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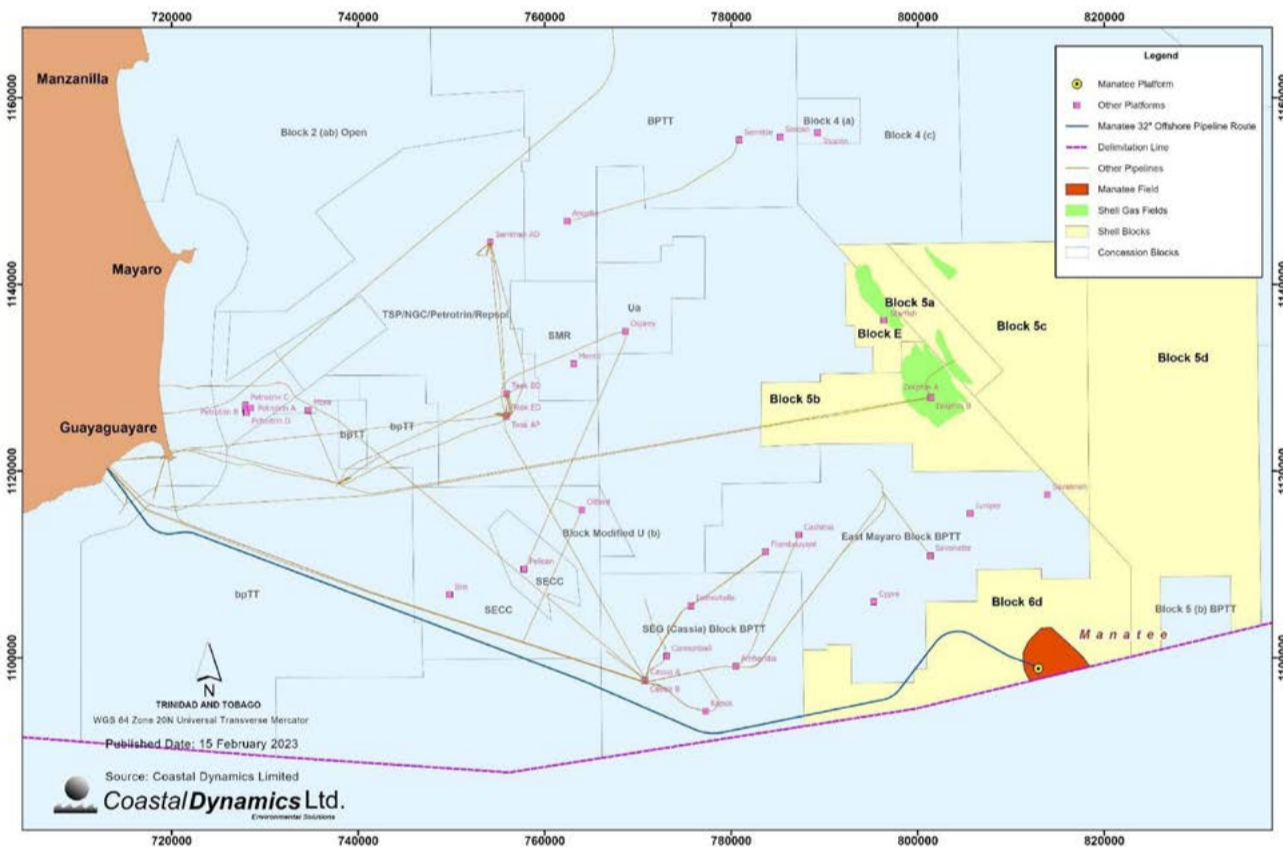
A publication of the Energy Chamber of Trinidad and Tobago

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Issue 45 September 2023

Shell seeks environmental clearance for Manatee project

Shell has formally begun the process of seeking environmental clearance for the highly anticipated Manatee project, though the submission of an application for a certificate of environmental clearance to Trinidad & Tobago's Environmental Management Authority (EMA).



Offshore components - Manatee Development Project (Source: Shell CEC application)

**MINISTER RECEIVES UPDATE ON CALYPSO DEEPWATER PROJECT
 RAMPS LOGISTICS AND FLYING SHIP CHART NEW HORIZONS
 EU REACHES 90% GAS STORAGE
 TOUCHSTONE PROVIDES ORTOIRE OPERATIONAL UPDATE**

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UPSTREAM OPERATORS FORUM

September 20th 2023

The Upstream Operators Forum is a **members-only** event hosted by the Energy Chamber, where the major upstream operators in T&T share asset updates and information on upcoming projects and activities. This information is intended to be used by energy services companies to adequately prepare to take advantage of the opportunities that may present themselves in the short- and medium-term.

During the forum, supply chain teams from the operators will also be available in virtual breakout rooms where they will field one on one questions with participants.

Activity updates by



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Shell seeks environmental clearance for Manatee project

(continued)

The EMA is the environmental regulator and for the project to advance a certificate of environmental clearance (CEC) must be granted.

Manatee is the Trinidad and Tobago portion of the giant Loran-Manatee field that straddles Trinidad and Tobago's maritime boundary with Venezuela. The combined Loran-Manatee field has an estimated resource of 10.04 trillion cubic feet (tcf) of natural gas, of which 2.712 tcf is within the Manatee portion. The Manatee field is located around 100 km off the east coast of Trinidad in an average water depth of 105 m (340 feet). Manatee will be largest new east coast field development in recent years. It is expected to sustain gas supplies to both domestic and export markets and has the potential to enable future growth opportunities.

As part of the CEC process, Shell has made extensive information about the project available to the public for comment. The Manatee project is a major one, and the local and international energy industry is keeping a close eye. Offshore Technology reports that the project will cost approximately US\$1.8 billion. At the time of CEC submission, Shell anticipates first gas by Q1 2028. It is anticipated that the execution phase of this project is approximately 3.5 years; 2.5 years of site operations with an operations phase of 13 years.

The Manatee field has had a long history. Exploration and appraisal activities began when Loran-Manatee was discovered in 1983 and subsequently appraised via four wells. Reservoir depths range from 2,000 to 4,500 ft true vertical depth subsea (TVDS) with an associated pressure range of 980 to 2,100 psi.

Back in 2010, a unitisation agreement was put in place for the Loran-Manatee field, which would have allowed joint development of the entire field as one project. The agreement was terminated in 2019 and the governments of Trinidad and Tobago and of Venezuela agreed to the independent development by each nation of the portion of the field that falls within its respective marine area.

In 2021, Trinidad and Tobago Prime Minister Dr. Keith Rowley said: "The decision to proceed independently on the development of the cross-border fields created the opportunity for the government as resource owner and for Shell as contractor to monetise what would be one of the country's largest natural gas fields to date."

Shell is the operator of the Manatee field with a 100% working interest under the renegotiated sub-block Block 6d Production Sharing Contract (PSC). The company indicated that the recovered hydrocarbons from Manatee would be delivered by drilling eight new development wells from a new, normally unmanned offshore platform from which gas and condensate would be delivered to shore via a new gas pipeline. The hydrocarbons would be processed at National Gas Company's (NGC) existing Beachfield Facility and delivered for sale to both export and domestic markets.

The Shell submission to the environmental regulator highlighted 6 key elements of the project.

The company seeks to drill 8 new horizontal, open-hole gravel packed wells using a Class 1 Jack-up rig. These will be horizontal, single zone, open-hole gravel packed wells producing at a plateau rate of up to 900 mmscf/d.

In addition, Shell will install and commission a new offshore platform. The platform is expected to be unmanned and controlled from shore via a new fibre-optic cable. The platform will incorporate a 12-slot well-bay and a helideck and will carry out minimal topside processing as follows: product separation, gas and condensate metering, and produced water treatment.

A new 112 km, 32" pipeline will be installed from platform to shore, which includes a 3 km onshore segment to deliver hydrocarbons to the existing Shell-operated but NGC-owned Beachfield Gas Facility for processing.

As part of the project, the Beachfield Facility will be upgraded to increase facility throughput capacity to one billion cubic feet per day (1 bcf/d). This will involve the installation of a new Manatee gas separator and metering skids.

Onshore, there will also be installation of downstream pipelines to deliver Manatee gas to nearby networks, namely the Cross Island Pipeline (CIP) the domestic system for sale and onward transportation to market.

In March 2023, it was reported that McDermott was awarded a front-end engineering design (FEED) contract from Shell Trinidad and Tobago Limited for the Manatee gas development project as part of a competitive FEED process. Under the contract scope, McDermott will provide comprehensive FEED services for a wellhead platform, export pipeline system, shore approach, midstream pipeline and onshore control room.

Shell is currently the second-largest natural gas producer in Trinidad and Tobago and produces approximately 750 mmscf/d. The present national natural gas production is 2.5bcf/d. Production has been falling over time and this has severely affected the downstream petrochemical and LNG export industry. The industry is certainly eyeing the new gas from the Manatee field to alleviate some of the effects of gas curtailment in Pt. Lisas and at Atlantic LNG facility. In addition, the industry hopes to see other major projects delivered, such as Woodside's Calypso deepwater gas development. The Energy Chamber has been working with the government to ensure that fiscal terms encourage development of these large-scale projects and continues to encourage swift decision-making and streamlining of the approval processes to encourage quick delivery of projects and ultimately securing delivery of natural gas for the downstream industry.

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The Honourable Stuart R. Young
 Minister of Energy and Energy Industries and Minister in
 the Office of the Prime Minister

Minister receives update on Woodside's Calypso deepwater project

Staff Writer | Energy Chamber

The Ministry of Energy and Energy Industries has indicated that Minister of Energy and Energy Industries and Minister in the Office of the Prime Minister, The Honourable Stuart R. Young, MP, met with Woodside Energy executives on August 22, 2023 for an update and discussion on the Calypso deepwater project.

Minister Young, together with Permanent Secretary, Sandra Fraser (Ag.), engaged in substantive discussions on the technical and commercial aspects of the Calypso natural gas project with Woodside Energy's Kellyanne Lochan, Country Manager (Ag.); Woodside Energy, Trinidad and Tobago's Stacy Patrick, Project Director, Calypso; Onne Peters, VP Atlantic Sales; Ross Wildy, VP Commercial Exploration & Development; and Sheldon Narine, Senior Advisor, Corporate Affairs.

Minister Young reiterated the significance of the project and its importance not only to deepwater resource development but also to the future beneficial growth of Trinidad and Tobago's energy sector and the overall energy security of the region.

The Woodside executives provided insightful updates on the project and the parties discussed an aggressive timeline aimed at bringing first gas to market as soon as possible.

Country Manager (Ag.), Kellyanne Lochan, expressed gratitude for the Minister's contributions and the Ministry's willingness to engage with Woodside to further the project. The Calypso deepwater project is located 250 km off the East Coast of Trinidad in 2,200 m water depth.

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Operational and market challenges in 2023 moderate TTNGL performance

Staff Writer | Energy Chamber

Trinidad and Tobago NGL Limited (TTNGL) has published its financial results for the period ending June 30, 2023, which reflects operational and market challenges impacting its underlying asset, Phoenix Park Gas Processors Limited (PPGPL).

The financial performance and revenues were adversely impacted by external market factors. Natural gas liquids (NGL) prices continued their declining trend in 2023 and were 37.7% lower than prices recognised in the comparable period of 2022. A warmer U.S. winter weakened demand for NGLs, and a combination of higher U.S. NGL production and falling exports kept U.S. NGL inventories above the five-year average. Both factors served to dampen NGL prices, which accounted for over 60% of PPGPL's year-to-date sales revenue variance at June 2023.

In the domestic market, NGL sales volumes for the period up to June 2023 were 39.7% below 2022, because of lower NGL production. This was due to a planned twenty-day facility-wide turnaround for maintenance activities, as well as ongoing domestic gas supply challenges, which resulted in 25% lower production when compared to Q2 from 2022. Higher feedstock costs also significantly impacted the performance of PPGPL when compared to Q2 2022.

Notwithstanding, TTNGL recorded a healthy after-tax profit of TTD\$14.6 million in the first quarter; however, results from the second quarter led the company to post a year-to-date loss after tax of TTD\$2.8 million at the end of June. This performance was primarily derived from TTNGL's investment in PPGPL, which recorded a loss after tax of USD\$0.8 million for the first half of 2023.

Positively, PPGPL's North American-based subsidiary Phoenix Park Trinidad and Tobago Energy Holdings Limited's (PPTTEHL) sales volumes for the review period stood at 15,205 barrels per day, 3.8% above the 2022 level, although its earnings were dampened by lower demand. Additionally, margins per gallon for this segment remain robust.

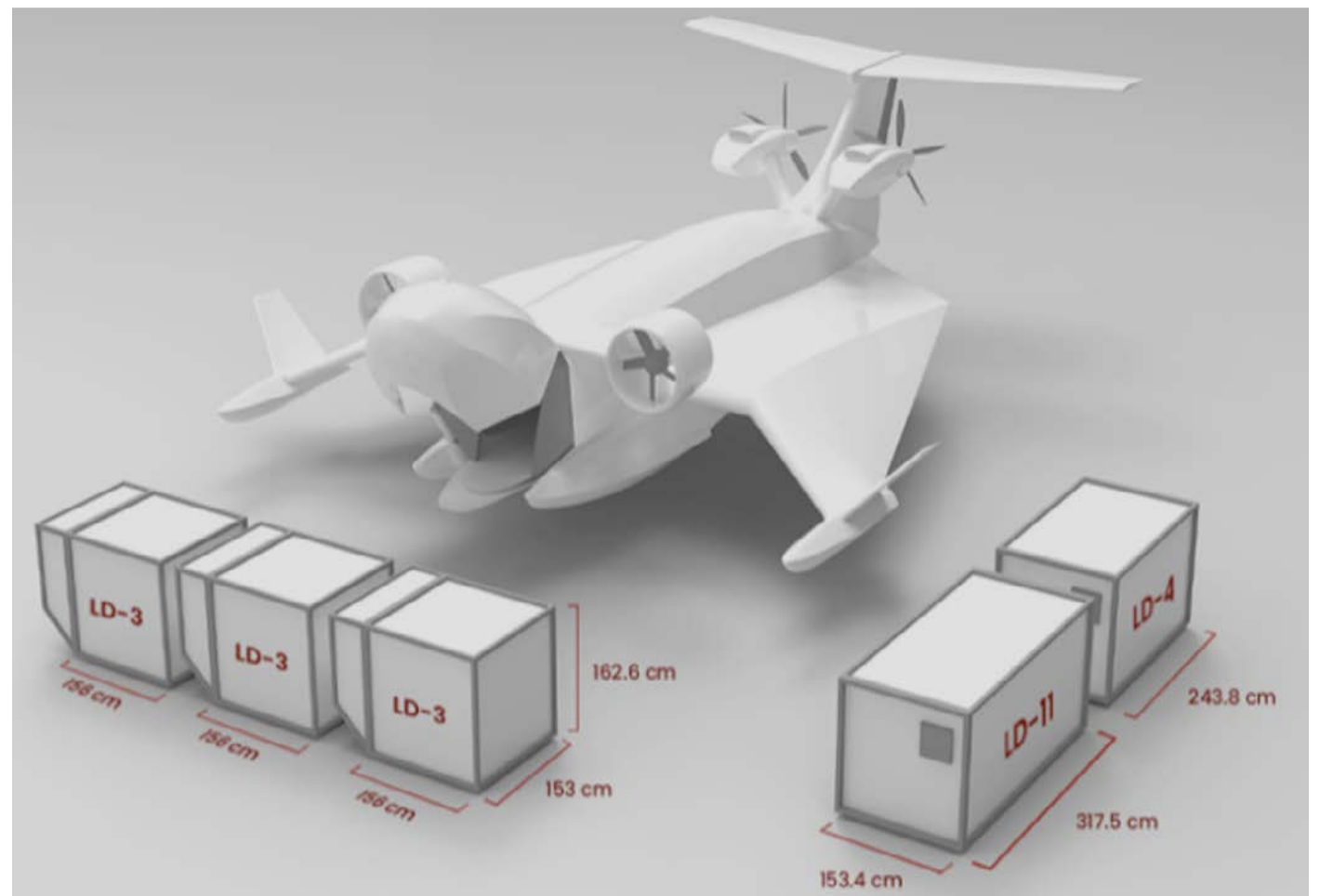
Commenting on the half-year results, TTNGL Chairman Dr Joseph Ishmael Khan noted the challenges facing the company and the efforts being made towards recovery:

"TTNGL is an energy-based stock, and the reality is that the world's increasingly unstable climate, shifting market demand, and gas supply uncertainties will inevitably put pressure on margins in our business. However, shareholders can rest assured that PPGPL is undeterred in its mission to grow long-term value through cost rationalisation, customer focus, market expansion and retention, and building operational efficiency.

"Moreover, the wider NGC Group to which both PPGPL and TTNGL belong continues to evolve and adapt its business model, making significant strides on its journey to become a successful, diversified, and global clean-energy brand. All resources are being devoted towards restoring and maximising profitability across The Group."

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Ramps Logistics and Flying Ship Technologies chart new horizons: revolutionising the future of sustainable log-tech shipping



Flying Ship modelling (www.flyingship.co/flying-ships)

Staff Writer | Energy Chamber

Ramps Logistics Limited has signed a letter of intent with Flying Ship Technologies, Corp to introduce unmanned, autonomous, eco-friendly, wing-in-ground-effect vessels, or "Flying Ships" to the Caribbean and South America. Ramps Logistics indicated that this innovative collaboration would revolutionise shipping in the region by decreasing vessel costs, significantly cutting shipping time, and reducing the company's carbon footprint.

Ramps Logistics is a technology-driven company, always searching for innovative ways to revolutionise logistics processes. The company is taking steps to connect the Caribbean and South American countries like never before, leveraging the proximity of these nations to facilitate smaller demands for shipping. This collaboration beckons a new era in logistics and supports CARICOM's agenda to make the trade of goods within the region more accessible.

In expressing his excitement for the upcoming project, CEO of Ramps Logistics, Shaun Rampersad, said, "This project will be critical to connecting the Caribbean and South America by facilitating the movement of commodities, bridging the gap within CARICOM." He added, "The Flying Ships will significantly cut costs and shipping times, with the vessels being ten times faster than boats and one-quarter of the cost to maintain and operate compared to planes."



Ramps Logistics' adoption of Flying Ships' advanced wing-in-ground-effect vessels marks a pivotal move towards eco-friendly and efficient shipping. These "Flying Ships", which fly close to the surface, use less fuel and offer faster speeds. Combined with autonomous features, they promise enhanced shipment efficiency and reduced human errors. As global markets demand quicker and more eco-friendly delivery methods, this partnership demonstrates a commitment to staying ahead of the curve and leading the way in sustainable, fast-paced logistics.

Bill Peterson, CEO of Flying Ships, said, "Ramps Logistics is going to create a high-speed distribution network using Flying Ships across the CARICOM that will enable delivery-van-sized payloads to virtually anywhere with a coastline. As a disruptive pioneer, they are one of the first adopters of our revolutionary capability. Their forward-leaning company envisions a future with a

thriving, internationally connected economy across the Caribbean and Americas."

The collaboration between Ramps Logistics Limited and Flying Ship Technologies, Corp heralds a new era in log-tech (logistics technology), focusing on innovation, efficiency, and sustainability. Born from discussions at the Caribbean Investment Forum (CIF) 2022, this partnership will be proudly announced at CIF 2023. Beyond reinforcing the united objectives of both entities, this alliance offers an inspiring look into a future where advanced logistics technology and environmental consciousness merge. As the world watches, this partnership is set to pave the way for the next big leap in logistics and shipping, redefining the way goods are transported across regions.

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EU reaches 90% gas storage target ahead of winter

Staff Writer | Energy Chamber

The EU has reached its target of filling gas storage facilities to 90% of capacity roughly 2.5 months ahead of the November 1 deadline, according to the latest figures released today by Gas Infrastructure Europe. Aimed at optimising EU preparation for the coming winter, the gas storage regulation of June 2022 set a binding EU target of 90% filling storage facilities by November 1 each year, with interim targets for EU countries. Gas storage is key for security of supply in Europe as it can cover up to one-third of the EU's gas demand in winter. The figures published today show that gas storage levels have reached 1,024 TWh or 90.12% of storage capacity (equivalent to just over 93 billion cubic metres (bcm) of natural gas).

European Commissioner for Energy, Kadri Simson said, "Today's confirmation that we have met our gas storage requirements so far ahead of schedule underlines that the EU is well-prepared for winter and this will help to further stabilise markets in the coming months. The EU energy market is in a much more stable position than it was this time last year, in good part because of the measures we have taken at EU level. But we have seen in recent weeks that the gas market remains sensitive. The Commission will continue to monitor the situation, so that

storage levels remain sufficiently high as we enter the next winter. Let me recall that we can further strengthen our position through investments in renewables and energy efficiency."

The EU has taken a wide range of measures following the energy crisis triggered by Russia's invasion of Ukraine to be better prepared for the winter. The gas demand reduction regulation (August 2022) stimulated a 18% drop in gas consumption from August 2022 to May 2023, and has now been extended for a further year. In terms of finding alternative sources of gas, the Commission has spearheaded a concerted international outreach for alternative gas supplies—notably in the form of Liquefied Natural Gas (LNG). In addition, the EU Energy Platform (through #AggregateEU) has already hosted two calls for joint purchases of gas, with a third call to be launched in the second half of September. Key investments at the EU and national level have also increased the EU's LNG import capacity and reinforced the resilience of the EU gas system.

On the EU Energy Platform, Vice-President of the European Commission Maroš Šefčovič said, "The two first calls for joint purchasing of gas had very positive results, with a total combined of 22.9 bcm of gas demand matched by supply. I am pleased that

the EU Energy Platform contributed to the EU reaching its target for gas storage early on and more generally to EU energy security ahead of the winter. It shows that we can have significant added value by joining forces, pooling our demand, and working together to guarantee stable and affordable gas supplies to the EU market."

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Touchstone provides Ortoire operational update

Staff Writer | Energy Chamber

Touchstone Exploration has provided an update on the Royston-1X well production testing, commissioning of the Cascadura natural gas and liquids facility, and operations at Coho. Touchstone has an 80% operating working interest in the Royston-1X sidetrack well and the Cascadura and Coho fields, all of which are located on the Ortoire block onshore in the Republic of Trinidad and Tobago. Heritage Petroleum Company Limited holds the remaining 20% working interest.

Royston-1X

The company has completed its programme of five production test intervals at Royston-1X. Touchstone is currently evaluating the uppermost prospective intervals in the Herrera and Karamat formations. The well is shut-in while awaiting the arrival of a service rig which will be used to put the well on pump to facilitate further testing.

As previously reported, the lowermost section of the Royston-1X well in the subthrust sheet of the Herrera Formation was initially completed at depths between 11,102 and 11,168 feet. Swabbed oil volumes were analysed by a third party confirming between 34.1 to 40.0° API gravity formation crude oil, representing the deepest oil encountered on the Ortoire block to date. The maximum shut-in pressure observed at surface was 2,534 psi, however, this section of the formation was interpreted to have a low permeability reservoir.

The second production test evaluated the subthrust sheet of the Herrera Formation at depths between 10,604 and 11,020 feet. Light, sweet oil was recovered measuring 35.4° API gravity. The maximum shut-in pressure observed at surface was 2,450 psi. Similar to the first testing interval, the formation exhibited a low permeability reservoir with minimal natural oil flow to surface. Touchstone suspended the first two intervals with a retrievable plug, allowing us the opportunity to re-evaluate the subthrust sheet at a further date for potential fracture stimulation.

The third production test evaluated the intermediate sheet in the Herrera Formation at depths between 10,220 and 10,314 feet. 38.3° API gravity crude oil was encountered, with a maximum shut-in pressure observed at surface of 2,331 psi.

The fourth production test evaluated the overthrust sheet in the upper Herrera X Formation at depths between 9,591 and 9,662 feet. 38.1° API gravity oil was encountered, with a maximum shut-in pressure of 2,438 psi.








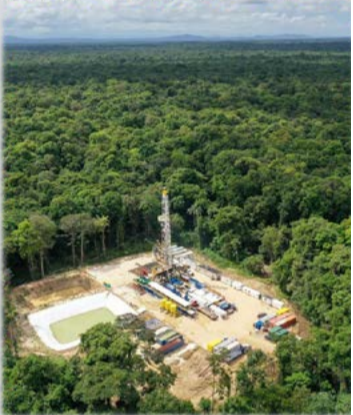
The final production test targeted the Karamat Formation at depths between 9,318 and 9,346 feet. Once again, light, sweet oil was recovered with a maximum shut-in pressure observed at surface of 2,230 psi.

Royston commerciality

Although high reservoir pressures were observed during each of the production tests, minimal natural flow to surface was observed, indicating low permeability. As a result, Touchstone has now commingled the three

Exploration Upside – Ortoire Block

Utilizing our expertise of the regions geological and reservoir characteristics

 Coho-1 Gas discovery	 Cascadura Gas discovery	 Royston Light oil discovery	 Ortoire Prospects
			
Q1 2023 net production (boe/d) 854	Est. initial net production (boe/d) ₍₁₁₎ 9,200	2P Reserves (Mboe) ₍₅₎ 3,520	3 - 8 development prospects at Cascadura ₍₁₀₎
2P Reserves (Mboe) ₍₅₎ 3,428	Net incremental optimization potential (boe/d) ₍₁₁₎ 3,067	Best estimate TPIIP (MMbbls) ₍₅₎ 165.7	Kraken ₍₁₂₎
2P before tax NPV10 (\$MM) ₍₅₎ 20.9	2P Reserves (Mboe) ₍₅₎ 52,082	Royston Sidetrack (Royston-1X) Testing	20 additional exploration prospects ₍₁₂₎
Future development drilling	2P before tax NPV10 (\$MM) ₍₅₎ 603.3		

(touchstoneexploration.com)

“Looking forward to the commencement of commercial production from the Cascadura facility, we now have in place the infrastructure to process and monetise all future potential drilling successes on the Ortoire block.” (Paul Baay)

uppermost prospective intervals and is waiting for a service rig to place the well on pump. We expect that once the well is pumping, the hydrostatic pressure on the reservoir will be reduced, allowing the formation fluid to produce at increased rates. A further update will be provided following completion of the final evaluation of the three uppermost prospective intervals.

Cascadura

The Cascadura facility has been designed for a maximum gross production capacity of approximately 200 mmcf/d and 5,000 bbls/d of associated liquids, with a current gross production capacity of 90 mmcf/d and 2,250 bbls/d of associated liquids (17,250 boe/d).

The facility is currently undergoing final commissioning with natural gas from the Cascadura-1ST1 well being used for the initial systems start-up and equipment testing. Upon completion of the commissioning of the Cascadura facility, the company will begin to introduce natural gas and associated liquids from both the Cascadura-1ST1 and Cascadura Deep-1 wells.

The current commissioning status of the Cascadura facility is as follows:

- testing of the flare system has been successfully completed
- introduction of fuel gas to the recycle compressors has occurred
- introduction of fuel gas for the generators to provide power to the site has been established
- all safety devices and equipment have been tested and are functioning
- testing of all electronics, alarms, and systems at the facility to ensure full functionality is 99% complete.

Touchstone anticipates initial sales volumes during the week of August 28, 2023.

Coho

Since the Coho facility commenced commercial production in October 2022, the Coho-1 well has produced a total of approximately 2 Bcf of gross natural gas and generated over USD\$4 million in gross natural gas sales. The Coho facility has achieved 99.9% uptime performance with the majority of the downtime associated with third-party processing issues. The Coho-1 well is currently being restricted on a 34/64-inch choke to manage flowing pressures. In May 2023, the company performed a downhole production test that indicated the well could be optimised

by reconfiguring the producing reservoir intervals. The company will commence this operation once the Cascadura facility comes onstream. Additionally, Touchstone has been approved to drill two additional wells from the existing Coho location with the intent to fill the facility to its maximum gross operating capacity of approximately 24 mmcf/d of natural gas (4,000 boe/d).

Paul Baay, President and Chief Executive Officer, said, “Testing of the Royston-1X well was undertaken in a methodical manner to provide a comprehensive evaluation of the prospect. The flow and build-up tests for each interval has provided us with information that could be used for future stimulation of the well to optimise recovery and production rates. The fact that we have recovered light oil and significant pressures on each test is encouraging. We now need to evaluate the mechanics of how to produce the well at economically sustainable rates. By putting the well to pump for an extended period, we will be able to determine both the economics and viability of future operations, which could include artificial stimulation of the reservoir.

“Looking forward to the commencement of commercial production from the Cascadura facility, we now have in place the infrastructure to process and monetise all future potential drilling successes on the Ortoire block. This has been a long process, but we have now put in place the building blocks for a fully funded, full-cycle exploration and production strategy.”

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Ministry of Health to collaborate with the Energy Chamber to host National Blood Drives

Staff Writer | Energy Chamber

In an effort to increase the number of voluntary blood donors locally, the Ministry of Health will partner with the Energy Chamber of Trinidad and Tobago to host a series of blood donation initiatives.

The Honourable Terrence Deyalsingh, Minister of Health, and other senior officials of the Ministry, recently met with President of the Energy Chamber of Trinidad and Tobago, Dr. Thackwray Driver and CEO of Heritage Petroleum, Erik Keskula to discuss partnering with the Energy Chamber to embark on a three-day blood drive, set to begin in October.

This is in keeping with the Ministry of Health's initiative to transition the national blood donation system from a replacement donation to one that is based on 100% Voluntary Non-Remunerated Blood Donation (VNRBD). The Ministry is working towards its strategic goal and vision of an altruistic blood donation system by encouraging all members of society to register and become voluntary non-remunerated blood donors for the good of the country.

The Minister noted the importance of the collaboration because of the extensive reach the chamber has within the energy sector.

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An idea

Michael J. Shand | Contributor

An idea.

Not everyone is on the same page—neither the ‘business as usual’; ‘time for change’ nor the ‘and—not or’ page. Are the divisions across industry a reflection of the global community or is the global community a reflection of industry? Which is the cause, which is the effect; what is a need versus what is a want—and does it matter? The truth is, our planet is in trouble.

Our generation, the working class generation that saw the evolution from the black and white screen to colour; film to digital; post—mail to email; the dot matrix printer to paperless; fiction to reality, universally has a common thread we can tug on—change. The precursor would argue effectively, which came first, the chicken or the egg? I’m of the opinion now, that that question in itself is a philosopher’s luxury and I have deduced that it really doesn’t matter.

What does matter is that change has come and not a minute too soon. It is humanity though, that drives us to determine how we exercise change in its implicit nature. Whatever the driver has been for your business and the industry, ES&G and its constitution is now resident in our policies and operations.

In the not-so-distant past, Stork decided to tether our Company’s ideology directly to our E,S&G principles and revised our

mission and purpose to ‘Maintaining A Better World’. What gives me pride in this redefined position is its truth—it doesn’t matter which came first. For Stork, if it doesn’t align with our Purpose, Ambition and Values, we aren’t doing it at all. This is why our Ethics & Compliance policies establish at the baseline, synonymous expectations of our employees and our strategic partners.

What we stand for by now is well known. Our views on Investing in ES&G and Private - Public Partnerships are communicated widely. How we aim to achieve these objectives is etched into our suite of services and how we deliver them. At its foundation, our Value Proposition demonstrates introspection and action to decarbonise our operations whilst in pursuit of executing our client’s needs responsibly. Across industry, carbon reduction through capture and sequestration grows in demand and our Capabilities continue to mature in this space, geared toward meeting this essential demand.

Effectively, as a Brownfield Modification, Installation and Maintenance Company, we keep assets running at peak performance by supporting all phases of the asset life cycle. Backed by our portfolio of professional solutions, whether it be Clean Industrial Asset Management, command of the Hydrogen discipline and Fugitive Emissions technologies, we continuously strive to improve client operational performance.

When we shared our Sustainability Charter with just about everyone, we did so with the intent of casting aside the rhetoric of division

across industry and asked those receiving it to commit to one simple task—do it better. Let us learn from how you improve on our charter and collectively let’s partner in redefining what excellence looks like in the 21st century.

Unfortunately, not many have answered to this call to action. We continue to challenge our partners and other stakeholders in this plight, and invite all to rise to the occasion. This is not a divide and conquer scenario. While the Operator class has engaged the service providers asking for inputs supporting Net Zero and similar targets and objectives, the target categories are so vast and wide that

the task can appear to be a daunting one. The undertaking is massive and while we remain divided by the mantle of competitiveness among the service providers and the diverse target areas having an equally diverse set of demands, the question could be asked—how far will we truly get if not working together?

As a matter of National Policy, “Trinidad and Tobago has committed in its Nationally Determined Contribution (which is up to the year 2030) to a reduction in overall cumulative emissions from the three main emitting sectors (power generation, industry and transportation) by 15% by 2030 which, in absolute terms is an equivalent of one hundred and three million tonnes (103,000,000) of carbon dioxide equivalents or CO₂-e.”

The idea.

This National Policy is no small feat. However, one hat doesn’t fit all. Not all



Michael J. Shand

contribute to the emission rates equally. This is further defined as large quantity generators (LQGs), small quantity generators (SQGs), and conditionally exempt small quantity generators (CESQGs). I envision a true Public—Private Partnership, where S.M.A.R.T Goals are scaled across the three (3) categories of emitters and incentivised through regulatory catalytic polices aimed at Industry, operationalised through license agreements and compounded in the lending and underwriting stakeholder markets—each, pulling their weight.

Change is here. Change is now. How we do this is literally up to us. But if we do not work together, we are working against each other. Tugging on this proverbial thread is the necessary effort to decomplexify this monumental task. If we aren’t all pulling in the same direction, the triumph in this tug of war simply won’t be mankind’s. “Together we aspire, together we achieve.”

Michael J. Shand is the Trinidad Business Development and Strategy Manager / Global KPO—Quality Assurance at Stork.

Argentina, Uruguay to receive credit line to modernise hydroelectric complex

Staff Writer | Energy Chamber

The Inter-American Development Bank (IDB) has approved a Conditional Credit Line for Investment Projects (CCLIP) of up to US\$800 million to support the implementation of the Strategic Investment Plan for the modernisation of the Salto Grande Binational Hydroelectric Complex (CHSG, for its Spanish acronym) in Argentina and Uruguay. The objective is to contribute to the decarbonisation of the interconnected electricity system and foster regional sustainable development, which are crucial for both countries' efforts to advance their climate commitments.

The First Individual Loan Operation under this CCLIP is for up to US\$75 million for each country (up to US\$150 million total). This operation will contribute to ensuring the reliability and availability of the CHSG, extending its useful life and its environmental and social sustainability. The project will benefit more than seventeen million users of the interconnected electricity systems of Argentina and Uruguay. Additionally, residents of Salto and Concordia, the cities surrounding

the CHSG, will benefit from coastal protection works in the public spaces to be intervened.

The CHSG was the first binational project in the region, initiating the process of electrical systems integration in the Southern Cone, which in turn paved the way for further binational projects down the road. Argentina and Uruguay are members of the Energy Integration System of the Southern Cone Countries, whose goal is to promote regional power integration using CHSG as a cornerstone.

The loan will help upgrade CHSG's infrastructure and finance its institutional strengthening, with a focus on digitalisation, inclusion, and regional development. In terms of institutional strengthening, it will improve digital corporate management by incorporating cybersecurity measures and conducting technical studies to support the execution of the operation. It will also prepare a next stage of modernisation and training for CHSG staff on technical issues, management, promotion of gender policies, inclusion of persons with disabilities, and prevention of sexual



Punto Salto Grande (Dario Alpern /wikimedia commons)

and workplace violence and harassment. In addition, the loan will promote local productive development and job creation through the strengthening of regional suppliers' capacities.

The IDB has been supporting CHSG's modernisation since 2019, through the Modernisation of the Salto Grande Binational Hydroelectric Complex operation (RG-L1124) currently under execution, for a total of US\$80 million (US\$40 million per country).

The Conditional Credit Line for investment loans in the energy sector will be available for fifteen years (for an amount of up to US\$800

million), through at least three individual lending operations. The first loan approved under this credit facility will be for up to US\$150 million, with a repayment term of 23.5 years, a disbursement period of six years, a grace period of seven years, and an interest rate based on SOFR.

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NESC Technical Institute signs statements of intent with three Guyanese schools



(nesc.edu.tt)

Press Release

NESC Technical Institute (formerly National Energy Skills Centre) signed statements of intent with three Guyanese technical institutes on 23 August, 2023 at the culmination of a three-day visit by principals and faculty from Guyana to Trinidad and Tobago.

The three institutions—Georgetown Technical Institute, Linden Technical Institute and New Amsterdam Technical Institute—have each agreed to enter discussions with NESC-TI regarding collaboration on a needs assessment of unskilled and semi-skilled workers, the establishment of a system of competency assessment and skills development as well as other related initiatives to address Guyana's labour training needs.

"Regional collaboration in technical education is a learning process for us all and NESC is available to support and enhance efforts aimed at contributing to the development of technical skills," said NESC-TI President Kern Dass at the signing ceremony.

The visiting delegation had the opportunity to tour NESC-TI campuses at Point Lisas, Ste Madeleine and Woodford Lodge, Chaguanas as well as interact

with subject matter experts in welding, drilling rig operations, electrical and instrumentation and IT.

"I am excited about the opportunity to collaborate with NESC-TI again. Training in drilling rig operations and instrumentation and process control are areas for development in Guyana and I am sure our collaboration will benefit both Guyana and Trinidad and Tobago," said Anthony Hector, Principal of Linden Technical Institute. NESC-TI has already made in-roads in training in Guyana in 2022, when ten instructors from Linden Technical Institute graduated with diplomas in Heavy Equipment from NESC.

In February 2023, the National Energy Skills Centre was conferred the title of Technical Institute by the Accreditation Council of Trinidad and Tobago. As a result, the institution has officially renamed NESC Technical Institute (NESC-TI).

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From ideas to action

At the T&T Energy Conference in January 2023, one of the key sentiments coming out of all the discussions was that while we were on the right pathways to secure the future of the sector, we simply needed to be moving faster. This was a sentiment we heard not just from industry leaders but also from senior government leaders, especially the Minister of Energy and Energy Industries, Stuart Young.

We have chosen the theme of the 2024 conference to reflect that sentiment: "Accelerating Action". But saying we want to move faster and actually moving faster are two different things.

Why are things taking so long?

Despite Minister Young's best assurances and his palpable commitment, his desire to get the 2021 deepwater bid round completed and the blocks awarded quickly has still not come to pass some seven months later. This also means that the anticipated 2023 shallow water bid round has not yet been launched.

We need to get to the bottom of why things take so long to be implemented and try to systematically address those bottlenecks to get things flowing. From my position, I see four major things that we need to address:

- fixing the business-as-usual mindset that protects the status quo;
- breaking siloed decision-making in the public service;
- ruthlessly streamlining the approvals process; and
- making sure that the key regulatory agencies can hire the brightest and best and access the skills that are required.

Business as usual won't work

One of the key issues we face is that most citizens, including many leaders in society, just do not understand the crisis we are facing. Sure, it is a slow-burning crisis—unlike crime or the pandemic—but nevertheless, it is a crisis for the country.

Trinidad and Tobago's economy is based on the production and processing of natural gas, and our gas production has fallen by a third in the past decade. If we do not make changes, it will continue to fall. We can substitute some of the natural gas feedstock going to our petrochemical industries with green hydrogen, but that will itself need massive injections of capital into the production of green electrons (most likely from wind power).

If we are unable to secure new investment for upstream production of green electrons, gas, or oil, and new investment in decarbonising our downstream plants, our economy is going

to contract hugely and the standard of living for Trinidad and Tobago's entire population is going to plummet. Yet, when I read Vision 2030, the country's overall policy framework, I see no mention of this issue.

T&T's population does not identify with the national crisis at hand

In 2013, the Energy Chamber brought the ex-President of Colombia, Álvaro Uribe, to Trinidad to talk at the Energy Conference about the decisions he had taken to transform Colombia. We followed this up with a mission from the key architects of the very successful 2003 reform of the Colombia energy sector (that resulted in them doubling oil production in the years following the reforms). One of the things the team from Colombia made clear was that they had faced a national crisis which the entire population could identify with and that this drove the consensus that things had to change.

In Trinidad and Tobago, by contrast, it was only the energy industry insiders who were seeing that we had a crisis on our hands with the fall in investment in upstream gas exploration and production. The rest of the country was happy with the status quo. Our intervention to bring in the team from Colombia failed to make any real impact on decision-making.

A decade on and not much has changed, despite the global push to net zero and the continued slide in our oil and gas production. The response by the population to the Regulated Industries Commission (RIC) electricity rate review process is clear evidence that people are not willing to confront the reality of our situation. Until there is wide acceptance that we face a crisis, the temptation will be to follow a "business-as-usual" model which means the usual slow progress, bottlenecks, and procrastination.

We need to get all leaders across society to accept and communicate consistently that it cannot be business as usual and that we need significant reforms which will upset the status quo.

If we accept that we are not in a business-as-usual mode, then it might mean we rethink how we conduct bid rounds, for example, or how we subsidise electricity produced from natural gas.

Breaking the silos

The second major problem we face is that we have siloed decision-making in the public sector. This was quite apparent to me in the very long and frequently delayed process to

get the first major grid scale renewable energy project (with investments from bp and Shell) underway.

We simply must make sure that we streamline the decision-making and approval processes, if we are, for example, going to get in the massive investments in renewable energy that will be needed to make the green hydrogen plans a reality. At the moment, we seem to have different Ministries and agencies pulling in different directions. I am seeing the same with the vital fiscal reform process. This has to stop; we need all Ministries and agencies pulling in the same direction.

Dealing with the devil in the details and streamlining approval processes

The third major problem I see is that the approval processes themselves are not designed for speed. In 2019, we conducted a thorough review of the approval process for major new upstream gas projects and documented no less than thirty-three major approvals that were required from eight different Ministries or statutory agencies to get from a bid round to first gas. Most of these took place in series rather than working in parallel. And, shockingly, in 2023 most of the decisions have still to be taken using paper files and relying on physical signatures of the decision-makers. We have heard of cases where important decisions cannot be taken because a hard-copy file has gone missing. Fixing this issue needs detailed, busy work and a commitment to streamline and ruthlessly cut out processes and decisions that do not add value to the overall approval process.

Fixing the people issues

Doing this work requires a time-and-effort commitment from already stretched public servants, which brings me to the fourth and final issue that I think must be addressed: the capacity within the Ministry of Energy and Energy Industries and other critical agencies.

In 2017, there was a decision to allow the Ministry of Energy and Energy Industries to directly recruit technical staff into public service positions, rather than having the Service Commission run the recruitment exercise. It seems that this has been shelved, after legal challenges from the PSA. The Ministry of Energy and Energy Industries has had to rely on the same system used by the rest of the public service of hiring contract staff on fixed-term contracts to fill skill gaps. This approach to trying to fix the human resource issues in the public service has been around for decades and I do not think there is any evidence it has been effective.



The energy sector in T&T does potentially have a long and vibrant future ahead, but this will only be realised if [unpopular] decisions are taken.

The Trinidad and Tobago Ministry of Energy and Energy Industries has had access to some of the best and brightest young minds, not just in T&T, but in the entire world, though the returning national scholars programme—a programme championed by the former Minister Franklin Khan. A new round of the programme has recently been launched. Unfortunately, this does not seem to have had the desired impact to modernise and make the Ministry more efficient.

One of the most important elements of the reforms in Colombia twenty years ago was to create a separate hydrocarbon agency (the ANH) that could set its own employment terms, and condition and model its processes and procedures on the best practices of the international oil and gas companies. This is the organisation that oversees bid rounds, licensing, and the regulation of the industry. Perhaps it is time for something similar in Trinidad and Tobago. Whatever the details are of how we proceed, it is vital we ensure that the Ministry and other regulatory agencies have the skill sets they require.

Accelerating the pace at which fundamental decisions are taken is vital to the success of the Trinidad and Tobago energy sector. The energy sector in T&T does potentially have a long and vibrant future ahead, but this will only be realised if decisions are taken. Some of these decisions are likely to be unpopular with sections of the population, but it is nevertheless essential that they are taken.

We have no time to waste, and collectively Trinidad and Tobago is going to have to find a way to implement changes faster.

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President and Chief Executive Officer: Dr. Thackwray 'Dax' Driver
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opinion

In pursuit of regional energy security

Mark Loquan | Contributor

In 2022, following the Russian invasion of Ukraine, the disruption of energy supply chains in Europe triggered a continental scramble to find alternatives to Russian oil and gas. The resultant tightening of energy supply, logistical challenges, and soaring prices have undermined European energy security. This has been a particularly destabilising consequence of the war—you cannot produce and feed, sustain and grow, defend and rebuild without a secure supply of energy.

Caribbean and Latin American territories have noted the European crisis and begun to assess their own energy needs and vulnerabilities, asking the question—are we energy secure?

What is energy security?

The International Energy Agency (IEA) defines energy security as the uninterrupted availability of energy sources at an affordable price.¹ Parsing this definition, we can pull out three conditions for energy security. Firstly, there must be enough supply to meet demand (availability). Secondly, that supply must be steady and reliable (uninterrupted). Thirdly, its cost must make it accessible to consumers (affordable price). Energy security is therefore impacted if anything stands in the way of those conditions being met.

These conditions also have a temporal dimension. Long-term energy security is bolstered when there are timely investments that ensure future supply stability. On the other hand, short-term security is achieved when energy systems are adequately equipped to react to any sudden changes in the supply-demand balance.²

What threatens our energy security?

In the Caribbean and Latin America, there are several factors that weaken our energy security.

Dependence on imported fuels

At present, many Caribbean islands still depend heavily on imported crude for power and transportation. The greater part of that energy comes from North and South American sources, although a percentage of the market is supplied by European, Asian, and African producers.³

This dependency impacts the region's short-term energy security. Heavy reliance on external suppliers, coupled with insufficient domestic supply/capacity to meet demand, puts countries at the mercy of the market. Anything that impacts the source of supply—be it supply chain failures, policy changes, trade embargoes, or geopolitical developments—will in turn impact the importer's ability to meet its energy needs. Even when countries have sufficient buffer in the form of multiple supply sources, there is still a risk of interruption. Challenges along logistics routes due to weather events, accidents, or even acts of terror could hinder the timely and safe delivery of energy commodities to their destinations.

Importation of fuels also has implications for the cost of energy. Caribbean consumers pay the highest electricity rates in the Western Hemisphere—prices are on average four times higher than in the United States, in large part because of the dominance of imported fuels.⁴ Moreover, as price-takers, regional energy importers must absorb any surges in market prices, such as those that have occurred due to the COVID-19 pandemic and the Russia-Ukraine war. Except where they are offset by transfers and subsidies, higher purchase costs for fuels on the international market are passed along to consumers. More expensive energy inflates prices and drives up the overall cost of living.

Weather events

In recent years, Latin American and Caribbean territories have begun to increase investment in renewable energy technologies. Of the energy sources being harnessed, solar, wind, and hydropower are most prevalent. However, the infrastructure used in these systems is vulnerable to extremes of weather.



Mark Loquan

How can we become more energy secure?

- accelerate progress toward greater self-sufficiency
- diversify our region's energy mix
- install climate resilient rooftops, which can generate electricity
- create a distributed power generation base
- governments: create enabling environments

For example, wind turbines currently on the market were not designed to withstand the force of Category 5 hurricane winds.⁵ Severe storms can also damage solar arrays. Hydropower plants, which leverage flowing water, can be impacted by changes to the hydrological cycle due to global warming.

It is worth noting that renewable systems are not the only energy infrastructure that can be compromised by weather. Storms and hurricanes often cause electricity failures, as winds and floods damage power lines. As hurricanes become more prevalent and severe, the region could experience more frequent grid disruptions.

Investment

As mentioned before, long-term energy security hinges on timely investment in future sources of supply. If the region hopes to achieve a degree of energy independence in the near future, there needs to be heavy investment in renewables today. As it stands, Aruba, Dominica, the Dominican Republic, and Jamaica are among a small handful of countries where renewables account for more than 10% of the energy mix.⁶

Under the Caribbean Sustainable Energy Roadmap and Strategy, the region is targeting a renewable energy electricity penetration of 47% by 2027.⁷ However, the region is not on track to easily achieve this goal. An annual investment of USD\$1.2 billion—sixteen times the current investment level—will be needed.⁸

The Caribbean Development Bank believes financing for this investment will likely need to be provided by the private sector, since Caribbean governments tend to have heavy debt loads that make it difficult for them to obtain new loans, even from multilateral agencies.⁹ However, as the World Bank notes, the relatively small scale of investments in many Caribbean countries often makes transaction costs for private financiers prohibitively high.¹⁰ The lack of clearly elaborated clean energy policies, regulations, and incentives can also deter investors, who need to be sure of their returns.

How can we become more energy secure?

So how do we address some of these challenges and build our short- and long-term energy security?

High on the agenda should be accelerating progress toward greater self-sufficiency in energy. This includes developing regional hydrocarbon resources to help supply the market. Looking within the region for energy supplies—at Trinidad and Tobago, Guyana, and Suriname, for example—can mitigate the supply chain and logistics risks associated with importing fuels from distant locations. This is one of the drivers behind NGC's focus on micro-LNG, and its exploration of opportunities to supply Caribbean territories. It is also a factor underpinning recent calls by regional leaders for the Caribbean to be allowed to pursue development of its resources.

At the same time, it is understood that we need to diversify our region's energy mix and increase our installed capacity in renewable energy. The region has enormous potential in this area. The challenge is, of course, ensuring that any new capacity installed is climate resilient.

Innovation will be key in this regard. One of the Caribbean Development Bank's proposals is to install climate resilient rooftops, which can generate electricity and withstand extreme weather events, in 75% of homes in the region by 2035.¹¹ Achieving this goal would, however, require collaboration between private and public sector actors. Learning from others is also important. After Hurricane Ian battered Florida in 2022, many communities were left without power, but lights in one solar-powered town remained on.¹² Case studies such as these offer insight into what conditions or physical setups contribute to more resilient renewable energy infrastructure.

Decentralised systems which allow for more independent power producers to supply the grid can further build resilience by creating a distributed power generation base—akin to sharing one's eggs among multiple baskets. Since renewable energy setups are modular and standalone, failure in one part of the grid need not impact the whole. Appropriate legislative frameworks and feed-in tariffs will be needed to help build these distributed power generation systems.

Importantly, governments have a responsibility to create enabling environments, to encourage all the investment that must happen if the region is to become more energy secure. Regional collaboration could be key, as a combined market has more purchasing power and allows for economies of scale, while standardisation of certain regulations and processes can significantly improve the ease of doing business. All of these can make the region more attractive to investors.

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Overcoming digital transformation challenges in Trinidad and Tobago's oil and gas industry

Martín Luna & Anthony Vieira | Contributors

Introduction

Trinidad and Tobago has played a crucial role in the global oil and gas market, with these industries being the backbone of its economy for years. However, as the world shifts towards renewable energy and a low-carbon future, oil and gas companies in the country are facing the pressing need for digital transformation.

While digitisation offers numerous benefits, including enhanced efficiency and cost reduction, there are substantial challenges to address. In this blog post, we will delve into these challenges and provide insights on how companies can successfully navigate the path of digital transformation.

Challenges in Adoption

One of the primary hurdles for oil and gas companies in Trinidad and Tobago is the cost associated with adopting new technologies. According to a recent report by the Inter-American Development Bank, technology adoption remains a significant barrier to innovation in the Caribbean's energy sector. The high cost of technology is particularly concerning, placing a heavy financial burden on companies, especially smaller and mid-sized enterprises. To tackle this challenge, businesses must explore cost-effective solutions that offer tangible benefits.

Another challenge lies in the shortage of skilled workers proficient in digital technologies. With the rapid pace of technological advancements, companies must continuously adapt and upskill their employees to stay competitive. This task can be daunting in a small country like Trinidad and Tobago, which has a limited pool of qualified workers. However, investing in comprehensive training and education programmes enables companies to nurture the skills necessary to embrace digital transformation successfully.



Anthony Vieira (HHSL Safety Systems Limited) and Martín Luna (AIS)

Leveraging Digital Twin Technology for Sustainable Transformation

Furthermore, the transition to a low-carbon economy presents additional hurdles for oil and gas companies in Trinidad and Tobago. As the demand for renewable energy grows, companies face mounting pressure to reduce their carbon footprint and adopt sustainable practices. While this transition is imperative, it can be costly and time-consuming, requiring investments in new technologies and infrastructure. However, by harnessing digital technologies, companies can reduce their carbon footprint and make their operations more sustainable.

Digital twin technology emerges as a powerful solution for overcoming these challenges. A digital twin is a virtual replica of a physical asset, such as an oil rig or refinery. Through digital twins, companies can optimise their operations, proactively identify potential issues, and make data-driven decisions. Collaborating with a trusted partner like AIS, renowned for its expertise in digital twin technology, enables companies to swiftly and cost-effectively embrace digital transformation.



Digital twin for TT facility

Conclusion

Digital transformation is a crucial step for oil and gas companies in Trinidad and Tobago to maintain competitiveness in the evolving global market. Nonetheless, significant challenges, such as high technology adoption costs and a shortage of skilled workers, need to be addressed.

By investing in cost-effective solutions, fostering employee skills, adopting sustainable practices, and leveraging digital twin technology, companies can successfully navigate this transformative journey. Partnering with AIS, a trusted industry expert with proven experience and local knowledge, empowers companies to overcome these challenges and unlock the full benefits of digital transformation.

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CCREEE signs three-year MoU with CARILEC

Staff Writer | Energy Chamber

The Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) and the St Lucia-based Caribbean Electric Utility Services Corporation (CARILEC) have signed a Memorandum of Understanding (MoU) to cooperate and share technical data, information, and knowledge related to the region's energy sector.

The three-year MoU was signed by The CCREEE's Executive Director, Dr Gary Jackson, and CARILEC's Executive Director, Dr Cletus Bertin, on August 14, 2023. This MoU is significant for the region as CARILEC represents thirty-five utilities that play an important role in achieving the sustainable energy targets set by CARICOM heads of government of 47% of electricity generation from renewable energy sources by 2027. Together, The CCREEE and CARILEC will leverage their expertise and the latest technologies and innovations to promote sustainable energy goals for the Caribbean and to achieve the vision of a sustainable and energy-independent region.

Through the MoU, the agencies have also agreed to explore and implement activities in areas of common interest and priorities in the energy sector, including:

- Institutional strengthening
- Capacity building and awareness raising
- Training, research, development, and innovation
- Technology and knowledge transfer related to power sector policies, markets and region-appropriate technologies and engineering for energy efficiency, energy management, and renewable energy
- Promoting diversity and inclusion within the energy sector to correct historical imbalances and provide equal opportunities for all individuals, regardless of gender, age, or ethnicity.

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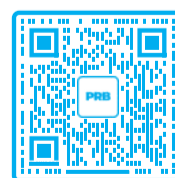
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Rystad Energy: Conventional oil and gas exploration activity grows, but discovered volumes remain elusive

Rystad Energy

Spending on conventional oil and gas exploration is growing and expected to top \$50 billion this year, the highest since 2019, but operators are still waiting for the results they had hoped for. Rystad Energy's research shows that despite the rising investments, discovered volumes are falling to new lows.

Rystad estimates show that in the first half of 2023, explorers found 2.6 billion barrels of oil equivalent (boe), 42% lower than the first half of 2022's total of 4.5 billion boe. Fifty-five discoveries have been made, compared to eighty in the first six months of last year. This means discoveries in 2023 have averaged 47 million boe, lower than the 56 million boe per discovery for the same period in 2022.

The exploration and production (E&P) industry is in a transitional period, with many companies exercising increased caution and shifting their strategies to target more profitable and geologically better-understood regions. This strategic shift and the failure of several critical high-potential wells are contributing to the precipitous drop.

In the hunt for new resources, exploration companies are prioritising the offshore sector, trying to capitalise on underexplored or frontier areas to unlock new volumes through high-risk, higher-cost offshore developments.

The offshore industry accounted for about 95% of exploration spending this year to date but only about two-thirds of discovered volumes.

Aatisha Mahajan, Vice President of Upstream Research, Rystad Energy, said, "Upstream companies are facing a period of uncertainty. They are eager to capitalise on the increased demand for fossil fuels and find additional resources, but recent results have been lacklustre. If exploration efforts continue to yield unimpressive results for the remainder of the year, 2023 could be a record-breaker for the wrong reasons."

Where are the resources?

The continued growth of Guyana's Stabroek offshore block means the Caribbean country leads the way in discovered volumes, with 603 million boe in 2023. Turkey sits second with 380 million boe, Nigeria with 296 million boe, and Namibia with 287 million boe, with the potential for these estimates to grow as we better understand the reserves.

Offshore discoveries are spread relatively evenly among ultra-deepwater, deepwater, and shelf finds. However, we expect increased activity in the remainder of 2023, especially in the ultra-deepwater market, with a projected growth of 27% versus 2022 in terms of spud wells.

Failed high-impact wells

The research shows that thirty-one high-impact wells—designated using Rystad's tiering system based on the project's significance and production potential—are expected to be drilled this year. So far, thirteen have been completed, six are ongoing, and twelve remain in the pipeline. Only four of the thirteen completed wells encountered hydrocarbons, a measly 31% success rate. The results of three wells are not yet disclosed, while the remaining six failed to find any reserves. These failures significantly impact the total discovered resources and greatly contribute to the falling discoveries.

Majors continue to drive spending

The six majors—ExxonMobil, BP, Shell, TotalEnergies, Eni, and Chevron—continue to play a critical role in global exploration, with a prominent share of exploration spending and global conventional discovered volumes. The six companies are expected to spend about \$7 billion this year on exploration, about 10% higher than in 2022.

Exploration activity will likely gain momentum in the second half of 2023, with crucial exploration wells planned to be drilled. Rystad forecasts show that the majors will

contribute about 14% of total global exploration spending in the coming months, highlighting their relative significance in an environment where exploration has pivoted to the offshore sector, with an increased focus on frontier regions. These underexplored or virgin regions hold some of the most technically prospective yet-to-be-drilled prospects, with majors playing a vital role in recent years in exploring these areas.

The spending and activity profiles of the majors position them firmly in the market, but national oil companies (NOC) have the most extensive subsurface resource base at their collective disposal. More than half of the projected exploration spending in 2023 will come from NOCs and NOCs with international portfolios (INOC).

However, there may yet be some success to come this year, as only 30% of anticipated wells have been completed, highlighting the magnitude of the remaining activity. Only twenty-three of the remaining fifty-six exploration wells are either drilled or are expected to be drilled this year, meaning about 60% are likely to be drilled or postponed until 2024. So, even if 2023 proves unsuccessful, a rebound could be in the cards next year.

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Green hydrogen as the engine for medium-term transformation?



Dr. Roger Hosein



Dr. Roger Hosein | Contributor

It is well known that natural gas production in the Trinidad and Tobago economy has been on the decline and in this context, to ensure the survival of the downstream petrochemical sector, the suggestion by policymakers is to make a switch from grey hydrogen usage to green hydrogen usage.

There are a total of **eleven** ammonia plants in Trinidad and Tobago, of which two are inactive, including two ammonia complexes situated on the Point Lisas Industrial Estate, with a combined annual capacity of 5.2 million metric tonnes (MT) of ammonia. Table 1 provides details on the launch dates, technology and annual capacities for each ammonia plant in Trinidad:

Plant	Start-up Year	Technology	Annual Capacity (MT)
Yara Trinidad Limited	1959	Braun	285,000
Tringen I	1977	Fluor	500,000
PCS 01	1981	M.W. Kellogg	445,000
PCS 02	1981	M.W. Kellogg	445,000
Tringen II	1988	Braun	495,000
PCS 03	1996	Braun	250,000
PCS 04	1998	Kellogg Advanced Ammonia Process (KAAP)	650,000
Point Lisas Nitrogen Limited (PLNL)	1998	Kellogg Advanced Ammonia Process (KAAP)	650,000
Caribbean Nitrogen Company (CNC)	2002	Kellogg Advanced Ammonia Process (KAAP)	650,000
Nitrogen 2000 (N2K)	2004	Kellogg Advanced Ammonia Process (KAAP)	650,000
AUM Ammonia	2009	Kellogg Advanced Ammonia Process (KAAP)	650,000

The clear indication is that the Trinidad and Tobago economy is a major exporter of ammonia, methanol and urea, both absolutely and relatively. Indeed, between 2000 and 2019, the Trinidad and Tobago economy benefitted from US\$23.87 bn in ammonia exports.

Critically, the Trinidad and Tobago economy has a comparative advantage and a competitive advantage in the production of ammonia, built up over many years. Table 3 below shows the comparative advantage scores of Trinidad and Tobago as regards ammonia, methanol and urea

	World exports ammonia US\$m	TT exports ammonia US\$m	% share ammonia	World exports methanol US\$m	TT exports methanol bnUS	% share methanol	World exports urea US\$m	TT exports urea US\$m	% share urea
2000	1519.2	359.2	23.6	1814.8	267.1	14.7	2028.7	61.0	3.0
2005	3733.2	885.8	23.7	3794.9	708.8	18.7	5699.4	143.9	2.5
2010	5225.3	1376.5	26.3	5529.0	616.5	11.2	10003.1	168.7	1.7
2015	7950.5	1627.8	20.5	6622.4	1147.0	17.3	12305.1	147.3	1.2
2016	5868.8	1649.6	28.1	5284.6	649.8	12.3	9591.9	121.6	1.3
2017	4611.8	1004.0	21.8	7719.7	1225.1	15.9	9433.8	118.9	1.3
2018	5907.1	1047.0	17.7	9503.3	1398.7	14.7	10355.6	190.6	1.8
2019	5394.2	879.0	16.3	6874.3	955.2	13.9	10231.2	218.6	2.1

Source: WDI

for 2000, 2010 and 2021. Trinidad and Tobago in 2000 had a comparative advantage (revealed comparative advantage (RCA) value >1) in 26 commodities and in 2021 had comparative advantage in 27 commodities. In both 2000 and 2019, Trinidad and Tobago had strong comparative advantage (RCA value > 4) in ammonia and methanol.¹ (Three digit SITC data is deployed herein).

¹ The concept of 'revealed comparative advantage' (RCA) as defined by Bela Balassa, is commonly applied to identify a country's strong and weak industries. Using (Hinloopen and Van Marrewijk 2001) class division of the Balassa index as follows:
 Class a: 0 < Balassa index < 1 - captures all those sectors without a comparative advantage, that is, have a comparative disadvantage.
 Class b: 1 < Balassa index < 2 - "weak comparative advantage"
 Class c: 2 < Balassa index < 4 - "medium comparative advantage"
 Class d: 4 < Balassa index - "strong comparative advantage"

Green hydrogen as the engine for medium-term transformation? (continued)

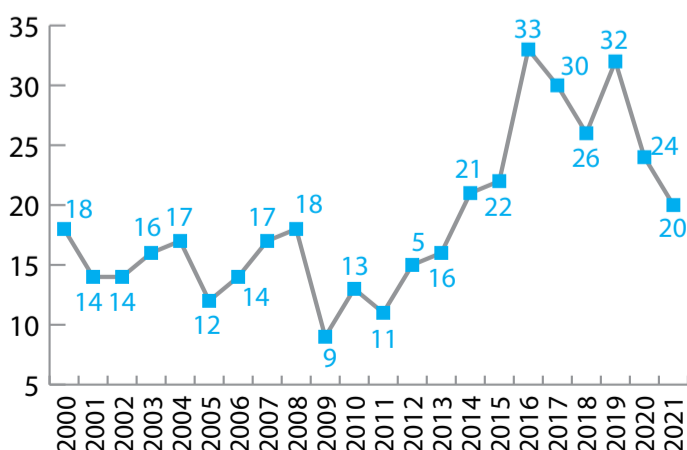
Table 3: RCA scores for 3 digit SITC data for TT, 2000, 2010 and 2021

Description	RCA 2000	RCA 2010	RCA 2021
46 Flour/meal wheat/meslin	1.88	1.11	1.25
48 Cereal etc flour/starch	3.35	1.61	4.87
58 Fruit presvd/fruit preps	1.53	0.81	2.02
59 Fruit/veg juices	1.4	1.81	1.81
61 Sugar/molasses/honey	5.65	0.02	0.26
62 Sugar confectionery	2.3	0.61	1.71
72 Cocoa	1.05	0.18	0.14
73 Chocolate/cocoa preps	0.96	0.54	1.42
91 Margarine/shortening	4.19	1.67	3.85
98 Edible products n.e.s.	1.04	0.31	2.06
111 Beverage non-alcohol n.e.s.	12.13	5.36	8.29
112 Alcoholic beverages	1.72	0.64	0.71
122 Tobacco, manufactured	0.86	1.26	3.66
223 Oil seeds-not soft oil	0.1	1.1	0.68
278 Other crude minerals	0.25	0.35	15.75
281 Iron ore/concentrates	0.01	6.76	0.01
282 Ferrous waste/scrap	0.03	0.46	2.7
289 Precious metal ore/conc.	0		1.31
333 Petrol./bitum. oil,crude	2.35	1.67	4.44
334 Heavy petrol/bitum oils	15.85	6.9	4.68
342 Liquid propane/butane	10.53	13.27	0.61
343 Natural gas	8.1	7.24	14
344 Petrol./hydrocarbon gas	32.87	35.89	2.08
512 Alcohols/phenols/derivs	28.12	19.66	60.85
522 Elements/oxides/hal salt	32.74	42.52	43.86
554 Soaps/cleansers/polishes	2.49	1.04	1.11
562 Manufactured fertilizers	7.34	5.75	24.15
635 Wood manufactures n.e.s.	1.06	0.16	0.28
642 Cut paper/board/articles	2.82	1.01	2.38
661 Lime/cement/constr matl	2.32	0.68	5.11
665 Glassware	1.46	0.42	1.49
671 Pig iron etc ferro alloy	12.57	11.91	41.81
676 Iron/steel bars/rods/etc	10.77	3.7	0.42
792 Aircraft/spacecraft/etc	0.01	0.02	1.41
793 Ships/boats/etc	0.12	2.05	2.11

The Trinidad and Tobago economy is at an important crossroad as it makes an energy transition. As is stands, Trinidad and Tobago is a major player with petrochemicals, and the economy has a sound oil and gas infrastructure and export facilities as well as operational experience that spans almost 100 years.

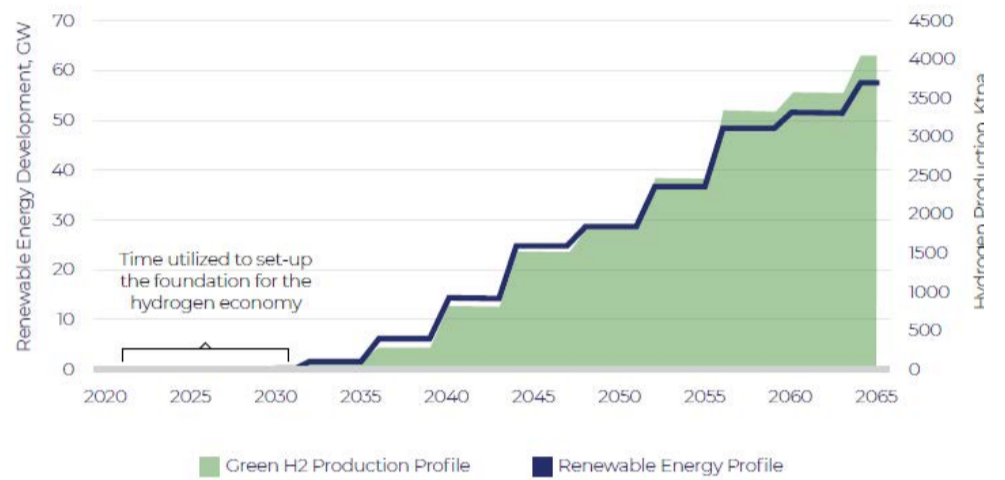
This gives the Trinidad and Tobago economy a head start compared to other economies when it comes to developing a green hydrogen economy. Many of the requirements to be a leader in green downstream products are already in place, for example, the Trinidad and Tobago economy has a thriving energy ecosystem and there are already existing markets for the products produced by this energy ecosystem, with long-standing trade relations. The diagram below generated from the World Integrated Trade Systems (WITS) shows the number of countries to which Trinidad and Tobago sold its ammonia for the time period 2000 to 2021.

Number of countries to which T&T sold its ammonia

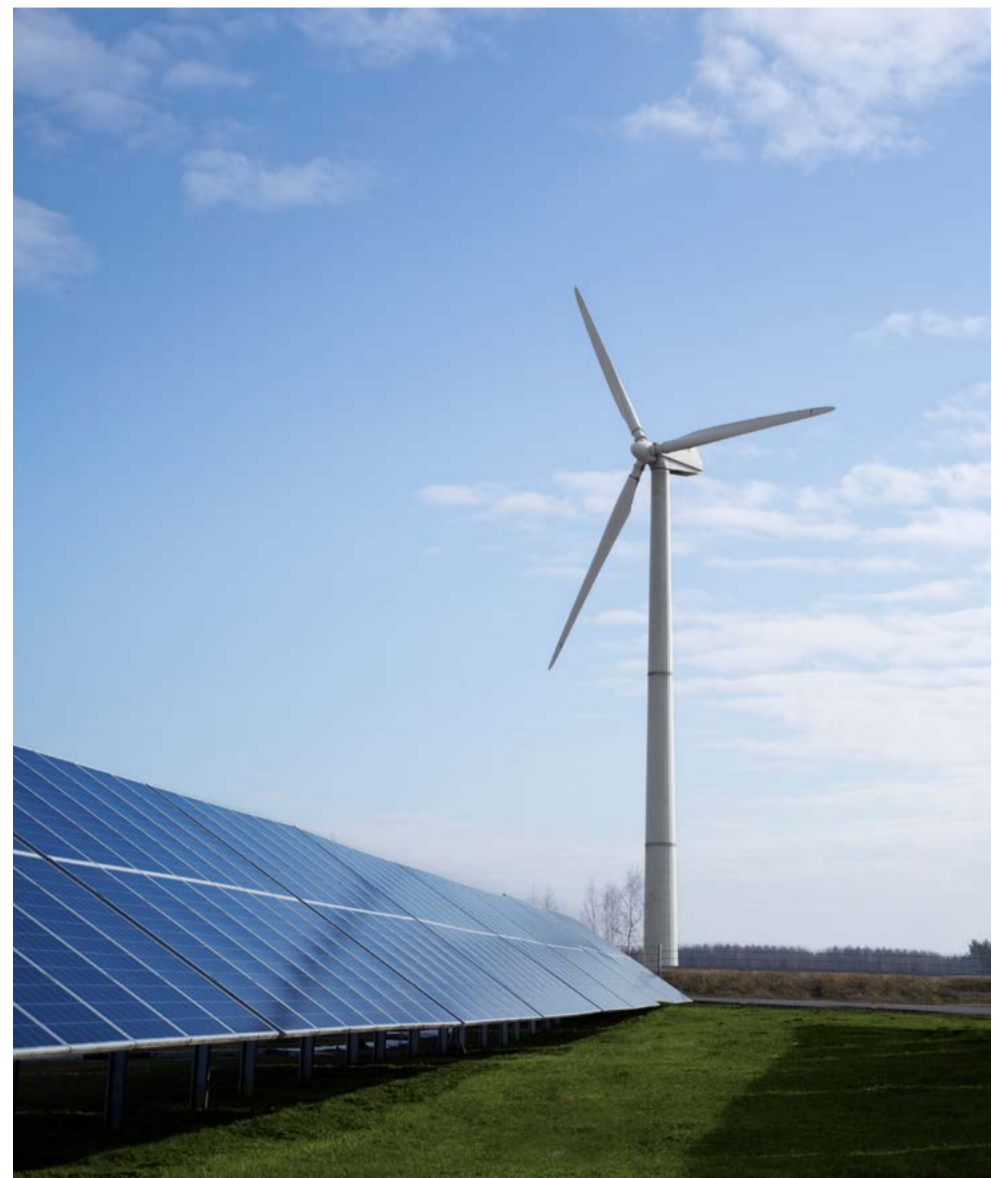


The government, on recognising the sharp and extreme problem associated with the supply of grey hydrogen linked to natural gas production, has outlined that it will target its significant offshore wind capacity of 57 gigawatts (GW). 57 GW translates into 25 GW of power and this electrolyses to produce 4 mtpa of environmentally friendly hydrogen. This ambitious undertaking is projected to spark the creation of numerous job opportunities spanning construction, operational and maintenance roles. Currently, Trinidad and Tobago's existing infrastructure has the capacity to handle approximately 1.7 million metric tons per annum (Mtpa) of hydrogen.

By way of a timeline, the diagram below shows that by 2040 Trinidad and Tobago authorities are hoping to bring onstream 5GW approximately of (wind) renewable energy, of which several commentators have suggested would constitute 2 GW of onshore wind and 3 GW offshore wind.



In closing I cite a comment from "The Roadmap for a Green Hydrogen Economy in Trinidad and Tobago": *Renewable Energy and green hydrogen represents ... an incredibly bright future for Trinidad and Tobago in the years ahead. The right economic, political, and social environment is needed to bring about a more sustainable future. If developed cohesively, the country has the potential to become a green energy superpower, an aspiration that is well within reach of Trinidad & Tobago.*



Climeworks' Mammoth construction update on preparatory works for Carbfix's on-site storage of CO₂

Staff Writer | Energy Chamber

With a nominal CO₂ capture capacity of up to 36,000 tonnes per year when fully operational, Mammoth located in Iceland is a key milestone on Climeworks' ambitious scale-up plan of reaching multi-megaton capacity in the 2030s and gigaton capacity by 2050.

Preparations for in-situ CO₂ storage underway, thanks to partner Carbfix. Mammoth's ground breaking took place in June 2022, and the cladding of the process hall and first foundations for the collector containers and maintenance hall were completed end of that year. 2023 kicked off with the start of the CO₂ collector container production.

The construction continues to follow an ambitious timeline and is making steady progress considering current challenges in global supply chains. Now that the harsh Icelandic winter has passed, the company has shared that a further key piece of the facility is about to be completed: the infrastructure for the in-situ storage, owned and operated by Carbfix. This involves the creation of boreholes (narrow shafts vertically inserted into the basalt ground) that will carry the CO₂ that Mammoth captures underground for mineralisation in basalt. Housing these boreholes will be igloo-like structures, foreseen for later this year. The combination of borehole plus housing, is referred to as an "injection well".

With these two on-site injection wells, Mammoth's design differs from Orca's. At Orca, the world's first commercial DAC+S plant, the CO₂ is carried via pipeline to one single Carbfix injection well several hundred metres away. The ongoing development of the Mammoth project represents a challenging industrial project build, however, by leveraging the company's field experience and learnings from Orca, the company is able to optimise the execution of the project and integration with a storage solution: Mammoth's two in-situ injection wells are located less than 100m from the process hall. This makes for an even more efficient delivery of the air-captured CO₂ to Carbfix for permanent storage.

Carbfix: natural and permanent

Carbfix permanently stores CO₂ thanks to its rapid underground mineralisation approach: CO₂ is dissolved in water and stored deep underground in basalt rock formations that accelerate the natural mineralisation process. As a result, the CO₂ turns into stone in less than two years. Climeworks focuses on the permanent removal of CO₂, and Carbfix's mineralisation enables just that. Carbfix's method is one that their expert team has fine-tuned over the last decade and is an accelerated natural process which is fully measurable and permanent for millennia.

Geological storage of CO₂

Mineralisation as done by Carbfix is a specific form of geological storage. Geological storage deep underground is considered a highly robust option for storing CO₂ as it combines technical maturity, permanence, and scalability. This is regardless of whether the storage is based on mineralisation relying on injection of water-dissolved CO₂ (e.g., Carbfix) or conventional storage in which pure-phase CO₂ is stored underground, for example, in saline aquifers. Scientific estimates show that the global potential for geological storage of CO₂ outweighs all greenhouse gases ever emitted since the Industrial Revolution, approximately by at least a factor of three (CDR Primer).

Suitable sites for geological storage exist around the world. They typically include a porous and permeable reservoir rock that serves as the storage location for the CO₂ as well as an impermeable caprock above it, which safely locks the CO₂ underground.

As Climeworks scales and expands internationally, it is exploring further suitable locations for DAC combined with highly durable geological storage, including the U.S, the Middle East, and elsewhere in Europe.

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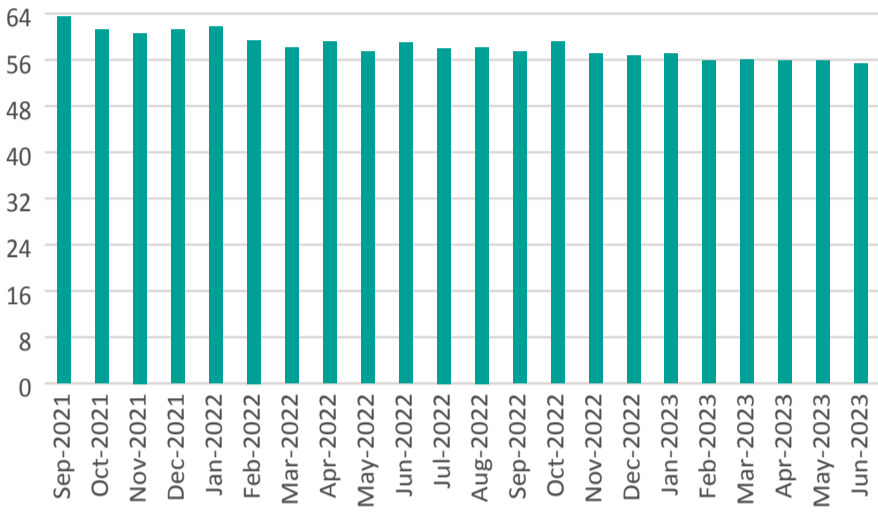


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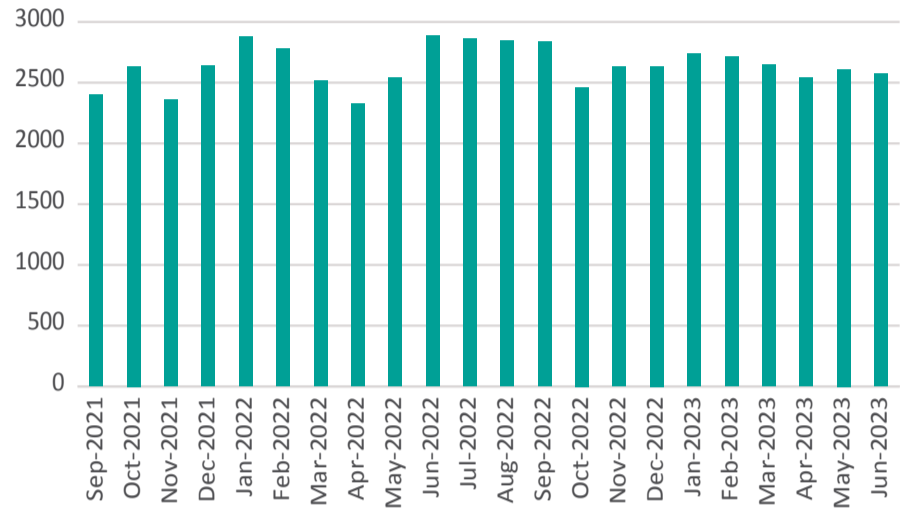
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Monthly Review

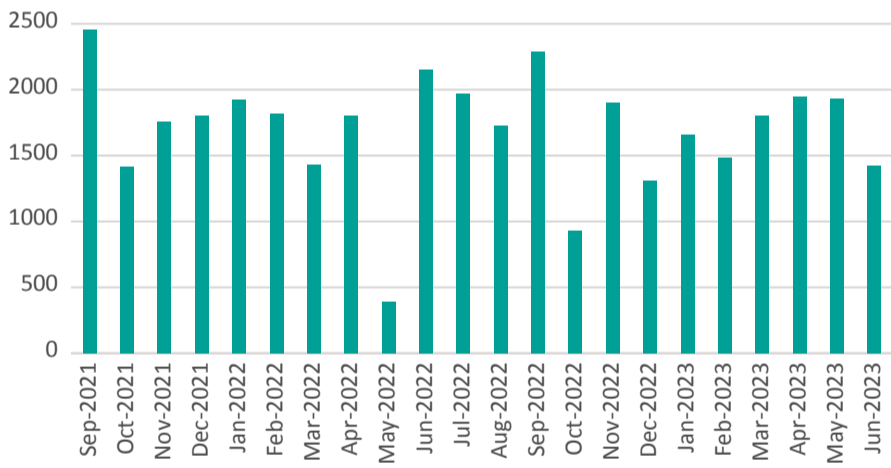
Crude Oil Production Daily Average (000' bbls/d)



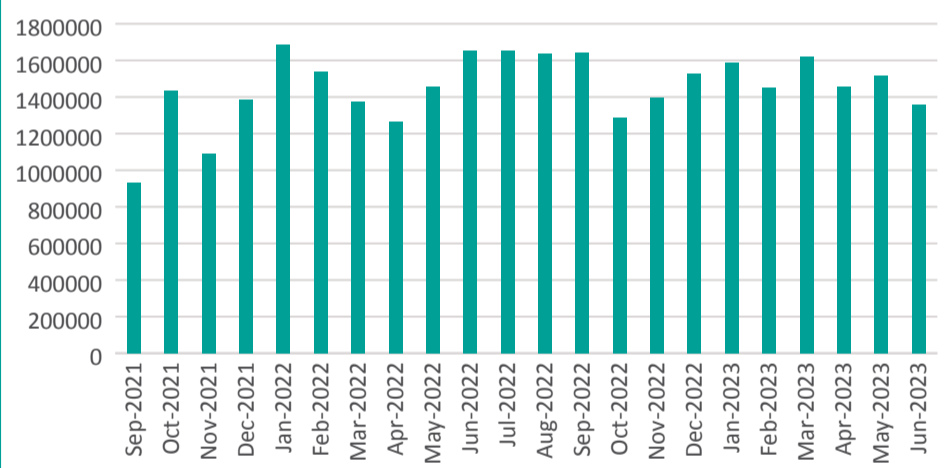
Natural Gas Production (mmcf/day)



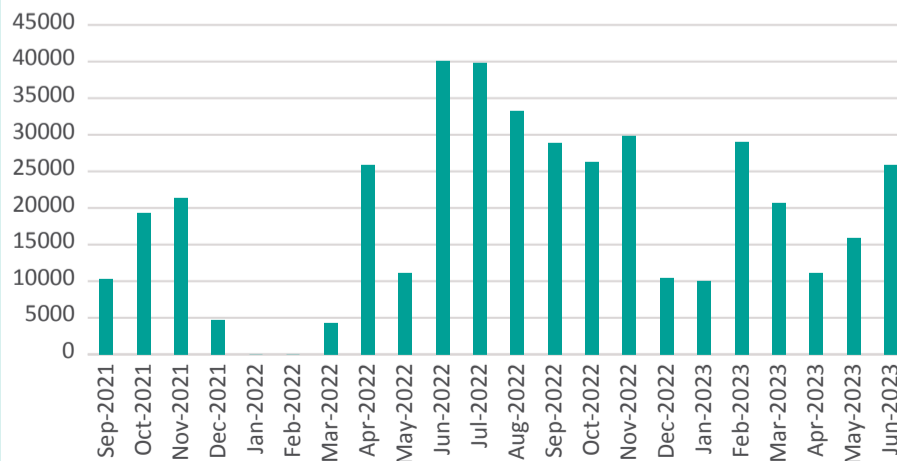
Crude Oil Exports (000' barrels)



Liquefied Natural Gas Production (m³)

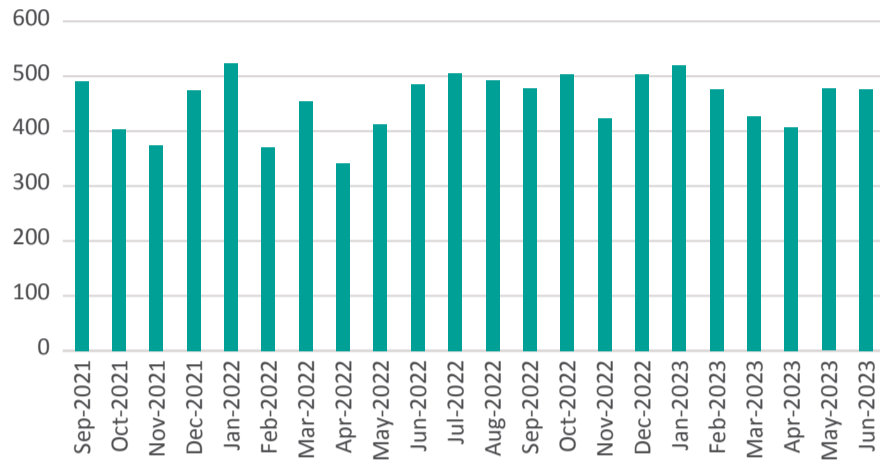


Depth Drilled (ft)

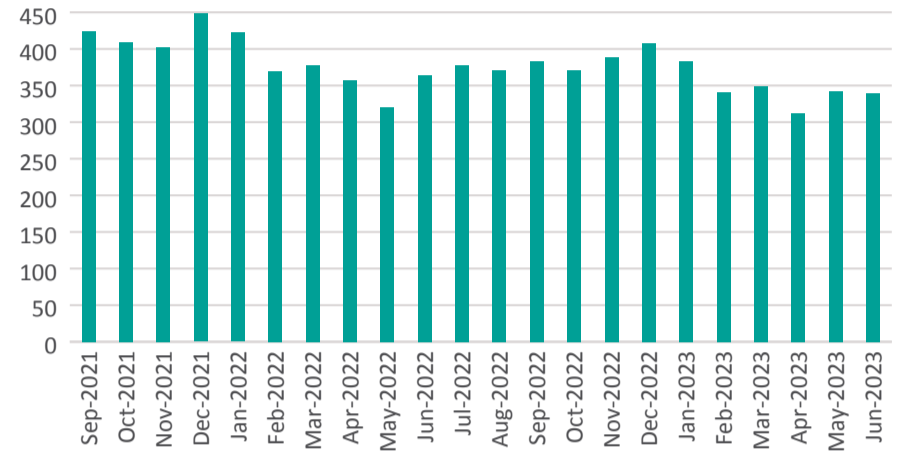


Monthly Review

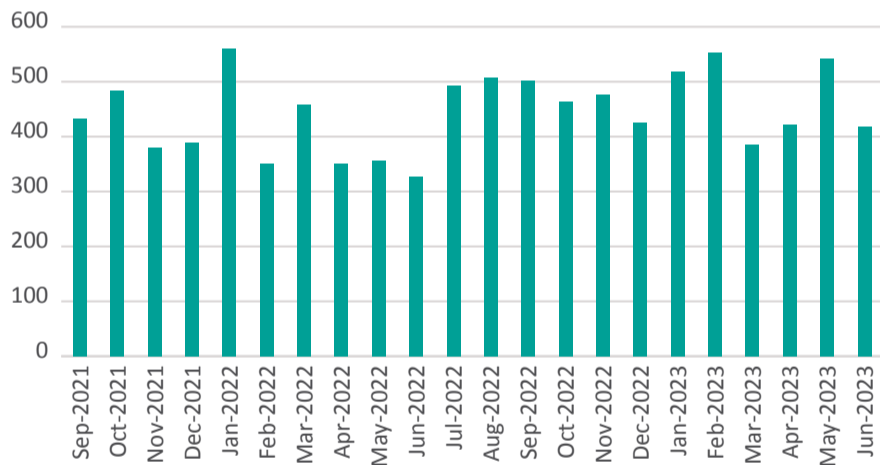
Methanol Production (000' tonnes)



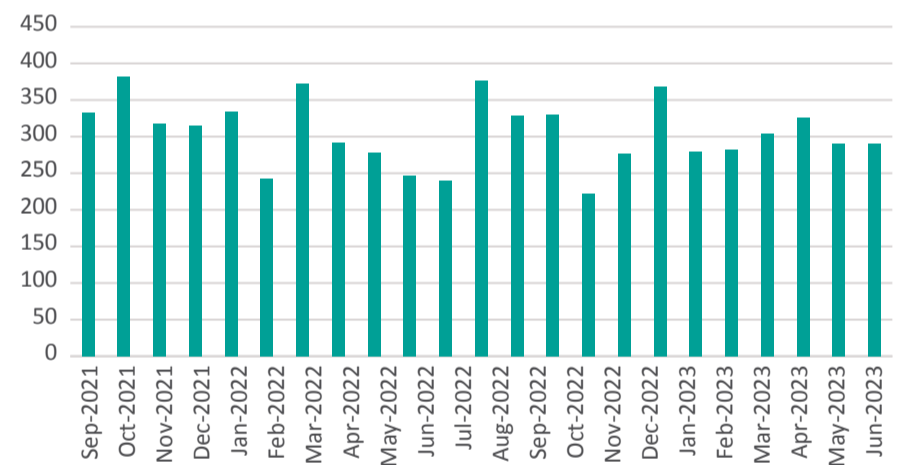
Ammonia Production (000' tonnes)



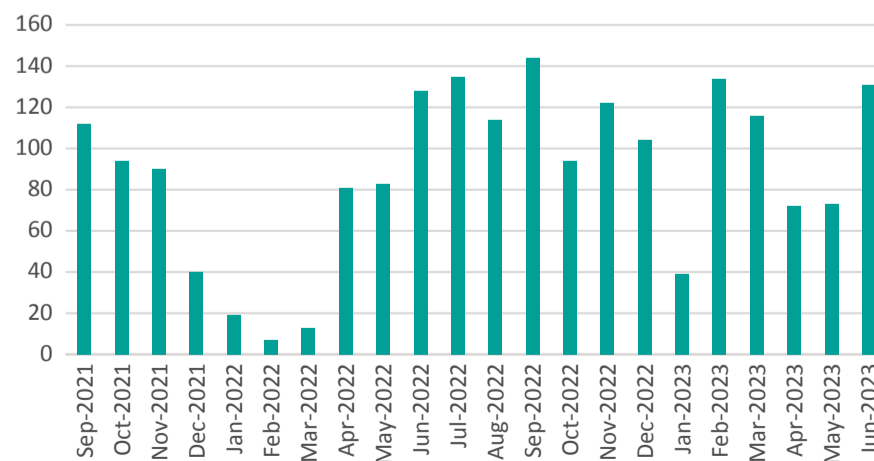
Methanol Exports (000' tonnes)



Ammonia Exports (000' tonnes)



Number of Rig Days



European Commission adopts detailed reporting rules for the Carbon Border Adjustment Mechanism's transitional phase

Staff Writer | Energy Chamber

The European Commission has adopted the rules governing the implementation of the Carbon Border Adjustment Mechanism (CBAM) during its transitional phase, which starts on October 1, 2023 and runs until the end of 2025.

The Implementing Regulation details the transitional reporting obligations for EU importers of CBAM goods, as well as the transitional methodology for calculating embedded emissions released during the production process of CBAM goods.

In the CBAM's transitional phase, traders will only have to report on the emissions embedded in their imports subject to the mechanism without paying any financial adjustment. This will give adequate time for businesses to prepare in a predictable manner, while also allowing for the definitive methodology to be fine-tuned by 2026.

To help both importers and third-country producers, the Commission also published guidance for EU importers and non-EU installations on the practical implementation of the new rules. At the same time, dedicated IT tools to help importers perform and report these calculations are currently being developed, as well as training materials, webinars, and tutorials to support businesses when the transitional mechanism begins. While importers will be asked to collect fourth-quarter data as of October 1, 2023, their first report will only have to be submitted by January 31, 2024.



Ahead of its adoption by the Commission, the Implementing Regulation was subject to a public consultation and was subsequently approved by the CBAM Committee, composed of representatives from EU Member States. One of the central pillars of the EU's ambitious Fit for 55 agenda, CBAM is the EU's landmark tool to fight carbon leakage. Carbon leakage occurs when companies based in the EU move carbon-intensive

production abroad to take advantage of lower standards, or when EU products are replaced by more carbon-intensive imports, which in turn undermines our climate action.

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Origin Materials and Proman partner to produce low-carbon biofuels

Staff Writer | Energy Chamber

Origin Materials, Inc., the world's leading carbon-negative materials company with a mission to enable the world's transition to sustainable materials, and Proman, a global leader in natural gas-derived products and one of the world's largest producers of methanol, announced a strategic partnership centred on low-carbon biofuel production utilising Origin's technology platform and Proman's worldwide fuels capabilities and expertise.

As part of the partnership, Proman and Origin Materials signed an agreement to explore the production and global distribution of low-carbon biofuels.

Proman's Chief Executive, David Cassidy, welcomed today's agreement, saying: "Certified lower-carbon fuels and feedstocks will play a vital role in enabling the transition to a more sustainable world. From the production of the materials and packaging that we all use every day, to the fuels that power our global supply chains and transport these products around the world, biofuels have huge potential to drive down emissions. That's why we are delighted to be partnering with Origin Materials, who shares our commitment to innovation and our belief in methanol's potential to enable more sustainable manufacturing. By combining Proman's production expertise and extensive distribution network with Origin's patented technology platform, we will explore new ways to create the building blocks for reduced environmental impact across our everyday lives."

Origin expects to produce bio-based fuels using its patented technology platform, which turns the carbon found in sustainable wood residues into useful products.

"We are excited to partner with Proman, a leader in natural gas-derived products with extensive global shipping and supply chain capabilities, to take this step forward in low-carbon biofuels commercialisation," said Origin Materials' Co-CEO Rich Riley. "Biofuel is a rapidly growing market. Low-carbon-intensity biofuels made from wood waste reflect the future of biofuels as industry moves aggressively towards decarbonisation. Origin's technology platform is uniquely positioned to deliver these renewable fuels using our 'oils and extractives' intermediate stream. We are thrilled to partner with Proman, a company that brings significant expertise across engineering, procurement, and construction related to world-scale sustainable technology development. Over the long-term, we see the potential for biomass-derived, low-carbon-intensity fuels to be used in marine and other transportation fuels, industrial applications, heat and power generation, and more."

Learn more and have your say online:

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SIX-POINT PLAN TO SECURE NEW NATURAL GAS SUPPLIES AND MAXIMISE EXPORTS FROM TRINIDAD & TOBAGO: 2022 – 2030

FAST-TRACK bid rounds & the approval processes



1

Acreege needs to be awarded to competent operator companies for new exploration to take place. Improving regulatory approval processes will reduce the time between the award of new acreage and first gas production. This will significantly improve project economics and make new gas available faster. A one-year reduction in the time taken to first gas has been calculated to create US\$ 120 million in additional net present value for a typical Trinidad & Tobago medium-sized offshore gas field.¹

The current structure of upstream royalties and taxation does not encourage companies to reinvestment in exploration or the development of new fields. The fiscal regime, inclusive of the VAT system, needs to be reformed to unlock new investment.²

2



REFORM upstream tax system to incentivise investment

Cross border adjustment mechanisms (CBAM) for carbon taxes pose a threat to exports of LNG, petrochemicals and iron and steel from Trinidad & Tobago, especially to the European Union. If Trinidad & Tobago commodity exports are to be able to sell to higher price premium markets the carbon intensity of production must be able to compete with other jurisdictions. This will require the reduction of CO₂ emissions from operations, reducing methane emissions and flaring, accessing offsets, and the introduction of low carbon molecules into the product mix (including green³ and blue⁴ hydrogen).

INVEST in reducing the carbon intensity of operations and products



3

Gas for electricity generation is sold at prices far below the market rates for petrochemicals or export markets through LNG, which acts as a disincentive for upstream companies to invest in gas production. Reducing gas going to electricity, though both increased renewable generation and improved energy efficiency (including upgrades towards high efficiency electricity generation and higher reliability in IPP and distribution sectors) will make more gas available for these foreign exchange earning sectors and will improve the profitability of upstream gas developments.⁵ Green hydrogen can also supplement natural gas as a feedstock.

4



DIVERT GAS from domestic electricity generation through energy efficiency and renewables

Encourage innovative approaches to SMALL FIELD DEVELOPMENT



5

As Trinidad & Tobago has matured as a gas province, new fields are often smaller and more difficult to develop. Working with the Ministry of Energy, operator companies need to find new ways of bringing this gas to market making the best use of existing infrastructure.

There are significant gas resources in neighbouring territories, especially Venezuela but also potentially in Barbados and Grenada (in the longer-term). In addition to significant untapped offshore gas fields, more natural gas is flared on the North Monagas oilfields in eastern Venezuela alone than the current shortfall in Trinidad production. Securing these resources for export to Trinidad is politically challenging but has huge potential economic benefits and, in the case of the flared gas in particular, significant climate change benefits as well.

6



Secure CROSS BORDER SUPPLIES

1. Kenesjay Systems Ltd "Project Fast-track" submission to T&T Energy Chamber, November 2019. A reduction in the time taken from bid round to first gas from the current average 5 years to 4 years would represent an increase in the NPV (8%) of a typical gas field in T&T from US\$ 815 million to US\$ 934 million.

2. Energy Chamber's Fiscal Reform Task Force "Final Report" delivered to Government of Trinidad & Tobago, August 2021.

3. Green hydrogen produced from the electrolysis of water or plasmification of waste.

4. Blue hydrogen produced from natural gas with CO₂ captured and sequestered (carbon capture and sequestration).

5. "Draft Energy Conservation and Energy Efficiency Policy Action Plan 2020 to 2024", submitted to Minister of Public Utilities, September 2019.



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