

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

BARBADOS

**SUPPORT STUDIES FOR THE UPGRADE AND EXPANSION OF THE NATURAL GAS
NETWORK**

(BA-T1008)

PLAN OF OPERATIONS

This document was prepared by the project team consisting of: Alejandro Melandri (INE/ENE) Team Leader; Christiaan Gischler (INE/ENE); Roman Payo (INE/ECC); Jorge Ordóñez (INE/ENE); Patricia Shako (CCB/CBA); Rochelle Franklin (CCB/CBA); Miozotis Florez, (LEG/SGO).

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BASIC SOCIOECONOMIC DATA

For basic socioeconomic data, including public debt information, please refer to the following address:

<http://www.iadb.org/RES/index.cfm?fuseaction=externallinks.countrydata>

ELECTRONIC REFERENCES

ABBREVIATIONS

BNOCL	Barbados National Oil Company
CCB/CBA	Country Office in Barbados
CNG	Compressed Natural Gas
EA	Executing Agency
ESR	Environmental and Social Review
GoBA	Government of Barbados
IDB	Inter American Development Bank
IFN	InfraFund (Infrastructure Project Preparation Fund)
INE/ENE	Energy Division
LAC	Latin America and the Caribbean
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
McF	Million cubic feet
MFIE	Ministry of Finance, Investment, Telecommunications and Energy
NG	Natural gas
NPC	National Petroleum Corporation
PE	Polyethylene
PVC	Poly vinyl chloride
TC	Technical Cooperation

I. Basic Project Data

Beneficiary Country	Barbados		
Executing agency:	Inter-American Development Bank (IDB)		
Beneficiaries:	National Petroleum Corporation (NPC) and Ministry of Finance, Investment, Telecommunications and Energy (MFIE)		
Project team:	Alejandro Melandri (INE/ENE) Team Leader; Christiaan Gischler (INE/ENE); Roman Payo (INE/ECC); Jorge Ordóñez (INE/ENE); Patricia Shako (CCB/CBA); and Rochelle Franklin (CCB/CBA)		
Financing plan:	IDB (InfraFund):	US\$	500,000
	Local Counterpart:	US\$	125,000
	Total:	US\$	625,000
	The general objective of the TC is to assess the local natural gas transmission and distribution infrastructure needs for each of the gas import options being considered by the government: (i) shipped liquefied natural gas; (ii) shipped compressed natural gas (CNG); and (iii) CNG transported by pipeline.		
Objective:			
Execution period:	10 months		
Disbursement period:	12 months		
Special contractual conditions:	None		
Exceptions to Bank Policies and Procedures:	None		
Environmental and social review:	The ESR Secretariat reviewed the TC profile on September 11th, 2009.		
Coordination with Other Donors:	N/A		

II. Background

- 2.1 Barbados, a country-island of 431 square kilometers and a population of 271,000, ranks high among Latin America and the Caribbean (LAC) countries in terms of social and economic indicators. However, in terms of energy, Barbados has very high dependency on fossil fuels. Approximately 90% of the electricity produced is generated from fuel oil. Since Barbados' oil demand significantly exceeds its production capacity, the country has to import in excess of 9000 bbl/d that, together with the 1000 bbl/d produced locally, are mainly used for power generation (50%) and transportation (33%).
- 2.2 With the fluctuating price of oil, the Government of Barbados (GoBA) is committed to diversifying the energy matrix to reduce this dependency from expensive fossil fuels. Additionally, the GoBA is interested in ensuring the

security and stability of the energy supply, maximizing energy efficiency and achieving environmental sustainability. The IDB country strategy with Barbados (document GN-2539, October 2009) emphasizes the need for diversification from oil to reduce the risk of oil price shocks to the economy.

- 2.3 Barbados has proven natural gas (NG) reserves of 141 million cubic meters (mcm) and consumes about 29 mcm per year. At present Barbados produces NG but each year at a lesser rate due to exhaustion of reserves and the lack of new exploration activities. In 2007, NG production reached 805,432 million cubic feet (Mcf), representing a 2.5 per cent decrease compared to the 826,342 Mcf produced in 2006¹. It is estimated that reserves will run out in the next 5 to 10 years at the current extraction rate.
- 2.4 At present, all NG is produced locally and purchased from the Barbados National Oil Company (BNOCL), which is in charge of exploration and production. Most gas in Barbados is consumed at the residential and commercial level. Approximately 16,900 households and 678 commercial customers are connected to the NG grid, which until 2007 expanded continuously. However, because of interconnectivity issues and underground pipeline infrastructure requirements, which can be costly, its availability is limited to less than 25% of the island and approximately only 18% of the domestic households, which gives room to an important expansion potential given a sufficient local or foreign NG supply.
- 2.5 In terms of cost comparison, NG is currently (prices of September 2009) between 50 and 56% less expensive than gasoline and 15 to 40% less expensive than domestic liquefied petroleum gas (LPG). This fact gives economic grounds to the sustained and potentially increasing use of NG as an energy source in presence of volatile oil prices, which have hardly hit Barbadian economy during high price periods.

Cost (Barbadian dollars) to obtain 1,000,000 btu equivalent calorific value²

Form of Energy	N.G.	L.P.G.	Diesel	Kerosene	Gasoline	Bunker C	Electricity
Equivalent Cost (Resid.) \$	1.48	2.37	2.08	1.45	2.55	0.98	2.33
Equivalent Cost (Com.) \$	1.29	2.20	1.89	1.40	2.30	0.98	2.69

- 2.6 In light of the decreasing NG local production, volatile oil prices and the environmental and efficiency benefits of NG, the GoBA and the National Petroleum Corporation (NPC) are analyzing options to import NG at competitive prices, as the GoBA believes that NG will still be part of the energy matrix. Among the options analyzed by GoBA and NPC, the most suitable are: (i) shipped liquefied natural gas (LNG); (ii) shipped compressed natural gas (CNG); and (iii) NG transported by pipeline from Trinidad and Tobago. In each

¹ Research and Planning Unit, Ministry of Finance, Economic Affairs and Energy. Barbados Economic and Social Report 2007. July 2008.

² NPC calculations. Excludes VAT.

case, the NG may have a different geographical entry point and infrastructure requirements (i.e., port facilities, regasification process for LNG, pumping stations, etc.) to reach the existing NG network. NPC will have to assess the transmission and infrastructure needs from the entry point into the country, as well as the improvement needs in existing transmission and distribution infrastructure for an expected larger demand of NG.

- 2.7 The IDB has offered its support to the GoBA, and in particular NPC, in assessing the NG local transmission and distribution infrastructure needs from the entry point into the country for each one of the gas import options. The results of the corresponding studies will help GoBA and NPC better understand the implications for each option and thus to make an informed decision. The technical cooperation (TC) is eligible for resources of the Infrastructure Project Preparation Fund (InfraFund) since it is financing activities that will support the scaling up of infrastructure investments, in this case, a future expansion of the local NG transmission and distribution infrastructure.
- 2.8 The IDB is also supporting the GoBA with the TC “Sustainable Energy Framework for Barbados, BA-T1007” (under execution), and the loan operations under preparation “Support for Sustainable Energy Framework for Barbados First Phase” (BA-L1022, PBL loan) and the “Sustainable Energy Implementation Program” (BA-L1020, Investment loan) to promote and support sustainable energy and energy conservation programs and diversify the energy matrix. This TC will complement the sustainable energy studies as one of its components will analyze the role and magnitude of fossil fuels in the energy matrix, and particularly the demand and use of NG for diversification purposes. In this way, with the ongoing work in sustainable energy and the proposed activities of this TC, the IDB is supporting GoBA with a comprehensive assessment of the energy sector and the options available to face future challenges and to reconfigure the energy matrix to attain sustainability. Additionally, with this TC, options to upgrade the NG distribution and transmission network will be evaluated, which after implementation normally will result in fewer NG losses and, as a result, higher energy efficiency.
- 2.9 The IDBs Country and Sector Strategies: The project is fully coherent with the IDB’s 2009- 2013 Barbados Country Strategy (GN-2539), and its main objective of lowering oil imports, and promoting clean energy and an efficient use of energy. The Country Strategy also establishes the need to optimize the use of fossil fuels, mainly natural gas, as a measure of energy conservation. In this regard, the operation analyzes the options to maintain or increase the use of natural gas and thus promote a further diversification of the energy matrix. Together with other operations in the current IDB’s energy portfolio that address Barbados’ renewable energy (RE) and energy efficiency (EE) potential, this TC advances in the objective of reducing oil dependency by exploring the different alternatives available to the country for the diversification of energy sources.

III. Program Objectives and Description

- 3.1 **Program goal and purpose.** The **general** objective of the TC is to assess NG transmission and distribution infrastructure needs for each of the import options being considered by the government: (i) shipped LNG; (ii) shipped CNG; and (iii) CNG transported by pipeline. The **specific objectives** will be to: (i) assess the fossil fuel contribution to the energy matrix, (ii) analyze the existing environmental regulations for the hydrocarbon sector, (iii) evaluate current and prospective NG demand, (iv) analyze transmission and distribution needs for a potential grid expansion under the three afore-mentioned scenarios, taking into consideration their environmental implications; and (v) disseminate the findings.
- 3.2 **Components.** The main components of this TC are:
- i **Component I – Fossil fuel assessment**
 - a. **Assessment of Fossil Fuel use.** Determine the current sources and uses of fossil fuels in Barbados. This component should outline the current situation of fossil fuel use in the island to complete the country's energy matrix initiated with the Sustainable Energy Framework program. At the end of this activity GoBA will have a complete picture of the country's energy matrix and enough sector information that is critical for the decision-making process.
 - b. **Market Demand for NG:** study to determine current and prospective future market demand across the various and potential customer sectors, *i.e.*, domestic, commercial and industrial. The study will also seek to determine the market potential from a geographical standpoint, *i.e.*, across the various parishes.
 - ii **Component II – Transmission and distribution Infrastructure.**
 - a. **Analysis of Current Network:** This component will seek to determine the integrity and capacity of the current network, which comprises over 12 miles of transmission pipeline [(1) BNOCL to Belle distribution station and (2) Belle distribution station to the Barbados Light and Power Limited] and over 315 miles of distribution network spanning the north to the south of the island. The current capacity of the network will be assessed, which will involve a nodal and integrity analysis of the system where various types of materials (poly vinyl chloride (PVC), polyethylene (PE), carbon steel and cast iron) have been used to deliver NG to various destinations in both overland and underground applications. The study will also determine whether the current infrastructure can handle new distribution requirements in light of more gas being available for distribution, which more than likely will involve greater pressures and larger volumes of gas.

- b. **Analysis of Infrastructure Needs:** This component will analyze the infrastructure needs to connect to the existing network from the entry point and the improvement needs in the existing transmission and distribution network associated with each of the import options. The most effective route to transport NG from the entry point will be assessed in tandem with the technical, financial, economic and environmental feasibility of the required infrastructure. In the case of LNG importation, the global costs and technical requirements of a regasification plant will be estimated.

Within the component, an assessment of environmental issues will be executed, including: (a) evaluation of the institutional capacity of the government agencies in charge of the environmental regulation of the hydrocarbons sector (approval of new projects, construction and operations supervision, etc.); (b) evaluation of the adequacy of the environmental, health and safety standards and limits that apply to the hydrocarbons sector in Barbados; (c) evaluation of the adequacy of the environmental and social legal requirements/legislation applicable to (i) right-of-way acquisition and easements, and (ii) compensation and remediation of environmental and social damages associated with environmental accidents (*e.g.*, leaks, spills, explosions); and (d) a preliminary environmental audit of the existing operations and facilities to identify any existing liabilities associated with point (c) above (*e.g.*, encroachments in the right-of-way, environmental or social damages from former leaks, spills or explosions). According to this assessment, subsequently this component will: (a) evaluate the existing legal environmental and social requirements for selecting the sites for the various options of importing NG (expanding the NG distribution network or construction of a LNG regasification plant); (b) propose any required adjustments in such legal and social requirements; (c) conduct a Preliminary Environmental Assessment of the three options to upgrade and expand the said NG infrastructure (from the three potential entry points); and (d) prepare the Terms of Reference for the Environmental Impact Assessment of the selected option for the upgrade and expansion of the NG infrastructure.

- iii **Component III – Dissemination of findings.** Carry out workshops with relevant stakeholders to showcase the results of the TC and stimulate the debate on the relevance of NG in the energy matrix.

IV. Cost and Financing

- 4.1 The cost of this TC is US\$625,000 of which Infrastructure Project Preparation Fund (InfraFund), will finance US\$500,000, and local counterpart will fund the remaining US\$125,000, which will comprise an in kind contribution (US\$105,000) represented by the information, personnel time and logistical resources needed to carry out the studies, as well as a cash contribution (US\$20,000) that will cover the financing of dissemination activities. The total

cost of the TC as set forth above is US\$625,000. This TC is being financed on a contingent recovery basis under the specifications stated in the InfraFund constitutive document (GN 2404-4). The contingent recovery of the resources is determined as follows: (i) if the project is feasible and the IDB finances the project the technical assistance becomes a grant; (ii) if the project is not feasible the technical assistance becomes a grant; and (iii) if the project is feasible but the borrower chooses to finance it through a different financial institution the technical assistance becomes a loan and it must be repaid.

- 4.2 The present operation is not eligible under the “Integration Fund” (Fund for the Financing of Technical Cooperation for Initiatives for Regional Infrastructure Integration, created with document GN-2344-4 and modified with GN-2344-6). Likewise, there are no other resources from other Funds that can be utilized in the time and manner that the activities under this TC require.

Component	Financing		Total Funding
	IDB	Local	
	(US\$)	(US\$)	(US\$)
Component I – Assessment of Fossil Fuel	80,000	30,000	110,000
• Assessment of Fossil Fuel Use	30,000	15,000	45,000
• Market Demand for Natural Gas	50,000	15,000	65,000
Component II – Transmission and Distribution Infrastructure	410,000	75,000	485,000
• Analysis of Current Network	75,000	30,000	105,000
• Transmission and Distribution Infrastructure Needs	335,000	45,000	380,000
Component III –Dissemination of Findings	10,000	20,000	30,000
TOTAL	500,000	125,000	625,000

V. Executing Agency and Execution Structure

- 5.1 The IDB through INE/ENE will be the Executing Agency (EA). The GoBA has asked the IDB to be the EA in communication dated August 21st, 2009. The request is due mainly because the GoBA is looking to make a swift decision on the NG issue since it is strategic for the country to keep an adequate supply of this resource the local production is expected to fall short in the future. The Bank’s execution of the TC would expedite the process of selection and contracting of consulting services in time for GoBA to take a decision. The IDB will work in close coordination with the NPC throughout the project’s lifetime.
- 5.2 The Execution period of the TC will be 10 months while the disbursement period will be 12 months.
- 5.3 Procurement and program implementation readiness: The selection and hiring of the consultant/consulting firms and the procurement of goods for the development of the activities comprised by this TC will be carried out in accordance with Bank’s policies and procedures (GN-2349-7 and GN-2350-7).

VI. Monitoring and Evaluation

- 6.1 Monitoring: The monitoring responsibility during the execution of this TC will reside with INE/ENE, while the IDB's Country Office in Barbados (CCB/CBA) will provide additional operational support.
- 6.2 Technical and basic responsibility: The work of the consulting firms and the individual consultant, and their compliance with the Terms of Reference for this project will be monitored by INE/ENE in close coordination with MFIE and NPC.
- 6.3 Progress and final reports: The terms of reference of each activity for which a consulting service is hired will specify the progress and final reports to be presented to the Bank and CCB/CBA. The final reports will be approved by the Bank, in consultation with MFIE and NPC.

VII. Program Benefits and Risks

- 7.1 Benefits and beneficiaries: This TC contributes to the diversification of Barbados' energy matrix and the assessment of alternatives that contribute to a cost-efficient energy supply. The use of NG improves the resilience of the Barbadian economy to sharp fluctuations in oil prices as well as the environmental footprint of the energy sector. Additionally, the analysis of the fossil fuel component of the Barbados energy matrix complements the country's ongoing efforts in the areas of renewable energy and energy efficiency. The Bank's support will help update the sources and uses of energy in the country, provide alternatives to an oil dependent sector and set the grounds for a regulatory debate that leads to a more sustainable energy matrix.
- 7.2 The beneficiaries of the program are the NPC and the Ministry of Finance, Investment, Telecommunications and Energy.
- 7.3 Risks: The major risk for this TC is that, even though the studies provide all the knowledge required to make an informed decision, the process to pick one of the import alternatives turns into a lengthy one the decision-making process over this strategic issue loses momentum, especially if oil prices drop down enough that the interest of pursuing NG ceases to exist. However, it could be said that the lack of comprehensive information about the different alternatives for NG supply is the main reason why GoBA has not yet taken action to expand the NG grid. Given the depth and transcendence that GoBA has put into the current energy debate, which is being strongly supported by the IDB through different TCs and potential loans, there is enough evidence that indicates that energy source diversification is a top priority for the authorities and any initiative related to the matter ranks high in the government's agenda.

VIII. Environmental and Social Strategy

- 8.1 This TC will evaluate the current situation of Barbados regarding its fossil fuel use and its NG transmission and distribution infrastructure. The TC will also evaluate from a financial, economic and environmental point of view three options to upgrade and expand the said NG infrastructure. No negative

environmental or social effects have been identified. This TC was reviewed by the Environmental and Social Impact Review (ESR) Committee on September 11, 2009 and no negative environmental or social effects were identified. The TC has been classified as a “C” according to the Safeguard Classification Tool.

8.2 However, based on the IDB Environment and Safeguards Compliance Policy (OP-703), directive B.4, the following evaluations will be included:

- i. As part of Component 1: (a) evaluate the institutional capacity of the government agencies in charge of the environmental regulation for the hydrocarbons sector (approval of new projects, construction and operations supervision, etc.); (b) evaluate the adequacy of the environmental, health and safety standards and limits that apply to the hydrocarbons sector in Barbados; (c) evaluate the adequacy of the environmental and social legal requirements/legislation applicable to (i) right-of-way acquisition and easements; and (ii) compensation and remediation of environmental and social damages associated to environmental accidents (*e.g.*, leaks, spills, explosions); and (d) conduct a preliminary environmental audit of the existing operations and facilities to identify any existing liabilities associated with point (c) above (*e.g.*, encroachments in the right-of-way, environmental or social damages from former leaks, spills or explosions).
- ii. As part of Component 2: (a) evaluate the existing legal environmental and social requirements for selecting the sites for the various options of importing NG (expanding the NG distribution network or construction of a LNG regasification plant); (b) propose any required adjustments in such legal and social requirements; (c) conduct a Preliminary Environmental Assessment of the three options to upgrade and expand the said NG infrastructure (from the three potential entry points); and (d) prepare the Terms of Reference for the Environmental Impact Assessment of the selected option for the upgrade and expansion of the NG infrastructure.

IX. Certification

I hereby certify that this operation (BA-T1008) was approved for financing under the Infrastructure Project Preparation Fund - InfraFund through an email communication dated September 18, 2009, and signed by Gerhard Lair (VPC/GCM). Also, I certify that resources from the Infrastructure Fund are available for up to US\$500,000 in order to finance the activities described and budgeted in this document. This certification reserves resources for the referenced project for a period of nine (9) calendar months counted from the date of signature below. If the project is not approved by the IDB within that period, the reserve of resources will be cancelled, except in the case a new certification is granted.

The commitment and disbursement of these resources shall be made only by the Bank in US Dollars. The same currency shall be used to stipulate the remuneration and payments to consultants, except in the case of local consultants

working in their own borrowing member country who shall have their remuneration defined and paid in the currency of such country. No resources of the InfraFund shall be made available to cover amounts greater than the amount certified herein above for the implementation of this Plan of Operations. Amounts greater than the certified amount may arise from commitments on contracts denominated in a currency other than the InfraFund currency, resulting in currency exchange rate differences, for which the InfraFund is not at risk.

DETAILED BUDGET
SUPPORT STUDIES FOR THE UPGRADE AND EXPANSION OF THE NATURAL GAS NETWORK
(BA-T1008)

Activity	Type	Unit	Quantity	Unitary price	Consultants	Expenses	Infrafund	Local	Total
Component I – Fossil fuel assessment					65,000	15,000	80,000	30,000	110,000
Assessment of Fossil Fuel use	IC				25,000	5,000	30,000	15,000	45,000
Market Demand for natural gas	IC				40,000	10,000	50,000	15,000	65,000
Component II – Transmission and Distribution Infrastructure					345,000	65,000	410,000	75,000	485,000
Analysis of Current network	F				60,000	15,000	75,000	30,000	105,000
Transmission and Distribution Infrastructure requirements	F				285,000	50,000	335,000	45,000	380,000
Component III –Dissemination of Findings							10,000	20,000	30,000
Seminars, publications, etc	GL						10,000	20,000	30,000
Total							500,000	125,000	625,000

F: Firm

IC: Individual Consultant

GL: Global

G: Goods

ANNEX II

SUPPORT STUDIES FOR THE UPGRADE AND EXPANSION OF THE NATURAL GAS NETWORK (BA-T1008)

PROCUREMENT PLAN

Country: Barbados

Beneficiary: National Petroleum Corporation (NPC) and Ministry of Finance, Investment, Telecommunications and Energy (MFITE)

Executing Agency: Inter American Development Bank

Project Name: Support Studies for the Upgrade and Expansion of the Natural Gas Network

Operation Number: BA-T1008

Brief description of the Project's objectives and components:

The general objective of the TC is to carry out the studies on the natural gas transmission and distribution infrastructure needs for each of the importation options being assessed by the government: (i) shipped liquefied natural gas; (ii) shipped compressed natural gas (CNG); and (iii) CNG transported by pipeline.

Approval date: December 2009

Estimated date for contract signature: January 2010

Estimated date for last disbursement: January 2011

A) Introduction

Procurements for the proposed project will be carried out in accordance with the *Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank* (GN-2350-7) and the *Policies for the procurement of works and goods financed by the Inter-American Development Bank* (GN-2349-7), of August 2006, and with the provisions established in the loan contract and this procurement plan.

B) Procurement Plan

The procurement plan for the “Support Studies for the Upgrade and Expansion of the Natural Gas Network” covering 12 months of project execution has been agreed between the Bank and the beneficiary. The plan, which is summarized in Appendix 1, indicates the procedure to be used for the procurement of services and goods, and the method of selecting consultants, for each contract or group of contracts. It also indicates the estimated cost of each contract or group of contracts; and estimated dates for the publication of specific procurement notices and completion of the contracts included in this project. The procurement plan will be updated annually or whenever necessary or as required by the Bank.

The procurement plan is available on the Bank's website: [Information on project procurements](#)

C) Project Procurement

The procurements to be made for the proposed project are described below

Procurement of works: NA

Procurement of goods: NA

Procurement of non-consulting services: Dissemination activities will be financed.

Consulting services: The consulting services for this project include research, analysis and results reporting.

The consulting firms to be hired for the project will be selected using the standard request for proposals (RFP) issued by the Bank. Individual consultants will be selected bearing in mind the provisions established in chapter V of the policy in document GN-2350-7.

Short lists of consultants for consulting services estimated to cost less than US\$200,000 equivalent per contract, may consist entirely of national firms.

Operational costs: N/A.

Other: N/A.

SUPPORT STUDIES FOR THE UPGRADE AND EXPANSION OF THE NATURAL GAS NETWORK (BA-T1008)

Estimated time period for this procurement plan: from January/2010 to January/2011

Ref No.	Contract Description	Estimated Procurement cost (US\$ thousands)	Selection method ²	Review (ex-ante or ex-post)	Source and percentage of financing		Prequalification ³ (Yes/No)	Estimated dates		Status ⁴ (pending, in process, awarded, cancelled)	Comments
					IDB %	Local / Other %		Publication of procurement notices	Contract's date of termination		
	CONSULTING SERVICES										
	Component I – Fossil fuel assessment										
	Assessment of Fossil Fuel use	30,000	QCBS	Ex-ante	100		NO		Q2 2010	Pending	
	Market Demand for natural gas	50,000	QCII/ QCNI	Ex-ante	100		NO		Q2 2010		
	Component II – Transmission and Distribution Infrastructure										
	Analysis of Current network	75,000	QCBS	Ex-ante	100		NO	Q1 2010	Q4 2010	Pending	
	Transmission and Distribution Infrastructure requirements	335,000	QCBS	Ex-ante	100		NO	Q1 2010	Q4 2010	Pending	
	NON-CONSULTING SERVICES										
	Component III –Dissemination of Findings										
	Seminars, publications, etc	10,000	PC		100		NO		Q4 2010	Pending	

¹ If there are a number of similar individual contracts to be executed in different places or at different times, these can be grouped together under a single heading, with an explanation in the comments column, indicating the average individual amount and the period during which the contracts would be executed. For example: an education project that includes school construction might include an item labeled "School Construction" for an estimated cost of US\$20 million and an explanation under the Comments column such as this: "This item encompasses some 200 contracts for school construction averaging US\$100,000 each, to be awarded individually by the participating municipal governments over a three-year period between January 2006 and December 2008."

² **Goods and Works:** **ICB:** International competitive bidding; **LIB:** limited international bidding; **NCB:** national competitive bidding; **PC:** price comparison; **DC:** direct contracting; **FA A:** force account; **PSA:** Procurement through specialized agencies; **PAs:** Procurement agents; **IA:** Inspection agents; **PLFI:** Procurement in loans to financial intermediaries; **BOO/BOT/BOOT:** Build, own, operate/build d, operate, transfer/build, own, operate, transfer; **PBP:** Performance-based procurement; **PLGB:** Procurement under loans guaranteed by the Bank; **PCP:** Community participation procurement; **Consulting Firm ms:** **QCBS:** Quality- and cost-based selection; **QBS:** Quality-based selection; **FBS:** Selection under a fixed budget; **LCS:** Least-cost selection; **CQS:** Selection based on the consultants' qualifications; **SSS:** Single-source selection; **Individual Consultants:** **QCNI:** Selection based on comparison of qualifications of national individual consultants; **QCII:** Selection based on comparison of qualifications of international individual consultants.

³ Applicable only to Goods and Works in case the new Policies apply. In the case of previous Policies, it is applicable to Goods, Works and Consulting Services.

⁴ Column "Status" will be used for retroactive procurement and when updating the procurement plan.

Terms of Reference

SUPPORT STUDIES FOR THE UPGRADE AND EXPANSION OF THE NATURAL GAS NETWORK

I. BACKGROUND AND JUSTIFICATION

- 1.1 Barbados, a country-island of 431 square kilometers and a population of 271,000, ranks high among Latin America and the Caribbean (LAC) countries in terms of social and economic indicators. However, in terms of energy, Barbados has very high dependency on fossil fuels. Approximately 90% of the electricity produced is generated from fuel oil. Since Barbados' oil demand significantly exceeds its production capacity, the country has to import in excess of 9000 bbl/d that, together with the 1000 bbl/d produced locally, are mainly used for power generation (50%) and transportation (33%).
- 1.2 With the fluctuating price of oil, the Government of Barbados (GoBA) is committed to diversifying the energy matrix to reduce this dependency from expensive fossil fuels. Additionally, the GoBA is interested in ensuring the security and stability of the energy supply, maximizing energy efficiency and achieving environmental sustainability. The IDB country strategy with Barbados (document GN-2539, October 2009) emphasizes the need for diversification from oil to reduce the risk of oil price shocks to the economy.
- 1.3 Barbados has proven natural gas (NG) reserves of 141 million cubic meters (mcm) and consumes about 29 mcm per year. At present Barbados produces NG but each year at a lesser rate due to exhaustion of reserves and the lack of new exploration activities. In 2007, NG production reached 805,432 million cubic feet (Mcf), representing a 2.5 per cent decrease compared to the 826,342 Mcf produced in 2006¹. It is estimated that reserves will run out in the next 5 to 10 years at the current extraction rate.
- 1.4 At present, all NG is produced locally and purchased from the Barbados National Oil Company (BNOCL), which is in charge of exploration and production. Most gas in Barbados is consumed at the residential and commercial level. Approximately 16,900 households and 678 commercial customers are connected to the NG grid, which until 2007 expanded continuously. However, because of interconnectivity issues and underground pipeline infrastructure requirements, which can be costly, its availability is limited to less than 25% of the island and approximately only 18% of the domestic households, which gives room to an important expansion potential given a sufficient local or foreign NG supply.
- 1.5 In terms of cost comparison, NG is currently (prices of September 2009) between 50 and 56% less expensive than gasoline and 15 to 40% less expensive than domestic liquefied petroleum gas (LPG). This fact gives economic grounds to the sustained and potentially increasing use of NG as an energy source in presence of

¹ Research and Planning Unit, Ministry of Finance, Economic Affairs and Energy. Barbados Economic and Social Report 2007. July 2008.

volatile oil prices, which have hardly hit Barbadian economy during high price periods.

1.1 Cost (Barbadian dollars) to obtain 1,000,000 btu equivalent calorific value²

Form of Energy	N.G.	L.P.G.	Diesel	Kerosene	Gasoline	Bunker C	Electricity
Equivalent Cost (Resid.) \$	1.48	2.37	2.08	1.45	2.55	0.98	2.33
Equivalent Cost (Com.) \$	1.29	2.20	1.89	1.40	2.30	0.98	2.69

- 1.6 In light of the decreasing NG local production, volatile oil prices and the environmental and efficiency benefits of NG, the GoBA and the National Petroleum Corporation (NPC) are analyzing options to import NG at competitive prices, as the GoBA believes that NG will still be part of the energy matrix. Among the options analyzed by GoBA and NPC, the most suitable are: (i) shipped liquefied natural gas (LNG); (ii) shipped compressed natural gas (CNG); and (iii) NG transported by pipeline from Trinidad and Tobago. In each case, the NG may have a different geographical entry point and infrastructure requirements (i.e., port facilities, regasification process for LNG, pumping stations, etc.) to reach the existing NG network. NPC will have to assess the transmission and infrastructure needs from the entry point into the country, as well as the improvement needs in existing transmission and distribution infrastructure for an expected larger demand of NG.
- 1.7 The IDB has offered its support to the GoBA, and in particular NPC, in assessing the NG local transmission and distribution infrastructure needs from the entry point into the country for each one of the gas import options. The results of the corresponding studies will help GoBA and NPC better understand the implications for each option and thus to make an informed decision. The technical cooperation (TC) is eligible for resources of the Infrastructure Project Preparation Fund (InfraFund) since it is financing activities that will support the scaling up of infrastructure investments, in this case, a future expansion of the local NG transmission and distribution infrastructure.
- 1.8 The IDB is also supporting the GoBA with the TC “Sustainable Energy Framework for Barbados, BA-T1007” (under execution), and the loan operations under preparation “Support for Sustainable Energy Framework for Barbados First Phase” (BA-L1022, PBL loan) and the “Sustainable Energy Implementation Program” (BA-L1020, Investment loan) to promote and support sustainable energy and energy conservation programs and diversify the energy matrix. This TC will complement the sustainable energy studies as one of its components will analyze the role and magnitude of fossil fuels in the energy matrix, and particularly the demand and use of NG for diversification purposes. In this way, with the ongoing work in sustainable energy and the proposed activities of this TC, the IDB is supporting GoBA with a comprehensive assessment of the energy sector and the options available to face future challenges and to reconfigure the energy matrix to attain sustainability. Additionally, with this TC, options to

² NPC calculations. Excludes VAT.

upgrade the NG distribution and transmission network will be evaluated, which after implementation normally will result in fewer NG losses and, as a result, higher energy efficiency.

II. OBJECTIVES

A. Program goal and purpose

- 2.1 **Program goal and purpose.** The **general** objective of the TC is to assess NG transmission and distribution infrastructure needs for each of the import options being considered by the government: (i) shipped LNG; (ii) shipped CNG; and (iii) CNG transported by pipeline. The **specific objectives** will be to: (i) assess the fossil fuel contribution to the energy matrix, (ii) analyze the existing environmental regulations for the hydrocarbon sector, (iii) evaluate current and prospective NG demand, (iv) analyze transmission and distribution needs for a potential grid expansion under the three afore-mentioned scenarios, taking into consideration their environmental implications; and (v) disseminate the findings.

III. ACTIVITIES

- 3.1 **Transmission and distribution infrastructure:** this component will make and overall assessment of the NG market demand and prospective infrastructure needs for the transmission and distribution of NG in the event of importing it under three different scenarios: (i) shipped LNG; (ii) shipped CNG; and (iii) CNG transported by pipeline. In an indicative manner the activities to be developed under this consultancy will comprise:
- Determine the integrity and capacity of the current network which comprises over 12 miles of transmission pipeline [(1) BNOCL to Belle distribution station and (2) Belle distribution station to the Barbados Light and Power Limited] and over 315 miles of distribution network spanning the north to the south of the island;
 - Determine the current capacity of the network which will involve a nodal and integrity analysis of the system where various types of materials (poly vinyl chloride (PVC), polyethylene (PE), carbon steel, cast iron and have been used to deliver natural gas to various destinations in both overland and underground applications;
 - Determine whether the current infrastructure can handle new distribution requirements in light of more gas been available for distribution which more than likely will involve greater pressures and larger volumes of gas;
 - Analyze the infrastructure needs to connect to the existing network from the entry point and the improvement needs in the existing transmission and distribution network associated to each of the importation options;

- Find and assess the most effective route to transport NG from the entry point in tandem with the technical, financial, economic and environmental feasibility of the required infrastructure;
- Analyze the possible final tariff of the natural gas as determined by the total cost of transportation and distribution from the point of origin for each one of the options;.
- In the case of LNG importation, the global costs and technical requirements of a regasification plant will be estimated;
- In the case of CNG and LNG analyze the different alternatives for transportation from the entry point to areas that are not interconnected to the existing or expanded grid, if required;
- An assessment of environmental issues will be executed, including: (a) evaluation of the institutional capacity of the government agencies in charge of the environmental regulation of the hydrocarbons sector (approval of new projects, construction and operations supervision, etc.); (b) evaluation of the adequacy of the environmental, health and safety standards and limits that apply to the hydrocarbons sector in Barbados; (c) evaluation of the adequacy of the environmental and social legal requirements/legislation applicable to (i) right-of-way acquisition and easements, and (ii) compensation and remediation of environmental and social damages associated with environmental accidents (*e.g.*, leaks, spills, explosions); and (d) a preliminary environmental audit of the existing operations and facilities to identify any existing liabilities associated with point (c) above (*e.g.*, encroachments in the right-of-way, environmental or social damages from former leaks, spills or explosions).
- Subsequently for each of the three options the consultancy will analyze the following environmental issues: (a) Evaluate the existing legal, environmental and social requirements for selecting the sites for the various options of importing NG (expanding the NG distribution network or construction of a LNG regasification plant); (b) Propose any required adjustments in such legal and social requirements; (c) Conduct a Preliminary Environmental Assessment of the three options to upgrade and expand the said natural gas infrastructure (from the three potential entry points); (d) Prepare the Terms of Reference for the Environmental Impact Assessment of the selected option for the upgrade and expansion of the natural gas infrastructure in accordance with IDB and local guidelines;

IV. REPORTS AND PAYMENTS

- 4.1 The consulting firm shall prepare the following final reports in English (including an executive summary) and a publishable summary paper on the matter of the consultancy:

- 4.2 Inception Report: This report will be prepared 2 weeks after starting the consultancy. The report will include a detailed work plan (including methodology to be used, interviews, development of activities, etc.), schedule of activities of the team and schedule of presentation of all deliverables.
- 4.3 Intermediate Report with the findings of component II a, Analysis of Current Network. The intermediate report will be complemented with a power point presentation to be presented to the IDB and the GoB in Barbados during the third quarter of 2010:
- 4.4 Draft Final Report: The report should include the results of all the activities performed during the consultancy and should address all the activities in the objectives of the TORs.
- 4.5 Final Report: This report will be delivered by the consultant by the first quarter of 2010. The report should incorporate the comments from the GoB, NPC and IDB.
- 4.6 Powerpoint presentation with the final results and findings to be presented at a workshop in Barbados during the fourth quarter of 2010;
- 4.7 Publishable summary paper of the activities of the consultancy.