THE NGC GROUP OF COMPANIES CORPORATE QUARTERLY JOURNAL

GASCO news

Vol 32. No.4 DECEMBER 2022

IN SEARCH OF SUSTAINABLE SOLUTIONS

PRODUCED BY
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PRESIDENT'S MESSAGE

ON THE GREEN AGENDA

PRESIDENT'S MESSAGE

In search of sustainable solutions

At the close of November 2022, days of sustained rainfall over Trinidad and Tobago culminated in disastrous flooding across the islands. Entire communities were partially submerged; landslips and inundated thoroughfares barred access to many areas; roadways collapsed and the supply of water and electricity were disrupted for thousands of people. Citizens suffered millions of dollars in losses and unquantifiable distress at the prospect that flooding on this scale could become more frequent and intense.

This is the grave reality we must confront as our climate continues to change, fanned by mounting atmospheric levels of greenhouse gases. At the COP 27 climate conference, the urgency of mitigative action was again underscored to citizens of the world. At this juncture, that action must include measures to both restrict further warming and help our societies adapt to those changes we cannot soon reverse.

In search of sustainable solutions

Through its Green Agenda and holistic focus on sustainability, The NGC Group has been hard at work exploring, devising and implementing strategies to help Trinidad and Tobago meet its own climate action and sustainability targets.

Looking internally first, we have plotted a path to reduce our operational emissions of methane by the year 2025, while supporting the efforts of our industry colleagues

to do the same. This has earned us special recognition under the reporting framework of the global Oil and Gas Methane Partnership (OGMP 2.0) — an organisation we joined in 2021.

At the same time, we continue to explore options beyond our core business for reducing the carbon footprint of the energy sector. Group subsidiary National Energy has been working collaboratively with the Inter-American Development Bank (IDB) and KBR Inc. to assess the potential to produce green hydrogen locally. The results of their study were incorporated into "The Roadmap for a Green Hydrogen Economy in Trinidad and Tobago", launched by the government in November 2022.

We recognise that climate adaptation is equally important. Our changing weather patterns have been impacting our farmers, so building food and nutrition resilience must be an area of focus. Taking stock of where we are as a region is an important first step, and we commit to sharing what we learn with the national community through our channels.

Climate change is also impacting our settlements, and we need to explore solutions for building more resilient communities and cities. Building with nature is one such solution that we can pursue. In October 2022, NGC joined IAMovement, a non-governmental organisation, to deliver the inaugural Caribbean Green Infrastructure Conference, to promote exchange around this topic.

Of course, while we engage our industry colleagues, we also need to bring our young people into the conversation. Education of our youth must go hand in hand with climate adaptation efforts. With that in mind, NGC has partnered with Shell Trinidad and Tobago Limited to deliver a special curriculum to a group of secondary school students across the country, aimed at building energy literacy and mobilising our youth to support the climate fight.

In this issue of *GASCO News*, we profile these and other stories that give insight into The NGC Group's approach to shaping a sustainable future for our country. ■

Mark Loquan
President

THE DIMENSIONS OF FOOD AND NUTRITION SECURITY IN THE CARIBBEAN

ESTIMATED READ TIME: 9 MINUTES

ON THE GREEN AGENDA

ON THE GREEN AGENDA

KEY TAKEAWAYS

Improving food and nutrition security is a key to advancing progress of the United Nations Sustainable Development Goals (SDGs).

Food and nutrition insecurity strongly correlate with issues such as health, workplace productivity and economic vulnerabilities.

In Latin America and the Caribbean, 40.6% of the population, or 56.5 million people, are moderately or severely food-insecure.

Sustainable agricultural practices, leveraging technology in farming, expanding the food production value chain and tackling food waste can all help boost food availability.

The experience of the COVID-19 pandemic, and more recently, the impact of the Russia-Ukraine war, have elevated food security as an issue of growing concern to the Caribbean region.

Within the Caribbean Community (CARICOM), food imports amount to an estimated US$5 billion per annum. It is no secret that the Caribbean region depends heavily on food imports to meet its dietary needs.

Disruptions in international food supply chains remind the region's citizens of how vulnerable we are to external shocks that drive up the cost of food.

Uncertainty with global food supply chains is expected to persist in the medium to long term as the compounding effects of climate change intensify. Unpredictable weather patterns, increasing frequency and intensity of storms and droughts, and the prevalence of pests and diseases triggered by a warming planet, are all expected to elevate risks in food systems.

In recognition of the growing threat of food insecurity, CARICOM member states have been actively pursuing a strategy to make regional food security a top priority. This is reflected in CARICOM's push to boost food production with its "25% by 2025" food security initiative, which aims to stimulate investments in food production to reduce regional dependence on food imports.

Improving food and nutrition security is key to advancing progress on the United Nations Sustainable Development Goals (SDGs).

FIGURE 1

End poverty in all forms everywhere

End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Achieve gender equality and empower all women and girls

Reduce inequality within and among countries

Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss

Revitalise the global partnership for sustainable development

Given the multi-dimensional nature of food systems, it has strong connections with several SDGs such as: #1 — No Poverty; #2 — Zero Hunger; #5 — Gender Equality; #10 — Reduced Inequalities; #15 — Life on Land and #17 — Partnerships for the Goals (Figure 1 refers).

WHAT IS THE EXTENT OF **FOOD AND NUTRITION INSECURITY** IN THE CARIBBEAN?

According to the Food and Agriculture Organisation (FAO), "food and nutrition security exists when all people at all times have physical, social and economic access to food of sufficient quantity and quality in terms of variety, diversity, nutrient content and safety to meet their dietary needs and food preferences for an active and healthy life, coupled with a sanitary environment, adequate health, education and care". It may come as a surprise to some that enough food is currently produced to feed every person on the planet. Despite this fact, between 702 and 828 million people around the world face hunger daily.

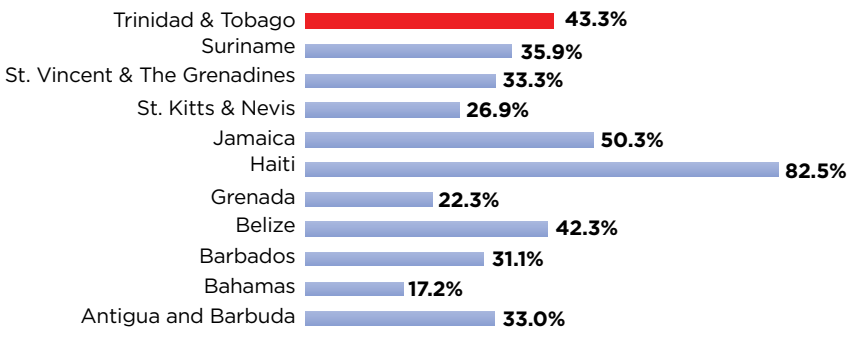
In Latin America and the Caribbean, 40.6% of the population, or 56.5 million people, are moderately or severely food-insecure. Within CARICOM, this figure ranges from 17.2% in the Bahamas to a sobering 82.5% in Haiti.

Despite enjoying one of the highest Gross Domestic Product (GDP) levels in the region, Trinidad and Tobago recorded the third highest prevalence of food and nutrition insecurity in 2021 at 43.3%, behind second place Jamaica (50.3%) and first place Haiti (Figure 2 refers).

FIGURE 2

PREVALENCE OF MODERATE OR SEVERE FOOD INSECURITY (COUNTRY LEVEL ESTIMATES 2019-2021: 3 YEAR AVERAGES)

SOURCE: FAO, THE STATE OF FOOD SECURITY AND NUTRITION IN THE WORLD 2022, INTERACTIVE STORY



[1]FAO, IFAD, UNICEF, WFP and WHO. 2022. The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable. Rome, FAO. https://doi.org/10.4060/cc0639en

ON THE GREEN AGENDA

HOW DOES THE **REGION COMPARE** TO THE REST OF THE WORLD?

In 2021, the Latin American and the Caribbean region had the second highest prevalence of food insecurity in the world behind Africa (see Figure 3). This justifies the urgency of CARICOM regional leaders to achieve the '25% by 2025' food security initiative.

FIGURE 3

NORTHERN AMERICA & EUROPE	ASIA	OCEANIA	AFRICA	LATIN AMERICA & THE CARIBBEAN
8%	24.6%	13%	57.9%	40.6%
MODERATE + SEVERE	MODERATE + SEVERE	MODERATE + SEVERE	MODERATE + SEVERE	MODERATE + SEVERE
1.5%	10.5%	4.5%	23.4%	14.2%
SEVERE	SEVERE	SEVERE	SEVERE	SEVERE

THE **IMPLICATIONS** OF FOOD AND NUTRITION INSECURITY FOR THE CARIBBEAN REGION

With 40.6% of Latin America and the Caribbean experiencing food insecurity, 4 in 10 people in the region are at risk of experiencing uncertainty about where and how they will obtain food, while some will typically run out of food and have to go a day or more without eating (see Figure 4).

Food and nutrition insecurity strongly correlate with issues such as the social determinants of health[2], workplace productivity, and economic vulnerabilities which disproportionately impact women and girls in the region.

FIGURE 4

THE STATE OF FOOD INSECURITY IN LATIN AMERICA AND THE CARIBBEAN

59.4%

FOOD SECURITY

Adequate access to food in both quality and quantity

VULNERABLE GROUPS

26.4%

MODERATE FOOD INSECURITY

People experiencing moderate food insecurity face uncertainties about their ability to obtain food and have been forced to compromise on the quality and/or quantity of the food they consume.

14.2%

SEVERE FOOD INSECURITY

People experiencing severe food insecurity have typically run out of food and at worst have gone a day (or days) without eating.

SOURCE: FAO, IFAD, UNICEF, WFP AND WHO. 2022. THE STATE OF FOOD SECURITY AND NUTRITION IN THE WORLD 2022. REPURPOSING FOOD AND AGRICULTURAL POLICIES TO MAKE HEALTHY DIETS MORE AFFORDABLE, ROME, FAO https://doi.org/10.4060/cc0639en

[2]The social determinants of health (SDH) are the non-medical factors that influence health outcomes. They are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life. World Health Organization. https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1

The lack of affordable food is therefore a major barrier to food and nutrition security.

In 2020, the Latin American and Caribbean region had the highest cost of a healthy diet compared to other regions (see Figure 5).

Individuals who fall within lower income brackets and those with fixed incomes (such as retirees/pensioners and the differently abled) are the most exposed to food insecurity. With the least amount of disposable income, these at-risk individuals often gravitate toward cheaper, low-quality food, full of sugar, sodium, preservatives, and refined grains.

This was confirmed in a 2022 study by Henry et al. on the comparative cost of diets for low-income families in the Caribbean which found that:

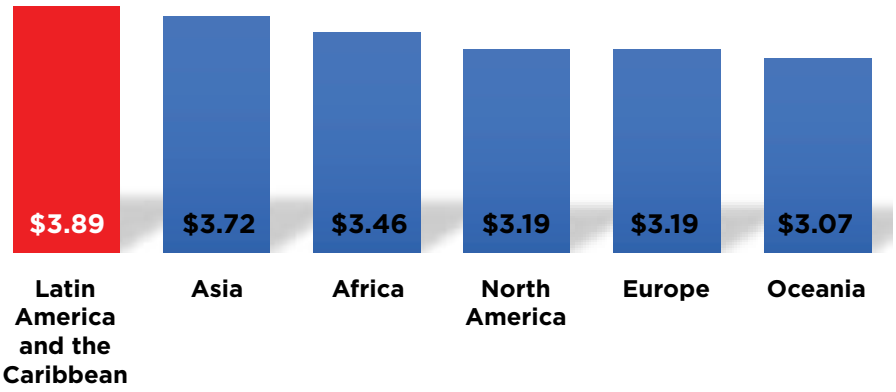
"Poverty and food insecurity are associated with lower food expenditures, low fruit and vegetable consumption, and lower quality diets.

"In practical terms, diets composed of refined grains, added sugars and added fats are more affordable than diets based on lean meats, fish, fresh vegetables and fruit".

The study also found that "... low-income households will need between 22% and 47% of their earnings to obtain a healthy diet" (Henry, F.J. et al. 2022).

FIGURE 5

COST OF FOOD IN 2020 PER PERSON PER DAY (US$)



THE **LINKS** BETWEEN FOOD AND NUTRITION SECURITY, HEALTH AND GENDER

Another dimension of food and nutrition security is the link between poor diets and non-communicable diseases (NCDs). In the Caribbean, more than 70% of deaths are caused by NCDs, making it the leading cause of death.[3] While NCDs are mainly a result of a combination of genetic, environmental, behavioural, and metabolic risk factors such as physical inactivity, unhealthy diets play a major role in their development.

In addition to the human cost of NCDs, they drive up the costs of healthcare and reduce regional governments' available funding for other priority areas of development.

Food and nutrition security also has a gender dimension.

In 2021, 31.9% of women in the world were moderately or severely food-insecure compared to 27.6% of men.

This widening gender gap in food security reflects the disproportionate impact of the economic crisis on women brought on by the COVID-19 pandemic. Additionally, women have traditionally and continue to bear a greater share of the burden of caregiving for children and sick family members, which was exacerbated during the pandemic.

WHAT ARE THE **OPPORTUNITIES** TO IMPROVE FOOD AND NUTRITION SECURITY?

Amid all the challenges posed by food and nutrition security in the Caribbean region, there are opportunities for stakeholders to become more involved in helping rebuild the region's agriculture and food production systems to help improve the availability of affordable and nutritious food.

[3]Razzaghi H, Martin DN, Quesnel-Crooks S, Hong Y, Gregg E, Andall-Brereton G, et al. 10-year trends in noncommunicable disease mortality in the Caribbean region. Rev Panam Salud Publica. 2019;43:e37

ON THE GREEN AGENDA

FIGURE 6

SOURCE: www.fao.org/save-food/resources/infographic/en/

A BETTER SUPPLY CHAIN SERVES US ALL. LET'S EAT.

The following are a few of those opportunities.

1) **Sustainable agriculture** can help improve the competitiveness and viability of regional food production. Areas of potential competitive advantage in agriculture, such as niche products like organic vegetables, spices, coffee, specialty grains, seafood, oils, and cocoa, could help unlock exports which could help drive job creation and foreign exchange earnings potential. Farming practices that use fewer harmful chemicals and degrading techniques, such as tillage, could help improve soils and crop yields.

2) **Utilising newer technologies and regenerative farming practices**[4] such as hydroponics and indoor vertical farming, digital farming, and other practices to improve soils and reduce environmental impacts, could help lower the risks associated with traditional farming methods and vulnerability to climate change impacts.

3) **Pursuing value-added activities,** such as food processing, could create new import substitution opportunities, reduce food miles[5] and create more local jobs while improving food and nutrition security.

4) **Tackling food waste** represents "low-hanging fruit" in the food and nutrition equation. Around one-third of all food produced globally is wasted by retailers, restaurants and consumers. This represents a staggering 1.3 billion tonnes of fruits, vegetables, meat, dairy and seafood that never leave the farm, spoil during distribution, or are thrown away in hotels, grocery stores, restaurants, schools, or home kitchens annually (Figure 6 refers).

In Trinidad and Tobago, the average household discards about 75kg of food per year, making the country one of the most wasteful in Latin America and the Caribbean.[6]

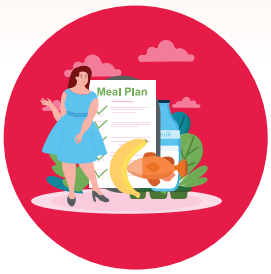
Eliminating food waste represents a low-cost pathway to improving food availability that every citizen can take immediate action to support.

[4]Regenerative farming refers to farming practices that, among other benefits, reverse climate change by rebuilding soil organic matter and restoring degraded soil biodiversity – resulting in both carbon drawdown and improving the water cycle.
[5]Food miles refer to the distance between the place where food is grown or made and where it is consumed.
[6]UNEP Food Waste Index Report 2021.

TIPS FOR REDUCING FOOD WASTE IN HOUSEHOLDS

Check the fridge

Check what food you already have in your cupboards and fridge before going shopping.



Use meal plans

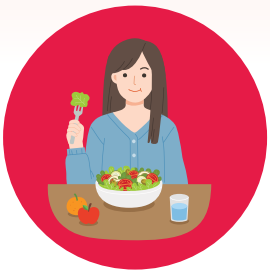
Write a weekly meal plan and only buy what you need – remember to include leftovers in your plan

Use your freezer

Freezing food can extend its lifespan and stop it from going to waste.

Get to know your labels

"Use by" relates to food safety, whereas "best before" relates to quality. You can eat food after its "best before" date if you think it's still fresh, but you shouldn't eat food after its "use by" date



Measure your food portions

Only make/take what you need to reduce waste – or have a plan for any leftovers.

Label and date your leftovers

Having an organised fridge and freezer lets you know clearly what is where and by when you need to use it.

Reconsider bulk-buying

Buying in bulk might save on the unit cost per food item, but one might end up with quantities of food too large to consume before expiry.

WHERE DO **WE GO FROM HERE?**

Boosting the production and availability of nutritious, affordable food represents one of the key sustainability challenges in the Caribbean region. Regional governments in CARICOM have made this a top issue for sustainable development and are collaborating to ensure that the target of 25% by 2025 is achieved.

From the data presented in this article, it is reasonable to conclude that business-as-usual will not solve the region's food security challenges. Investing in sustainable agriculture based on the tenets of Climate Smart Agriculture[7] supported by newer technologies and older ones such as regenerative farming practices, will be key to rebuilding the region's food systems.

Understanding the linkages between food and nutrition and dimensions, such as gender, income inequality and health, are crucial considerations in designing effective policies and programmes to support greater investment and involvement in food and nutrition. ■

[7]Climate-smart agriculture (CSA) is an approach that helps guide actions to transform agri-food systems towards green and climate resilient practices. It aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible. FAO.

GREEN INFRASTRUCTURE: HOW BUILDING WITH NATURE CAN HELP HUMAN HABITATS

ESTIMATED READ TIME: 6 MINUTES

ON THE GREEN AGENDA

KEY TAKEAWAYS

Green infrastructure is any installation, environmental feature or space designed into built environments to deliver ecosystem services to society.

Building with and alongside nature can help us better manage water shortages, mitigate floods and combat rising temperatures.

"Public parks, community gardens and urban landscaping are all examples of attempts to make cities greener and to reap the health and aesthetic benefits of building around nature."

Rainwater harvesting

The term "green infrastructure" may not be familiar to all, but the concept is by no means a novel one. Throughout the history of urban planning and development, efforts have been made to integrate nature into built environments. Public parks, community gardens and urban landscaping are all examples of attempts to make cities greener, and to reap the health and aesthetic benefits of building around nature.

Trees provide shade and visual reprieve in "concrete jungles"; parks and open spaces are retreats for recreation and family outings; gardens provide opportunities for communal agriculture and building food security; and in general, greenery helps filter pollutants and improve air quality.

Green infrastructure is essentially any installation, environmental feature or space designed into built environments to deliver ecosystem services to society. As the world seeks more sustainable ways to construct and manage human habitats — to reduce their carbon and resource footprint and make them more resilient against the impacts of climate change — more developers are turning to green infrastructure solutions.

THE **CHALLENGE** OF WATER

While the term "green infrastructure" can subsume the gamut of eco-engineering projects, it is commonly used to refer to systems that help manage water use and runoff. Water presents a dual challenge for sustainable development. On the one hand, there is an entire United Nations Sustainable Development Goal (SDG) dedicated to addressing water scarcity and the management of freshwater sources. This is because heat stress and altered weather patterns are putting pressure on potable water sources across the globe.

On the other hand, we are also grappling with an excess of water due to severe storms and catastrophic flooding events. Stormwater runoff and floods can move leached toxins, sewage, and other harmful pollutants into freshwater reservoirs, cause damage to properties, incubate vectors and diseases and even lead to loss of habitats and life.

There is an opportunity to address both water shortages and surplus volumes using green infrastructure solutions.

Rainwater harvesting

Strategies and tools for rainwater harvesting mimic the natural environment's water catchment and storage basins. They are considered a green infrastructure solution because they help with resource conservation.

In the Caribbean, we have traditionally used barrels to collect rainwater for household use.

ON THE GREEN AGENDA

> "The use of rooftop gardens for growing food is a doubly sustainable solution as it leverages rainwater to help build food security. This technique of direct, natural irrigation is a useful short circuit in the water supply chain that immediately connects supply with demand."

This technique is already utilised in areas of prevalent water shortages, but it is also gaining popularity elsewhere as building and home designers are incorporating features to channel water from guttering systems into storage tanks.

Collected water can be used for maintenance and upkeep, sanitation, laundry and even dishwashing and showering. Agricultural facilities and greenhouses can use rainwater for irrigation, watering animals and sanitation, as applicable. Rainwater can even be used for cooking and drinking once it is filtered and sterilised.

Diverting some rainwater into storage, especially in heavily concreted areas, can help reduce the volumes of water that run off into storm drains or settle in low-lying areas, while boosting water availability for domestic, agricultural and commercial use.

Infiltration surfaces

Another solution for managing water involves engineering natural catchment areas by creating spaces for water to infiltrate into soil in places where there is significant concrete cover. Rooftop gardens, planter boxes and forested enclaves in urban areas can all help capture rainwater.

The use of rooftop gardens for growing food is a doubly sustainable solution as it leverages rainwater to help build food security. This technique of direct, natural irrigation is a useful short circuit in the water supply chain that immediately connects supply with demand. It allows some of the treated pipe-borne water that would otherwise have been used in food production to be conserved for other applications.

Xeriscaping

The most popular options for landscaping around buildings include lawns and surfacing with lower-maintenance concrete, pavestones or tiles. Both options can impact water supply under different conditions. In some countries, for example, lawns need to be watered during dry weather to keep them lush, while non-porous surfacing can contribute to water runoff into storm drains and other reservoirs.

An environmentally friendly alternative that has been growing in popularity is xeriscaping. This refers to the practice of using landscape designs that require little or no irrigation. This technique involves replacing grassy lawns with rocks and mulch and planting drought-tolerant shrubs and trees.

Green infrastructure: how building with nature can help human habitats | CONTINUED

Vetiver grass is used as a solution for slope stabilisation.

Xeriscapes do not add additional burden to water supply, and can still absorb some rainfall, in contrast to non-porous yard surfaces.

Greening of slopes

In the Caribbean region, flooding and landslides are perennial risks during the rainy season. Deforested or degraded hills and slopes are major contributors to both, as loose soil can silt rivers and cause land slippages. Retaining walls are traditionally used for slope stabilisation in such areas, but certain trees and grasses can provide a natural engineering solution.

In October 2022, local IAMovement, non-governmental organisation partnered with NGC to deliver the inaugural Caribbean Green Infrastructure Conference, wherein the merits of using vetiver grass for slope stabilisation were spotlighted.

This grass has a dense, fibrous root system which can grow past 10 feet long within two years.[1] Rows of vetiver can thereby serve as natural retaining walls as their roots hold the soil together, slowing runoff and preventing surface erosion.

Their roots also help absorb certain contaminants, such as heavy metals, which has led to their inclusion in remediation strategies for polluted waterways across the world.[2]

In Trinidad and Tobago, organisations such as Vetiver TT and the United Nations Development Programme have been promoting vetiver as a cheaper alternative to building retaining walls at vulnerable sites across the country.

Leveraging mangroves

Abundant rainfall is just one water source that can present a challenge for human settlements. Artic ice melt and thawing permafrost are contributing to rising sea levels and saltwater intrusion into freshwater reservoirs. Coastal protection is therefore critical to sustainable development.

[1]https://tvnwi.org/what-is-vetiver-grass/
[2]Ibid

Mangrove trees can serve as natural structural reinforcements to coastlines and surrounding areas. Their above-ground roots encourage deposition of sediment and can help bind and build soils — a feature which offers some protection against rising sea levels.[3] They also buffer waves and help protect inland areas from storm surges, which can often cause severe flooding.[4] Protecting, restoring and planting mangrove belts is therefore recognised as an important strategy to help adapt our settlements to the impacts of our changing climate.

BEATING **THE HEAT**

Water management is not the only service that can be provided by green infrastructure. As temperatures get progressively warmer, we increasingly retreat into artificially cooled environments to escape the heat. Our higher appetite for air conditioning leads to increased burden on our power grids. In areas where electricity is still generated using fossil fuels, this climbing demand creates a vicious cycle — the more we burn fossil fuels to support cooling, the more we contribute to global warming.

We all know that shade trees can provide welcome respite from the sun on a hot day. This is because tree canopies intercept some of the sun's light and heat. Trees can therefore be leveraged as a green infrastructure solution to help naturally cool built environments.

If a building is fronted by glass that is not tinted or windows without awnings, the interior could heat up quickly and demand more of air-conditioning systems. Planting trees in strategic locations around such buildings can create a natural defense against the sun's rays and help regulate internal temperatures, thereby reducing reliance on air conditioning.

Green spaces can also help reduce cooling needs by providing outdoor alternatives to artificially cooled environments for the pursuit of various activities. Exercise, social gatherings and even some office-based work can be accommodated in urban forests, parks and gardens. Indeed, many prefer to utilise such spaces when they are available, not just for the energy-saving advantage, but for the health and wellness benefits of spending more time in nature.

A **SUSTAINABLE SOLUTION** FOR THE REGION

Regardless of where they find themselves on the development curve, all countries across the Caribbean region are faced with the common challenge of balancing growth imperatives with climate action. As Small Island Developing States, we are experiencing firsthand the devastating effects of a warmer global climate, so we need to ensure that any plans we devise for long-term growth are both climate-conscious and sustainable.

In that context, green infrastructure will be critical to our region's future. If we can leverage and work alongside nature when we plan and build, we can simultaneously serve our people and our planet.

[3]https://www.nature.org/media/oceansandcoasts/mangroves-for-coastal-defence.pdf
[4]Ibid

NATIONAL ENERGY AND IDB LAUNCH "THE ROADMAP FOR A GREEN HYDROGEN ECONOMY IN T&T"

ESTIMATED READ TIME: 5 MINUTES

ON THE GREEN AGENDA

KEY TAKEAWAYS

Trinidad and Tobago has the requisite infrastructure, expertise and offtake market to facilitate development of a green hydrogen economy.

Over the last year, National Energy collaborated with the IDB and KBR Inc. to assess the potential of Trinidad and Tobago to produce green hydrogen as a major decarbonisation option for the power and industrial sectors.

The findings of that study were launched in the "The Roadmap for a Green Hydrogen Economy in Trinidad and Tobago" — a 35-year development programme split into three broad horizons.

> "The future use of green hydrogen in Trinidad to produce ammonia and methanol is inevitable."

Stuart Young, Minister of Energy and Energy Industries, fifth from left, together with, Robert Le Hunte, left, IDB Executive Director; Dr Vernon Paltoo, President, National Energy; Farley Augustine, THA Chief Secretary; Pennelope Beckles, Minister of Planning and Development; Carina Cockburn, IDB, Country Head, and Dr Joseph Khan, Chairman, National Energy, display the Roadmap for a Green Hydrogen Economy during its launch at the Hilton Trinidad and Conference Centre, Lady Young Road, Port of Spain on November 29, 2022.

National Energy and IDB Launch "The Roadmap for a Green Hydrogen Economy in T&T" | CONTINUED

On Tuesday November 29, 2022 National Energy, on behalf of the Ministry of Energy and Energy Industries and in collaboration with the Inter-American Development Bank (IDB), launched "The Roadmap for a Green Hydrogen Economy in Trinidad and Tobago", which is the summary of findings of the Study to establish a Green Hydrogen Market in Trinidad and Tobago. Over the last year, National Energy collaborated with the IDB and KBR Inc. to assess the potential of Trinidad and Tobago to produce green hydrogen as a major decarbonisation option for the power and industrial sectors.

THE **HYDROGEN POTENTIAL** AND **VALUE PROPOSITION** IN T&T

The idea of building a hydrogen economy for Trinidad and Tobago is based on the premise that the nation can leverage its existing hydrocarbons and fossil fuel infrastructure and know-how to build capacity in another way — green hydrogen and green products.

Trinidad and Tobago currently has installed infrastructure with a capacity for approximately 1.7 million tonnes per annum (Mtpa) of hydrogen.

Moreover, being one of the leading exporters of ammonia and methanol globally, the country has a captive demand of 1.5Mtpa of grey hydrogen (hydrogen derived from fossil fuels such as natural gas) for use as feedstock for these applications. The future use of green hydrogen in Trinidad to produce ammonia and methanol is inevitable.

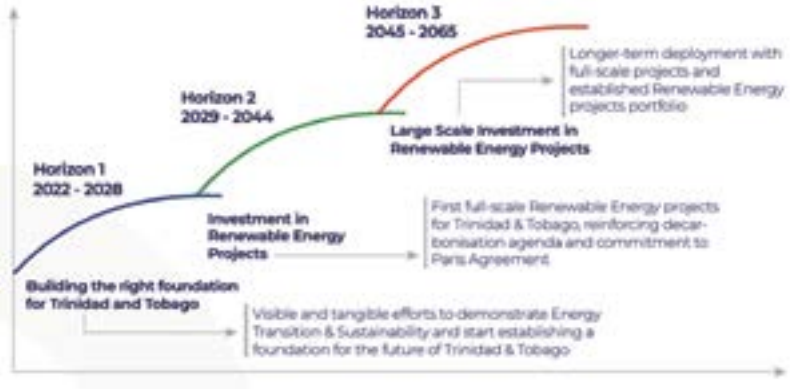


FIGURE 1: TRINIDAD AND TOBAGO'S HYDROGEN ECONOMY ROADMAP

The other major uses of grey hydrogen in Trinidad are for steel and cement production. Whilst steel production facilities are currently mothballed, the 0.2 Mtpa allocated for that sector allows for the possibility of the revival of this industry as green steel gains traction in the market. Cement production is a major emitter of greenhouse gases (GHGs). As such, green hydrogen could be used to fuel the cement facility, reduce emissions and produce green cement for local use, with the potential for exports if the market conditions are appropriate and local production capacities increase.

Additionally, the hydrogen potential for Trinidad and Tobago doesn't stop there.

Green hydrogen can play a significant role in the transportation sector of Trinidad and Tobago through the transition of heavy-goods vehicles, long-haul carriers and public transport to green hydrogen vehicles.

In the shipping sector, green ammonia and methanol are expected to play a significant role in the decarbonisation of this sector, providing an opportunity for Trinidad and Tobago to transition local ferries to green fuels in the future.

Trinidad and Tobago's value proposition lies in leveraging its existing petrochemical facilities, operational experience and associated infrastructure. All other nations exploring green hydrogen and hydrogen derivatives will need to invest additional sums in the transformation facilities (ammonia, methanol or other hydrogen carriers) as well as storage and export facilities, and this will require not only high levels of capital expenditure (CAPEX), but also the workforce and know-how required to build, operate and maintain these facilities, all of which are pre-existing in Trinidad and Tobago.

KEY FEATURES OF THE GREEN HYDROGEN ROADMAP

The proposed roadmap for Trinidad and Tobago is based on a 35-year development programme and is split into three broad horizons as illustrated above.

ON THE GREEN AGENDA

Horizon 1: Building the Right Foundation for Trinidad and Tobago

The first horizon and probably the most critical of all three will focus on building a strong foundation for Trinidad and Tobago. Some of the key activities in Horizon 1 will be the following:

1. The completion of an offshore Wind Resource Assessment Programme (WRAP) to realise the activities required to support offshore wind development in Trinidad and Tobago. Of all the renewable energy sources available in Trinidad and Tobago, offshore wind offers the largest potential for the island.

2. Development of demonstration projects to test the end-use applications of green hydrogen in Trinidad and Tobago.

3. Creating the right enablers through regulations, policies and incentives that will support the development of this hydrogen economy.

4. Planning for the renewable energy and hydrogen campaign.

Horizon 2: Investment in Renewable Energy Projects

Horizon 2 builds on Horizon 1 and the enabling environment developed to initiate a utility scale renewable energy project as well as a green hydrogen production facility, fully launching Trinidad and Tobago on this pathway. By the end of Horizon 2, Trinidad and Tobago will have installed 25 gigawatts (GW) of offshore wind with 10.5 GW output to feed electrolysers to produce 1.5 Mtpa of green hydrogen.

Horizon 3: Large-Scale Investments in Renewable Energy Projects

Horizon 3 reinforces the leadership of Trinidad and Tobago in the new energy sector, reaching 57 GW of offshore wind capacity with 25 GW output to feed electrolysers to produce 4 Mtpa of green hydrogen by 2065. This would provide Trinidad and Tobago with the opportunity to decarbonise the existing petrochemical industry and expand this industry in the future to contribute to the Gross Domestic Product (GDP) growth of Trinidad and Tobago through additional export potential.

> "Creating a hydrogen economy will be a massive undertaking, but it is one that is well within the reach of Trinidad and Tobago through government intervention in policy and regulation in conjunction with careful planning and actions from key stakeholders."

FUTURE LANDSCAPE FOR GREEN HYDROGEN AND NEXT STEPS

Creating a hydrogen economy will be a massive undertaking, but it is one that is well within the reach of Trinidad and Tobago through government intervention in policy and regulation in conjunction with careful planning and actions from key stakeholders. The immediate next steps will include a few interlinked activities such as:

- Securing funding for the activities in the roadmap. Funding sources, such as climate finance, carbon markets, private sector and national finance, will be explored by creating financing mechanisms that promote renewable energy and green hydrogen projects.

- Initiating the activities required to support the offshore wind developments, most importantly, the offshore WRAP.

- Introducing demonstration projects to test the end-use applications of green hydrogen in Trinidad and Tobago.

- Securing the enablers that will support the development of the green hydrogen economy.

A green hydrogen economy will generate net benefits in the billions and create thousands of jobs in the construction, operation and maintenance sectors, and significantly reduce carbon dioxide (CO_2) emissions. Trinidad and Tobago is at the beginning of a challenging and exciting journey.

The country will continue to play a major role as a natural gas exporter while leveraging existing heritage and facilities to position itself in the evolving energy landscape, thereby ensuring sustainable economic growth in the future. This journey starts with setting up a strong foundation with the right enabling policies, regulatory framework and institutional support to launch Trinidad and Tobago's hydrogen economy. ■

THE ROLE OF SUSTAINABLE TRANSPORTATION IN CLIMATE ADAPTATION

ESTIMATED READ TIME: 5 MINUTES

ON THE GREEN AGENDA

KEY TAKEAWAYS

Transportation contributes 15% of the total global greenhouse gas (GHG) emissions and 22% of carbon dioxide (CO_2) emissions.

Greener mobility solutions can not only mitigate the impacts of transportation on climate but can also play an active role in climate adaptation and sustainability.

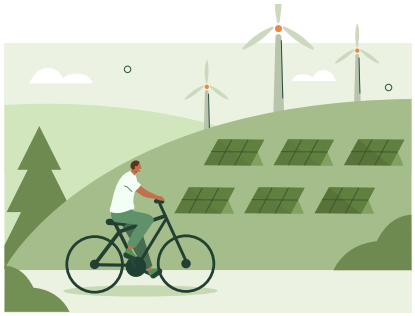
Some options for decarbonisation of transportation include compressed natural gas (CNG), electric vehicles, alternative fuels, such as hydrogen and biodiesel, and practices such as carpooling, biking and using public transportation.

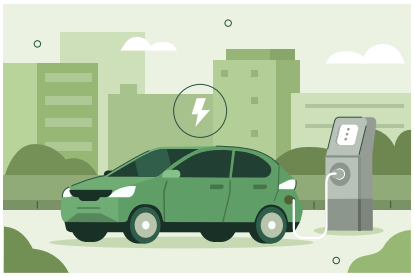
Transportation is an essential facet of our daily lives. Cars, buses, trucks, trains, airplanes, and more — transportation connects people and delivers the goods and services required for societies and economies to function and grow. There is a paradox, however. As transportation systems expand and modes of transport become more affordable and accessible, the deleterious impacts of transportation on the environment also increase.

Transportation contributes 15% of the total global greenhouse gas (GHG) emissions and 22% of carbon dioxide (CO_2) emissions (Rodrigue, 2020).

In addition to GHG emissions, the transportation sector emits particulates that have been linked to respiratory and cardiovascular illnesses. Other forms of pollution, including noise pollution and the generation of solid waste from vehicles and parts, can also be attributed to transportation. Companies and countries are therefore investing in research and development of sustainable transportation solutions to address this global issue.

The United Nations has defined sustainable transportation as transportation that "achieves better integration of the economy while respecting the environment, improving social equity, health, resilience of cities, urban-rural linkages and productivity of rural areas." Sustainable transportation





can not only mitigate the impacts of transportation on climate, it can also play an active role in climate adaptation and sustainability. The concept of sustainable transportation is integrated into the UN 2030 Agenda for Sustainable Development and features in several Sustainable Development Goals (SDGs), including SDG #3 — Good Health & Wellbeing, SDG#9 — Industry, Innovation and Infrastructure, and SDG#11 — Sustainable Cities and Communities.

FORMS OF **SUSTAINABLE TRANSPORTATION**

As an interim solution, compressed natural gas (CNG) was introduced in several countries, including Trinidad and Tobago, over the last three decades.

CNG produces lower levels of CO_2 emissions than gasoline and diesel when used as fuel for vehicles with internal combustion engines (ICEs).

NGC subsidiary, NGC CNG, promotes and manages the distribution of CNG throughout the country.

At the end of 2021, there were 1,775 (sedan equivalents) Original Equipment Manufacture (OEM) and converted CNG vehicles on the road in T&T.

During the period 2014 through 2021, CNG vehicles contributed to the reduction of 44,007 tonnes of CO_2 emissions from the country's road transportation system.

While CNG is a recognised transition fuel that is helping to reduce carbon emissions, zero-carbon solutions are being developed and promoted. Of the many sustainable transportation technologies on the market, electric vehicles (EVs) are the fastest growing. Three types of EVs are available.

Hybrid electric vehicles are powered by gasoline/diesel and electricity and the car alternates between the two energy sources to maximise efficiency. Plug-in hybrid EVs contain both an electric battery and an ICE and the vehicle can be recharged by either electricity or by internal combustion. The third type of EVs are all-battery EVs, which do not utilise ICEs for propulsion.

Battery EVs are powered by electricity stored in a battery that can be charged by plugging the vehicle in to charging equipment either at home, at fuel stations outfitted with EV chargers or EV charging ports located in large cities. When powered by electricity generated from renewable sources, EVs can be zero-carbon emitters. The Preysal Service Station — collaboratively constructed by NGC subsidiaries National Energy and NGC CNG with The Trinidad and Tobago National Petroleum Marketing Company Limited (NP) — is outfitted with solar-powered EV chargers as well as 10 CNG fuel pumps.

The government of Trinidad and Tobago has signalled its intention to support the country's transition towards sustainable transportation.

In the country's Nationally Determined Contributions to the Paris Climate Agreement, transportation is identified as one of three sectors through which the country will achieve a target of 15% reduction in GHG emissions by 2030. Incentives have also been put in place to facilitate conversion to CNG as well as the purchase of OEM CNG vehicles, and from January 2021, customs duties, motor vehicle tax and value-added tax were removed from the importation of EVs.

Several global motor vehicle companies, including General Motors, have also announced plans to phase out ICEs from their vehicles in the next 10 years. This may be driven in part by the continuous growth in sales of battery EVs in regions such as Asia, North America and Europe. The International Energy Agency (IEA) reported that there were more than 10 million battery EVs on the world's roads in 2020, resulting from exponential growth in the number of EVs bought from 2010 to 2020 (IEA, 2022).

Alternative fuels such as hydrogen and biodiesel, are also being used for transportation. Hydrogen fuel cells (HFC) are used to power vehicles by combining hydrogen with oxygen from the air to produce electricity that propels the vehicle and emits water vapour.

ON THE GREEN AGENDA

The process does not produce harmful GHGs, but adoption of HFCVs has been slow, due to the need for hydrogen fuel stations and the tendency of HFCVs to perform best only at steady speeds.

Biofuel produced from waste and residues are considered important for the trucking, shipping and aviation industries in the energy transition. Utilisation of biofuels has been increasing steadily, albeit at a slower rate than required to meet the world's 2050 net zero emissions target.

The NGC Group continues to explore opportunities for partnership and investment in sustainable transportation technologies.

In 2021, NGC, National Energy and NGC CNG, executed a Memorandum of Understanding (MOU) with The Trinidad and Tobago Solid Waste Management Company Limited (SWMCOL) to evaluate possibilities for the capture and commercialisation of landfill gas to be used for the manufacture of renewable CNG. National Energy also signed an MOU with Methanex Trinidad Limited to conduct a feasibility study to determine the potential for use of methanol as a fuel for marine transportation in the region and vehicular transportation in Trinidad and Tobago.

HOW CAN **INDIVIDUALS SUPPORT** SUSTAINABLE TRANSPORTATION

We can all contribute towards the sustainable transportation transformation by practicing prudent and responsible mobility. For example, we can employ context-appropriate transportation methods, such as walking instead of driving over short distances. Journey planning and management is another means by which we can reduce the number of trips we make monthly. Car-pooling can also be a useful time and energy saver. Additionally, as far as practicable, using public transportation can be an effective energy- and cost-saving measure, especially in large cities and on thoroughfares where traffic congestion is a major concern. ■

> We can employ context-appropriate transportation methods, such as walking instead of driving over short distances... Car-pooling can also be a useful time and energy saver.

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GOING GREEN TURNS GOLD FOR NGC

ESTIMATED READ TIME: 4 MINUTES

ON THE GREEN AGENDA

KEY TAKEAWAYS

Mitigation of methane — a powerful greenhouse gas — is critical to the climate fight.

NGC has set clear targets for reducing methane from its operations by 2025, which has led to its achievement of the Gold Standard status of reporting under the global Oil and Gas Methane Partnership 2.0.

NGC's strategy will focus heavily on leak detection and repair through a combination of process and technology improvements.

Addressing the issue of climate change is one of the defining challenges of this decade. It is of particular consequence to the Caribbean region as Small Island Developing States (SIDS) are demonstrably vulnerable to the impacts of rising global temperatures and extreme weather events. In late 2022, for example, parts of Trinidad and Tobago suffered calamitous flooding after an excessively wet November dumped nearly twice the usual amount of rainfall on the islands.

With the prognosis that such events could become more frequent and severe as global warming intensifies, it is imperative that action be taken to curb the greenhouse gas (GHG) emissions which are fuelling the phenomenon. Among the most potent of these GHGs is methane, which is the primary component of natural gas, and has 80 times the warming potential of carbon dioxide on a 20-year timescale.

NGC has made pioneering investments to track and reduce methane emissions from its operations. It also made a voluntary commitment to report on its progress after joining the global Oil and Gas Methane Partnership 2.0 (OGMP 2.0) in 2021. The company's resolve was made clear in its first report to the OGMP — submitted in 2022 — wherein it outlined targets to reduce methane emissions by 2025. This led the company to achieve the Gold Standard status of reporting under the OGMP 2.0 framework.

> NGC has made pioneering investments to track and reduce methane emissions from its operations. It also made a voluntary commitment to report on its progress after joining the global Oil and Gas Methane Partnership 2.0 (OGMP 2.0) in 2021.

THE OGMP **GOLD STANDARD**

The OGMP 2.0 is a multi-stakeholder partnership to improve the accuracy and transparency of methane emissions reporting, which is key to methane mitigation in the oil and gas sector. It is the only comprehensive measurement-based reporting framework covering all material sources of methane emissions from both operated and non-operated assets across all segments of the value chain.

Under the OGMP 2.0 framework, there are different tiers of reporting to which member companies can aspire, based on declared targets and the rigour of measurement tools and methodologies. To reach Gold Standard status of reporting, companies need to announce 2025 absolute reduction or near-zero intensity targets. Target setting is a complex exercise requiring a good understanding by companies of their emissions profile.

NGC's achievement of Gold Standard status under the OGMP 2.0 was revealed in the second edition of the United Nations Environment Programme (UNEP) International Methane Emissions Observatory (IMEO) publication, *An Eye on Methane*. The achievement, which came just one year after NGC joined the organisation, represents an international acknowledgement of the work the company has committed to do over the coming years to address its carbon impact.

NGC'S **TARGETS**

As outlined in its inaugural submission to the OGMP, NGC's methane emissions from natural gas sources — comprising venting, fugitives, flaring, stationary combustion and mobile combustion — totaled 21.91 thousand tonnes of CO_2e in 2021.

NGC GHG REDUCTION TARGETS

	Consolidation Basis (Operational Control, Equity) Consolidation	Year in which the Target was Set	Reference/ Base Year	Total Emissions in Scope of the Target (Metric Tonnes CH_2)	Target Year (e.g. 2025) T	Targeted Reduction from Reference or Base Year %	Absolute Emissions in Target Year (kg)
Target 1	Operational-Venting	1	2021	681.6	2025	75%	170.4
Target 2	Operational-Fugitive	1	2021	68.3	2025	50%	34.2

Using 2021 as a baseline year, NGC is now targeting:

- An overall reduction of **75%** in venting methane emissions and **50%** in fugitive methane by 2025
- A **50%** reduction in overall GHG emissions by 2025

NGC's methane reduction campaign already looks at flaring versus venting and includes infrared visualisation and satellite imaging of its pipelines and gas handling infrastructure to detect fugitive emissions. To build on that campaign and achieve its targets by 2025, it plans to focus heavily on reinforcing its Leak Detection and Repair (LDAR) programme through the following:

Leadership and Governance — ensuring alignment of the LDAR programme with corporate strategy and culture; managing processes and resources; establishing accountabilities for LDAR activities

Administrative Management Systems — building a collaborative culture among supporting functions such as HSSE, Procurement, Engineering, Human Resources and Information Management

Strategic Partnerships and Agreements — engaging and aligning stakeholders from across The NGC Group and wider industry

Reporting — using best practices and standards in data collection; strengthening reporting capacity; establishing clear timelines for reporting

Technology and Measurement — using top-down and bottom-up equipment for emissions data capture; integrating new tools and equipment to support LDAR where possible

Engineering and Design — using engineering and design considerations to incorporate more efficient equipment and systems

Technical Standards and Best Practice — using learnings and evaluation of industry best practices to improve LDAR

Auditing and Continuous Improvement — assuring LDAR processes and systems through internal and external audits and taking corrective actions where necessary

NGC'S **COMMITMENT**

Bringing emissions in check requires a collective and concerted effort, and a clear roadmap for action. Having elaborated its own methane goals, NGC will be working purposefully towards their realisation by 2025. Along the way, the company intends to communicate and educate on the need to address methane emissions to encourage greater industry participation and increase the chances of success in this high-stakes fight. ■

SHELL AND NGC PARTNER TO "RE-ENERGIZE TNT" THROUGH EDUCATION

ESTIMATED READ TIME: 5 MINUTES

ON THE GREEN AGENDA

KEY TAKEAWAYS

NGC and Shell are partnering on an energy education initiative called Re-Energize TnT which aims to prepare students across the country to become advocates for energy conservation and efficiency.

Central topics of the Re-Energize TnT curriculum are renewable energy, energy efficiency, energy conservation, advocacy and community mobilisation.

The programme comprises five components, which will be delivered at two schools each year for three years, starting with the Mayaro Government Secondary School and Woodbrook Secondary School

The Hon. Stuart Young, Minister of Energy and Energy Industries, along with Re-Energize TnT sponsors, pose for a picture with the students of Woodbrook Secondary and Mayaro Secondary Schools

Climate change is real and Trinidad and Tobago is experiencing its effects. This message was clearly articulated by The Hon. Stuart Young, Minister of Energy and Energy Industries and Minister in the Office of the Prime Minister, at the November 2022 launch of "Re-Energize TnT" - an energy education initiative being hosted jointly by Shell Trinidad and Tobago Limited (Shell) and NGC. The programme aims to prepare students across the country to become advocates for energy conservation and efficiency. The first cohort of participants comprises students from Mayaro Government Secondary School and Woodbrook Secondary School.

Students were eager to chat with Eugene Okpere, Senior VP and Country Chair – Shell, and Mark Loquan, President — NGC.

As explained by Shell Senior Vice President and Country Chairman, Eugene Okpere in his address at the launch event, Re-Energize TnT was conceptualised by Shell to help prepare society to address the "Energy Trilemma". Mr. Okpere stated,

"We need to quickly find the balance in what can appear to be conflicting components of the Energy Trilemma — providing the energy that humanity needs to thrive — that needs to be more affordable, more secure and cleaner."

He challenged the youths to show courage and to collaborate to find solutions to the complex issues around the energy transition, which would require involvement of government, business, civil society and the general population.

In his address to the students, President of NGC, Mark Loquan, indicated that the Re-Energize TnT programme fits well into NGC's Green Agenda — an integrated portfolio of carbon reduction and sustainability initiatives.

He urged the students to use the knowledge they are acquiring in the programme to keep the momentum of climate change going, as the target of "net-zero by 2050" would require years of sustained climate mitigation and adaptation if it is to be achieved.

He reminded the audience of the gravity of the task at hand and the significant role the youth will play in shaping the future, stating,

"If we connect our youth with information, if we can inspire them to get involved in this climate fight — this world war — then we can salvage their future".

A common thread that was interwoven through all the remarks was Trinidad and Tobago's position as a leader in the energy transition. This country has harnessed its pioneering spirit since the 1970s, determining to utilise the transition fuel of natural gas for industrial development, while many developed states are still utilising coal and crude oil.

ON THE GREEN AGENDA

Minister Young urged the students to feel proud of their country and to find ways to keep natural gas — the cleanest fossil fuel — at the forefront of industry while simultaneously developing renewable energy.

ABOUT THE **PROGRAMME**

Key to achieving the goal of responsible and balanced industrial development are energy efficiency and energy conservation, central topics of the Re-Energize TnT curriculum.

The programme comprises five components, which will be delivered at two schools each year for three years. Under Component 1, students will be exposed to 15 modules on a wide range of sustainability topics. The programme is certified by the Association of Business Executives (ABE) and students completing the modules will receive ABE certificates.

Component 1 Training Modules

- The importance of energy
- Traditional (fossil fuels) and non-traditional fuels
- T&T's carbon footprint
- What is energy conservation and efficiency
- Conducting an energy audit
- The Paris Agreement and T&T's carbon reduction commitment
- Introduction to renewable energy
- Climate-smart agriculture
- Introduction to solar energy
- Introduction to wind energy
- Introduction to biofuels
- The future of transportation: electric vehicles
- Advocacy and community mobilisation
- Presentation skills
- Stakeholder engagement

In Component 2, the students who have completed the training modules will compete to determine the school that achieves the greater reduction in its energy usage. This will involve conducting energy audits and development of energy consumption reduction plans. The winning school will receive a solar photovoltaic system and LED lights to be installed at the school. The top-performing students will also receive individual awards throughout the programme.

Component 3 Training includes:

- Presentation and advocacy skills
- Stakeholder engagement
- Community mobilisation
- Project design and implementation

Component 3 is centred around the "Idea Incubator" in which they will collaborate with subject matter experts to conduct research and design a community-based renewable energy project to address a problem in a specific community. At the end of each year, students from the winning school will be invited to participate in the Idea Incubator, where they will benefit from training related to community engagement and project development.

Component 4 will empower the students to implement the green initiatives that they designed in the Idea Incubator. Students will be required to present a proposal for the initiatives, and a panel comprising Shell, NGC and programme facilitators from Renew T&T, will select the most feasible project to be implemented. The aim is to execute three green initiatives by the end of the three-year programme.

Component 5 of Re-Energize TnT seeks to engage communities, the energy industry and the public through an ongoing awareness campaign to be delivered through social media, newsletters, events and webinars throughout the project. Subject matter experts and key agencies will be engaged to share their knowledge and experience on energy efficiency, renewable energy, sustainability and sustainable financing, among others. The goal is to engender conversation around sustainability issues that would lead to attitudinal and behavioural change and collaboration to implement solutions.

Based on the testimonials given by the students in 2022, Re-Energize TnT is off to a promising start. Programme sponsors Shell and NGC are pleased to invest in the youth, who have the capacity to create a cleaner, more prosperous and happier future for our nation and the world. ■

The audience views a video presentation on the Re-Energize TnT programme.

2022 IN REVIEW

ON THE GREEN AGENDA

FINANCIAL PERFORMANCE

The NGC Group registered a solid financial performance in 2022. For the first half of the year, The Group recorded a profit of

TT$1.6BN.

This represents a

260% increase over the TT$437M profit recorded for the same period in 2021.

For the nine months ended 30th September 2022, Trinidad and Tobago NGL Limited recorded an after-tax profit of

TT$165.1 MN.

This represents a 23.1% increase over the same period in 2021.

MAJOR PROJECTS

NGC's project to deliver a pressure regulator skid package for the existing Takoradi Distribution Station (TDS) in Ghana progressed through important milestones. The technical services project is nearing completion, with 2023 targeted for final installation and commissioning of the skid.

A milestone was crossed in the Liquid Fuels Pipeline (LFP) project, designed to make the transportation of liquid fuels safer, more reliable and more efficient. Both the jet fuel and diesel lines have now been commissioned for the project.

NGC executed its Low-Pressure Switch Over (LPSO) project to upgrade low-pressure customers to a higher-pressure pipeline operating system. The project involved diversion of segments of its 16-inch pipeline, which runs through Port of Spain and environs.

NGC commenced construction of new natural gas pipeline infrastructure to enable production from the Coho and Cascadura fields in the Ortoire onshore block. The Coho pipeline was completed in 2022, and construction of the Cascadura line is underway.

COMMERCIAL ACHIEVEMENTS

NGC completed negotiations with Gulf Coast Methanol 1, LLC and its parent IGP Methanol LLC of the USA, for a Purchase and Sales Agreement that will allow NGC to acquire blue methanol from the IGP's Gulf Coast Methanol Park (GCMP) project.

Group member Phoenix Park Gas Processors Limited (PPGPL) acquired a new NGL terminal in Hull, Texas in January 2022, which opens access to markets in Mexico and the USA.

In February, NGC signed an agreement with Proman to lift methanol cargoes from Methanol Holdings (Trinidad) Limited's (MHTL's) Point Lisas facilities, which will allow for expansion of NGC's energy marketing and trading portfolio.

Downstream contract renewals continued, with a Gas Sales Contract signed with local cement manufacturer, Trinidad Cement Limited (TCL).

In September 2022, the company took a positive step towards securing supply stability over the coming years with the signing of a milestone Gas Supply Contract with bp Trinidad and Tobago (bpTT).

At the close of 2022, an Amended and Restated Heads of Agreement was signed between the GORTT and Atlantic shareholders Shell, bpTT and NGC, for the restructuring of the Atlantic facility into a single unitised facility. A Bilateral Heads of Agreement was also signed by the GORTT, Shell and bpTT. These agreements indicate that the government and shareholders have agreed to the commercial terms of a restructured Atlantic.

LEADERSHIP AND BRAND POSITIONING

The government appointed National Energy as the agency responsible for Trinidad and Tobago's export promotion of energy services, under the direction of the Ministry of Energy and Energy Industries (MEEI).

Representatives of The NGC Group participated in the following conferences and exhibitions:

Local
- TT Energy Chamber's Caribbean Sustainable Energy Conference
- TT Energy Chamber's Trinidad and Tobago Energy Conference
- Methanex Ascend event
- Atlantic Process Safety Day
- TTCIC Post-Budget Forum
- NGC/IAMovement Caribbean Green Infrastructure Conference
- AMCHAM HSSE Exhibition and Conference

International
- World Gas Conference (South Korea)
- Suriname Energy, Oil and Gas Summit (Suriname)
- Gastech (Italy)
- Association of Oil, Gas and Renewable Energy Companies of Latin America and the Caribbean (ARPEL) Conference 2022 (Peru)

GREEN AGENDA

Energy education

To support clean energy education, upgraded versions of the company's two digital platforms — EnergySmarTT and CariGreen — were launched.

An internal portal called SustaiNGC was created to build employee awareness around the Green Agenda and sustainability.

A new television series called *New Energy Conversations* was produced in conjunction with One Caribbean Media (OCM) to help educate the public on key energy and sustainability matters.

NGC partnered with Shell Trinidad and Tobago Limited and Renew TT to deliver the Re-Energize TnT Programme — a renewable energy education initiative targeting select secondary schools across the country.

Organisational achievements

After joining the global Oil and Gas Methane Partnership 2.0 (OGMP 2.0) in 2021, NGC submitted its first upstream and mid-downstream report for the 2021 reporting cycle.

NGC achieved the Gold Standard status of reporting under the OGMP 2.0 framework for its declared commitments to reduce methane emissions by 2025.

NGC joined the Global Reporting Initiative (GRI) community in early 2022 and launched its 5th annual Sustainability Report in October.

National Energy's REnewable Minds portal won the AMCHAM T&T Award for Outstanding OSH and Environment Project 2022 (Energy — Large Category).

Partnerships

In May, NGC signed a Memorandum of Understanding (MOU) with the Caribbean Community Centre for Climate Change (CCCCC) to cooperate on climate change mitigation efforts.

In June, NGC announced its partnership with Nutrien to explore opportunities to improve food and nutrition security in Trinidad and Tobago.

NGC and NewGen Energy Limited signed a non-binding Heads of Agreement (HOA) in August 2022, deepening their partnership to cooperate on the enabling of a sustainable hydrogen economy for the energy sector of Trinidad and Tobago.

NGC partnered with IAMovement to deliver the inaugural Caribbean Green Infrastructure Conference in October 2022.

The Ministry of Energy and Energy Industries (MEEI) launched "The Roadmap for a Green Hydrogen Economy in Trinidad and Tobago" in November 2022. This presents the findings of a study undertaken by National Energy in collaboration with the Inter-American Development Bank (IDB) and KBR Inc., to assess the potential of Trinidad and Tobago to produce green hydrogen.

ON THE GREEN AGENDA

CORPORATE SOCIAL RESPONSIBILITY

NGC copped the Energy Chamber's inaugural Best Social Investment Project Award at the Trinidad and Tobago Energy Conference in June for its support of the NGC Bocas Lit Fest.

The NGC/NAAA Championship games resumed as a live public event after three years.

To help build food and nutrition security, NGC partnered with the SURE Foundation to execute free seedling distribution drives at three schools in Couva and Rio Claro. In total, approximately 75,000 vegetable and herb seedlings were distributed.

NGC announced its intention to purchase the renowned Banyan archives — the largest digital archive of Caribbean cultural programming in existence.

The NGC Bocas Lit Fest travelled to the UK for a five-city roving showcase of Caribbean literature.

NGC launched the Inspire to Achieve (I2A) programme, which seeks to support more rounded development of youth and open pathways for careers and entrepreneurship based on green and sustainable economies. The pilot will be delivered to schools in La Brea.

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

Sunset sail through the mangroves of the Caroni Swamp

THE NATIONAL GAS COMPANY OF TRINIDAD AND TOBAGO LIMITED

PHOENIX PARK GAS PROCESSORS LIMITED

LABIDCO
LA BREA INDUSTRIAL DEVELOPMENT COMPANY LIMITED

ngl
Trinidad and Tobago NGL Limited

NGC CNG
Company Limited

National Energy
CORPORATION OF TRINIDAD AND TOBAGO

THE NGC GROUP OF COMPANIES