Developing a National Carbon Capture and Storage Programme in Trinidad and Tobago- An International Knowledge-Sharing Symposium

Carbon Capture and Storage (CCS) in Trinidad and Tobago

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October 29th 2019

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Agenda

- The Impacts of Climate Change on the Caribbean
- Results on Carbon Capture in T&T
- Rationale for CCS in T&T
- Key finding from local studies
- Global Updates
- Way forward for T&T

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Impact of Climate Change on the Caribbean

Climate Change Impacts in the Caribbean (Dominica -2017)

"To deny climate change is to procrastinate while Earth sinks. It is to deny a truth we have just lived. It is to mock thousands of my compatriots who, in a few hours, without a roof over their heads, will watch the night descend on Dominica in fear of sudden mudslides and what the next hurricane may bring." – Prime Minister Roosevelt Skerrit

Climate Change Impacts in the Caribbean (Trinidad and Tobago)

Marooned residents swim through floods for help

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Sharlene Rampersad

Desperate residents of Mafeking Village Mayaro have had to become their own first responders, as there is no one to bring food and other supplies through floodwaters into the most-heavily-hit areas. The Sunday Guardian visited the small fishing village yesterday and spoke to several residents who say even though help has been forthcoming, they have had to carry in supplies to their marooned families and neighbours themselves. "The corporation bring hampers and water but is we self carrying it to everybody," said Dale Mohammed, a 37-year-old resident of Chrysostom Trace, Mafeking. "Nothing can't go in there. Last night (Friday) it had six feet of water by my house. we swim to come out and we had a small raft we carry in the stuff with." "Is four of we doing everything, because it have plenty sick people and little children inside there who can't come out," said Shameeka Joseph, one of Mohammed's neighbours.

Dale Mohammed ventured into waist-high floodwaters to demonstrate the severity of the situation facing residents at Chrysostom Trace in Mafeking, Mayaro, yesterday. PHOTO: KRISTIAN DE SILVA

Trinidad Express Newspapers, 2018

Climate Change Impacts in the Caribbean (Trinidad and Tobago)

Catastrophic floods, and it could get worse

Carolyn Kissoon and Sandhya Santoo Oct 20, 2018 1 min to read

Residents of Kelly Village waited on their rooftop as the floods rose.

There has been a catastrophic level of flooding across many communities in Trinidad overnight.

Families are being evacuated from homes in east and central Trinidad as flood waters continue to rise following two days of persistent rainfall.

Trinidad Express Newspapers, 2018

Climate Change Impacts in the Caribbean (T&T)

Samaroo J., 2018

"Last year, we were experiencing, as we have experienced yesterday (Sunday), approximately 30 days' rain in one day and this has had significant effects on the national community – Prime Minister Dr. Keith Rowley (23rd September, 2019)

Climate Change Impacts in the Caribbean

Livelihoods Severely Affected:

- Food Security
- Infrastructure
- Economic and Financial Impacts
- Coastal and Marine Resources
- Water Resources
- Health

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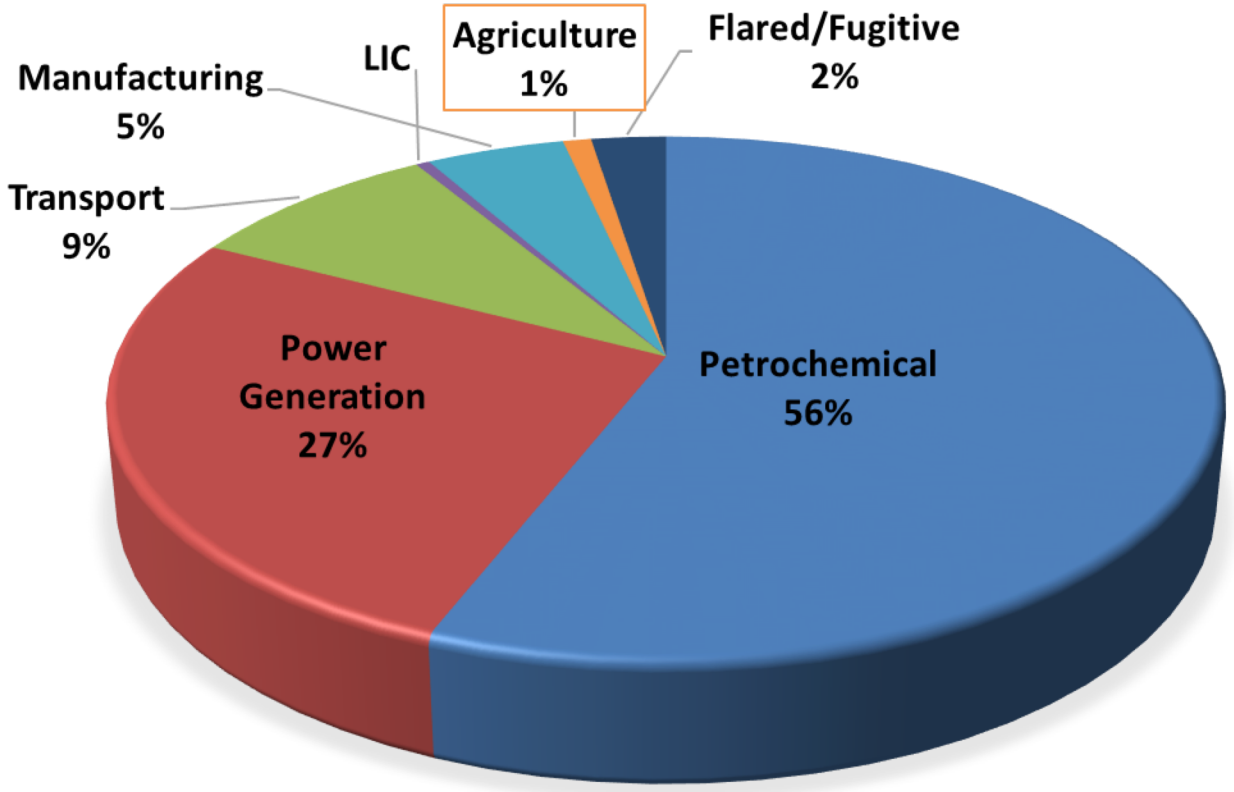
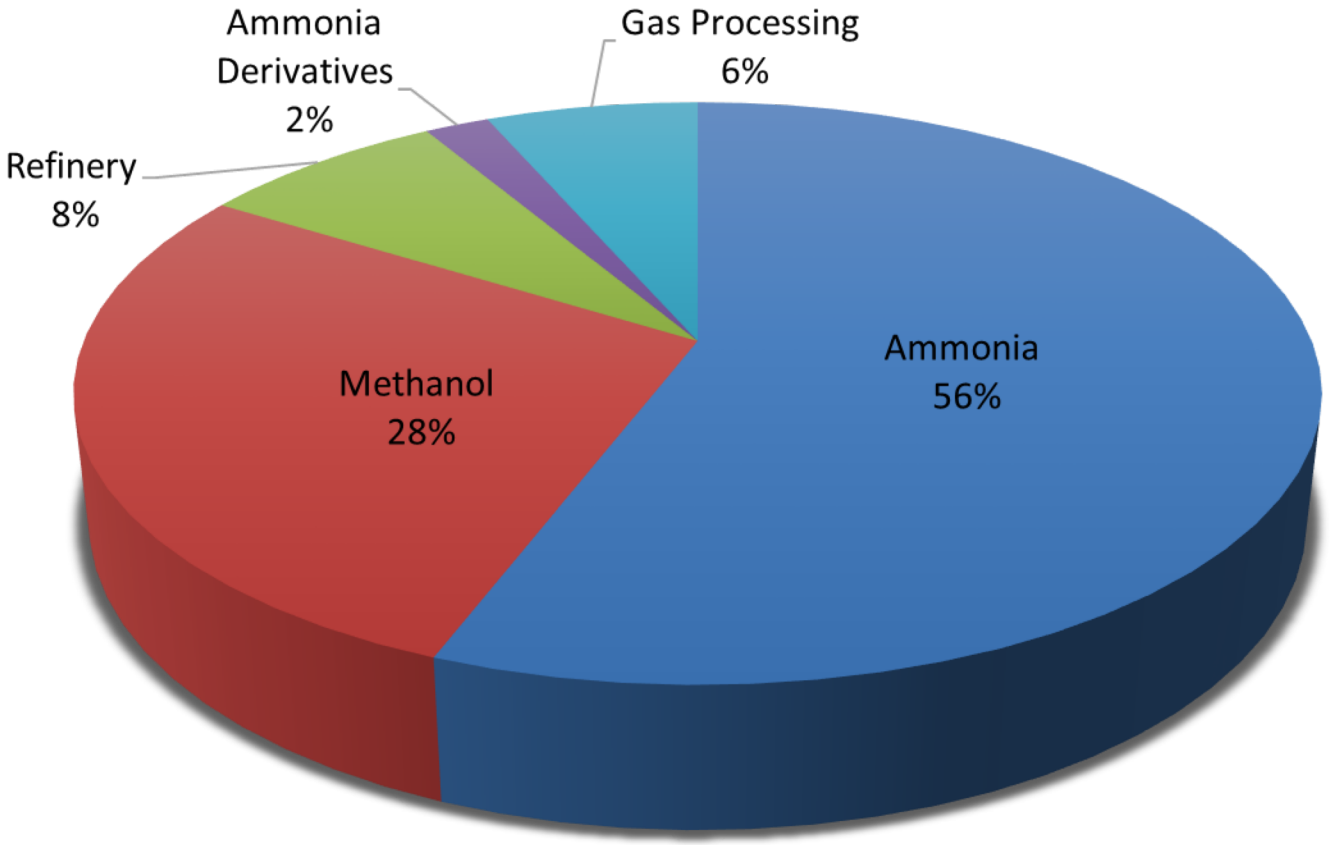
Results on Carbon Capture in T&T

T&T's GHG Inventory - 2015



In 2015, 45 Million Tonnes of GHG emissions occurred in T&T. More than 80% emanated from the Petrochemical and Power Sectors.

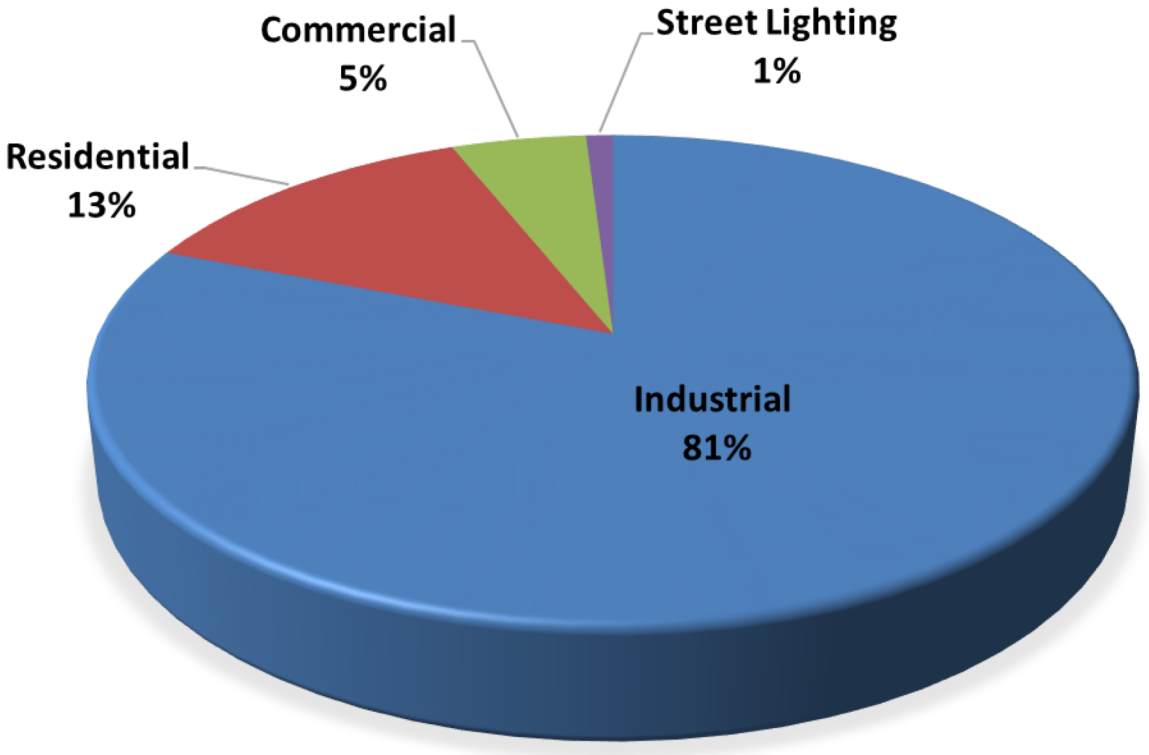
T&T's GHG Inventory - The Petrochemical Sector



In 2015, within the Petrochemical Sector in T&T, more than 80% of GHG emissions originated from Ammonia and Methanol Synthesis.

Boodlal, 2018

T&T's GHG Inventory - The Power Sector



In 2015, within the Power Sector in T&T, more than 80% of GHG emissions originated from Industrial consumption.

Boodlal, 2018

Best CO_2 Sources in T&T

- Process Emissions from Ammonia Synthesis
  - We need to take into account volumes that are already re-used
    - When this is incorporated, at least 4 million metric tonnes per annum are still available for CO_2 sequestration projects
- Process Emissions from Atlantic (1 million metric tonnes per annum are available)
- A UTT executed carbon management Study funded by the Ministry of Energy and Energy Industries was executed. In this study the techno-economic assessment of carbon capture in T&T was assessed.

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Rationale for CCS in T&T

Why sequester CO_2?

- Like it or not, fossil fuels will remain the mainstay of energy production well into the 21st century.
- Increased concentrations of carbon dioxide (CO_2) due to carbon emissions are expected unless energy systems reduce the carbon emissions to the atmosphere.
- It can assist in enhancing oil production as seen in T&T in the 1970's

Why not Ocean and Terrestrial Sequestration?

- Ocean sequestration is unsafe and unreliable
- Trinidad is 5000 km^2 = 500,000 hectares
- Eleven tonnes/hectare of tropical forest per year can be sequestered. (IPCC, 2006)
- 500,000 x 11 = 5.5 million tonnes would be the maximum amount of emitted CO_2 that could be captured by natural sinks

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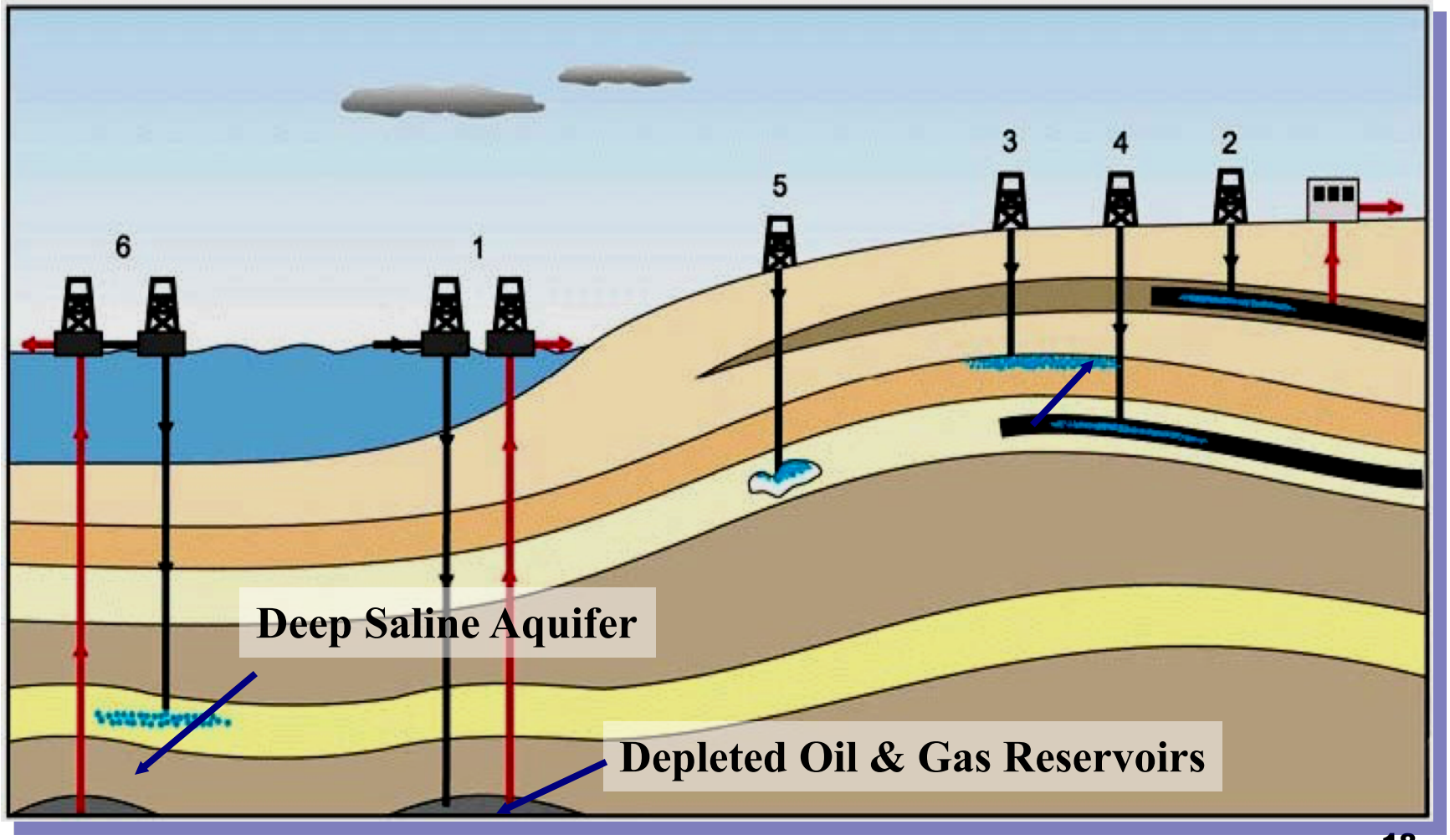
Geologic sequestration Options for T&T



Modified from www.spacedaily.com/news/greenhouse00j-html

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Critical Factors to Geologic Sequestration

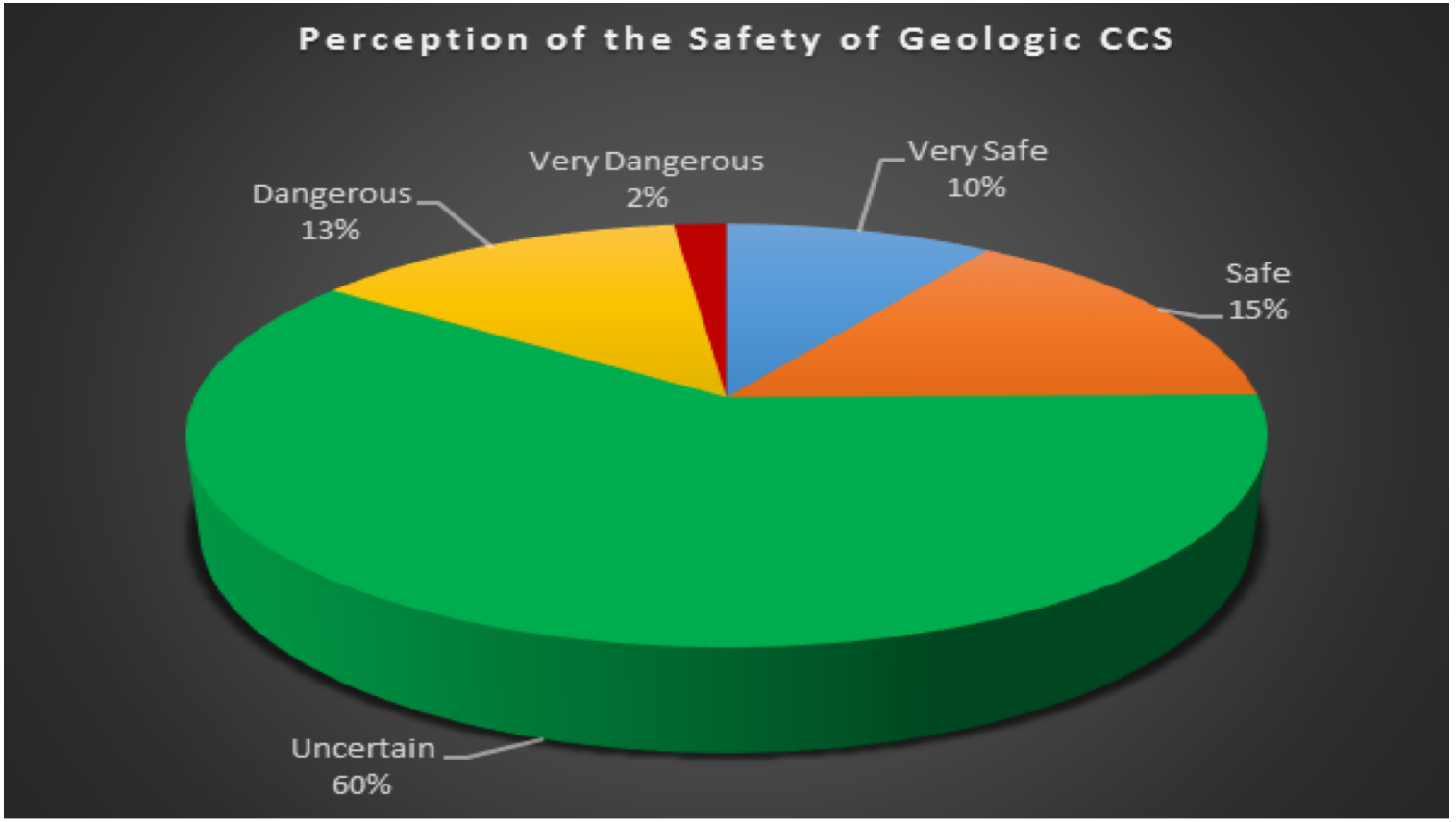
- Costs
- Public acceptance
- Leakage of injected CO_2

Key finding from local studies

Key finding from local studies

- A large amount of T&T's anthropogenic emissions emanate from large point sources in the Industrial Sector and these are within relatively close proximity to possible geological sinks to enable sequestration
- A local study and model has been developed to aid in assessing the economics of transporting these volumes some of these possible sinks
- CO_2 can be trapped for thousands of years once fault and cap rock is sealing.

Public perception of CCS in T&T -2018



Alexander et al., 2018

Global Updates

45Q Tax Credits

- "As part of an omnibus budget bill signed in February **(2018),** US president Donald Trump passed legislation to incentivize carbon capture through so-called 45Q tax credits. Those capturing and simply burying CO_2 would receive $50 per metric ton, and those that put the greenhouse gas to some use would receive $35 per metric ton".

https://qz.com/1335075/once-on-the-sidelines-carbon-capture-is-now-being-touted-as-an-economic-win/

CCS required to control climate change

CCS Required in IPCC's Scenarios to Keep to 1.5 Degrees Celcius

OCT 11, 2018

In context of strengthening the global response to the threat of climate change, IPCC released it's 1.5 Degree Celcius Report on Oct 8, 2018.

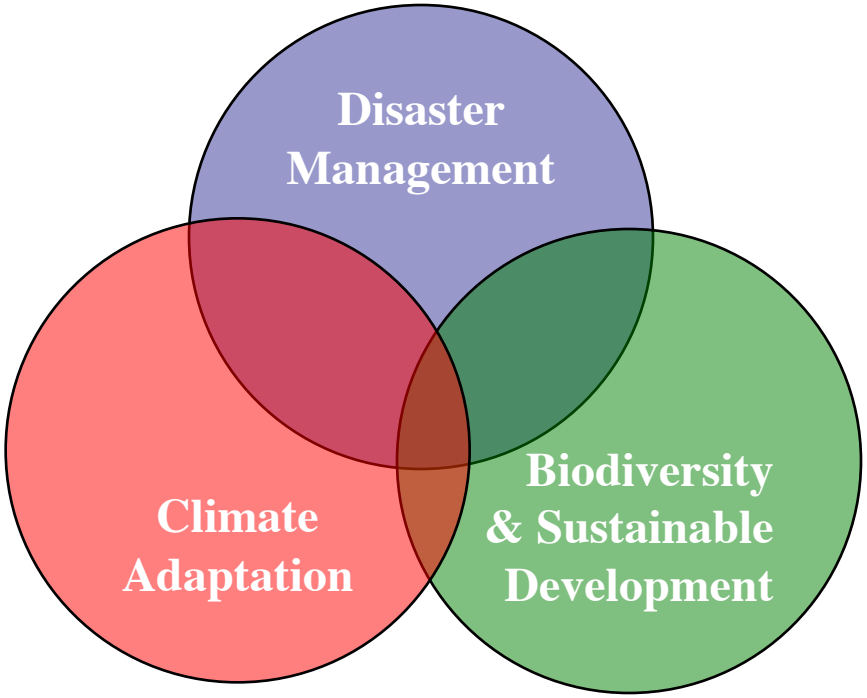
https://ccsknowledge.com/blog/ccs-required-in-ipccs-scenarios-to-keep-to-15-degrees-celcius/

Way forward for T&T

Way forward for T&T

- Capacity Building at the Educational Institutions (UWI and UTT)
- National climate change workshops
  - Public Awareness
- International Partnerships
- Funding by International Agencies
- Continue conducting local research
  - Storage Capacity
- Demonstration Projects and CERM Support
  - CCS
  - CO_2-Enhanced Oil Recovery (improve current production by 15-20%)

Meeting Multiple Objectives though Adaptation



Canari, 2017

ANY QUESTIONS?

SOURCE: Boodlal and Smith (2007)