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Sustainability in focus

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Sustainability in Focus

Although it is most often associated with national development agendas, sustainability is a critical focus area of all companies with a long-term vision. Achieving sustainability involves managing risks and opportunities to secure business viability.

Because NGC is one of the largest contributors to government revenue, the sustainability of The NGC Group is of national consequence. For that reason, sustainability is built into the heart of its growth strategy.

AXES OF SUSTAINABILITY

Operational sustainability is tied to long-term profitability. NGC and its subsidiaries are not simply focused on today's bottom line, but are thoughtfully contemplating future income streams.

The predicted increase in demand for natural gas, and entry of fledgling producers into the global energy market, opened doors for an accomplished gas player such as NGC. The product in the pipeline is no longer its only marketable resource. NGC's value proposition hinges equally on its decades of expertise, robust and diversified asset base, and an internationally acclaimed business model, all of which the Company can leverage to build capacity in the global industry. Regional and international prospects for partnerships have already been identified, and NGC is quite optimistic about their potential returns.

While growing the current business portfolio, NGC remains mindful of the environmental ethos of today's industry. Climate change can no longer be dismissed as fiction, and the organisation is cognizant of the role fossil fuels play in global warming. The NGC Group wants to address that externality of the sector.

In support of the government's commitments under the Paris Climate Change Agreement, The NGC Group is proactively partnering with stakeholder groups to push the renewable energy agenda, particularly with respect to harnessing solar energy. This will help The Group achieve sustainability on two fronts: it will help redirect some gas from electricity generation to other customers who need it, and it will simultaneously help The Group to assist in preservation of the environment by reducing the emissions attributable to electricity generation.

Another important greening initiative is NGC's signature Reforestation Programme, through which the replanting of areas of forest cleared during pipeline construction activities is facilitated. NGC is targeting a reduced ecological footprint for its business and is proud of the progress to date.

Of course, a key objective of achieving business sustainability is ensuring that NGC can continue to give back to communities in meaningful ways. After all, national development informs the Company's strategic direction. In addition to the Reforestation Programme, NGC invests in other future-focused initiatives such as its in-house Right on Track athletics programme and Habitat for Humanity housing projects. NGC is pleased to profile these initiatives in this sustainability-themed edition of *Gasco News*.

Mark Loquan, President, NGC

Reporting

In the interest of keeping this national company accountable and measuring progress toward becoming a more sustainable organisation, NGC is committing to produce regular Sustainability Reports. The inaugural report is due to be published in the second quarter of 2018, and will be guided by Global Reporting Initiative (GRI) standards. NGC intends to widen its ambit of reporting to include more sustainability metrics, so that it can meet international benchmarks for this type of publication.

The NGC Group's focus on sustainability is timely, strategic and necessary. Its ever-evolving business context may make sustainability a moving target, but NGC and its subsidiaries are embracing the challenge. I trust that the work our teams put in today will profit our people for many tomorrows. ■

Mark Loquan, President

NGC Head Office, Point Lisas

More than a Pipeline: Building National Value

Over the period 1992 to 2008, Trinidad and Tobago experienced 16 consecutive years of economic prosperity, as reflected in the positive growth in all major macro-economic indicators. Real Gross Domestic Product (GDP) grew at an annual average rate of 6.8% per annum. Government revenue climbed from just about TT$8 billion in 1992 to TT$48 billion in 2008. Unemployment, one of the major negatives of the structural adjustment policies of the late 1980s, fell from 19.3 % in 1992 to less than 4.3 % in 2008. On the external account, our foreign exchange reserves increased from US$206 million or six weeks import cover in 1993 to a whopping US$11.5 billion or 12 months import cover by 2008.

It is fairly widely accepted that the economic prosperity we have come to enjoy emanated mainly from the explosive growth in the natural gas sector. In 1993, natural gas utilisation in Trinidad and Tobago was only 770 million standard cubic feet per day (mmscf/d). By 2008, gas demand peaked at 4,048 mmscf/d. The main contributor of course was the birth and rapid expansion of the Liquefied Natural Gas (LNG) subsector. Between 1999 and 2005, four LNG trains were constructed and commissioned in Point Fortin, bringing Trinidad and Tobago's LNG capacity to 14.8 million tonnes per annum within six years.

There was also significant expansion in the petrochemical subsector. Ammonia production increased from 1.7 million metric tonnes to 5.1 million metric tonnes by 2008. Similarly, methanol expanded to 6 million metric tonnes from a meagre 481 thousand metric tonnes in 1993.

What is less well-known and appreciated is the central critical role played by The National Gas Company of Trinidad and Tobago Limited (NGC) in the process. Founded in 1975, primarily to be the pipeline providing transportation services for the industry, NGC has evolved to become an integrated state-owned conglomerate involved in activities throughout the gas value chain and playing multiple roles in the sector. A critical moment in the evolution of the Company and the natural gas sector came in 1992.

The new Government charged the Board of NGC – led by Prof. Kenneth Julien – with a fresh mandate to be the

prime mover in the future development of the natural gas industry. This mandate was buttressed by two further decisions. First was the acquisition of The National Energy Corporation (NEC) by NGC. NEC (now National Energy) had responsibility for business development and the port and marine infrastructure at Point Lisas. The second decision was to allow the export of gas as LNG, representing a reversal of the "no gas export" policy position adopted earlier. These decisions set the institutional platform for the expansion of the industry alluded to earlier.

The NGC-NEC affiliation created a dominant entity in its role and influence on the natural gas industry. In mapping the way forward under its new mandate, NGC developed and pursued a revised vision focused not only on itself but on the country. That vision, "To position Trinidad and Tobago as a major player in the global natural gas business", would inspire the Company and nation until 2010, by which time it was truly fulfilled.

It is significant that even the change in political administration in 1995 did not deter the focus of NGC during those years. As the driving force behind the sector's development, NGC played multiple roles of business developer, gas merchant/aggregator, sole transporter/distributor, infrastructure developer, and an outstanding corporate citizen. Unfortunately, most citizens are unaware of how these synergistic roles have worked to benefit the industry and the people of the Republic. It is analogous to the entertainment business. The audience sees the show but not what goes into making the show. To have a fuller understanding of the impact of NGC on the development of the industry, it is perhaps worthwhile to look separately at four specific areas of contribution over the years.

MERCHANT/AGGREGATOR

First, NGC is gas merchant/aggregator, meaning that it buys and sells gas using its pipeline infrastructure as the distribution channel. In this role, NGC sits in the middle of the gas value chain, providing value to both its suppliers (upstream) and its customers (downstream). In the case of the suppliers, NGC's purchase of large volumes under long-term contracts is necessary for the economic feasibility of a field development. The gas volumes typically required by any single plant (with the exception perhaps of LNG) will be insufficient to justify investment in a new producing field. As aggregator, NGC's bulk purchases support new field development. For example, when EOG Resources (then Enron) entered the market in 1993, it secured a 15-year contract for a maximum of 150 mmscf/d. The Amoco Cassia contract of 1983 was renewed in 1991 for an additional 20 years with volumes of 350 mmscf/d. By 1997 this was increased to 620 mmscfd. The value of the long-term contract is perhaps best demonstrated by the contract with British Gas signed in 1994. This contract specified a minimum take of only 87

PPGPL at night

Building National Value

mmscf/d beginning in 1996, with a gradual seven-year build up to 275 mmscf/d by 2003. The point being made is that such expansion and development would not have been possible without NGC as merchant/aggregator to guarantee the sale of volumes to the market. In so doing, NGC shields the supplier from market risk. If one customer goes out of business, that shortfall is absorbed by NGC and has no impact on an individual supplier.

In a similar vein, NGC as merchant provides significant value to the downstream customers. The first benefit is better prices. NGC purchases in bulk and therefore can command better prices from suppliers than can any individual customer. NGC as aggregator also shields the customer from the supply risk of a producer being unable to deliver temporarily or permanently. This was the case for example with the demise of Trintomar. The company had a contract to supply NGC with volumes of 120 mmscf/d beginning in 1991. However, shortly after deliveries commenced, a drilling accident precipitated a sharp decline in the deliverability and recoverable reserves, making it impossible for Trintomar to fulfil its contractual obligations. The effect on the market then was negligible as NGC was able to draw supplies from other producers.

Perhaps the most significant aspect of its role as merchant is the pricing mechanism offered by NGC to its major customers in the petrochemical sector. Product-related pricing or commodity-linked pricing was an innovation developed and approved in 1988, and first used in 1993. Prior to this all contracts were based on fixed pricing with a fixed escalator which resulted in annual increases in prices that were eroding the competitiveness of Trinidad and Tobago's industry. The product-related pricing mechanism links the price of gas to the price of the petrochemical – ammonia or methanol. An agreed formula allowed the gas price to move up or down with fluctuations in the price of ammonia or methanol.

Given that the cost of gas accounts for over 60% of the cost of the petrochemicals, the mechanism proved very attractive to the industry. By this mechanism, which is not commonplace in the natural gas business, NGC shares some of the market risks with the petrochemical producers and reduces their most significant operating costs at a time when revenues are relatively lower. Contrary to the view that NGC uses its monopoly position for price gouging and profiteering, it is the big risk taken on product-related pricing that has in the past generated significant surpluses in periods of high prices. This has allowed the entire industry to grow and prosper. The rapid expansion of both ammonia and methanol capacity between 1993 and 2006 may be attributable in no small way to the attractiveness of the product-related pricing mechanism to these investors.

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BUSINESS DEVELOPMENT

Given its vision to position Trinidad and Tobago as a major player in the global natural gas business, NGC pursued an active business development strategy. One of the unique features of the natural gas business in a small emerging market like Trinidad and Tobago's is that a market must exist for field development to proceed. NGC therefore adopted a very deliberate and conscious policy to actively pursue new gas-based business to stimulate the upstream. In the post-1992 period, NGC's role in the creation of Atlantic LNG is perhaps the most significant. The LNG project was conceived by a small LNG importer CABOT, who proposed the project to NGC. With the change in government policy with respect to the export of natural gas, NGC then encouraged participation of the producers in the project feasibility and development study. As the only neutral and national party among the multinationals, NGC played a critical role in holding the project together during the contract's intense and prolonged negotiations in the face of competing interests. NGC also played a seminal role in wooing Farmland/Misschem (now Point Lisas Nitrogen Limited) to invest in an ammonia plant in Trinidad and Tobago.

Significant resources were expended in the advancement of the aluminium smelter project before it became a victim of political expediency in 2011. A host of other projects including steel, ethylene, and polyethylene were at various stages of development when the global economic crisis of 2009 and subsequent US shale gas revolution caused a withdrawal of interest. Nevertheless, NGC has taken up an equity position in the Caribbean Gas Chemicals Limited (CGCL) plant currently under construction in La Brea. NGC has also expanded its asset base by making several strategic investments both upstream and downstream. NGC participates in the upstream sector as a non-operated joint venture partner in Blocks 2c/3a, the South-East Coast Consortium (SECC) and Teak, Samaan and Poui (TSP) Blocks, and most recently, Block 1a. NGC also purchased ConocoPhillips' share of Phoenix Park Gas Processors Limited in 2013.

56-inch Cross Island Pipeline under construction

BUILDING INDUSTRY INFRASTRUCTURE

Industrial infrastructure – estate land, port, utilities – and natural gas are critical ingredients for industrial development. NGC has increased pipeline capacity manifold in order to accommodate the rapid growth in gas demand. Between 1992 and 2012, NGC completed five major pipeline projects. Major pipelines constructed and financed by NGC included – 30-inch cross country Beachfield to Point Lisas; 56-inch Cross Island Pipeline from Beachfield to Point Fortin; 36-inch North East Offshore and 12-inch Tobago; Union Estate Pipeline and the Beachfield Upstream Development (BUD).

As the Point Lisas Industrial Estate approached the limits of its capacity, NGC stepped up to develop more industrial space. These include Point Lisas North and South, the La Brea Industrial Estate managed by LABIDCO, and the Union Industrial Estate. New and/or expanded port facilities have been built at Point Lisas, La Brea and Galeota in an effort to ensure that the industrial customers have adequate infrastructure to support the efficient operations of their respective businesses. That NGC has been able to finance these capital projects without recourse to the state is testimony to prudent financial management of its resources. It also provides tangible evidence about the way in which NGC's surpluses are used in furthering the national development objectives.

WEALTH TRANSFER

NGC has always been a profitable state enterprise and therefore has been a source of significant wealth transfer to the citizens of Trinidad and Tobago. Sitting as it does in the middle of the gas value chain, NGC has earned just reward from the risks associated with the merchant business. In particular, the product-related pricing mechanism exposes NGC to significant risk because it was not supported by similar provisions in gas purchase agreements. But markets have been more favourable than unfavourable, enabling NGC to earn significant surpluses over the years. Citizens as shareholders benefit indirectly through the payment of taxes and dividends to the government. Such transfers have been significant. For example, between 2015 and 2016, NGC's payment of dividends and taxes to government amounted to TT$21.5 billion, the most by any single entity. Citizens have also been able to share the wealth through direct ownership of equity in NGC subsidiaries – TTNGL, which trades separately on the Trinidad and Tobago stock market, and NGC NGL, whose assets are part of National Enterprises Limited (NEL).

NGC has been a quiet yet significant contributor to national development over its 42-year history. While it continues to lead the way in terms of local development, it is also well poised to leverage that learning and experience on the international stage. The Company's aspiration is to be a sustainable, integrated global corporation, the seeds for which have been sown over the years. ■

By Gerry C. Brooks,
Chairman, NGC

Sustainability and The NGC Group

Strategies and tactics which have provided success in the past will no longer guarantee survival of any business in the future. Ask Kodak, Compaq, Blockbuster, or Toys "R" Us, the latest company to announce bankruptcy proceedings in March 2018. The same mantra is true for energy. The only truly sustainable energy businesses are those which can innovate and change.

Guided by an ambitious target of twelve percent compounded annual growth (12% CAGR), The NGC Group is determined to not merely adapt, but to thrive and excel. The Group has been proactively adapting to change to ensure its future growth and success through a deliberate strategy of innovation and expansion. Group subsidiaries are simultaneously pursuing a philosophy of "excellence in execution", transformative strategies and Group optimisation to continuously improve shareholder and national value, retool for new market opportunities and broaden the business footprint regionally and internationally. In short, The NGC Group has fundamentally changed its vision, deepened its commercial philosophy and is working on multiple fronts to ensure its sustainability for the benefit of the country.

STABILISATION

In 2018, the immediate focus of The Group will be stabilisation to ensure a solid platform for future growth. This was achieved in our 2017 results with the arresting of fiscal declines, improved governance, and capacity building to drive the major imperatives of The Group.

Securing supply

Commodity prices have rebounded since the nadir of 2016, with ammonia and methanol improving from annual averages of US$237 and US$178 per metric tonne respectively, to US$241 and US$287 in 2017. The Henry Hub natural gas price, which is one of many indices, also recovered, moving from an average of US$2.46 per mmbtu in 2016 to US$2.99 in 2017.

NGC has been working closely with upstreamers to review, reshape and lock in short to medium-term supply. Agreements were concluded with BPTT and EOG Resources in 2017. Negotiations are still in train with Shell on a holistic basis, and are progressing in a constructive manner. The Company will be applying this same constructive but holistic approach to all negotiations in future, to ensure NGC and the country realise a fairer share of value for our resources.

Work is also being advanced on at least one marginal field with a consortium. Though these areas were traditionally considered uneconomical to 'farm', NGC has pioneered a revised approach with the Ministry of Energy and Energy Industries (MEEI) in extracting valuable gas from these smaller fields with the help of more nimble, lower-cost operators.

Discussions with Venezuela are ongoing. Recall that a Heads of Agreement and Memorandum of Understanding (MOU) have been signed at the government level. Additionally, an MOU was signed by the three partners PDVSA, Shell and NGC. A new Venezuelan Minister of Energy, Manuel Quevedo, was recently instated, and work has continued with his Ministry to secure a mutually acceptable basis to resolve all outstanding issues, while providing Venezuela with access to international markets and much-needed revenue. This has included recent high-level meetings with the Government of Trinidad and Tobago. Once operationalised, Dragon will feed Venezuelan gas into the local gas distribution network and help normalise supply to downstream customers.

NGC also continues to work collaboratively with upstream gas suppliers BPTT, Shell, EOG and BHP to increase gas supply through the optimisation of existing operating conditions across the gas network. This includes short-term interruptible sale and purchase of additional volumes as they become available.

Collaboration is yielding results. After an aggressive work programme with BPTT, gas supply was enhanced by the Trinidad Onshore Compression Project (TROC) in April 2017, which added approximately 100 million standard cubic feet of gas per day (mmscf/d) to domestic supply. BPTT also announced first gas from its Juniper development in September 2017, with a production capacity of 590 mmscf/d. On the horizon is the Angelin project, estimated to be completed late 2019, which will supply an additional 600 mmscf/d.

Getting more gas into the system is a pressing priority, but equally important is ensuring the gas that is being sold is put to the most efficient use. Electricity generation is especially inefficient in terms of value for gas, largely because of government subsidies, consumer wastage and failure to leverage alternative technologies for producing power. In that regard, The NGC Group is

Rig repair works at Berth 3, Port of Brighton

partnering with stakeholders to encourage the uptake of renewable energy in Trinidad and Tobago. Underpinning this advocacy is a desire to liberate some of the scarce molecules of natural gas used in electricity generation for profitable diversion to other industries. It also dovetails with the Group CSR focus on environmental sustainability. National Energy is taking the lead on a Solar Park initiative for the local manufacture of solar panels. Investment approval was granted in 2017 for the project to get underway. This will assist the country in realising its United Nations Climate Change (COP21) mandates.

Restoring fiscal balance

Augmenting supply to increase income is one way to improve profit margins. Another mechanism is expenditure control. Throughout The NGC Group, management teams have streamlined spending to curtail excess and have favourably re-negotiated agreements with vendors and service providers. This was achieved through an inaugural NGC Group Vendor Forum, which brought all vendors together to partner meaningfully in The Group's 2017/2018 work programme. This allowed suppliers an opportunity to plan ahead, and enabled The Group to secure savings which could be shared across the value chain.

Through strict budget management practices, Phoenix Park Gas Processors Limited (PPGPL) delivered its 2017 work programme with a further 10% cost reduction, saving The Group US$5.2 million. PPGPL also posted a 28% uplift in profits relative to 2016, due in part to improved commodity prices. The company also pursued and secured a high premium sales contract with the Eastern Caribbean, enhancing its income stream for 2018 and beyond.

In addition to exercising fiscal prudence in its own operations, The Group's parent company, NGC, began engaging more actively with the Trinidad and Tobago Electricity Commission (T&TEC), and has shared several innovative solutions with the Commission to eliminate its significant receivable. This matter is receiving the attention of the relevant government ministries and NGC continues to push for its swift resolution.

Also seeking to recover money was National Energy. In 2011, the company was the victim of a TT$60 million wire transfer fraud. Some of the money had already been recovered, but at the start of 2017, a significant percentage was still outstanding. Thanks to the dogged pursuit and diligent effort of The Group's legal team and management, and supported by the Board, National Energy was able to recover the final TT$23.87 million in 2017. I commend the National Energy Executive and legal teams.

MOBILISATION

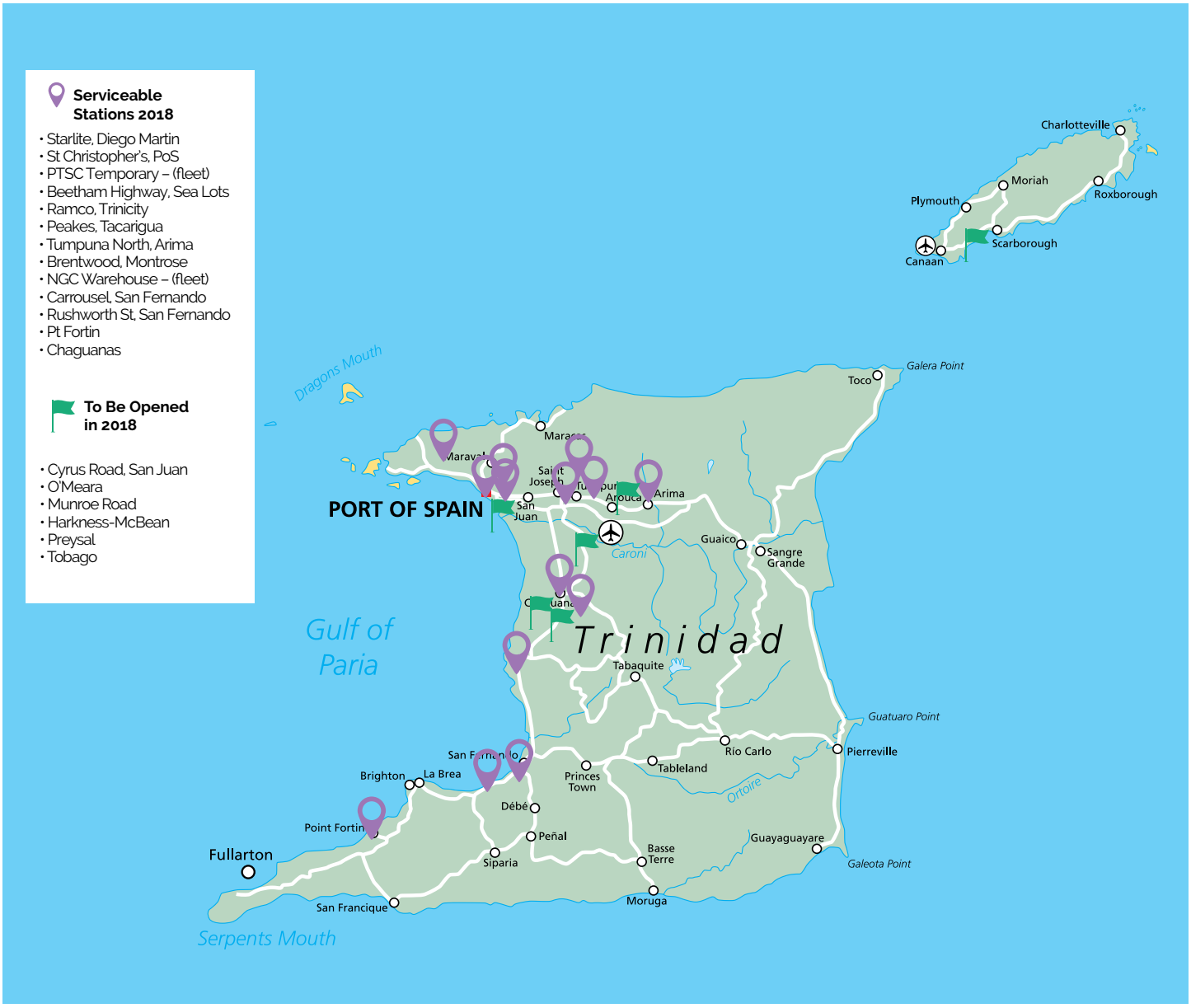
Recognising the pockets of opportunity in the changing global energy sector, The Group is positioning itself to seize attractive market opportunities that may emerge.

In 2017, The Group continued to invest in building internal capacity through training and strategic new hires. The objective is to staff the organisation with a highly skilled, highly competent and innovative workforce, with expertise that can deliver our strategic intent. In today's knowledge economy, intellectual capital is an important and valuable resource, and The NGC Group is ensuring it attracts and retains the best talent.

The Group has also been mindful of the value that its infrastructural assets, technical capacity and industry know-how can have relative to potential regional and international business partners. Guyana's incipient industry is evolving quickly, with Exxon Mobil Corporation announcing its seventh offshore oil discovery on 28th February. The monetisation and merchandising of these hydrocarbon resources in Guyana, as well as in neighbouring Suriname, will increase demand for 'ship-

to-shore', port and other services. In anticipation of this upsurge, National Energy completed several major upgrade projects in 2017 which means The Group is ideally equipped to handle continental business. Reconstruction and repair works on LABIDCO's Berth 2 were completed, as was the dredging of all harbours and turning basins to cater to larger vessels. Reconstruction of the LABIDCO corridor road was also completed which will help accommodate increased local estate traffic as domestic shipping needs grow. Port Galeota is the key to capturing the emerging energy markets in South America and the Guyana-Suriname basin in particular and National Energy is working assiduously to make this a preferred regional logistics hub.

A third resource being mobilised in anticipation of imminent market change is the CNG station network. The financial rigours of a deficit budget have forced government to reduce gasoline subsidies and consider their eventual elimination. This is projected to be circa $680 million in 2018, down from $4 billion in 2014. CNG is approximately 70% cheaper than diesel, 75% cheaper than super gasoline, and 83% cheaper than premium gasoline. It is expected that more consumers will convert to CNG use on this basis. In 2017, NGC CNG reported a 12% increase in sales, and 468 applications for conversion incentives were received. To accommodate higher demand, the company has been expanding its supply network. Five new stations were added in 2016/2017,



Map showing CNG station network

and 11 public stations are currently serviceable. Work is progressing on 11 additional stations, including a proposed flagship station at the Couva/Preysal Interchange.

EXPANSION

Building the business

Price shocks over the past decade have made it clear: 'mono-cropping' in the energy sector exposes companies to high risk in the event of market turbulence or collapse. The NGC Group recognises this. It is actively exploring ways to diversify its portfolio to reduce earnings volatility while maximising margins and improving overall revenue and profitability.

Commodity trading is one avenue being pursued. The Group's direct export of its share of LNG and crude cargoes from investments and shareholdings eliminates intermediary costs and substantially improves profit margins.Inorganic growth through mergers and acquisitions (M&A) is another strategic pillar for expanding The NGC Group's portfolio. A team has been assembled to explore possible M&A opportunities across the globe.

Concurrently, The Group is continuing its outreach into new energy jurisdictions to market the highly regarded Trinidad Gas Model of Development. A number of promising partnerships are evolving. In 2017, The Group visited Ghana, Tanzania and Mozambique to advance discussions around lending technical support to these countries' respective energy sectors. Regionally, The Group was invited to share insights and expertise at conferences in Cuba, Jamaica, Suriname and Venezuela.

Building the brand

Brand value and loyalty are important contributors to business sustainability. Customer and stakeholder trust opens doors to new opportunities while acting as a shield in difficult times. In our targeting of global expansion, it is especially critical for The NGC Group to have a solid brand standing in Trinidad and Tobago and to have credibility as an international business partner. I am pleased to advise that our credit ratings of BBB and Ba1 have been reaffirmed by Standard and Poor's and Moody's respectively.

The Group's brand recognition and value added were reaffirmed during the recent Additional Public Offering (APO) of shares in Trinidad and Tobago NGL Limited (TTNGL). The IPO and subsequent APO allowed citizens to establish personal connections with The Group and its brand through a direct ownership stake in one of its subsidiaries. Citizens are now financially invested in the success and longevity of TTNGL and its underlying asset, PPGPL.

Securing Business in Africa: From left - Alvin Dookie, VP Business Development PPGPL (1st from left); Chairman Gerry C. Brooks, (2nd from left) and Mark Loquan, NGC President, (2nd from right) with Government officials in Ghana including Honorary Consul Hilton John Mitchell (far right).

Positively, the TTNGL stock has increased in value since the IPO, with price appreciation reaching 32.5% at the end of 2017. A solid buy, the stock significantly outperformed the market on a total return basis in 2017 and shareholders pocketed the second highest dividend yield on the Trinidad and Tobago Stock Exchange. The strength of the TTNGL investment will undoubtedly inspire confidence in The Group's business fundamentals, and build faith in the brand and other potential GORTT investments.

TOWARDS GROWTH AND NATIONAL DEVELOPMENT

There is no doubt that NGC has rebounded significantly in the last two and a half years. Across The Group, cost-saving initiatives were implemented and have borne fruit, and synergies were sought to further streamline expenditure. Growth initiatives are being executed, with several upstream agreements already negotiated, supply-boosting projects advanced and downstream negotiations in train. Local engagement with the brand and business was deepened with an IPO and APO, as well as the expansion of the retail CNG network. Beyond Trinidad and Tobago, inorganic and international growth are being strategically pursued.

Through deliberate strategy, diligent application, an unyielding commitment to excellence and of course, unflagging optimism, The NGC Group has created a robust platform for continued growth in 2018. I have every confidence that the talent, work ethic and vision of our team will see company and country make even greater strides in the year ahead. With sustainability firmly anchored in focus, The NGC Group is going nowhere but up.

Achieving Sustainability through Collaboration

Mark Loquan at the Trinidad and Tobago Energy Conference

NGC is working towards sustainability, not just for itself as a gas business, but for all stakeholders across the value chain. The interdependence of suppliers, merchant/aggregator/transporter (NGC) and consumers means the chain is stronger with collaboration.

At the recently concluded Trinidad and Tobago Energy Conference (TTEC), energy players came together to discuss how the sector can maximise value through collaboration. The message was clear – partnership and alignment of strategy are critical to sustaining the industry over the long term.

For its part, NGC has been proactively collaborating with upstream suppliers, downstream consumers, the government and international players to help restore Trinidad and Tobago's energy sector to a path of sustainable growth. It means, however, navigating a difficult period in the short to medium term, until there is equilibrium in a new architecture in contractual terms and arrangements. At the Energy Conference, NGC President Mark Loquan shared the Company's approach to collaboration, giving examples of current partnerships and highlighting valuable opportunities for further cooperation.

For its part, NGC has been proactively collaborating with upstream suppliers, downstream consumers, the government and international players to help restore Trinidad and Tobago's energy sector to a path of sustainable growth.

Achieving Sustainability through Collaboration

POWER GENERATION IMPROVEMENT

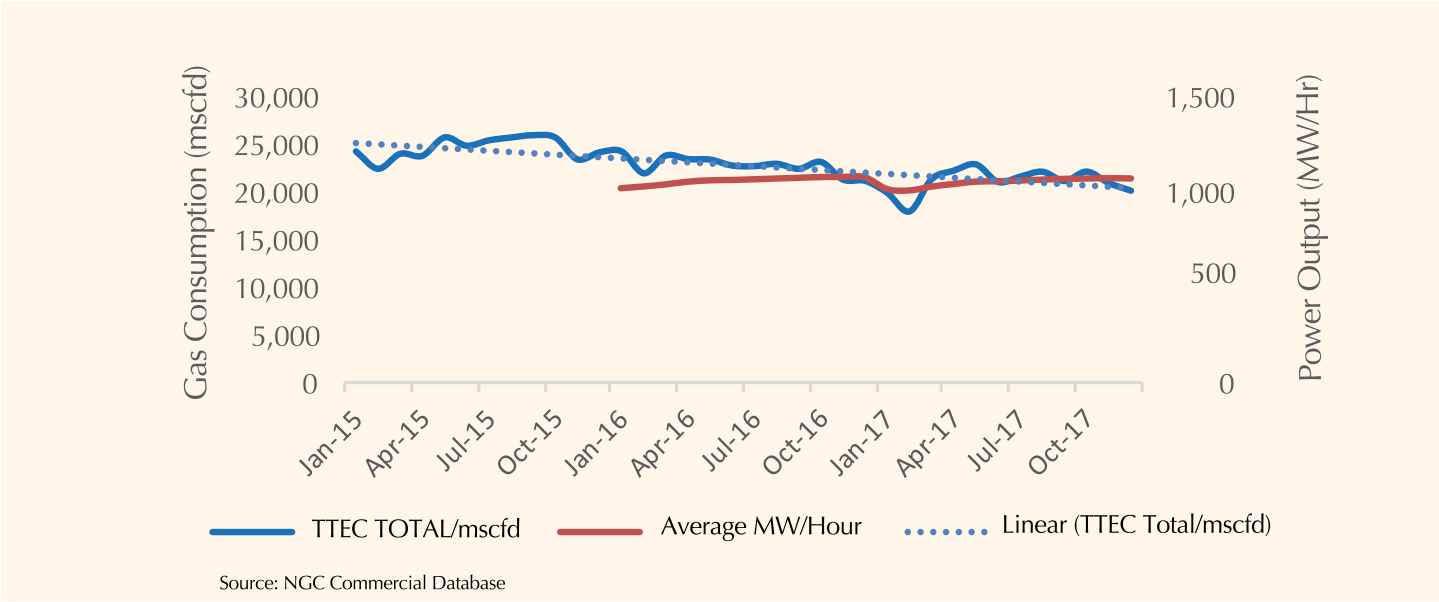


Chart showing improvements in power generation following collaborative work with NGC

SUSTAINING THE INDUSTRY

Stabilising and increasing supply are of immediate importance to all gas stakeholders, and have considerable bearing on business sustainability. Currently, the gas-based sector is running on a maximum of 3.3 billion cubic feet (bcf) of gas per day, down from a peak of 4.2 bcf per day at its peak, due to natural depletion in upstream supply. This has resulted in curtailment to downstream consumers and the Atlantic LNG trains and loss of revenues across the value chain and for the country. Data suggests that this supply-demand imbalance will persist over the coming years. Methods to treat with this shortfall include managing and optimising consumption, finding alternative gas sources locally and across the border, studying marginal fields close to existing infrastructure, and working with all stakeholders towards achieving national targets for renewable energy.

Managing consumption

Much can be achieved through collaboration. NGC, as aggregator and distributor of the gas, plays a critical intermediary role between upstream and downstream. Using data shared by the Trinidad and Tobago Upstream Operators Group (TTUOG) and the Point Lisas Energy Association (PLEA), NGC's aim is to efficiently allocate available gas supply across its downstream network in times of planned shutdowns and maintenance works. This tripartite collaboration ensures optimal distribution of resources in the supply-strained system. Discussions are now more granular around planning across the chain, while looking closer with upstream companies at reliability issues which interrupt supply, and exploring areas of possible de-bottlenecking on the network.

Negotiations are also underway with the downstream with regard to renewal of supply contracts, with NGC intent on contract terms that ensure equitable distribution of gas across the consumer base and maximum national takeaway from gas sales. In this context, a new Gas Sales Agreement was signed in April 2018 with Caribbean Nitrogen Company (CNC), after negotiations concluded on mutually-acceptable terms.

Significant attention is also being paid to determining the most efficient use of gas molecules. Many downstream plants are operating at reduced capacity due to gas curtailment. This impacts their output and the country's export earnings. Power generation plants also use inefficient equipment in their production process, which consumes more gas per kilowatt hour (kWh) of electricity generated.

NGC and National Energy are collaborating with a number of stakeholders to address the inefficiencies of power generation. Solutions include outfitting power-producing facilities with more energy-efficient equipment such as combined-cycle turbines that generate more electricity with less gas; incorporating solar and wind energy into the supply mix to reduce the natural gas required to meet demand for electricity; and encouraging energy-efficiency at the domestic consumer level to reduce demand altogether. These initiatives will all drive gas consumption by the power generation sector down to more sustainable levels, and liberate scarce molecules for use by other downstream industries. Through collaborative work undertaken thus far, T&TEC has already reduced gas consumption by 14%.

That is not to say that power plants are the only ones using gas inefficiently. Some downstream companies have aging infrastructure and use dated technology which result in wasteful fuel consumption. There is an acknowledged need for plant turnarounds to correct this. However, given supply uncertainty, companies are hesitant to invest in capital upgrades at this time. This is a key driver behind NGC's accelerated negotiations with upstream suppliers and its collaboration on projects aimed at increasing supply volumes. The sustainability and growth of downstream industry hinges on supply certainty and it is positive to see significant increased activity with BP, Shell, BHP, EOG and new players like De Novo.

A primary objective of managing consumption is ensuring the country extracts maximum value from its natural gas resources. This means maximising the domestic product and foreign exchange generated per molecule of gas consumed. The Light Industrial Commercial (LIC) sector is not a large consumer of gas, yet returns significant economic value on account of the employment opportunities it creates and its output of consumer goods for export. NGC has committed to work very closely with the LIC sector and its stakeholder groups - the Trinidad and Tobago Chamber of Industry and Commerce, Trinidad and Tobago Manufacturers Association and Tobago House of Assembly – to drive growth in this sector. Given its low gas consumption, the LIC sector is seen as an easy target for incorporating renewable energy technologies, as well as promoting the use of CNG. This will make the sector's growth sustainable over the long term and, with its broad employment base, will create the perfect platform for diffusing green thinking among a larger public.

NGC can only push for more responsible consumption of gas molecules within its remit of influence. A considerable share of the burden falls on the government. Collaboration is needed with the energy sector, through its line ministry, on the development of an allocation policy for natural gas. Currently, government is considering the balance between gas for the export and petrochemical sector, and how value is retained through the value chain. A significant component will be how all stakeholders approach the expiry of the Atlantic Train 1 contract in 2018.

Alternative supply

Since domestic supply is falling short of demand, NGC has been looking at options for collaborating with international gas suppliers to import gas.

The most advanced option is the Dragon Project, which will feed gas from Venezuela's Mariscal Sucre Dragon Field into the domestic and LNG system. This

Finalising partnership with Grenada - From L to R: NGC Chairman, Gerry C. Brooks, GPG Executive Director, Eduard Vasilyev and NGC President, Mark Loquan

Achieving Sustainability through Collaboration

is a collaborative initiative involving the governments of Trinidad and Tobago and Venezuela, Shell Trinidad Limited and Petróleos de Venezuela S.A. (PdVSA). Other fields in the same Mariscal Sucre region offshore Venezuela hold even greater quantities of gas. Once the Dragon infrastructure is in place, it may be possible to access gas from those fields to strengthen supply. Additionally, along the southern maritime border between Trinidad and Venezuela, monetisation of the Loran-Manatee cross-border field has been the subject of ongoing discussion between both countries.

Most recently, in April 2018, NGC finalised a commercial agreement with oil and gas company Global Petroleum Group (GPG), which is currently undertaking exploration and appraisal activities off Grenada's south coast. NGC will work with GPG and the government of Grenada towards monetisation of any gas reserves in the country's maritime territory, with a view to developing Grenada's gas-based sector and potentially securing new sources of supply for Trinidad and Tobago.

Another option that was being considered was importation of LNG from US shale plays and re-conversion to gas for domestic use via Floating Storage Regasification Units (FSRUs). However, after intensive study of the economics of using FSRU technology, it was determined that this option was not feasible for Trinidad and Tobago.

It is important to note that the search for alternative supply is not only externally-focused. Approximately 35% of Trinidad and Tobago's proven reserves remain locked in small and marginal pools that have not been monetised. Individually, they hold less than 500 bcf of gas, and for this reason they are generally considered uneconomical to develop. Taken together, though, they can give a significant boost to current supply.

Eighty percent (80%) of small and marginal fields lie in the acreage of existing operators. This places them close to the infrastructure necessary for extraction. The opportunity therefore exists for smaller, more agile operators with smaller overhead costs to partner with the owners/PSC Operators of this infrastructure to bring these fields on stream. The Ministry of Energy and Energy Industries (MEEI), 'landlords' of the marine acreage, can also use incentives and redistributive strategies to get the right operators into these fields. NGC is currently working through an in-house geologist and the MEEI to assess the feasibility and logistics of such arrangements.

SUSTAINING NATIONAL DEVELOPMENT

NGC's focus on strengthening collaboration in the sector ties into a bigger picture of national development.

The success of the Trinidad Gas Model of Development puts our country in a place of energy leadership. In just over four decades, we have been able to transform a product in low commercial demand into the driver of industrial development. Natural gas is a business we know.

While there is great interest in the prospect of renewables, hydrocarbons will continue to meet the greater part of global energy needs for some decades more. However, given the greening of energy consumption patterns, the more pollutant coal, and to a lesser extent petroleum-based fuels, will see some displacement by cleaner-burning natural gas. According to the U.S. Energy Information Administration's International Energy Outlook 2017, natural gas consumption to 2040 is predicted to increase by 1.4% per year – outpacing growth in consumption of other fossil fuels.

What does this mean for Trinidad and Tobago? The success of the Trinidad Gas Model of Development puts our country in a place of energy leadership. In just over four decades, we have been able to transform a product in low commercial demand into the driver of industrial development. Natural gas is a business we know. As it assumes greater importance and sees new players enter the market from the Caribbean, South America and Africa, there is substantial opportunity for sharing our expertise. This intangible export is a unique way for the country to diversify its revenue stream at a time of low domestic gas production, with minimal overhead investment and practically zero environmental footprint.

International outreach cannot be led by NGC alone. Input and collaboration are required from the government, embassies, business chambers, universities, industry stakeholders and service sector companies, just to name a few. The success of the Trinidad Model is the outcome of synergy and collaboration among a host of domestic players, and it follows that packaging and exporting the model requires a team effort.

There is strength in numbers. There is no doubt that collaboration will continue to drive growth both in the energy sector and at the national level. NGC has initiated the necessary dialogue and is confident that with continued cooperation, all parties will survive this economic cycle and emerge stronger in the next.

By Sheila Mc Intosh, National Energy

The Trinidad and Tobago Natural Gas Model: Transforming and Sustaining

A HISTORY OF ENERGY DEVELOPMENT

Trinidad and Tobago enjoys a rich and unique history in the commercial hydrocarbon business. Dating as far back as 1908 when the first commercial well was drilled at Guapo, Point Fortin, this country has been competing with the oil producing countries in the Western Hemisphere for over 100 years.

In the mid-1970s, the government took a deliberate decision to develop the nation's natural gas resource (Boopsingh & McGuire, 2014), which was viewed by the upstream producers as an undesirable by-product of oil production. This decision proved to be discerning, as it would usher in an era of unprecedented development fuelled mainly by natural gas, which by 1996 had replaced petroleum as the primary driver of the economy.

The Point Lisas Industrial Estate, built in the 1970s, produces and exports a range of gas-based commodities including petrochemicals and metals. The estate houses 11 ammonia plants with a capacity of 5.6 million tonnes and seven methanol plants with a production capacity of 6.5 million tonnes. Based on the capacity, Trinidad and Tobago is ranked among the top five producers of methanol in the world and is the largest exporter of ammonia. The country's energy portfolio also includes natural gas processing, petroleum refining and LNG manufacture.

Point Lisas Industrial Estate

The Trinidad and Tobago Natural Gas Model

Over the years, this country's approach to natural gas monetisation came to be known as the Trinidad and Tobago Natural Gas Model. Within the past few decades, various countries with developing gas regimes including Ghana, Equatorial Guinea, Tanzania and Mozambique have been looking to us as an example of how natural gas can be used to transform both socio-economic conditions and critical infrastructure.

A major question arises: is the Trinidad and Tobago Natural Gas Model transferable? This article will seek to define the model and examine whether the model itself may become Trinidad and Tobago's next major export.

Luminaries of the local energy sector, Professor Andrew Jupiter, former President of National Energy and former Permanent Secretary of the Ministry of Energy and Energy Industries (MEEI); and Dr. Frank Look Kin, Advisor to the MEEI and former President of The National Gas Company of Trinidad and Tobago Limited (NGC) weighed in on this issue. Both experts generously shared their insights on the model and the prospects for exporting it beyond our shores.

Prof. Andrew Jupiter

With over 40 years of energy sector experience to his name, Prof. Jupiter is a respected industry veteran. He served as Permanent Secretary in the Ministry of Energy and Energy Industries from 1998 to 2004, and served as President of National Energy from 2009 to 2012. In 2013, he was conferred the honorary title of 'Distinguished Fellow' by The UWI. In 2016, Prof. Jupiter was awarded the Chaconia Medal (Gold) for his achievements over decades of public service.

Dr. Frank Look Kin

Dr. Look Kin has committed his career to shaping our nation's globally renowned gas model. He has held top level positions in Trinidad and Tobago's energy industry, notably serving as NGC's President from 1996 to 2009. In 2008, he was awarded the Chaconia Medal (Gold) for his contribution to national energy development, and in 2018, was conferred an Honorary Doctorate from the University of Trinidad and Tobago.

DEFINING THE MODEL

Frank Look Kin, NGC's longest serving president to date, having led the company from 1996 to 2009, was directly involved in developing and managing the model. In his opinion, the definitive element of the model is its product-related pricing structure. He explained:

"In Trinidad and Tobago, natural gas, as a raw material, makes up 30 to 60% of the production cost. That is, 30% in the initial stages when you have debt financing and between 50 to 60% when the debt is paid off after 10 to 15 years. Natural gas, as a raw material, is a critical element in the manufacturing process and therefore, it is logical that there be some linkage between the gas price and the product price."

Petrochemicals Production Capacity as at January 2018

Methanol	6.5 million tonnes
Ammonia	5.6 million tonnes
Urea	1.3 million tonnes
Nitric Acid	495,000 tonnes
Ammonium Nitrate	630,000 tonnes
UAN	1.4 million tonnes
Melamine	60,000 tonnes
Urea Formaldehyde	12,000 tonnes
Iron & Steel[i]	1.6 million tonnes

NGC took the bold step to introduce product-related pricing in 1993, moving away from its previous pricing structure which featured a fixed price plus an escalator. This was a courageous strategy, especially in the context of the cyclicity of petrochemical prices. However, the new structure gave rise to a unique situation in which the state and multi-national corporations (MNCs), which shared an interest in natural gas, now also had a share in the risk. Over time, Trinidad and Tobago developed a partnership approach to dealing with MNCs, which has led to greater corporate citizenship among MNCs (Mottley, 2008).

Professor Jupiter concurs with NGC's former president with respect to the significance of the pricing structure to the model. He added, however, that there were several other aspects which impacted the investment climate, without which the country's venture into the natural gas business would not have succeeded. He recalled the initial stages of building the gas industry:

"In the early days, it was relatively easy to do business, as most regulatory approvals came through the same ministry – the Ministry of Energy and Energy Industries. We had technocrats who were very knowledgeable of the system, so processes were not overly bureaucratic. We knew the economics were critical, so we provided an environment that allowed investors to obtain a reasonable return on investment."

Investment facilitation though, was balanced against the country's objective of value maximisation, according to Dr. Look Kin: "Yes, we provided the operating conditions

[i] This capacity includes the Arcelor Mittal plant which is not currently in operation

Point Lisas Savonetta Pier 1981

to attract foreign investment, but ultimately, we were always trying to do what was best for the citizens of this country."

Trinidad and Tobago also developed a robust legal and regulatory system to ensure that revenues were collected by the state. In addition to economic incentives, infrastructure was provided to support the construction and operation of plants including ports, roads and an extensive transmission and distribution network.

Trinidad and Tobago employed cutting-edge innovation by constructing multi-user facilities at Point Lisas, thereby increasing efficiency (Mottley, 2008.) To date, Savonetta Piers 1-4 and ISCOTT Dock, owned and operated by National Energy, handle shipments of methanol, ammonia, urea, iron and steel products and bulk cargo. Professor Jupiter emphasised that the combination of factors made this country a very attractive investment destination: "They came not only because we had gas; not only because we provided infrastructure. They also came because of the particular tax holiday that was granted to them at the time."

There was a certain degree of audaciousness associated with this country's gas-based development, perhaps because it was understood that with limited reserves, Trinidad and Tobago needed to be efficient both in terms of timing and scale, if we were to compete on the world stage. Dr. Look Kin shared candidly, "Whatever the price of gas, we recognised that plants in Trinidad needed to be as efficient as plants in the USA; and we had to provide a lower cost structure because transportation costs had to be factored into our cost. Products made in Trinidad had to be transported from here to the Gulf Coast or Europe or wherever the final market was."

Trinidad and Tobago responded to the challenges by facilitating world-scale petrochemical plants which could benefit from economies of scale. Point Lisas is home to two of the world's largest methanol facilities: Methanol Holdings Trinidad Limited and Methanex, each having a plant with a capacity of 5,000 mtpd. Another unique offering was the enablement of year-round operations. Dr. Look Kin pointed out, "Plants in Trinidad and Tobago were designed to run 365 days per year. We had to ensure that they could be operated and maintained to run essentially at 95 to 99% onstream time. The business model was to come to Trinidad, get a constant supply of gas and run maximum throughput all year round if possible."

Simultaneously, as the number of energy installations increased, so too did the skill base of locals, till eventually, Trinidad and Tobago nationals would staff much of energy companies at all levels. Professor Jupiter noted, "We have knowledge of the entire value chain. When we decided to develop natural gas, we had technicians who already had experience in the petroleum sector, so it was not difficult for them to transfer these skills."

In fact, Trinidad and Tobago has demonstrated leadership in terms of local content in the management and operation of the energy sector. Professor Jupiter recalled one of his most memorable moments as a student at The University of the West Indies, St. Augustine: "On 31 August 1974, I came home to witness the lowering of the Shell flag and the hoisting of the TRINTOC flag for the first time at the

The Trinidad and Tobago Natural Gas Model

TRINTOC Administration Building in Point Fortin. It gave me immense pride as a citizen to know that we would be taking charge of our destiny."

Another important facet of the Trinidad and Tobago natural gas model, according to our experts, is that of political stability. Since 1956, Trinidad and Tobago has remained a stable democracy. Notably, this country transitioned seamlessly from an independent nation to a Republic in 1976; a feat not so smoothly achieved in many developing states at the time. This stability has positioned us well in relation to other territories that possess larger resource deposits but have not experienced a similar political environment.

In Professor Jupiter's opinion, this factor is part of our competitive advantage: "Trinidad and Tobago is a stable democratic state and that worked in our favour and continues to be an advantage today."

EXPORTING EXPERTISE

From what we have learned, the Trinidad and Tobago Natural Gas Model primarily comprises the following:

- A product-related pricing structure
- Provision of a favourable investment environment
- Provision of supporting infrastructure
- Availability of knowledgeable, skilled labour
- Political stability

The natural gas industry in Trinidad and Tobago can be deemed to have entered the mature stage (Mottley, 2008). The question now arises as to whether the country can reboot the Trinidad and Tobago brand to extend the life of the natural gas sector. Our experts weighed in on this question, both agreeing that change is required as we chart the way forward.

Dr. Look Kin thinks courage remains key to unlocking further potential for this country. He noted: "We have to continue to negotiate and optimise our resources, but we have to remember that gas is a finite resource. We have to be brave and start developing talent in other areas and prepare for the next industry."

Professor Jupiter believes that we can also leverage our integrated knowledge of the industry to export expertise to developing territories: "Our people are working all around the world and we have demonstrated that we have both the leadership and technical capability to run energy operations. We have negotiation skills that we can share. We can build and manage pipelines and ports."

He recollected the M 3000 methanol plant commissioned in Oman in 2007. This plant was modelled after its Trinidad counterpart and the know-how of our people was successfully exported.

There is no doubt that Trinidad and Tobago's Natural Gas Model can be customised and marketed for our benefit. However, in Professor Jupiter's view, efforts to export knowledge require support at the highest levels: "We need government-to-government agreements for Trinidad and Tobago companies to enter new markets with a sense of assurance. This will help grow GNP and bring in foreign exchange."

It appears that the MEEI shares this view. At the Trinidad and Tobago Energy Conference held in January 2018, Senator the Honourable Franklin Khan, Minister of Energy and Energy Industries, announced this country's presidency of the Gas Exporting Countries Forum (GECF) for 2018. As Senator Khan explained, "The GECF is a gathering of the world's leading producers, whose objective is to increase the level of coordination among members to maximise the gas value accruing from the monetisation of the natural gas resources of members". Additionally, there has been, and continues to be, support from the state for expansion of Trinidad and Tobago's gas business in new jurisdictions including the Caribbean, Venezuela, Africa, Suriname and Guyana.

Professor Jupiter believes that the time is opportune for intensification of our thrust towards building relationships with new energy provinces through the formulation of agreements that clearly enumerate specific areas of cooperation. He noted that some local companies such as Tucker Energy Services and Kenson are already exporting services internationally. He emphasised that with more government support—as China has done through the provision of specific concessions and the formation of special purpose banks, for example—Trinidad and Tobago can expect to see more local companies expanding their horizons. There is also an important role for tertiary education institutions to play, as our management and operational knowledge can be offered to fledgling gas economies.

While the road ahead will be challenging, Trinidad and Tobago can draw strength from its wealth of experience in the natural gas industry, which can be marketed to the world. Building on the foundation of our past, we can enter the future with confidence. ■

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Recently completed Habitat build

Building Sustainable Futures with Habitat for Humanity

Trinidad and Tobago is falling well short of its sustainability potential. The prevailing approach is that in order to preserve global resources for future generations—to ensure "sustainability"—businesses must assume an important role in the process. NGC, through its work with Habitat for Humanity® Trinidad and Tobago (HFHTT), is doing just that.

PARTNERING WITH NGC

HFHTT began operations in 1997 with a vision to help secure decent and affordable housing for impoverished families across the country. Since its inception, the work of HFHTT has not only helped hundreds of citizens into safer housing—it has given families stability, security and a solid foundation for the future.

Habitat's work, with its emphasis on empowering families and getting them to a place of self-reliance, was found to be a perfect fit for NGC's support. In 2005, NGC began partnering with Habitat, and has since contributed millions to its revolving fund, used to finance new constructions and home restorations. In December 2017, NGC renewed its support with a million-dollar investment. This contribution was the third tranche of a three-year commitment to HFHTT, and was earmarked to fund three new builds, as well as at least ten home refurbishment projects over the HFHTT's fiscal year.

With NGC zoning in on sustainability, the Company is pleased that some of that funding will be used to help HFHTT deploy more sustainable housing solutions.

THE SUSTAINABILITY NEXUS

Though it may not be immediately obvious, houses have a big role to play in sustainability. Patterns of consumption for electricity, water and even food can be shaped to a large extent by the design of homes. For example, proper insulation cuts heating bills in cold climates, while sufficient ventilation reduces reliance on fans and air conditioners in warmer areas. Solid plumbing prevents leaks, and certain fittings can help boost water pressure without increasing the volume of water used. In many rural areas, guttering along roof lines is used to channel rainwater to storage tanks for washing and showering. Backyard spaces and rooftop terraces can accommodate kitchen gardens, and herbs and small

Building Sustainable Futures with Habitat for Humanity

plants can even be tended on window sills with sufficient exposure to sunlight.

Thoughtful design and construction of houses therefore presents great opportunities for homeowners to make their consumption patterns more sustainable over the long term.

BUILDING SUSTAINABILITY INTO HOUSES

Habitat for Humanity International's New Urban Agenda promotes the development of shelters that respectfully interact with the natural environment and support the United Nations Sustainable Development Goals for Clean Water and Sanitation, Affordable and Clean Energy, Sustainable Cities and Communities, Climate Action and Life on Land.

HFHTT is modelling its own work on these tenets, keeping sustainability top of mind, both in terms of the environmental footprint of builds and long-term operational and maintenance costs. The organisation is exploring ways to make its builds more resource-efficient, to encourage responsible consumption and reduce the homeowners' utility and upkeep costs over the long term.

The incorporation of solar panels into roof designs is one option being studied. In Trinidad and Tobago, electricity is generated using natural gas. Integrating alternative technologies to help meet electricity demand will allow NGC to divert some of the gas currently fueling power generation to other customers in need of supply. Given the abundance of solar energy in Trinidad and Tobago, powering homes with solar panels is a useful, sustainable solution.

According to HFHTT National Director, Jennifer Massiah, the organisation is actively researching the feasibility of incorporating low-cost solar panels into their house plans. Specifically, they have begun work on a solar-powered greenhouse project in Cashew Gardens, Chaguanas, in collaboration with The University of the West Indies (The UWI) and funded by the Global Environment Facility/ United Nations Development Programme. For residents of the area, the greenhouse will grow short-term crops using hydroponics, with rainwater and nutrients recycled through composting. The greenhouse will be powered by solar energy, harvested via a rooftop solar panel. Commenting on the value of this initiative, Ms. Massiah says: "Data from this project will inform HFHTT decisions on incorporating similar technology into existing and future shelter solutions."

NGC is simultaneously investigating the potential of solar-powered housing, through its subsidiary National Energy. Together with the University of Trinidad and Tobago (UTT), National Energy and both entities' respective line Ministries partnered to build the country's first solar-powered house. Completed in 2015 at UTT's Energy Campus in Point Lisas, the 750 square foot Solar House is a prototype for research and public education. The building is designed to meet the energy needs of an average household in Trinidad and Tobago, and incorporates roof-mounted solar panels, solar water heaters, solar-powered fans and lighting. An in-depth study is currently underway into the economics of powering this house with solar energy, and NGC intends to share the findings with HFHTT, to help the organisation design more sustainable homes.

The organisation is exploring ways to make its builds more resource-efficient, to encourage responsible consumption and reduce the homeowners' utility and upkeep costs over the long term.

The incorporation of solar power into builds is just one approach being pursued. After successes in Moriah, Tobago with a Canadian-funded initiative, HFHTT is now strongly considering the inclusion of rainwater harvesters in home designs to help homeowners conserve water and cut utility costs. In addition to those prospective upgrades, Habitat homes now use energy-efficient electrical and plumbing fixtures. Moreover, the organisation's compulsory homeowner training has been expanded to include guidance on proactive, preventative home maintenance, aimed at encouraging responsible resource consumption.

ADJUNCT BENEFITS

Homeowners are not the only ones who benefit from HFHTT interventions. The organisation recently forged a partnership with the MIC Institute of Technology, a training institution providing instruction in technical and vocational competencies. Through this partnership, Habitat gives MIC trainees the opportunity to work on builds, and thereby gain valuable hands-on experience of direct relevance to their fields of future employment. This is also a way to incorporate local content into Habitat projects, and build capacity in and sustainability of the construction industry.

Habitat for Humanity is charging forward with its mandate and NGC continues to work closely on the ground with the organisation. The Company looks forward to deepening this collaboration as HFHTT turns toward a more sustainable approach in delivering its work programme.

NGC/NAAA Championship month

BUILDING BRAND TRINIDAD AND TOBAGO

Towards a Sustainable Future for Track and Field

Sport has been an axis of NGC's CSR programme since its inception, because of the clear value it adds to society. Not only does sport profit individuals and bring communities together, but athlete success and international renown effectively market Brand Trinidad and Tobago.

Track and field accounts for the lion's share of Trinidad and Tobago's sporting success at the international level. In order to sustain and build on that success, investment in the next generation of athletic stars is crucial. For that reason, NGC has been focusing significant investment attention on track and field.

LAYING THE FOUNDATION

NGC's longstanding commitment to the sport is best evidenced by its signature in-house athletics programme: NGC Right on Track (ROT). Now in its 19th year, the programme has been an incubator for sporting talent across Trinidad and Tobago, providing the necessary platform for budding athletes to be discovered and trained.

The programme, which has three main components, is run in partnership with the National Association of Athletics Administrations (NAAA) and the National Basketball Federation of Trinidad and Tobago (NBFTT). The NAAA administers the Kids' Athletics Programme at selected schools during the week, which teaches students how to run, jump and throw. Also running in schools and communities is the NBFTT's Mini to Masters Basketball Programme, through which participants are introduced to the basics of the sport. On the weekend, the ROT coaching caravan sets up in communities to teach the fundamentals of both track and field and basketball.

Since its inception in 1999, the Right on Track developmental programme has benefitted more than 20,000 participants in 105 communities and eight institutions, across eight Education Districts. According to the programme's founder, Olympic champion and former Head, Community Relations at NGC, Hasely Crawford:

"The true value of the NGC Right on Track Programme lies in its focus on starting from scratch. It assumes no prior knowledge of the sport and gives a comprehensive introduction to the fundamental skills involved in track and field disciplines and basketball. This builds the necessary foundation for participants who wish to progress to other athletics programmes that focus on sharpening skills. Without the structured introduction that NGC ROT provides, athletes hoping to compete at national and international levels would fall short of required standards with respect to technique and execution.

Towards a Sustainable Future for Track and Field

What makes the ROT programme even better is its emphasis on making track and field and basketball fun for children. The entertainment factor attracts more participants to the programme and ensures a wider pool of potential talent is exposed to the sport at an early age. This increases the chances of discovering future stars and getting them the necessary preparatory training.

For these reasons, in my professional estimation, NGC ROT lays the foundation upon which national success in athletics can be built."

NGC's investment does not stop there. To further ensure sporting talent is nurtured from a tender age, NGC has for many years been supporting the Primary Schools Track and Field Games in the Moruga Zone and in the St. Patrick and Caroni Education Districts. The Caroni Education District Games are in fact the longest-standing recipient of NGC sponsorship.

The Primary School Games not only provide productive outlets for youthful energies and extra-curricular lessons in discipline and fair play, but critically, they expose budding talent and provide a springboard for careers in juvenile athletics.

SHAPING WORLD-CLASS ATHLETES

The sustainability of success in track and field hinges just as much on training professional athletes as it does on unearthing and moulding future stars.

Trinidad and Tobago's athletes have achieved considerable success at international meets. However, if this success is to be sustained, attention must be paid to maintaining and increasing competitiveness. Raw talent is not enough to guarantee a place on the podium. Specialised coaching and rigorous training are necessary to maximise athlete potential, and meet the standard of performance expected of international-level competition.

NGC has been a main sponsor of the NAAA since 2013. With NGC's support, the organisation administers a number of valuable training programmes for promising athletes. In 2017, the NAAA launched a Youth Elite Programme targeting athletes aged 15 to 20, who have excelled at regional and international competitions. The 10 inductees in the inaugural run of the programme were paired with specialist coaches for customised courses of training aimed at building their strengths and correcting their weaknesses. In November, the Michael

Inductees in the Youth Elite Programme with NAAA CEO, Kabir Hosein (back row, third from left) and NGC VP Operations Ronald Adams (back row, third from right)

NGC Right on Track training

Johnson Performance agency, founded by the veteran US Olympian himself, was brought on to partner with the administrators of the Youth Elite Programme, and has been sharing world-class experience with the athletes.

Since the start of the programme, the elite athletes have shown marked improvement, with most achieving personal bests over the course of their training. All but one represented the national team at regional and international competitions, including CARIFTA, at which several athletes brought home medals and one achieved a record.

TRAINING THE TRAINERS

The success of professional athletes depends to a large extent on the quality of coaching they receive. It is therefore important that coaching staff receive training to ensure they are adequately equipped to guide the athletes in their care.

NGC's financial support of track and field makes provisions for training of coaches administering both the NGC ROT programme and NAAA initiatives. In addition to technique-focused training, coaches and programme administrators receive instruction in equally critical areas such as nutrition and first aid. Through the NGC ROT programme alone, almost 100 coaches have accessed professional development courses. Partnerships such as the MJP collaboration with the NAAA Youth Elite Programme also serve to build the competencies of coaches by exposing them to international best practices.

NGC also understands the need for strong institutional capacity and administrative staff to manage the various athletic programmes. For this reason, funding is made available to improve the governance and managerial proficiency of sport clubs and organisations under the NAAA umbrella.

Commenting on the importance of NGC's sponsorship, Ephraim Serrette, President of the NAAA, noted:

Long jump practice with NGC Right on Track

"Our sport is no longer seasonal but spans the entire year. Track and field as an industry has become very demanding. We now require full-time administration to efficiently and effectively manage the business to continue on its successful path. The financial and non-financial support of the National Gas Company make this possible, and we are very optimistic about what lies ahead for the sport."

Having invested in track and field at all levels, NGC is confident that the future of the sport is secure. Although the most telling metric of ROI remains athlete performance in international competitions, the true measure of success for NGC is sustained interest in growing the sport nationally, developing the talent of our youth, and by extension, building Brand Trinidad and Tobago. ■

No Net Loss – Update on NGC's Reforestation Programme

NGC is committed to running an environmentally responsible business. In the course of its operations, the Company strives to manage the footprint of construction activities, by choosing minimally disruptive routes for pipelines and using Horizontal Directional Drilling techniques to leave surface habitats intact. However, it is sometimes necessary to clear tree cover in order to facilitate works. As a countermeasure, and guided by a principle of "no net loss", NGC embarked on a large-scale Reforestation Programme in 2005.

THE IMPORTANCE OF FORESTS

Every year, forests deliver US$75-100 billion worth of goods and services to our planet.[1] They provide food security, habitats, medicines and sustain rural livelihoods. Trees protect against soil erosion, absorb pollutants and help regulate ambient temperature. In short, forests support life.

Perhaps most critically, forests are carbon sinks. Trees and plants absorb carbon dioxide during photosynthesis, and sequester it in their living tissues as biomass. These organisms consequently play a major role in managing global warming. In fact, one United Nations Environmental Programme (UNEP) publication estimates that forests and agriculture hold more than 30% of the solution to climate change.[2]

Removal of forest cover by extractive industries, farmers, and developers has severe consequences, especially in tropical regions. In addition to slashing biodiversity, destabilising soil and impacting rural incomes, tropical deforestation adds more carbon dioxide to the atmosphere than the sum total of all the cars and trucks on the world's roads.[3] This is because these forests are particularly adept at sequestering atmospheric carbon.

For these reasons, reforestation initiatives are crucial.

SCOPE OF NGC'S REFORESTATION PROGRAMME

NGC's Reforestation Programme aims to replant the equivalent acreage cleared during pipeline construction activities, with the support of the Ministry of Agriculture, Land and Fisheries' Forestry Division. The project's target area is 315 hectares spread across Mayaro, Moruga, Rio Claro, Rousillac, Guapo and Parrylands in Southern Trinidad. It was envisioned that once completed, the project would have restored a dense, mixed-species tree

[1] https://www.earthday.org/campaigns/reforestation/deforestation-climate-change/
[2] https://www.unenvironment.org/news-and-stories/video/unlocking-sustainable-finance
[3] https://www.earthday.org/campaigns/reforestation/deforestation-climate-change/

Update on NGC's Reforestation Programme

canopy back to the Southern watershed. Trees selected for planting include apamate, teak, cedar, mahogany and fruit trees.

The project was designed to progress through seven phases. Each phase involves planting and maintaining a specific number of hectares over a five-year period. After tending to saplings over the planned maintenance cycle, NGC will transfer the reforested areas to the care of the Forestry Division.

NGC's Reforestation Programme also turns on a socioeconomic axis. Throughout the project, coordinators have drawn on local resources, providing short-term employment and training opportunities for members of surrounding communities. Residents are also invited to share their empirical insights into the best ways to approach the terrain during planting and maintenance.

PROGRESS TO DATE

Since the start of the project, NGC has replanted approximately 267 hectares of land across the target locales, with saplings registering a healthy survival rate. The first three phases—in which some of the deforested areas of Mayaro, Guapo, Parrylands and Grant's Trace, Rousillac were replanted—have already been completed and handed over to the Forestry Division.

In 2017, the focus was on maintenance at four sites—Rio Claro, Grant's Trace, Guapo and Edward Trace in Moruga. Works involved removing shrubs and vines from above and around trees on roughly 132.25 hectares. Additionally, ahead of the 2018 dry season, fire traces were cleared around saplings at two sites to protect against bushfires.

Site communities were closely involved in the 2017 work programme. Residents were engaged to provide labour, and in the process, were able to access valuable guidance and training from NGC. Prior to the start of the work season, communities were instructed on safe work practices, specifically with regard to using manual tools and motorised equipment. Advice was also shared on managing personal finances. Many participants, for instance, had never banked their money, and were encouraged to open accounts to facilitate payment for ongoing and future jobs. These sessions helped better equip programme partners for the job market.

After a successful maintenance cycle, which resulted in an 85% plant survival rate, Phase 4 work at the Edward Trace, Moruga site is now complete. This site, as well as others where works are close to completion, will be handed over to the Forestry Division in 2018.

This year, work is also set to begin on the 48 hectares left to be planted in order to meet NGC's total reforestation target.

NGC employee hands-on with reforestation exercise

BIG PICTURE

According to Myles Lewis, acting Head of Corporate Social Responsibility at NGC, the Company's Reforestation Programme can be situated in the broader agenda of sustainable national development:

"As of February 22nd, 2018, Trinidad and Tobago has formally committed to reduce cumulative greenhouse gas emissions through ratification of the Paris Agreement on Climate Change. As a hydrocarbon-based business, NGC accepts its responsibility to support the government in meeting its reduction target. Our Reforestation Programme, with its adjunct carbon benefits, is just one way to build a more Earth-centric future for our nation. Given the success of the programme to date, and in pursuit of national emissions targets, consideration could possibly be given to a more proactive afforestation project at the country level."■

Giving Life-Sustaining Hope: PPGPL Continues its Fight Against Cancer

Phoenix Park Gas Processors Limited (PPGPL) has been an avid supporter of organisations and projects that focus on cancer. For PPGPL, cancer is a national health issue that cannot be ignored, or left solely in the hands of health care professionals. In fact, the company believes that cancer must be confronted as aggressively as it attacks its victims. For this reason, PPGPL has demonstrated its support by funding initiatives that are geared towards education and awareness, treatment, detection and prevention of cancer. For a company that lost two employees to the dreaded disease, and which currently supports other employees undergoing treatment for various forms of cancer, the battle is real. Cancer for PPGPL is therefore not just another cause; it is personal, tangible and present.

Over more than two decades, the company has contributed millions of dollars to cancer treatment, with the intention of saving lives. In 2001, it donated a blood analyser to the National Radiotherapy Centre. Upon achieving 20 years of production in 2011, it pledged US$10 million of equipment towards the outfitting of the National Oncology Centre. The facility was to provide state-of-the-art diagnostic equipment to average citizens, who normally have to travel abroad for PET scans and other services, at exorbitant personal cost. While the centre has not been completed, PPGPL remains committed to providing this country with advanced diagnostic cancer facilities.

In 2017, when PPGPL's Wellness Committee observed cancer month, it participated in a unique programme for cancer screening offered by the Family Planning Association. Male and female employees were invited to participate in voluntary cancer screening paid for by the company. For each employee who was screened, a member of PPGPL's fence line community will receive free cancer screening.

In addition to the aforementioned projects, PPGPL has consistently assisted the Trinidad and Tobago Cancer Society (TTCS) especially with its public education efforts. However, in the last few years, the company took its relationship with the organisation to another level. In 2013, upon achieving 21 years of no lost workday cases, PPGPL decided to part-fund the purchase of a digital mammography system for the TTCS to aid in the detection of breast cancer. With a contribution of $2,190,750, PPGPL is the major sponsor of this system, which had an overall price tag of $4,319,100.

L-R - Dominic Rampersad, President – PPGPL, Kevin Cox, General Manager – TTCS, Zalayhar Hassanali, patron – TTCS, Dr. Asante Le Blanc, Vice Chairman – TTCS stand next to the digital mammography system.

Over more than two decades, the company has contributed millions of dollars to cancer treatment, with the intention of saving lives.

On 26 October, 2017, PPGPL, in conjunction with the TTCS, officially unveiled the digital mammography system. A digital mammography machine promises to offer more patient comfort, better records management, and enhanced communication among medical professionals in screening patients for breast cancer. One of the major benefits of the project is that at the TTCS, mammograms will continue to be available to the public at more affordable rates than private institutions.

At the unveiling of the mammography system, PPGPL's President Dominic Rampersad, in highlighting the major projects delivered by the company over the years, stressed: "We have done all of these projects because we have seen the needs in our society, and we have responded in ways that we believe would bring positive results for our citizens. It is our way of returning the revenues from gas to the people of Trinidad and Tobago." ■

CNG vehicles offer several advantages to the motoring public

The CNG Advantage

For decades, Trinidad and Tobago has been a mono-fuel country, with consumers filling their tanks using different grades of petroleum-based liquid fuel. In the mid-1980s, a sincere attempt was made to introduce Compressed Natural Gas (CNG) as an affordable, cleaner alternative. CNG – natural gas compressed to a high pressure – performs just as well as, or even better than liquid fuel in a vehicle.

When first introduced, CNG became popular with taxi and high-mileage drivers, for whom affordability was the major draw. Over the years, it remained a viable alternative to conventional fuel. Today, thanks to an aggressive marketing plan by NGC CNG Company Limited (NGC CNG), hundreds of drivers as well as the Public Transport Service Corporation (PTSC) have slashed their fuel bills by as much as 70% by switching to CNG. Three licensed converters now employ more than two dozen installation and service technicians. Employment and economic activity has also ramped up for the supply, installation and maintenance of CNG equipment at service stations. In 2017, CNG sales increased by 12% relative to 2016 figures, indicating healthy market growth.

Apart from fuel price differentials, increased consumption of CNG is due in part to government incentivisation in the form of tax rebates, and no Motor Vehicle Tax (MVT) or VAT on Original Equipment Manufacturer (OEM) CNG vehicles. In 2015, the decision was taken to extend these incentives to electric and hybrid vehicles to diversify the suite of environmentally-friendly vehicles on the nation's roads and offer consumers more choice.

This has led to discussions around the merits of CNG versus electric vehicles, with some commentators postulating that CNG will cede market share to other types of 'green' cars. A careful look at the domestic context, however, suggests a solid future for CNG. While both types of vehicle are environmentally-friendly choices for motorists, there are notable features that give CNG a comparative advantage in Trinidad and Tobago.

CNG VS ELECTRIC VEHICLES

Cost is the first major consideration. While there is an initial overhead cost attached to conversion to CNG, motorists would save thousands on their annual fuel bill, with the quantum being greater for vehicles that currently use super and premium gasoline. Conversion costs can therefore be amortised in as few as two to three years based on these savings. In contrast, purchasing a new electric or hybrid vehicle would require a significantly higher and unrecoverable investment. Importation of new vehicles also adds to the foreign exchange burden – the cost of importing a new (economy class) hybrid or electric vehicle is easily more than 30 times that of a CNG conversion.

Another consideration in CNG's favour is accessibility. Almost every internal combustion vehicle in the country—approximately 800,000 automobiles—can be converted to run on CNG. This puts all the benefits of owning an environmentally-friendly vehicle within reach of most of the motoring public. Though electric cars offer attractions of their own, they are not as readily available. Whereas practically anyone can retrofit an existing vehicle to use CNG, an electric or hybrid vehicle is a separate purchase altogether, and must be imported. As a result, the market penetration of these vehicles would be markedly lower.

The CNG Advantage

Naysayers have cited current natural gas shortages as undermining the sustainability of the CNG industry in Trinidad and Tobago. However, the NGC Group has calculated that there is sufficient supply to fuel the 20,000 vehicles targeted for conversion in the initial marketing phase. It is estimated that 20,000 high-mileage CNG vehicles will only require 3% of the total annual gas intake of an average plant on the Point Lisas Industrial Estate. At US$5 per litre of gasoline equivalent, CNG sales would also generate revenue for the country. It is also the fuel that has the greatest margin leeway of all fuels while still maintaining an affordable price.

Sustaining a large electric vehicle fleet, on the other hand, is less practical. These cars would increase demand for electricity. The Trinidad and Tobago Electricity Commission (T&TEC) receives gas at a subsidised price from NGC, and currently owes billions of dollars on its gas bill. The economic logic of selling scarce gas at a cheaper price than would obtain for CNG, to facilitate expansion of the electric vehicle market, is therefore not compelling. Moreover, if T&TEC decides on a rate increase to help offset its growing debt, then the operating costs for electric vehicles would climb as well.

There is also the matter of supporting infrastructure. Through NGC CNG, the government has invested millions in the expansion of the CNG network across Trinidad and Tobago. This investment was a studied decision, based on long-term cost-benefit analysis, and the fact that there was sufficient existing and predicted demand for CNG to justify station expansion. At this point, given the government's commitments and CNG targets, it is unlikely that further public capital will be invested in building the equivalent infrastructure for electric vehicle "refuelling". This means that private capital would need to lead the way. It is however difficult for private investors to venture funds into developing this market without a solid consumer base or definitive appetite for the product. In any event, infrastructure costs for CNG are considerably below that for new power generation, transmission and distribution.

An argument made against CNG's long-term sustainability is that the international market is moving toward electric and hybrid vehicles, with innovation in vehicle manufacture largely focused on iterating these engine types. However, natural gas vehicle (NGV) sales and market penetration have not flagged. In fact, around the world, NGV numbers are steadily rising. To give just a snapshot of recent headlines:

- As part of the Government of Mexico City's commitment to environmental protection, 406 official municipal vehicles have been converted from gasoline to CNG since 2017. The total conversion goal is 1,000 units in the near term.[1]
- Russia is upgrading and expanding its CNG network capability ahead of the 2018 FIFA World Cup.[2]
- Ontario public transportation agency Grande West Transportation Group Inc. recently invested CDN$3 million in CNG buses.[3]
- Spanish supermarket chain, Mercadona, and its transport providers will allocate 4 million euros in 2018 to add 40 Iveco LNG-powered trucks for the cities of Madrid, Barcelona and Valencia.[4]
- At the end of 2017, Sweden had more than 55,000 NGVs in registered use, and given the excellent availability of natural gas models from which to select, many believe in a growing market in the future.[5]
- Egypt recently launched an NGV initiative to convert 10,000 vehicles.[6]

Moreover, the marketing frenzy around electric and hybrid vehicles may lead one to assume that no innovation is happening in the CNG industry, but natural gas engines are also receiving research and design attention. Several new models of CNG vehicles have been launched by brands Audi, Skoda, Seat and Volkswagen, with some models offering combination CNG-hybrid-electric engines[7]. Though these cars have not yet hit the local market, these are vehicles that will no doubt appeal to consumers as practical buys, given the growing availability of CNG in Trinidad and Tobago.

This is not to say that electric vehicles should not be purchased, nor that they cannot survive in the domestic market. There is no doubt that electric vehicles will form part of the automotive mix in Trinidad and Tobago in the future, and will play an important supportive role in the reduction of carbon emissions from the transportation sector. However, NGC CNG expects its penetration to be limited in the first instance, and grow gradually over time. In the meanwhile, the move towards CNG adoption is galloping along in all market segments and creating economic value for scores of stakeholders.

[1] http://www.ngvjournal.com/s1-news/c1-markets/mexico-city-converts-over-400-municipal-vehicles-to-natural-gas/?utm_campaign=shareaholic&utm_medium=twitter&utm_source=socialnetwork
[2] http://www.ngvjournal.com/s1-news/c4-stations/russian-cng-refueling-network-in-expansion-for-2018-fifa-world-cup/?utm_campaign=shareaholic&utm_medium=twitter&utm_source=socialnetwork
[3] http://www.ngvjournal.com/s1-news/c3-vehicles/public-transport-agency-in-ontario-invests-3-million-in-cng-buses/?utm_campaign=shareaholic&utm_medium=twitter&utm_source=socialnetwork
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[7] https://www.autocar.co.uk/car-news/motor-shows-geneva-motor-show/skoda-vision-x-concept-previews-2019-crossover

TO REFLECT ON THE BEAUTY THAT SURROUNDS US HERE IN TRINIDAD AND TOBAGO

A portrait of strength and resilience, the great samaan tree reaches skyward in this captivating shot by photographer Mark Lyndersay at the Morne L'Enfer Reserve, Rousillac.

THE NATIONAL GAS COMPANY
OF TRINIDAD AND TOBAGO LIMITED

PHOENIX PARK
GAS PROCESSORS LIMITED

Trinidad and Tobago NGL Limited

NGC CNG
Company Limited

National Energy

CORPORATION OF TRINIDAD AND TOBAGO

THE NGC GROUP OF COMPANIES