NGC AND THE DEVELOPMENT OF THE 4.4 BCFD GAS TRANSPORTATION INFRASTRUCTURE

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Abstract: The National Gas Company of Trinidad and Tobago Limited (NGC) was established by the Government of Trinidad and Tobago in 1975 with a mandate to promote large scale commercial and industrial use of the country's vast natural gas resources and to develop, own and operate a suitable gas transmission and distribution network, industrial sites and marine infrastructure adequate to this purpose. This paper reviews the achievements of the Company to date and focuses on recent major developments, in particular: the 56" Cross Island Pipeline (CIP) and the Beachfield Upstream Development (BUD). The current development of the gas transmission network has been fuelled by NGC's successful attainment of its original business mandate. In its thirty years of operations, NGC's development of the national infrastructure and pioneering work in establishment of a local energy-based industry, has allowed Trinidad to gain world ranked status. Attendant to on-going network expansion has been the application of innovative construction technology, IT-enabled business process re-designs, re-organisation of its management structure and systems and work force expansion. NGC has also adopted various policies and practices to maximize safety, minimize environmental damage due to construction, restore eco-systems and foster socio-economic development of communities along the pipeline network.

Keywords: transmission, pipeline, infrastructure, safety, sustainable development

1. Introduction

In March 1975, the Government of Trinidad and Tobago took a decision "that a separate company to be designated The National Gas Company of Trinidad and Tobago Ltd. ("NGC") should be formed and should be the designated Agency of Government for the purpose of purchasing and selling natural gas in the country to industrial and commercial users". The company was incorporated on August 22, 1975 with a capital of TT$80,000. Thirty years from its inception, NGC is a diversified group of companies with operations and strategic investments in natural gas transportation, industrial sites, port and marine infrastructure development and services, investment promotion and facilitation, upstream production, natural gas liquids and liquefied natural gas. Figure 1 illustrates the contribution to revenues of the different subsidiaries and affiliated companies to the group in 2005. However, NGC's core business remains the purchase, transportation, sale and distribution of natural gas in Trinidad and Tobago for commercial and industrial use.

NGC remains a strategic asset of the Government with an asset base of TT$12.7 billion and gross revenue of TT$8.02 billion. The company has contributed over TT$4.7 billion since 1975 with TT$3.5 billion in tax revenue TT$1.2 billion in shareholder dividends. The company is one of the few Caribbean companies with international investment grade credit rating with BBB+ from S&P and A3 from Moody's Investor service.

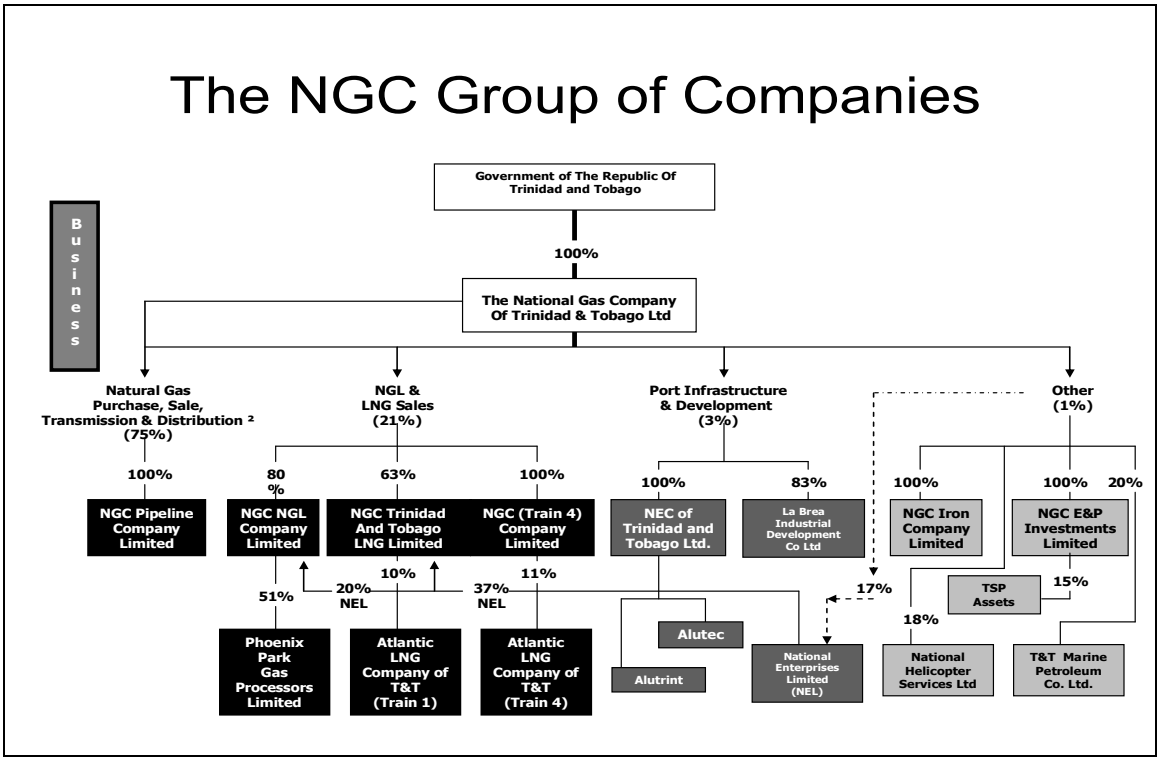

Figure 1: The NGC Group of Companies

An essential element of carrying out its core functions is the development of the natural gas transportation infrastructure and the implementation of management systems to transport a continually increasing volume of gas in response to the expansion of industrial and commercial activities in Trinidad and Tobago. At the end of 2006, NGC will own, maintain and operate a natural gas transmission and distribution network which comprised 624 kilometres of onshore and offshore natural gas pipelines with a capacity of 4.4 Bcfd without compression. This would rank in the top 10% of gas transmission system in the world.

2. The Development Of The Gas Transmission And Distribution Infrastructure

The development of the natural gas transmission system parallels the growth of gas utilisation (excluding gas used by the Oil companies for own use in Producing operations). Initially, the company acquired the 16" pipeline from Penal to Port of Spain which was built by T&TEC to transport gas from the Penal gas condensate field for use in the generation of Electricity in 1963. Thereafter, the company made successive capital investments in the construction of the

24", 30", 36" and finally the 56" cross-island/offshore gas transmission pipelines as illustrated in Table 1.

Table 1: Listing of Major Transmission/Distribution Related Assets

Maior Transmission / Distribution Related Assets				
Year Completed	**From**	**To**	**Length**	**Pipe Diameter**
Offshore Transmission				
1978	Teak	Galeota Point	30 mi	24"
1983	Cassia	Abyssinia/Beachfield	40 mi	30"
1983	Poui	Cassia	3.3 mi	24"
1990	Trintomar Perlican	Cassia	0.7 mi	16"
2006	*Cassia B*	*Beachfield*	*42 mi*	*36"*
2006	*Dolphin*	*Beachfield*	*58.8 mi*	*24"*
Onshore Transmission				
1977	Beachfield	Picton	28 mi	24"
1980	Picton	Phoenix Park	13 mi	20"
1984	Mayaro Bay	Phoenix Park	41 mi	30"
1999	bpTT Slug Catcher	Point Fortin	47 mi	36"
1999	bpTT Mainline Valve	Picton	42 mi	36"
1999	Phoenix Park	PPGPL	0.7 mi	48"
2005	Beachfield	Point Fortin	47.5 mi	56"
Onshore Distribution				
1963	Penal Inlet	PowerGen POS	41 mi	16"
1984	Balckstart	PowerGen POS	4 mi	16"
1993	Ring Main	PPGPL	4 mi	30/24"
1999	Hot Tap to Tringen 1	Nucor Gas Line	2 mi	24"

◆ *Italicized assets are currently under construction.*

The basic design parameters for the gas transmission system comprise an upstream pressure of 900-950 psig and a downstream pressure of 550-600 psig for the pipelines which terminate in Point Lisas and 705 psig for the pipeline to Point Fortin. The pipeline is designed to operate without compression although compression facilities could be added if required. Natural gas is purchased at several delivery points – primarily at the offshore producer platforms with one delivery point on land at Beachfield. The gas is delivered to NGC free of liquids but in a saturated state such that with the cooling effect as the gas flows in the underwater offshore pipeline and with the drop in pressure, condensation occurs resulting in liquid dropout along the pipeline. This requires the use of slug catchers as the pipelines come ashore and as the land pipelines approach Point Lisas and Point Fortin prior to delivery to customers.

2.1 Safety Features

The offshore pipelines are weight concrete coated to counter the buoyancy of the pipeline in water. In addition, at undersea pipeline crossings, there must be protection to avoid damage to

other pipelines. In general, the offshore pipelines are not buried except where they approach landfall. On land, the pipelines are buried with a minimum cover of 1 metre to 1.5 metres and their locations are identified by pipeline markers with information as to the ownership, the orientation of the pipeline and contact numbers in the event of an emergency. These markers are located at regular intervals and where the pipeline crosses roads, streams, etc. or where there is a change of pipeline direction.

The combination of the wall thickness of the pipeline and the depth of cover provides for operational safety with the determination of the minimum wall thickness dependent on the maximum operating pressure, diameter of pipeline, grade of steel and the population density of the area. For added safety, a corrosion allowance is added to the calculated wall thickness. Other features include the use of marker tapes that are installed above the pipeline as a warning indicator to the operator of excavation equipment. At strategic intervals, isolation valves are installed for use in emergency to divert or isolate sections of the pipeline in the event of a failure of the pipeline.

The company has an active system of corrosion protection consisting of sacrificial anodes or ground bed anodes and internal corrosion inhibitors together with potential surveys to monitor the level of protection from these corrosion protection devices. In addition, a combination of "walking the line" and aerial surveys are conducted to monitor the quality and any encroachment of the Right of Way (ROW). Internal condition monitoring of the pipelines is conducted at least once every 5 years to determine the wall thickness throughout the length of the pipelines. Appropriate maintenance activities are conducted if suspect sections of the pipelines are identified.

From a security perspective, 100% surveillance is difficult to achieve and the company maintains emergency stocks of replacement pipelines in the event of external damage to the pipeline.

2.2 Description of the Pipeline Infrastructure

NGC's pipeline transmission network, which is shown in Figure 2 comprises:

i) East Coast Offshore Transmission and
ii) Onshore Transmission Networks.

2.2.1 East Coast Offshore Transmission Network

The East Coast Offshore Transmission Network is made up of two main parallel marine pipelines. One is a 75 kilometre, 24-inch diameter line, installed during the period 1977-1978. This line originates at the Teak 'B' platform and terminates at Galeota Point. Installed in 1983, the second marine line - a 123 kilometre, 30-inch diameter line - originates at bpTT's Cassia Platform and terminates at the Beachfield Valve Station. Additionally, NGC has a 450 MMscfd transportation capacity in bpTT's 40-inch diameter offshore line, which originates in the Mahogany offshore field.

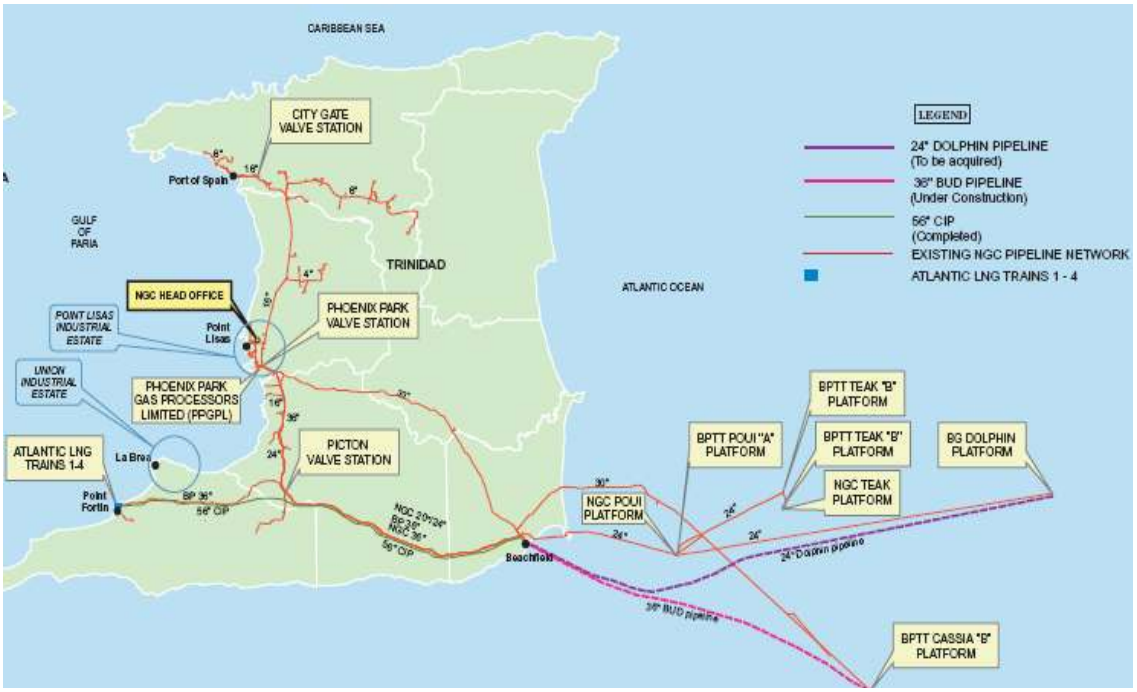

Figure 2: Map of NGC Natural Gas Pipeline Network

2.2.2 Onshore Transmission Network

The onshore transmission network is made up of four pipelines:

- A 130 km, 30-inch diameter pipeline running from Abyssinia to Point Lisas Industrial Estate
- A 66 km, 36-inch diameter pipeline from Beachfield Valve Station to Point Lisas Industrial Estate
- A 117 km, 24/20-inch diameter pipeline running from Beachfield via Picton Valve Station to Point Lisas
- An 80 km, 36-inch diameter pipeline running from Beachfield Valve Station to Atlantic LNG, Point Fortin that is beneficially operated by bpTT

The first three pipelines, with a gas transmission capacity of 1.4 Bcfd, interconnect in the Abyssinia/Beachfield area in southeast Trinidad and end in the slug catching facilities at NGC's Phoenix Park Valve Station, Point Lisas.

2.2.3 New Pipeline Infrastructure: 2005 – 2006

Based on increases in natural gas demand resulting from new gas-based plants and the expansion of LNG, specifically Train IV, a substantial increase of the country's natural gas transmission capacity would be needed by the fourth quarter of 2005.

In 2004, two major pipeline projects were launched. These landmark projects, the Cross Island Pipeline (CIP) Project and the Beachfield Upstream Development (BUD)

Project, would, on completion, add 3 Bcfd to the existing transmission system, bringing NGC's total gas transmission capacity to 4.4 Bcfd.

3. The Cross Island Pipeline (CIP)

The US$260 million (TT$1.2 billion) Cross Island Pipeline (CIP) was originally conceived by the shareholders of Atlantic LNG as part of Atlantic LNG's Train IV project. However, there was extensive debate over a long period about the size/capacity of the pipe which ranged from a 36-inch to a 56-inch pipeline.

Due to the lack of progress on this critical pipeline infrastructure, the Standing Committee on Energy in December 2002 directed that NGC build, own and operate a 56-inch pipeline. Further, it was recommended that the pipeline should be designed to supply natural gas to Atlantic LNG Train IV as well as to the new industrial estates proposed for southwest Trinidad.

Construction of CIP, therefore, aimed to provide NGC with the capacity to transport natural gas from the East Coast to Atlantic LNG Train 4 at Point Fortin, in the first instance, and to a new industrial estate, namely Union Industrial Estate, with the capacity to supply future LNG expansion and other proposed industrial sites.

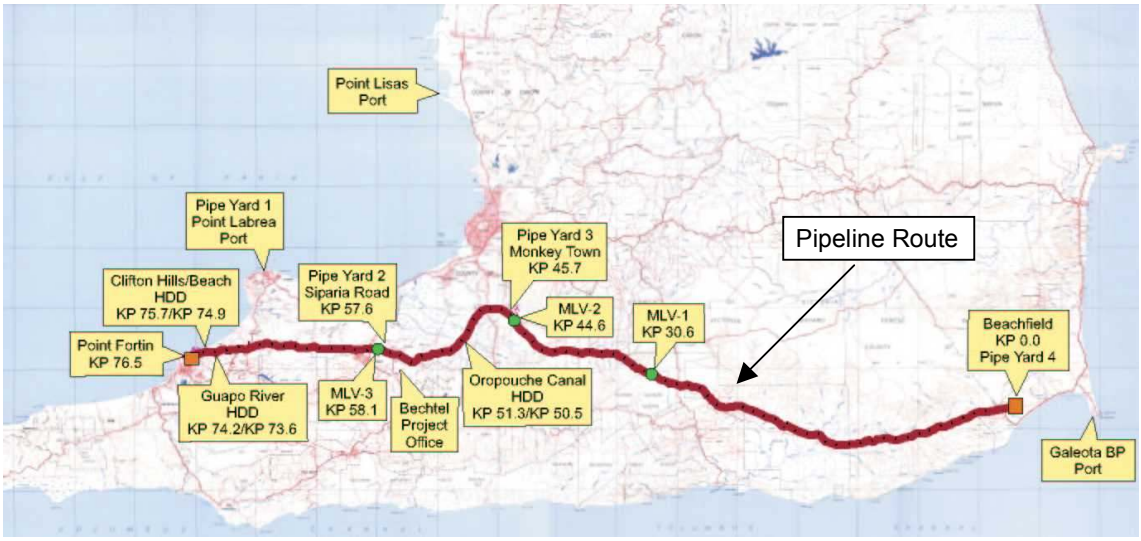

Figure 3: Map of the Cross Island Pipeline:
A 76.5km, 56" Diameter Pipeline from Beachfield to Pt Fortin

Physical construction of the 76.5 kilometre Cross Island Pipeline (CIP), shown in Figure 3, began in January 2004 and was completed in November 2005. This pipeline was constructed within an expanded Right of Way of the previous 30", and two 36" cross-island pipelines. The scope of the project involved installing 6,500 lengths of 56" natural gas pipeline from Beachfield to Point Fortin.

CIP consists of the following:

- A 56-inch pig launcher and inlet facilities located at Beachfield
- A 56-inch, 76.5 km onshore pipeline running from KP 0.0 at the pig launcher in Beachfield to the CIP receiving facilities located at the ALNG plant in Point Fortin
- Five main line valve stations located along the onshore line at Beachfield, Moruga, Picton, Siparia Road and Point Fortin
- Interconnection tees at Central block, Picton and La Brea/Union
- A receiving facility located at the ALNG Plant consisting of a slug catcher, a pig receiver, valving and piping
- SCADA data gathering, monitoring and communication facilities.

Construction activities included: clearing; grading; bending; stringing; mainline welding; NDE (Non-Destructive Evaluation); bored crossings; horizontal directional drilling (HDD); field joint coating; ditching; lowering-in; tie-ins; hydrostatic testing; gauging; calliper surveys; backfilling; ROW clean-up; other pre-commissioning and commissioning activities.

From the project's inception to its commissioning, strict quality assurance and quality control measures were implemented. The 56-inch pipe lengths, which were manufactured in Germany, were inspected and passed by a qualified team of NGC inspectors. A team of pipeline and welding inspectors worked on site throughout construction to ensure pipeline integrity.

The pipeline design was based on several classes of pipe wall thickness:

- Class 1: 49.9 km wall thickness – 0.708"
- Class 2: 7.6 km wall thickness – 0.825"
- Class 3: 19.0 km wall thickness – 0.965"

These were used in accordance with international pipeline codes and the standards set by the Ministry of Energy and Energy Industries. Thicker pipe walls were used in areas with a higher population density, an intrinsic safety feature of the line and also where the pipelines were installed using Horizontal Directional Drilling (HDD).

Other safety features include the five main line valve stations at Beachfield/ Guayaguayare (launcher station), Moruga, Picton, Siparia Road and Pt Fortin (receiver station at Atlantic LNG). The pipeline is monitored on a 24-hour basis by a Supervisory Control and Data Acquisition (SCADA) System. This feature equips the operator the capability of opening/closing valves and other field equipment remotely from the control room.

3.1 Innovative Technology and Construction Methods for CIP

3.1.1 Horizontal Directional Drilling (HDD)

Three areas that were of particular concern for CIP during the design phase were the Clifton Hill Beach and the Guapo and Oropouche Rivers. HDD while more expensive to implement was considered to be the best technique to protect these sensitive areas from environmental damage during construction. These HDDs were completed between June and October 2004.

The Guapo HDD was conducted in an area characterised by wetland/marshy conditions and soft mud. The horizontal distance between the entrance and exit holes was just over 670 metres or 2,198.5 feet. The entrance hole was 13 metres (42.5 feet) above sea level and was drilled at a 10-degree angle of descent. The exit hole was 1.5 metres (5 feet) above

sea level and was drilled with an exit angle of 8 degrees. In essence, there was an elevation (vertical) difference of 11.5 metres (38 feet) between the entrance and exit holes. The HDD "String" as it is called was made by welding fifty-six one tonne joints of 56-inch pipe together. The maximum depth from the surface was 33 metres (108 feet).

The Clifton Hill beach area was a particularly challenging HDD as the job entailed drilling below BG's 24-inch line. Clifton Hill's HDD string was made by welding 64 joints of pipe. The horizontal distance between the entrance and exit holes was 766 metres or 2515.3 feet. The maximum depth from the surface was 33 metres or 108 feet.

The Oropouche HDD string was made by welding 60 joints of pipe. The horizontal distance between the entrance and exit holes was 728 metres or 2389 feet and the maximum depth from the surface was 31.2 metres (102.5 feet).

3.1.2 Buoyancy Control

This line also included 2.8 kilometres of buoyancy control (a combination of concrete weight coat and set on weights). A minimum strength of 3000 psi and density of 210 lb/ft^3 reinforced continuous coating was applied to the pipe to increase the specific gravity of the pipe to 1.3 times the specific gravity of freshwater ($1000kg/m^3$) for buoyancy control.

3.2 Adding to the System on CIP

The golden weld (final weld) on CIP was completed in October 2005 with first gas introduced on November 25, 2005. The line was pressured to the required 750 psig on December 01, 2005. CIP was designed for a maximum pressure of 1050 psig and a downstream pressure of 705 psig.

The pipeline will initially operate with an upstream pressure of 950 psig and a downstream pressure of 705 psig. Under these operating conditions, the pipeline adds a transmission capacity of 2.4 Bcfd to the existing 1.4 Bcfd. Its current commitment is 1.2 Bcfd.

4. The Beachfield Upstream Development (BUD)

The second project that will contribute to an expanded transmission system is the US$153 million Beachfield Upstream Development (BUD) - a 36-inch, 66 kilometres pipeline of which sixty-three kilometres run offshore from bpTT's Cassia B platform to landfall at Rustville and 3 kilometers to Abyssinia, as well as a new slug catcher. Construction on BUD began in March 2004 and is scheduled for completion by Third Quarter 2006.

Currently, NGC has two slug catchers operating along its transmission system. One is located at Phoenix Park, Point Lisas and the other at Abyssinia, Guayaguayare. The current Abyssinia slug catcher can handle 400 million cubic feet per day of natural gas and collects 1500 barrels per day of condensate.

The new Abyssinia facility, a section of which is shown in Figure 4, will be able to handle 3 billion cubic feet of gas per day and separate 5000 barrels per day of condensate. This increased capacity is in anticipation of an increase in gas volumes from the BUD pipeline and other existing and future offshore lines which will be routed into this

accumulator station. On completion and commissioning of the new slug catcher, the existing Abyssinia slug catcher will be decommissioned in 2006 and taken out of service.

Figure 4: BUD Slug Catcher with Capacity to handle 3 Bcfd

Safety is a key element of any NGC pipeline or facility project and operation. The slug catcher is no exception. While the old Abyssinia system lies underground, the new 'super' slug catcher will be above ground, making monitoring and maintenance easier. The slug catcher will also have automatic bypass facilities where gas can bypass the slug catcher in emergency, allowing safe transmission.

It will also allow for safe flaring of gas during pigging and other operations and will function as a pressure control facility to isolate the onshore pipeline from the offshore system.

BUD will also provide for the following:

- Custody Measurement of Condensate
- Re-routing of the 24-inch line into the New Slug Catcher
- Re-routing of the 30-inch line into the New Slug Catcher
- Full bypass capabilities on all lines
- Automation of Station and integration into the existing SCADA System
- Construction of New Control Building & Maintenance Workshop

There are two phases of offshore pipelay:

i) Phase I: from landfall (KP 0) to kilometre mark KP 10.5 which has been completed; and

ii) Phase II: from Cassia B platform to KP 10.5 which is ongoing. (See Figure 5.) The onshore section of the line, 3 kilometres running from Rustville to Abyssinia was completed in 2005.

Figure 5: Snapshot of Pipe Laying Barge as it lays 36" pipes offshore

4.1 Innovative Technology and Construction Methods for BUD

4.1.1 Hot Tap and Stoppling

NGC's two other existing lines from offshore, a 24-inch line and 30-inch line, were diverted into this new slug catcher without disruption in gas supply through the hot tap and stoppling process. Some other construction methods and technologies employed on BUD include:

4.1.2 Concrete-Coating

Concrete-coating was applied to the lengths for the offshore pipeline to give them additional weight to stabilize the line on the seabed and protect the external corrosion coating against mechanical damage.

4.1.3 Pipe Grooving

Grooving of 160 lengths of concrete-coated pipe to accommodate floatation devices.

4.1.4 Concrete Mats

To further protect the submarine portion of BUD, 903 sub-sea concrete mats, each weighing 10,500 pounds and measuring 20 feet by 8 feet, were fabricated and laid by a local construction company.

4.2 Adding to the System on BUD

BUD will have a transmission capacity of 600 Mmcfd and will transport gas for local industries in the Point Lisas area. Completion of the BUD line will allow NGC to transport 2

Bcfd of natural gas from offshore gas fields to onshore users (other than LNG production).

4.3 Management Systems

The operation of this expanding gas transmission system requires significant systems changes. The relative remoteness of Beachfield from Point Lisas required NGC to expand its Beachfield operations and staffing in order to actively monitor and manage its East Coast Operations (CIP, BUD and all other related facilities) and other NGC installations.

4.4 New Developments 1: Gas Management System

NGC is currently installing a computer-based Gas Management System (GMS), a mechanism used to facilitate the transactions, calculations and reporting requirements of the hydrocarbon monitoring and accounting system. Phase I of this project has been carried out by NGC using internal resources GMS is an essential tool for monitoring the flow of shippers' gas streams from input to the redelivery point and, in its basic form, fulfils the major commercial functions of the transporter. NGC as the transporter, has significant obligations to ensure provision of efficient and uninterrupted operation and maintenance of the pipeline and other physical facilities; reliable and consistent measurement procedures as well as secure, timely and accurate information flow and communications.

NGC's GMS will have two very important capabilities:

- the administration of transactions required, e.g. nominations, allocations, scheduling, curtailment, accounting and invoicing; and
- performing online, real-time and predictive type analysis which is the ability to accurately model the dynamic hydraulic behavior of the physical pipeline.

The project team responsible for envisioning and implementing GMS has been drawn completely from NGC in-house resources. The system will be implemented in two phases. The first phase of implementation, done in-house, involved building a computer spreadsheet model. The input to the system is the information on the shippers' redelivery requirements and nominations (requests submitted to the transporter on a specifically designed form by a party (shipper) wishing to transport a certain quantity of gas between two points along the line from a delivery point to a redelivery point).

It facilitates the confirmation and scheduling process prior to gas flow as well as the allocation after gas flow. Daily, monthly and other related summary reports and associated database can be generated. However, live operational data on the pipeline must be communicated as required to the GMS operator by the Pipeline Control Room operator who has the benefit of viewing SCADA screens.

Phase II will require an external party to write a new programme patterned after the NGC spreadsheet model; which, in combination with other software and various application modules together with the pipeline's existing SCADA and communications infrastructure, will achieve greater integration and automation.

4.5 New Developments 2: Geographical Information Systems (GIS)

NGC's GIS programme has been designed for the management of NGC's pipeline network. NGC's project goal was to build an efficient and effective infrastructure management system

utilising GIS technology. This would allow staff to access accurate pipeline, metering stations, SCADA, Land Information Systems and other information. The system is currently in its final stages of testing and will be available via Web Link.

The system will:

- perform general purpose GIS display, query and reporting, including hot linking to various external documents;
- connect to SCADA database to provide operators and field services personnel with measured and calculated data such as pressures, temperatures, gas flows, flow volumes;
- connect to Land Information Systems database to provide users with existing land owner and parcel information for all existing NGC gas line Right of Ways; and
- facilitate new pipeline route selection, giving users the power to select a new route based on particular criteria – slope, soils, land use etc.

Because of additional tools within the GIS, the following analyses that were previously unavailable can now be carried out:

- Buffer around pipelines and NGC facilities;
- Automatic calculation of line lengths and boundary areas;
- Overlays, Intersections, Merge of multiple data layers;
- Selection and identification of features by name, location, station etc.

5. Transmission System – 2006 and Beyond

5.1 Acquisition of Dolphin to Beachfield Pipeline

In Third Quarter 2006, NGC expects to complete the acquisition, from BGTT/Chevron, of the Dolphin to Beachfield offshore natural gas pipeline with a capacity of 423 MMcfd. NGC will enter into a "ship or pay" contract under which the company will transport BGTT's 28.89% share of natural gas for Atlantic LNG Train 4 through this pipeline which will also be connected to CIP.

5.2 Expansion of Phoenix Park Valve Station

Improvement to Phoenix Park Valve Station is a major project planned for 2006. Phoenix Park Valve Station facility is an essential part of the NGC gas transmission system. There are two slug catchers at this facility where condensed liquids are removed from the gas stream before processing. With the increase in transmission capacity brought about by the construction of additional pipelines, plans are in train to modify and upgrade this facility. The works will include the construction of a larger slug catcher. Engineering designs should be completed by August 2006 with engineering construction to be awarded in September 2006. Completion is scheduled for late 2007 with an estimated cost of US$31 million.

5.3 36" Diameter Pipeline to Parallel Existing Ring Main

NGC plans to build a 36-inch diameter pipeline to parallel the existing Ring Main at Point

Lisas Industrial Estate. This eight kilometer line is expected to be completed in 2007. An application has been made for a Certificate of Environmental Clearance.

5.4 Union /Chatham Pipelines

Preliminary Engineering Designs are in progress for these lines that will serve the Union Industrial Estate and the proposed Chatham Industrial Estate. The Pre-lay Survey is 72% completed. Construction is proposed for First Quarter 2007.

6. Pipeline Extension and Sustainable Development – Training, Environment and Community Development

All of NGC's projects include components encompassing human capacity building, the environment and by extension, sustainable development.

6.1 Training

Under CIP, Welder Training (with service providers NESC/MIC) was provided to 80 trainees under a 16-week General Welder Training program and 40 trainees under an advanced 6-week Pipeline Welder Training program. NGC's main contractor, Bechtel, facilitated Construction Skills Training of 526 trainees, with 12,814 training hours and 10,000 apprentice hours in 15 craft areas.

6.2 Environment

6.2.1 HDD

A decision was taken to use Horizontal Directional Drilling (HDD) technology to ensure minimal disturbance of three environmentally sensitive areas, satisfying the conditions of the Certificate of Environmental Clearance (CEC) and all stakeholders concerned about the impacts of pipeline construction in these areas.

6.2.2 Reforestation

NGC adopted the "No Net Loss Principle" applicable to Wetlands (National Environmental Policy, 1998) and applied the principle to forested areas. NGC will reforest 315 hectares in critically degraded blocks of forest located within a 2.5 km radius of the CIP and BUD pipeline corridor in the Victoria/Mayaro Forest Reserve (South East Conservancy), the Rochard Douglas Forest Reserve (South Central Conservancy) and the Morne L'Enfer Forest Reserve (South West Conservancy). NGC has a 'Clear Corridor Policy' which means that the ROW must remain clear of tree cover for safety, easy access for pipeline maintenance. NGC is being allowed to institute *ex situ* (at another location) reforestation by the Forestry Division. This means that the company will be able to maintain its Clear Corridor Policy by reforesting degraded areas in the general area of the pipeline ROW.

6.2.3 Socio-Economic Programme

In Phase I of NGC's Socio-Economic Programme, which will run from 2005 to 2006, NGC will spend approximately TT$18 million in communities along the southeast to southwest of Trinidad impacted by CIP, BUD and Union Industrial Estate construction activities. These host communities span five regional and borough corporations - Mayaro/Rio Claro, Princes Town, Penal/Debe, Siparia and Point Fortin. The focus of the programme is two-fold and consists of a Community Facilities Programme and a Human Capacity-Building Programme. The projects selected are designed to provide or enhance social infrastructure and will include construction and/or upgrading of recreational, social, training and eco-tourism facilities as well as deliver training and educational support for young residents of the target communities. This has included bursaries for tertiary and technical vocational studies worth over TT$170,000 for the current academic year.

7. Conclusion

The National Gas Company of Trinidad and Tobago Limited's vision is to establish this country as a major player in the global natural gas industry. By contributing to the optimum and sustainable development of the natural gas industry through its current and intended projects, and by providing both infrastructure and systems to support the industry's expansion, NGC hopes to continue to play a key role in fulfilling and mastering its role in the local and global gas industry.

Author's Biographical Notes:

Frank Look Kin *is the President of the state-owned National Gas Company of Trinidad and Tobago Limited). Before joining NGC in 1991, as Vice-President - Business Development, he held various positions in the Technical and Energy Planning Divisions of the Ministry of Energy with his final position being Chief Technical Officer. Mr. Look Kin has a Master's of Engineering in Mineral Engineering Management from Pennsylvania State University and a Professional Degree in Geophysical Engineering from the Colorado School of Mines. He is an award winning Registered Engineer and a Fellow of the Association of Professional Engineers of Trinidad & Tobago.*