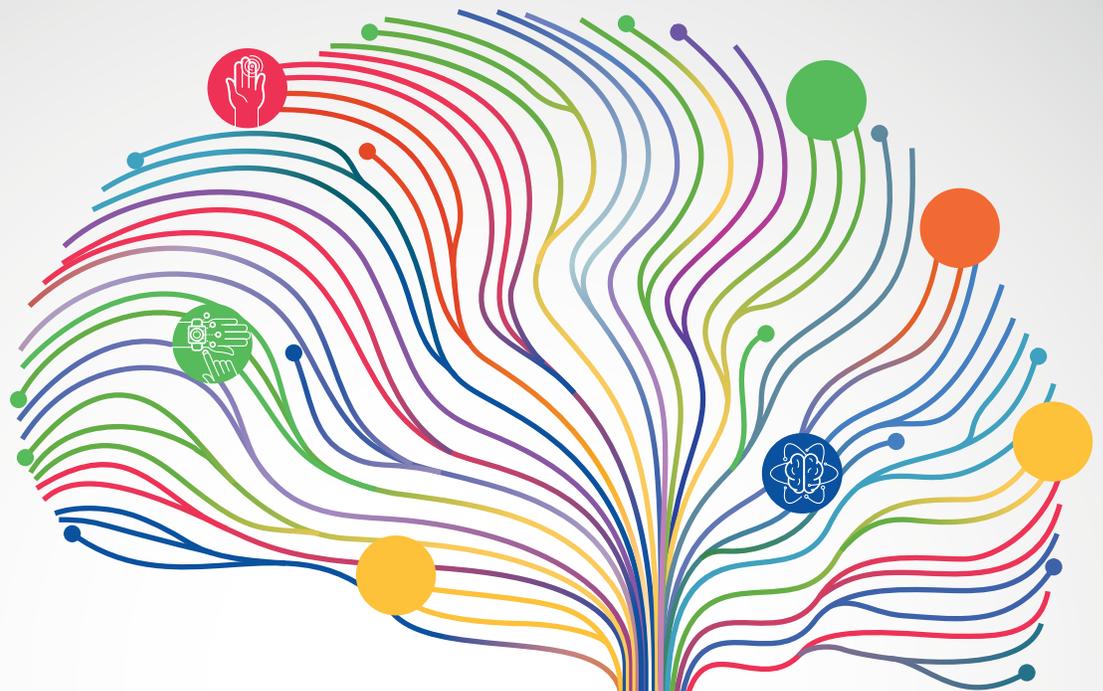


PIONEER

BUSINESS | PEOPLE | CORPORATE SOCIAL RESPONSIBILITY



THE Technological Edge

THE BERTH
OF TECHNOLOGY

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IMPLEMENTATION OF A
BUSINESS CONTINUITY
MANAGEMENT PLAN AT
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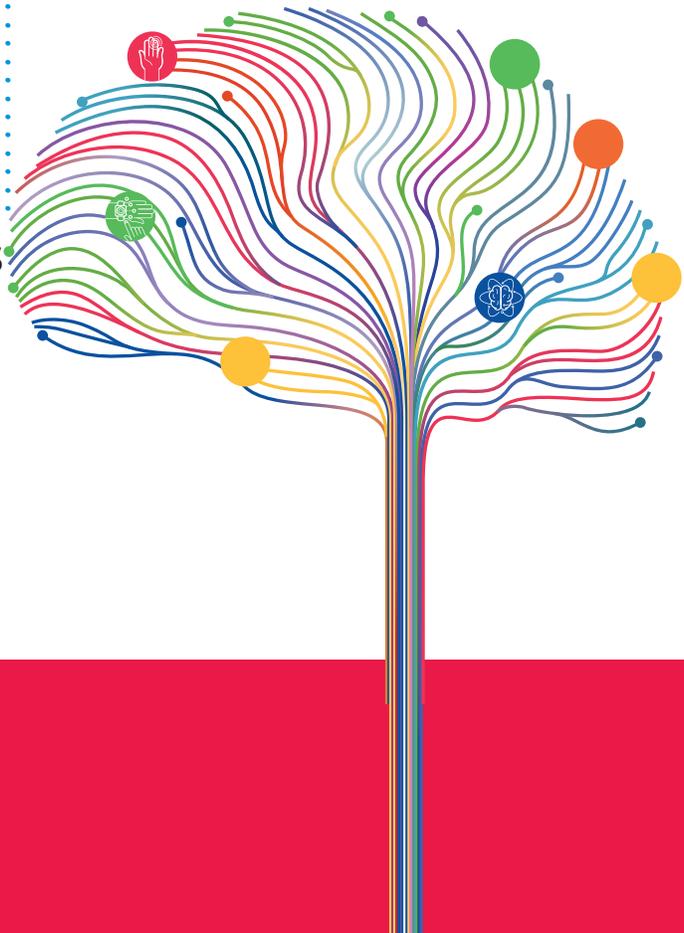
PARTNERING WITH
COMMUNITIES FOR
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THE TECHNOLOGICAL EDGE



BY:
**STEPHON
JIMENEZ**

Many have described the last decade as potentially the most significant since the invention of the Edison light bulb. Advances in hydraulic fracturing (fracking), electric vehicles, LED lighting and solar photovoltaics are but a few of the present technologies that are transforming industries and setting whole societies on new paths to industrial growth and development. This is happening on a scale not seen since the Industrial Revolution in the late 17th and early 18th centuries.

Technology has invariably played a key role in the development of the Trinidad and Tobago energy sector. From Federation Chemicals Limited's pioneering use of natural gas as a

chemical feedstock in the manufacture of ammonia, to Atlantic LNG's Phillips Optimised Cascade Process, T&T has, at different times, been at the forefront of cutting edge, technological, energy developments. In this regard, National Energy, as one of the chief architects of the nation's energy-based sector, has had a key role in facilitating technological innovation in the sector by providing the right regulatory, economic and environmental conditions necessary to encourage such innovation.

National Energy, as facilitator of downstream energy development, continues to recognise and understand the role that technology will



THE COMPANY HAS ALWAYS SOUGHT TO PUT TECHNOLOGY AT THE FOREFRONT OF ITS OPERATIONS BY NOT ONLY ADOPTING IT IN VARIOUS WAYS WITHIN EACH DEPARTMENT BUT BY ACTUALLY MAKING TECHNOLOGY A PART OF THE COMPANY'S CORPORATE CULTURE.

continue to play in navigating the sector through the various obstacles it faces at present, as well as through charting its future. Accordingly, the company has always sought to put technology at the forefront of its operations, by not only adopting it in various ways within each department, but by actually making technology a part of the company's corporate culture. This issue therefore seeks to highlight the many ways in which National Energy continues to incorporate, promote, and facilitate the use of cutting edge technology in its everyday operations towards achieving its corporate, environmental and social objectives.

TECHNOLOGY
FOR BUSINESS

TECHNOLOGY
FOR LIFE

BY:
SHEILA
MC INTOSH

BUSINESS

Intelligent, adventurous, embracing mobility and welcoming new technology - that's how National Energy's employees can be described and according to the company's Information Communications and Technology (ICT) Officer, Mr. Earle Telesford, these traits combine to form National Energy's culture as it pertains to technology. Mr. Telesford stated, "We have a very dynamic, exciting and innovative tech culture. Employees across all age groups and functional lines embrace new technologies to help make their work easier in very practical ways." So what has been National Energy's journey in becoming a tech-savvy organisation? Moreover, how far into the

future is the company willing to go in applying technology?

A History of Technological Innovation

Established in 1979 to formalise the work of the Coordinating Task Force, National Energy was always a technological pioneer, having owned and operated Trinidad and Tobago's first methanol and urea plants. The company also operated an information centre at Point Lisas Industrial Estate, which served as an information hub for companies located in and around the estate, for potential investors and for the national public. At the information

centre, a group of information officers disseminated information on the Point Lisas Projects and the country's developing natural gas industry, using a range of media including videos, brochures, an Investor Guide, exhibitions and guided tours.

National Energy was one of the first state enterprises to embrace information technology at its offices with the establishment of a Management Information Systems (MIS) Department in 1981. The MIS Department provided data processing facilities and services to the energy-based industries at Point Lisas and implemented a number of 'firsts' in technology at the estate. These accomplishments included:

- The first international Direct Dialling facilities for voice and data communications;
- Online communications between ISCO's IBM System 34 minicomputer and National Energy's IBM 4341 mainframe computer; and
- Online communications between National Energy's 4341 mainframe computer and the Trinidad and Tobago Electricity Commission's (T&TEC) 4341 mainframe computer.

Though these accomplishments seem minor in today's world of advanced computing, they represented a significant step forward in 1981.

*National Energy Head Office,
Point Lisas, Trinidad.*

More importantly, these early strides set the stage for the type of technology-forward culture the company would adopt and nurture over the years.

Technology Solutions in a Fast-Paced Environment

Fast-forward thirty-four (34) years to 2015. The Trinidad and Tobago energy and technological landscapes have changed drastically as we adapt to remain competitive in a fast-paced world. With the advancement of the Internet, the world has truly become a global village as information now travels at the speed of thought, facilitating trade across geopolitical borders. A company is now only as successful as its ability to access, process and utilise information.

How is National Energy keeping itself in the game? By embracing change and delivering ICT solutions and value to its employees, customers and stakeholders to enable them to work smarter, faster and with more focus. In 2015, National Energy took a bold step into the future of business technology with the introduction of Business Intelligence (BI) throughout the company.



BI can be defined in two (2) ways. Firstly, it is a method of empowering ICT end users to make informed decisions. Secondly, BI represents the set of tools and systems that allow the company to gather, store, access and analyse corporate data to aid in decision-making. Simply put, BI is bringing together the Right Data and the Right People at the Right Time to achieve the organisation's information and business objectives.

National Energy formally launched its Business Intelligence initiative in July 2015 with the support of ICT giant, Microsoft. In accordance with the theme: 'Work Smart 365', the BI implementation team demonstrated how Microsoft's Office 365 can be used to make work more effective. Employees also gave testimonials, highlighting how they are using Office 365 to analyse data and create more accurate and dynamic reports. Since the launch, National Energy has continued to roll out BI solutions through the following projects:

Development of Project Site for Berth 2 Reconstruction

National Energy is currently managing the reconstruction of Berth 2 at the Port of Brighton, La Brea. This project provided an ideal opportunity for the implementation of a BI Project Site. The Project Site involved the creation of a virtual container, in which all data related to the project can be stored and accessed by duly authorised persons. A framework for the Project Site was established in consultation with the department responsible for managing the project. Access and authorisation levels were then determined, following which the Project Coordinator input data into the Project Site. Authorised personnel could access the site by simply sending an email to the specified site address.

Engineers working on the project can now access project reports and updates from anywhere, at any time, eliminating the need for paper reports and reducing the number of project meetings required by the team. Team

meetings can also be held online from multiple locations, using Skype for Business.

Enterprise-wide Document Management System (EDMS)

The EDMS project is being built on the SharePoint platform, which is a centrally controlled cloud-based data storage point for all National Energy critical data. This data will be accessible by authorised persons and will allow for the development of dashboards to effectively display the information. This enhanced reporting format makes it easier for managers to see data associations, classifications and trends at a glance. Data manipulation is also made easier through SharePoint, as multiple users can edit a document at the same time.

One of the benefits of an effective EDMS is the reduction of paper, as documents are edited, routed and approved electronically. This saves time and cost, as less time and physical space are required for filing and storage of documents.

Several other BI projects are currently being undertaken with the guidance of the ICT Section, and the participation of the respective functional units such as Procurement, which is revising its Procurement Reporting process. Remote access to data as well as voice and video conversation through Skype for Business are also available to users.

Just as National Energy continues to build on its original mandate for facilitation and development of energy-related industries, the company is likewise continuing to build on its forward-looking technological culture. This is a work in progress. The ICT Section is seeing a growth in demand for the ICT solutions from employees who are now looking to ICT to help make their work more efficient and effective. National Energy is committed to working with all its employees, customers and stakeholders at all levels, providing Technology for Business and by extension, Technology for Life.

How

is National Energy
keeping itself in the game?

By embracing change and
delivering ICT solutions and
value to its employees,
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enable them to work smarter,
faster and with more focus.



*Live demonstration of Skype for
Business at launch of Work Smart 365*



NEC Pioneer

NEC PIONEER

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EMBRACING TECHNOLOGY, IMPROVING SERVICES:

A MODERN APPROACH TO TOWAGE OPERATIONS

BY CHARISSA MAHABIR

One of National Energy's main sources of revenue is its Towage Operations which fall under the ambit of the Operating Assets Department within the Operations Group. The Operating Assets Department has overall responsibility for management of commercial, operational and maintenance aspects of the company's fleet of marine vessels, in order to achieve optimal efficiency and profitability.

National Energy's fleet of vessels consists of eight (8) tugs, one (1) passenger launch and one (1) fast crew supply vessel, which are owned, operated and maintained by the company. Over the years, National Energy has developed a reputation for being a reliable tug service provider, operating on a commercial basis and providing services to all local ports of Trinidad and Tobago, to the offshore oil and gas industry and to the regional markets.

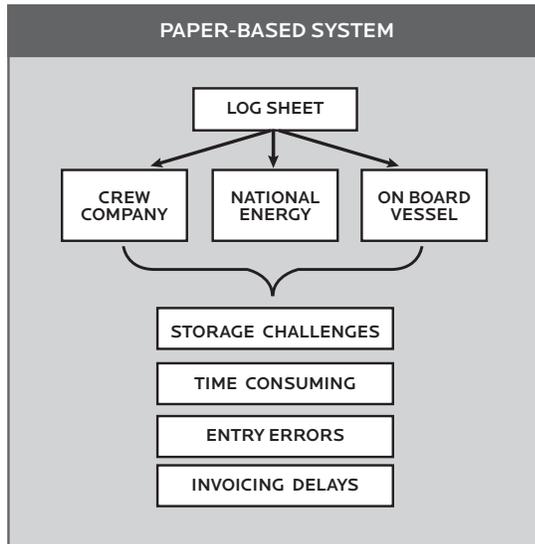
To continue to be a reliable service provider and remain competitive and grow in the industry, one crucial element is currently engaging the attention of the department's

management team - and that is its use of technology.

Technology has revolutionised the way businesses are run, so why not use the available technology to improve the company's towage operations? The management team of the Operating Assets Department is committed to embracing new technologies for the continued improvement of its operations and delivery of service to its customers.

At present, there are limited facilities on board the vessels to accommodate the use of computers. All vessel calls made by National Energy's fleet are registered into a log sheet, which has to be written in triplicate; a copy each for the vessel crewing company, National Energy, and one to remain on board the vessel for a period of three (3) to six (6) months. This presents a few challenges, as storage on board the vessels and in office is limited. Archiving files, processing reports and invoices from the paper-based system is very time consuming

and at times, results in entry errors and invoicing delays. At this time, Operating Assets is partnering with ICT to introduce a system to log vessel calls via an online entry system on the company's newest vessel, the National Energy Explorer.

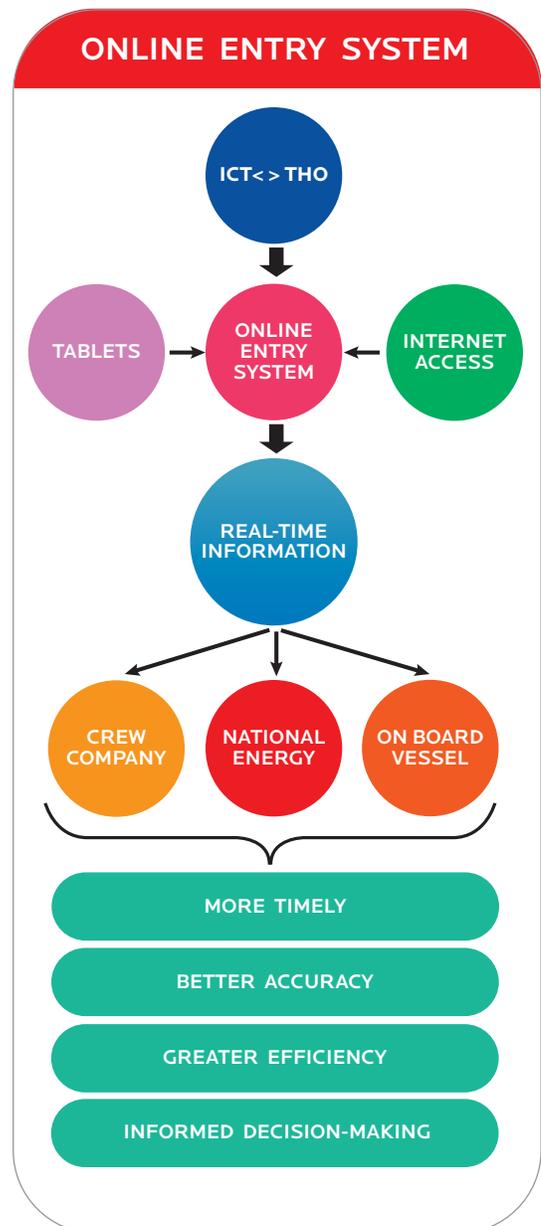


This online entry system would assist in direct access to the vessel call information by all parties involved, reducing the need for hardcopy paperwork that requires storage facilities. The implementation of tablets with Internet access on board the vessels would provide real-time access to information required by the crewing company, the Captain on board the vessel as well as National Energy. This would result in higher productivity and more informed decision-making. Once testing of this online system is proven on the National Energy Explorer, vessels working out of the Port of Port of Spain will be targeted for implementation of a similar system. (See online entry system diagram)

Another way in which Operating Assets is utilising technology is through the Damen Asset Maintenance Operating System (DAMOS). This software is a planned maintenance programme which prompts schedule maintenance activities when vessel

components have reached their Original Equipment Manufacturer's (OEM) recommended running hours. It also allows for manual inputs in the event that unscheduled maintenance becomes necessary. The use of this software helps to preserve the integrity of National Energy's assets.

Continuing to implement technological systems into the company's towage operations would further enhance National Energy's ability to remain as the preferred provider of towage services in Trinidad and Tobago and regionally.



THE PORT OF GALEOTA:

ON THE CUTTING EDGE OF ENERGY

Aerial view of the Port of Galeota.

BY TAMARA GILDHARRY

On September 5th 2014, National Energy officially opened the first phase of the state-of-the-art Port of Galeota, located on the south-eastern coast of Trinidad, on the Galeota Peninsula. Designed and constructed by National Energy at a cost of approximately US\$85 million, the Port will be a major logistics hub for emerging energy markets in South America and the Guyana-Suriname basin. The Port currently serves light to medium offshore energy-based industrial services through five (5) berthing spaces, one (1) of which is dedicated to the Trinidad and Tobago Coast Guard. The facility will provide a number of specialised services, including:

- Rig supply and support operations
- Rig and boat repair
- Modular stacking of deck cargo
- Waste management facilities
- Delivery of material by sea to and from Galeota
- Crew changeover services

While primarily designed for rig support services, the Port can also accommodate cargo handling.

To facilitate these operations, the Port of Galeota requires the best technology and, according to National Energy's Senior Project Engineer, Bobby Thomas, "New technology means new thinking. Unlike historical ports in Trinidad and Tobago that developed over time, this port was studied significantly prior to construction, using the best computer modelling, dredging and environmental technology to ensure its success. This is what makes it different. The new technology was incorporated even before construction began."

As a prerequisite to the design of the Port, various design modelling programs were utilised to inform on key areas of concern. Issues of over-topping, storm surges, sediment transport to determine dredging frequency and met-ocean statistics, along with other available data, were utilised to assist with informed decision-making in connection with the port design parameters.



National Energy Explorer is loaded with cargo for transport to offshore platform.

Compilation of the met-ocean data by National Energy's environmental consultant, Coastal Dynamics Limited (CDL), using oceanographic forecast modelling, involved the use of buoys placed into the surrounding waters to collect data which included water temperature, wind strength and wave patterns. Onshore computers then received this data to be analysed and thus determine the impact of the Port on the environment. The buoys were installed prior to the construction of the Port and environmental regulations require consistent employment and monitoring of the buoys, even after the commencement of operations, for a period of five (5) years. This represents part of National Energy's Shoreline Monitoring and Management Plan (SMMP) required for compliance with the conditions of the Certificate of Environmental Clearance (CEC).

Dredging at the Port of Galeota required two (2) different dredging vessels provided by the internationally renowned European company, Jan de Nul Group. One vessel, a Cutter Suction known as the 'Hondius', cut the hard, rocky areas along the channel and turning basin. Mr. Thomas indicated that to his knowledge,

this was the first time the cutter suction dredging technology was utilised in Trinidad and Tobago. The second dredging vessel, a Trailing Suction Hopper known as 'Francesco di Giorgio', was utilised in areas where the dredged material was loose and easily extracted. These works accounted for almost 50% of the total project cost.

The construction of the Port comprised mainly sheet-piling works configured to produce two (2) finger piers yielding the five (5) berths, as shown in Table 1.

	Length (m)	Bearing Capacity (KN/m ²)
<i>Berth 1</i>	104.8	40
<i>Berth 2</i>	148	50
<i>Berth 3</i>	104.8	40
<i>Berth 4</i>	95	40
<i>Berth 5 (Coast Guard)</i>	71.8	15

Table 1: Berths at the Port of Galeota

These berths are equipped with quayside ladders, arch fenders and 50-tonne mooring bollards. The dredged depth at Berths 1 to 4 is 7.6m and, at Berth 5, it is 5.5m relative to Mean Sea Level.



Construction of the 1.2-kilometre roadway leading to the Port utilised a geosynthetic material to reinforce soil and similar materials, known as a 'Geogrid'. With traditional roadway construction, soil pulls apart under increasing tension. Geogrids are stronger under pressure—a property that allows them to transfer forces over a larger area of soil. This technology not only strengthened the roadway, but also allowed for lower costs, shorter timeframes and less material than would be required for regularly constructed thoroughfares.

Additionally, the Port engages the use of excellent navigational aids, including solar powered leading lights and channel markers. During the day, the natural sunlight charges these lights and, as darkness approaches, they illuminate to guide vessels to the Port. This removes the need for underwater electricity cables and lowers electricity costs. Additionally, the implantation of these solar powered lights contributes to National Energy's eco-friendly approach to business, as fossil fuels are not required for electricity generation. It also allows for continuous Port monitoring in the event of power outages.

To aid in the operations of the Port of Galeota, National Energy will construct an administration building along with a warehousing complex in close proximity to the Port. This will aid Port users with constant service and access to cargo handling and storage facilities.

Mr. Thomas suggested that the completion of Phase Two (2) of the Port of Galeota will bring with it even newer operational technologies. These may include:

- Connection to National Energy's internal accounting system to facilitate faster billing and processing of payments to berth users, through the application of Business Intelligence
- Real-time, computer-based monitoring of Port activities
- Weather monitoring for storm warnings and preparation

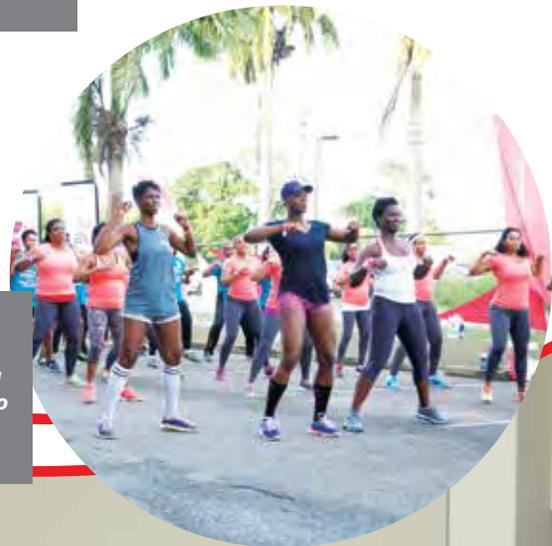
For National Energy, new technology goes beyond high-tech gadgets and computerised systems. It is about finding new ways of thinking, conceptualising, constructing and operating. From inception, the Port of Galeota has represented a dynamic shift in local port infrastructure design, development and management which paves the way for new opportunities in the energy sector and opens new markets in the South American region. The Port of Galeota represents truly limitless possibilities.

FROM INCEPTION, THE PORT OF GALEOTA HAS REPRESENTED A DYNAMIC SHIFT IN LOCAL PORT INFRASTRUCTURE DESIGN, DEVELOPMENT AND MANAGEMENT.



Distribution of Book Bags to SEA Students

National Energy employees conducted the company's annual distribution of book bags to graduating SEA students from schools in our fence line communities of La Brea, Mayaro/Guayaguayare and Couva.



Cancer Awareness Month 2015

Several activities were hosted including the annual Cake Sale and Zumbathon to raise funds and awareness in the fight against cancer.





International Coastal Clean-up (ICC) 2015

In keeping with National Energy's commitment to environmental preservation, the company partnered with parent company, The National Gas Company (NGC), to participate in the annual International Coastal Cleanup (ICC) at Station Beach, La Brea on Saturday, 19 September 2015. Overall, this was a very successful undertaking, as a total of 1,099.3 lbs of trash was removed from the beach.

Reading Workshops

During the month of July 2015, Reading Workshops were hosted for children between the ages of 6 to 12 in the community of La Brea and environs. Collaborating with the San Fernando Arts Council, National Energy hosted 6 workshops with the aim of improving the reading and comprehension abilities of children in the community. The 28 participants were assessed using the Ministry of Education's assessment tools and worksheets.



Donation of Paint to Mayaro Government Primary PTA

The company donated 24 gallons of paint of various colours to the Mayaro Government Primary School PTA to assist in the beautification of the school's class rooms.



THE BERTH OF TECHNOLOGY



The Port of Brighton, a hub of logistical activity in the south-west.

BY TAMARA GILDHARRY

Located in the south-western peninsula of Trinidad, La Brea serves as the gateway for the next phase of gas-based energy development and diversification in Trinidad and Tobago. This can be achieved through the La Brea Industrial Development Company Limited (LABIDCO) and Union Industrial Estate (UIE). LABIDCO's activities for the La Brea Industrial Estate are to provide industrial land, port, logistics and bioremediation services at competitive prices. To facilitate its objectives on both the national and community level, LABIDCO employs a series of new and innovative technologies. The best example of innovative technology in use at La Brea is currently underway with the reconstruction of Berth 2 at the Port of Brighton.

In December 2009, routine maintenance inspections by LABDICO staff at the Brighton Port highlighted a serious breach in the integrity of Berth 2. An investigation into the cause of this failure was conducted as a matter of urgency due to contractual obligations to several port users, which are of critical importance to the profitability of LABDICO and ultimately, National Energy. The investigation, completed in early 2010, outlined a variety of issues affecting the berth, which led to the decision to reconstruct the berth to allow full functionality.

The reconstruction project entails the construction of a new steel piled wall on the seaward side of the existing quay in front of

Berth 2, using H-steel and sheet piles. The new quay wall will be a 2.302-metre combination wall structure, consisting of 26.2-metre-long, H-tubular pipes filled with alternating Z-shaped steel sheet piles, 1.260 millimetres wide and 18.2 metres long. There will also be an anchor wall running parallel to the main quay wall, connected to the main wall by tie rods, which will provide stability and structural support to the main wall.

The construction will also require a new, precast, reinforced concrete cope beam outfitted with bollards, fenders and ladders, the removal of the area known as 'Zone 1' and the installation of a granular surface and a drainage system. Extension of the design life of the project requires the modification of the existing discrete load-out deck within the quay, which entails the replacement of the steel beams and reinforced concrete deck. The load-out deck must be completed in mid-2016, so that the Juniper topside can be loaded out.

Post reconstruction, Berth 2 will have the capacity to accommodate larger vessels such as the Panamax-sized vessels, with lengths up

to 242 metres long and water depth requirements of 12.8 metres. Modern hardware, built in compliance with updated international standards to accommodate these vessels, will complement Berth 2.

The total estimated cost for this project is approximately US\$50 million.

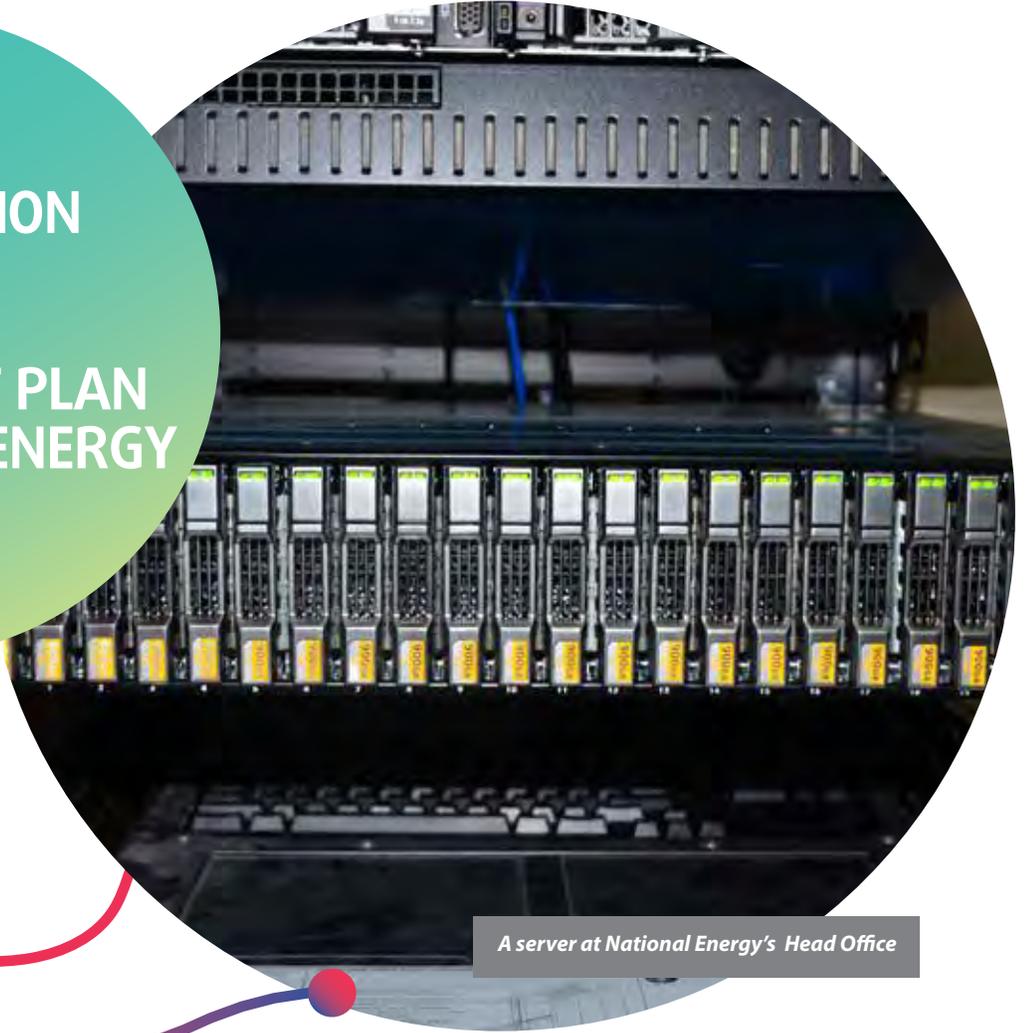
The new technology used in the construction of this berth will reduce the probability of future interruption to services. The berth also serves as a benchmark for the construction of additional berths that may come on stream in Brighton.

This reconstruction project is of great significance to National Energy as the company continues to deliver on its mandate of developing excellent industrial estates and ports. Completion of Berth 2 within the targeted time frame of 18 months is crucial, as the facility will be utilized for the load-out of bpTT's Juniper Platform which is currently under construction at the Fabrication Yard. The berth will also support the construction and operation of the Caribbean Gas Chemical Limited (CGCL) Project located at UIE. Berth 2 is scheduled for completion in early 2017.

Repair works in progress at Berth 2, La Brea Port



IMPLEMENTATION OF A BUSINESS CONTINUITY MANAGEMENT PLAN AT NATIONAL ENERGY



A server at National Energy's Head Office

What is Business Continuity Management?

Business Continuity (BC) is defined as the capability of the organisation to continue delivery of products or services at acceptable predefined levels following a disruptive incident (Source: ISO 22301:2012). Business Continuity Management (BCM) is defined as a holistic management process that identifies potential threats to an organisation and the effects those threats, if realised, might have on business operations those threats, if realised, might cause. It provides a framework for building organisational resilience with the capability of an effective response that safeguards the interests of its key stakeholders, reputation, brand and value-creating activities (Source: ISO 22301:2012).

BY NIKESHA ANN VICTOR

These incidents may include natural disasters such as tornadoes, floods, blizzards, earthquakes and fire, accidents, sabotage, power and energy disruptions, communications, transportation, safety and service sector failure, environmental disasters such as pollution and hazardous materials spills, cyber attacks and hacker activity. These unexpected events can cause interruptions or negative publicity to an organisation's products, services and activities. In order to mitigate the impact of such events, National Energy has embarked upon a thrust to incorporate BCM planning into its overall risk management strategy. BCM planning will help prepare the business to manage incidents in a well-thought-out, organised manner and mitigate their effects as far as possible.

The objective of BCM is to make the entity more resilient to potential threats and allow the entity to resume or continue operations under adverse or abnormal conditions. This is accomplished by the introduction of appropriate resilience strategies to reduce the likelihood and impact of a threat, and the development of plans to respond to and recover from threats that cannot be controlled or mitigated.

The following paragraphs outline the basic stages of the approach and methodology adopted by National Energy for the implementation of a Business Continuity Plan (BCP) in the organisation.

Programme Management

During this phase, the need for the implementation of the BCP within the organisation is established. The BCM programme is developed determining the scope, objective and assumptions of the programme. A steering committee, comprising senior managers, is established and a BCM champion or resident expert is responsible for the ongoing administration and maintenance of the programme.

At the heart of good BC practice sits the BCM Lifecycle. The BCM Lifecycle illustrates the repetitive stages that a typical BCM Programme moves through, with the overall aim of improving the organisation's resilience. (See Figure 1)

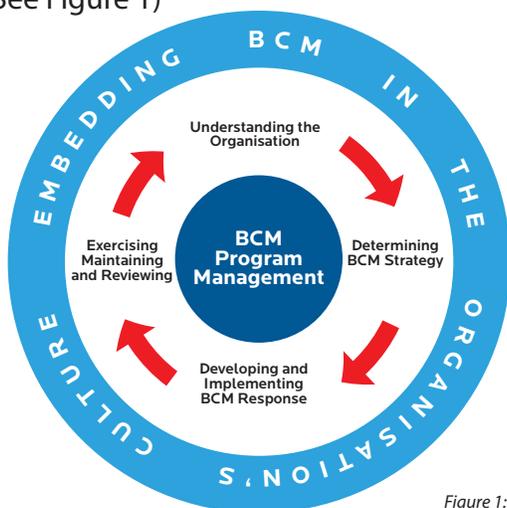


Figure 1: BCM Life Cycle

The first step in the BCM cycle is referred to as "Understanding the Organisation." There are two (2) critical activities during this stage including (i) Risk Assessment and (ii) Business Impact Analysis (BIA).

Risk Assessment is the process of identifying hazards, their relative probability of occurrence, assets at risk and vulnerability assessment of these assets, and quantification of potential impact. Business Impact Assessment (BIA), on the other hand, identifies and documents the key functions and services, the activities and resources required for their delivery and the impact of a disruption of these activities to the organisation.

The criteria used to measure and assess the financial, customer, regulatory and/or reputational impacts must be defined as accepted, and then used consistently throughout the organisation to define the Recovery Time Objective (RTO) and Recovery Point Objective (RPO) that support the organisation's critical functions. The result of this analysis is to identify time-sensitive processes and the recovery requirements, in the timeframe that is acceptable to the organisation.

The BIA provides valuable information that assists the organisation in the development of strategic 'next steps' for restoration and recovery. This analysis is conducted with the use of data-gathering tools, and qualification and validation interviews with key management representatives across the organisation.

Determining the Business Continuity Strategy

The data collected during the BIA and Risk Evaluation stages are used to identify availability, continuity and recovery strategies for organisations and technology. This stage of the process pertains to the development of appropriate Business Continuity Strategies to ensure that the organisation can manage and

respond to any disruption effectively and ensure continuity and recovery of critical activities that support key functions and services.

Developing and Implementing the BCM Response

During this phase of the Business Continuity Management Programme, the relevant teams design, develop and implement the continuity strategies approved by the organisation, and document the recovery plans to be used in response to an incident or event.

National Energy's operations span several areas, which include Towage and Harbour Operations and Marine Terminal Operations at Point Lisas, LABIDCO, Union Industrial Estate, Galeota Port and National Energy's Administration Building. As such, based on the diversity of the operations, it is necessary to develop plans to address each of these in a particular manner.

For instance, in the event of a disaster impacting any of National Energy's Marine Operations and consequently adversely impacting upon our revenues, the BCP strategies developed must be specifically crafted to address these issues.

In the case of National Energy, plans were developed to document how the organisation will respond to emergencies in a coordinated, timely and effective manner. The plan addresses life safety and stabilisation of emergency situations until the arrival of

trained or external first responders, and focuses on the areas of Emergency Management and Response, Crisis Management and Communications, Business Restoration and Operational Recovery, and Disaster Recovery.

Disaster Recovery is considered a key component of Business Continuity Management. Disaster Recovery Plans (DRPs) define the resources, actions, tasks and data required to manage an organisation's recovery process in the event of a business interruption. With regard to Information and Communications Technology (ICT), such steps may include restoring servers or mainframes with backups, reestablishing private branch exchanges (PBX), or provisioning local area networks (LANs) to meet immediate business needs. This plan also should assist a company when restoring affected business processes by outlining the specific steps the company must take in its path toward recovery. Specifically, the DRP is used for the preparation and planning needed to minimise disaster damages and for ensuring the availability of the organisation's critical information systems. In terms of ICT, DRPs address the recovery of critical technology assets, including systems, applications, databases, storage devices and other network resources.

Given the important role of ICT within the organisation, particularly as it pertains to internal and external communications, inventory management, data management and customer relations, the development of a robust DRP is crucial to National Energy's BCM implementation process.



Plan, Audit, Awareness and Training, Maintenance and Testing

This stage of the process ensures that an organisation's BCM arrangements are validated through the conduct of an exercise and review, and that they are kept up to date. BCM Plans should also be tested regularly to assure comprehensiveness of the plan and the team's ability to execute the plan.

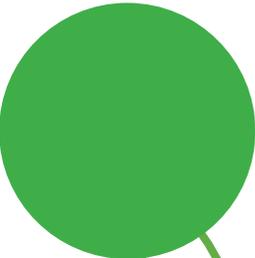
It should be noted, however, that the long-term success of the BCM Programme hinges upon the approval and endorsement of senior management and must be embedded into the organisation's culture. The BCP effort must become part of the way things are done at the organisation.

Conclusion

In today's global environment, organisational resilience is necessary for the adaptation of changing circumstances which may have damaging effects on the organisation's ability to survive. Through the implementation of a BCM programme, National Energy has made significant strides in building and improving organisational resilience. As at 3rd Quarter 2015, the implementation phase of the project is at approximately 95% completion and is advancing towards the final stage of implementation by 1st Quarter 2016.



National Energy is at the helm of downstream energy industry development in Trinidad and Tobago



Preventative maintenance is an important part of ensuring business continuity.

SMALL TO MID-SCALE LNG TECHNOLOGY: MATCHING OPPORTUNITY WITH REALITY

BY STEPHON JIMENEZ

Since the first commercial Liquefied Natural Gas (LNG) cargo shipment from an LNG plant in Algeria some 51 years ago in 1964, LNG has grown into a global commodity. Driven by economies of scale in the design and construction of facilities, LNG plants have grown from the original 0.4 million tonnes per annum (mtpa) capacities, to 7.8 mtpa megatrans, like those found in the Ras Laffan Industrial City in Qatar. In recent times however, there has been a noticeable return to the construction of smaller scale LNG facilities.

What Exactly is Small to Mid-Scale LNG Technology?

The small to mid-scale LNG concept utilises the same cryogenic technology of traditional large-scale LNG plants. A major difference is that large-scale plants export millions of tonnes

of LNG over long distances, from an LNG production unit to an import terminal, usually located in another continent, where the commodity product is fed into a national pipeline grid system.

Small-scale LNG, on the other hand, is more of a regional business moving hundreds of thousands of tonnes of LNG over relatively short distances. Transport of the fuel is done using various modes, which range from ships to semitrailers and ISO containers, directly to end users.

Another major difference is in the production capacities, as small to mid-scale ranges in capacity from < 0.5 mtpa (small-scale) to up to 2 mtpa (mid-scale), whereas large-scale LNG plants are usually considered to be anything above 2 mtpa.





This LNG technology is also considered unique in that the type of market it targets is commonly described as a 'stranded market', stranded in the aspect of no access to a natural gas pipeline system and/or too small to merit investment in natural gas pipeline infrastructure, and thus heavily dependent on the import and use of crude/heavy oil for fuel.

National Energy bringing Small to Mid-Scale LNG technology to the Caribbean

This lack of access to natural gas pipeline infrastructure and heavy dependence on oil for fuel has been a familiar story across the Caribbean. According to a study by AES, fuel oil comprises 85% of power generation in the region. In fact, 11 of 14 nations in the region rely on diesel and fuel oil-fired plants for the majority of their power needs.

Given its mandate of conceptualising, and facilitating new energy-based downstream initiatives, National Energy, recognising the opportunity within the region for a small to mid-scale LNG supplier, is actively exploring various options that seek to leverage this unique LNG technology to meet the demand for natural

gas by our Caribbean neighbours. As indicated earlier, large producers of LNG tend to ignore smaller niche markets, mostly due to demand being too small to justify breaking up larger LNG cargoes.

Thus, the opportunity presented by this technology is an advantage for both T&T and its energy-importing Caribbean partners, since it allows for sale of our natural gas into a traditionally ignored, higher-priced niche market, while also providing the importing Caribbean countries with a cheaper, more environmentally friendly and more stable energy source.

Even within the context of the current low oil price environment, which some have seen as dampening the urgency to pursue natural gas as an alternate power generation source in the Caribbean, the financial incentives are still strong, since LNG prices are traditionally tied to oil (or some other alternative e.g. fuel oil or naphtha), thus ensuring that natural gas will remain competitive against its more expensive counterpart.

It should be noted that mid to small-scale LNG supplies will never compete against large-scale LNG head on. The targeted customers for small-scale LNG will be stranded, as indicated earlier, and therefore large LNG cargoes will not be an alternative, at least not in the short term. Therefore, it is wrong to compare small-scale with large-scale LNG solely on the basis of cost. The relevant comparison is to other liquid fuels like fuel oil, naphtha, diesel and LPG.

However, despite the clear interest and obvious benefits of switching to natural gas, several of the Caribbean nations face a number of impediments to conversion. These range from scale, to supply, to credit. In light of these challenges, the task that National Energy faces is finding a solution that will comprehensively address them. Whatever the final decision may be, National Energy will always strive to harness the best available technologies towards this end.

RENEWABLE ENERGY APPLICATIONS

GLOBAL AND NATIONAL INITIATIVES

Many countries and companies on an international, regional and local level have been seeking to obtain energy from the use of renewable resources. These renewable resources, as their name suggests, refer to those substances of economic value whose quantities can be naturally replenished over time. Such resources would therefore include wood, water, wind and solar energy. Potential applications of biomass are also being researched in greater depth. As it stands today, the world's energy currency is oil and natural gas. However, due to greater environmental awareness and innovation, new avenues are being sought to provide energy in a more sustainable manner. The use of these renewable resources however, is dependent on factors such as location, availability of the resource and economic as well as political constraints.

The Caribbean, in particular, is located in a geographically optimal region which is suitable for the use of resources such as wind power, water and geothermal energy. The region is also located in close proximity to the equator, where the exposure to solar insolation is higher than other regions, making it ideal for solar energy applications. This makes the Caribbean, and its constituents, eligible to make use of photovoltaic cells, solar panels and solar stills. The area is also visited by the North East Trade Winds, which make the north-eastern parts of the territories ideal for the establishment of wind turbines.

Global Initiatives

According to the International Energy Agency (IEA) 2012, approximately 13.2% of the world's primary energy supply came from renewable

resources. Globally, many countries have pioneered energy initiatives to increase this figure and produce a subsequent decrease in the reliance of many territories on oil and gas as their main source of energy.

According to the US Energy Information Administration Short-Term Energy Outlook, it is expected that in the US alone, the use of renewables in electricity generation will increase by 1.8% during 2015. It was also forecasted that wind capacity, which grew by 8.3% in 2014, will increase to 12.8% in 2015 and up to 13% by 2016.

Another well recognised, global renewable energy initiative is the International Renewable Energy Agency (IRENA). This agency facilitates the provision of current data on renewable energy policies, building practices and beneficial technologies. On September 23rd 2014, IRENA launched a Small Island Developing States (SIDS) Lighthouses Initiative, which seeks to provide funding and initiate a political thrust towards the application of renewable energy projects in island territories. A second initiative put forward by IRENA, in conjunction with the Abu Dhabi Fund for Development, is a US\$350 million fund which would be disbursed in the form of soft loans, to fund renewable energy projects that

are approved by IRENA. This project's first phase began in November 2012.

Application of Renewable Energy Technologies in Trinidad and Tobago

Over the years, the Government of Trinidad and Tobago has initiated numerous programmes related to the use of renewable energy and education awareness in communities and schools nationwide, based on Energy Efficiency and Renewable Energy. One example is the Green Paper, in which the Renewable Energy Committee (REC) pioneered a one(1)-year education project focusing on increasing the range of persons trained to operate renewable energy technologies, and informing the public about the many advantages of renewable energy and energy efficiency practices.

A Wind Resource Assessment Programme (WRAP) is currently in the early stages of consultation and development along Trinidad's East Coast, in preparation for a wind turbine farm which would greatly reduce the quantity of natural gas required to generate electricity.



Solar House located at UTT, Point Lisas Campus



The Hon. Nicole Olivierre, Minister of Energy and Energy Industries tours Solar House at the opening of CARICOM Energy Week



Trinidad and Tobago therefore, by increasing the integration of renewable energy applications in all spheres of society, is attempting to keep pace with the global frontier in endorsing energy efficiency.

The Ministry of Energy and Energy Industries (MEEI) has entrusted the implementation of various contracts regarding the use and application of renewable energy technologies to National Energy. These have seen the introduction of new and innovative technologies which are applying renewable energy resources to everyday life. In the Caribbean, a unique example is the Model Solar House that was established in Barbados. National Energy managed the construction of a similar self-sufficient solar house on behalf of the MEEI, as part of the Ministry's National Energy Communication Campaign. The house is designed for an average family, in which the electrical output would suffice for an average-sized household. The house is outfitted with basic electrical appliances and is located at UTT's Point Lisas Campus. The house was completed and officially opened in July 2015.

Other projects that National Energy has delivered include the installation of solar

induction lighting systems in 13 community centres and the establishment of solar stills in 21 schools nationwide. These efforts, among others, have earned the country worldwide recognition, especially by the United Nations Environmental Programme (UNEP).

Although such initiatives are ongoing, it is challenging to develop and implement renewable energy projects in Trinidad and Tobago due to the current electricity cost structure. This however, does not inhibit the Government from endorsing the use of these technologies, as well as providing incentives for the use of renewable energy technologies for commercial and residential purposes. Trinidad and Tobago therefore, by increasing the integration of renewable energy applications in all spheres of society, is attempting to keep pace with the global frontier in endorsing energy efficiency. This can be achieved by promoting the increasing use of renewable resources in an effort to provide clean technologies for the nation and create a sustainable energy environment.

PARTNERING WITH COMMUNITIES FOR OIL SPILL RESPONSE



Members of the community of Mayaro/Guayaguayare are trained to respond in the event of an oil spill.

BY SHEILA MC INTOSH

"Building Capacity, Minimizing Risk" is the theme National Energy adopted for the period 2014-2015, which guides our interactions with our fence line communities. Accordingly, several training programs and initiatives have been conducted in order to empower residents for the sustainability and enhancement of the community. Some of the programs conducted in 2015 included: Advanced Scaffolding, Navigational Aid, Rigging and Banksman, and Risk Assessment.

In keeping with the core value of Safety and the Environment, National Energy also hosted two (2) oil spill response training programmes in 2015. The first session was held in Mayaro on June 8th to 10th 2015 followed by La Brea on September 22nd to 25th 2015. The three (3)-day intensive programme entitled, 'Oil Spill Awareness & Response', was facilitated by Tiger Tanks Trinidad Unlimited. In each instance, 25 participants were accommodated, selected from the community as well as from National Energy.

The main objective of the training programme was to prepare members of the community, as well as National Energy employees, to work in partnership in the event of an oil spill occurring in the area. Through the training, persons are listed as first responders in a database which resides with Tiger Tanks and National Energy. In the event of an oil spill, persons could be accessed and mobilised immediately to mitigate any negative effects. The programme was delivered in three (3) modules:

- Day 1: Health and Safety, Risk Assessment, Properties and Effects of Oil, Potential Environmental Impacts, Response Structure (ICS Overview) and Trajectory Modelling
- Day 2: Spill Response Equipment, Spill Equipment Selection and Deployment, Support Services and Support Equipment
- Day 3: Shoreline Clean-Up, Oil Spill Dispersants, Wildlife Management, Decontamination Procedures, Demobilisation and Documentation



National Energy employees work together with members of the community for oil spill response training.

There was also a practical part of the programme in which participants got an opportunity to gain hands-on experience in the use of oil spill equipment.

During the programme, Mr. Anthony Superville, Programme Facilitator, shared from his wealth of knowledge and experience in dealing with hazardous chemicals. Participants were particularly interested in learning about Volatile Organic Compounds (VOCs), which can go undetected due to their odourless and colourless nature, causing potentially devastating effects. Participants were trained in methods of monitoring, detecting and handling VOCs to reduce the possibility of explosions.

With the completion and operationalisation of the Port of Galeota and ongoing operations and construction works at the Port of Brighton, this training programme was both timely and relevant. The diverse group of participants, which included HSE professionals, were therefore very receptive to the training and immersed themselves in learning during the course.

This is yet another example of how National Energy is partnering with the community to promote learning opportunities which empower residents for greater participation in the sustainability of their community.

10

QUESTIONS
WITH
BOBBY THOMAS

How long have you been at National Energy?

I have been at National Energy for about 13 years.

Can you describe your current position?

I am the Senior Project Engineer in the Infrastructure Planning and Development Department.

What do you like most about your job?

This job is project-oriented; therefore I spend a lot of time out of the office, on the project site, ensuring compliance with the scope of works for the project. I also liaise with the contractors and stakeholders to address any concerns and complications that may arise.

What advice would you give to young persons interested in entering your field?

Be prepared to work in the field to ensure that projects

are delivered within time frame, budget and specifications. There is a great deal to be gained from field work and there are very limited avenues that can accomplish the same knowledge acquisition.

If you could choose another career, what would it be? Why?

My alternative career would have been to enter the world of business. Business may have been more rewarding financially due to the creation of wealth, which is a major concern in today's world.

Who is your role model? Why?

Mr. Warren Buffet is one of my role models because he embodies the essence of philanthropy, despite being one of the top five (5) wealthiest people in the world.

What is something that most people do not know about you?

People don't know that I cannot cook.

What are your hobbies?

I like reading, listening to music, going to the movies, fishing, and playing golf as often as I am allowed.

What motto do you live your life by?

Failure is not an option.

What ability/skill do you most wish you had (that you don't already have)?

I would like to be a great cook at some point.

PIONEER SURVEY

1. Company (Optional):

2. How did you find out about the Pioneer?

- It is delivered to my company
- I saw it at a trade exhibition
- I saw it on National Energy's website
- Other

3. On a scale of 1–5, 5 being the highest, how would you rate the Pioneer's articles:

Articles are informative ① ② ③ ④ ⑤
Articles are interesting ① ② ③ ④ ⑤

4. Does the Pioneer magazine help you understand National Energy's:

Business Yes No

Brand Yes No

5. What information would you like to receive in the Pioneer?

6. Would you recommend this magazine to a colleague? Yes No

7. Who should be included in the distribution list for the Pioneer?

Please mail your responses to the address at the back of the magazine or complete the survey at nationalenergy.tt/media

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