

THE NGC GROUP OF COMPANIES CORPORATE QUARTERLY JOURNAL

GASCO news

Vol 33. No. 2 June 2023



THE IMPERATIVE OF **ADAPTATION**



PRESIDENT'S MESSAGE

The imperative of adaptation | 01

PRODUCED BY

The National Gas Company of Trinidad and Tobago Limited (NGC)
Orinoco Drive
Point Lisas Industrial Estate, Couva
Republic of Trinidad and Tobago
West Indies

MANAGING EDITOR

Nicola J. Ghouralal
Head, Communications and Brand

SUB-EDITOR

Nadine Ramharack
Public Relations Officer II
Communications and Brand

CONTRIBUTORS

Nadine Ramharack
Richard Jobity
Mario Singh

PHOTOGRAPHY

NGC Archives

DESIGN

Lonsdale Saatchi and Saatchi
Advertising Limited

PRINTING

SCRIP-J

Please address all correspondence to GASCO NEWS
c/o NGC Communications and Brand Department
NGC Orinoco House (Head Office), Orinoco Drive,
Point Lisas Industrial Estate
Tel: (868) 636-4662,4680
Fax: (868) 679-2384
Email: info@ngc.co.tt
Website: www.ngc.co.tt

©2023 Material in this publication, with the exception of photography, may be reproduced once credit is given to GASCO NEWS



The symptoms of climate change — addressing health risks in a warming world | 03

A path of continuous improvement — NGC's Asset Integrity Management (AIM) Journey | 11

Adapting our built environment for a warmer, wetter world | 17

The Caribbean case for LNG | 23

NGC Introduces its Climate Adaptation and Resilience Portal (CARP) | 27

NGC Group half-year highlights | 33



The imperative of adaptation

When we talk about climate action, much of the discourse is focused on the need to reduce our net carbon emissions — the tipping points we must watch, ‘quick-win’ opportunities to cut our output, and broader systemic changes that must be initiated if long-term ambitions are to be realised.

However, even as we take action today to change the current and future global emissions profile, we cannot soon escape the cumulative impact of carbon emitted since the age of industrialisation. We must accept that some damage has already been done, and we need to focus equal attention on building a strong defence through climate change adaptation strategies.

The meteorology of our planet is changing rapidly, with concerning implications for agricultural cycles and soils, the biosphere, human settlement patterns and the integrity of our built environment. While we work in earnest to prevent further deterioration of climate stability, we need to start adapting our habits and habitats so we can build more resilient societies and continue to meet our basic human needs for food and shelter in a warmer, wetter world.

In this context, NGC decided to develop a new portal called the Climate Adaptation and Resilience Portal (CARP), which aims to inform the kind of proactive planning that will allow us to pivot in response to climate-driven changes.



It includes information and alerts on hazards such as flooding, sea-level rise, landslips, riverine alerts, coastal erosion, maritime alerts, bush fires, air quality, seismic activity, deforestation and other emerging threats related to climate change.

In this issue of *GASCO News*, we share more information about the intent and content of this portal. We also extend the conversation around adaptation, exploring in greater detail some of the ways our society may need to evolve to thrive in the midst of new climatic and environmental conditions.

Of particular concern is the potential impact of higher temperatures on human health. Heat-related illness, migration of disease-carrying vectors and weakened food and nutrition security are all threats that must be on our radar. Insofar as possible, we must build our defences against them.

Of course, it must be emphasised that a focus on adaptation is not an admission of defeat. We are still intent on winning the climate fight, and we continue to actively pursue every possible avenue to shrink our carbon footprint.

For us at NGC, this means strengthening our core business, since natural gas remains an important fuel in the transition to a low-carbon energy future. An intensive asset integrity management campaign is allowing us to reduce losses of natural gas and methane from our pipeline network. The lessons we have learnt along our journey are instructive for any company managing similar assets, and we are resolved to share our insights and technologies to help others achieve similar gains.

We also continue to explore options for supporting the regional clean energy transition through micro-LNG projects. Displacing some of oil's market share in the energy mix will positively impact the collective emissions output of our region.

It is our hope that the stories in this issue shed some light on topics of great interest and importance to our company, and indeed, our planet as a whole.

Mark Loquan
President





THE SYMPTOMS OF CLIMATE CHANGE

ADDRESSING HEALTH RISKS IN A WARMING WORLD

Estimated read time:  10min

KEY TAKEAWAYS

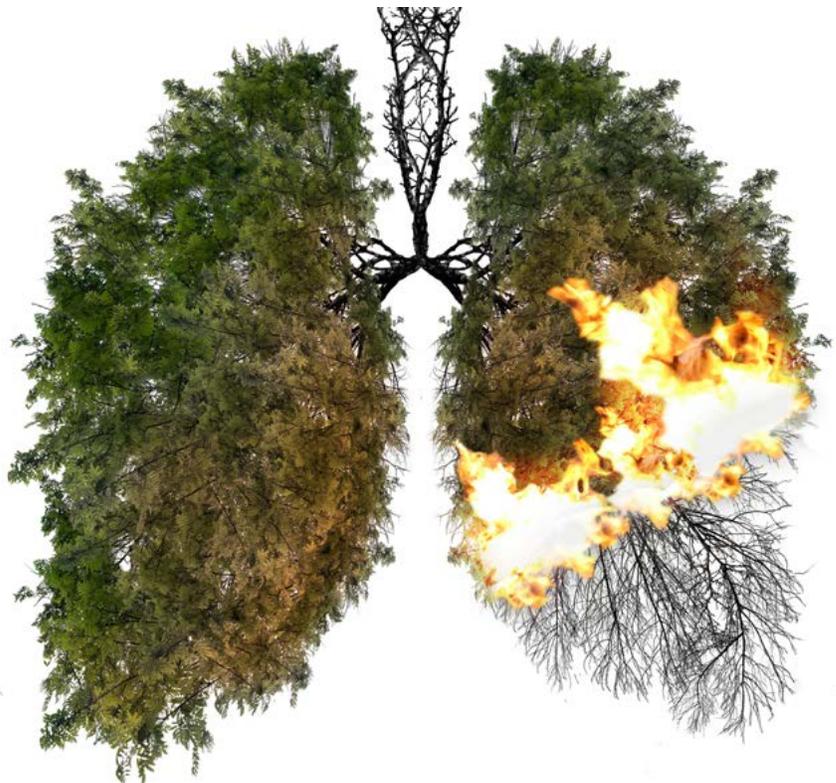
Climate change poses significant risks to human health, causing heat-related illness, shifting the geographical frontiers of infectious diseases, introducing nutritional risks and contributing to mental health disorders.

Humans must be aware of the risks and learn to adapt their behaviours, consumption practices, activity patterns and environments accordingly.

In 2012, a Harvard researcher presented a paper with some disturbing statistics. Comparing two possible scenarios for the future, he calculated that between 2010 and 2099, the United States will register 35,000 more murders, 216,000 more rape cases, 409,000 more robberies and 1.6 million more aggravated assaults in one scenario versus the other.¹ The differentiating variable in the higher-crime scenario? Increased temperatures due to climate change.

Though we reflexively think of heat-related illness when considering the impact of climate change on human health and well-being, the scope of impact is in truth far greater. Climate change is shifting the geographical frontiers of infectious diseases, introducing nutritional risks, and has even been linked to mental health disorders and heightened propensity to commit crime.

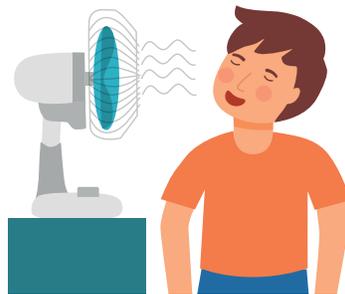
SO, HOW EXACTLY IS CLIMATE CHANGE INTERFERING WITH OUR HEALTH, AND WHAT CAN WE DO ABOUT IT?



¹ https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/ranson_2012-8.FINAL.pdf

HEAT AND HEALTH

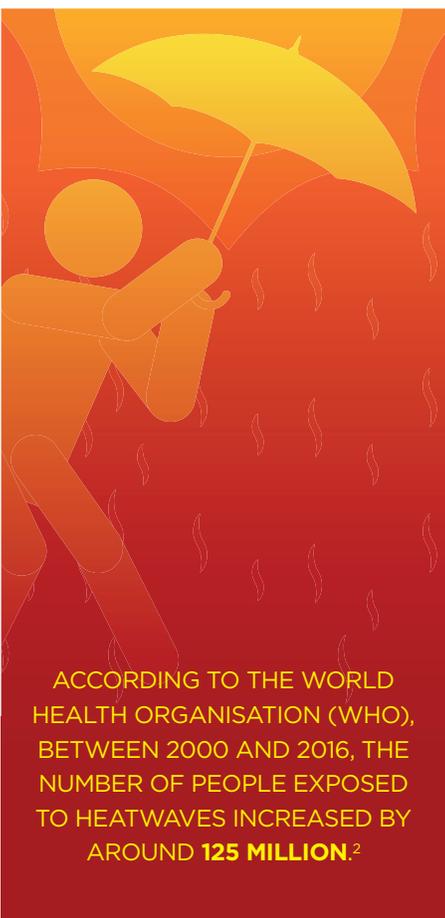
In recent years, record-high temperatures have given us undeniable evidence that our climate is changing. Countries around the world have been experiencing punishingly hot days, with deadly heatwaves increasing in frequency and intensity.



Hotter, drier conditions fuel wildfires and dust storms, and ground-level ozone, often called smog, forms easier in hot, stagnant air.⁶

Alarmingly, according to the United Nations Environment Programme (UNEP):

“In 2019, 99% of the world population was living in places where the WHO’s strictest 2021 air quality guideline levels were not met.”⁷



MEANWHILE, UNICEF ESTIMATES THAT BY 2050, **ALL 2.02 BILLION CHILDREN GLOBALLY** WILL BE EXPOSED TO HIGH HEATWAVE FREQUENCY, REGARDLESS OF WHETHER THE WORLD ACHIEVES A ‘LOW GREENHOUSE GAS EMISSION SCENARIO’ OR NOT.³

What this means is that the incidence of heat-related illnesses will increase. Heat stroke is particularly dangerous — it occurs when the body heats up quickly and the sweating mechanism fails, inhibiting the body’s ability to cool itself down.⁴ Heat can also cause severe dehydration and acute cerebrovascular accidents and contribute to blood clots.⁵

In addition to its direct impact on the body, extreme heat can indirectly contribute to respiratory distress and associated ailments by supporting the accumulation of more particulate matter in the air.



Rising temperatures and further falling air quality will exacerbate these conditions and increase humanity’s risk of developing lung, heart, brain and other disorders linked to breathing contaminated air.⁸

²https://www.who.int/health-topics/heatwaves#tab=tab_1

³<https://www.unicef.org/press-releases/heatwaves-report>

⁴https://www.cdc.gov/climateandhealth/pubs/extreme-heat-final_508.pdf

⁵https://www.who.int/health-topics/heatwaves#tab=tab_2

⁶<https://www.lung.org/clean-air/climate-change/climate-change-air-pollution#:~:text=Ground%2Dlevel%20Ozone%20Pollution,tailpipes%20mix%20in%20the%20air.>

⁷https://www.unep.org/interactive/air-pollution-note/?gclid=CjwKCAjwzuqgBhAcEiwAdj5dRlI8oQMAwakC-7-crFDL0nVCoe7HWKsQ-ywSsYMMMA59FV40hb6dfVBoCGVwQAvD_BwE

⁸Ibid



MITIGATING IMPACT

Given these heightened risks, extra precautions must be taken to protect the body during periods of extreme heat.

SAFETY TIPS

STAY INFORMED

Monitor weather reports to know when temperatures are dangerously high. Learn about the signs of heat stress so you can identify if you or others are experiencing symptoms.



HYDRATE

Replenish fluids and electrolytes lost through sweating by drinking regularly. Avoid very sugary or alcoholic drinks as they can cause you to lose more fluids.



FIND WAYS TO KEEP COOL

Stay indoors when possible to limit direct sun exposure and intake of contaminated air.



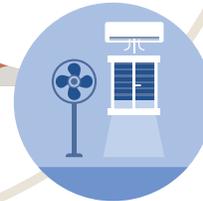
EAT AND EXERCISE WISELY

Avoid heavy and hot meals, which can add heat to your body. Avoid strenuous exercise and schedule any outdoor activity for the coolest times of day.



KEEP COOL:

Air-conditioning can help regulate body temperatures, as can cold drinks or fruit and showers. Fans are useful too, but bear in mind that above a certain temperature threshold, they will not prevent heat-related illness.



WEAR APPROPRIATE CLOTHES

Wear loose-fitting, lightweight clothing made of breathable fabrics when possible.



PROTECT YOUR SKIN

Sunburn affects your body's ability to cool down and can make you dehydrated. Wear wide-brimmed hats and broad-spectrum sunscreen to protect your skin.



The symptoms of climate change — addressing health risks in a warming world | CONTINUED

HUNGER AND MALNUTRITION

Addressing food and nutrition insecurity is one of the major challenges facing development practitioners today.

According to the World Food Programme (WFP), humanity is more than twice as hungry today as three years ago, with over 345 million people facing high levels of food insecurity in 2023.⁹

While there are multiple factors contributing to global hunger, climate change is a primary driver. Increasingly frequent and more intense droughts and flooding events put pressure on agricultural

systems and often lead to crop failure. These events not only reduce the quantity of food that makes it to market, but drive prices sharply up.

For example, after severe flooding in Trinidad and Tobago in late 2022, the cost of produce skyrocketed — wholesale prices of tomatoes increased by 266 per cent, cauliflower by 108 per cent, and lettuce by 33.3 per cent.¹⁰ This forced many consumers to forgo certain vegetables or purchase less. Elsewhere in the world, extreme heat has been impacting yield growth for wheat, maize and other crops. By some estimates, without appropriate interventions, global yields could decline by up to 30 percent by 2050, making those crops more expensive.¹¹

As many families around the world struggle to regain their economic footing following the pandemic,

surges in food prices can compound their challenges and accentuate food insecurity. Undernourishment and malnutrition can ensue, in turn spawning many health concerns.

To make matters worse, while climate change can affect the quantity of food available, the high levels of carbon dioxide which are fuelling it can affect the quality of that food as well. One Harvard research team found that when food crops such as wheat, corn, rice and soy are exposed to carbon dioxide at the levels projected for 2050, those plants lose as much as 10% of their zinc, 5% of their iron, and 8% of their protein content.¹² This increases the risk of consumers developing micronutrient deficiencies which can cause a range of medical complications, including birth defects, undeveloped cognitive ability and reduced productivity, among many others.¹³

MITIGATING IMPACT

At the level of the state, greater investment is needed to drive research and development in agriculture to build crop and farm resilience. In some instances, use of early warning systems and technology ahead of extreme weather events can help protect against some crop loss.

On a personal level, to insulate one's household from the effects of climate change on food supply, quality and prices, the following measures can be taken:



Plant a vegetable garden

Kitchen gardens can boost household food supply, and once properly positioned and tended, can be easier protected against severe weather events than larger-scale farms.



Reduce food waste

Buying and cooking only what you need, making early use of all perishable produce so that none is wasted and freezing leftovers can all help reduce your food bill and boost food security.



Shop and eat wisely

Research and purchase foods that have high nutrition density, so that daily dietary requirements can be met even if small quantities are consumed. If necessary and feasible, use multivitamins to supplement your diet.

⁹<https://www.wfp.org/global-hunger-crisis#:~:text=Conflict%2C%20economic%20shocks%2C%20climate%20extremes,next%20meal%20is%20coming%20from.>

¹⁰<https://www.guardian.co.uk/news/consumers-buy-less-walk-away-from-highpriced-vegetables-6.21581294.80fa02b0a9>

¹¹<https://unfoundation.org/blog/post/climate-change-and-the-future-of-food/>

¹²<https://www.hsph.harvard.edu/c-change/subtopics/climate-change-nutrition/>

¹³<https://www.cdc.gov/nutrition/micronutrient-malnutrition/index.html#:~:text=Vitamins%20and%20minerals%2C%20also%20called,cognitive%20ability%2C%20and%20reduced%20productivity.>



VECTORS AND PATHOGENS

As we learned from the pandemic, the smallest pathogen can have devastating effects on health and society. While some pathogens are transmitted through contaminated food, fluids or air, others require vectors such as mosquitoes to ferry them between hosts.

One of the concerning consequences of a warming planet is that environments that were once inhospitable for mosquitoes to breed are becoming more accommodating as temperatures increase.

MITIGATING IMPACT

To address these risks, we need to simultaneously manage those threats that are already at our doorstep and work to limit the growth of others.



Mosquito management

Awareness campaigns around mosquito breeding and biting habits can teach the public — particularly in new breeding zones — how to eliminate potential breeding sites and what precautions to take to avoid being bitten. Vaccination drives can provide an additional layer of protection among vulnerable groups.



Habitat conservation

Halting and reversing habitat loss can reduce opportunities for infectious diseases to spread from animals to humans. Reforestation, sustainable land use and agricultural practices, as well as legally protected nature reserves, can all help safeguard and restore habitats.



Conscious consumption and good hygiene

Humans can limit their exposure to dangerous pathogens by exercising discretionary consumption of wild meats, at the very least ensuring they are properly prepared and thoroughly cooked. Frequent handwashing, social distancing and overall good hygiene can help counter the spread of some pathogens.

An Imperial College study found that between 1950-2000, the world became 1.5% per decade 'more suitable' for the *Aedes aegypti* mosquito — carrier of dengue, zika and yellow fever — to breed.¹⁴

Future predictions show this could increase to between 3.2% and 4.4% per decade by 2050, and that disease-carrying mosquitoes could establish themselves in Europe by as early as 2030.¹⁵

Another study estimated that under the current warming trajectory, the advance of mosquitoes could put more than two billion additional people at risk for dengue in 2080 compared with 2015.¹⁶

Then there are other diseases that result from changing settlement patterns of wildlife. As climate change and human activities contribute to habitat loss, many species are forced to migrate, with greater incursions into human habitats. This creates opportunities for unfamiliar pathogens to find new hosts and make their way into human food chains and settlements.

The COVID-19 virus, which is thought to have originated in animals sold at a market in China, could potentially be a mere preview of the health risk associated with species displacement.

¹⁴<https://www.imperial.ac.uk/news/197333/disease-carrying-mosquitoes-could-common-europe-2030/>

¹⁵Ibid

¹⁶<https://www.nytimes.com/interactive/2019/06/10/climate/dengue-mosquito-spread-map.html>

The symptoms of climate change — addressing health risks in a warming world | CONTINUED

MENTAL HEALTH AND BEHAVIOURAL IMPACTS

As we have seen, climate change can affect our bodies in many ways, but it can also engender mental health concerns.

Among populations bearing the brunt of impact from changing weather patterns — for whom the risk of property damage or even loss of life and livelihood are increasingly high — climate change can be a major mental and psychosocial stressor.

The Intergovernmental Panel on Climate Change (IPCC) revealed that the prospect and manifestations of global warming can induce emotional distress, anxiety, depression, grief, and even suicidal behaviour.¹⁷

Moreover, heat stress on the body can trigger psychological disturbances, as discomfort from overheating increases likelihood of agitation, frustration and even aggression.¹⁸

Several studies have found positive correlations between elevated temperatures and antisocial behaviours, including violence to self and others.¹⁹



ONE BODY OF RESEARCH FOUND A **2.2% INCREASE** IN MENTAL HEALTH-RELATED MORTALITY PER 1°C RISE IN TEMPERATURE.²⁰



MITIGATING IMPACT

Mental health needs to be given more attention at the policy level, and associated stigmas need to be dismantled. The WHO has recommended that governments address the mental health impacts of climate change by:

- **Integrating climate considerations with mental health programmes;**
- **Integrating mental health support with climate action;**
- **Building upon global commitments;**
- **Developing community-based approaches to reduce vulnerabilities; and**
- **Closing the large funding gap that exists for mental health and psychosocial support.²¹**

¹⁷<https://www.who.int/news/item/03-06-2022-why-mental-health-is-a-priority-for-action-on-climate-change>

¹⁸<https://theconversation.com/heatwaves-worsen-mental-health-conditions-186759>

¹⁹<https://link.springer.com/article/10.1007/s40641-019-00121-2>

²⁰<https://www.sciencedirect.com/science/article/pii/S0160412021001586>

²¹<https://www.who.int/news/item/03-06-2022-why-mental-health-is-a-priority-for-action-on-climate-change>

ON THE GREEN AGENDA

FOR INDIVIDUALS GRAPPLING WITH MENTAL HEALTH ISSUES, IT IS IMPORTANT TO:



Seek help when it is needed, whether from family, friends or professionals.



Find outlets for stress such as exercise, meditation, a hobby or any relaxing activity that can help defuse tension and feelings of anger or frustration.

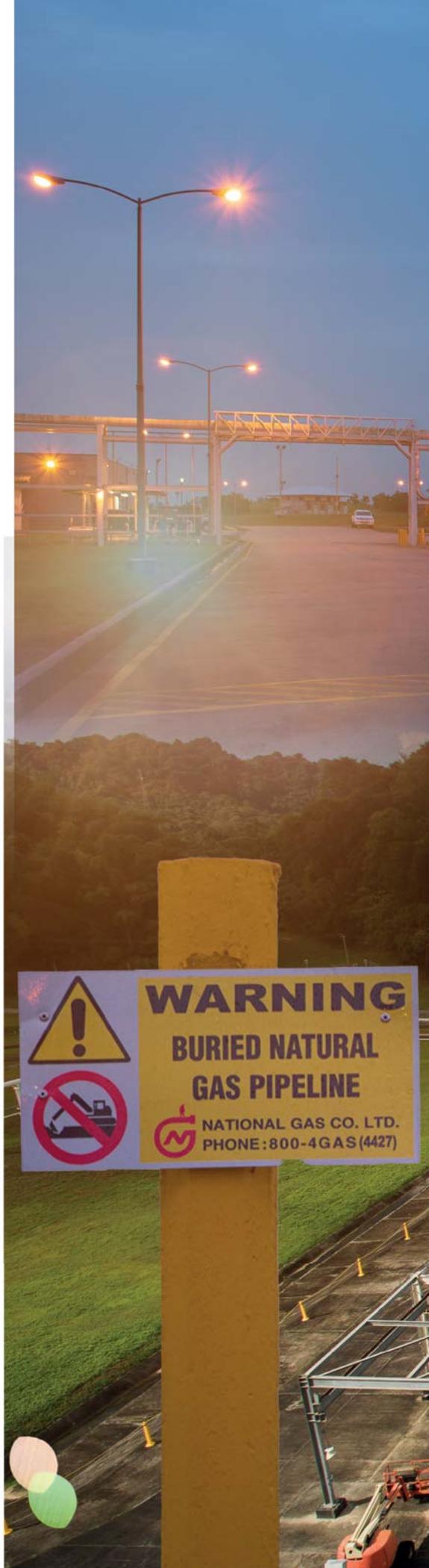


Acknowledge that there is a problem to be fixed in the first place — this can sometimes be the most important step.



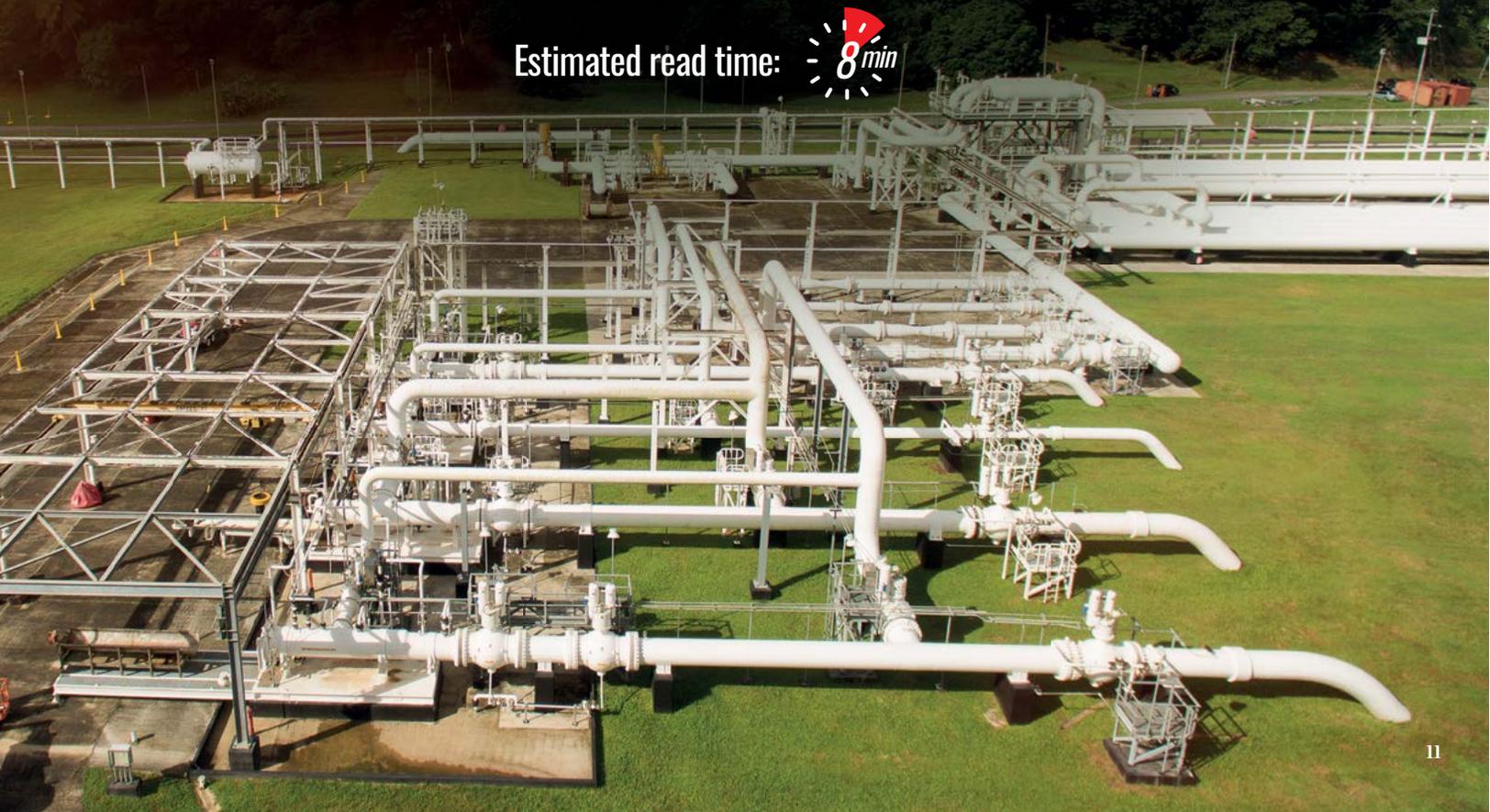
CONCLUSION

Even as we work in earnest to keep rising global temperatures in check, a degree of adaptation will be necessary, as we cannot outrun the fallout of damage already done. From a health perspective, this means understanding how our health is threatened and what measures we can take to mitigate the impact. To the extent that we can prevent escalation of those risks through more aggressive climate action, we need to fight to make that happen. Our lives could depend on it. ■



A PATH OF CONTINUOUS IMPROVEMENT – NGC'S ASSET INTEGRITY MANAGEMENT (AIM) JOURNEY

Estimated read time:  8min





KEY TAKEAWAYS

Asset integrity management (AIM) is a business-critical activity for NGC given the risks associated with natural gas infrastructure.

Following a 2015 AIM audit which revealed shortfalls in NGC's systems and equipment, the company embarked on an aggressive remedial campaign which significantly improved its AIM performance.

NGC is now sharing lessons learnt with the wider industry.

One September evening in 2010, a loud explosion rocked San Bruno — a residential suburb of San Francisco, California. A deadly fire broke out, killing eight people, injuring 58, and engulfing dozens of homes. After initial uncertainty around the cause, investigations concluded that the explosion was triggered by the rupture of defective welds on a buried, high-pressure natural gas pipeline running beneath the community.¹

Tragedies such as the San Bruno explosion are sobering reminders of how crucial it is to monitor and maintain the structural integrity of high-risk energy assets.

With a natural gas pipeline network spanning 1,000km, NGC manages one of Trinidad and Tobago's most extensive and important energy infrastructure systems. Given the intrinsic dangers associated with the product running through its pipelines, NGC has always regarded asset integrity management (AIM) as business-critical. However, in recent years, the company has been taking an even more aggressive approach to AIM, intent on minimising risk in its business and across the energy sector as a whole.

WHY IS AIM IMPORTANT?

NGC's sprawling network comprises enough infrastructure to line the coasts of Trinidad more than twice over. Subsea lines aggregate gas from offshore fields, while the onshore grid carries gas cross-country for either LNG production or

processing and distribution to power producers and industrial consumers. Despite its extensive footprint, NGC's network goes largely unseen. Save for yellow marker posts along the Rights of Way (ROW) and above-ground installations such as gas receiving facilities and valve and metering stations, the majority of NGC's infrastructure is buried underground.

WHILE THIS RELATIVELY LOW VISIBILITY HELPS SAFEGUARD THE NETWORK IN SOME WAYS, THE COMPANY STILL CONFRONTS DIFFERENT TYPES OF RISK:



Third-party interference — risk of damage caused by the actions of persons or entities external to the company, such as persons excavating or disturbing the ground along the ROW



Corrosion — risk of damage to infrastructure due to internal or external deterioration of pipeline hardware



Natural events — risk of damage due to landslides, earthquakes, washouts, rapid earth movement and other events linked to natural occurrences



Operational failure — risk of damage due to oversight, error or mismanagement in the course of network operation, or inherent engineering/design flaws.

¹<https://udspace.udel.edu/items/14648e1c-6bc1-402e-a2e9-40dbadfb795e>; <https://www.latimes.com/local/la-xpm-2011-aug-30-la-me-0831-san-bruno-20110831-story.html>

Failure to address these risks could lead to catastrophic asset loss or infrastructural damage with a high potential for personnel injury/loss of life, which in turn would impact NGC's ability to service its customers. More importantly, certain risks can precipitate dangerous incidents along the line and cause harm to the public and environment.

This is why AIM is so important. NGC must consistently assess the risk in its operations and take action to prevent damage to its infrastructure. However, to properly assess and manage risk, the company's systems and equipment must be in optimal working order, in alignment with best practices and industry standards. In recent years, independent audits have been used to benchmark both systems and equipment at NGC and identify gaps that needed to be closed to help the company improve its AIM efforts.

NGC'S AIM JOURNEY

In 2015, the Ministry of Energy and Energy Industries engaged international firm DNV to conduct a National Facilities Integrity Audit. This audit investigated AIM processes, procedures, plans and resourcing at over 30 local companies and included physical asset inspections. Systems and Equipment evaluation scores were then assigned using the scale below.



An infrared camera is helping NGC visualise leaks along its lines

4 = Optimising	The activity or practice is effective and efficient. Visible continuous improvement culture/efforts are in place.
3 = Managing	The activity or practice is documented and effectively implemented.
2 = Implementing	The activity or practice is documented with implementation ongoing but not fully mature.
1 = Developing	The activity or practice exists, although it may be incomplete and undocumented.
0 = Learning	The activity or practice is absent or ad hoc and little awareness of the expectation is in place.



The national average for Systems was 2.02, while the Equipment score was 1.93. In comparison, NGC's scores were 1.79 and 1.64 respectively. Having scored below the national average, NGC decided to undertake an aggressive remedial campaign on its equipment and systems to address concerns raised by the auditors.

The organisation has since begun to focus on bringing its AIM capability in line with best-in-class standards, starting with organisational changes that have assigned more dedicated resources towards this area.

In 2019, NGC adopted a new AIM Framework based on 10 functions, aligned with ISO 55000 Standards in Asset Management.

THIS FRAMEWORK IS BUILT ON FOUR MAIN PILLARS:

- LEADERSHIP AND GOVERNANCE
- ADMINISTRATIVE MANAGEMENT SYSTEMS
- TECHNICAL MANAGEMENT SYSTEMS
- FUNCTIONAL EXECUTION AND PERFORMANCE

This framework specifies the requirements for an effective asset management system and integrates AIM with other business areas such as human resources, governance, technical document management and supply chain management.

AREAS OF IMPROVEMENT

Maintenance Automation

One key function of the AIM Framework where significant strides have been made is in the area of



NGC's new AIM framework

Information Management, with the computerisation of maintenance planning and scheduling. Through the Computerised Maintenance Management System (CMMS), NGC has made great progress with planning and scheduling preventative maintenance works on its manned facilities and generated valuable data to streamline maintenance performance in the future.

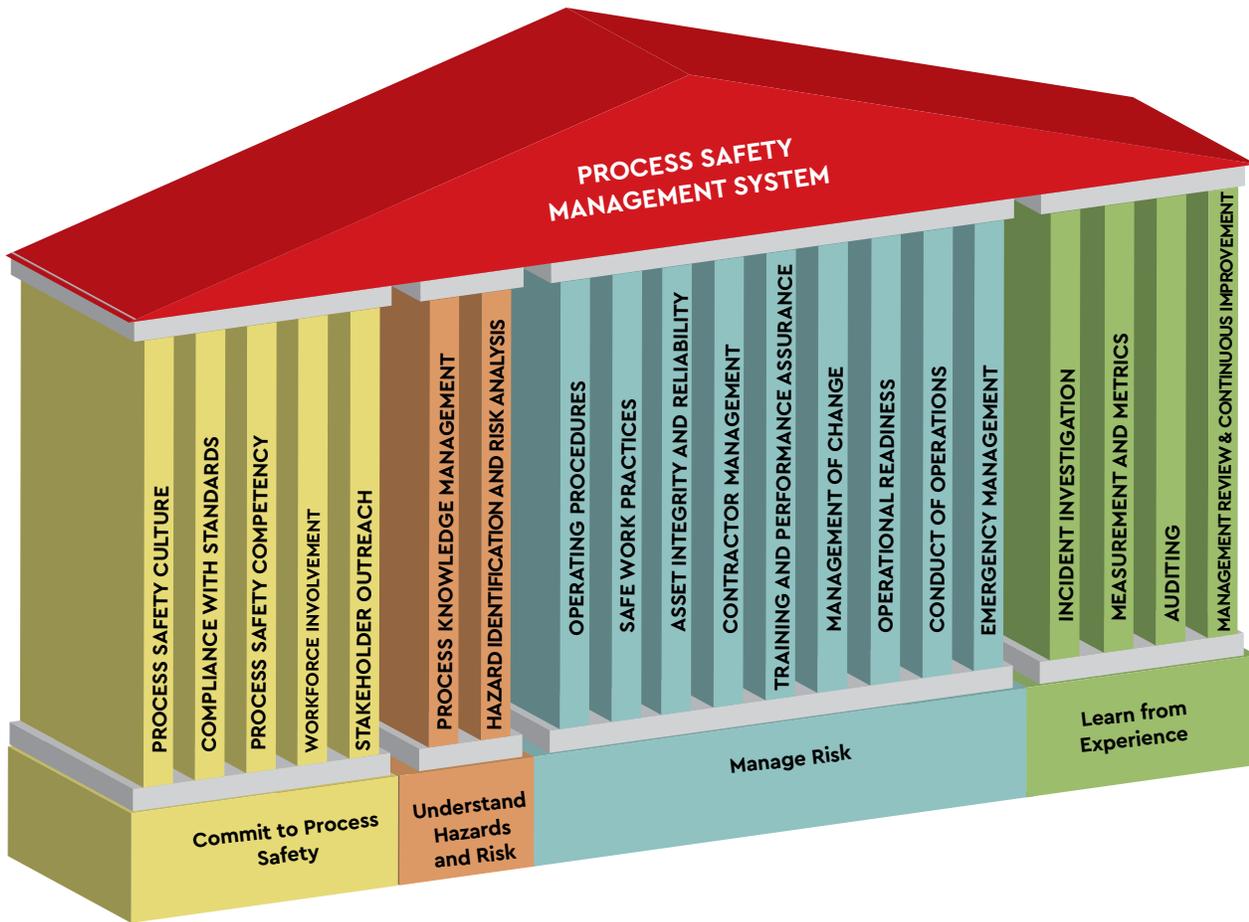
Mitigating risk

In 2019, in line with the overall goal of reduced risk to operations, NGC began transitioning from a traditional time-based asset inspection programme to a Risk-Based Inspection (RBI) programme. This best-practice approach focuses

on reducing risk by channelling resources and priorities towards inspecting assets in areas that are high risk and more prone to failure.

NGC has also adopted the Centre for Chemical Process Safety (CCPS) Risk-Based Process Safety (RBPS) guidelines, which are built on four pillars:

-  COMMIT TO PROCESS SAFETY
-  UNDERSTAND HAZARDS AND RISKS
-  MANAGE RISKS
-  LEARN FROM EXPERIENCE



PSM and occupational safety are continuously reinforced through communication, training and system improvements to strengthen the safety culture.

Technology

Technology is also being integrated to help sustain best-in-class capability in the maintenance function. A specialist drone has been drafted into use, capable of carrying payloads such as infrared cameras, Light Detection and Ranging (LiDAR) sensors and gas detection sensors, all of which can aid in asset integrity efforts.

On the field, tablets and digital forms are now being used to capture information and prepare and submit reports in real time, truncating and streamlining the process for

identifying and addressing potential or actual risks.

Exploration of applications for Extended Reality technologies, which can assist with work planning, scenario modelling, emergency response training and even virtual tours for visitors, are also in progress. These would reduce the exposure of NGC’s infrastructure to the risk of third-party interference, and the exposure of people to the inherent risk in its operations.

One of the latest technology initiatives undertaken was the upgrade of the Synergi Pipeline Software — which NGC has been using since 2012 — to the latest version of the DNV Pipeline Integrity Management Software in 2022. The latest version of the software offers a host of advantages in classifying

risk across the NGC onshore and offshore pipeline network collectively. It also uses NGC’s Geospatial Information Services (GIS) database to source all geotechnical and statistical population data to formulate an overall risk rating, which informs NGC’s preparedness in managing the risk. This allows for easier collaboration among user departments and greater process efficiency.

Focus on methane

In line with NGC’s focus on sustainability and climate action, the company has made methane mitigation a priority focus area. This is intimately tied to AIM, since compromised assets can leak gas — and by extension methane — into the atmosphere.



Accordingly, the company has an active Leak Detection and Repair (LDAR) programme, which is supported by specialised equipment for emissions detection. This includes a Forward-Looking Infrared (FLIR) camera and satellite imaging of its facilities under a contract with Netherlands-based technology provider Orbital Eye. The FLIR camera provides data through scheduled periodic assessments as required by international standards, whilst the satellite technology provides a more real-time approach to leak detection.

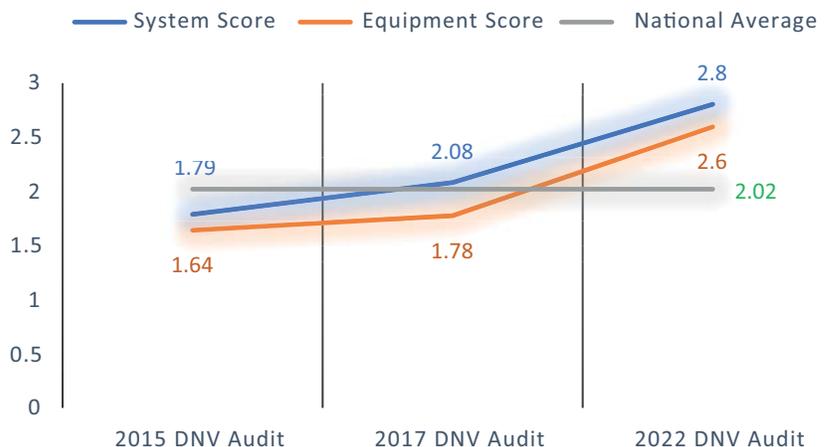
Complemented by staff training, certification and competency assurance initiatives, the company's LDAR programme is very stringent and is continuously being improved to align with and exceed international best practices.

Accountability

To keep the company accountable, AIM has been pegged to its corporate scorecard, so that work in this area is taken to be a key performance indicator. As part of the wider NGC Group, an AIM Steering Committee was also formed, which provides the platform for sharing best practices, methodologies and technologies.

NGC has also joined the voluntary Oil and Gas Methane Partnership (OGMP 2.0), which commits members to report on their methane emissions. NGC submitted its first report to the OGMP in 2022 and earned gold standard status for reporting of the targets it set with respect to curbing emissions in the coming years. This membership and learnings from other companies around the world will help NGC improve its emissions measurement, management and reporting, which will in turn strengthen its AIM capability.

NGC AIM PERFORMANCE



BUILDING STRONGER

Since the 2015 DNV audit, NGC has periodically re-assessed its AIM performance through internal assessments and two subsequent external audits — one in 2017 and the other in 2022. According to the results of the latest audit, thanks to its interventions over the past eight years, the company's AIM scores have markedly improved. Its Systems score is now 2.8 (2015: 1.79) and its Equipment score is 2.6 (2015: 1.64). This means NGC has moved from the 'Developing' to 'Implementing' bracket in the DNV scoring rubric. While there is still work to be done, the company is reassuringly on the progressive path.

Importantly, NGC is not just keeping its learnings to itself. The 2015 DNV audit revealed deficiencies in asset integrity management across the energy sector, which is a national concern. NGC has therefore resolved to share lessons learnt, best practices and even its technology with its industry counterparts.

NGC is an active member of the Point Lisas Energy Association's (PLEA) Asset Integrity Management and Technical (AIMT) Sub-Committee, whose mandate is to share, review and implement technical best practices and systems to ensure AIM objectives are met among the PLEA member companies.

NGC also hosted an event in April 2023 to share its AIM journey and learnings with invited guests from across the public and private sectors. These included energy companies, as well as representatives from agencies such as the Water and Sewerage Authority (WASA), which also manages ageing pipeline systems. Ultimately, NGC believes its journey can be of value to others and hopes to not only be an exemplar of AIM performance but a leader in domestic industry — a standard-bearer marshalling other companies to strive for excellence in safety and asset integrity. ■



Estimated read time:  6 min

ADAPTING OUR BUILT ENVIRONMENT FOR A WARMER, WETTER WORLD



KEY TAKEAWAYS

The built environment may be threatened by climate change, and adaptation is necessary to ensure resilience.

A combination of thoughtful design, sustainable materials, effective planning and supportive policy frameworks can help buildings and cities withstand the impacts of climate change.

Changes in the global climate caused by ongoing temperature rises mean that most places are expected to be hotter and wetter. Over time, climate change threatens the integrity of physical assets and the ability to provide reliable accommodation and services, unless steps are taken to make the built environment more resilient.

The built environment refers to any physical space designed or constructed by humans, including buildings, roads, cities and countries.¹ For small island developing states, warmer weather contributes to sea level rise, hurricanes, floods, droughts and other weather phenomena, which can compromise built

infrastructure such as cities, roads and pipelines, inter alia. Some of the efforts to mitigate the impacts of climate change will involve humans adapting their built environment for greater resilience.

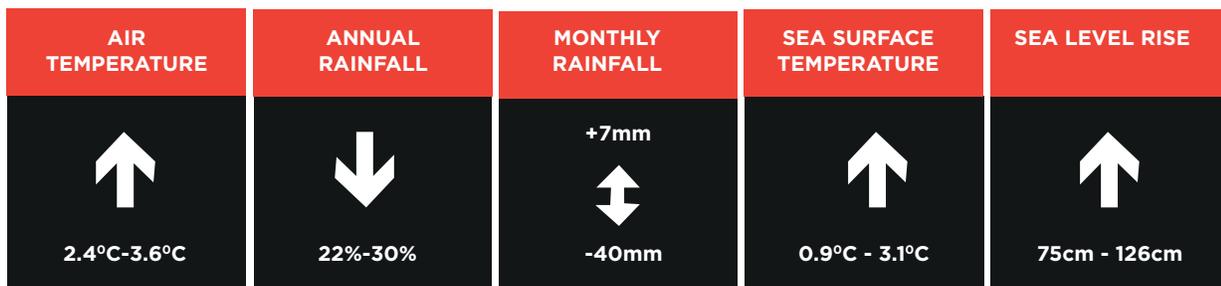
THE CARIBBEAN CONTEXT

Despite the many differences among Caribbean nations, climate change poses a serious threat to them all. According to the Intergovernmental Panel on Climate Change (IPCC), average temperatures in the region have increased by 0.1° to 0.2°C per decade over the past three decades. Rainfall patterns have also shifted in the region, with the number of consecutive dry days expected to increase. Additionally, sea level rise

has occurred at a rate of about two to four centimetres per decade over the past 33 years, presenting a risk to the region’s freshwater resources and to its largely coastal population.² Figure 1 lists climate projections for 2100 for Trinidad and Tobago.

For small island developing states (SIDS) of the Caribbean, avoiding the worst effects of changing temperatures and mitigating the effects of flooding will be among the most critical challenges faced in the coming decades. This involves mitigation and adaptation against several weather-related phenomena, including hurricanes, sea level changes, flooding and changing rainfall patterns. Adapting the built environment is considered under the global sustainable development goals (SDGs) and the Caribbean core sustainable development indicators.

Figure 1: Key Climate Projections for 2100 for Trinidad and Tobago³



¹<https://www.constructionplacements.com/built-environment/>

²<https://www.iadb.org/en/ove/climate-change-caribbean-small-island-states>

³Particip “Vulnerability and Capacity Assessment (VCA) Report: Trinidad and Tobago – Technical assistance for the Environment Programme” (2019) Accessed at (planning.gov.tt)



Caribbean architecture has historically been adapted to local conditions, with features such as verandas and stilts

Adaptation to climate is not a new phenomenon in the Caribbean. Caribbean people have historically adapted their built environment for maximum utility, with European architecture being adapted for Caribbean weather conditions — whether as a protective mechanism or to maximise the use of wind or water. In Bermuda, for example, the Bermuda Roof (in conjunction with a potable water holding tank) has been used for harvesting rainwater for the past four centuries as a practical response to the lack of lakes or rivers in Bermuda. In Trinidad and Tobago,

adaptations made for heat include verandas for shade and shelter of pedestrians, atriums with clerestory windows for ventilation and architectural pivots around terrain (such as houses built on stilts in areas prone to flooding or in swampy areas).

In the context of climate change, building adaptation will assume new dimensions. Climate change can impact both the structural features of the building and indoor conditions within the building. The inability to properly regulate indoor

temperatures may lead to thermal discomfort for users, potentially resulting in negative impacts on health, well-being and productivity.

Future weather and climate changes may potentially bring about degradation of construction materials and even reduced structural integrity of buildings, significant loss of value, deteriorating indoor climate and reduced building lifetime. New and existing buildings need to be assessed for resilience to current risks and future climate changes and planned or upgraded accordingly.



Without adaptation of infrastructure, islands can face mounting costs associated with adverse weather events

While there is only embryonic research on the cost of not adapting built infrastructure to climate change, some global studies imply that every dollar spent on climate adaptation (including to the built environment) results in just under four dollars of net benefit.⁴

Other studies indicate these adverse trends will be especially strong in Africa and Asia and that in general, agriculture will have the largest losses due to lower yields and that losses due to sea level rise will continue to increase.⁵

Data from the Caribbean suggests that the net impact of such adaptation is heavily dependent on the country's location relative to potential hurricane tracks, with benefits being much greater in hurricane-prone countries.

Estimates around investing in structural resilience suggest that they can boost the level of GDP in the long run between **2 and 6 per cent** for Caribbean islands. Moreover, the level of output would be around 1/4 per cent higher three years after a natural disaster in the Caribbean on average, once resiliency is achieved.⁶

Assessing the benefits of adaptation requires accounting for the reduced impact of natural hazards, and their contribution to overall economic development. Assessments also need to consider net benefits to biodiversity, air quality, water management, greenhouse gas emission reductions, and health and well-being.⁷

⁴The Global Commission on Adaptation "Adapt Now: A Global Call For Leadership On Climate Resilience" (2019), Pg.3.

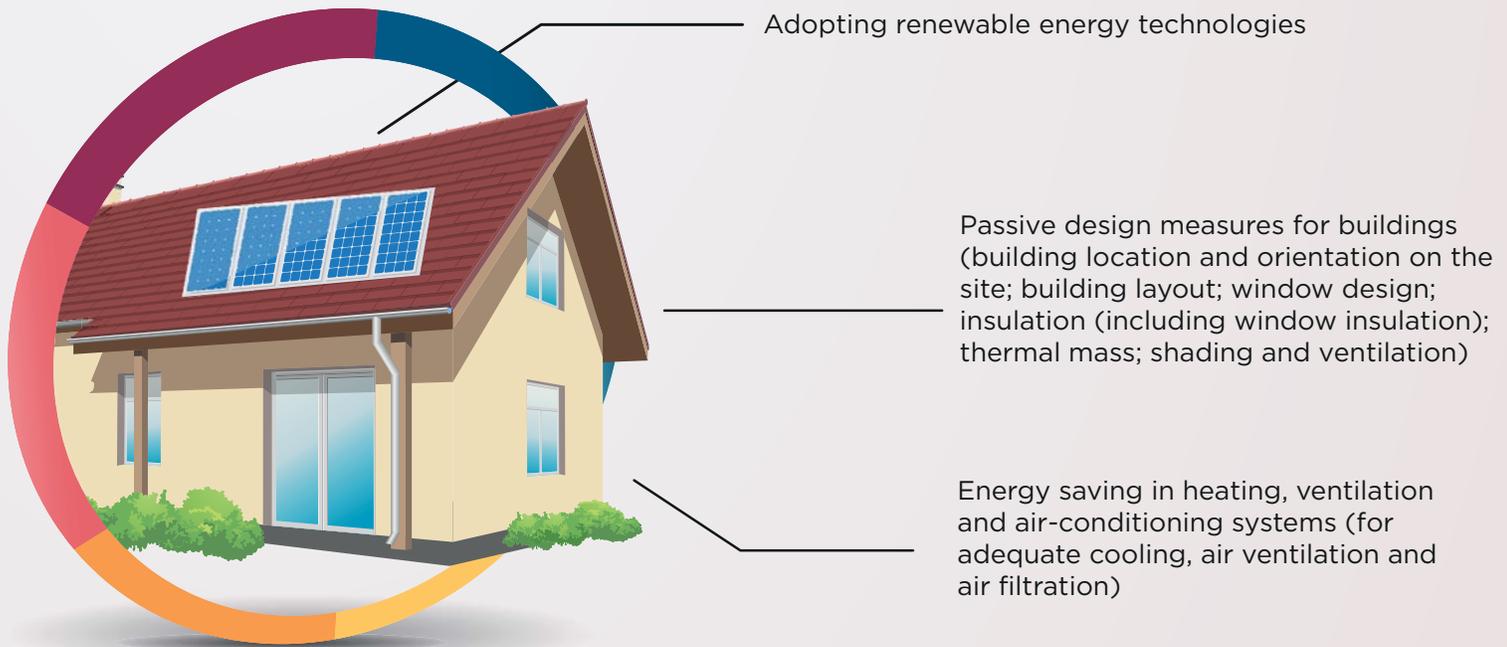
⁵What Are the Costs of Not Adapting to Climate Change? | Global Climate Change (climatelinks.org)

⁶Climate Change in Latin America and the Caribbean: Challenges and Opportunities (imf.org)

⁷European environmental agency "Assessing the costs and benefits of climate change adaptation" (March 2023).

ADAPTING BUILDINGS

FUTURE CONSIDERATIONS FOR BUILDINGS (NEW AND RETROFITTED) SHOULD INCLUDE:



Building adaptations can include:

- The use of **resilience-based measurement frameworks** and reporting standards, calling for users to assess climate risk and adopt resilient and adaptive strategies based on future scenario modelling of likely climate impacts
- The incorporation of **materials** that are better able to withstand the impact of likely future weather events, once the materials prioritise circularity principles and the use of low-embodied carbon materials
- The use of **off-grid electricity**, distributed microgrids and other sources of decentralised and resilient energy supply
- Implementing **passive design** and retrofit techniques to mitigate extreme heat or installing passive systems, including rooflights and reflective surfaces to increase solar gain



- Implementing **designs** to protect, collect and efficiently utilise natural resources such as rainwater collection apparatus, e.g. water wells and tanks, grey-water reuse systems, low-flow amenities, water-saving devices, building green and blue roofs or installing rain gardens to manage rainwater runoff with adaptive and native vegetation. Some of these measures have been implemented in the Caribbean, notably the Bermuda roof for potable water collection and the use of grey water in Barbados.

ADAPTING CITIES

IN RECENT YEARS, CITY PLANNERS HAVE ALSO BEGUN TO TAKE STEPS TO ADAPT URBAN SPACES TO CLIMATE CHANGE.

- **Urban microclimate interventions** (the addition of green spaces; changes to the albedo of the urban surfaces and water-based techniques as well as a combination of them)



- Setting **building regulations or guidelines** to target specific climate risk, e.g., guidelines to reduce storm damage

- Adopting **renewable energy systems**

- **Policies and financial incentives/penalties** to increase resource efficiency (water conservation) and to avoid unnecessary risks (regulation for woodburning, campfires and behaviour around flammable substances to reduce fire risk)

- The implementation of a **responsive regulatory toolbox** for gradual and extreme weather change events that enables adaptation activities across different scales and levels

- **Integrated and sustainable spatial planning** (urban development strategies and approaches used to design and plan the distribution of people, facilities, infrastructure, spaces and activities in set regions)

- A shift towards **sustainable behaviours** through campaigns and initiatives (buy-in at the local level)



- **Land use policies and regulations** to reduce/prevent development in high-risk areas and incentivise development in lower-risk ones

- Support of **sustainable and circular economy interventions** through public procurement and regulation of building and construction services

- Building **climate-resilient coastal infrastructure**, including the adaptation of drainage systems/seawalls and erosion-resistant roads. This can be useful in ensuring that communities such as those along the North Coast in Trinidad and Manzanilla are not cut off from the remainder of the country due to adverse weather.

- **Resilient and decentralised systems** to improve data reconciliation, reduce points of weakness and optimise resource distribution



PROGRESS

Overall, while there has been some movement to address the issue of adaptation of the built environment, there is still much more to be done. Within CARICOM, there is a framework for implementing adaptations to the built environment

through national policies, but tracking of the relevant indicators as a basis for policy is still a work in progress. While gathering the data can be difficult for SIDS, if countries have the right data, risk models and decision-making methods available, the incremental cost of building the resilience of new infrastructure assets is small — and far outweighed by the benefits.

Governments also need to set priorities for actions to make them consistent with available resources and capacity as well as set up robust institutional and legal frameworks and a consistent monitoring and evaluation system for measuring progress. ■



THE CARIBBEAN CASE FOR LNG

Estimated read time:  4 min



KEY TAKEAWAYS

LNG is a good fit for the Caribbean region because of clean energy and sustainability challenges associated with high-carbon fossil fuels and scaling renewable energy technologies.

Trinidad and Tobago is uniquely poised by virtue of its location and infrastructure to supply this market.

There is a pragmatic and realistic case for incorporating LNG as part of the energy transition in the Caribbean. While moving to sustainable energy has well-defined financial, social, environmental, and economic benefits, most governments in CARICOM face challenges with making a transition to renewables. Not all energy transitions look the same — one size does not fit all and this is true even in the Caribbean. Small Caribbean islands cannot adopt wholesale a standardised transition to renewables as they are all different in their physical characteristics and circumstances.

CARIBBEAN CHALLENGES

Most Caribbean economies — at least the net importers of energy — are characterised by high-debt levels and consequently have limited room for fiscal manoeuvring. Counter-intuitively, their relatively high incomes mean they cannot borrow at concessional interest rates or qualify for some categories of grant financing.

Apart from Trinidad and Tobago, Suriname and Guyana, Caribbean countries do not possess significant proven hydrocarbon resources. The remaining countries are net energy importers, with heavy fuel oil and

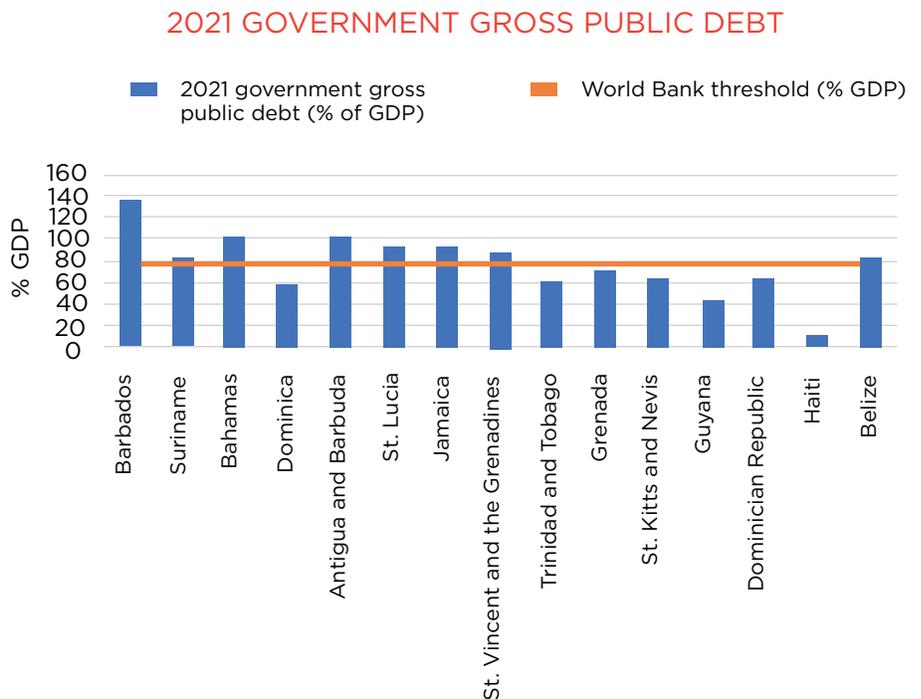


Figure 1: Caribbean external public debt, 2021 (% GDP)
Source: CEPAL, regional central banks.

diesel accounting for a significant percentage of the total needed for primary consumption in most of the islands.

Fuel prices can easily exceed 10% of government revenue for a Caribbean Small Island Developing State (SIDS) in a normal year, which is significant.

Above-ground electricity infrastructure is also vulnerable to hurricanes and other disasters. Moreover, electricity systems tend to run at low efficiency and equipment is often out of date. With limited fiscal wiggle room, most owners of Caribbean energy infrastructure are from outside the Caribbean.

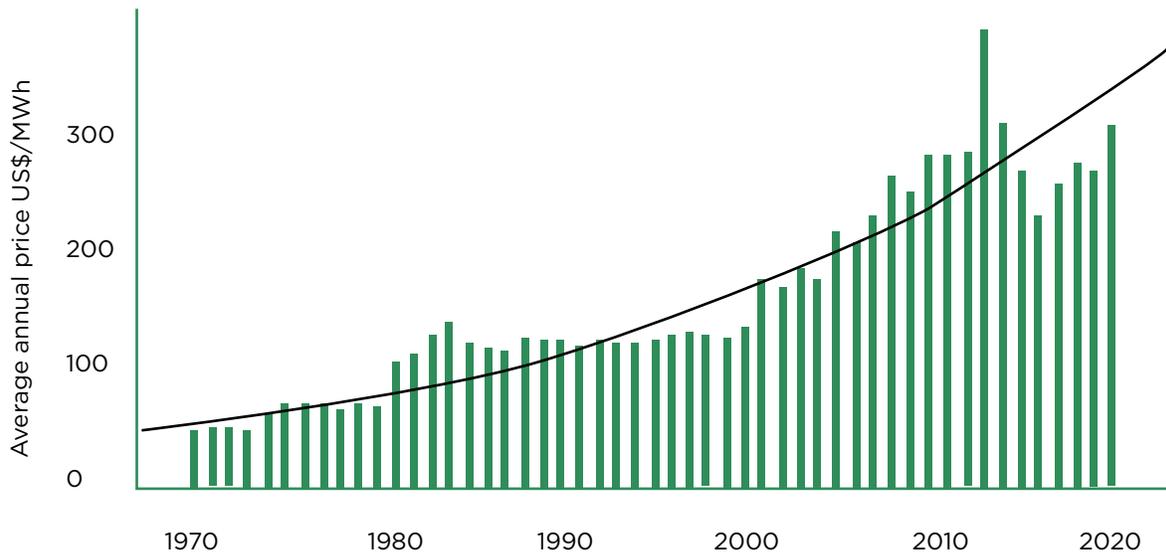


Figure 2: Caribbean electricity prices: 1970 - 2020

Source: Hubenergia

Other challenges, such as weak regulations and tariffs, limited infrastructure maintenance and persisting monopolies in transmission and distribution, contribute to the Caribbean having some of the highest electricity prices worldwide.

While new renewable installations may be less costly than fossil fuel options, when energy storage is added to the calculation, the value proposition vanishes. While rechargeable batteries have great future potential, costs have not yet fallen to the level that would make batteries viable for power supply throughout the night. Countries need dispatchable power sources that are controllable (generation source can operate to its maximum capacity or anywhere in between, depending on the needs of the system), firm (high confidence that the generation capacity is available as needed) and that have the required flexibility (power generation can ramp capacity up and down as needed to fulfill supply requirements).

Newer fossil fuel generation capacity in most of the smaller islands have been based around reciprocating engines for which the market has been rapidly expanding because of flexibility and performance benefits, including scalability and right-sized solutions, especially for applications in the 20-300 MW range (ideal for small island populations). Given the high cost of battery storage, even with an eventual transition to renewables, reciprocating engine power generation is likely to be retained for spinning reserve and

supplementing other energy sources. However, natural gas as LNG will still be needed for these engines.

While some countries can potentially utilise continuous renewables such as geothermal (Dominica) or hydropower, not all countries have that advantage because their renewable energy source is non-continuous. This is where LNG comes in.





ENTER LNG

CARICOM countries that want to eliminate the use of heavy fuel oil (HFO) and diesel but lack options such as geothermal and hydropower can choose natural gas as LNG to achieve lower emissions and cleaner power. Using LNG can extend the life of existing infrastructure at affordable and predictable costs (through long-term commercial contracts and the occasional spot sale), while LNG does not incur the storage issues of non-dispatchable energy sources.

Simply put, the need for dispatchable power and consistently supplied and stable night energy, along with the cost of new infrastructure and technical capability/capacity issues, limits the economically viable uptake of renewable energy technologies.

Trinidad and Tobago is uniquely poised by virtue of its location and infrastructure to continue to export LNG to both large markets, and eventually, to small-scale markets.

Even for Caribbean countries with geothermal and hydro resources, where 100% renewable power generation may be eventually feasible, natural gas can still play a role in the transition. For other net fuel importers, natural gas in the form of LNG can be a cheaper, cleaner substitute than the diesel and HFO currently used, at least until battery storage becomes competitive for sustained night-time supply. For these countries, that time is still far away. ■

NGC INTRODUCES ITS CLIMATE ADAPTATION AND RESILIENCE PORTAL (CARP)

Estimated read time:  7 min





KEY TAKEAWAYS

NGC has launched a new portal called CARP — the Climate Adaptation and Resilience Portal — to keep citizens abreast of climate change impacts and threats.

In the first instance, CARP will provide information and alerts on climate change-related risks such as sea level rise, coastal erosion and vulnerability, maritime alerts, bush fires, air quality, deforestation and other emerging threats that can disrupt our way of life in the Caribbean.



In a world of rapidly accelerating climate change and global warming, due in large part to greenhouse gas emissions (GHGs), and other man-made changes to ecosystems that affect the planet’s ability to effectively absorb and recycle carbon, Small Island Developing States (SIDS) such as the Caribbean are particularly vulnerable to climate change impacts.

The factors that make the region vulnerable include its geographic location, limited land area, abundance of sensitive ecosystems such as forests, mangroves, coral reefs and other natural habitats, high population density in coastal areas,

economic dependence on climate-sensitive sectors and limited access to resources for adaptation and resilience-building.

One key vulnerability of SIDS is their exposure to sea level rise. Many SIDS have low-lying coastal areas, making them highly susceptible to inundation and coastal erosion as sea levels continue to rise.

In its ‘2022 Sea Level Rise Technical Report’, the National Oceanic and Atmospheric Administration (NOAA) projected that over the next three decades, sea level rise in the Caribbean is projected to be, on average, 8 - 10 inches (0.2 - 0.25 metres). While this may seem small at first glance, this poses significant

risks to infrastructure, settlements and freshwater resources, as well as to the livelihoods and well-being of the population.

Sea level rise of 8-10 inches could have disastrous consequences on economic activities such as tourism, fishing, agriculture and farming, threatening the region’s ability to withstand planetary warming greater than 1.5°C. Coastal erosion for example, can lead to the loss of land, property, and infrastructure, impacting the viability of tourism, fisheries and other coastal-based industries. The economic impacts of coastal erosion can be substantial and may require investments in adaptation measures to protect vulnerable areas.

NGC introduces its Climate Adaptation and Resilience Portal (CARP) | CONTINUED

It is within this context of climate impacts to SIDS that NGC decided to develop its Climate Adaptation and Resilience Portal (CARP).

CARP seeks to build on the success of NGC’s CariGreen website which was launched in 2021. While CariGreen successfully brings together datasets and knowledge on climate change mitigation from around the Caribbean into one central location, CARP focuses on climate adaptation and resilience.

Adaptation, unlike mitigation, refers to the process of adjusting and modifying societal and natural systems to minimise the adverse effects of climate change. It involves developing strategies and implementing measures to reduce vulnerability and enhance resilience in the face of changing climatic conditions. Resilience is the capacity of a system to absorb shocks, adapt and recover from disturbances while maintaining essential functions and structures.

In the first instance, CARP will provide information and alerts on climate change-related risks such as sea level rise, coastal erosion and vulnerability, maritime alerts, bush fires, air quality, deforestation and other emerging threats that can disrupt our way of life in the Caribbean.

Using interactive Geographic Information Systems (GIS) technology, CARP will illustrate climate risks using maps, charts and other interactive tools to assist NGC’s employees and members of the public in making more informed decisions in their daily lives considering the evolving environmental conditions associated with climate change.

Figures 1-3: CARP screenshot comparison of Climate Projections for Sea Level Rise in parts of Northwestern Trinidad over the periods 2021-2040; 2040-2060; and 2021-2100.

Figure 1: 2021-2040



Figure 2: 2041-2060



Figure 3: 2061-2100



WHY IS IT IMPORTANT TO BECOME AWARE AND EDUCATED ON CLIMATE CHANGE IMPACTS USING TOOLS LIKE NGC'S CARP?

Education on climate adaptation and the impacts of climate change is crucial for increasing awareness, driving mitigation and adaptation efforts, fostering resilience, creating economic opportunities, promoting social equity, advocating for policy action and achieving sustainable development. By empowering individuals, businesses and society with knowledge and understanding, we can more effectively address the challenges of climate change and work towards a more sustainable and resilient future.



Here are some key reasons to become more climate-aware and educated using tools like NGC's CARP:



Awareness and Understanding:

Education plays a crucial role in raising awareness about climate change and its impacts. By providing accurate and accessible information, individuals can develop a better understanding of the challenges posed by climate change, including the need for adaptation strategies. This knowledge empowers individuals to make informed decisions and take appropriate actions to mitigate and adapt to climate change.



Mitigation and Adaptation:

Education is essential for driving both mitigation and adaptation efforts. It helps individuals and businesses understand the importance of reducing greenhouse gas emissions and adopting sustainable practices to mitigate climate change. Furthermore, education on climate adaptation equips individuals with the knowledge and skills to prepare for and respond to the impacts of climate change, such as extreme weather events, rising sea levels and changing ecosystems.



Resilience and Preparedness:

Education fosters resilience and preparedness at various levels. By educating individuals, businesses and communities on climate adaptation, they can develop strategies to enhance resilience, minimise vulnerabilities, and effectively respond to climate-related risks. This includes measures such as building resilient infrastructure, implementing early warning systems and developing emergency preparedness plans.



Economic Opportunities:

Education on climate adaptation and the impacts of climate change opens new economic opportunities. It enables businesses to identify and seize opportunities for developing and offering climate-resilient products and services.

Additionally, a well-informed workforce can contribute to innovation and the development of sustainable solutions, creating green jobs and promoting economic growth.

NGC introduces its Climate Adaptation and Resilience Portal (CARP) | CONTINUED

5.



Social Equity:

Climate change disproportionately affects vulnerable communities and exacerbates existing inequalities. Education can help address these disparities by promoting equitable access to information, resources and opportunities for climate adaptation.

By ensuring that education reaches all segments of society, including marginalised groups, it can empower communities to adapt effectively and reduce the social inequities associated with climate change.

6.

CALL to ACTION

Policy Advocacy and Action:

Education enables individuals and communities to advocate for effective climate policies and take collective action. Informed citizens can engage in discussions, participate in decision-making processes and hold policymakers accountable for implementing climate adaptation measures. Education also fosters a sense of responsibility and collective action, promoting behaviour change and community-based initiatives.

7.



Sustainable Development:

Education on climate adaptation and the impacts of climate change aligns with the principles of sustainable development. It equips individuals and businesses with the knowledge and skills necessary to balance environmental, social and economic considerations. By integrating climate change education into sustainable development practices, society can work towards a more resilient and environmentally conscious future.

NGC'S CARP WILL BE LAUNCHED SOON.
LOOK OUT FOR RELEASE UPDATES ON
NGC'S WEBSITE (**WWW.NGC.CO.TT**) AND
SOCIAL MEDIA PLATFORMS.

References

Brown, H., Tompkins, E. L., Malcolm, H., Schreckenber, K., & Corbett, J. (2021). Climate and development research in small island developing states: The benefits of a political ecology approach. In S. Moncada, L. Briguglio, H. Barnbrick, I. Kelman, C. Irons, & L. Nurse (Eds.), *Small Island Developing States: Vulnerability and Resilience Under Climate Change* (Vol. 9, pp. 35-53). (The World Small States; Vol. 9). Springer. https://doi.org/10.1007/978-3-030-82774-8_3

Cambridge Insights (2022). Why is education important in tackling climate change? Retrieved from <https://www.cambridge.org/news-and-insights/insights/why-is-education-important-in-tackling-climate-change>

C.C-L. Virgil et al.: Climate Change Adaptation Planning in Selected Caribbean Countries: Is Enough Being Done? 2022. Retrieved at https://sta.uwi.edu/eng/wije/vol4402-jan2022/documents/DOI_09_20013_v44n2p80-91CVirgil

NOAA (2022). 2022 Sea Level Rise Technical Report - Updated projections available through 2150 for all U.S. coastal waters. Retrieved at <https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html>

The World Bank (2022). The Adaptation Principles: 6 Ways to Build Resilience to Climate Change. Retrieved from <https://www.worldbank.org/en/news/feature/2020/11/17/the-adaptation-principles-6-ways-to-build-resilience-to-climate-change>

United Nations in the Caribbean (2022). Small islands are increasingly affected by climate change: IPCC report. Retrieved from <https://caribbean.un.org/en/173533-small-islands-are-increasingly-affected-climate-change-ipcc-report>



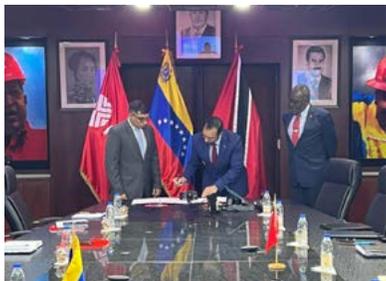


NGC GROUP HALF-YEAR HIGHLIGHTS





NGC signed an Amended and Restated Heads of Agreement (“HoA”) with Shell Trinidad and Tobago in January 2023, to facilitate the commencement of the Front-End Engineering and Design (FEED) phase for the Beachfield Manatee Upgrade Facility.



The US Government granted Trinidad and Tobago a two-year OFAC (Office of Foreign Assets Control) License for the development of the Dragon gas field located in Venezuelan waters.

NGC formed a joint working team with Heritage Petroleum Company Limited for onshore gas, and progressed the Cascadura pipeline between Touchstone’s upstream facility and NGC’s network.



In May, NGC signed a **Memorandum of Understanding (MOU)** with a consortium comprising Globus Energy Group Trinidad Limited, Corban Energy Group and Chester LNG LLC, to identify and screen technologies for micro and small-scale LNG development projects in the Caribbean.

NGC signed **Master Service Agreements (MSAs)** with Massy Energy Engineered Solutions and WorleyParsons Limited. Both MSAs will provide NGC with design engineering and project management services to support planning and implementation of strategic project initiatives.

In May, **NGC CNG Company Limited** achieved its highest monthly sales of 2.2 million litres of gasoline equivalent (lges). Sales for the period January to June 2023 were 24% higher than sales in the same period of 2022 (12.2 million vs 9.9 million lges).

NGC’s Infrastructure Projects Division completed the 16-inch Low-Pressure Switch Over (LPSO) project in the first quarter of 2023. This project involved diverting a section of the existing 16-inch low-pressure pipeline.

Several other projects were progressed through the first half of 2022:

- Charlieville Diversion Project - to replace a portion of the existing 16” Charlieville pipeline with a 24” pipeline, that will increase safety and reliability along NGC’s pipeline network
- The Alternate Gas Supply (TAGS) to the Trinidad Generation Unlimited (TGU) power plant project - to construct a 20” pipeline and metering station to provide an emergency gas supply to TGU
- Touchstone Cascadura project - to construct a 20” pipeline and gas receiving facility to allow for receipt of gas from the Cascadura facility

In May, **NGC CNG Company Limited** opened the 12th public CNG filling station in Trinidad, on Rushworth Street, San Fernando. This takes the total of public and fleet stations to 15.



In **February**, National Energy officially commissioned Trinidad and Tobago's first low-exhaust tug. The new 60-ton bollard-pull tug, named National Energy Resilience, is IMO Tier III-certified with technologies that reduce its nitrous oxides emissions by 80 per cent — making it the 'cleanest' tug operating in Trinidad and Tobago, and at this time, the 2nd in the region.



This **March**, NGC marked the official end of its reforestation programme - which was started in 2005 - with a ceremonial handover of the last of its project sites to the Forestry Division of the Ministry of Agriculture, Land and Fisheries.

NGC is extending its reforestation project into a broader programme called 'Beyond 315'. The first phase of 'Beyond 315' was kicked off in January with a five-day beekeeping workshop, which introduced the members of the Rio Claro Reforestation Group to facets of setting up a functioning apiary unit.

In **June**, LABIDCO launched its "Plant for a Purpose" Initiative, planting 181 trees on approximately 4,000 sq. meters of land of the La Brea Industrial Estate. This initiative will play an important role in offsetting greenhouse gas emissions and promoting ecological diversity within the Estate.



In **May**, LABIDCO and The University of Trinidad and Tobago completed the country's first-of-its-kind GHG emission inventory. The inventory was conducted on the Port of Brighton and included information on GHG emissions produced by vessels while anchored, maneuvering through the harbour, and berthed at the facility.

In **June** National Energy launched its Super ESCO Pilot Project, signalling the company's first step towards maximising energy efficiency within local manufacturing enterprises. The Bermudez Biscuit Company Limited signed a Letter of Interest with National Energy, as the first manufacturing company to participate in the Pilot Project.



NGC and National Energy partnered with the Ministry of Labour's On-The-Job (OJT) programme to facilitate work-based training for nationals of Trinidad and Tobago who recently completed their University degrees across various disciplines. Graduates will be mentored and trained over the next two (2) years in areas related to The NGC Group's Green Agenda.

In **June**, NGC introduced its new Climate Adaptation and Resilience Portal (CARP).



National Energy hosted its first Secondary Schools Energy Sustainability Debate competition. Out of 23 secondary schools, four schools participated in the finals in front of a live audience, with Presentation College, Chaguanas emerging as winner. Holy Faith Convent, Couva placed 2nd, SWAHA Hindu College placed 3rd, and Naparima College placed 4th.

In commemoration of **World Earth Day 2023**, National Energy launched its Recycling Hub Project at its Tug Mooring facility with the installation of Trinidad and Tobago's first solar-powered waste compactor. The project also included the installation of marine smart recycling bins and collection bins. The Recycling Hub Project will allow National Energy to identify, quantify, and measure the volume of waste generated, thus ensuring compliance with local environmental legislation.

ON THE GREEN AGENDA



The **NGC Group** participated in several conferences and exhibitions:

- Trinidad and Tobago Energy Conference
- AMCHAM Women’s Conference
- AMCHAM ESG Conference
- Arthur Lok Jack Graduate School of Business Distinguished Leadership & Innovation Conference
- Caribbean Renewable Energy Forum (Florida)
- Caribbean Sustainable Energy Conference
- Suriname Energy Oil and Gas Summit and Exhibition (Suriname)
- LNG2023 (Canada)



In **February**, the Honourable Minister of Energy and Energy Industries and Minister in the Office of the Prime Minister, Stuart R. Young MP, attended a special NGC Board meeting at the company’s Head Office. The visit was the Minister’s first since he assumed office in 2021.

In **March**, NGC resumed its Annual Technical Meeting — a staple event on the pre-pandemic corporate calendar, which allowed the company to share operational and strategic updates from its business with its line ministry and other key stakeholders.



National Energy, under the direction of the MEEI, hosted the first ever Trinidad and Tobago Pavilion at the 2023 Suriname Energy Oil and Gas Summit. The Pavilion provided a platform for several local energy and energy-services companies to promote their products and services. NGC, PPGPL and LABIDCO also participated.

NGC supported the Ministry of Education (MOE) with a laptop procurement exercise through iGovTT. Using its e-auction tool, the company facilitated the purchase of 8,000 laptops at a cost which resulted in millions of dollars of savings for the MOE.

NGC hosted an event to share its Asset Integrity Management (AIM) journey and lessons learnt with stakeholders in April 2023.



NGC’s sponsored bands – **NGC Couva Joylanders and NGC Steel Xplosion** – delivered exceptional performances at Panorama 2023, finishing **2nd and 9th** respectively in the Medium Band category at the event finals in Tobago.

In **February**, NGC CNG partnered with online learning specialists Pennacool.com to distribute over 100 SEA practice test booklets to students at five primary schools.



NGC’s Inspire-to-Achieve (I2A) programme won the Energy Chamber’s Best Social Investment Award 2023 at the Trinidad and Tobago Energy Conference.



NGC signed a **Memorandum of Agreement (MOA)** with The University of Trinidad and Tobago (UTT), to implement a scholarship programme for the Tier I student-athletes of NGC/NAAATT Youth Elite Programme (YEP) who are interested in pursuing a tertiary education at the university.

One Moment Please



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

A row of pink Poui trees in the Queen's Park Savannah in Port of Spain.



THE NGC GROUP OF COMPANIES
