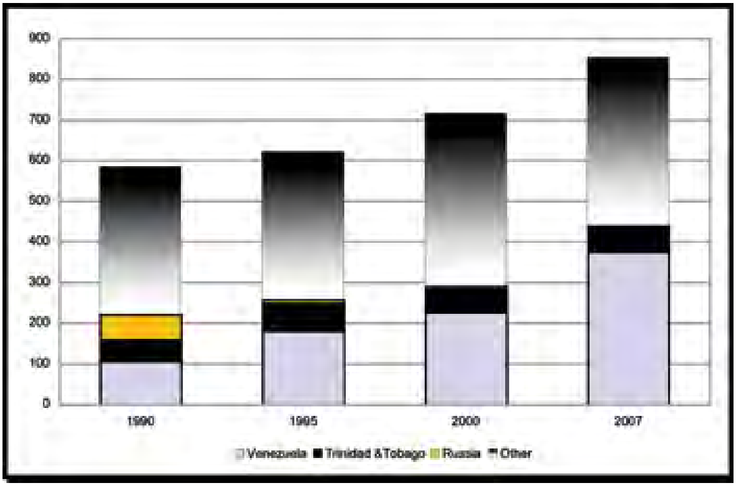


Figure 2: Energy Imports by Supply Countries
Source: EIA, Russia Oil-Sugar Barter Deal 1989 - 1999, consultant estimates

Caricom Countries

The CARICOM countries' are naturally aligned to Trinidad and Tobago from whom most of its members have relied upon for their oil imports over the past decades. However, Trinidad and Tobago's reserves could theoretically meet the Caribbean region's total demand for only 2.5 years at the present regional consumption rate. The CARICOM-Trinidad and Tobago relationship continued un-abated until the formation of Petro-Caribe in 2005, which is a financial plan that offers its members the option to defer a portion of their payment at preferential terms that nu-llify the impact of the prolonged spike in oil price in the short term. By September 2005, all the CARICOM members apart from Barbados and Trinidad and Tobago had agreed to become members and partake in the concessionary financing PetroCaribe provided. PetroCaribe now su-pplies approximately 145,000 bpd of oil to its members. Venezuela also provides over 200,000 bpd more to the region under the regular pricing structure as a portion of that oil is exported as refined products. Whi-le the region does import the majority of its oil from countries such as Mexico, Nigeria, Algeria, and the Middle East, Figure 3 shows that since 1990, Venezuela has increased its share of the region's total supply from less than 20% to almost 40%, through a combination of PetroCaribe and the demise of other former exporters.

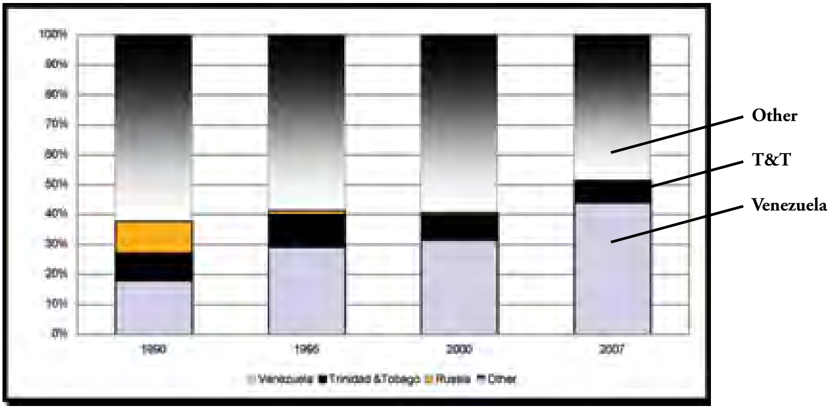


Figure 3: Energy Imports to Caribbean
Source: EIA, Russia Oil-Sugar Barter Deal 1989 - 1999, consultant estimates

Within the Caribbean, the three inter-regional oil producers' reserve-to-production ratios give further insight into the region's growing dependence on extra-regional oil importation, as shown in the figures below.

From a supply perspective, energy inputs into a country can be derived from:

Internally generated sources
Intra-regional sources
Extra-regional or international suppliers

Internally Generated Sources

Three (3) Caribbean countries have oil and natural gas reserves: viz. Trinidad and Tobago, Cuba, and Barbados. Trinidad and Tobago is self-sufficient in energy and is a significant exporter. Crude oil and natural gas production of producing countries are as follows:

Cuba

Oil production in Cuba has fallen steadily over the last half decade from a production high of nearly 65,000 barrels per day in 2003. Over the past five years, production in Cuba has dropped to about 52,000 bpd. This is not because of any in-efficiencies in the extraction process but rather because Cuba's main oil field, Varadero, is in its fourth decade of production and is showing signs of being near the end of its lifespan.

Though the island receives 93,000 bpd in discount oil from Venezuela, its basic energy needs - estimated at 205,000 bpd - are barely being met. Cuba now produces 25% of the fuel it consumes and generates 15% of its electricity with accompanying gas from oil production.

Barbados

Barbados has been producing crude oil for more than 50 years, with local petroleum production satisfying approximately 30% of Barbados' energy consumption. Oil production resumed in October 2000 after being suspended in February 1999 because of low crude oil prices. The Barbados National Oil Company (BNOC) increased production to 3,000 bpd in 2002 and has begun to use horizontal-drilling techniques to increase production. BNOC contracted with a consortium led by U.S.-based Waggoner Exploration to manage its projects. Conoco and Total jointly conducted oil and gas exploration offshore Barbados. As Barbados has no refining capacity, its oil is refined in Trinidad, and products returned for domestic consumption.

The Barbados National Terminal Company Limited (BNTCL) is a subsidiary of Barbados National Oil Company Limited (BNOCL), which in turn is 100% owned by the Government of Barbados. BNTCL operates the Fairy Valley terminal to export crude oil for refining and import refined products such as gasoline, diesel, and fuel oil. BNTCL supplies the Texaco, Shell and Esso service stations on the island as well as the Barbados Light & Power generating plant.

Trinidad and Tobago

Trinidad and Tobago has current reserves-to-production ratio of 14 years and still contains significant deposits of heavy oil and tar sands for further exploitation. The fields in Trinidad and Tobago have been on production since the early 1900s and are mature. The most likely forecast is for relatively slow declines over the next 10 years.

International Sources

The Caribbean relies on imported oil primarily from extra-regional sources. Barbados, the Dominican Republic, Haiti, and Jamaica are party to the San Jose Pact, under which Mexico and Venezuela supply crude oil and refined products under favorable terms. Natural gas and hydropower are used in countries that have these domestic resources.

Natural gas is used most extensively in Trinidad and Tobago, where natural gas-intensive industries, such as steel, fertilizers, and petrochemicals are important to the country's economy. Puerto Rico and the Dominican Republic import LNG from Trinidad and Tobago for power generation.

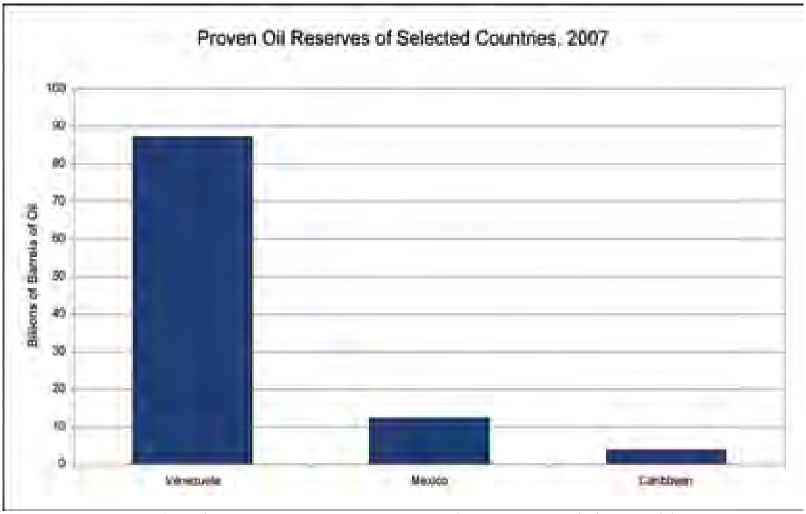


Figure 4: Oil Reserve Estimates - Venezuela, Mexico and the Caribbean

	Proven Reserves as of 1/1/08		Production	
	Crude Oil (Million barrels)	Natural Gas (billion cubic feet)	Oil (crude, liquids, refinery gain) (1,000 barrels per day, 2007)	Natural Gas (billion cubic feet, 2007)
Barbados	2.5	6	1.0	1.0
Cuba	124.0	2,500	52.0	14.0
Trinidad & Tobago	728.0	19,180	121.2	1475.3
Total	**1,468.5**	**25,955**	**174.2**	**1,490.3**

Table 1: Reserves and Production Data
Source: Energy Information Administration, International Energy Annual 2008

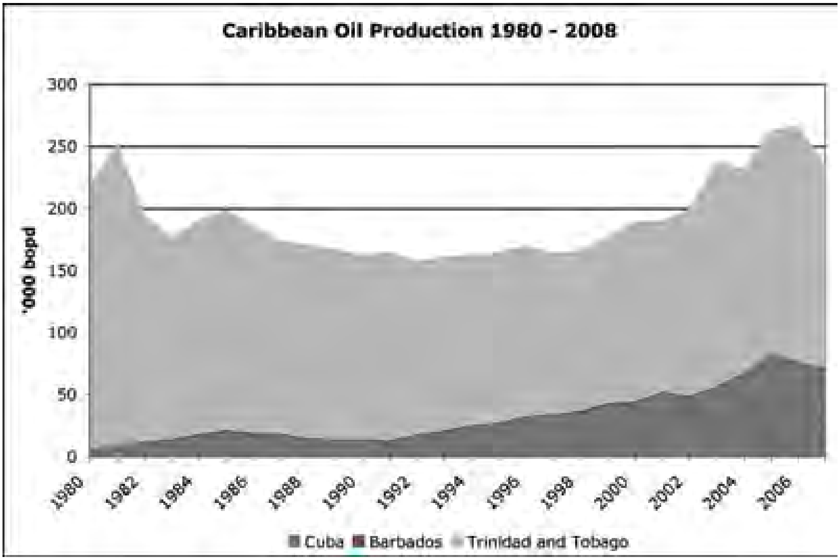


Figure 5: Oil Production

Energy Balance Trends (1990-2007)

Trends in Energy production and consumptions are provided below for six (6) countries. Three of these countries produce some or all of their energy requirements. These are

- Trinidad and Tobago - produce and export
- Barbados - produce but supplement with imports
- Cuba - produce but supplement with imports

The other three (3) countries import exclusively i.e. Jamaica, Haiti and Grenada.

The year 2005 was chosen as the base case year in selecting the IEA data used to compile the energy balance for production and consumption by categories for years 1990, 1995, 2000, 2007. The table below highlights each country's base profile.

	Barbados	Cuba	Jamaica	Haiti	Grenada
Year	2005.00	2005.00	2005.00	2005.00	2005.00
000 toe	000 toe	000 toe	000 toe	000 toe	000 toe
Oil Production	50.69	8465.00			
Gas Production	23.15	22934.00			
Combustable, Renewable & \	38.35	31399.00	482.00	1921.00	4.11
Production	112.19	4597.00	482.00	1921.00	4.11
Oil Imports	405.56	-22887.00	3316.00	582.00	91.25
Coal Imports	28.00	-260.00	37.00		28.00
Other		-142.00			
Domestic Consumption	545.75	12707.00	3835.00	2503.00	123.36
Electricity	-236.06	-1558.00	-1185.00	-277.00	-236.06
Energy processing and byproc	5936.31	-8704.00	-473.00	-458.00	6358.70
Commercial & Hotel	-3066.00	-1448.00	-551.00	-304.00	-3066.00
Transport	-914.00	-734.00	-900.00	-1421.00	-914.00
Residential	-948.00	-263.00	-377.00	-43.00	-948.00
Other sectors	1318.00		-349.00	0.00	1318.00

Table 2: Base Profile for Energy Balance

Based on the above template for the subject countries, assumptions in trends for the various pertinent classifications of domestic energy production, imports exports and consumptions were made.

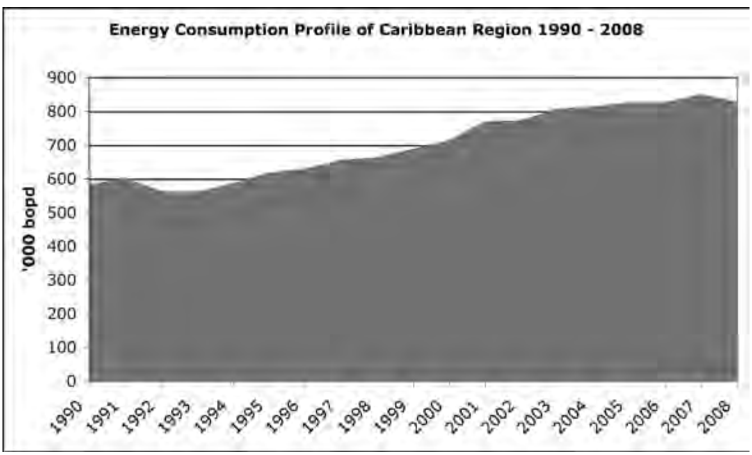


Figure 6
Source: EIA

4.4 Energy Demand and Usage

Data is presented and discussed by sectors for energy usage and fuel type. These data are for each country wherever information was available. In this way a complete analysis of the present situation can be obtained. The analysis also includes the percentage of renewables in the entire mix of energy supply and the respective growth rate. There is a mandate for the Caribbean as a block to achieve at least 10% of energy usage through renewable sources by 2012, which was agreed to during the Johannesburg World Energy Conference, South Africa. This is in keeping with the various agreements signed by countries to stave off global warming and other climate change issues.

Energy consumption trends for the Caribbean region for the period 1990 to 2007 show a steady increase until year 2001 to 2002, when a marked reduction and flattening of energy utilization took place. Consumption beyond 2002 has been slower mainly due to increasing fuel prices.

The consumption pattern of individual countries in the study area is shown on the following graph:

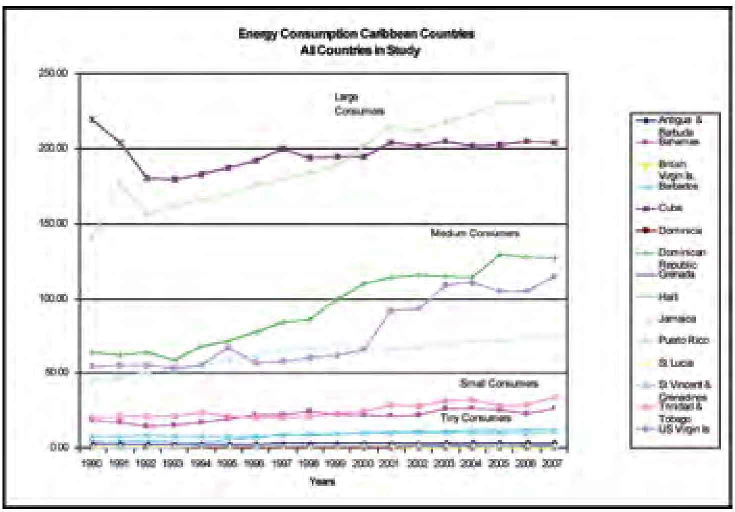


Figure 7
Source: EIA

The consumption by countries is presented above and shows that the data can be sub-divided into large consumers - Cuba and Puerto Rico - which are the larger and more prosperous islands, medium consumers - Dominican Republic and US Virgin Islands, small consumers - Trinidad and Tobago and the Bahamas, and finally tiny consumers that include St Vincent, Grenada and all of the islands of the Lesser Antilles. For the purposes of discussion the comparison is made along the sub-divisions as follows:

- Large Consumers >140,000 boe/d
- Medium Consumers 70,000 to 140,000 boe/d
- Small Consumers 25,000 to 70,000 boe/d
- Tiny Consumers < 25,000 boe/d

4.4.1 Usage by Sectors

The main uses for primary energy are categorized into power generation, industrial, commercial, transportation and residential sectors. In many countries of the Caribbean the commercial and industrial sectors are combined into one, since industry is small compared to the services sector for tourism. In these cases the numbers are combined and presented as one hybrid number. Power generation is the share of energy used for electricity generation. However, the data does not account for losses in generation nor losses during transmission.

Data for selected countries by sector usage are shown below:

Sector	Caribbean Countries					
	Barbados	Cuba	Grenada	Haiti	Jamaica	Trinidad & Tobago
Power Generation	50	28	46	11	31	12
Industrial/Commercial	28	54	16	20	36	80
Transportation	14	9	33	12	23	6
Residential	8	9	5	57	10	2

Table 3: Energy Consumption by Industry in 2007 by percentage
Source: Trinidad and Tobago Petroleum Company, EIA, IEA and Consultant Estimate

The smaller islands such as Barbados and Grenada show an almost even percentage for power generation because their main economic drivers are tourism and agriculture. The tourism sector would make demands for space cooling via air conditioning equipment, hotel needs and various related infrastructure. In the larger islands some form of industrial activity exists. An example is the bauxite/alumina industry in Jamaica, which requires a large amount of electrical energy to convert the bauxite ore into alumina ingots. Another example is Trinidad and Tobago that has a thriving petrochemical and petroleum sector geared for exports. In Cuba, there exists a vibrant services sector and nickel mining, petroleum refining and other industrial activities.

Transportation usage is broken down into vehicles for road and railways. There has been an increase in vehicles, especially foreign previously-owned cars over the last five years due to the availability of bank loans and an increase in per capita income. Most of these imports are for Japanese-made cars, pick-ups and small trucks. In Cuba and Jamaica railway transport is an important means of transportation and is reflected in their energy usage.

Growth in electricity is in direct relationship to population and GDP increase. The expectation, therefore, is a steady increase in electrical consumption alongside the increase of population. In some islands population growth is on the decline and would not affect electrical demand increases. The growth in GDP is dependent upon tourism for many of the countries. This means that the world financial crisis would have a very material effect on GDP for these countries.

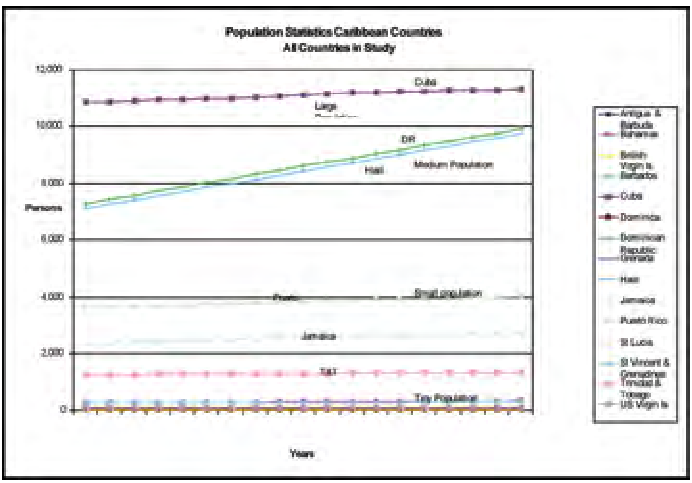


Figure 8:
Source: IEA

The population growth for two islands in the Caribbean is noteworthy. These are the Dominican Republic and Haiti, both of which share the island of Hispaniola. Their population growth rates are higher than all of the other islands' and need to be checked. Cuba is next in population growth rate. All of the other islands have a flat population line that means negligible growth. It is expected that electricity demand would increase proportionally to the increase in population for service as long as it is affordable to the populace

Residential usage is for cooking, appliances and other domestic uses in the homes. It is also expected that growth in GDP would mean more demand for new appliances and labor saving devices that would cause an increase in this sector's usage. Electricity usage for selected countries is shown in the table below.

	Electricity Demand by Sectors			
	Caribbean Countries			
%	2005	2005	1998	2003
Sector	Barbados	Cuba	Grenada	Haiti
Residential	34	41	41	60
Commercial	38	31	54	20
Industrial	7	28	4	20
Other	21	0	1	0

Table 4: Electricity usage by sectors
Source: Trinidad and Tobago Petroleum Company

In the case of Barbados the category 'Other' was used to place hotel and public areas for classification purposes only. Otherwise there are no differences in this category.

4.4.2 Use by Fuel Type

The total petroleum demand by products for Caricom countries is shown in the table below:

Country	Fuel Oil	Gas-Oil	Jet/ Kerosene	Motor Gas	LPG	Total
Antigua	1,111	694	1,194	694	125	3,819
Dominica	30	348	37	220	53	668
Grenada		611	181	475	83	1,350
St Kitts/Nevis		669	60	263	37	1,029
St Lucia		1,097	384	867	167	2,515
St Vincent		564	20	316	88	989
Dom. Rep.	11,678	11,062	3,277	7,792	5,047	38,857
Barbados	3,056	1,989	4,667	2,313	142	12,168
Cuba	20,663	9,405	3,255	2,940	1,027	37,290
Jamaica	35,333	7,040	3,053	11,400	2,033	58,860
Haiti	600	5,000	1,600	2,200	400	9,800
Bahamas	2,667	10,000	2,000	4,500	400	19,567
Trin &T'bgo	633	6,667	2,800	9,000	1,700	20,800
Total	**75,771**	**55,146**	**55,146**	**42,980**	**11,302**	**207,712**

Table 5: Petroleum Demand in Caribbean, 2005 (All figures in boe/d)
Source: Trinidad and Tobago Petroleum Company

For Grenada, the dominant imports are for gas-oil and motor gasoline, since previously we have seen that power generation and transportation are the main uses. Gas oil is used for thermo-electric generation of electricity, which is not as efficient as a new combined cycle turbine. This pattern is similar for the smaller island states such as St Vincent, St Lucia, St Kitts, etc that depend upon tourism for their revenue.

For aviation fuel the leader is Barbados which has instituted a major incentive to make that country the re-fueling hub in the Caribbean-in spite of the fact that it does not have adequate supplies and aviation fuel has to be imported.

The larger islands use fuel oil in large quantities for electricity generation. This is so for the Dominican Republic, Cuba and Jamaica. In the case of Trinidad and Tobago, natural gas is used as the main energy source.

4.5 Energy Prices

Energy prices in the Caribbean are among the highest in North and South America and are very high by world standards. Belize, a CARICOM country located on the Central American mainland, tops the

American region with the highest price in the hemisphere. Nevertheless, there is variation in fuel prices across the countries that comprise the Caribbean region and it is quite common to have different prices in neighbouring countries because of differences in internal policies regarding taxation on fuels.

Data obtained from the Caribbean Energy Information System, CEIS, in September 2008 indicate that average retail prices rose from US$1.03 in January 2008 to a high of US$1.23 in June and July 2008, declining slightly to US$1.14 by September 2008. This corresponds to the period of worldwide peak crude oil prices and their subsequent rapid decline. Table 6 presents gasoline prices for Caribbean countries taken from the CEIS.

Prices in all of the countries are linked to international crude oil prices, except in Trinidad and Tobago where subsidies in varying amounts for gasoline, diesel and LPG are still prevalent. The Eastern Caribbean Central Bank (ECCU) published in October 2007 a document entitled 'Suggested Policy Responses to Oil Price Increases in the ECCU, the Eastern Caribbean Currency Union. The ECCU consists of the island nations of Antigua and Barbuda, Anguilla, Dominica, Grenada, Montserrat, St Kitts, St Lucia and St Vincent and the Grenadines. Within the document is a critical examination of the gasoline pricing mechanisms used by Eastern Caribbean states and a proposed new system to reflect the recent rapid changes in international crude oil prices and the attendant changes in fuel prices. The proposed system is intended to also protect consumers from major oil price swings and to shield taxing authorities from revenue losses.

As explained in that document, the author suggested five basic principles for an effective pricing regime viz.

- It should signal the relative scarcity of oil, promote conservation and efficiency
- It should shield the public fiscal accounts from automatic deficits
- It ought to avoid the transmission of excessive volatility to domestic economic agents
- It must be transparent, credible and therefore predictable
- It must be easy to administer and manage

THE CARIBBEAN ENERGY INFORMATION SY THE CARIBBEAN ENERGY INFORMATION SYSTEM

PETROLEUM PRODUCTS RETAIL PRICES PETROLEUM PRODUCTS RETAIL PRICES

January - September 22, 2009 January - September 22, 2010

Regular Unleaded Gasoline - Average Retail F Regular Unleaded Gasoline - Average Retail Pump Prices

Unleaded Gasoline: Regular : Average Retail Price – January - September 22, 2008 (US$/Litre)										
	2008									
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
ANTIGUA/ BARBUDA	1.08	1.08	1.08	1.07	1.11	1.15	1.15	1.15	1.15	**1.11**
BAHAMAS [91 OCT]	1.26	1.20	1.25	1.52	1.52	1.52	1.52	1.41	1.41	**1.40**
BARBADOS	1.14	1.08	1.08	1.21	1.34	1.34	1.34	1.34	1.34	**1.25**
BELIZE [87 OCT]	1.26	1.26	1.28	1.31	1.40	1.58	1.47	1.32	1.45	**1.37**
B.V.I [87 OCT]	0.99	0.98	0.98	1.09	1.17	1.17	1.22	1.25	1.25	**1.12**
DOMINICA	1.05	1.05	1.05	1.13	1.13	1.29	1.29	1.21	1.15	**1.15**
GRENADA	1.08	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	**1.09**
GUYANA	0.87	0.94	0.95	1.03	1.08	1.14	1.20	1.18	1.16	**1.06**
JAMAICA [87 OCT]	0.94	0.93	0.96	1.00	1.07	1.16	1.20	1.18	1.13	**1.06**
MONTSERRAT	1.01	1.00	1.09	1.09	1.19	1.34	1.34	1.32	1.28	**1.18**
ST. KITTS/ NEVIS	1.04	1.04	1.09	1.10	1.21	1.29	1.34	1.21	1.25	**1.17**
ST. LUCIA	0.96	0.96	1.09	1.09	1.09	1.09	1.09	1.09	1.09	**1.06**
ST. VINCENT/ GRENADINES	1.04	1.04	1.04	1.04	1.10	1.10	1.10	1.24	1.20	**1.10**
SURINAME [95 OCT]	1.11	1.14	1.14	1.20	1.24	1.34	1.34	1.39	1.30	**1.25**
TRINIDAD/ TOBAGO [92 OCT]	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	**0.42**
TURKS/ CAICOS	1.29	1.47	1.51	1.51	1.51	1.61	1.61	dna	dna	**1.50**
AVERAGE RETAIL PRICES	**1.03**	**1.04**	**1.07**	**1.12**	**1.17**	**1.23**	**1.23**	**1.19**	**1.18**	**1.14**

NOTE: **US Gallon = 3.785 L*

**Imperial Gallon = 4.546 L*

Source - Marketing Companies

Premium Unleaded Gasoline - Average Retail Pump Prices

January - September 22, 2008

Table 6: Gasoline Prices 2008 (Source CEIS)

Retail fuel prices are generally based on the purchased F.O.B. price of imported oil or oil products, which is directly related to world crude oil prices, processing and distribution costs. In a simplified explanation of retail price build-up, crude oil is purchased by refiners at world market prices for refining and processing into fuels at refining centers. The prices paid by refiners reflect the forces of supply and demand and the relative scarcity of the commodity at the time of purchase. Sales are usually made in US dollars, so foreign exchange is a necessary ingredient for these transactions. In the Caribbean context, imports of crude oil products are undertaken by State controlled agencies or companies such as Barbados National Oil Company Limited, Petrojam of Jamaica or Cupet of Cuba.

All governments impose taxes and charges on the sale of fuel products through which revenue is generated. The only exception is Trinidad and Tobago where the prices are subsidised. An example of the non-sudsidised case is as follows

F.O.B. Purchase Price + Freight & Insurance = C.I.F. Price

F.O.B. = Freight on Board C.I. F = Cost Insurance Freight

Added to the CIF price are a General Consumption Tax (GCT), Customs Service Charge and Petrol Levy. The sum of the taxes to the CIF cost equals the Landed Cost on the importing island. The final items in the calculation represent the wholesale and retail margins for the distributors and retailers. The sum of these margins to the Landed Cost is the Retail Fuel Price at the pump.

The GCT and Customs Charge are usually fixed percentages of the CIF price. The other elements are fixed numbers in dollars that do not move with oil price fluctuations. Most countries in the Caribbean use these taxes and charges as outlined above as a means of generating significant government revenues.

4.5.1 Benchmark Pricing

Fuel prices are therefore a direct function of crude oil prices, scarcity of the commodity, market forces of supply and demand, processing and distribution costs, exchange rate fluctuations and government taxes or charges. A benchmark price is required that takes into consideration all of the factors stated above but void of imposed government taxation or reliefs such as government subsidies. The most widely used benchmark price that is appropriate for this region is that of the United States without imposed taxes, but including a US 10 cents per litre for highway repair and refurbishment. Using this method one can place gasoline and diesel prices in context relative to the benchmark for a complete coverage of the time series.

As a comparison to other areas in the world, data published in 2007 from German sustainable development company, GTZ, has provided the following values for benchmarks in the Americas and the European Union countries.

World Average	US$0.38 per litre
USA Diesel	US$0.69 per litre
USA Gasoline	US$0.63 per litre
EU Diesel	US$1.14 per litre
EU Gasoline	US$1.29 per litre

Graphs were developed from the data compiled for each country and compared to the US as a reference price.

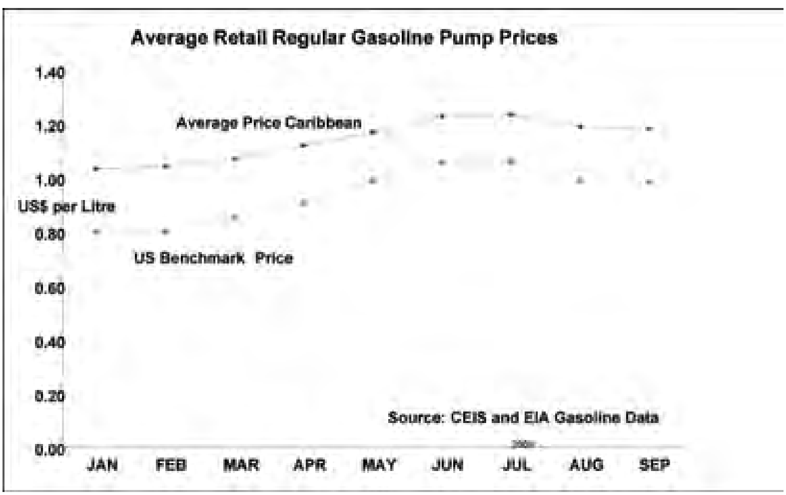


Figure 9: Average Retail Regular Gasoline Pump Prices

In the case of subsidies, a benchmark for the lowest cost is the cost of crude oil, which is the input material for the manufacture of fuels. This cost is also tracked to determine how much subsidization is being supported by governments.

Data Sources

The GTZ organisation's database on gasoline and diesel prices was found to be the most reliable and had enough data to generate time series. The data was supplemented by individual year's prices from other publications, as found in the references.

In the Caribbean region all countries depend upon the importation of oil products for energy uses except for Trinidad and Tobago. In the discussion that follows, prices are presented in the context of oil producing countries and oil importing countries. Notably, the only oil exporting country, Trinidad and Tobago, has the lowest gasoline and diesel prices in the region and on the hemispheric scale has the second lowest retail price in South American. Venezuela has the lowest fuel price on the Western Hemisphere.

Data collected on retail gasoline and diesel prices are presented in graphs in twelve Figures (36 - 47). The discussion on energy prices is set out in the format of energy producing countries and importing countries since there are different objectives of governments in each case.

4.5.2 Oil Producing Countries

The oil producing countries in the region are Trinidad and Tobago, Cuba and Barbados. However, only Trinidad and Tobago has sufficient oil to meet local demand and for the export of significant hydrocarbon volumes. In the case of Cuba, there is a deficiency of over 50% and in Barbados by over 70%.

As a consequence of government policy, Trinidad and Tobago has the lowest gasoline and diesel price, set at US$0.56/litre. However, due to the continued high world crude oil prices, the government of Trinidad and Tobago incurred subsidy expenditure as high as US$320 million recently. To reduce the impact of the subsidy on the fiscal budget, the Trinidad and Tobago government recently increased premium gasoline prices by 33%, as of September 2008, to reduce the subsidy. However, local prices have to be increased steadily over time to meet world averages. In the case of Barbados, the pricing of petroleum automatically reflects cost movements, with the price set by the Ministry of Trade on a monthly basis, without reference to Cabinet (using a Cabinet approved pricing formula).

4.5.3 Oil Importing Countries

The highest prices are found in the smaller islands of Turks and Caicos and the Bahamas where retail prices are US$1.50/litre and US$1.40/litre. The rest of the Caribbean islands have prices within a band ranging from US$1.00 to US$1.20, depending upon the level of government taxes being imposed.

An examination of ECCB documents show that there are gasoline pricing mechanisms in place in the various countries. The pricing mechanisms were classified into three categories

1. A relatively fixed system with countries adjusting retail prices once per year - Antigua & Barbuda, St Lucia, St Vincent & the Grenadines
2. A partial pass-through system in which countries allow the retail price to change at least five times per year - Anguilla, Dominica, Grenada
3. A full pass-through system in which retail prices are adjusted to every shipment of petroleum products - Montserrat, St Kitts and Nevis, Barbados, Jamaica

4.5.4 Electricity Prices

Over 90% of the electrical power generated in the Caribbean is derived from imported fuels via thermo-electric generated power plants. Electricity prices are among the highest in the world and may be due to a combination of factors such as imported fuels for generation purposes, low conversion rate of heat to electricity from old power plants, line losses during transmission, fuel surcharges and government taxes. Most of the islands utilize fuel oil or diesel fuels for power generation. Natural gas is used for generation in Trinidad and Tobago, Puerto Rico and the Dominican Republic.

In the case of Trinidad and Tobago the country is a natural gas producer and collected low pressure gas from offshore areas is used to supply gas turbine alternators on land. Gas prices to the Trinidad and Tobago electric utility T&TEC are small compared to US gas prices. This would also allow for Trinidad and Tobago having the lowest electrical unit cost in the region and is low based on hemispheric standards.

Both Puerto Rico and the Dominican Republic have installed LNG receiving facilities. LNG supplies are brought from Trinidad and Tobago by tankers and the re-gasified natural gas is used to generate electricity. The following table is a comparison of unit electrical rates for some Caribbean countries.

Country	Unit Electrical Rate, US$/kWh
Barbados	0.24
Dominica	0.37
Grenada	0.30
St. Lucia	0.26
St. Vincent	0.28
Trinidad & Tobago	0.04

Table 7

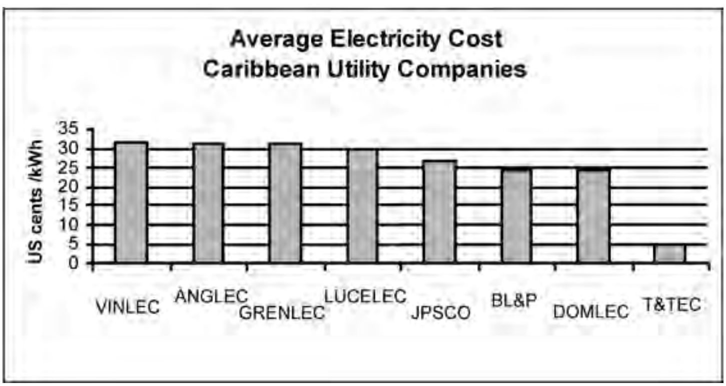


Figure 10

4.6 Taxes and Subsidies

Individual country retail prices for gasoline and diesel products are composed of a combination of costs and government impositions based on national fuel policies. Differences in retail prices at the pump would therefore reflect the directives in each country's national fuel policy. Prices were compared against the US benchmark price to determine the trends and the variation above or below the benchmark price.

The fuel prices of gasoline and diesel over the period 1990 to 2008. Are illustrated in the appendix. The benchmark used is the US retail price. If the country's selling price is above the benchmark then the government is imposing taxes. The further above the benchmark means that users of fuel are being overtaxed. The main reason for these high taxes is for the generation of government revenues, since most Caribbean countries economies rely mainly on income from tourism and agricultural exports such as bananas and sugar. Trinidad and Tobago, Jamaica, Dominican Republic and Puerto Rico have energy-intensive industries.

If the country price is below the benchmark price then the government is subsidizing the price of the fuel for that country's specific reasons. This usually occurs when governments try to stimulate growth in the development of their local private sector by allowing goods and services to utilise low energy prices. These goods and services will be very competitive in the region because of this government support. Trinidad and Tobago is the only country in the region that has fuel subsidies. This is due to the fact that T&T has ample supplies of petroleum and its internal consumption is at cost, plus a small margin.

In Trinidad and Tobago sensitization of the public to the removal of the subsidy has already begun and an initial step for its removal has been implemented. In the 2009 Trinidad and Tobago Budget speech, gasoline prices were increased by US$0.16/ litre.

All of the countries studied, except Trinidad and Tobago have a consumption tax levied on consumers. This tax has a mechanism of setting selling prices based on an annual outlook for crude oil products. This means that prices are set at the beginning of the year and are held constant for the duration of the year. It does not consider vastly changing monthly prices. However, because of the rapid change in energy prices recently (2005 to 2008), this annual forecast has fallen short of the import cost of the fuel. As a result, the taxes collected were non-existent if the annualised price was lower than the prices of the purchased fuels. Consequently, governments that used this mechanism to generate revenues were, in fact, forced to subsidise fuel imports caused by the negative effect of the taxes.

The International Monetary Fund (IMF) made recommendations to allow for monthly adjustments in fuel prices, thereby passing on the burden of increased fuel prices to consumers. It is believed that this measure would have the effect of reducing unforeseen subsidies to consumers on the one hand, while factoring in reduced consumption patterns based on prices.

This recommendation has been approved by certain countries, for example Barbados and Jamaica, and other countries are expected to follow. The chart below is taken from the ECCB report by Bullen and shows the dramatic decrease in government's revenues from fuel taxation.

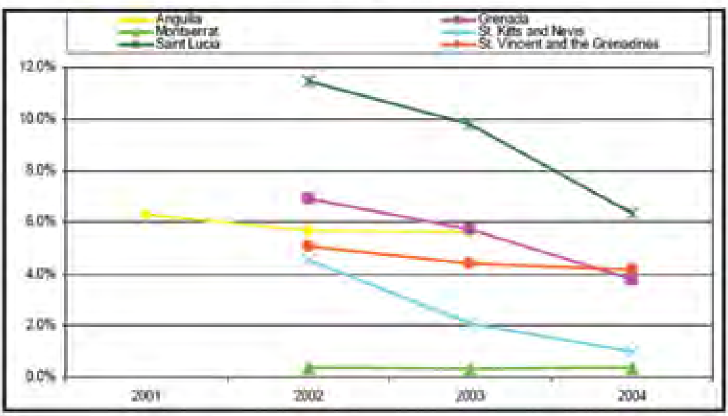


Figure 11: Gasoline Consumption Tax as a per cent of Current Tax Revenue over the Period 2001 to 2004.

Source: ECCB aand Ministries of Finance

4.7 Key Issues Facing Caribbean Governments

General

Common issues have been lumped under the categories of energy security, efficiency improvement and environmental concerns. Under the headings of energy security are three areas of concern, namely oil dependence, diversification of energy sources and renewable energy sources. Oil dependence underscores the fact that Caribbean islands are 90 to 100% dependent upon oil or natural gas as their energy source. Recognition of this fact occurs especially during periods of high oil prices which have recently occurred. The issue is to find a suitable, economic alternative path away from crude oil. However, this would take time and investment, government policy and related legislations. In the medium term, (5 years), oil would continue to be important but diversification of resources is the next logical step. The region's suppliers are now Trinidad and Tobago, Venezuela, Mexico, Nigeria and other international exporters. The eventual solution lies in having indigenous sources of energy which are abundant locally, for example, wind and solar. To achieve this solution now becomes the ultimate issue.

Efficiency improvements are very important for countries to obtain the best results of energy usage. This is especially important in electricity generation and transmission losses. At least 5% to 10% initial decrease can be obtained.

Environmental concerns are related to keeping most of the islands eco-friendly as tourist destinations.

4.8 Summary of Government Policies

In this section we present the main summary of Government Policies. As we can see, there are common topics inside the countries regarding, specially, the oil dependence.

KEY ENERGY ISSUES FACING SELECTED CARIBBEAN GOVERNMENTS												
	National Energy Policy	Energy Security			Energy Prices		Efficiency Improvements			Environmental Effects		
Country		Oil Dependence	Source Diversification	Startup of Renewables	High Prices	Low Prices	Conservation	Conversion Efficiency	Minimise Demand	GHG Emissions	Pollution	WEC 10% min RE
Barbados	Draft	Yes	Offshore	Solar water heaters	Yes		Yes	Needs	Awareness			15%
			exploration	26-30 GWh Wind Farm				improvement				
								in electrical				
			Gas Pipeline from	Wind Farm				generation				
			Tobago									
Grenada	Sustainable Energy Plan	Yes	Offshore		Yes		Yes	Needs	Awareness			
	2002		exploration					improvement				
			Gas Pipeline from					in electrical				
			Tobago or electrical					generation				
			cable									
			Solar Power 45KW									
Haiti		Yes	Charcoal resources	Bio-diesel	Yes			Needs				
			10-30 KW Hydro elec	Hydro - Electric-54 KW				improvement				
								in electrical				
								generation				
Jamaica	Green Paper	Yes	Natural gas /LNG	Wind Farm	Yes		Yes	Needs	Awareness			
			sources	Wington - 20.7 MW				improvement				
				Solar 8.5 MW				in electrical				
			Offshore	Hydro 24 MW				generation				
			exploration									
Cuba		Yes	Offshore	Bio-diesel, wind	Yes		Yes	Needs	Awareness			
			exploration	charcoal				improvement	Curtailment			
								in electrical				
								generation				
Dominican Republic	Legislation Law 57.07-	Yes			Yes							
	Law of Incentive to Renewable											
	Energy and Special Regime											
Organisation of Eastern												
Caribbean States (OECS)												
- Antigua, St Lucia, St Vincent	Draft Caricom Energy Policy	Yes	Renewables as	Run of the river Hydro	Yes			Needs				Dominica 35%
- Dominica, St Kitts	Dominica Sustainable Energy Plan		Alternative sources	Geothermal				improvement				Grenada 0%
- Antigua, St Lucia, St Vincent	2002			Wind				in electrical				St Lucia 0%
								generation				St Vincent 20%
Trinidad and Tobago	T&T Energy Plan	Yes				Yes						

TABLE 8

4.9 Technical Assistance

There can be no Caricom list of "Areas for Technical Assistance" because there is no single Energy Policy i.e. Caricom Energy Policy to guide that process. Caribbean territories have individual energy policies and therefore customized initiatives have evolved to reduce fuel costs, according to each island's special circumstances. In addition, each territory's preference, stage of usage and awareness of available renewable technology, economic, natural and human resources capacities are different and add to the lack of a cohesive approach.

However, the institutional framework already exists to identify and facilitate the required technical assistance in the format of a United Nations Development Programme Global Environmental Facility: Caribbean Renewable Energy Development Programme (CREDP). This has been in existence since January 2004. The programme's stated objective is to remove barriers through specific actions that reduce barriers to policy, finance, capacity and awareness. On the supply side, one benefit is the concern that there will always be the incremental risk related to renewable energy investment at the start-up stage.

Therefore, if the result of this program can be considered a common list, at this point, twenty seven (27) renewable energy projects have been identified in the pipeline.

Of note, or mention is the influence and priority of hydrocarbon production in the Trinidad and Tobago economy, with regards to its minute level of financial contribution to support renewable energy technology in the region. The graph below illustrates:

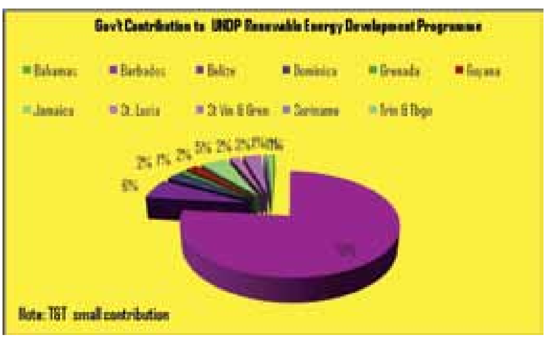


Figure 12

The common areas investigated by Caribbean countries researching renewable energy technologies are:

i. Grid-connected renewable power (e.g. wind farm, bio-mass, cogeneration, geothermal and solar water heating, small and mini hydro electric)
ii. Renewable rural electrification (e.g. photovoltaics and micro-hydro)
iii. Solar water heating

Type of Technical Assistance Required

The template for guidance, format and structure on the best method to offer technical assistance is to examine the work of the Caribbean Renewable Energy Development Programme (CREDP) which has offered technical assistance in the following format:

- Assignment of two (2) Experts and convening of the Stakeholder Meeting on the Harmonisation of the Legislation for the Electric Sector (Dominica and Barbados)
- Coordination of CARICOM Task Force on Regional Energy Policy
- Contributions to draft CARICOM Policy in RE and Electric Utilities
- Delegate to 1st PETROCARIBE Summit c/o St Vincent and the Grenadines

Also, Caribbean Renewable Energy Development Programme (CREDP) has provided technical assistance to the following countries:

- Jamaica (national Government) - Information Systems and Stakeholder Consultations
- Barbados • Comments on Draft Energy Policy; use of CREDP national policy framework
- Belize - Consultation with Stakeholders and GoB - Minister assigned to Energy thereafter
- St Kitts - Consultations with GoSKN
- Dominica - Draft Energy Policy - Report on the Independent Regulatory Commission
- St Lucia - Comments on Green Paper

- St Vincent and the Grenadines - Draft Policy Statement
- Analysis of the policy options for 5 countries - Jamaica, St Lucia, Dominica, SVG, Grenada

This CREDP programme has lead to policy initiatives in several member states:

- The World Bank support in Dominica - Reform of the electric sector complete - new electricity supply act and Independent Regulatory Commission (IRC)
- Global Sustainable Energy Islands Initiative, GSEII (includes the OAS)
- Sustainable energy plans for Dominica, Grenada, St Lucia, and St Kitts and Nevis
- Jamaica - Internal efforts, with assistance from CREDP
- St Kitts - Sugar sector reform w/USA & Brazil

Possible Area that will Request Technical Assistance

Using the work of this CREDP Task Force as a template, certain policy recommendations (both island and Caricom specific) requiring technical assistance exist. These are:

- Policy goal - 10% primary renewable energy by 2010
- Legislative and regulatory reform (e.g. restructuring and competition)
- Requirements for utilities to increase RE
- Optimise synergies between agriculture and energy
- Define RE resources and identify commercially available technologies
- Substitute RE for local use, e.g. wood and charcoal - health benefits
- Encourage R&D and training in RE
- Establish South-South Cooperation
- Encourage carbon trading to enhance RE
- Strengthen the Energy Desk at the CARICOM Secretariat
- Explore “transportation” technologies for large hydro e.g. Guyana
- Introduce fiscal and other incentives for EE

- Implement comprehensive EE programmes; Conduct audits
- Promote RE in building construction
- Promote EE and establish M&E guidelines
- Establish regional EE institutions and Test Facilities
- Establish utility DSM programmes
- Establish training capacity in national and regional agencies
- Develop a CARICOM Charter on Energy Efficiency

The following recommendations were made by Dr Roland Clarke of Clarke Energy at the 3rd Tobago Gas Conference. It is suggested that correspondence be initiated for a more in depth explanation:

- Policy not enough, also need legislative & regulatory reform PLUS an Independent Regulatory Commission IRC e.g. Dominica
- Reform to be aimed at restructuring the utility industry, to ensure competition in generation and sales (including wheeling)
- Incentive Pricing Schemes
- Net Metering - max price at average electricity costs or coincident peak costs depending on pricing regime
- Feed-in Tariffs to guarantee the investor a reasonable return on investment - prices may exceed average costs

5 Regional Scenarios of Caribbean Region

5.1 General

The following countries have been countries have been mandated in the Terms of Reference for specific analysis:

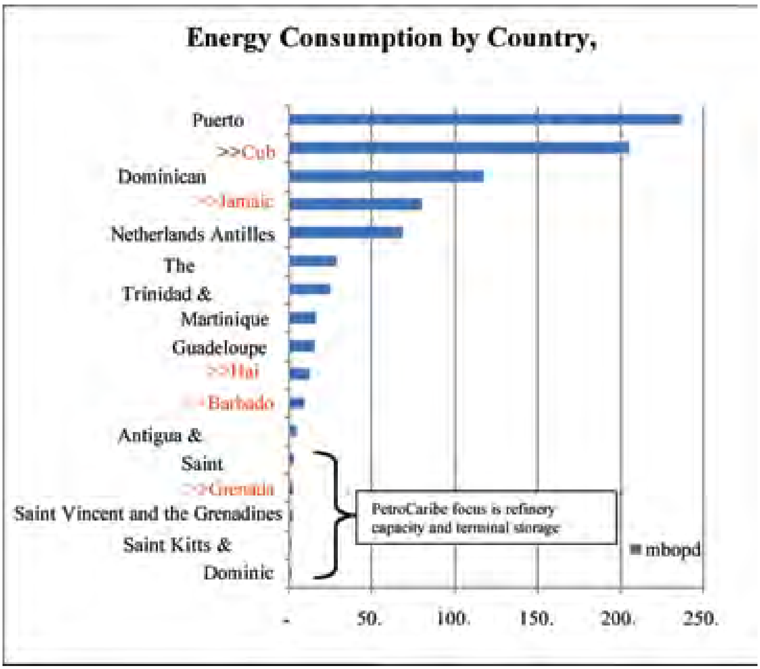


Figure 13
Energy Consumption by Caribbean Country 2007 - (Five countries of Interest)

5.2 Caribbean Energy Policies

Salient priorities of each country's energy policy or in the absence of a policy its stated intentions, are as follows:

	Cuba	Haiti	Grenada	Jamaica	Barbados
Short Term Policy					
Aggressive Purchase of Oil	100,000				
Diversify Supply Source					X
Solicit Int'l Exploration	X		X		X
Increase economic Competitiveness	X		X		
Fuel Conservation	X		X	X	
Avoid or Delay Generation Capacity				X	
Enhance Services and Energy Security			X		
Long Term Policy					
Deregulation of Utility					
Foreign/ Direct Investment	X		X		
Legislation, Incentives	X		X	X	X
Renewable Energy Technology	X		X	X	X
Reduce Greenhouse Emission			X	X	
Build Institutional Capacity				X	X
Gains by Utilities in other islands				X	X

Table 9: Caribbean Energy Policy

The following assumptions were used to define the impact of individual countries energy consumption increases.

Scenario A - Successful	**Scenario B - No Successful**
A1 - Oil Price Increases	A2 - Oil Price Decreases
B - Efficiency /Conservation Programs introduced	B2 - No program-Status Quo
C - Efficiency and Conservation Program continued	C2 - Increase fossil consumption
D - Technical Assistance to define Renewable Option	D2 - Adhoc Research
E - Define Renewable Option, Introduce Legislation	E2 - Adhoc Private Sales of Equipment
F - Introducing Renewable option Provide Incentives	F2 - No incentives
G - CARICOM Energy Policy adopted by all	G2 - Individual Island's Energy Policies
H1 - Feed-in Tarriffs, Net - Metering to Elec. Grid	H2 - Increase Demand on Elec Grid
I1 - Increase and wider range of renewable options	I2 - Greater market but by Private Sector
K1 - Caricom archieving 20% renewable substitute	K2 - Islands between 2% - 5% substitute

5.3 Scenario A - Successful Government Policies

Historical data for each country were analysed to determine energy consumption trends over the past five years. The analysis shows an average increase of 1.98% per annum for the entire region studied. However, individual increases and decreases differ due to each country's specific circumstances.

The largest consumers are Cuba, Puerto Rico, Dominican Republic, US Virgin Islands and Jamaica that account for over 79% of the energy consumption of the region. Increases occurred in Cuba 1.88%, Puerto Rico 6.03%, Dominican Republic 2.57% and Jamaica by 11.31%. The largest increase is in Jamaica due to the imports of oil for the aluminum industry. Of particular note is the decrease of 11.63% in the US Virgin Islands.

The consumption data can be categorised into large consumers and small consumers, usually less than 50,000 bpd. All of the countries showed increased consumption except for Barbados in which case consumption was reduced by 20.18% over the 5-year period. This is due to the steadfast approach by this country to derive more of their energy supplies from renewable energy sources. However, it is believed that further reductions would require new capital investments and access to technology.

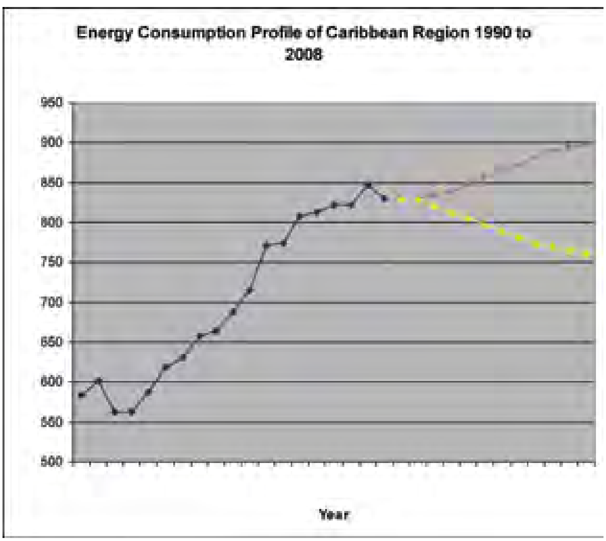


Figure 14

In this scenario consumption patterns are expected to remain the same for the next two years after the decrease in present world crude oil prices. After this constant period it is expected that decreases would occur at 0.5% per annum at first increasing to 1% per annum. The net result is a decrease in consumption by 69,000 bpd in oil equivalent assuming all of the countries policies are successful.

5.4 Scenario B Government Policies are unsuccessful

In this case a two year period of constant consumption is forecasted followed by a gradual increase from 0.5% per annum to 1% per annum. The net result is an increase of 70,000 bpd over present consumption rates.

This case is based on a slow change in regulatory monopolistic systems of energy importation, generation and distribution into an open market system that can allow new investments into the supply chain. It is evident that the start of the process for change lies with the regulatory and legislative systems. Access to needed new capital and novel renewable technologies will require individual governments to adopt and maintain a clear and un-ambiguous strategy to move away from fossil fuels over a period of 10 years as a start. To obtain these two ingredients would require a commitment from governments and local private enterprise to ensure success.

6 General LNG Concept for Caribbean Islands

As discussed in section 4, the major consumers of energy are the power generation and transportation sectors which between themselves account for over 80% of total usage. The best alternative for LNG supply is for a dedicated facility such as power generation. In this context the following concept is developed:

1. Install 100,000 or 200,000 cubic meter LNG storage tank for receiving LNG imports
2. Construct a Re-gasification Terminal for conversion of the imported LNG back into natural gas
3. Build a dedicated deep water harbor and jetty for un-loading LNG tankers
4. Install a pipeline connection between the Regasification plant and the Power generation Plant
5. Purchase and install new Combined Cycle Generation Turbine facilities to improve conversion efficiency

The installation of the necessary infrastructure is estimated to take up to five (5) years from a final investment decision. The assumption is that financial and commercial agreements to secure long term LNG supply contracts and raising the necessary capital to undertake the projects will be already in place. Debt financing in some cases may take up to 3 to 4 years.

The phasing of work is envisaged to begin with soil testing, detailed information gathering, permitting, governmental consents and environmental applications. This step is expected to take at least one year and utilize 5% of the total capital expenditures. With the data obtained, the Front End Engineering Design (FEED), work will be next with an anticipated time of one year. The bidding for Engineering, Procurement and Construction, EPC contractor will follow this step and is expected to last some 9 months before final EPC award. The actual construction time is expected to last three years from the date of award. This gives a 5-year investment time period before the re-gasification terminal is ready for commissioning and first operation.

Phasing of Works for LNG Re-gasification Terminal

Year 1	Data and information gathering; permitting, etc
Year 2	FEED work for LNG tank(s), jetty, dredging plan, etc
Years 3 to 5	EPC construction of LNG Re-gasification facility

CNG Potential

The Transportation sector utilizes gasoline, diesel and aviation fuels. In this case it is not a simple switch from one fuel to another especially in the aviation industry. The only area that can be fuel substituted with natural gas is the land transportation vehicles namely cars, light transport vehicles and trucks. The move would be in the form of Compressed Natural Gas (CNG), for use in the vehicles that have undergone a retrofit to use natural gas. This initiative would require some form of government support in terms of policy directive and tax deductions to accelerate the movement away from fossil fuels to natural gas. The infrastructure required to undertake this plan is the availability of re-fuelling stations located within at least 10 miles of each other in order to provide enough cover for re-fuelling. These CNG filling stations can be undertaken via private capital as long as the necessary regulatory framework is in place.

CNG can be a secondary offshoot from a base load power project since the bulk of the LNG would be available for dispensation along high pressure pipelines to filling stations.

Natural Gas Pricing Basis
The pricing of the final natural gas will be based on the following model:

	F.O.B. Cost at Point Fortin Trinidad
+	Shipping Cost to Un-Loading Port
+	Unit Cost in country for 20% DCFROR
=	Final Price

In the event the LNG country supply source is changed then the F.O.B. purchase price can be inserted and a new final price determined. For example, if Trinidad LNG is un-available then Nigerian LNG can be replaced by the F.O.B. price. In this changed case, shipping costs would also have to be adjusted due to the different nautical miles to the delivery port.

6.1 Barbados Case Study - Pre-Feasibility Concept for LNG Supply

Aim - LNG importation to replace a portion or all of power generation's fuel supply

Consumption of approximately 4,000 barrels per day of diesel is used for the generation of electricity by the Barbados Light and Power Company Limited, BL&P. This company is privately owned and has a monopoly over power generation on the island. At present power is generated using thermal means which is in-efficient and has about 20 to 30% conversion efficiency.

Replacement of suitably sized gas generation turbines will yield a tranche of fuel consumption substitution. Utilizing turbines will almost certainly move the industry into better conversion efficiencies, lower green-house gas emissions and lower operating costs. On the whole therefore, 4000 bpd translates into 25 mmscf/d of gas equivalent energy.

Supply Source - Trinidad & Tobago, LNG Plant. Cargoes will be purchased from ALNG or an alternate LNG company at Point Fortin, Trinidad. A long term commercial supply agreement for the supply of 1 cargo every 60 days is estimated. Barbados is approximately 208 nautical miles from Point Fortin in Trinidad.

Consumption Rate for Power generation - 25 mmscf/d. This assumes that new gas turbines are installed to properly treat with this type of energy supply and maximize the usefulness of the energy conversion into electrical power.

Tanker Sizing - A small LNG tanker of 70,000 cubic meters capacity is estimated to be adequate for this service since the distance is approximately 210 miles. A complete round trip would take 3 days at a maximum. The LNG volume is equivalent to 0.75 billion cubic feet of natural gas.

Deep Water Harbor and Un-Loading facilities - A protected deep water harbor dedicated for LNG service is recommended. Some concerns are sure to be expressed for dredging especially with respect to the environment since tourism is the main earner of foreign exchange on the island.

The jetty would have breasting dolphins for tie-up alongside the jetty. Loading arms would be installed for offloading together with an insulated pipeline to the storage tank.

Re-Gasification Terminal - Onshore from the Harbor and jetty facilities would be the terminal. This is expected to contain one (1) double walled LNG tank of 100,000 cubic meter capacity. This capacity would ensure at least 60 days at a send-out rate of 25 mmscf/d with about 20,000 to 30,000 cubic meters remaining.

Natural Gas Pipeline - The location of the deepwater harbor, jetty and re-gasification facilities should be in close proximity to the power generation plant to reduce pipeline transmission costs. However, it is anticipated that some 15 kilometers of 16-inch pipeline may be required and is included in the capital estimates.

Capital Expenditure Estimates - The following gross cost estimates are based on Trinidad & Tobago's plant costs suitably reduced for sizing and recently completed international projects for new terminals based on gas rate sizing.

Install 100,000 cubic meter LNG Storage Tank	$ 150 million
Construct Re-Gasification terminal	$ 50 million
Build dedicated deep water harbor and LNG Un-loading facilities	$ 75 million
Install 16-inch pipeline to Power Plant	$ 25 million
Front End Engineering	$ 30 million
Permitting, data gathering, etc	$ 35 million
Total Costs	**$ 365 million**

Project Economics

A cash flow model was developed and run to determine the project profitability with 40% for taxes and other government impositions. Due to the small rate of25 mmscf/d there is not much variation in a Base case, Optimistic case and a Pessimistic case. However, small variations were done to make these adjustments and perform the sensitivities.

Base Case

25 mmscf/d supply

Optimistic Case

30 mmscf/d, assuming that the additional 5 mmscf/d is for CNG usage in cars

Pessimistic Case

10 mmscf/d fuel substitution occurs

The three cases were run to determine the natural gas price to obtain a 20% DCFROR on the initial investments. Taxes were imposed on the model but no financing. The F.O.B. price ex Trinidad is estimated to be US$3.05/mmbtu and shipping costs of US$0.50/mmbtu, re-gasification: US$0.40/mmbtu and pipeline to Generation Plant : : US$0.10/mmbtu

The plot below displays the results obtained as well as the table.

Case		**Gas Price(no Taxes)**	**Gas Price(wi-thTaxes)**
Optimistic Case	55 mmscf/d	US$ 9.7 /mmbtu	US$ 13.6 /mmbtu
Base Case	30 mmscf/d	US$ 15.3 /mmbtu	US$ 21.4 /mmbtu
Pessimistic Case	10 mmscf/d	US$ 40.0 /mmbtu	US$ 56.0/mmbtu

Diesel costs are US$4.05 per gallon or US$27.00/mmbtu.

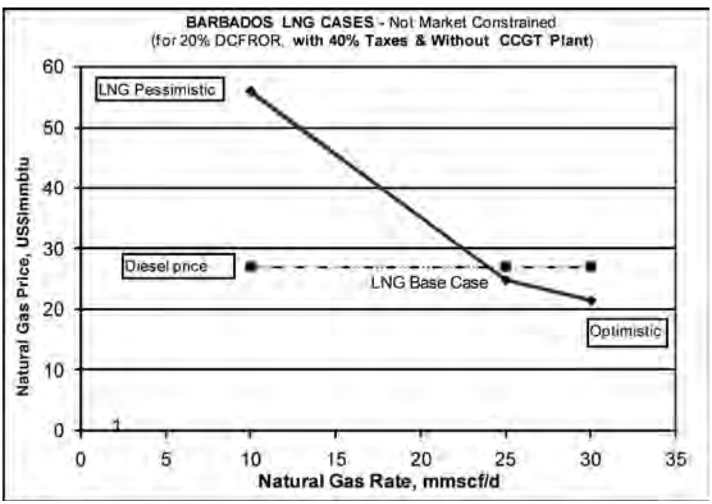


Figure 15

The graph shows that Barbados requires a small volume of natural gas to satisfy its power generation requirements ranging from a full capacity of 25 mmscf/d to a pessimistic case of 10 mmscf/d. The corresponding diesel price in the island is US$4.05 per gallon which is equivalent to US$ 27.00 /mmbtu.

With Combined Cycle Gas Turbine Plant

Note that this solution stops short of having a new combined cycle gas generation turbine installed to generate electricity at much cheaper unit costs. Therefore other cases were run to incorporate a CCGT system connected to the facility. This is estimated to cost US$300 million.

The three cases were re-run to determine the natural gas price to obtain a 20% DCFROR on the initial investments plus the plant. No taxes were imposed on the model as well as no financing charges.

The plot below displays the results obtained as well as the table.

Case		**Gas Price(no Taxes)**	**Gas Price(withTaxes)**
Optimistic Case	55 mmscf/d	US$ 14.9 /mmbtu	US$ 20.9 /mmbtu
Base Case	30 mmscf/d	US$ 25.6 /mmbtu	US$ 35.8 /mmbtu
Pessimistic Case	10 mmscf/d	US$ 68.0 /mmbtu	US$ 95.2 /mmbtu

Diesel costs are US$4.05 per gallon or US$27.00 /mmbtu.

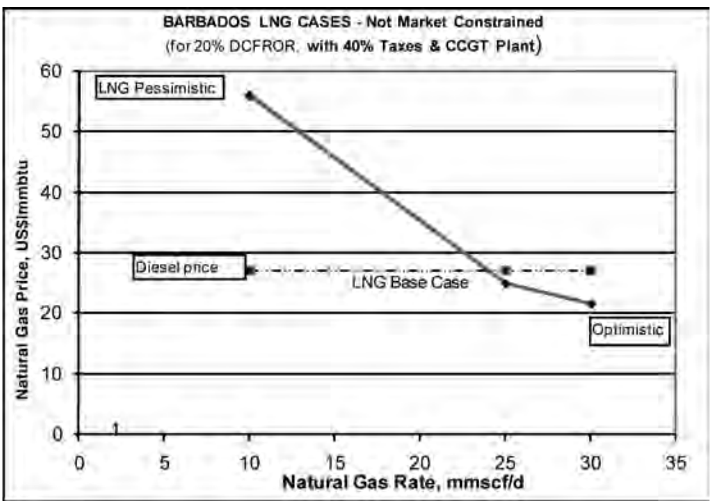


Figure 16

Demand Side Considerations

The Barbados consumer market for electricity fuels require diesel and Bunker C fuels that cost US$149 million in 2008, ref. B L P Annual Report 2008. This annual revenue stream is therefore the maximum amount that can be obtained from the present electrical tariff structure. Power consumption is believed to grow at very low rates at about 0 to 1% per annum. Utilizing this information, cashflows were run based on the three natural gas supply cases to the electric utility at 10, 25 and 30 mmscfd. A gas sales price was then calculated to generate US$149 million per annum revenue for the base case. This amount was then reduced pro rata for the Pessismistic Case to US$ 61 million.

Results from these runs are as follows,

With Combined Cycle Gas Turbine plant

10 mmscfd	DCFROR	14.8%	Gas price US$ 39.0 mmbtu
25 mmscfd	DCFROR	15.1%	Gas price US$ 13.2 mmbtu
30 mmscfd	DCFROR	15.2%	Gas price US$ 7.2 mmbtu

The conclusion drawn from the demand side market constraint yields a much lower rate of return on the project that is below investment grade for stand alone projects.

Eastern Caribbean Gas Pipeline Option

There is also an alternate project that is awaiting commercial sanction that is the Eastern Caribbean Gas Pipeline Project that has its first line from Tobago to Barbados. This project will cost less than an LNG project and will have lower costs that can compete with diesel fuel supplies.

The main consideration is that Barbados is very close to Trinidad for LNG supply to be very effective unless the pipeline option is technically challenging.

6.2 Grenada Case Study - Pre-Feasibility Concept for LNG Supply

Aim - LNG importation to replace a portion or all of power generation fuel supply

Consumption of approximately 2,400 barrels per day of diesel is used for the generation of electricity by the Grenada Light and Power Company Limited, Grenlec. This company is privately owned and has a monopoly over power generation on the island. At present power is generated using thermal means which is in-efficient and has about 20 to 30% conversion efficiency.

Replacement of suitably sized gas generation turbines will yield a tranche of fuel consumption substitution. Utilizing many turbines will almost certainly move the industry into better conversion efficiencies, lower green-house gas emissions and lower operating costs. On the whole therefore, 2,400 bpd translates into 15 mmscf/d of gas equivalent energy.

Supply Source - Trinidad & Tobago, LNG Plant. Cargoes will be purchased from ALNG or an alternate LNG company at Point Fortin, Trinidad. A long term commercial supply agreement for the supply of 1 cargo every 90 days is estimated.

Consumption Rate for Power generation - 15 mmscf/d. This assumes that new gas turbines are installed to properly treat with this type of energy supply and maximize the usefulness of the energy conversion into electrical power.

Tanker Sizing - A small LNG tanker of 70,000 cubic meters capacity is estimated to be adequate for this service since the distance is approximately 150 miles. A complete round trip would take 2 days at a maximum. The LNG volume is equivalent to 0.75 billion cubic feet of natural gas.

Deep Water Harbor and Un-Loading facilities - A protected deep water harbor dedicated for LNG service is suggested. Some concerns are sure to be expressed since the island is very mountainous with sharp drop-offs to the sea with very little flat areas. This impinges upon the environment since tourism is the main earner of foreign exchange. The jetty would have breasting dolphins for tie-up alongside the jetty. Loading arms would be installed for offloading together with an insulated pipeline to the storage tank.

Grenada is a mountainous country of volcanic origin with very little good anchorage positions. The location and sitting of this jetty would be of some concern to developers.

Re-Gasification Terminal - Onshore to the Harbor and jetty facilities would be the terminal. This is expected to contain one (1) double walled LNG tank of 100,000 cubic meter capacity. This capacity would ensure at least 90 days at a send-out rate of15 mmscf/d with about 10,000 cubic meters remaining.

Natural Gas Pipeline - The location of the deepwater harbor, jetty and re-gasification facilities should be in close proximity to the power generation plant to reduce pipeline transmission costs. However, it is anticipated that some 15 kilometers of 16-inch pipeline may be required and is included in the capital estimates.

Capital Expenditure Estimates - The following gross cost estimates are based on Trinidad & Tobago's plant costs suitably reduced for sizing and recently completed international projects for new terminals based on gas rate sizing.

Install 100,000 cubic meter LNG Storage Tank	$ 150 million
Construct Re-Gasification terminal	$ 50 million
Build dedicated deep water harbor and LNG Un-loading facilities	$ 50 million
Install 16-inch pipeline to Power Plant	$ 25 million
Front End Engineering	$ 16 million
Permitting, data gathering etc	$ 16.5 million
Total	**$ 307.5 million**

Project Economics

A cash flow model was developed and run to determine the project profitability without taxes or other government impositions. Due to the small rate, 15mmscf/d there is not much variation in a Base case, and Optimistic case and a Pessimistic case. However, small variations were done to make these small adjustments and perform the sensitivities.

Base Case

15 mmscf/d supply

Optimistic Case

20 mmscf/d assuming that the additional 5 mmscf/d is for CNG usage in cars

Pessimistic Case

5 mmscf/d fuel substitution occurs

The three cases were run to determine the natural gas price to obtain a

20% DCFROR on the initial investments. 40% taxes were imposed on the model.

Case		Gas Price (no Taxes)	Gas Price (withTaxes)
Optimistic Case	5 mmscf/d	US$ 64.0 /mmbtu	US$ 89.6 /mmbtu
Base Case	15 mmscf/d	US$ 23.2 /mmbtu	US$ 32.5 /mmbtu
Pessimistic Case	20 mmscf/d	US$ 18.2 /mmbtu	US$25.5 /mmbtu

Diesel costs are US$4.05 per gallon or US$27.00 /mmbtu.

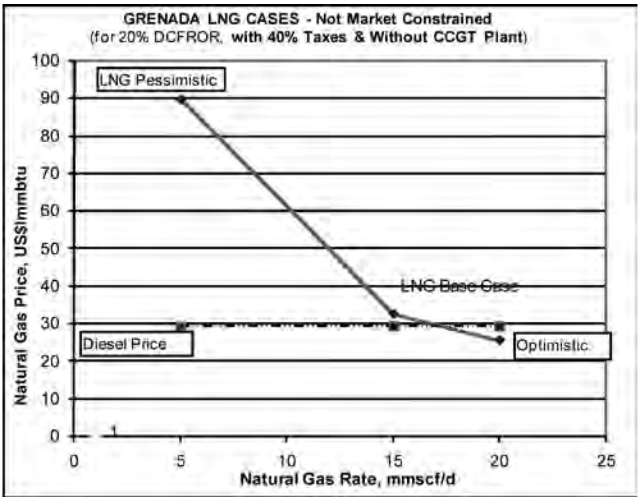


Figure 17

With Combined Cycle Gas Turbine Plant

Note that this solution stops short of having a new combined cycle gas generation turbine installed to generate electricity at much cheaper unit costs. Therefore other cases were run to incorporate a CCGT system connected to the facility. This is estimated to cost US$50 million for a 50 MW plant.

The three cases were re-run to determine the natural gas price to obtain a 20% DCFROR on the initial investments plus the plant. No taxes were imposed on the model as well as no financing.

The plot below displays the results obtained as well as the table.

Case		Gas Price (no Taxes)	Gas Price (withTaxes)
Optimistic Case	5 mmscf/d	US$ 72.4 /mmbtu	US$ 101.4 /mmbtu
Base Case	15 mmscf/d	US$ 26.1 /mmbtu	US$ 36.5 /mmbtu
Pessimistic Case	20 mmscf/d	US$ 20.3 /mmbtu	US$ 28.4 /mmbtu

Diesel costs are US$4.39 per gallon or US$ 29.27 /mmbtu.

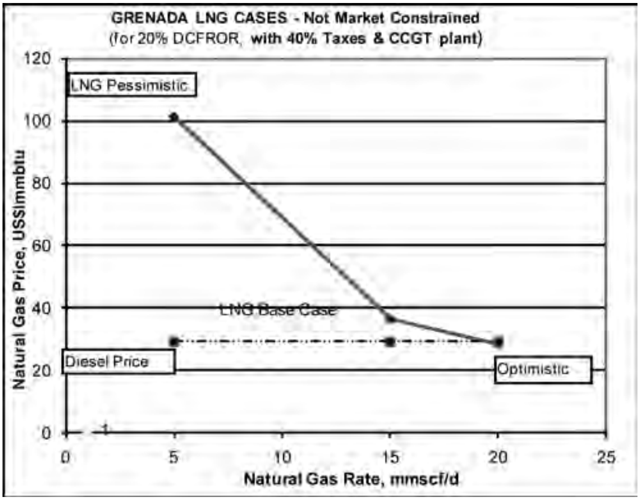


Figure 18

Grenada's is located just 150 miles away from Trinidad and is within pipeline distance from Tobago. The Eastern Caribbean Pipeline project seeks to economically transport gas via high pressure pipelines from Tobago. This may be more economical than LNG. Another alternative is the possibility of running a high voltage under-sea electrical cable from Tobago to Grenada. All these option have to be evaluated and the most economic one chosen.

Demand Side Considerations

The Grenadian market for electricity fuels require diesel and Bunker C fuels that cost US$26 million in 2007, ref. Grenada Electricity Services Limited Prospectus for EC$ 45.8 million, 15th November 2007. This annual revenue stream is therefore the maximum amount that can be obtained from the present electrical tariff structure. Power consumption is believed to grow at very low rates at about 0 to 1% per annum. Utilizing this information, cashflows were run based on the three natural gas supply cases to the electric utility at 5, 15 and 20 mmscfd. A gas sales price was then calculated to generate US$26 million per annum revenue for the base case. This amount was then reduced pro rata for the Pessismistic Case.

Results from these runs are as follows,

With Combined Cycle Gas Turbine plant

5 mmscfd	DCFROR	6.1% (-ve)	Gas price	US$ 16.9 per mmbtu
15 mmscfd	DCFROR	5.9% (-ve)	Gas price	US$ 7.63 per mmbtu
20 mmscfd	DCFROR	6.3% (-ve)	Gas price	US$ 6.46 per mmbtu

The conclusion drawn from the demand side market constraint yields a negative rate of return on the project which is substantially below investment grade for stand alone projects.

6.3 Jamaica Case Study - Pre-Feasibility Concept for LNG Supply

Aim - LNG importation to replace a portion or all of power generation fuel supply

Consumption of approximately 40,000 barrels per day of diesel is used for the generation of electricity by the Jamaica Power Supply Company Limited, JPSCO. At present power is generated using thermal means which is in-efficient and has about a 20 to 30% conversion efficiency.

Replacement of suitably sized gas generation turbines will yield a tranche of fuel consumption substitution. Utilising many turbines will almost certainly move the industry into better conversion efficiencies, lower greenhouse gas emissions and lower operating costs. On the whole therefore, 40,000 bpd translates into 252 mmscf/d of gas equivalent energy.

Supply Source - Trinidad & Tobago, LNG Plant. Cargoes will be purchased from ALNG or an alternate company at Point Fortin, Trinidad. A long term commercial supply agreement for the supply of 1 cargo every 14 days is estimated. Jamaica is approximately 1,300 miles away from the LNG plant in Trinidad.

Consumption Rate for Power generation - 170 mmscf/d. This assumes that new gas turbines are installed to properly treat with this type of energy supply and maximize the usefulness of the energy conversion into electrical power.

Tanker Sizing - One dedicated LNG tanker of 135,000 cubic meters capacity is estimated to be adequate for this service since the distance is approximately 1,700 miles. A complete round trip would take 8 days at a maximum. The LNG volume is equivalent to 2.3 billion cubic feet of natural gas.

Deep Water Harbour and Un-Loading facilities - A protected deep water harbour dedicated for LNG service is suggested. Some concerns are sure to be expressed for dredging especially with respect to the environment since tourism is the main earner of foreign exchange. The jetty would have breasting dolphins for tie-up alongside the jetty. Loading arms would be installed for offloading together with an insulated pipeline to the storage tank.

Re-Gasification Terminal - Onshore to the Harbour and jetty facilities would be the terminal. This is expected to contain two (2) double walled LNG tanks of 100,000 cubic meter capacity. This capacity would ensure at least 20 days at a send-out rate of 170 mmscf/d with about 10,000 to 20,000 cubic meters remaining.

Natural Gas Pipeline - The location of the deepwater harbour, jetty and re-gasification facilities should be in close proximity to the power generation plant to reduce pipeline transmission costs. However, it is anticipated that some 15 kilometers of 30-inch pipeline may be required and is included in the capital estimates.

Capital Expenditure Estimates - The following gross cost estimates are based on Trinidad & Tobago's plant costs suitably reduced for sizing and recently completed international projects for new terminals based on gas rate sizing.

Install two100,000 cubic meter LNG Storage Tanks	$ 300 million
Construct Re-Gasification terminal	$ 75 million
Build dedicated deep water harbour and LNG Un-loading facilities	$ 75 million
Install 16-inch pipeline to Power Plant	$ 25 million
Front End Engineering	$ 96 million
Permitting, Data gathering etc	$ 35 million
Total	**$ 606 million**

Project Economics

A cash flow model was developed and run to determine the project profitability with 40% taxes and other government impositions.

Base Case

120 mmscf/d supply

Optimistic Case

250 mmscf/d assuming that the additional volunes are used in both electrical generation and some CNG for vehicles

Pessimistic Case

85 mmscf/d fuel substitution occurs

The three cases were run to determine the natural gas price to obtain a 20% DCFROR on the initial investments. 40% taxes were imposed on the model.
The plot below displays the results obtained as well as the table.

Case		**Gas Price (no Taxes)**	**Gas Price (withTaxes)**
Optimistic Case	85 mmscf/d	US$ 10.4 /mmbtu	US$ 14.6 /mmbtu
Base Case	120 mmscf/d	US$ 8.3 /mmbtu	US$ 11.6 /mmbtu
Pessimistic Case	250 mmscf/d	US$ 5.7 /mmbtu	US$ 7.9 /mmbtu

Diesel costs are US$4.05 per gallon or US$27.00 /mmbtu.

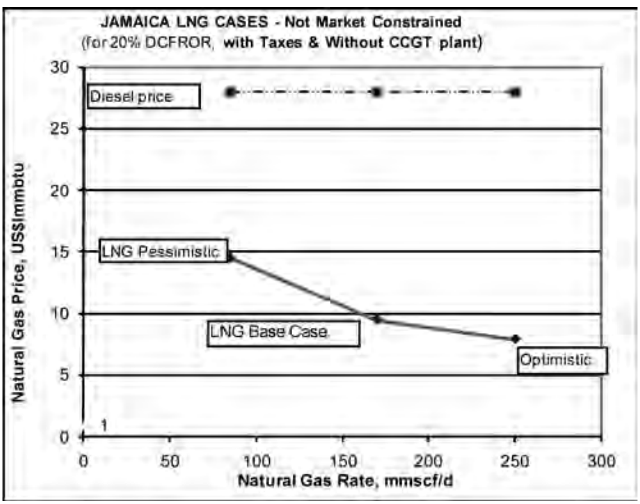


Figure 19

The graph shows that Jamaica is a good candidate for the supply of natural gas to satisfy its power generation requirements ranging from a full capacity of 250mmscf/d to a pessimistic case of 85 mmscf/d. The corresponding natural gas price required to achieve a 20% DCFROR makes the project very attractive for investment. LNG derived gas prices are much lower than the existing fuel supply which is diesel.

With Combined Cycle Gas Turbine Plant
Note that this solution stops short of having a new combined cycle gas generation turbine installed to generate electricity at much cheaper unit costs. Therefore other cases were run to incorporate a CCGT system connected to the facility. This is estimated to cost US$1,450 million using 1 million dollars per MW.

The three cases were re-run to determine the natural gas price to obtain a 20% DCFROR on the initial investments plus the plant. 40% taxes were imposed on the model. The plot below displays the results obtained as well as the table.

Case		**Gas Price (no Taxes)**	**Gas Price (withTaxes)**
Optimistic Case	85 mmscf/d	US$ 26.3 /mmbtu	US$ 36.8 /mmbtu
Base Case	120 mmscf/d	US$ 14.8 /mmbtu	US$ 27.4 /mmbtu
Pessimistic Case	250 mmscf/d	US$ 11.1 /mmbtu	US$ 15.5 /mmbtu

Diesel costs are US$4.05 per gallon or US$27.00/mmbtu.

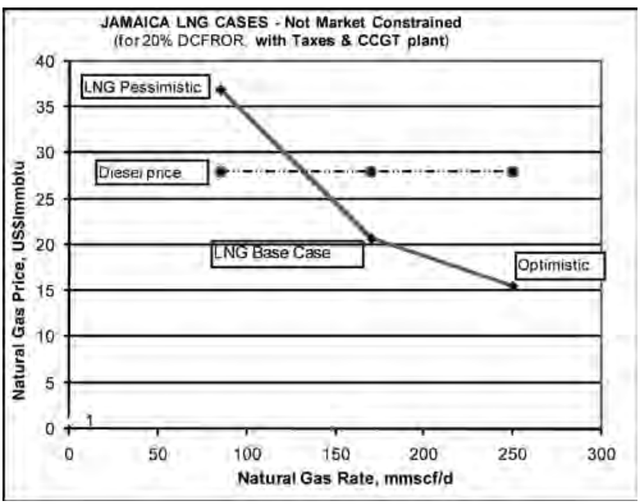


Figure 20

Demand Side Considerations
The Jamaican consumer market for electricity fuels require diesel and Bunker C fuels that cost US$360 million in 2007, ref. Jamaica Public Service Company Limited Annual Report 2007. This annual revenue stream is therefore the maximum amount that can be obtained from the present electrical tariff structure. Power consumption is believed to grow at very low rates at about 0 to 1% per annum. Utilizing this information, cashflows were run based on the three natural gas supply cases to the electric utility at 85, 170 and 250 mmscfd. A gas sales price was then calculated to generate US$360 million per annum revenue for the base case. This amount was then reduced pro rata for the Pessismistic Case.

Results from these runs are as follows,

With Combined Cycle Gas Turbine plant

85 mmscfd	DCFROR	8.2%	Gas price	US$ 14.50/mmbtu
120 mmscfd	DCFROR	8.3%	Gas price	US$ 8.90/mmbtu
250 mmscfd	DCFROR	8.2%	Gas price	US$ 5.97 mmbtu

The conclusion drawn from the demand side market constraint yields a much lower rate of return on the project that is below investment grade for stand alone projects. This is due to the fact that the incremental revenue generated to pay back the CCGT investments are too small to generate a positive rate of return. To achieve a 20% DCFROR a gas sales price os US$ 11.1 per mmbtu is required.

6.4 Cuba Case Study - Pre-Feasibility Concept for LNG Supply

Aim - LNG importation to replace a portion or all of power generation fuel supply

Consumption of approximately 150,000 barrels per day of diesel is used for the generation of electricity. At present power is generated using thermal means which is in-efficient and has about a 20 to 30% conversion efficiency.

Replacement of suitably sized gas generation turbines will yield a tranche of fuel consumption substitution. Utilising many turbines will almost certainly move the industry into better conversion efficiencies, lower greenhouse gas emissions and lower operating costs. On the whole therefore, 40,000 bpd translates into 200 mmscf/d of gas equivalent energy.

Supply Source - Trinidad & Tobago, LNG Plant. Cargoes will be purchased from ALNG or an alternate company at Point Fortin, Trinidad. A long term commercial supply agreement for the supply of 1 cargo every 14 days is estimated.

Consumption Rate for Power generation - 200 mmscf/d. This assumes that new gas turbines are installed to properly treat with this type of energy supply and maximize the usefulness of the energy conversion into electrical power.

Tanker Sizing - One dedicated LNG tanker of 135,000 cubic meters capacity is estimated to be adequate for this service since the distance is approximately 1700 miles. A complete round trip would take 8 days at a maximum. The LNG volume is equivalent to 2.3 billion cubic feet of natural gas.

Deep Water Harbour and Un-Loading facilities - A protected deep water harbour dedicated for LNG service is suggested. Some concerns are sure to be expressed for dredging especially with respect to the environment since tourism is the main earner of foreign exchange. The jetty would have breasting dolphins for tie-up alongside the jetty. Loading arms would be installed for offloading together with an insulated pipeline to the storage tank.

Re-Gasification Terminal - Onshore to the Harbour and jetty facilities would be the terminal. This is expected to contain two (2) double walled LNG tanks of 100,000 cubic meter capacity. This capacity would ensure at least 20 days at a send-out rate of 200 mmscf/d with about 10,000 to 20,000 cubic meters remaining.

Natural Gas Pipeline - The location of the deepwater harbour, jetty and re-gasification facilities should be in close proximity to the power generation plant to reduce pipeline transmission costs. However, it is anticipated that some 15 kilometers of 30-inch pipeline may be required and is included in the capital estimates.

Capital Expenditure Estimates - The following gross cost estimates are based on Trinidad & Tobago's plant costs suitably reduced for sizing and recently completed international projects for new terminals based on gas rate sizing.

Install two100,000 cubic meter LNG Storage Tanks	$ 300 million
Construct Re-Gasification terminal	$ 200 million
Build dedicated deep water harbour and LNG Un-loading facilities	$ 75 million
Install 16-inch pipeline to Power Plant	$ 75 million
Front End Engineering	$ 82 million
Permitting, Data gathering etc	$ 35 million
Total	**$ 767 million**

Project Economics

A cash flow model was developed and run to determine the project profitability without taxes or other government impositions.

Base Case

200 mmscf/d supply

Optimistic Case

250 mmscf/d assuming that some gas is used for CNG

Pessimistic Case

100 mmscf/d

The three cases were run to determine the natural gas price to obtain a 20% DCFROR on the initial investments. 40% taxes were imposed on the model. The plot below displays the results obtained as well as the table.

Case		**Gas Price (no Taxes)**	**Gas Price (withTaxes)**
Optimistic Case	100 mmscf/d	US$ 12.6 /mmbtu	US$ 17.6 /mmbtu
Base Case	200 mmscf/d	US$ 7.9 /mmbtu	US$ 11.1 /mmbtu
Pessimistic Case	250 mmscf/d	US$ 7.0 /mmbtu	US$ 7.7 /mmbtu

Diesel costs are US$4.05 per gallon or US$27.00 /mmbtu.

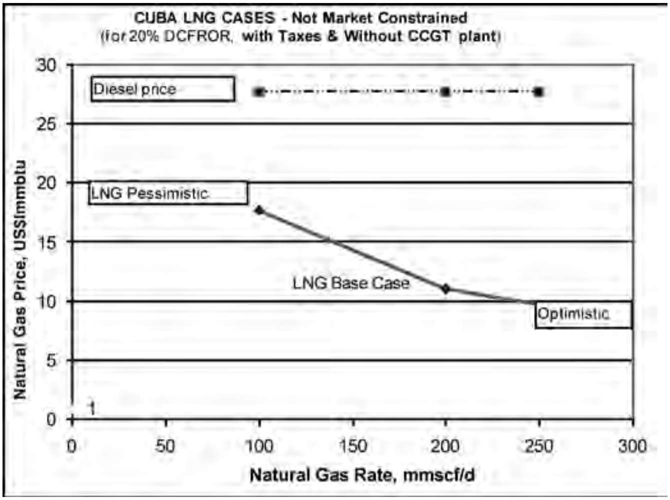


Figure 21

The graph shows that Cuba may be a good candidate for the supply of natural gas to satisfy its power generation requirements ranging from a tranche of 250 mmscf/d to a pessimistic case of 100 mmscf/d.

With Combined Cycle Gas Turbine Plant

Note that this solution stops short of having a new combined cycle gas generation turbine installed to generate electricity at much cheaper unit costs. Therefore other cases were run to incorporate a CCGT system connected to the facility. This is estimated to cost US$1,000 million.

The three cases were re-run to determine the natural gas price to obtain a 20% DCFROR on the initial investments plus the plant. 40% taxes were imposed on the model. The plot below displays the results obtained as well as the table.

Case		Gas Price (no Taxes)	Gas Price (withTaxes)
Optimistic Case	100 mmscf/d	US$ 22.3 /mmbtu	US$ 31,2 /mmbtu
Base Case	200 mmscf/d	US$ 12.8 /mmbtu	US$ 17.9 /mmbtu
Pessimistic Case	250 mmscf/d	US$ 10.9 /mmbtu	US$ 15.2 /mmbtu

Diesel costs are US$4.05 per gallon or US$27.00 /mmbtu.

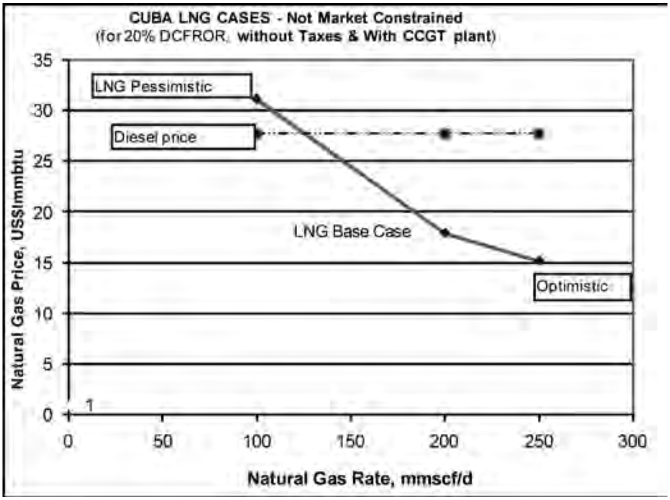


Figure 22

Demand Side Considerations

The Cuban consumer market for electricity fuels require natural gas, diesel and Bunker C fuels that cost an estimated US$149 million in 2008, ref. author,s calculations. This annual revenue stream is therefore the maximum amount that can be obtained from the present electrical tariff structure. Power consumption is believed to grow at very low rates at about 0 to 1% per annum. Utilizing this information, cashflows were run based on the three natural gas supply cases to the electric utility at 10, 25 and 30 mmscfd. A gas sales price was then calculated to generate US$149 million per annum revenue for the base case. This amount was then reduced pro rata for the Pessismistic Case to US$61 million.

Cuba has about 40% of its electricity generated from Distributed Generation systems in which local electricity generation occurs using many small generator sets.

Results from these runs are as follows,

With Combined Cycle Gas Turbine plant

100 mmscfd	DCFROR	20.1%	Gas price	US$ 7.19/mmbtu
200 mmscfd	DCFROR	-4.6%	Gas price	US$ 5.20/mmbtu
250 mmscfd	DCFROR	-4.6%	Gas price	US$ 4.8/mmbtu

The conclusion drawn from the demand side market constraint yields a much lower rate of return on the project that is below investment grade for stand alone projects.

6.5 Haiti Case Study - Pre-Feasibility Concept for LNG Supply

Aim - LNG importation to replace a portion or all of power generation fuel supply

Consumption of approximately 6,600 barrels per day of diesel is used for the generation of electricity using 250 MW of generation capacity. At present power is generated using thermal means which is in-efficient and has about a 20 to 30% conversion efficiency.

Replacement of suitably sized gas generation turbines will yield a tranche of fuel consumption substitution. Utilising many turbines will almost certainly move the industry into better conversion efficiencies, lower green-house gas emissions and lower operating costs. A model similar to Cuba was assumed for Haiti as a supply scenario.

Supply Source - Trinidad & Tobago, LNG Plant. Cargoes will be purchased from ALNG or an alternate company at Point Fortin, Trinidad. A long term commercial supply agreement for the supply of 1 cargo every 14 days is estimated.

Consumption Rate for Power generation - 200 mmscf/d. This assumes that new gas turbines are installed to properly treat with this type of energy supply and maximize the usefulness of the energy conversion into electrical power.

Tanker Sizing - One dedicated LNG tanker of 135,000 cubic meters capacity is estimated to be adequate for this service since the distance is approximately 1200 miles. A complete round trip would take 8 days at a maximum. The LNG volume is equivalent to 2.3 billion cubic feet of natural gas.

Deep Water Harbour and Un-Loading facilities - A protected deep water harbour dedicated for LNG service is suggested. Some concerns are sure to be expressed for dredging especially with respect to the environment since tourism is the main earner of foreign exchange. The jetty would have breasting dolphins for tie-up alongside the jetty. Loading arms would be installed for offloading together with an insulated pipeline to the storage tank.

Re-Gasification Terminal - Onshore to the Harbour and jetty facilities would be the terminal. This is expected to contain two (2) double walled LNG tanks of 100,000 cubic meter capacity. This capacity would ensure at least 20 days at a send-out rate of 200 mmscf/d with about 10,000 to 20,000 cubic meters remaining.

Natural Gas Pipeline - The location of the deepwater harbour, jetty and re-gasification facilities should be in close proximity to the power generation plant to reduce pipeline transmission costs. However, it is anticipated that some 15 kilometers of 30-inch pipeline may be required and is included in the capital estimates.

Capital Expenditure Estimates - The following gross cost estimates are based on Trinidad & Tobago's plant costs suitably reduced for sizing and recently completed international projects for new terminals based on gas rate sizing.

Install two100,000 cubic meter LNG Storage Tanks	$ 300 million
Construct Re-Gasification terminal	$ 200 million
Build dedicated deep water harbour and LNG Un-loading facilities	$ 75 million
Install 16-inch pipeline to Power Plant	$ 75 million
Front End Engineering	$ 82 million
Permtttiing, Data gathering etc	$ 35 million
Total	**$ 767 million**

Project Economics

A cash flow model was developed and run to determine the project profitability without taxes or other government impositions.

Base Case

200 mmscf/d supply

Optimistic Case

250 mmscf/d assuming that the additional 5 mmscf/d is for CNG usage in cars

Pessimistic Case

100 mmscf/d fuel substitution occurs

The three cases were run to determine the natural gas price to obtain a 20% DCFROR on the initial investments. 40% taxes were imposed on the model. The plot below displays the results obtained as well as the table.

Case		Gas Price (no Taxes)	Gas Price (withTaxes)
Optimistic Case	85 mmscf/d	US$ 12.6 /mmbtu	US$ 17.6 /mmbtu
Base Case	170 mmscf/d	US$ 7.9 /mmbtu	US$ 11.1 /mmbtu
Pessimistic Case	250 mmscf/d	US$ 7.0 /mmbtu	US$ 9.7 /mmbtu

Diesel costs are US$4.05 per gallon or US$27.00 /mmbtu.

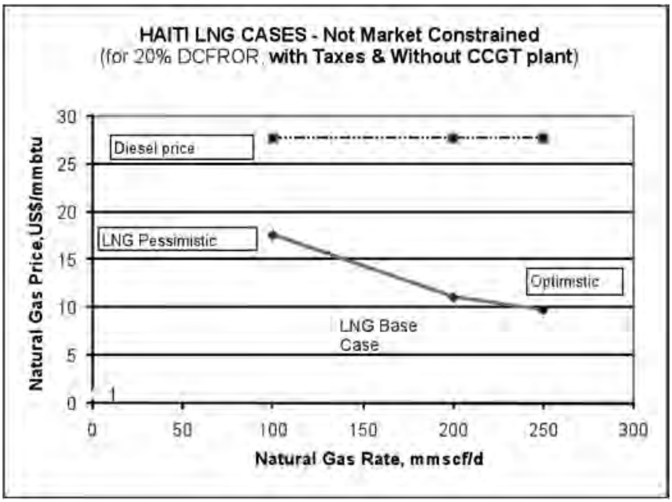


Figure 23

The graph shows that Haiti may be a good candidate for the supply of natural gas to satisfy its power generation requirements ranging from a tranche of 250 mmscf/d to a pessimistic case of 100 mmscf/d. However Haiti is the poorest country in the western hemisphere and collection risks would be apparent.

With Combined Cycle Gas Turbine Plant

Note that this solution stops short of having a new combined cycle gas generation turbine installed to generate electricity at much cheaper unit costs. Therefore other cases were run to incorporate a CCGT system connected to the facility. This is estimated to cost US$1,000 million.

The three cases were re-run to determine the natural gas price to obtain a 20% DCFROR on the initial investments plus the plant. No taxes were imposed on the model as well as no financing.

The plot below displays the results obtained as well as the table.

Case		Gas Price (no Taxes)	Gas Price (withTaxes)
Optimistic Case	100 mmscf/d	US$ 22.3 /mmbtu	US$ 31.2 /mmbtu
Base Case	200 mmscf/d	US$ 12.8 /mmbtu	US$ 17.9 /mmbtu
Pessimistic Case	250 mmscf/d	US$ 10.9 /mmbtu	US$ 15.2 /mmbtu

Diesel costs are US$4.05 per gallon or US$27.00 /mmbtu.

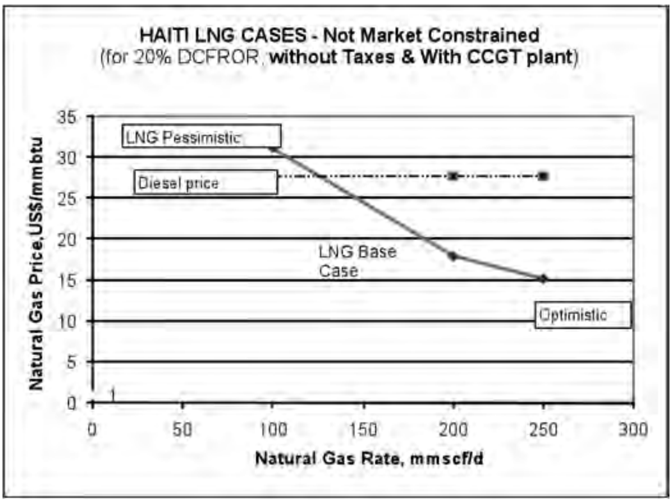


Figure 24

The Haiti Electricity Company, EDH generates electricity for a small part of the population. Less than 10% of the Haitian population has access to electricity and for those who are grid connected outages are regular with average daily supply of about 10 hours. EDH is in negative cashflow and could not operate unless financial support is obtained from the government. Average government support approximates US$50 million per year.

Due to the poor market size it would be unprofitable to conduct an LNG project in Haiti.

7 Major Findings

This report is based upon preliminary collection and analysis of data from the Caribbean region, as defined in this document. The Final Report may contain differences to this preliminary report.

Definitions

1. The Caribbean Region as used in this report is defined as the CARICOM countries and Cuba, Haiti and the Dominican Republic. It excludes territories of developed countries such as the United States, United Kingdom, Netherlands and France.

2. The term "energy" as used herein is also defined as primary energy sources such as fossil fuels, solar, hydro, geo-thermal, wind and biomass.

Supply

3. The Caribbean Region utilises an estimated 817,000 barrels per day of oil equivalent in petroleum products.

4. Internal petroleum production from the region is 171,000 barrels per day from Trinidad and Tobago 120,000 b/d, Cuba 50,000 b/d and Barbados 1,000 b/d. Oil production is forecasted to decline over the next 20 years since most of these fields are very mature and are in depletion stage.

5. Proven Gas reserves for the region are about 23TCF, mainly coming from Trinidad and Tobago. Gas production is 4.1 billion cubic feet per day. Only in Trinidad and Tobago is gas used in processing for the manufacture of Liquified Natural Gas (LNG), ammonia, methanol and urea for export.
(TCF = trillion cubic feet at standard conditions)

6. Trinidad and Tobago is a major supplier of LNG to the US and Spain. There are four LNG trains exporting 10 mtpa , all under long term contracts.

Demand

7. The Caribbean Region is a Net Importer of energy to satisfy internal demand.

8. Consumption of fossil fuel energy is for power generation as electricity, transportation via automobiles, aircraft and sea vessels, industrial/commercial usage for processing, manufacturing and residential, especially for cooking.

9. The five largest consumers of fossil fuel energy are Cuba 205,000 b/d, Puerto Rico 190,000 b/d, Dominican Republic 115,000 b/d, Jamaica 75,000 b/d and Trinidad and Tobago 42,000 b/d of oil equivalent petroleum products.

10. Major fossil fuel users by countries are

    a. Cuba - fuel oil for electricity generation and refining
    b. Jamaica - fuel oil for electricity generation
    in the bauxite/alumina industry
    c. Trinidad and Tobago - for LNG, petrochemical and refining

11. Refineries are located at Trinidad and Tobago (Petrotrin 165,000 b/d), Cuba (Nico Lopez, Hermanos Diaz, 75-100,000 b/d), St Croix (Hovensa 350,000 b/d) and Jamaica (XX35,000b/d). Crude oil imports are from Venezuela, Trinidad and Tobago, Mexico and other international sources such as Nigeria.

12. In Jamaica, usage of fossil fuel energy is distributed as follows: bauxite/alumina 36.6%, electricity generation 24.7%, road transportation 23.5%, aviation 7.7% and other users 7%. (we need to summarized the same for the other key islands or delete this point)

Retail Prices

13. Retail prices for gasolene and diesel are generally priced in relation to international prices, except for Trinidad and Tobago which has a subsidised pricing regime for gasoline, diesel and LPG.

14. The highest retail prices as at September 2008 are found in the northern islands of Turks and Caicos at US$1.50 per litre, Bahamas US$1.40 per litre and Barbados US$1.22 per litre.

15. The lowest price is the controlled selling price in Trinidad and Tobago of US$0.56 per litre, which was recently raised from US$0.42 per litre in September 2008.

16. The basis for retail prices consists of the cost of imported fuel plus consumption tax, plus a profit element.

Taxes and Subsidies

17. Crude oil imports into CARICOM countries are now free of the previous Common External Tariff of 10%. This has led to the introduction of crude imports via Petro-Caribe and in more competition for markets and prices.

18. In Jamaica, petroleum products sold in the local market pay a special consumption tax (SCT) fixed on a volume basis. The level of taxation is determined as a percentage of gasoline prices and is relatively low.

19. There are Fuel Surcharges related to electricity billing for industrial, commercial and residential customers.

20. In Grenada and Barbados, an automatic fuel pricing mechanism, as recommended by the IMF, has been established for the local market and by extension for the calculation of the taxes.
    IMF - International Monetary Funds

Issues

21. The key energy issues for the Caribbean region, based on authors' opinion are:
    a. Security of sustainable supplies of environmentally friendly energy at affordable prices
    b. Re-structuring of energy sources with greater emphasis

being placed on renewable sources such as wind, solar, hydro and bio-mass

c. Growth in intra-regional trade in energy

d. Investments in production, conversion and distribution of energy

e. Establishment of an institutional framework for financing

22. The PetroCaribe financing plan of the Bolivarian Republic of Venezuela has already replaced Trinidad and Tobago's Petrotrin's dominant supply position in the region. Its political dominance is reflected in the Dominican Republic's strong position in the acquisition of the Shell refinery in that territory.

23. Renewable supply sources are being accelerated in Barbados via solar water heating and electricity conversion for supply into the power grid. Jamaica is increasing its energy independence via solar and wind technologies. Hydro electric power is important in Dominican Republic and bagasse in Cuba. Wood is the dominant source of energy in Haiti as a fuel for cooking.

24. Offshore exploration opportunities have led to Barbados going to the UN for an arbitration judgment on its boundaries with Trinidad and Tobago. Barbados offered a bid round and received three submissions. Grenada may also have natural gas deposits on its southern border with Trinidad, and Tobago and a boundary treaty is required to be put in place. Jamaica has recently had an offshore bid round without much success. Cuba has signed licensing agreements with companies from Brazil, Spain, Canada, Venezuela, Norway, among others, to explore for potentially significant reserves in the waters of the Gulf of Mexico.

25. Consensus on LNG pricing between Trinidad and Tobago and Jamaica over the condition of supplies of LNG to Jamaica at the Trinidad domestic price are far apart. CARICOM's view is that Trinidad and Tobago should play a more symbiotic role in energy supply based on its perceived "large reserves" of natural gas.

26. The long term contract negotiated by Trinidad and Tobago with its global partners of Atlantic LNG does not allow a unilateral

decision by the Trinidad and Tobago government to offer LNG to its Caribbean neighbor.

27. A Caricom LNG price must consider Trinidad's alternative for internal for development compared to the sale price at the gate of the ALNG facilities.

28. New capital investments to replace existing old infrastructure for electricity generation with smaller energy losses and, therefore, lower generation cost per unit fuel consumed is very much needed in all islands.

Government Policies

29. The governments of the Caribbean region do not have a single, common plan for energy. CARICOM has issued the draft CARICOM Energy Policy January 2007. Jamaica has prepared a Green Paper on energy. Comments by Carilec do not reflect a unanimous support for the draft energy policy. In addition other countries have had their individual plans in draft for some time now.

30. Trinidad and Tobago has not adopted the CARICOM plan since it may reduce revenues as the plan requires natural gas to be sold into Caricom at local Trinidad prices, not using an international benchmark such as Henry Hub.

31. Further to the CARICOM plan, Barbados and Trinidad and Tobago have not embraced the PetroCaribe financial initiative to date.

32. The markets in Jamaica and Barbados are open for international investments, especially in electricity and renewable forms of energy supply. Other countries have monopolistic energy and generation regulations.

33. Conservation has been put on the forefront by most Caribbean countries due to the high petroleum prices.

34. Regional governments have embraced the Venezuelan PetroCaribe

financing plan to supply crude oil to Caribbean countries. There are policy frameworks to use petroleum in the short term but gradually replace petroleum via a mix of renewable energy sources.

35. Jamaica is pursuing research into the installation of a small nuclear power plant for power as its long term solution, as well as alternative renewable sources

36. Cuba's policies are wide ranging since its demand for energy is the greatest in the Caribbean and the US embargo restricts both private and other government investments. Although petroleum is the main supply at present, the Cuban government is amenable to renewable alternatives such as wind, solar, hydro and bio-mass.

37. Haiti's lack of a coherent regulatory framework prevents effective investment in energy. The country is pursuing bio-diesel using the "jatropha" plant for oil production and processing. Biomass is widely used in Haiti but at a rate that is detrimental to the local ecosystem.

38. Barbados is developing a policy of conservation and efficiency first, and is a leader in showcasing the benefits of alternative energy sources, especially solar and wind technology. This country is by far the most ready for technical assistance and investments.

Technical Assistance

39. Areas for technical assistance are in direct investments for energy via exploration, electricity generation and renewable as substitutes.

40. Commercial factors would influence the decision of investors based on market size, replacement of energy sources by renewables and conservation measures.

41. Wind and solar technologies are of the greatest demand for the Caribbean region.

42. A strategy to unite individual countries' energy policies or lack of policies is needed as a starting point to determine the particular aims and needs of each island. This can take the form of an organization-led workshop to determine common areas of energy policies.

43. The adoption of a common strategy by the islands collectively would make a major milestone for moving this process further. It is believed that without government's support, these strategies and policies would be useless.

44. Deregulation and removal of barriers to foreign direct investment are neccessary steps towards improvement, especially with respect to power generation. Competition between existing power providers and new plants would redound to the benefit of the consumers.

45. Pilot projects for solar and wind technology are most promising for the Caribbean. Assistance will be required for access to technology, equipment and machinery, installation, operation and maintenance. In this regard, both Barbados and Jamaica have had a listing of projects, and commercialization steps are now required.

46. Bio-diesel projects are also very attractive since they allow an element of local entrepreneurship that reduces unemployment levels. Haiti has taken the lead in this regard, and improvements can be accelarated through technical assistance.

47. Evaluation of electrical generation systems is required in all islands. This can lead to improved efficiency of electricity conversion, without the high losses presently being experienced. The work of Clarke Energy of the CARICOM is particularly important in this respect.

LNG Considerations

48. There are several covenants restrictive to Caribbean islands' access to LNG in the arrangement between the government of Trinidad and Tobago and the shareholders of ALNG.

49. The capital cost of investing in a new LNG plant is twice to three times the cost of Trains I, ll, lll, or lV, and this will convert to a higher cost for new entrants

50. The Trinidad and Tobago government has limited capacity of natural hydrocarbon resource for its development and further downstream involvement that conflicts with CARICOM demands.

51. The size of the economy of individual islands does not allow access to globally competitive volumes and prices.

52. The following Table summarizes the possible range of attainable volumes and send out rates at re-gasification facilities in the individual islands chosen as representative cases:

	With CCGT					Without CCGT					
Country Rate MMSCF/D	**Barbados**	**Grenada**	**Jamaica**	**Cuba**	**Haiti**	**Rate MMSCF/D**	**Barbados**	**Grenada**	**Jamaica**	**Cuba**	**Haiti**
5						5					
10	65	35				10	37	30.5			
15	43	23				15	26	20.2			
20	32.5	17.3				20	18.4	15.2			
30	21.6	11.6				30	12.4	10.1			
50	13	6.9				50	7.4	6.1			
75			23.1		21	75			7.2		11
85						85					
100				19.1	15.8	100				9.4	8.2
150					10.5	150					5.5
170			11.6			170			3.6		
200				9.6		200				4.7	
250			7.9	7.65		250			2.45	3.75	

Table 10: Volume and Rates in Caribbean Countries

53. The following graph illustrates the above

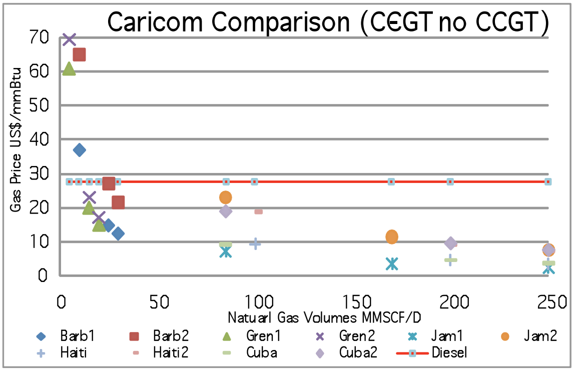


Figure 25

54. Comparison of the prices and volumes in the context of this global market is presented below:

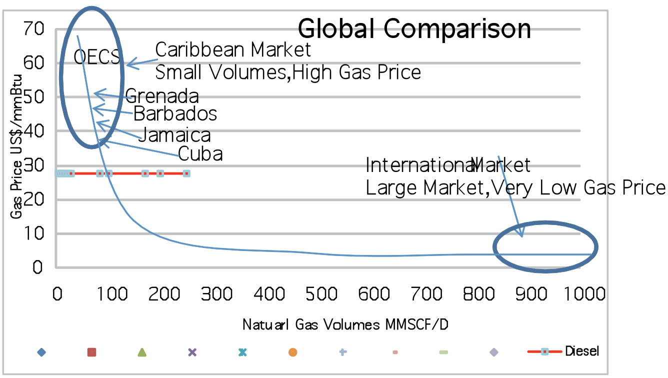
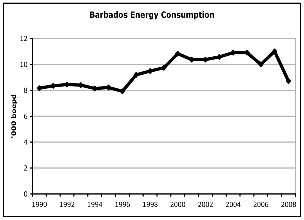
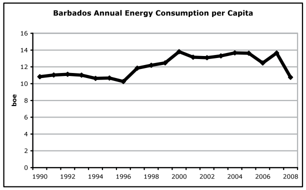


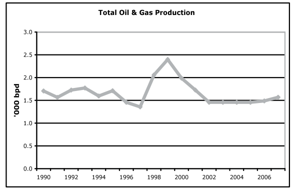
Figure 26

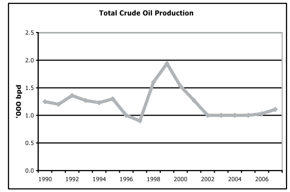
APPENDIX A
Historical Energy Data

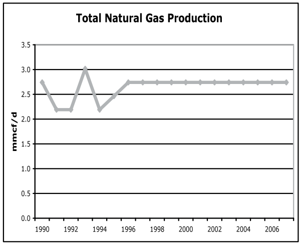
Barbados Historical Energy Data: A Statiscal Compilation

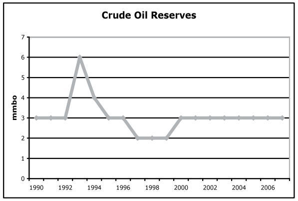


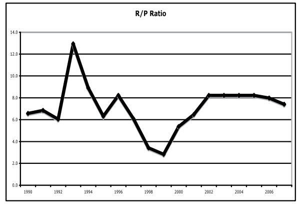


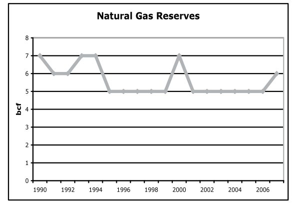


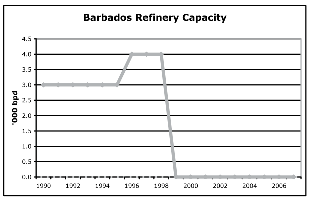


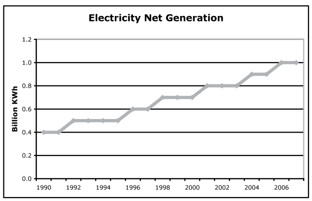


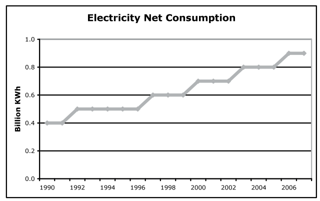


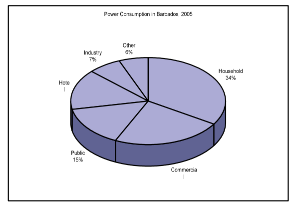




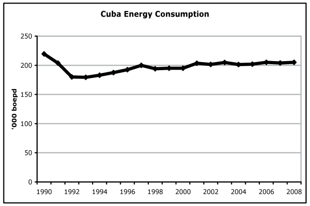


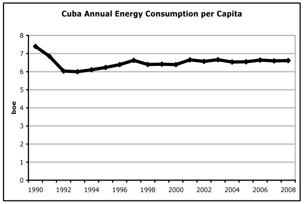


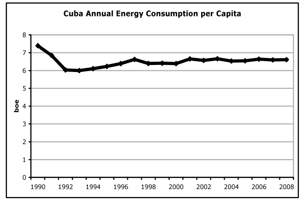


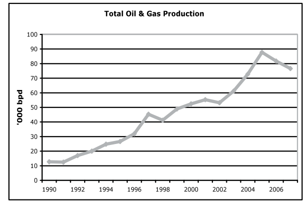


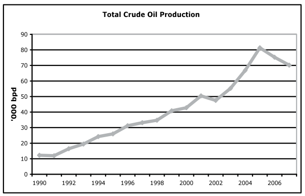
Cuba Historical Energy Data: A Statically Compilation

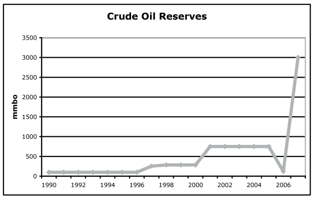


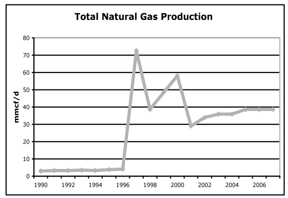


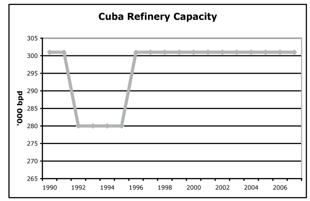


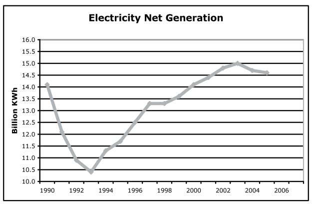


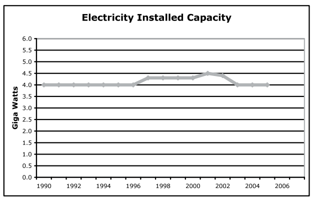


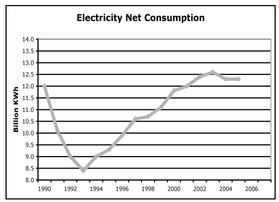


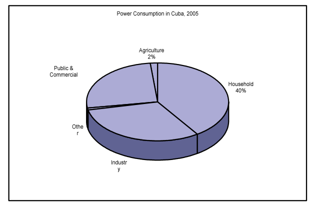




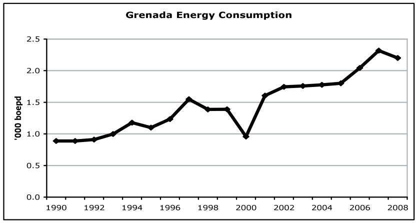


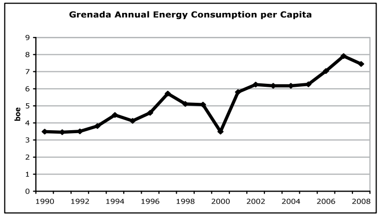


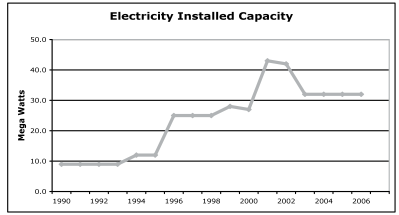


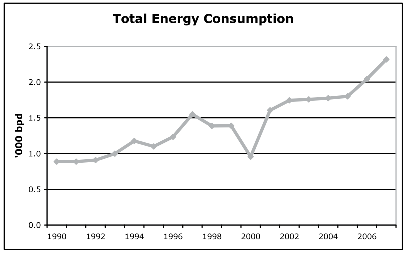


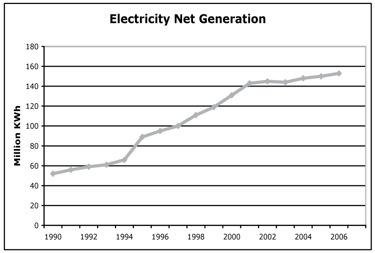
Grenada Historical Energy Data: A Statiscal Compilation

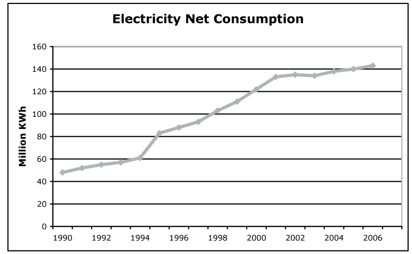


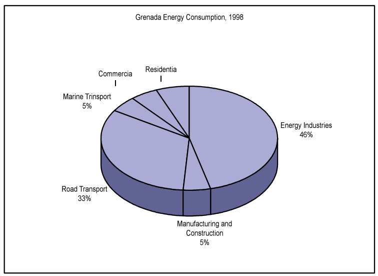




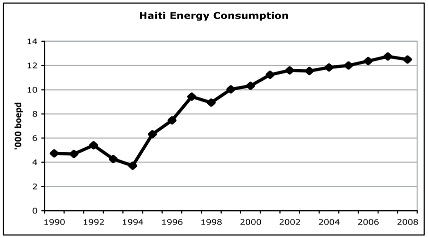


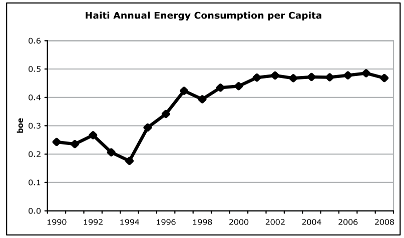


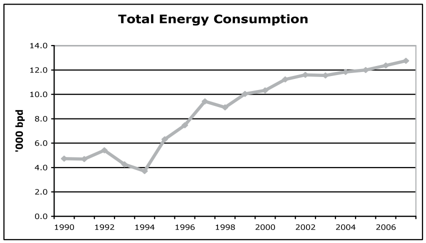


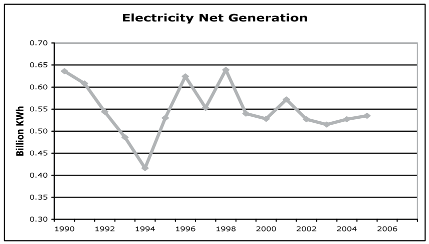


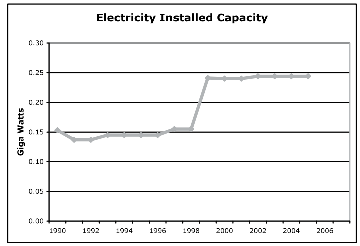
Haiti Historical Energy Data: A Statistical Compilation

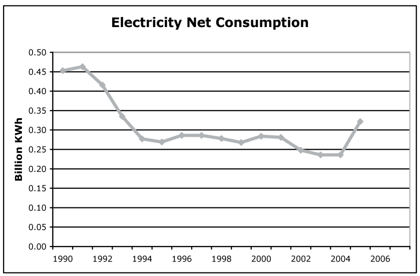


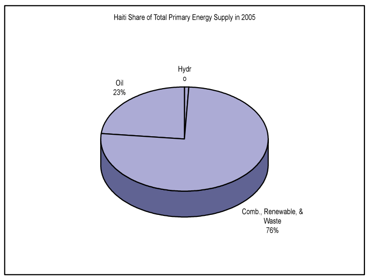


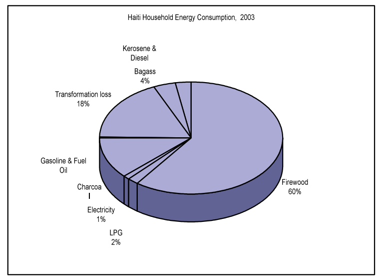




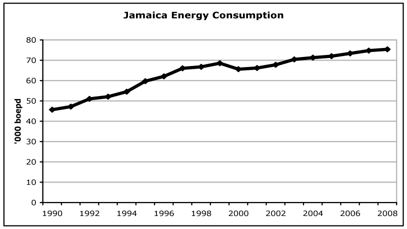


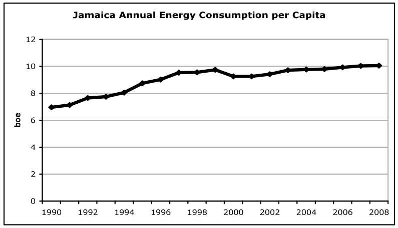


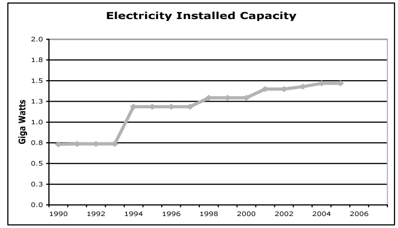


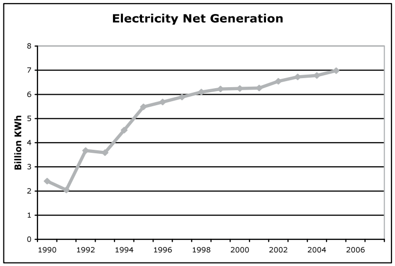


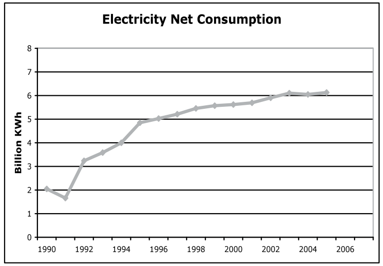
Grenada Historical Energy Data: A Statiscal Compilation

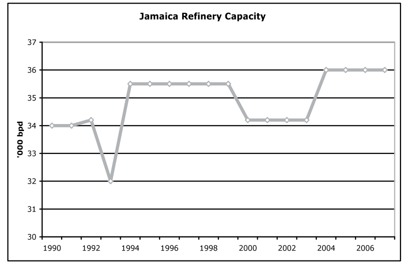


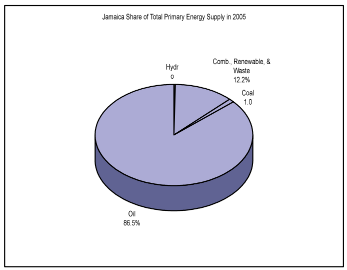




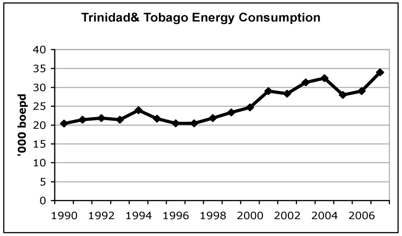


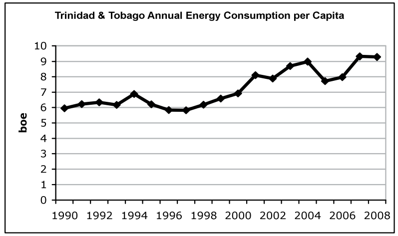


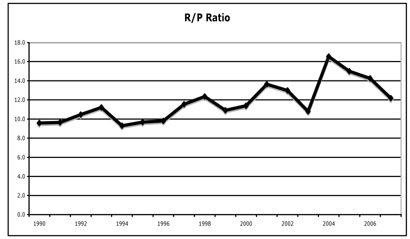


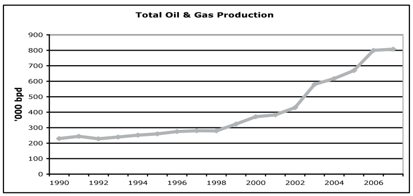


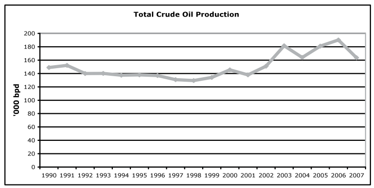
Trinidad & Tobago Energy Data: A Statiscal Compilation

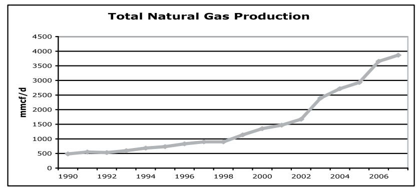


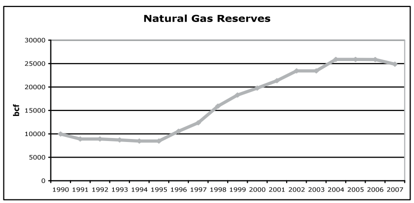


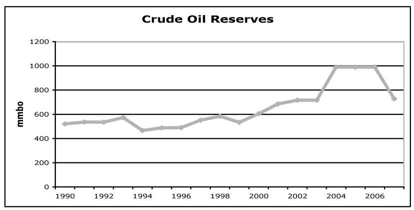


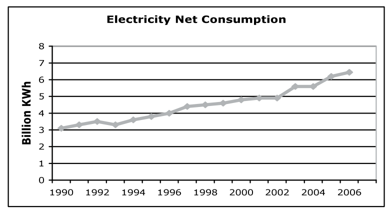




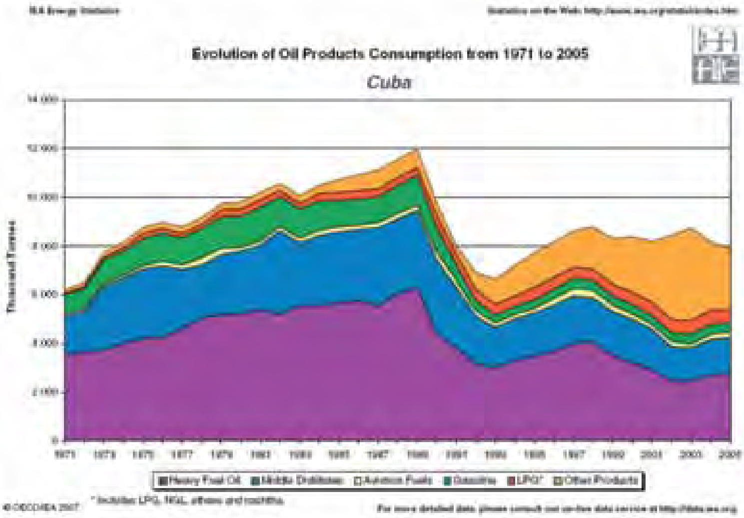


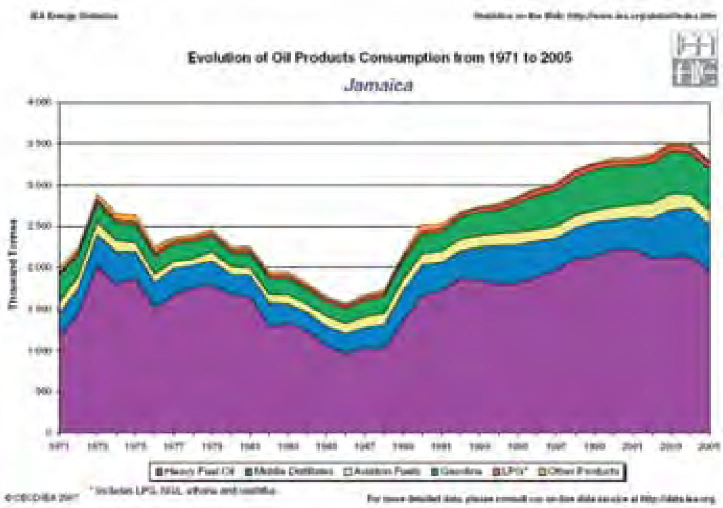


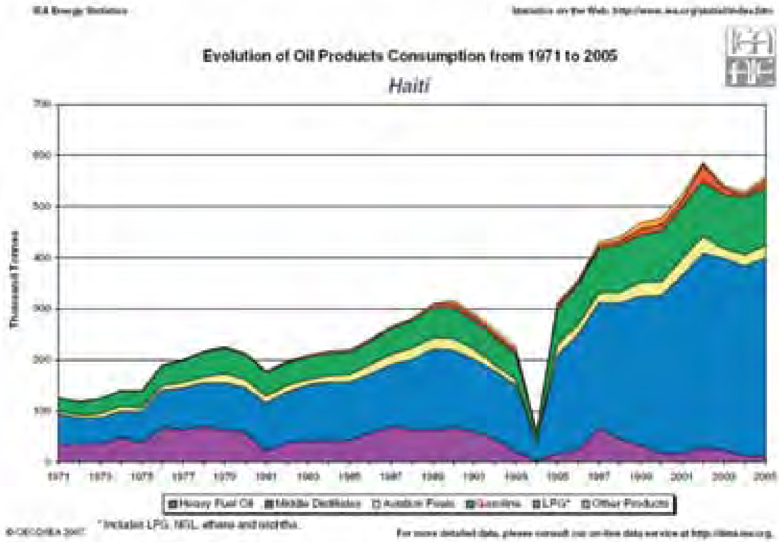


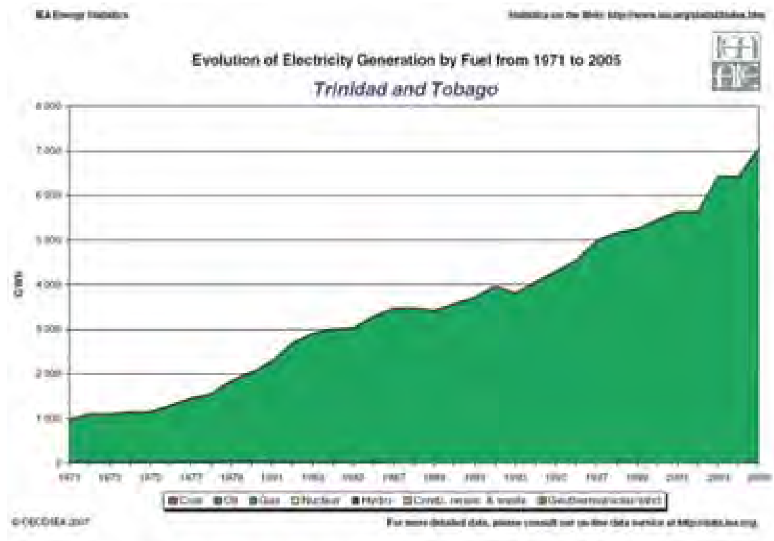


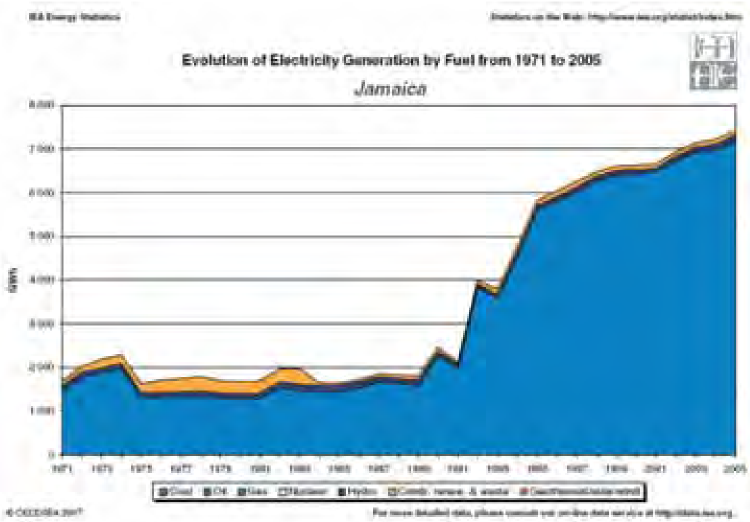
APPENDIX B
Productions Consumption 1971 - 2006
Electricity Generation 1971 - 2006
Distribution of Primary Energy Supply 2006

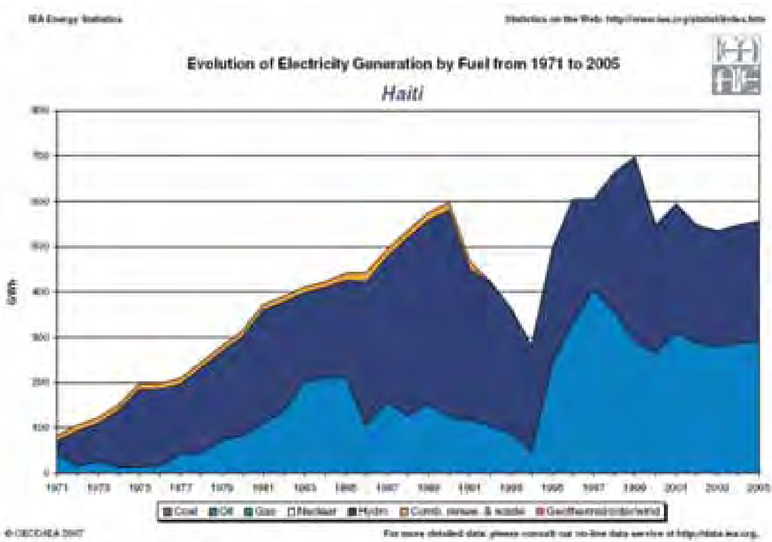

IEA Energy Statistics
Evolution of Oil Products Consumption from 1971 to 2005
Cuba
Thousand Tonnes
Heavy Fuel Oil
Middle Distillates
Aviation Fuels
Gasoline
LPG*
Other Products
* Includes LPG, NGL, ethane and naphtha.
© OECD/IEA 2007

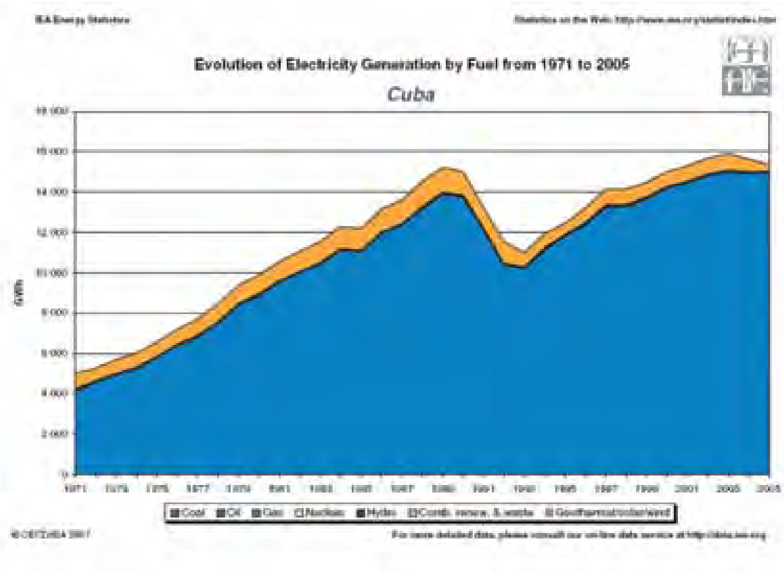

IEA Energy Statistics
Evolution of Oil Products Consumption from 1971 to 2005
Jamaica
Thousand Tonnes
Heavy Fuel Oil
Middle Distillates
Aviation Fuels
Gasoline
LPG*
Other Products
* Includes LPG, NGL, ethane and naphtha.
© OECD/IEA 2007


IEA Energy Statistics
Evolution of Oil Products Consumption from 1971 to 2005
Haiti
Thousand Tonnes
Heavy Fuel Oil
Middle Distillates
Aviation Fuels
Gasoline
LPG*
Other Products

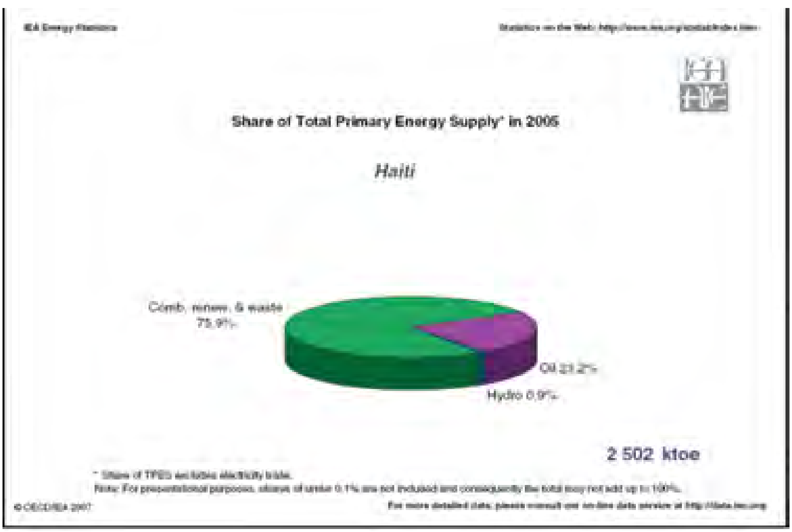

IEA Energy Statistics
Evolution of Electricity Generation by Fuel from 1971 to 2005
Trinidad and Tobago
GWh

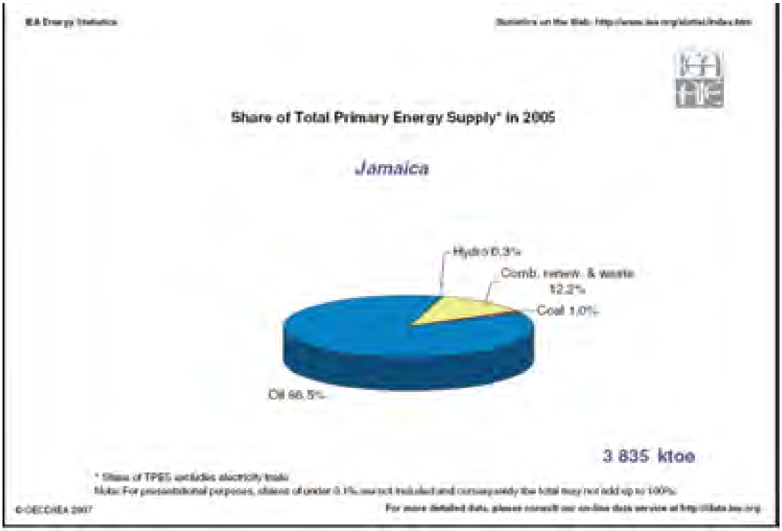

Evolution of Electricity Generation by Fuel from 1971 to 2005
Jamaica
GWh
1971
2005
Coal
Oil
Gas
Nuclear
Hydro
Comb. renew. & waste

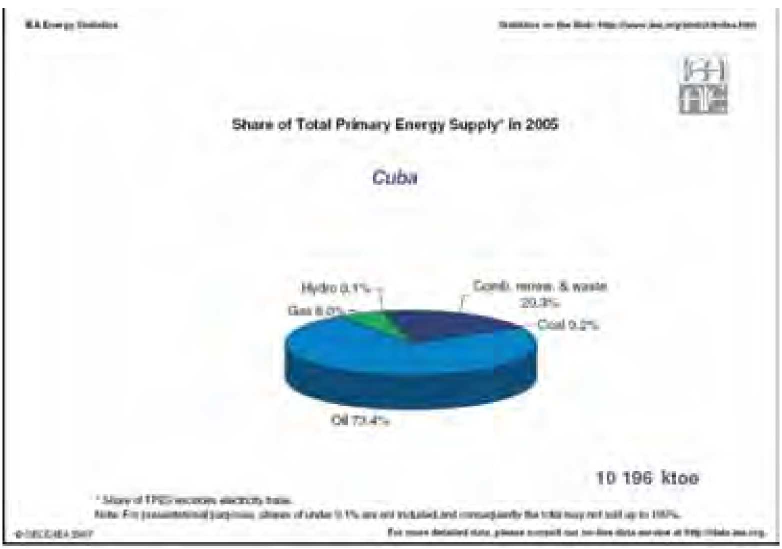

Evolution of Electricity Generation by Fuel from 1971 to 2005
Haiti
GWh
1971
2005
Coal
Oil
Gas
Nuclear
Hydro
Comb. renew. & waste



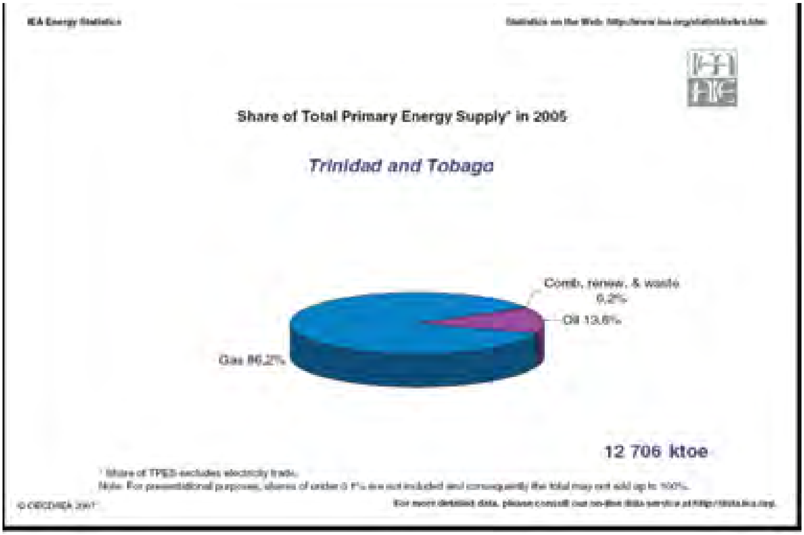
Distribution of Primary Energy Supply




Share of Total Primary Energy Supply* in 2005
Jamaica
Hydro 0.3%
Comb. renew. & waste 12.2%
Coal 1.0%
Oil 86.5%
3 835 ktoe


Share of Total Primary Energy Supply* in 2005
Cuba
Hydro 0.1%
Gas 6.0%
Comb. renew. & waste 20.3%
Coal 0.2%
Oil 73.4%
10 196 ktoe

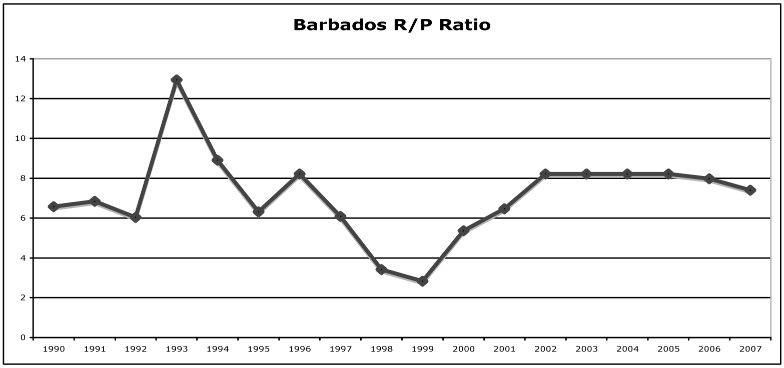
Source: IEA

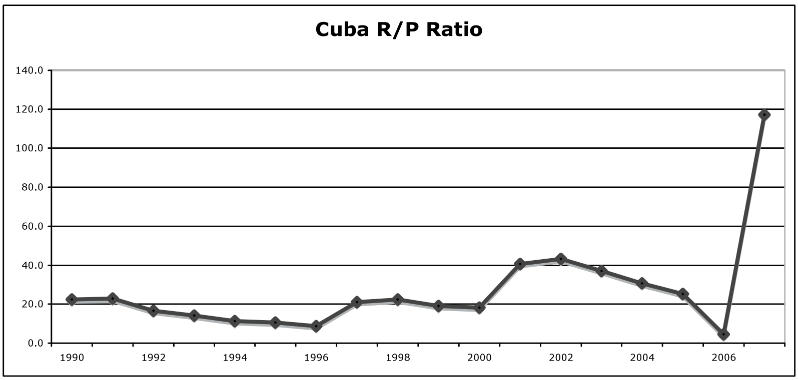

IEA Energy Statistics
Share of Total Primary Energy Supply* in 2005
Trinidad and Tobago
Comb. renew. & waste
0.2%
Oil 13.6%
Gas 86.2%
12 706 ktoe

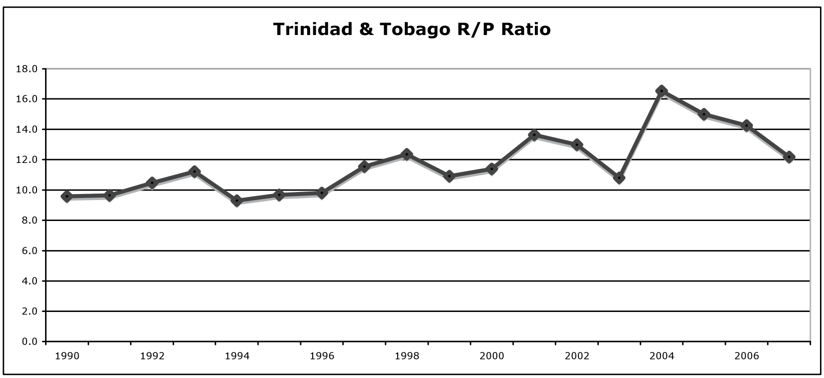
Source: IEA

Appendix C
Reserves to Production Ratio
Oil Producing Caribbean Island

Countries Reserve to Production Ratios

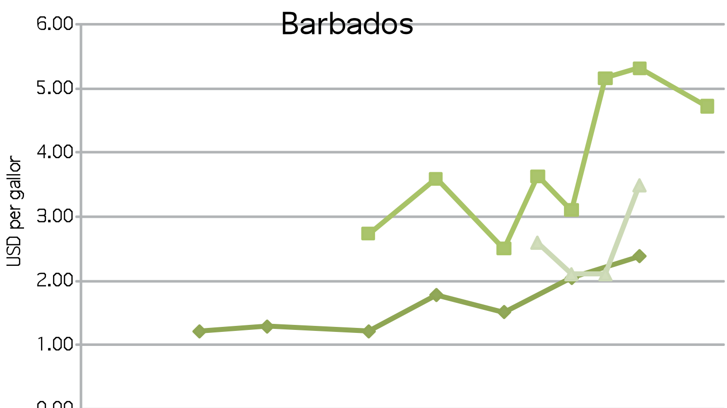






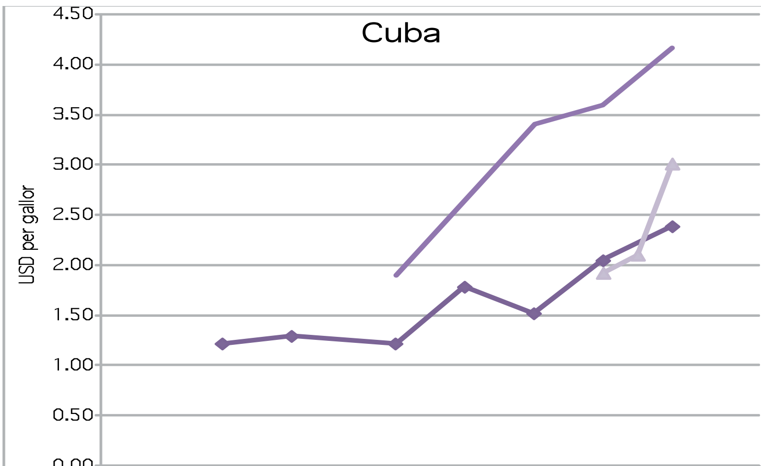
Source: EIA

APPENDIX D
Gasolene and Diesel Prices
Producing and Consuming Countries



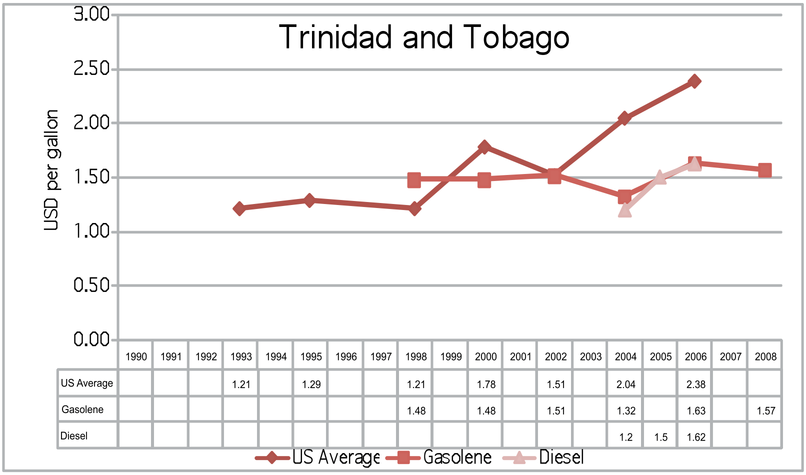
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.21		1.29			1.21		1.78		1.51		2.04		2.38		
Gasolene									2.73		3.59		2.50	3.63	3.10	5.16	5.31		4.72
Diesel														2.59	2.1	2.1	3.48		

US Average — Gasolene — Diesel

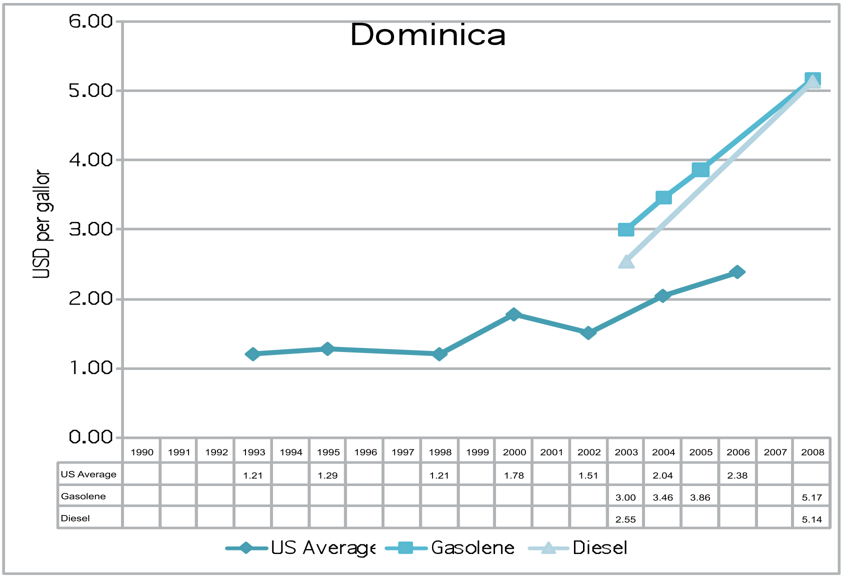


	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.2		1.2			1.2		1.7		1.5		2.0		2.3		
Gasolene									1.8				3.4		3.6		4.1		
Diesel															1.9	2.1	3		

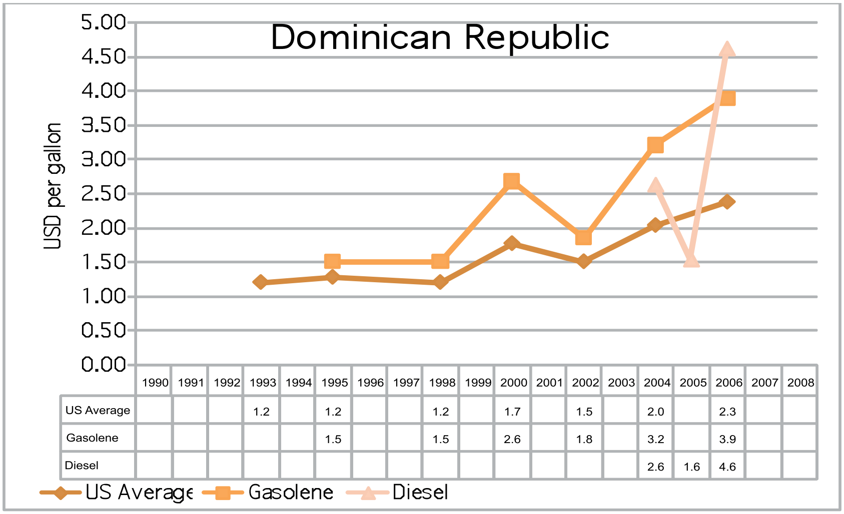
US Average — Gasolene — Diesel



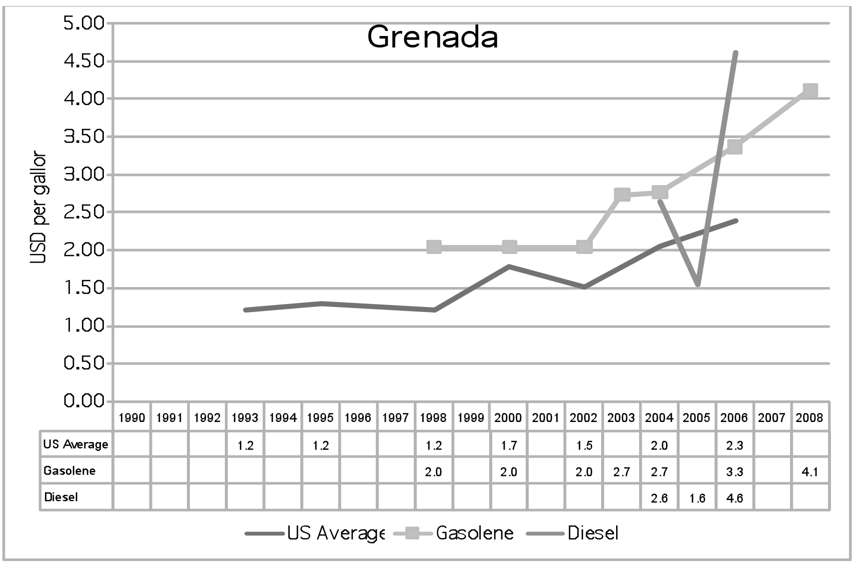
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.21		1.29			1.21		1.78		1.51		2.04		2.38		
Gasolene									1.48		1.48		1.51		1.32		1.63		1.57
Diesel															1.2	1.5	1.62		



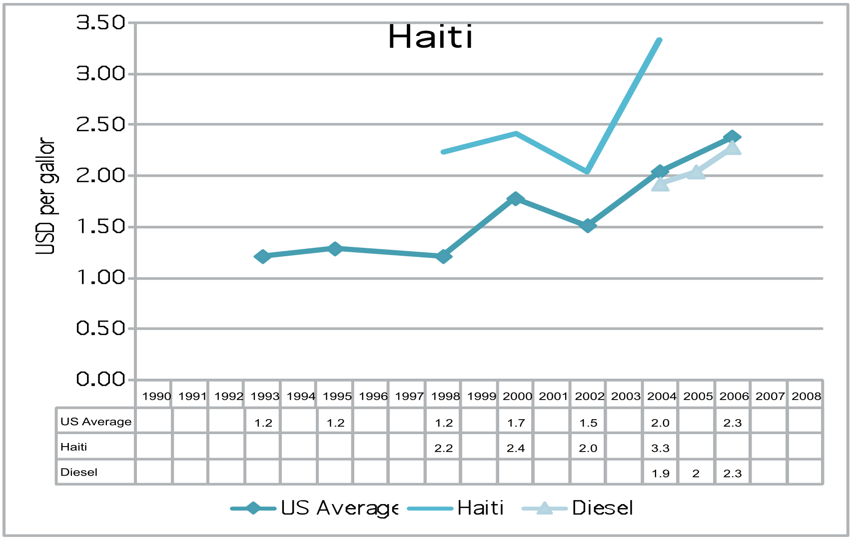
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.21		1.29			1.21		1.78		1.51		2.04		2.38		
Gasolene														3.00	3.46	3.86			5.17
Diesel														2.55					5.14



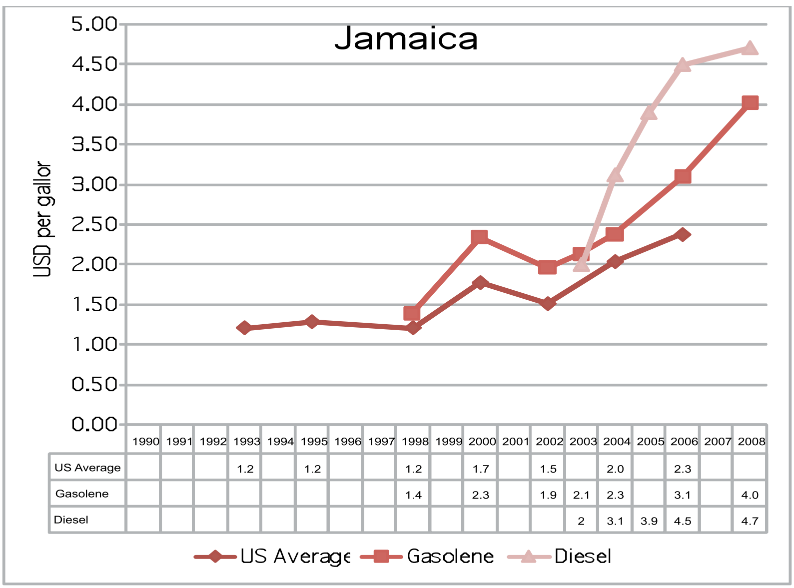
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.2		1.2			1.2		1.7		1.5		2.0		2.3		
Gasolene						1.5			1.5		2.6		1.8		3.2		3.9		
Diesel															2.6	1.6	4.6		



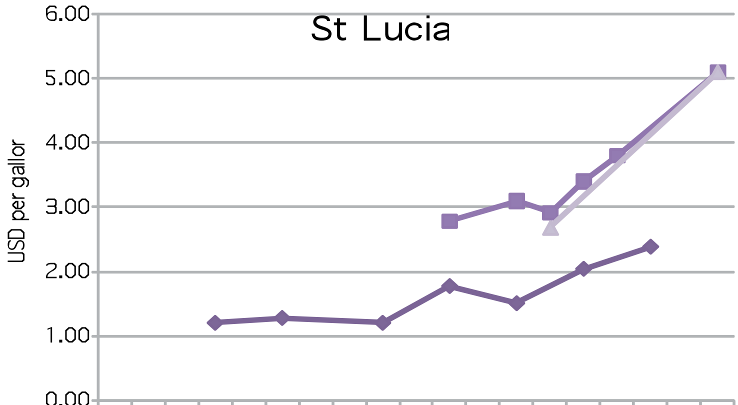
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.2		1.2			1.2		1.7		1.5		2.0		2.3		
Gasolene									2.0		2.0		2.0	2.7	2.7		3.3		4.1
Diesel															2.6	1.6	4.6		



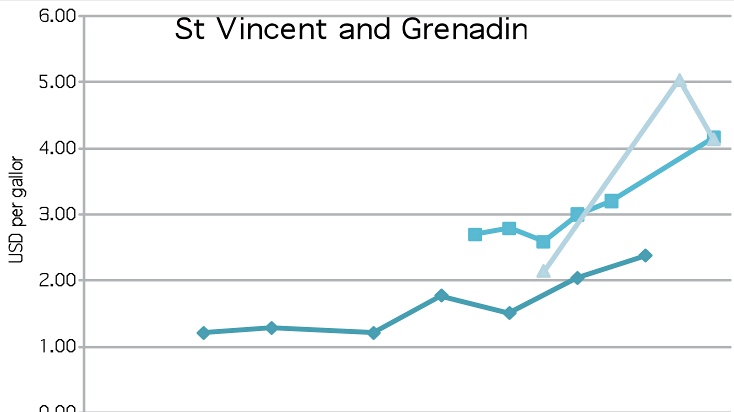
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.2		1.2			1.2		1.7		1.5		2.0		2.3		
Haiti									2.2		2.4		2.0		3.3				
Diesel															1.9	2	2.3		



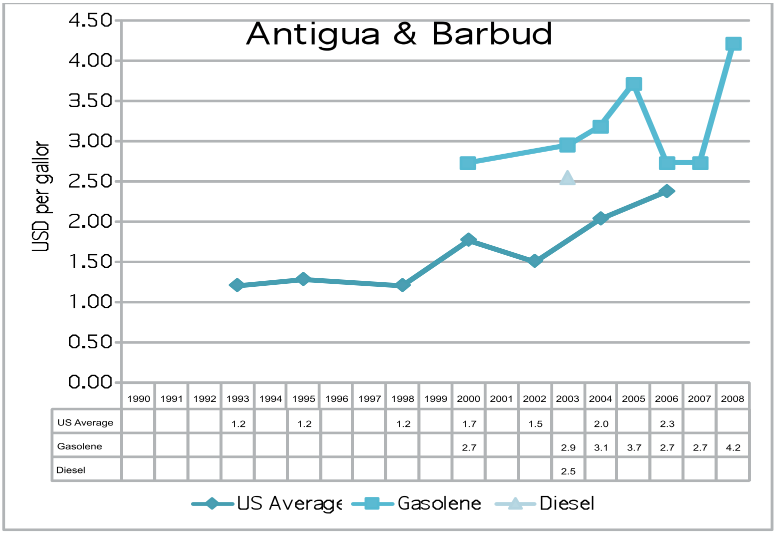
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.2		1.2			1.2		1.7		1.5		2.0		2.3		
Gasolene									1.4		2.3		1.9	2.1	2.3		3.1		4.0
Diesel														2	3.1	3.9	4.5		4.7



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.2		1.2			1.2		1.7		1.5		2.0		2.3		
Gasolene											2.7		3.1	2.9	3.4	3.8			5.1
Diesel														2.6					5.1



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.21		1.29			1.21		1.78		1.51		2.04		2.38		
Gasolene												2.70	2.79	2.59	3.00	3.20			4.16
Diesel														2.14				5.04	4.14



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US Average				1.2		1.2			1.2		1.7		1.5		2.0		2.3		
Gasolene											2.7			2.9	3.1	3.7	2.7	2.7	4.2
Diesel														2.5					

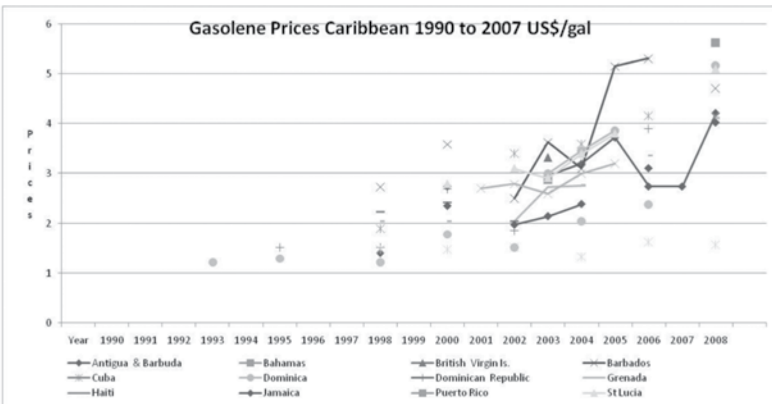


Figure 22

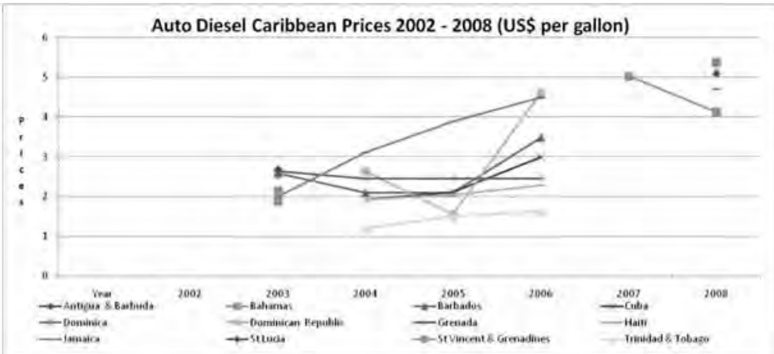
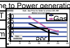

Auto Diesel Caribbean Prices 2002 - 2008 (US$ per gallon)
prices
Year
2002
2003
2004
2005
2006
2007
2008
Antigua & Barbuda
Bahamas
Barbados
Cuba
Dominica
Dominican Republic
Grenada
Haiti
Jamaica
St Lucia
St Vincent & Grenadines
Trinidad & Tobago

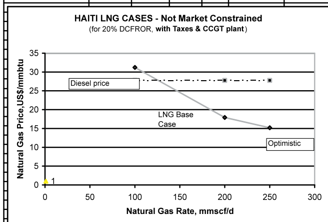
Figure 23

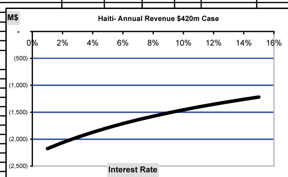
APPENDIX E
Calculation for LNG Options

Haiti LNG Option with CCGT

						Capital Costs	Unit Cost	
Assumptions						**US $**	**US$/mmbtu**	
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price						n/a	2.5	
2. Ship LNG via 70,000 cu metres tanker						n/a	0.7	
3. Install two 100,000 cu metre LNG tanks						300,000,000		
4. Construct Re-gasification terminal						200,000,000		
5. Build dedicated deep water harbour for LNG vessels						75,000,000		
6. Install 16 inch pipeline to Power generation facility						75,000,000		
7. Purchase new CCGT						1,000,000,000		
8. FEED						224,000,000		
9. Data Gathering, perm						35,000,000		
Total Capital Expenditures						**1,909,000,000**		
Power Requirements						1025	btu/kscf	
						0.15	mmbtu/gal	
Electrical Capacity installed is			MW			42	gallons/bbl	
Haiti uses for power generation			bbl/d diesel		or in BTUs	-	mmbtu/d	
					or in MMSCFD	-		
Constrained case for 250 mmscfd								
No Data available for Retail Diesel Sales								
Diesel Cost in Country					3.785	liters/gallons		
Diesel Cost in Country	US $	1.1	per litre	or US$	4.16	per gallon or	174.87	per barrel
Energy equivalent of diesel		6.30	mmbtu per barrel					
Unit Cost of Diesel	US	**$27.76**	**per mmbtu diesel**					
Unit LNG Cost (un-escalated)								
F.O.B. Cost of LNG		2.50	/mmbtu					
Shipping cost		0.70	/mmbtu					
Re-gas,jetty,gas turbine		0.00	/mmbtu					
capex recovery		variable						
	US	**$3.20**	**/mmbtu**	**LNG**				







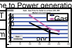
HAITI LNG OPTION WITH CCGT

Cashflow for Re-Gas Facility and Gas Turbines					**Years**				
Capital Expenditures	**1**	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**
1. Data Gathering, Permitting etc	**35**	**0**	**0**						
2. FEED	**0**	**224**	**0**						
3. Install 100,000 cu metre LNG tank	**0**	**0**	**50**	**150**	**100**				
4. Construct Re-gasification terminal 50mm/d capacity	**0**	**0**	**50**	**100**	**50**				
5. Build dedicated deep water harbour for LNG vessels	**0**	**0**	**25**	**25**	**25**				
6. Install 16 inch pipeline to Power generation facility	**0**	**0**	**25**	**25**	**25**				
7. Purchase new Combined Cycle Gas Turbine	**0**	**100**	**300**	**300**	**300**				
Sub-Total	**35**	**324**	**450**	**600**	**500**				
Volume Variable									
For 20% IRR									
			200	mmscfd					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	200	200	200	200
Unit Sales price, $/mmbtu						9.6	9.6	9.6	9.6
Annual Gas Sales M$						718.3	718.3	718.3	718.3
Operating Costs @ 5% of Capex						95.45	95.45	95.45	95.45
Net Cash Flow	(35)	(324)	(450)	(600)	(500)	623	623	623	623
Cumulative Net Cash Flow	-35.0	-359.0	-809.0	-1409.0	-1909.0	-1286.1	-663.3	-40.4	582.5
				Payout Time					
Cum NCF	6811			Cum Capex	1909.0				
DCFROR	20.1%			Cum Opex	1814				
NPV 10	1583.11								
Reality Case									
Revenue = 75 M$			200.00	mmscfd					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	200	200	200	200
Unit Sales price, $/mmbtu						1.0	1.0	1.0	1.0
Annual Gas Sales M$						74.8	74.8	74.8	74.8
Operating Costs @ 5% of Capex						95.45	95.45	95.45	95.45
5%									
Net Cash Flow	(35)	(324)	(450)	(600)	(500)	(21)	(21)	(21)	(21)
Cumulative Net Cash Flow	-35.0	-359.0	-809.0	-1409.0	-1909.0	-1929.6	-1950.3	-1970.9	-1991.5
				Payout Time					
Cum NCF	-2198			Cum Capex	1909.0				
DCFROR	#DIV/0!			Cum Opex	1814				
NPV 10	-1455.3	10%							
	Haiti	-1455.334							
	1%	(2,176.1)							
	2%	(2,064.1)							
	3%	(1,963.0)							
	4%	(1,871.2)							
	5%	(1,787.3)							
	6%	(1,710.3)							
	7%	(1,639.3)							
	8%	(1,573.5)							
	9%	(1,512.4)							
	10%	(1,455.3)							
	11%	(1,401.9)							
	12%	(1,351.8)							
	13%	(1,304.7)							
	14%	(1,260.2)							
	15%	(1,218.2)							

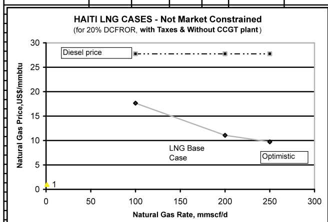
HAITI WITH CCGT

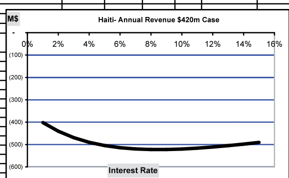
Haiti LNG Option without CCGT

Assumptions				Capital Costs US $	Unit Cost US$/mmbtu
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price				n/a	2.5
2. Ship LNG via 70,000 cu metres tanker				n/a	0.7
3. Install two 100,000 cu metre LNG tanks				300,000,000	
4. Construct Re-gasification terminal				200,000,000	
5. Build dedicated deep water harbour for LNG vessels				75,000,000	
6. Install 16 inch pipeline to Power generation facility				75,000,000	
7. Purchase new CCGT				0	
8. FEED				224,000,000	
9. Data Gathering, perm				35,000,000	
Total Capital Expenditures				909,000,000	



Power Requirements						
				1025	btu/kscf	
				0.15	mmbtu/gal	
Electrical Capacity installed is		MW		42	gallons/bbl	
Cuba uses for power generation		bbl/d diesel	or in BTUs	-	mmbtu/d	
			or in MMSCFD	-		
Constrained case for 250 mmscfd						
No Data available for Retail Diesel Sales						
Diesel Cost in Country			3.785	liters/gallons		
Diesel Cost in Country	US $ 1.1	per litre	or US$ 4.16	per gallon or	174.87	per barrel
Energy equivalent of diesel	6.30	mmbtu per barrel				
Unit Cost of Diesel	US $27.76	per mmbtu diesel				
Unit LNG Cost (un-escalated)						
F.O.B. Cost of LNG	2.50	/mmbtu				
Shipping cost	0.70	/mmbtu				
Re-gas,jetty,gas turbine	0.00	/mmbtu				
capex recovery	variable					
	US $3.20	/mmbtu	LNG			





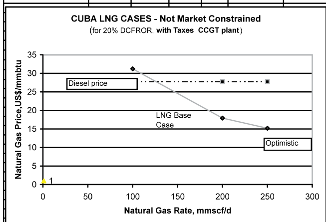
HAITI LNG OPTION WITH CCGT

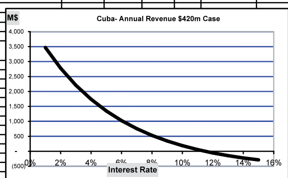
Cashflow for Re-Gas Facility and Gas Turbines		Years 1	2	3	4	5	7	8	9	10
Capital Expenditures		1	2	3	4	5	7	8	9	10
1. Data Gathering, Permitting etc		35	0	0						
2. FEED		0	224	0						
3. Install 100,000 cu metre LNG tank		0	0	50	150	100				
4. Construct Re-gasification terminal 50mm/d capacity		0	0	50	100	50				
5. Build dedicated deep water harbour for LNG vessels		0	0	25	25	25				
6. Install 16 inch pipeline to Power generation facility		0	0	25	25	25				
7. Purchase new Combined Cycle Gas Turbine		0	0	0	0	0				
Sub-Total		35	224	150	300	200				
Volume Variable For 20% IRR				200	mmscfd					
Natural Gas Sales Rate, mmscf/d		0	0	0	0	0	200	200	200	200
Unit Sales price, $/mmbtu							4.7	4.7	4.7	4.7
Annual Gas Sales M$							351.7	351.7	351.7	351.7
Operating Costs @ 5% of Capex							45.45	45.45	45.45	45.45
Net Cash Flow		(35)	(224)	(150)	(300)	(200)	306	306	306	306
Cumulative Net Cash Flow		-35.0	-259.0	-409.0	-709.0	-909.0	-602.8	-296.5	9.7	315.9
					Payout Time					
	Cum NCF	3378			Cum Capex	909.0				
	DCFROR	20.0%			Cum Opex	864				
	NPV 10	787.21								
Reality Case Revenue = 75 M$				200.00	mmscfd					
Natural Gas Sales Rate, mmscf/d		0	0	0	0	0	200	200	200	200
Unit Sales price, $/mmbtu							1.0	1.0	1.0	1.0
Annual Gas Sales M$							74.8	74.8	74.8	74.8
Operating Costs @ 5% of Capex							45.45	45.45	45.45	45.45
	5%									
Net Cash Flow		(35)	(224)	(150)	(300)	(200)	29	29	29	29
Cumulative Net Cash Flow		-35.0	-259.0	-409.0	-709.0	-909.0	-879.6	-850.3	-820.9	-791.5
					Payout Time					
	Cum NCF	-498			Cum Capex	909.0				
	DCFROR	-3.7%			Cum Opex	864				
	NPV 10	-520.0	10%							
		Haiti	-520.025							
		1%	(401.7)							
		2%	(440.3)							
		3%	(469.1)							
		4%	(490.0)							
		5%	(504.7)							
		6%	(514.3)							
		7%	(520.0)							
		8%	(522.4)							
		9%	(522.2)							
		10%	(520.0)							
		11%	(516.2)							
		12%	(511.1)							
		13%	(505.0)							
		14%	(498.1)							
		15%	(490.7)							

HAITI WITHOUT CCGT

Cuba LNG Option with CCGT								
						Capital Costs	**Unit Cost**	
Assumptions						**US $**	**US$/mmbtu**	
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price						n/a	2.5	
2. Ship LNG via 70,000 cu metres tanker						n/a	0.7	
3. Install two 100,000 cu metre LNG tanks						300,000,000		
4. Construct Re-gasification terminal						200,000,000		
5. Build dedicated deep water harbour for LNG vessels						75,000,000		
6. Install 16 inch pipeline to Power generation facility						75,000,000		
7. Purchase new CCGT						1,000,000,000		
8. FEED						224,000,000		
9. Data Gathering, perm						35,000,000		
Total Capital Expenditures						**1,909,000,000**		
Power Requirements						1025	btu/kscf	
						0.15	mmbtu/gal	
Electrical Capacity installed is		4000	MW			42	gallons/bbl	
Cuba uses for power generation		150000	bbl/d diesel		or in BTUs	945,000	mmbtu/d	
					or in MMSCFD	921.95		
Constrained case for 250 mmscfd								
No Data available for Retail Diesel Sales								
Diesel Cost in Country					3.785	liters/gallons		
Diesel Cost in Country	US $	1.1	per litre	or US$	4.16	per gallon or	174.87	per barrel
Energy equivalent of diesel		6.30	mmbtu per barrel					
Unit Cost of Diesel	US	**$27.76**	**per mmbtu diesel**					
Unit LNG Cost (un-escalated)								
F.O.B. Cost of LNG		2.50	/mmbtu					
Shipping cost		0.70	/mmbtu					
Re-gas,jetty,gas turbine		0.00	/mmbtu					
capex recovery		variable						
	US	**$3.20**	**/mmbtu**	**LNG**				

Cuba LNG OPTION WITH CCGT									
Cashflow for Re-Gas Facility and Gas Turbines					**Years**				
Capital Expenditures	**1**	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**
1. Data Gathering, Permitting etc	**35**	**0**	**0**						
2. FEED	**0**	**224**	**0**						
3. Install 100,000 cu metre LNG tank	**0**	**0**	**50**	**150**	**100**				
4. Construct Re-gasification terminal 50mm/d capacity	**0**	**0**	**50**	**100**	**50**				
5. Build dedicated deep water harbour for LNG vessels	**0**	**0**	**25**	**25**	**25**				
6. Install 16 inch pipeline to Power generation facility	**0**	**0**	**25**	**25**	**25**				
7. Purchase new Combined Cycle Gas Turbine	**0**	**100**	**300**	**300**	**300**				
Sub-Total	**35**	**324**	**450**	**600**	**500**				
Volume Variable									
For 20% IRR									
			200	**mmscfd**					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	200	200	200	200
Unit Sales price, $/mmbtu						9.6	9.6	9.6	9.6
Annual Gas Sales M$						718.3	718.3	718.3	718.3
Operating Costs @ 5% of Capex						95.45	95.45	95.45	95.45
Net Cash Flow	(35)	(324)	(450)	(600)	(500)	623	623	623	623
Cumulative Net Cash Flow	-35.0	-359.0	-809.0	-1409.0	-1909.0	-1286.1	-663.3	-40.4	582.5
				Payout Time					
Cum NCF	6811			Cum Capex	1909.0				
DCFROR	20.1%			Cum Opex	1814				
NPV 10	1583.11								
Reality Case									
Revenue = 420 M$			200.00	**mmscfd**					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	200	200	200	200
Unit Sales price, $/mmbtu						5.7	5.7	5.7	5.7
Annual Gas Sales M$						422.8	422.8	422.8	422.8
Operating Costs @ 5% of Capex						95.45	95.45	95.45	95.45
5%									
Net Cash Flow	(35)	(324)	(450)	(600)	(500)	327	327	327	327
Cumulative Net Cash Flow	-35.0	-359.0	-809.0	-1409.0	-1909.0	-1581.7	-1254.4	-927.1	-599.8
				Payout Time					
Cum NCF	2673			Cum Capex	1909.0				
DCFROR	11.5%			Cum Opex	1814				
NPV 10	187.5	10%							
	Cuba	187.544							
	1%	3,470.1							
	2%	2,779.9							
	3%	2,210.8							
	4%	1,740.4							
	5%	1,350.5							
	6%	1,026.5							
	7%	756.9							
	8%	532.1							
	9%	344.4							
	10%	187.5							
	11%	56.3							
	12%	(53.4)							
	13%	(145.2)							
	14%	(221.9)							
	15%	(285.9)							

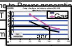


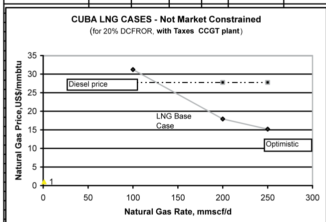


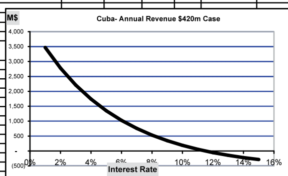
CUBA WITH CCGT

Cuba LNG Option with CCGT

				Capital Costs	Unit Cost	
Assumptions				**US $**	**US$/mmbtu**	
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price				n/a	2.5	
2. Ship LNG via 70,000 cu metres tanker				n/a	0.7	
3. Install two 100,000 cu metre LNG tanks				300,000,000		
4. Construct Re-gasification terminal				200,000,000		
5. Build dedicated deep water harbour for LNG vessels				75,000,000		
6. Install 16 inch pipeline to Power generation facility				75,000,000		
7. Purchase new CCGT				1,000,000,000		
8. FEED				224,000,000		
9. Data Gathering, perm				35,000,000		
Total Capital Expenditures				**1,909,000,000**		
Power Requirements				1025	btu/kscf	
				0.15	mmbtu/gal	
Electrical Capacity installed is	4000	MW		42	gallons/bbl	
Cuba uses for power generation	150000	bbl/d diesel	or in BTUs	945,000	mmbtu/d	
			or in MMSCFD	921.95		
Constrained case for 250 mmscfd						
No Data available for Retail Diesel Sales						
Diesel Cost in Country			3.785	liters/gallons		
Diesel Cost in Country US $	1.1	per litre	or US$ 4.16	per gallon or	174.87	per barrel
Energy equivalent of diesel	6.30	mmbtu per barrel				
Unit Cost of Diesel US	**$27.76**	**per mmbtu diesel**				
Unit LNG Cost (un-escalated)						
F.O.B. Cost of LNG	2.50	/mmbtu				
Shipping cost	0.70	/mmbtu				
Re-gas,jetty,gas turbine	0.00	/mmbtu				
capex recovery	variable					
US	**$3.20**	**/mmbtu**	**LNG**			







Cuba LNG OPTION WITH CCGT

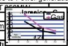
Cashflow for Re-Gas Facility and Gas Turbines (Years)

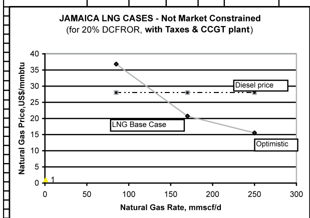
Capital Expenditures	**1**	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**
1. Data Gathering, Permitting etc	**35**	**0**	**0**						
2. FEED	**0**	**224**	**0**						
3. Install 100,000 cu metre LNG tank	**0**	**0**	**50**	**150**	**100**				
4. Construct Re-gasification terminal 50mm/d capacity	**0**	**0**	**50**	**100**	**50**				
5. Build dedicated deep water harbour for LNG vessels	**0**	**0**	**25**	**25**	**25**				
6. Install 16 inch pipeline to Power generation facility	**0**	**0**	**25**	**25**	**25**				
7. Purchase new Combined Cycle Gas Turbine	**0**	**100**	**300**	**300**	**300**				
Sub-Total	**35**	**324**	**450**	**600**	**500**				
Volume Variable For 20% IRR									
			200	**mmscfd**					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	200	200	200	200
Unit Sales price, $/mmbtu						9.6	9.6	9.6	9.6
Annual Gas Sales M$						718.3	718.3	718.3	718.3
Operating Costs @ 5% of Capex						95.45	95.45	95.45	95.45
Net Cash Flow	(35)	(324)	(450)	(600)	(500)	623	623	623	623
Cumulative Net Cash Flow	-35.0	-359.0	-809.0	-1409.0	-1909.0	-1286.1	-663.3	-40.4	582.5
				Payout Time					
Cum NCF	6811			Cum Capex	1909.0				
DCFROR	20.1%			Cum Opex	1814				
NPV 10	1583.11								
Reality Case Revenue = 420 M$			200.00	**mmscfd**					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	200	200	200	200
Unit Sales price, $/mmbtu						5.7	5.7	5.7	5.7
Annual Gas Sales M$						422.8	422.8	422.8	422.8
Operating Costs @ 5% of Capex						95.45	95.45	95.45	95.45
5%									
Net Cash Flow	(35)	(324)	(450)	(600)	(500)	327	327	327	327
Cumulative Net Cash Flow	-35.0	-359.0	-809.0	-1409.0	-1909.0	-1581.7	-1254.4	-927.1	-599.8
				Payout Time					
Cum NCF	2673			Cum Capex	1909.0				
DCFROR	11.5%			Cum Opex	1814				
NPV 10	187.5	10%							
	Cuba	187.544							
	1%	3,470.1							
	2%	2,779.9							
	3%	2,210.8							
	4%	1,740.4							
	5%	1,350.5							
	6%	1,026.5							
	7%	756.9							
	8%	532.1							
	9%	344.4							
	10%	187.5							
	11%	56.3							
	12%	(53.4)							
	13%	(145.2)							
	14%	(221.9)							
	15%	(285.9)							

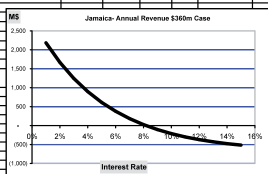
CUBA WITH CCGT

Jamaica LNG Option With CCGT

					Capital Costs	Unit Cost	
Assumptions					**US $**	**US$/mmbtu**	
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price					n/a	2.5	
2. Ship LNG via 70,000 cu metres tanker					n/a	0.7	
3. Install 100,000 cu metre LNG tank					300,000,000		
4. Construct Re-gasification terminal					75,000,000		
5. Build dedicated deep water harbour for LNG vessels					75,000,000		
6. Install 16 inch pipeline to Power generation facility					25,000,000		
7. Purchase new CCGT					1,450,000,000		
8. FEED					96,250,000		
9. Data Gathering, perm					35,000,000		
Total Capital Expenditu					**2,056,250,000**		
Power Requirements					1025	btu/kscf	
					0.15	mmbtu/gal	
Electrical Capacity installed is		1450	MW		42	gallons/bbl	
Jamaica uses for power generation		40000	bbl/d diesel	or in BTUs	252,000	mmbtu/d	
				or in MMSCFD	245.85		
CEIS Data Year Avg 2008							
Diesel Cost in Country				3.785	liters/gallons		
Diesel Cost in Country	US $	1.11	per litre	or US$ 4.20	per gallon or	176.46	per barrel
Energy equivalent of diesel		6.30	mmbtu per barrel				
Unit Cost of Diesel	US	**$28.01**	**per mmbtu diesel**				
Unit LNG Cost (un-escalated)							
F.O.B. Cost of LNG		2.50	/mmbtu				
Shipping cost		0.70	/mmbtu				
Re-gas,jetty,gas turbine		0.00	/mmbtu				
capex recovery		variable					
	US	**$3.20**	**/mmbtu**	**LNG**			







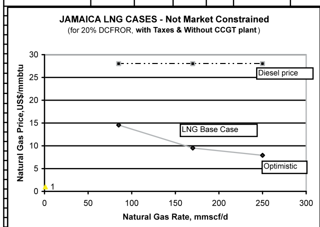
JAMAICA LNG OPTION WITH CCGT

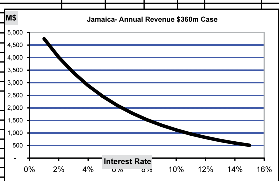
Cashflow for Re-Gas Facility and Gas Turbines				Years					
Capital Expenditures	1	2	3	4	5	7	8	9	10
1. Data Gathering, Permitting etc	35	0	0						
2. FEED	0	96.25	0						
3. Install 100,000 cu metre LNG tank	0	0	50	150	100				
4. Construct Re-gasification terminal 50mm/d capacity	0	0	25	25	25				
5. Build dedicated deep water harbour for LNG vessel	0	0	25	25	25				
6. Install 16 inch pipeline to Power generation facility	0	0	5	5	15				
7. Purchase new Combined Cycle Gas Turbine	0	0	450	500	500				
Sub-Total	35	96.25	555	705	665				
Volume Variable									
For 20% IRR									
			170	mmscfd					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	170	170	170	170
Unit Sales price, $/mmbtu						11.6	11.6	11.6	11.6
Annual Gas Sales M$						737.8	737.8	737.8	737.8
Operating Costs @ 5% of Capex						102.8125	102.8125	102.8125	102.8125
Net Cash Flow	(35)	(96)	(555)	(705)	(665)	635	635	635	635
Cumulative Net Cash Flow	-35.0	-131.3	-686.3	-1391.3	-2056.3	-1421.3	-786.3	-151.4	483.6
				Payout Time					
Cum NCF	6833			Cum Capex	2056.3				
DCFROR	20.1%			Cum Opex	1953				
NPV 10	1575.37								
Reality Case									
Revenue = 360 M$			170.00	mmscfd					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	170	170	170	170
Unit Sales price, $/mmbtu						5.7	5.7	5.7	5.7
Annual Gas Sales M$						359.3	359.3	359.3	359.3
Operating Costs @ 5% of Capex						102.8125	102.8125	102.8125	102.8125
5%									
Net Cash Flow	(35)	(96)	(555)	(705)	(665)	257	257	257	257
Cumulative Net Cash Flow	-35.0	-131.3	-686.3	-1391.3	-2056.3	-1799.7	-1543.2	-1286.6	-1030.1
				Payout Time					
Cum NCF	1535			Cum Capex	2056.3				
DCFROR	8.2%			Cum Opex	1953				
NPV 10	-211.5	10%							
	Jamaica	-211.481							
	1%	2,185.1							
	2%	1,668.0							
	3%	1,244.8							
	4%	897.6							
	5%	612.4							
	6%	377.9							
	7%	185.0							
	8%	26.2							
	9%	(104.3)							
	10%	(211.5)							
	11%	(299.3)							
	12%	(371.1)							
	13%	(429.4)							
	14%	(476.6)							
	15%	(514.4)							

JAMAICA WITH CCGT

Jamaica LNG Option Without CCGT

						Capital Costs	Unit Cost	
Assumptions						**US $**	**US$/mmbtu**	
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price						n/a	2.5	
2. Ship LNG via 70,000 cu metres tanker						n/a	0.7	
3. Install 100,000 cu metre LNG tank						300,000,000		
4. Construct Re-gasification terminal						75,000,000		
5. Build dedicated deep water harbour for LNG vessels						75,000,000		
6. Install 16 inch pipeline to Power generation facility						25,000,000		
7. Purchase new CCGT 250MW						0		
8. FEED						23,750,000		
9. Data Gathering, perm						35,000,000		
Total Capital Expenditu						**533,750,000**		
Power Requirements						1025	btu/kscf	
						0.15	mmbtu/gal	
Electrical Capacity installed is		1450	MW			42	gallons/bbl	
Jamaica uses for power generation		40000	bbl/d diesel		or in BTUs	252,000	mmbtu/d	
					or in MMSCFD	245.85		
CEIS Data Year Avg 2008								
Diesel Cost in Country					3.785	liters/gallons		
Diesel Cost in Country	US $	1.11	per litre	or US$	4.20	per gallon or	176.46	per barrel
Energy equivalent of diesel		6.30	mmbtu per barrel					
Unit Cost of Diesel	US	**$28.01**	**per mmbtu diesel**					
Unit LNG Cost (un-escalated)								
F.O.B. Cost of LNG		2.50	/mmbtu					
Shipping cost		0.70	/mmbtu					
Re-gas,jetty,gas turbine		0.00	/mmbtu					
capex recovery		variable						
	US	**$3.20**	**/mmbtu**	**LNG**				





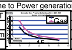
JAMAICA LNG OPTION WITHOUT CCGT

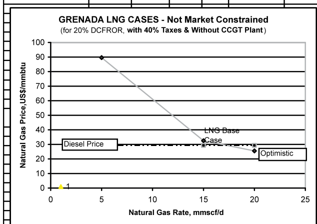
Cashflow for Re-Gas Facility and Gas Turbines					Years				
Capital Expenditures	1	2	3	4	5	7	8	9	10
1. Data Gathering, Permitting etc	35	0	0						
2. FEED	0	96.25	0						
3. Install 100,000 cu metre LNG tank	0	0	50	150	100				
4. Construct Re-gasification terminal 50mm/d capacity	0	0	25	25	25				
5. Build dedicated deep water harbour for LNG vessel	0	0	25	25	25				
6. Install 16 inch pipeline to Power generation facility	0	0	5	5	15				
7. Purchase new Combined Cycle Gas Turbine	0	0	0	0	0				
Sub-Total	35	96.25	105	205	165				
Volume Variable									
For 20% IRR									
			170	mmscfd					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	170	170	170	170
Unit Sales price, $/mmbtu						11.6	11.6	11.6	11.6
Annual Gas Sales M$						737.8	737.8	737.8	737.8
Operating Costs @ 5% of Capex						30.3125	30.3125	30.3125	30.3125
Net Cash Flow	(35)	(96)	(105)	(205)	(165)	707	707	707	707
Cumulative Net Cash Flow	-35.0	-131.3	-236.3	-441.3	-606.3	101.2	808.7	1516.1	2223.6
				Payout Time					
Cum NCF	9298			Cum Capex	606.3				
DCFROR	44.0%			Cum Opex	576				
NPV 10	2907.76								
Reality Case									
Revenue = 360 M$			170.00	mmscfd					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	170	170	170	170
Unit Sales price, $/mmbtu						5.7	5.7	5.7	5.7
Annual Gas Sales M$						359.3	359.3	359.3	359.3
Operating Costs @ 5% of Capex						30.3125	30.3125	30.3125	30.3125
5%									
Net Cash Flow	(35)	(96)	(105)	(205)	(165)	329	329	329	329
Cumulative Net Cash Flow	-35.0	-131.3	-236.3	-441.3	-606.3	-277.2	51.8	380.9	709.9
				Payout Time					
Cum NCF	4000			Cum Capex	606.3				
DCFROR	28.3%			Cum Opex	576				
NPV 10	1120.9	10%							
	Jamaica	1120.907							
	1%	4,754.6							
	2%	4,016.2							
	3%	3,401.8							
	4%	2,888.5							
	5%	2,458.0							
	6%	2,095.7							
	7%	1,789.5							
	8%	1,530.0							
	9%	1,309.3							
	10%	1,120.9							
	11%	959.7							
	12%	821.2							
	13%	702.1							
	14%	599.2							
	15%	510.2							

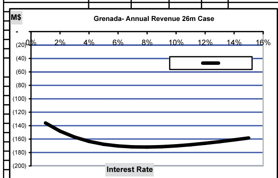
JAMAICA WITHOUT CCGT

Grenada LNG Option With CCGT

Assumptions				Capital Costs US $	Unit Cost US$/mmbtu	
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price				n/a	2.5	
2. Ship LNG via 70,000 cu metres tanker				n/a	0.5	
3. Install 100,000 cu metre LNG tank				150,000,000		
4. Construct Re-gasification terminal				50,000,000		
5. Build dedicated deep water harbour for LNG vessels				50,000,000		
6. Install 16 inch pipeline to Power generation facility				25,000,000		
7. Purchase new CCGT				0		
8. FEED				16,250,000		
9. Data Gathering, permi				16,250,000		
Total Capital Expenditures				307,500,000		
Power Requirements				1025	btu/kscf	
				0.15	mmbtu/gal	
Electrical Capacity installed is	220	MW		42	gallons/bbl	
Grenada uses for power generation	4000	bbl/d diesel	or in BTUs	25,200	mmbtu/d	
			or in MMSCFD	24.59		
CEIS Data Year Avg 2008						
Diesel Cost in Country			3.785	liters/gallons		
Diesel Cost in Country US $	1.16	per litre	or US$ 4.39	per gallon or	184.41	per barrel
Energy equivalent of diesel	6.30	mmbtu per barrel				
Unit Cost of Diesel US	$29.27	per mmbtu diesel				
Unit LNG Cost (un-escalated)						
F.O.B. Cost of LNG	2.50	/mmbtu				
Shipping cost	0.50	/mmbtu				
Re-gas,jetty,gas turbine	0.00	/mmbtu				
capex recovery	variable					
US	$3.00	/mmbtu LNG				







GRENADA LNG OPTION WITH CCGT

Cashflow for Re-Gas Facility and Gas Turbines

Years	1	2	3	4	5	7	8	9	10	11	12
Capital Expenditures											
1. Data Gathering, Permitting etc	16.25	0	0								
2. FEED	0	16.25	0								
3. Install 100,000 cu metre LNG tank	0	0	25	75	50						
4. Construct Re-gasification terminal 50mm/d capacity	0	0	20	25	5						
5. Build dedicated deep water harbour for LNG vessel	0	0	25	25	0						
6. Install 16 inch pipeline to Power generation facility	0	0	5	5	15						
7. Purchase new Combined Cycle Gas Turbine	0	0	0	0	0						
Sub-Total	16.25	16.25	75	130	70						
Volume Variable For 20% IRR			15 mmscfd								
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	15	15	15	15	15	15
Unit Sales price, $/mmbtu						20.2	20.2	20.2	20.2	20.2	20.2
Annual Gas Sales M$						113.4	113.4	113.4	113.4	113.4	113.4
Operating Costs @ 5% of Capex						15.375	15.375	15.375	15.375	15.375	15.375
Net Cash Flow	(16)	(16)	(75)	(130)	(70)	98	98	98	98	98	98
Cumulative Net Cash Flow	-16.3	-32.5	-107.5	-237.5	-307.5	-209.5	-111.5	-13.5	84.4	182.4	280.4
Cum NCF	1064			Payout Time							
DCFROR	20.0%			Cum Capex	307.5						
NPV 10	245.86			Cum Opex	292						
Reality Case - Market Constrained Revenue = 26 M$			15.00 mmscfd								
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	15	15	15	15	15	15
Unit Sales price, $/mmbtu						4.5	4.5	4.5	4.5	4.5	4.5
Annual Gas Sales M$						25.3	25.3	25.3	25.3	25.3	25.3
Operating Costs @ 5% of Capex 5%						15.375	15.375	15.375	15.375	15.375	15.375
Net Cash Flow	(16)	(16)	(75)	(130)	(70)	10	10	10	10	10	10
Cumulative Net Cash Flow	-16.3	-32.5	-107.5	-237.5	-307.5	-297.6	-287.7	-277.9	-268.0	-258.1	-248.2
Cum NCF	-169			Payout Time							
DCFROR	-3.8%			Cum Capex	307.5						
NPV 10	-170.2	10%		Cum Opex	292						

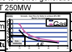
Barbados	-170.164
1%	(136.0)
2%	(148.2)
3%	(157.1)
4%	(163.4)
5%	(167.7)
6%	(170.3)
7%	(171.7)
8%	(171.9)
9%	(171.4)
10%	(170.2)
11%	(168.4)
12%	(166.3)
13%	(163.9)
14%	(161.2)
15%	(158.4)

Constrained Case	Price	Volumes	Revenue M$	IRR %
Barbados	10.7	25.00	100	5.8%
Grenada	4.5	15.00	26	neg
Cuba				
Jamiaca				
Hati				

GRENADA WITHOUT CCGT

Grenada LNG Option With CCGT

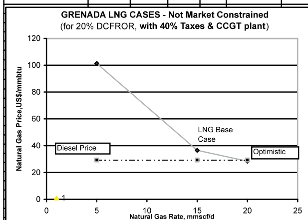
					Capital Costs	Unit Cost	
Assumptions					**US $**	**US$/mmbtu**	
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price					n/a	2.5	
2. Ship LNG via 70,000 cu metres tanker					n/a	0.5	
3. Install 100,000 cu metre LNG tank					150,000,000		
4. Construct Re-gasification terminal					50,000,000		
5. Build dedicated deep water harbour for LNG vessels					50,000,000		
6. Install 16 inch pipeline to Power generation facility					25,000,000		
7. Purchase new CCGT 250MW					50,000,000		
8. FEED					16,250,000		
9. Data Gathering, perm					16,250,000		
Total Capital Expenditu					**357,500,000**		
Power Requirements					1025	btu/kscf	
					0.15	mmbtu/gal	
Electrical Capacity installed is	32	MW			42	gallons/bbl	
Barbados uses for power generation	2400	bbl/d diesel		or in BTUs	15,120	mmbtu/d	
				or in MMSCFD	14.75		
CEIS Data Year Avg 2008							
Diesel Cost in Country				3.785	liters/gallons		
Diesel Cost in Country US $	1.16	per litre	or US$	4.39	per gallon or	184.41	per barrel
Energy equivalent of diesel	6.30	mmbtu per barrel					
Unit Cost of Diesel US	**$29.27**	**per mmbtu diesel**					
Unit LNG Cost (un-escalated)							
F.O.B. Cost of LNG	2.50	/mmbtu					
Shipping cost	0.50	/mmbtu					
Re-gas,jetty,gas turbine	0.00	/mmbtu					
capex recovery	variable						
US	**$3.00**	**/mmbtu**	**LNG**				

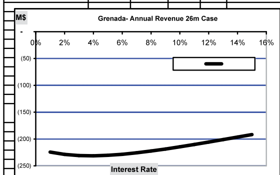


GRENADA LNG OPTION WITH CCGT

Cashflow for Re-Gas Facility and Gas Turbines	Years										
Capital Expenditures	**1**	**2**	**3**	**4**	**5**	**7**	8	9	10	11	12
1. Data Gathering, Permitting etc	**16.25**	**0**	**0**								
2. FEED	**0**	**16.25**	**0**								
3. Install 100,000 cu metre LNG tank	**0**	**0**	**25**	**75**	**50**						
4. Construct Re-gasification terminal 50mm/d capacity	**0**	**0**	**20**	**25**	**5**						
5. Build dedicated deep water harbour for LNG vessel	**0**	**0**	**25**	**25**	**0**						
6. Install 16 inch pipeline to Power generation facility	**0**	**0**	**5**	**5**	**15**						
7. Purchase new Combined Cycle Gas Turbine	**0**	**0**	**0**	**25**	**25**						
Sub-Total	**16.25**	**16.25**	**75**	**155**	**95**						
Volume Variable For 20% IRR											
			15	**mmscfd**							
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	15	15	15	15	15	15
Unit Sales price, $/mmbtu						23.1	23.1	23.1	23.1	23.1	23.1
Annual Gas Sales M$						129.6	129.6	129.6	129.6	129.6	129.6
Operating Costs @ 5% of Capex						17.875	17.875	17.875	17.875	17.875	17.875
Net Cash Flow	(16)	(16)	(75)	(155)	(95)	112	112	112	112	112	112
Cumulative Net Cash Flow	-16.3	-32.5	-107.5	-262.5	-357.5	-245.7	-134.0	-22.2	89.5	201.3	313.1
				Payout Time							
Cum NCF	1207			Cum Capex	357.5						
DCFROR	20.0%			Cum Opex	340						
NPV 10	278.30										
Reality Case - Market Constrained Revenue = 26 M$			15.00	**mmscfd**							
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	15	15	15	15	15	15
Unit Sales price, $/mmbtu						4.5	4.5	4.5	4.5	4.5	4.5
Annual Gas Sales M$						25.3	25.3	25.3	25.3	25.3	25.3
Operating Costs @ 5% of Capex						17.875	17.875	17.875	17.875	17.875	17.875
5%											
Net Cash Flow	(16)	(16)	(75)	(155)	(95)	7	7	7	7	7	7
Cumulative Net Cash Flow	-16.3	-32.5	-107.5	-262.5	-357.5	-350.1	-342.7	-335.4	-328.0	-320.6	-313.2
				Payout Time							
Cum NCF	-254			Cum Capex	357.5						
DCFROR	-6.9%			Cum Opex	340						
NPV 10	-214.6	10%									

Grenada	-214.566
1%	(224.4)
2%	(228.7)
3%	(230.9)
4%	(231.3)
5%	(230.4)
6%	(228.5)
7%	(225.8)
8%	(222.4)
9%	(218.7)
10%	(214.6)
11%	(210.2)
12%	(205.7)
13%	(201.1)
14%	(196.5)
15%	(191.8)





GRENADA MARKET WITH CCGT

Barbados LNG Option with CCGT

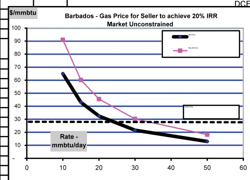
Assumptions					**Capital Costs US $**	**Unit Cost US$/mmbtu**	
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price					n/a	2.5	
2. Ship LNG via 70,000 cu metres tanker					n/a	0.5	
3. Install 100,000 cu metre LNG tank					150,000,000		
4. Construct Re-gasification terminal					50,000,000		
5. Build dedicated deep water harbour for LNG vessels					75,000,000		
...eline to Power generation facility					25,000,000		
...GT 250MW					300,000,000		
					30,000,000		
...ermitting etc					35,000,000		
Total Capital Expenditures					**665,000,000**		
Power Requirements					1025	btu/kscf	
					0.15	mmbtu/gal	
Electrical Capacity installed is	220	MW			42	gallons/bbl	
Barbados uses for power gener	4000	bbl/d diesel		or in BTUs	25,200	mmbtu/d	
				or in MMSCF	24.59		
CEIS Data Year Avg 2008							
Diesel Cost in Country				3.785	liters/gallons		
Diesel Cost in Count	US $	1.07	per litre or US	4.05	per gallon or	170.10	per barrel
Energy equivalent of diesel		6.30	mmbtu per barrel				
Unit Cost of Diesel	US	**$27.00**	**per mmbtu diesel**				
Unit LNG Cost (un-escalated)							
F.O.B. Cost of LNG		2.50	/mmbtu				
Shipping cost		0.50	/mmbtu				
Re-gas,jetty,gas turbine		0.00	/mmbtu				
capex recovery		variable					
	US	**$3.00**	**/mmbtu LNG**				

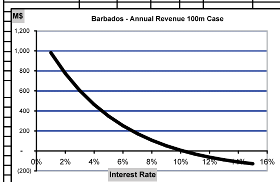
BARBADOS

Cashflow for Re-Gas Facility and Gas Turbines		Years								
Capital Expenditures		1	2	3	4	5	7	8	9	10
1. Data Gathering, Permitting etc		35	0	0						
2. FEED		0	30	0						
3. Install 100,000 cu metre LNG tank		0	0	25	75	50				
4. Construct Re-gasification terminal 50mm/d capacit		0	0	20	25	5				
5. Build dedicated deep water harbour for LNG vesse		0	0	25	25	25				
6. Install 16 inch pipeline to Power generation facility		0	0	5	5	15				
7. Purchase new Combined Cycle Gas Turbine		0	0	100	100	100				
Sub-Total		35	30	175	230	195				
Volume Variable For 20% IRR										
				25	mmscfd					
Natural Gas Sales Rate, mmscf/d		0	0	0	0	0	25	25	25	25
Unit Sales price, $/mmbtu							27.0	27.0	27.0	27.0
Annual Gas Sales M$							252.5	252.5	252.5	252.5
Operating Costs @ 5% of Capex							33.25	33.25	33.25	33.25
	5%									
Net Cash Flow		(35)	(30)	(175)	(230)	(195)	219	219	219	219
Cumulative Net Cash Flow		-35.0	-65.0	-240.0	-470.0	-665.0	-445.7	-226.4	-7.1	212.1
					Payout Time					
	Cum NCF	2405			Cum Cap	665.0				
	DCFROR	20.7%			Cum Ope	632				
	NPV 10	569.15								
Reality Case - Market Constrained Revenue = 100 M$										
				25.00	mmscfd					
Natural Gas Sales Rate, mmscf/d		0	0	0	0	0	25	25	25	25
Unit Sales price, $/mmbtu							10.7	10.7	10.7	10.7
Annual Gas Sales M$							100.0	100.0	100.0	100.0
Operating Costs @ 5% of Capex							0	0	0	0
Net Cash Flow		(35)	(30)	(175)	(230)	(195)	100	100	100	100
Cumulative Net Cash Flow		-35.0	-65.0	-240.0	-470.0	-665.0	-565.0	-465.0	-365.0	-265.0
					Payout Time					
	Cum NCF	735			Cum Cap	665.0				
	DCFROR	10.1%			Cum Ope	0				
	NPV 10	5.9	10%							

Barbados	5.914
1%	982.3
2%	775.0
3%	604.6
4%	464.1
5%	348.1
6%	252.1
7%	172.4
8%	106.4
9%	51.5
10%	5.9
11%	(31.9)
12%	(63.4)
13%	(89.4)
14%	(110.9)
15%	(128.7)

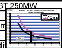
Constrained Case	Price	Volumes	Revenue - M$	IRR %
Barbados	10.7	25.00	100	5.8%
Grenada				
Cuba				
Jamiaca				
Hati				

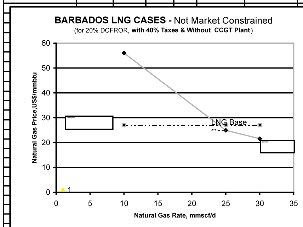


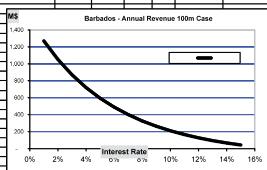


BARBADOS MARKET WITH CCCT

Barbados LNG Option without CCGT				
			Capital Costs	**Unit Cost**
Assumptions			**US $**	**US$/mmbtu**
1. Purchase LNG at Point Fortin, ALNG at F.O.B. price			n/a	2.5
2. Ship LNG via 70,000 cu metres tanker			n/a	0.5
3. Install 100,000 cu metre LNG tank			150,000,000	
4. Construct Re-gasification terminal			50,000,000	
5. Build dedicated deep water harbour for LNG vessels			75,000,000	
6. Install 16 inch pipeline to Power generation facility			25,000,000	
7. Purchase new CCGT 250MW			0	
8. FEED			15,000,000	
9. Data Gathering, perr			35,000,000	
Total Capital Expendi			**350,000,000**	
Power Requirements			1025	btu/kscf
			0.15	mmbtu/gal
Electrical Capacity installed is	220	MW	42	gallons/bbl
Barbados uses for power gener	4000	bbl/d diesel	or in BTUs 25,200	mmbtu/d
			or in MMSCF 24.59	
CEIS Data Year Avg 2008				
Diesel Cost in Country			3.785 liters/gallons	
Diesel Cost in Count US $	1.07	per litre or US$	4.05 per gallon or	170.10 per barrel
Energy equivalent of diesel	6.30	mmbtu per barrel		
Unit Cost of Diesel US	**$27.00**	**per mmbtu diesel**		
Unit LNG Cost (un-escalated)				
F.O.B. Cost of LNG	2.50	/mmbtu		
Shipping cost	0.50	/mmbtu		
Re-gas,jetty,gas turbine	0.00	/mmbtu		
capex recovery	variable			
US	**$3.00**	**/mmbtu LNG**		







BARBADOS									
Cashflow for Re-Gas Facility and Gas Turbines					Years				
Capital Expenditures	**1**	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**
1. Data Gathering, Permitting etc	**35**	**0**	**0**						
2. FEED	**0**	**30**	**0**						
3. Install 100,000 cu metre LNG tank	**0**	**0**	**25**	**75**	**50**				
4. Construct Re-gasification terminal 50mm/d capacit	**0**	**0**	**20**	**25**	**5**				
5. Build dedicated deep water harbour for LNG vesse	**0**	**0**	**25**	**25**	**25**				
6. Install 16 inch pipeline to Power generation facility	**0**	**0**	**5**	**5**	**15**				
7. Purchase new Combined Cycle Gas Turbine	**0**	**0**	**0**	**0**	**0**				
Sub-Total	**35**	**30**	**75**	**130**	**95**				
Volume Variable									
For 20% IRR									
			25	**mmscfd**					
Natural Gas Sales Rate, mmscf/d	**0**	**0**	**0**	**0**	**0**	**25**	**25**	**25**	**25**
Unit Sales price, $/mmbtu						**14.8**	**14.8**	**14.8**	**14.8**
Annual Gas Sales M$						**138.4**	**138.4**	**138.4**	**138.4**
Operating Costs @ 5% of Capex						**18.25**	**18.25**	**18.25**	**18.25**
5%									
Net Cash Flow	**(35)**	**(30)**	**(75)**	**(130)**	**(95)**	**120**	**120**	**120**	**120**
Cumulative Net Cash Flow	**-35.0**	**-65.0**	**-140.0**	**-270.0**	**-365.0**	**-244.8**	**-124.6**	**-4.5**	**115.7**
				Payout Time					
Cum NCF	**1317**			**Cum Cap**	**365.0**				
DCFROR	**20.1%**			**Cum Ope**	**347**				
NPV 10	**306.71**								
Reality Case - Market Constrained									
Revenue = 100 M$			**25.00**	**mmscfd**					
Natural Gas Sales Rate, mmscf/d	0	0	0	0	0	25	25	25	25
Unit Sales price, $/mmbtu						10.7	10.7	10.7	10.7
Annual Gas Sales M$						100.0	100.0	100.0	100.0
Operating Costs @ 5% of Capex						0	0	0	0
Net Cash Flow	(35)	(30)	(75)	(130)	(95)	100	100	100	100
Cumulative Net Cash Flow	-35.0	-65.0	-140.0	-270.0	-365.0	-265.0	-165.0	-65.0	35.0
				Payout Time					
Cum NCF	1035			Cum Cap	365.0				
DCFROR	17.4%			Cum Ope	0				
NPV 10	211.4	10%							
	Barbados	211.438							
	1%	######							
	2%	######							
	3%	871.3							
	4%	720.7							
	5%	595.1							
	6%	490.0							
	7%	401.7							
	8%	327.3							
	9%	264.6							
	10%	211.4							
	11%	166.4							
	12%	128.1							
	13%	95.5							
	14%	67.7							
	15%	44.0							
BARBADOS MARKET WITHOUT CCGT									

Appendix F
Overview of Caribbean History and Development

Overview of Caribbean History and Development

The Caribbean region stretches in an arc from north of South America and east of Central America to southeast of the North American continent. The region is a chain of islands bordering the Caribbean Sea. However, the Bahamas, located north of Cuba, borders the North Atlantic Ocean. The majority of the Caribbean population is of African descent with the rest being of Indian, European, Chinese and mixed-race ancestry.

The Caribbean was settled by its original inhabitants - the Amerindians - when the first Europeans arrived. From the 1500s onward, immigration from Spain, England, France and Holland changed the nature and content of the islands. For the sugar industry, many people were imported from other countries to work on the plantations of the European settlers. The descendants of this imported labor now comprise the majority of the population. Descendants of Africans brought as slaves now form the majority of the islands' population, with the descendants of East Indian indentured laborers comprising the next largest segment. The continuous warring among European countries, competing for dominance in the Caribbean caused islands to change hands frequently until the l900's. Eventually, most of the islands became territories of the British Empire. This historical diversity has lead to much cultural disparity that adversely affects the islands' ability to form a coherent Caribbean single market. Table 1 shows the official language, territorial status and government type in the Caribbean.

The Caribbean's 40 million inhabitants are collectively part of a total US$136 billion economy. The region's economies depend largely on remittances, agriculture and tourism, since all the countries are heavily service based. While agriculture continues to be a significant part of most of the islands' economies, both in revenues and employment, its overall share of GDP is declining through the loss of preferential treatment from Europe and the increased competition from mega farms in Central and South American countries. The region is not rich in natural resources. Only a few islands have mineral resources capable of being exploited, such as oil and gas in Trinidad, bauxite in Jamaica and nickel in Cuba as shown in Table 2, and many have tried to encourage the industrial and manufacturing sector, with mixed results.

Light manufacturing in countries such as Dominican Republic and Jamaica continues to face growing competitiveness from countries such as China, India and Bangladesh. The US market is the dominant consumer of most of the export industries such as manufacturing, mining and tourism, and as a result, the region's economies experience varying levels of ripple effects depending on the strength of the US economy.

Remittances have become a significant component of many countries GDP. The World Bank ranks Haiti among the highest in the world in terms of remittance contribution, amounting to 22% of GDP.

Average income varies greatly from island to island as shown in Figure 2 GDP by country and Figure 3 GDP per Capita by country. By 2007, The Bahamas had the highest annual per capita income in the region, at $21,421, followed by Trinidad and Tobago, at $17,266, and Barbados, at $13,260. Haiti has the region's lowest per capita income, $609 annually. The islands' economies are also shaped by their geography and climate. Most are of volcanic origin because the subduction zones of the Caribbean tectonic plate are near to the islands; as a result they have rugged, towering mountain ranges. These include the Dominican Republic, Cuba, St Vincent and Grenada. St Lucia, Grenada and St Kitts have limited flat terrain. Some islands are relatively flat such as Barbados, which is a coral island. Moreover, the region is within an active earthquake zone.

The climate of the Caribbean is tropical: hot and humid in the rainy season and cooled by the trade winds in the dry season. The Caribbean is located in one of the most active hurricane belts in the world. The southernmost islands such as Trinidad and Tobago are not affected by most hurricanes, while northern islands like The Bahamas, Jamaica, Haiti and Cuba experience much higher frequency and severity, causing greater human and economic toll.

The combination of geography and climate has made the region one of the largest agricultural baskets at the turn of the last century but at the end of the century the lack of large tracts of flat terrain and exposure to hurricanes prevented many of the region's countries from being able to compete with mega farms located in Central and South America. With the end of preferential treatment from Europe in the late 1990s, many countries turned to eco-tourism and other service sectors to take advantage of their climate and natural beauty. Also offshore banking is in vogue.

Tourism now contributes over US$25 billion to the region and account for 2.4 million jobs. Financial services have become a dominant industry on islands such as Bahamas, Cayman Islands and Trinidad and Tobago. Economic growth varies across the region. All of the islands' economies grew in 2007 at an average of 6.2% p.a.; the Dominican Republic's economy grew at 8.5%; Cuba at 7.0 %, St Vincent and the Grenadines at 6.6%. Tables 2 and 3 detail the GDP growth rates.

The strength of any economy is determined by several factors including:

- GDP – the ability to generate income
- External Debt - the confidence of external financial institutions to provide debt
- Public Debt - the executive government internal commitment on taxpayers
- Current Account - executive government net profit-and-loss statements
- FDI - external private investor confidence in assuming risk equity
- Remittance - sending of money by nationals working abroad

Table 3 indicates the GDP growth rate between 2000 - 2008 and Table 4 illustrates the financial status of the Caribbean islands' economies. These fundamental economic parameters dictate the choice and intent of the individual Caribbean governments' energy policies and the divergent views of the draft CARICOM Energy Policy dated January 2007.

Country including Territories	Area (sq km)	Population	Official Language	Government Political System
Cuba	110,860	11,423,952	Spanish	Communist state
Jamaica	10,831	2,804,332	English	Constitutional monarchy with a parliamentary system of government
Cayman Islands	262	47,862	English	British crown colony – parliamentary
Haiti	27,560	8,924,553	French	Democratic republic
Dom Republic	48,380	9,507,133	Spanish	Democratic republic
Puerto Rico	8,870	3,958,128	Spanish	Commonwealth
US Virgin Islands	346	109,840	English	Unincorporated territory of the US
Neth.Antilles	960	225,369	Dutch	Dutch crown colony – parliamentary
The Bahamas	10,070	307,451	English	Constitutional monarchy with a parliamentary system of government
St Kitts & Nevis	261	39,817	English	Constitutional monarchy with a parliamentary system of government
Antigua & Barbuda	443	84,522	English	Constitutional monarchy with a parliamentary system of government
Guadeloupe	1,706	452,776	French	Overseas department of France
Dominica	754	72,514	English	Parliamentary democracy
Martinique	1,130	401,000	French	Overseas department of France
Saint Lucia	606	159,585	English	Constitutional monarchy with a parliamentary system of government
St Vincent and the Grenadines	389	118,432	English	Constitutional monarchy with a parliamentary system of government
Barbados	431	281,968	English	Constitutional monarchy with a parliamentary system of government
Grenada	344	90,343	English	Constitutional monarchy with a parliamentary system of government
Trinidad & Tobago	5,128	1,333,000	English	Democratic Republic
Total		**40,342,577**		

Table 1: Caribbean Countries Basic Data (Source: CIA World Fact book 2008)

Countries	GDP in $Millions	GDP Growth Rate	CPI	Per Capita Income	Government Political System
Cuba	45,100	7.0%	3.6%	3,948	Tourism, mining, sugar, tobacco
Jamaica	11,210	1.4%	9.3%	3,997	Tourism, bauxite, agro processing
Haiti	5,435	3.2%	9.0%	609	Apparel, light manufacturing, palm oils
Dom Republic	36,400	8.5%	6.1%	3,829	Tourism, sugar, mining, textiles
The Bahamas	6,586	3.1%	2.4%	21,421	Tourism, banking
St Kitts & Nevis	527	3.3%	4.5%	13,236	Tourism, light manufacturing, banking
Antigua & Barbuda	1,089	6.1%	1.5%	12,884	Tourism, construction, light manufacturing
St Lucia	958	3.2%	1.9%	6,003	Tourism, banking, construction
St Vincent & Grenadines	559	6.6%	6.1%	4,720	Agriculture, tourism, banking
Barbados	3,739	4.2%	5.5%	13,260	Tourism, sugar, banking
Grenada	590	3.1%	3.7%	6,531	Agriculture, tourism, banking, construction
Trinidad & Tobago	23,015	5.5%	7.9%	17,266	Petroleum, chemicals, construction, financial services
Regional Total	$135,519	6.2%	5.7%	$3,856	

GDP = Gross Domestic Product
CPI = Consumer Price Index

Table 2: Economic Data 2007

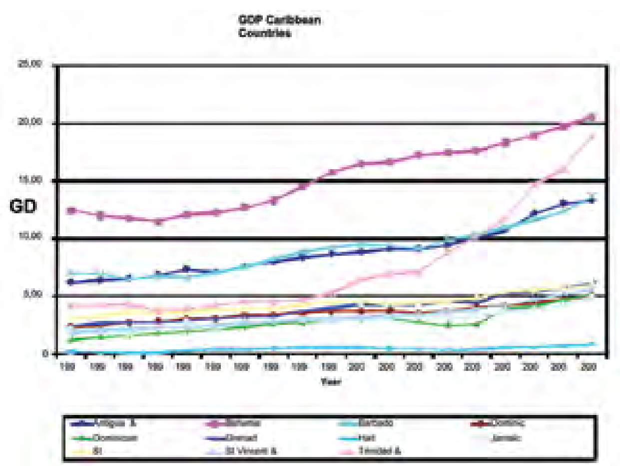


Figure 2
Source: CIA World Factbook

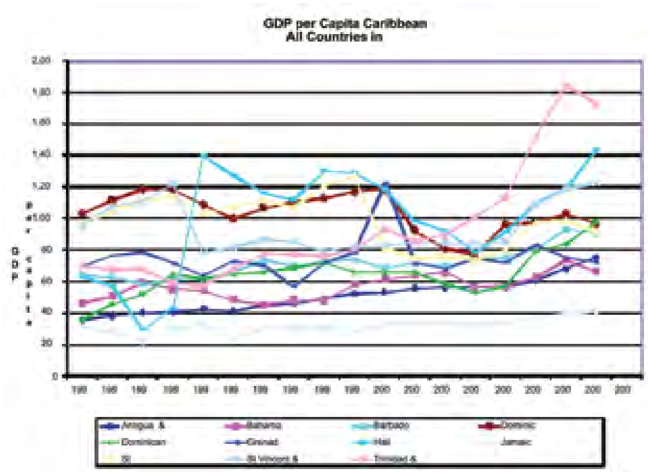


Figure 3
Source: CIA World Factbook

FDI = Foreign Direct Investment

GDP GROWTH RATES

COUNTRIES	2000	2001	2002	2003	2004	2005	2006	2007	2008
ANTIGUA & BARBUDA	3.3	1.5	2.0	4.3	5.2	5.5	12.2	3.8	2.1
THE BAHAMAS	1.9	0.8	2.3	1.0	1.3	2.5	3.4	2.8	1.0
BARBADOS	2.3	-2.6	0.7	1.9	4.9	4.1	3.5	4.0	1.7
CUBA	5.6	3.0	1.1	2.6	2.6	3.0	8.0	7.0	5.0
DOMINICA	1.3	-4.2	-5.1	0.1	3.1	3.3	4.0	3.2	2.6
DOMINICAN REPUBLIC	7.6	1.5	4.2	-0.4	-0.7	1.7	9.3	7.2	4.7
GRENADA	7.0	-3.0	1.6	7.1	-5.7	11.0	-2.4	0.9	3.7
HAITI	1.2	-1.2	-1.5	-1.5	-3.5	0.5	2.5	3.5	2.5
JAMAICA	0.7	1.5	1.1	2.3	1.0	1.4	2.5	1.5	0.7
ST. KITTS & NEVIS	6.5	1.7	-0.3	-1.3	7.3	4.4	4.0	6.0	3.5
SAINT LUCIA	0.1	-3.7	0.8	3.1	4.5	3.8	5.0	5.1	2.3
ST. VINCENT & G'DINES	2.0	-0.1	3.2	2.8	6.8	2.6	6.9	4.4	5.0
TRINIDAD & TOBAGO	6.9	4.2	7.9	14.4	8.8	8.0	12.0	5.8	5.0

Table 3: GDP Growth Rates in the Region (2000 - 08)
Source: Caricom and CIA World Factbook

Countries	Notes	GDP in $M	External Debt in $M	Public Debt as a % of GDP (2)	Current Account in $M	FDI in $M (3)
Cuba		$45,100	$16,790	36.8%	($358)	$630
Jamaica		$11,210	$9,657	127.2%	($1,623)	$779
Haiti	1	$5,435	$1,463	32.6%	$11	$75
Dominican Republic		$36,400	$10,210	40.6%	($2,041)	$1,698
The Bahamas		$6,586	$343	38.8%	($1,442)	$1,131
Saint Kitts & Nevis	4	$527	$314	182.5%	($163)	$110
Antigua & Barbuda		$1,089	$360	113.3%	($211)	$391
Dominica		$311	$213	94.3%	($72)	$48
Saint Lucia		$958	$257	127.4%	($199)	$111
Saint Vincent & the Grenadines		$559	$223	67.6%	($149)	$72
Barbados		$3,739	$668	94.6%	($254)	$51
Grenada		$590	$347	115.1%	($138)	$140
Trinidad & Tobago		$23,015	$2,826	26.6%	$4,171	$1,035
Regional Total		**$135,519**	**$43,670**			**$6,272**

Source: CIA World Fact book 2008
Notes
1 - Haiti total public debt as a percent of GDP is based on 2006 data
2 - IMF 2007 Article IV Consultation, except Cuba which data is obtained from CIA World Factbook
3 - UN Conference on Trade and Development
4 - 2006 data
M - Million

Appendix G
Analysis of Crude Oil Prices

Crude Oil prices

During the past 10 years world energy markets have experienced unprecedented growth, starting in 1998 when oil prices hit an inflation-adjusted low of US$8.51 per barrel as a result of a combination of OPEC increasing its supply quota by 2.5 million bpd and an Asian economic crisis decreasing demand. Since 1998, oil prices have followed an upward trajectory culminating in a new world daily quoted high price of US$147 per barrel (See Figure 4). The events of the past 10 years can be captured in four time periods namely 1998-2001, 2001-2006, 2006-2007, after 2007 to present day.

Bpd - barrels per day

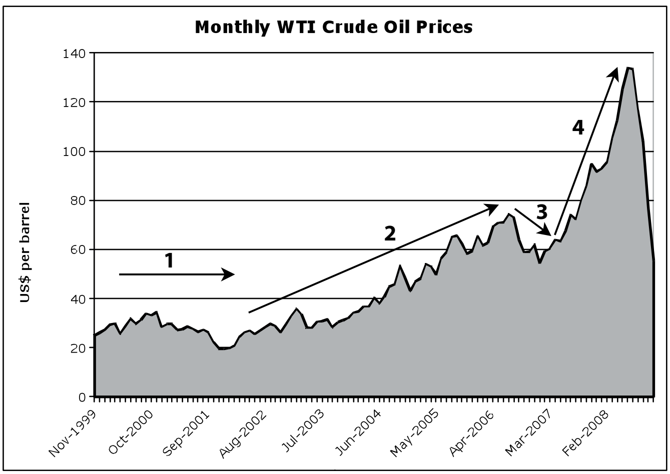


Figure 4: Monthly WTI Crude Oil Price
Source: Energy Information Agency (EIA)

Period 1

From 1998 to 2001, oil prices recovered from their lows and fluctuated due to OPEC overshooting and undershooting production quotas. As prices moved above US$25 per barrel at the end of 1999, OPEC began instituting successive production quota increases to stem future price increases. Prices began to fall in late 2000. This decline continued through

2001 because OPEC maintained production above a lower than expected demand caused by the weakening US economy.

Period 2

From 2001 to 2006, oil prices experienced sustained increases which began when OPEC instituted a 3.5 million bpd reduction on September 1st 2001. The attacks of September 11th 2001 delayed further production cuts by a couple of months, leading to OPEC's desired effect of returning prices to above US$25 per barrel. By the end of 2002, OPEC's ability to increase supply was significantly affected by strikes at PDVSA that eliminated approximately 900,000 barrels per day of Venezuelan production. To counter the lost supply, OPEC increased supply by 2.8 million barrels per day in early 2003; however, in March 2003, the US military action began in Iraq. At this time, US economic recovery was in full swing, coupled with Asian demand growing at a rapid pace. The events in Venezuela and Iraq eliminated over 4 million bpd of excess capacity as well as growing international demand reduced OPEC's ability to provide a buffer against price appreciation. The combination of Asia's rapidly growing demand, declining value of the US dollar and successive Atlantic hurricanes in 2005 all led to further increases in oil price. During this period, OPEC become more comfortable with signaling a higher price floor that now was way beyond the US$25 price of the past decade.

Period 3

In the second half of 2006, oil prices began to retreat from a peak of about US$77 per barrel, falling to US$49 per barrel. The prime drivers were a relatively mild winter in OECD countries, gradual build up of US inventory and a 1.8 million bpd increase in non-OPEC supply that surpassed global demand growth. OPEC subsequently instituted a quick series of production cuts that removed 1.9 million bpd by February 2007.

Period 4

The subsequent period from mid 2007 to the end of 2008 is characterized by a relentless price increase that culminated in a record daily quoted $147 per barrel, followed by a sharp fall in prices below the US$40 per barrel threshold. This period, unlike the others, was partially driven by financial speculation. This added extra fuel to the skyrocketing prices and together with a steady decline in the US dollar against other currencies had an inverse effect on oil price.

Emerging markets continued to be the drivers of demand growth, offsetting a recession that began in the US, then Europe and the rest of the world. During this period, investors began fleeing from stocks and bonds and into commodities, with the hope of benefiting from China and India's enormous appetite. Global demand put great pressure on OPEC to release more of its dwindling excess capacity. With prices crossing the $100 per barrel mark and sustaining this level, demand quickly eroded as the US, Canada and Western Europe fell into protracted recession. The recession began affecting countries like China, Brazil and India as demand for their exports quickly weakened. After hitting its record US$147 per barrel in July 2008, oil began a precipitous drop to below US$40 per barrel by December 2008. To establish a price floor, OPEC began what likely will be a series of production cuts, beginning with 1.5 million barrels in November 2008 as prices are having a significant impact on many OPEC members' budgets.

For the same time period, the Caribbean experienced the growing effects of oil price increases on their budgets. During the early part of the decade the effects of the oil price was offset by growth in revenues from tourism and other export products. However, as prices continued to set new records the region began crying out for solutions. The Venezuelan PetroCaribe financial option in 2005 of deferring 50% or more of the purchase price led many countries to quickly switch from their longstanding suppliers such as Trinidad and Tobago to Venezuela. In the latter part of the decade, as oil prices continued to push to new levels, countries began seeking new initiatives. With the global recession in full effect, the drop in oil prices has triggered a fall in revenues from tourism, investments and remittances, all leading to falling oil demand.

It is most probable that crude oil prices will maintain a much higher level than the historical average of US$25 per barrel price since the costs of exploration and production have risen considerably. The net effect is that energy costs for energy-importing countries have risen dramatically and constitute a major part of their import bill. This will continue to be a major fiscal concern for the immediate future.

Natural Gas Prices-NYMEX, Henry Hub

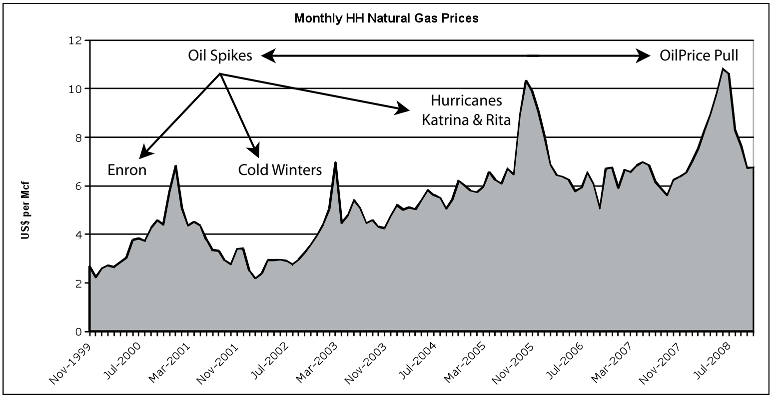


Figure 5: Monthly Natural Gas Price
Source: EIA

Unlike oil, natural gas prices are driven by regional demands. For the Caribbean, US prices would be the closest market for comparative purposes due to its proximity in the region. US natural gas prices, as captured above from 1999 - 2008 in Figure 5, have been primarily driven by growing demand from power producers who are being compelled to find a cleaner alternative fuel to coal. This has also moved natural gas from the realm of being a seasonal fuel that would experience price increases during winter months to a year-round fuel that began experiencing the effects of increased power consumption in summer. As Figure 5 shows, there have been momentary price spikes. In 2000 - 2001, a speculative bubble sending prices above US$10 per Mcf was created due to the manipulation of regulatory loopholes. With the demise of Enron and similar companies, as well as the US recession that followed the Dot.com bust, prices eventually returned to historical levels. However, without Enron to create a competitive market, natural gas began a sharp rise in early 2003 to over US$7 per Mcf coinciding with the winter months. As year-round demand increased, a new price floor was set at US$4 per Mcf versus historical floor of US$2 per Mcf. This new price floor led to the development of LNG imports into the US market as a competitive alternative to domestic supply on the Eastern US Coast. As prices continued their upward trend due to increasing industrial demand, the US experienced a significant price spike attributed to the violent 2005-hurricane season. Both hurricanes Katrina and Rita knocked out 19 percent of domestic supply. Over time, prices receded and stabilized at a new floor above US$6 per Mcf. At the end of 2007, natural gas began a year-long increase brought on by industries switching from oil and a decline in LNG imports, as foreign buyers were willing to outbid the US for LNG cargoes. With the global economy entering a worsening recession in early 2008, natural gas prices began a steady retreat as demand weakened.

Unlike oil, natural gas plays a minor role in the region's energy consumption. This is mainly attributed to the lack of infrastructure in place to accommodate the transportation and storage of natural gas. Trinidad and Tobago is a major producer, consumer and exporter of natural gas in the form of LNG. Exports are shipped to the Dominican Republic, Puerto Rico and the United States. Barbados has a small 2.5 MMSCF/D production which is widely distributed throughout the island via its pipeline grid.

Only the Dominican Republic and Puerto Rico currently consume natural gas beyond what is domestically produced. While Puerto Rico secures natural gas through a long-term LNG contract, the Dominican Republic struggles to maintain consistent supplies because of its floundering sovereign credit rating and the difficulties its electrical utilities face with collecting payments.

Appendix H
Energy Balance Tables

Year	1990	1995	2000	2007
'000 boe				
Oil Production	54,750	47,906	44,588	44,307
Gas Production	29,500	44,667	82,233	222,142
Production	**84,250**	**92,573**	**126,822**	**266,450**
Oil Imports	62,415	47,085	14,235	12,410
Oil Exports	-109,500	-89,425	-58,400	-61,320
Gas Export	0	0	-23,183	-119,957
Domestic Consumption	**37,165**	**50,233**	**59,473**	**97,583**
Electricity	-5,779	-6,799	-8,668	-11,900
Energy processing and byproducts	-23,355	-32,863	-38,047	-63,948
Other Industries	-4,769	-6,210	-7,461	-14,079
Transport	-2,147	-2,902	-3,435	-5,637
Residential	-1,116	-1,460	-1,863	-2,020

Table5: Trinidad Energy Balance
Source: EIA, IEA and Consultant's estimate

Year	1990	1995	2000	2007
'000 boe				
Oil Production	5,220	9,490	14,965	25,503
Gas Production	183	233	3,533	2,350
Combustable, Renewable & Waste	1,682	2,803	6,230	15,195
Production	7,085	12,527	24,728	43,047
Oil Imports & Petroleum Products	**75,555**	**58,765**	**55,480**	**49,275**
Coal Imports	1,033	450	183	167
Domestic Consumption	**83,673**	**71,742**	**80,392**	**92,489**
Electricity	-25,018	-20,760	-25,018	-26,083
Petroleum Refinery and byproducts	-449	-793	-1,566	-2,726
Other Industries	-37,036	-30,100	-33,481	-34,825
Transport	-7,503	-6,433	-7,209	-8,293
Residential	-1,116	-1,460	-1,863	-8,602
Other sectors	-12,551	-12,196	-11,255	-11,959

Table 6: Cuba Energy Balance
Source: EIA, IEA and Consultant's estimate

Year	1990	1995	2000	2007
'000 boe				
Oil Production	0	0	0	0
Gas Production	0	0	0	0
Combustable, Renewable & Waste	392	653	1,451	3,540
Production	**392**	**653**	**1,451**	**3,540**
Oil Imports & Petroleum Products	16,790	21,900	24,090	27,375
Oil Exports	233	267	233	283
Domestic Consumption	**17,415**	**22,820**	**25,775**	**31,198**
Electricity	-5,381	-7,051	-7,964	-9,640
Petroleum Refinery and byproducts	-385	-641	-1,424	-3,474
Other Industries	-4,862	-6,236	-6,129	-4,857
Transport	-4,087	-5,355	-6,049	-7,322
Residential	-1,116	-1,460	-1,863	-3,067
Other sectors	-1,585	-2,077	-2,346	-2,839

Table7: Jamaica Energy Balance
Source: EIA, IEA and Consultant's estimate

Year	1990	1995	2000	2007
'000 boe				
Oil Production	0	0	0	0
Gas Production	0	0	0	0
Combustable, Renewable & Waste	6,772	8,465	10,581	14,108
Production	**6,772**	**8,465**	**10,581**	**14,108**
Oil Imports & Petroleum Products	1,726	2,307	3,770	4,654
Domestic Consumption	**8,498**	**10,771**	**14,351**	**18,762**
Electricity	-940	-1,192	-1,588	-2,076
Industries	-1,615	-2,018	-2,523	-3,364
Transport	-1,032	-1,308	-1,743	-2,279
Residential	-4,825	-6,115	-8,148	-10,651
Other sectors	-86	-138	-350	-392

Table 8: Haiti Energy Balance
Source: EIA, IEA and Consultant's estimate

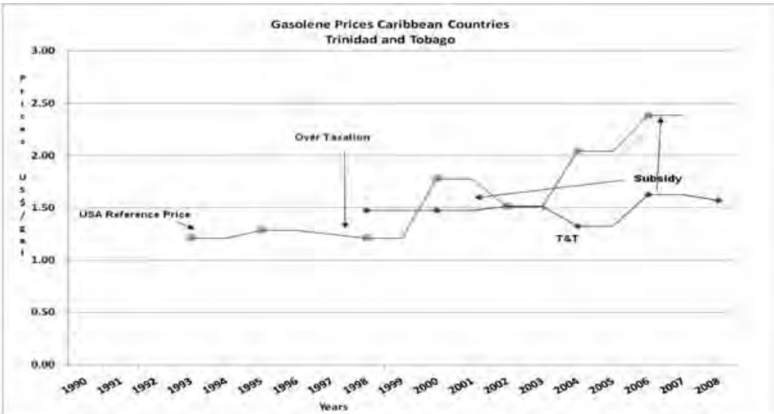
Year	1990	1995	2000	2007
'000 boe				
Oil Production	456	475	558	405
Gas Production	167	150	167	167
Combustable, Renewable & Waste	62	103	158	287
Production	**685**	**727**	**883**	**859**
Oil Imports & Petroleum Products	2,555	2,555	3,285	2,555
Domestic Consumption	**3,240**	**3,282**	**4,168**	**3,414**
Electricity	-1,044	-1,087	-1,426	-1,700
Petroleum Refinery and byproducts	-53	-47	-58	-49
Other Industries	-486	-558	-750	-492
Transport	-227	-263	-354	-283
Residential	-292	-381	-535	-704
Other sectors	-1,138	-946	-1,045	-187

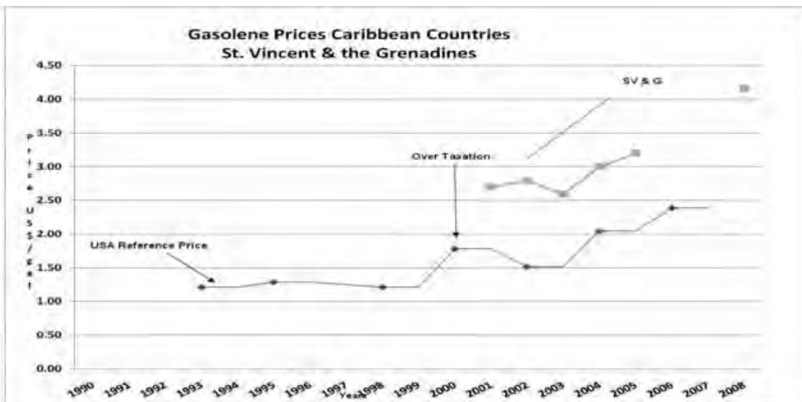
Table 9:Barbados Energy Balance
Source: EIA, IEA and Consultant's estimate

Year	1990	1995	2000	2007
'000 boe				
Oil Production	0	0	0	0
Gas Production	0	0	0	0
Combustable, Renewable & Waste	4	8	15	31
Production	**4**	**8**	**15**	**31**
Oil Imports & Petroleum Products	324	401	349	846
Domestic Consumption	**328**	**409**	**365**	**877**
Electricity	-151	-164	-171	-403
Other Industries	-33	-57	-66	-88
Transport	-108	-135	-142	-289
Residential	-20	-26	-36	-47
Other sectors	-16	-27	51	-49

Table 10: Grenada Energy Balance
Source: EIA, IEA and Consultant's estimate

Appendix i
Illustrations of Taxes and Subsidies


Gasolene Prices Caribbean Countries
Trinidad and Tobago
Prices US$/gal
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Over Taxation
Subsidy
USA Reference Price
T&T
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Years


Gasolene Prices Caribbean Countries
St. Vincent & the Grenadines
Price US$/gal
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
SV & G
Over Taxation
USA Reference Price
1990
1991
1992
1993
1994
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1996
1997
1998
1999
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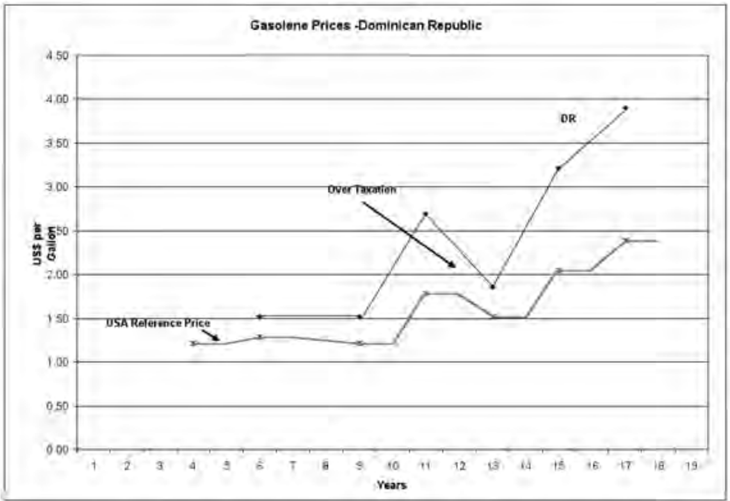
2002
2003
2004
2005
2006
2007
2008
Years


Gasolene Prices -Dominican Republic
DR
Over Taxation
USA Reference Price
US$ per Gallon
Years
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19


Gasolene Prices - Grenada
Grenada
Over Taxation
USA Reference Price
US$ per Gallon
Years
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

Appendix J
LNG - The ALNG-Caribbean Fallacy

There are some perspectives that Caribbean governments associate with that the paradigm must be adjusted to address the common issues above. These are

- LNG - The ALNG-Caribbean Fallacy
- PetroCaribe - A short term reprieve
- Dependency on Oil as a primary fuel
- Sustainable Alternative Fuel Supply
- Caribbean Insularity - A single market challenge

There is also some similarity among the major energy-related issues facing most Caribbean governments. These are listed below in no particular order of importance since each country may have different issues and therefore formulates a policy that relates to its unique circumstances.

The similar issues are

- high prices of oil and natural gas that are affecting balance of payments
- greater than 50% of export earnings devoted to fuel imports
- dependence upon oil as the primary fuel
- non-sustainability of the present supply scenario
- affordable electricity
- inflation and food prices
- renewed Foreign Direct Investments, especially in the energy sector
- insularity and fragmentation interfering with the development of a common energy policy, trading as a block

The impact of each of the above is significant but their cross relationship hide the unique consequence of any one issue

ALNG - The Caribbean Fallacy

Trinidad and Tobago is now considered a "gas economy" instead of an oil economy. It is significant to note that being such a significant exporter of LNG to the United States, there is the perception of an abundance of liquefied natural gas available for Caribbean distribution. This, however, is restricted by

- ALNG covenant restrictions
- Capital cost increases for both re-gasification

and liquefaction facilities
- Trinidad and Tobago's limited natural gas capacity to satisfy its downstream development.

An examination of ALNG shareholders arrangements highlights the limitation placed on Trinidad and Tobago as the owners of this natural resource and the role of government as an operator under this very restrictive covenant. Although beneficial as a "cash cow" to Trinidad and Tobago, access of LNG to other Caribbean countries has major obstacles. The details are explained below.

Impact of the Shareholders Structure

Ownership of upstream Gas, LNG plants and LNG sales in Trinidad and Tobago

	Upstream		LNG plants		LNG sales (all per annum)		Contracted Destination	
Train 1 4 bcm/year		BP	10%	[illegible]	2.4 bcm	Tractebel	Boston	
			10%	Tractebel				
			20%	[illegible]				
			26%	BG				
			34%	BP	1.6 bcm	Enagas	Spain	
Train 2 4.4 bcm/year	50%	BG	50%	BG	2.2 bcm	BG	Elba Island	
	50%	BP	50%	BP	0.3 bcm	Tractebel	Boston	
					0.9 bcm	[illegible]	Cartagena	
					1 bcm	Enagas (Gas Natural)	Spain	
Train 3 4.4 bcm/year	25%	BG	25%	BG	1.1 bcm	BG	Elba Island	Arrivals at Bilbao
	75%	BP	75%	BP	1 bcm	[illegible]	1 bcm	[illegible]
					2.3 bcm	[illegible]	1.1 bcm	BBE
							0.6 bcm	[illegible]
		(shaded)	Shaded area indicates shipping organized by Enagas/Repsol					

Figure 34
Source: Gas Strategies and Liquefied Natural Gas from Trinidad and Tobago: The Atlantic LNG Project

Beyond NGC's stake in Atlantic LNG, the Government of Trinidad and Tobago's only other direct interest in the natural gas sector is through its profit share in producing blocks, and Petrotrin's (Trinidad and Tobago's National Oil Company) joint venture interests in certain gas-producing blocks. This total daily volume of gas from each of these channels is currently insufficient to meet the domestic needs of both the local downstream industries and the production of electricity. Any negotiations between countries will require the support of the major gas suppliers who wish to maximize value for their shareholders and stakeholders, and thoughtful consideration of this would increase the chances that all parties can achieve a workable outcome.

Overview of Atlantic LNG

Atlantic LNG Train I Structure

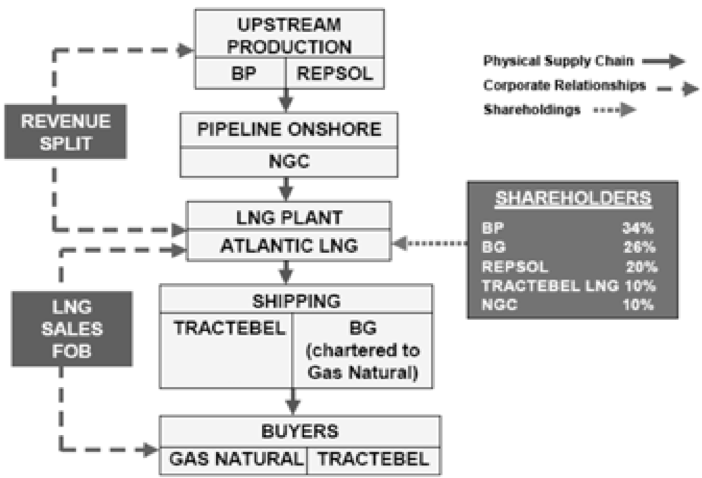


Figure 35
Source: Gas Strategies and Liquefied Natural Gas from Trinidad and Tobago: The Atlantic LNG Project

The natural gas for Train I is supplied 100% by BPTT (owned by BP and Repsol) while the LNG is sold via a f.o.b. offtake agreement to Tractebel (now Suez and formally Cabot) in the USA and Gas Natural (Repsol) in Spain. The contract allows the buyers to ship the LNG to different destinations without requiring agreement by the seller and thus a recalculation of the netback pricing.

Atlantic LNG Train II and III Structure

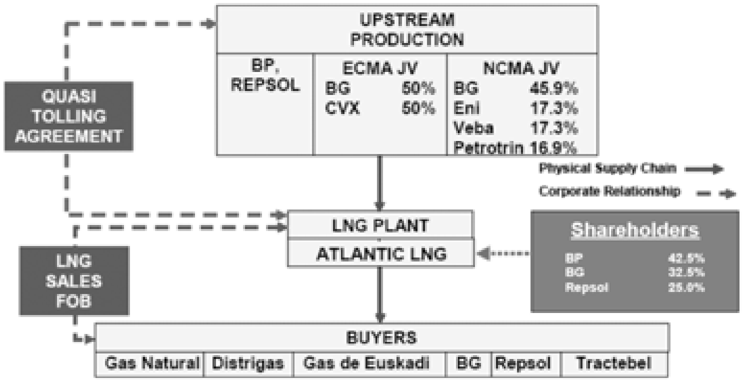


Figure 36
Source: Gas Strategies and Liquefied Natural Gas from Trinidad and Tobago: The Atlantic LNG Project

Unlike Train I, Trains 2&3 were built together to monetize the additional reserves of BP and BG to achieve economies of scale. The Trains also differed from Train I in that Train I was a pure tolling facility in which it was paid a fixed fee versus a netback price. This structure did not appeal to Cabot and NGC, and their equity was redistributed to the remaining shareholders.

Atlantic LNG Train IV Structure

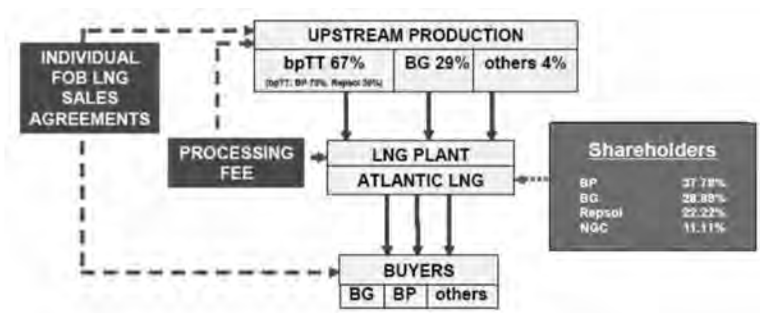


Figure 37
Source: Gas Strategies and Liquefied Natural Gas from Trinidad and Tobago: The Atlantic LNG Project

Train IV was the largest liquifaction facility built at the time. Under the Government of Trinidad and Tobago's insistence, NGC returned as an equity partner and the commercial structure of the Train enables all the shareholders to capture economic rent beyond the f.o.b sale of cargoes and instead all the way across the LNG value chain.

Atlantic LNG and the role the Government of Trinidad and Tobago

The conceptualization and development of Atlantic LNG has been deemed an un-equivocal success story within the global energy industry, one that transformed the industry by breaking with many of the long-standing norms and establishing new standards for time to market, project cost but, most importantly, for the flexibility its contracts provided its customers. The paradigm, perception and reality, it terms of success that Caribbean countries can be "a part of" may not exist.

By the time the project went into design mode, both BP and BG took the lead, as neither Cabot or the National Gas Company of Trinidad and Tobago (NGC) had the financial strength to bring the project to fruition. The financing for Atlantic LNG Train I was structured like a traditional project financing in which the facility received a guaranteed revenue stream due to the 20-year take or pay contract given to Cabot for 60% of offtake and Gas Natural (Repsol) for the remaining 40% to cover the repayment of debt and guarantee a return to the shareholders. Unlike Repsol's dominant presence in the Spanish gas market, Cabot had numerous competitors with access to its market in Boston. Having access to LNG ensured that Cabot kept its market share but it also wanted the opportunity to divert cargoes should it experience declining market conditions. With this in mind, Cabot was able to negotiate significant flexibility in the contracts that allow for switching of destination without needing prior agreement by the shareholders of Atlantic LNG.

The inclusion of the destination flexibility into the offtake contract led to Cabot carving out an estimated 0.2 million tonnes per annum (mtpa) of its Train I contracted volume to supply the LNG requirement of Puerto Rico Electric Power Authority. What was unique about this contract is that the flexibility allowed Cabot to resell a portion of its LNG to Puerto Rico without having to compensate the shareholders of Atlantic LNG or allow the Government of Trinidad and Tobago to influence the process or collect taxes on any incremental gains made from the transaction. By re-selling the LNG cargo, the contract is between Puerto Rico and Cabot (now Suez) and not Atlantic LNG. Further innovation was applied to this flexibility in the contract set up by BP, where it sold 0.75 mtpa to the Dominican Republic without indicating any source for the gas but clearly intending to use primarily Trinidad LNG[2]. Of note, BP is not a buyer of LNG from Atlantic but through its partnership with Repsol (Repsol owns 30% of BPTT and BP owns a LNG terminal in partnership with Repsol at Bilbao, Spain) was able to secure a re-sale contract with Repsol and BG to meet it supply requirements to the Dominican Republic. Once again, Atlantic LNG was not the partner in the contract and the Government of Trinidad and Tobago was left out of the negotiation as well as sharing in the profit achieved on this transaction.

By the time the development of Train IV was being negotiated, Mr Manning had returned as Prime Minister and Prof Julien was back at the negotiation table with the various shareholders of Atlantic LNG. The lessons learnt by the Manning administration guided them in negotiating an 11.1% equity stake in Train IV, as well as a revision to the destination flexibility to one that requires agreement by all shareholders in advance of any deviation and a recalculation of the netback, based on the price at the unloading port. However, this revision to the destination flexibility only applies to Train IV.[3]

PetroCaribe

PetroCaribe S.A. is a Venezuela-Caribbean oil alliance formed to purchase oil on conditions of preferential payment. The alliance was launched in June 2005 with participation by 14 countries of which 10 were from Caricom, plus Cuba, the Dominican Republic, Nicaragua and Suriname. The nations signing the agreement were:

Antigua and Barbuda, the Bahamas, Belize, Cuba, Dominica, the Domini

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[2] Liquefied Natural Gas from Trinidad and Tobago: The Atlantic LNG Project.
[3] BP benefits big time from Train IV - Trinidad Express Friday 5th September, 2003.

can Republic, Grenada, Guyana, Jamaica, Nicaragua, Suriname, St Lucia, St Kitts and Nevis and St Vincent and the Grenadines.

The countries that did not sign and have not signed to date are Barbados and Trinidad and Tobago. Haiti joined PetroCaribe in April 2007, Honduras in December 2007 and Guatemala in July 2008. The alliance therefore has grown in size and delivered oil volumes are now 156,000 bopd as reported in Venezuela.

Dependance on Oil as a Primary Fuel

Jamaica, Barbados and the OECS countries have all agreed that there is too much dependence upon oil as the primary source of energy. These countries have now realized the astronomical costs for generating electricity and for transportation.

Some countries have already installed policies to promote other forms of energy, especially wind and solar. Barbados has been an advocate for the installation of solar water heaters; Jamaica has started a wind farm to generate electricity, and Dominica has hydro projects. However, with the proliferation of projects and the rate of change from oil, it is crucial to make the change as rapidly as possible.

Some governments have forecast a 10% increase in other forms of energy within the next decade while others have forecast 20%. Jamaica has recently announced it is investigating two important projects - LNG and nuclear power. In the case of LNG, cargoes may become available from Trinidad and Tobago's Atlantic LNG at Point Fortin. But all cargoes for each train of LNG have been committed to a fixed destination first, with excess cargoes being sold on the open market. Therefore Jamaica can receive LNG from Trinidad only if there is continuous excess production that can be made from the existing trains. Otherwise, for Trinidad to be a stable supplier, a new train, Train X, about which there's been speculation for quite a while, will be needed. Jamaica is also courting LNG supplies from Nigeria to contribute to the energy mix.

Nuclear power for electricity generation has now been put on the table by Jamaica's present government. The University of the West Indies (UWI) has in the past used minute forms of radioactive materials safely for research purposes. The government has recently announced a study to determine the feasibility of using nuclear sources to generate power as a long-term solution.

Barbados has introduced individual home generation of electricity to offset electrical generation costs.

High Prices of Petroleum and Petroleum Products

Caribbean countries have suffered under the escalating high prices of crude oil and related petroleum products. Most of these countries use fuel oil or diesel as the prime energy source for conversion to electricity and gasoline, aviation fuel and diesel for transportation. Cooking utilises Liquified Petroleum Gases (LPG). Since the price hike of 2005, most of the countries have passed on the burden of rising energy costs to the consumer, with debilitating effects on the population. This is reflected in comments by leading policy makers throughout the Caribbean region such as:

Jamaicans "have everything to gain and nothing to lose (in looking at renewable energy sources) as the cost of fossil fuels will continue to climb, whereas the wind, the sun, and the water are by definition free," said Philip Paulwell, Minister of Commerce, Science and Technology in 2006, as reported by Reuters," Oil Stung Caribbean Looks at Energy Alternatives".

The ratio of energy consumption to gross domestic product in Jamaica has been rising over the last decade at a rate that the government calls economically challenging. The oil bill rose to $935 million in 2004 from $813 million in 2003. Last year it passed the $1 billion mark.

The article further concluded that "In the Caribbean, petroleum products account for an estimated 93 percent of commercial-energy use. Average electricity prices in the Caribbean are as much as seven times higher than those in the United States and Europe. Dependence on imported energy remains a principal hurdle to sustainable economic development in the region."

The Jamaica Gleaner newspaper's article by Zia Mian of 30 March 2008 states "The Jamaican economy is relatively energy intensive. Per capita energy consumption is estimated at over 10 barrels of oil equivalent (boe). Between 1990 and 2006 the GDP growth averaged at 1.1 per cent, while the increase in the demand for energy averaged at 2.5 per cent per annum. The oil import bill has increased at 10.1 per cent per annum.

Barbados is also suffering under the load of rising energy prices. Price Waterhouse Coopers in their analysis of Owen Arthur's PM budget of 2006 stated that

"The energy crisis is intimately linked to the foreign exchange challenges which we face as a nation and while the Minister has introduced a number of initiatives to conserve energy both in the prívate and public sectors, we wonder why measures to deal with some of the major root causes such as a comprehensive public transport system and the reduction of motor importation, both new as well as used vehicles, has not been addressed more aggressively. Perhaps the reality is that both in economic as well as political terms, the Minister has little room to manouvre."

Newly appointed PM of Barbados, David Thompson, in the 2008 Budget emphasized the need to move away from oil dependence as reported by PWC.

"The government has indicated its desire to take a lead in moving Barbados away from independence upon imported fossil fuels and towards energy independence by encouraging the generation of renewable energies and the sale of electricity into the national grid."

By far the greatest effect of high petroleum prices is in Haiti, the poorest country in the Western Hemisphere. Wood is used as the main fuel for cooking: it is the cheapest fuel available, and all other fuels are considerably more expensive and the majority of the population cannot afford it. The consequence of using wood for fuel, however, is un-checked de-forestation and dangers to the environment.

Affordable Electricity

The sharp price increase in fuel, starting from 2005, has driven customers' electricity bills to unprecedented high levels. Even though power-generating plants have maintained their basic rates, cost adjustments for the price of fuel are passed on to the consumer. The pass through costs of fuel amounts to an increase on average of 30 percent.

Even with conservation measures being introduced, the electricity consumption rate in the Caribbean is still high. But if the fuel factor price decreases, the average electricity consumption rate will increase accordingly. This indicates that electricity usage is elastic, depending on the price of electricity.

Security of Energy Supply

There is a serious need to change from an oil-based energy dependence to a mixture of energy sources. In this continuum, the change may be as subtle as moving to natural gas, which is more environmentally friendly than fuel oil. But security of supply must mean affordable supplies of energy from sustainable sources, for example wind and solar, both of which are abundant in the Caribbean.

In this regard, there are renewed calls for major investments and research into wind farms and solar cells technology. Since these are new areas of sustainable energy, technologically advanced partners who have experience in these areas would be of interest to Caribbean governments.

Island economies would not have the capital to invest in these projects since the current balance-of-payments problem has been exacerbated by the cost of fuel imports.

CARICOM has approached the problem through its Energy Policy document, with the conversion to natural gas that is abundant in the region, especially Trinidad and Tobago. However, pricing has been the problem in allowing Jamaica to receive LNG cargoes from Trinidad.

In the search for new sources of oil and gas, Jamaica, Barbados and Grenada hope to discover commercial quantities of petroleum within their territorial waters. Towards this end, both Jamaica and Barbados have offered bid rounds to international oil companies to explore for oil and gas, but so far without much success.

Pipeline gas from Trinidad and Tobago to the Eastern Caribbean is also a project that can offset some supplies over a 10- to 20-year term. The major hurdle is the adequacy of a commercial sized market to generate a good rate of return that can be financed by international banks and financial institutions.

The next level of security would mean a faster conversion of wind and solar technologies to offset import fuel bills. This requires both financial and technological inputs. A necessary step in this process is de-regularization of the local markets to allow for foreign investment, since most of the islands have monopolistic energy suppliers and distributors.

Caribbean Insularity

The many islands that make up the Caribbean are separated by large spans of ocean. Their colonial history and the conditions and periods of colonisation varied. Their ancestral history and circumstances of migration (slavery, indentureship, new trade routes, spreading religion, etc.) have fostered insularity in individual countries, especially in terms of trade and regional cooperation. Various associations have been created over the years in an effort to encourage partnership. CARICOM is by far the most advanced and has the greatest commitment of individual countries: it is the launch pad for a Caribbean economic and political union.

As a block, energy patterns can be mapped and security issues addressed in a holistic manner. However, the Caricom Energy Policy document has been in existence for some time now without any real support for its adoption. In the meantime, individual countries are starting on their own quest for new energy supplies. This is not the optimum solution for the investor or for the benefit of all the countries involved.

Over the past decade, Caribbean states have made efforts to integrate their economies. The major regional organization is the Caribbean Community and Common Market (CARICOM), whose members include the South American states of Guyana and Suriname, the Central American state of Belize, and the Caribbean islands of Antigua and Barbuda, The Bahamas, Barbados, Dominica, Grenada, Haiti, Jamaica, Montserrat, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines and Trinidad and Tobago. All other islands, with the exception of Cuba, have either associate or observer status. The Caribbean Community has three objectives:

(a) economic cooperation through the Caribbean Single Market Economy
(b) coordination of foreign policy among the independent Member States
(c) common services and cooperation in functional matters such as health, education and culture, communications and industrial relations.

Caricom countries have steadily reduced tariffs among members. Besides Caricom, the other main organizations of the region include the Association of Caribbean States, the Eastern Caribbean Currency Union and the associated Eastern Caribbean Central Bank.

This insularity, added to varied economic situations and the lack of a formal union forces the countries to conform to a process of collective debates and consensus before the implementation of one general policy. These factors have caused the bilateral agencies, international banks and private investors to evaluate various options and technologies to bring relief to the Caribbean islands as individuals. This has lead to similar policies among the countries, but varied methodology and choice of alternative energy in order of priority.

Appendix K
National Policies

Cuba

Cuba's national strategy to improve energy security has six fundamental pillars. These are

- Increased economic competitiveness
- Fuel conservation and rational use of energy
- Efficient exploration and use of crude oil and natural gas
- Development of renewable energy sources
- Legal and Institutional support
- International involvement

Jamaica's immediate aims are to:

- Reduce the consumption of fossil fuels
- Avoid or at least delay generation capacity expansion
- Reduce emissions of greenhouse gases
- Build institutional capability in the Jamaica electric power sector and the energy related private sector
- Support the ongoing efforts in testing and adopting energy efficient equipment
- Increase public awareness of the importance of energy conservation
- Demonstrate the potential gains to utilities of other developing countries
- Provide cost savings to the local utility company, JPSCo and participating customers, and
- Expand the use of new technologies including renewable energy technology to Jamaica

Grenada's Specific goals include:

- Ensure adequate, stable, reliable, and economical energy services to sustain economic development, while meeting current and projected demand
- Enhance the security of energy supply and services for all sectors of the economy
- Allow reasonable incomes for businesses engaged in the local energy sector, while attracting international investment where appropriate

- Promote energy efficiency and conservation at all levels of the economy in order to achieve optimum economic use of renewable and non-renewable sources of energy.
- Protect the local and global environment by maximizing the use of renewable-energy and energy-efficiency alternatives.
- Determine the extent of Grenada's potential hydrocarbon resources with a view towards developing these resources if found in commercial quantities. This development should be done in a sustainable manner, to benefit both the economy and environment of the nation."

Barbados National Energy Policy

The draft NEP document focuses on a number of critical areas such as:

- the provision of energy at a reasonable cost,
- the reduction of dependence on fossil fuels,
- the creation of a renewable energy society and economy,
- the establishment of an appropriate regulatory and economic framework,
- increased exploration for gas and oil both onshore and offshore,
- the promotion of research and development in energy, oil and natural gas and increased participation in the energy sector at the national level.

Appendix L
Caribbean Gas to Power Examples

EcoElectra

This is a power generation facility that supplies power to the Puerto Rico Electric Power Authority, PREPA and is privately owned by Gas Natural (50%) and a joint venture of International Power and Mitsui.

In 1993 the government of Puerto Rico established an energy policy to diversify its fuels sources for power generation away from oil. The order granting authority to construct and operate the LNG facility was issued on May 15, 1996. Approval to begin importing LNG was issued on June 20, 2000. The LNG facilities consist of: (1) a marine terminal with an 1800-foot pier for unloading LNG tankers; (2) 160,000 cubic meter double containment LNG storage tank; (3) a vaporization system; (4) various control systems; and (5) piping and other ancillary equipment. The plant when built in 2000 was the first independent power plant to integrate a power plant with an LNG terminal.

Its facilities are located in Puerto Rico's southwest coast, in Punta Guayanilla in the Municipality of Peñuelas, 9 miles west of Ponce, and the second most important city on the Island. EcoEléctrica is the most efficient power plant in Puerto Rico because of two major factors; it uses natural gas as fuel and its unique plant design. EcoElectrica supplies about 13% of the Island's energy needs in a clean, safe, and reliable manner. The re-vaporized natural gas is used to power a 461 megawatt cogeneration plant which sells electricity to the Puerto Rico Electric Power Authority and uses steam to power a desalination facility on the site.

It was constructed at a cost of US$700 million and lowered oil dependency on the island from 99% to 86% since its commencement.

The facility consists of a deep water jetty complete with loading arms and cryogenic insulated pipes to receive the cold liquefied natural gas. The LNG is pumped from the tanker into the storage tank in about 10 hours. The tank is 160,000 cubic meters in capacity and caters for a 40 day supply before receiving another cargo of LNG. The vaporized gas is used in a CCCT power generation plant which has a capacity of 540 MW.

LNG unloaded from ocean-going LNG carriers is stored at a temperature of -260 ° F and a pressure of 1.5 pounds per square inch gauge (psig). The LNG storage tank consists of a 9% nickel steel inner tank and a carbon steel outer tank. A concrete wall capable of containing 150% of the gross capacity of the tank's contents surrounds the tank. Natural gas from the Terminal is currently supplied solely to the EcoEléctrica Combined Cycle Power Plant, but plans are currently underway to expand the Terminal sendout to supply natural gas to the Puerto Rico Electric Power Authority (PREPA) for use in its power plants.

EcoEléctrica is a combined cycle cogeneration plant with two 501F 184MW combustion turbines designed and built by Siemens-Westinghouse. The turbines use natural gas as a primary fuel, but can also use liquefied petroleum gas (LPG) as a secondary fuel, and No.2 oil with very low sulfur content (0.04%) as a backup or emergency fuel. The exhaust gases from the combustion turbines are routed to heat recovery steam generators (HRSGs) to produce steam. Part of the steam is routed to a Toshiba steam turbine/generator to produce an additional 214 MW and to a desalination plant to provide heat for sea water distillation purposes. Steam is also used to control NOx emissions. The power generated by EcoEléctrica is transmitted to the Puerto Rico Electric Power Authority (PREPA) system on a 230 kV line.

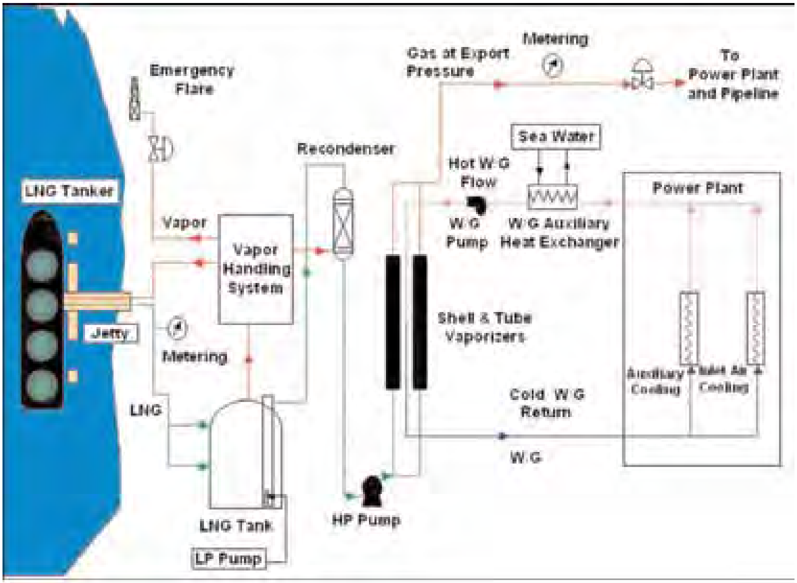
The power generated by EcoEléctrica is transmitted to the Puerto Rico Electric Power Authority (PREPA) operated power grid, while the steam is used to for the power generation in a steam turbine, and heat for running a desalination plant. The desalination plant produces up to 2 million gallons per day of desalinated water.

AES Andres - Dominican Republic

In the Dominican Republic, AES developed, constructed, and currently owns and operates AES Andres which consists of a 160,000 cubic meter tank LNG terminal in conjunction with a 310 megawatt combined-cycle power plant that uses natural gas from the terminal as its fuel. The project incorporates an innovative inlet chilling system that cools the air before it enters the power plant turbine. This system, which gets the "cold" needed for the chilling effect from the re-vaporizing LNG, significantly increases the already high efficiency of the power plant.

AES Andres has been in operation since December 2003.

AES is the largest private power generator in the Dominican Republic. In 2003, natural gas was imported into the country to run a combined 319 MW gas-fired plant and LNG regasification terminal. The plant is located 35 kilometers east of Santo Domingo. AES Andres also supplies AES Los Mina, a 236 MW generation plant that AES converted to gas-fired operations in 2003. These two plants represent approximately 30% of the country's total generation capacity.



The terminal is designed to receive LNG from ships with rated storage capacities ranging from 35,000 to 145,000 cubic meters and unload vessels at a rate of 10,500 cubic meters per hour. The steel, double-wall, flat-bottom tank provides 160,000 cubic meters of gross LNG storage capacity.

A unique vapor-handling system for the terminal was designed that eliminates the need for compressing the gas to pipeline pressure; this system is more economical to operate than a traditional vapor-handling system. The sendout system can be easily expanded. The system delivers up to 125 million standard cubic feet per day of vaporized gas to the pipeline at a pressure of up to 650 pounds per square inch gauge (4482 kilopascal) and temperature of up to 40°F (4.4°C). The terminal incorporates 100% redundancy for all LNG sendout systems pumps and heat exchangers.