CARICOM Regional Energy Dialogue Presentation

Using renewables and energy efficiency to enable carbon neutral hydrogen production in Trinidad and Tobago

Philip Julien-Managing Director

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Introducing – **NewGen**:

"A New Energy for Our New Generation"

Vision

NewGen will be a leader in transitioning Trinidad and Tobago into a New Generation of decarbonisation and increased renewable energy.

Our vision is to be a pioneer in the energy transition of Trinidad and Tobago, through the introduction of its hydrogen economy.

The Genesis of NewGen – *Kenesjay Systems*

Professor Kenneth S Julien

Founder of Kenesjay Systems

Professor Julien is known in T&T as the father of the Energy Sector.

He was Chairman of the nation's sole utility the Trinidad and Tobago Electricity Commission (T&TEC) for over 10 years and is responsible for the design of the Point Lisas Industrial Estate which now boasts some of the largest petrochemical facilities in the world.

KENESJAY
SYSTEMS LIMITED

PIONEERS IN ENERGY EVOLUTION
www.kenesjay.com

Philip Julien

Managing Director

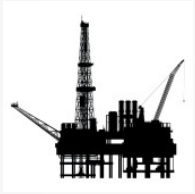
BSc. Chemical Engineering and a Minor in Environmental Engineering, McGill University

- Founded in 1998
- +20 year experience in energy sector project development and consulting , locally & globally
- Concept-to-Complete Experience with CNC Ammonia Plant

Why Hydrogen? Why Trinidad and Tobago?

Trinidad & Tobago is the single largest industrial base in the Caribbean

A massive energy exporter and a top ten producer of ammonia, methanol and LNG



Upstream

Liquefied Natural Gas

Power Generation

Petrochemicals

Upstream & Midstream

Operations by BP, Shell, BHP & EOG

3.8 billion cubic feet of gas production

15 million tons of LNG capacity

Downstream

2GW of installed power capacity

5.3 million tons of Ammonia capacity

6.6 million tons of Methanol capacity

Global Rankings

Largest exporter of Ammonia & Methanol

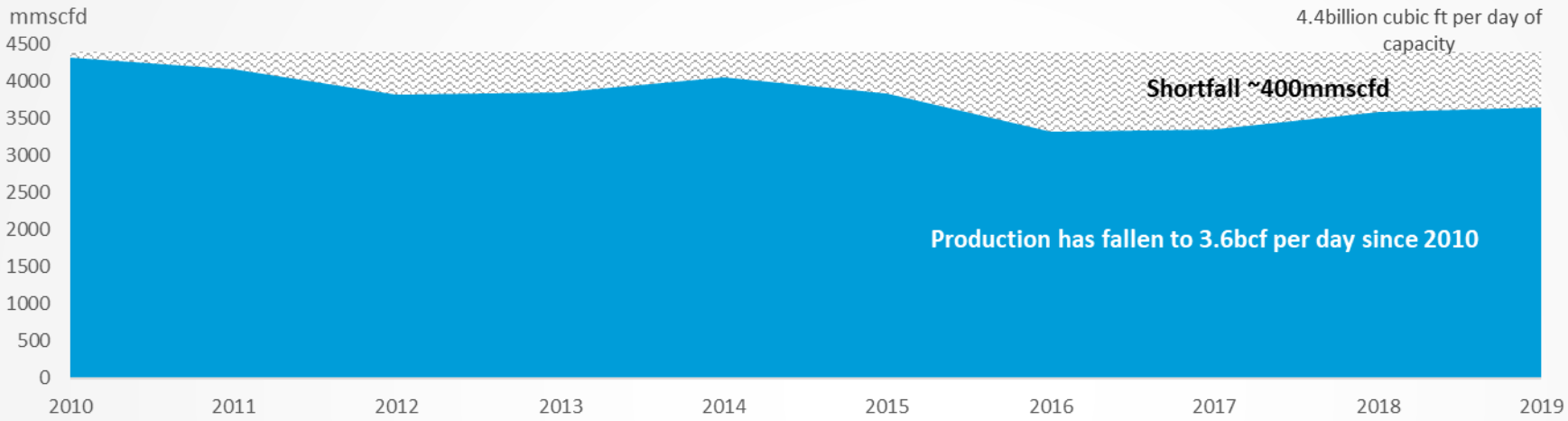
7th Largest exporter of LNG

2nd highest CO2 emissions per capita

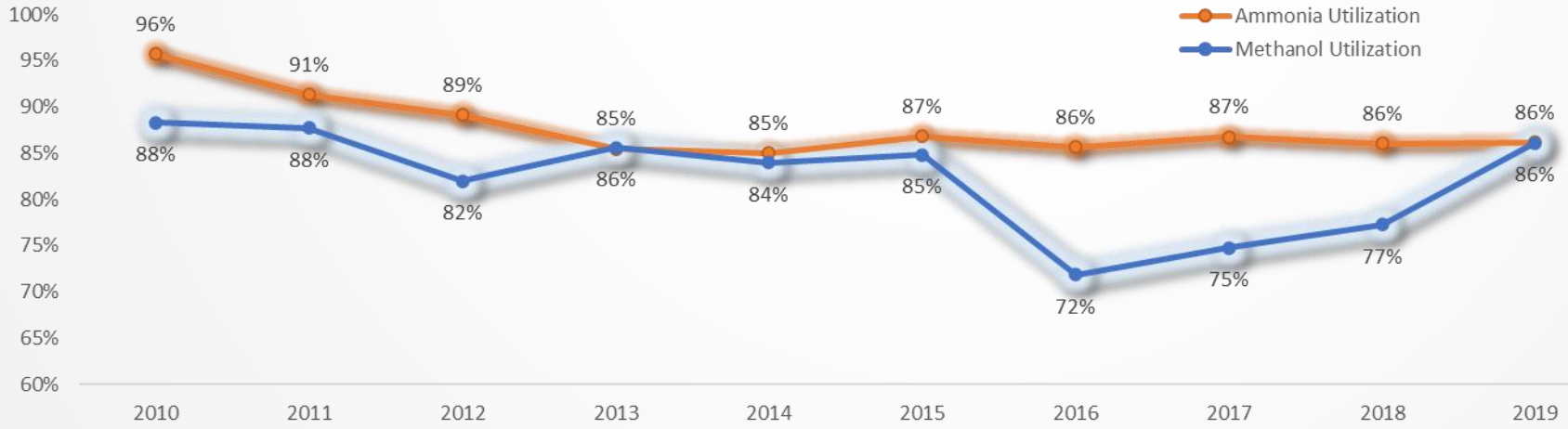
Trinidad and Tobago is home to an industrial scale hydrogen market that is currently supplied by significant natural gas production
2nd highest CO2 emissions per capita in the world

In recent years falling gas production has impacted petrochemical utilization

Gas supply/demand 2010 - 2019



Impact to the Ammonia & Methanol Industry's utilization



The Challenge – Trinidad is short on Hydrogen

Like all petrochemicals, Methanol & Ammonia require hydrogen as a major input

Hydrogen in T&T is sourced from Natural Gas via steam methane reforming (SMR)

First shift reaction

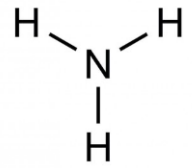
$$CH_4 + H_2O \leftrightarrows CO + 3H_2$$

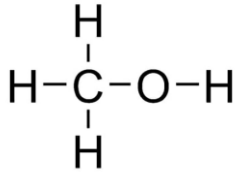
Second shift reaction

$$CO + H_2O \leftrightarrows CO_2 + H_2$$

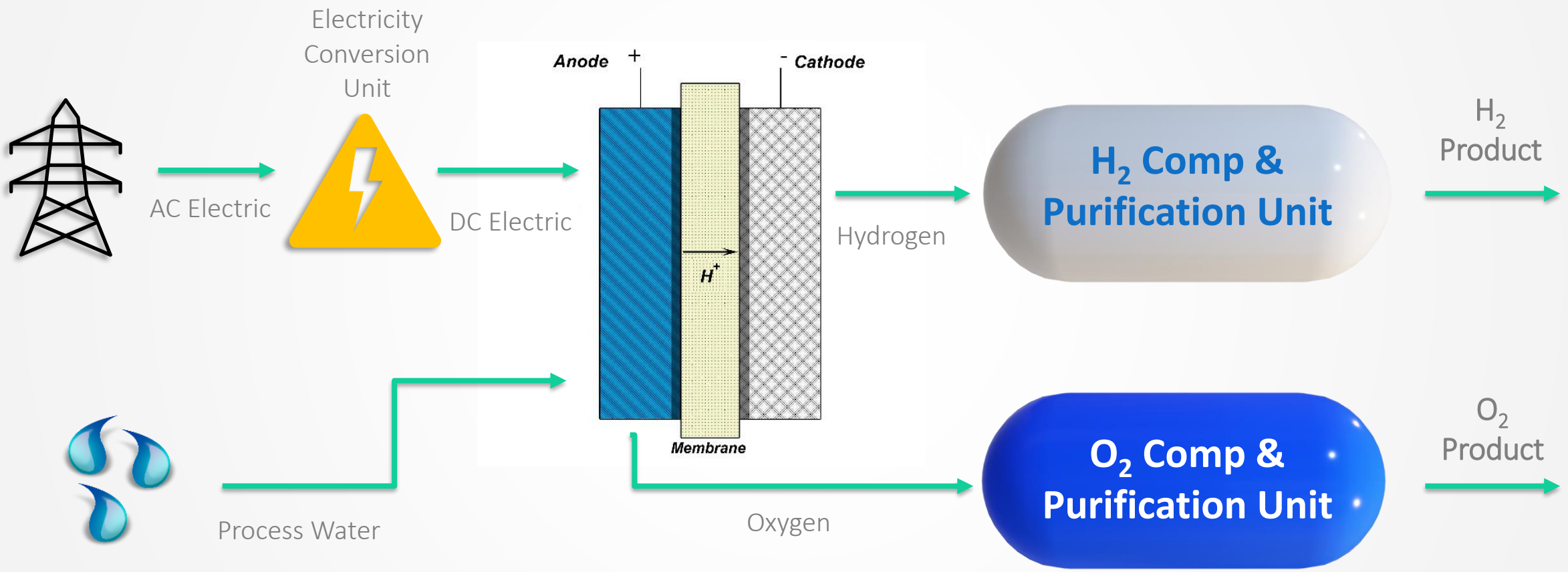
High CO2 emissions

- Trinidad is a captive market for hydrogen
- Currently all hydrogen on the island is sourced solely from reforming natural gas
- Point Lisas can consume over **2.2 million tonnes** of hydrogen **annually**
- Current gas supply providing 1.8 million tonnes – a shortfall of +400k MT/year

Ammonia	H_2 demand/yr	Shortfall in 2019
	**950K** Metric Tons	**131K** Metric Tons
3 hydrogen to 1 Nitrogen molecule	Reflects total installed capacity of Ammonia Plants	Equivalent to the needs of only one Ammonia plant

Methanol	H_2 demand/yr	Shortfall in 2019
	**1.3M** Metric Tons	**287K** Metric Tons
4 hydrogen to 1 Carbon & 1 Oxygen molecule	Reflects total installed capacity of Methanol Plants	Equivalent to the needs of ~ two Methanol plants

A Solution – Produce Hydrogen via Water Electrolysis



The NewGen Project

- Hydrogen Production – 27,200 mtpy
    - Equivalent to 25% feedstock requirement of a typical Pt. Lisas Ammonia Plant (1850MTPD) i.e. produces 450MTPD of ammonia
- CAPEX Estimate – Approx. $300M USD
- Electricity Consumption – Approx.170MW
- Water Consumption – 240,000 Gallons/day
- Plant location is to be in Pt. Lisas, Trinidad, adjacent to ammonia and methanol producers


Thank You