

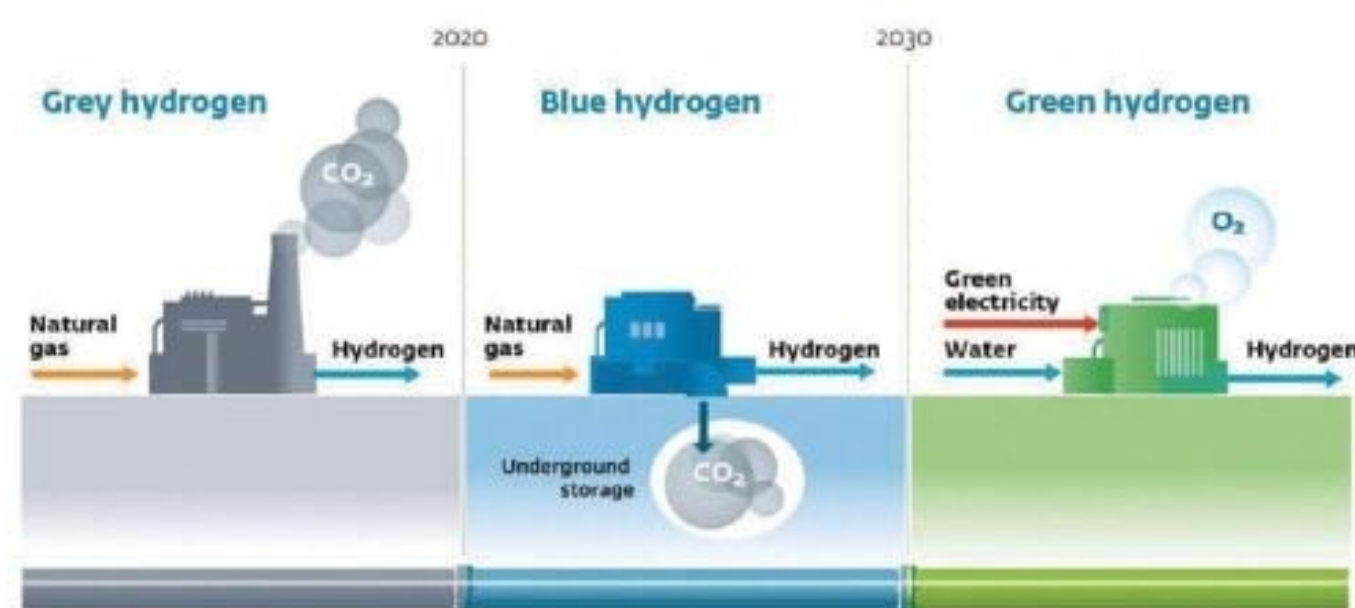
Decarbonisation Pathways – Green Hydrogen

Carbon-cutting actions are bringing to the fore hydrogen's versatility as an energy carrier in the battle to combat the global climate emergency. The potential role of hydrogen technologies in a decarbonised world is long recognised. However, wide-scale success in implementing suitable hydrogen technologies has been plagued by cycles of high hopes followed by disappointments. As the energy transition accelerates, an alignment of environmental urgency, political influence coupled with techno-economic solutions may finally lead to realistic applications across sectors.

The prospects that lie in the hydrogen space offer The NGC Group an opportunity to seek new markets and products aligned towards a nascent growth area – decarbonised petrochemicals – which can be a powerful platform upon which we build a sustainable Group and national future.

Why Hydrogen?

Hydrogen is a clean fuel whose sole by-product when burned is water. It can be produced from fossil fuels such as natural gas or coal through thermal processes, or from renewable sources such as solar and wind power.



Source: Gasunie

For Trinidad and Tobago (T&T), there is an obvious opportunity to produce hydrogen and utilise it as feedstock in the country's well-established petrochemical sector, displacing grey hydrogen production. Beyond the industrial sector, hydrogen would provide a possible pathway towards clean mobility as the transportation sector shifts from gasoline towards electric driving, both with batteries and fuel cells powered by hydrogen. Further afield, establishment of a regional industrial cluster is expected to be kickstarted from a hydrogen production complex that would complement Caribbean decarbonisation efforts and bring much needed economies of scale.

Building on the invitation by the Minister of Finance in the 2019/2020 National Budget Presentation to explore different hydrogen applications within the local economy, National Energy has initiated work to identify opportunities for applying renewables-based hydrogen locally. These efforts will be targeted toward the decarbonisation of the existing petrochemical industry and difficult-to-decarbonise sectors, such as the cement and metal industries.

Planning for a Hydrogen Economy

A modular, purely green hydrogen pilot facility can provide valuable insight for developing a green hydrogen economy. A pilot would offer proof of concept concerning the application of renewable energy (RE) technology for hydrogen production in the local context. A pilot project would facilitate:

The expansion of a T&T-based facility would in turn assist with the formation of a regional cluster. Hubs and clusters can link production, industrial demand, consumer demand, storage, usage, and trading workforce in a small, centralised, focused area. In this way, a Caribbean hydrogen cluster can contribute to a stronger regional energy ecosystem, strengthen economic growth, improve regional transportation, and boost economic integration.

The opportunities for investment along the hydrogen value chain include:

- **Clean Power Generation:** As new power generation capacity is needed, investors will seek to develop wind, solar, geothermal, biomass, and other forms of renewable and clean energy sources to satisfy demands.
- **Transportation of power:** Infrastructural investments to take power from the power generation sites to the hydrogen production facilities throughout the islands. T&T's existing gas infrastructure and any new infrastructure to enable gas-fired power generation throughout the region would represent considerable infrastructure-in-place for integrating green hydrogen.
- **Storage:** Hydrogen can go where batteries cannot, providing long-term energy storage of clean energy. Energy storage can be attractive business cases for Caribbean grids, improving grid reliability and resilience against power shortages and outages. Additionally, as prices decline, a hybrid solution (batteries and hydrogen) coupled with solar generation would yield an attractive business case for Caribbean grid operators to integrate hydrogen into the energy mix with storage options in Trinidad and Tobago and elsewhere.
- **New Industries:** A suite of sub-sectors with renewable or green hydrogen as the feedstock on the downstream industry is likely to be created. Given the region's large hotel and cruise tourism sectors, a hydrogen cluster can generate innovative solutions within the global tourism industry and lead to the Caribbean being the first-mover.

Our Work Ahead

With support from the Ministry of Energy and Energy Industries (MEEI) and the Ministry of Planning and Development (MPD), National Energy secured funding from the Inter-American Development Bank (IDB) under an IDB-executed non-reimbursable Technical Cooperation Promotion of the Green Hydrogen Market in Latin America and Caribbean (LAC) Countries. This funding will be used to gain an understanding of the economic parameters for producing green hydrogen locally through the conduct of feasibility studies in 2021, as well as developing a strategy to create a low carbon energy industry using clean hydrogen.

Complementing our investment in building employee capacity in the clean hydrogen space, the Group is also partnering with other companies on this agenda. In February 2021, NGC and National Energy signed a Memorandum of Understanding (MOU) with Kenesjay Green Limited (KGL) to work collaboratively on the creation of sustainable hydrogen projects for the energy sector of Trinidad and Tobago. Under the MOU, all parties will explore the development of viable, low carbon and green hydrogen-related industrial energy projects and their associated renewable and energy-efficient feedstock supply. First on the agenda is the country's first carbon-neutral project being spearheaded by KGL subsidiary NewGen. Through our ttEngage platform, National Energy is currently facilitating the project's development.

Securing Our Future

As a state-owned enterprise, National Energy actively supports the country's pursuit of a hydrogen economy, through the establishment of a pilot green hydrogen facility, and facilitation of other hydrogen research and development projects. With the right partnerships, investment and policy frameworks, this fuel of the future would launch Trinidad and Tobago into a position of leadership in the global clean energy space, and in alignment with the United Nations Sustainable Development Goals.

For Small Island Developing States, there is much to lose should global decarbonisation efforts fail. It is therefore essential that collaborative and meaningful actions be taken to stay on the 1.5oC climate-safe pathway of the 2015 Paris Agreement. With natural gas identified as a critical transition fuel, T&T is uniquely positioned to not only maintain the shift to natural gas from other fossils but also simultaneously accelerate the country's progress toward zero-carbon alternatives. Additionally, efficient use of energy, carbon capture and storage, and renewable energy will be critical elements of development on this path. Notwithstanding, and even more important will be the integration required with education, services, communities and other stakeholders to build the new culture of awareness that is required to enable this transformation. Future articles will explore these topics in more detail as we create the roadmap towards a future that would endure for many generations.

