Namibia Oil and Gas Conference

SECOND EDITION

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THE NEXT STEPS TOWARDS A PROSPEROUS OIL AND GAS INDUSTRY TO POWER NAMIBIA'S SUSTAINABLE FUTURE

Economics, Finance, Gas And Infrastructure

Namibia's Role in Global Oil and Gas Markets - Economic Growth Through Diversification and Competitive Supply Market. How to Pursue a Low Carbon Economy Amid an Oil and Gas Boom

LLOYD BEST INSTITUTE OF THE CARIBBEAN

INDEPENDENT THOUGHT + CARIBBEAN FREEDOM

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Approach

1. Provide a range of data, situations and insights that contribute to the complex tapestry of Namibia's energy and transition landscape:
    a. Oil vs gas
    b. Renewables options
    c. Diversification

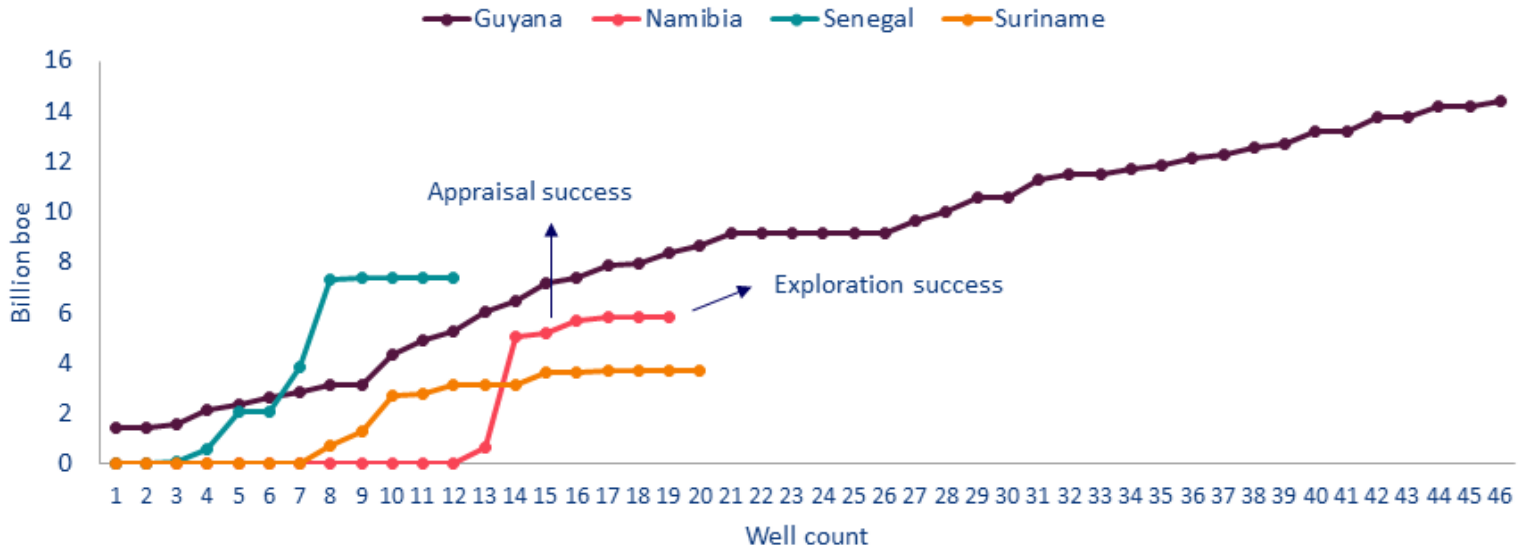
2. Look a few countries that have similarity to Namibia

3. Not intended to provide solutions for Namibia; but food for thought and discussion

Namibia will become a major deep-water oil (and gas) producer

- Namibia has 230,000 square km of licensed acreage;
  - Norway has less than 100,000.
- Currently, the area is hugely under-explored, with fewer than 20 deep-water wells,
  - compared to thousands of wells offshore in places like the North Sea or the Gulf of Mexico.

Deepwater creaming curve (cumulative resources discovered per exploration well)



Source: Wood Mackenzie Lens Upstream

With so few wells drilled in Namibia, we can expect further exploration success and resource upgrades.

So far, Namibia is in on trend with results achieved from other frontier deep-water hotspots like Guyana, Suriname and Senegal

Gas isn't being discussed, but the sense is that there is a high Gas/oil ratio (GOR) which may be delaying decision making and information flow. Similar situation in Suriname

Outlook for Namibia Upstream (Wood Mackenzie)

- …we believe oil production in Namibia could surpass 500,000 barrels per day within a decade and continue to grow after that.
- The scale of upstream investment will be unprecedented for the country, reaching up to US$4 billion per year in the first half of the next decade.
- Monetisation of gas will be more complicated:
  - The ultra-deepwater location, seabed topography, offshore conditions, gas quality and limited local market and infrastructure mean reinjection may be preferable initially to benefit from higher oil returns.
- Operators will adopt a multi-phase development concept to exploit the opportunity.
  - Initially, floating production storage and offloading (FPSO) installations will be used.
  - Later over 100 subsea wells, comprising producers and water and gas injectors, could be drilled on the fields.
- …see Namibia as an emerging core region for the Majors,
  - with expected NPV for projects giving them the potential to become crown jewel assets for several big operators

woodmac.com/news/opinion/will-namibia-become-a-major-deepwater-oil-producer/

Oil & Gas - Quick Reminder

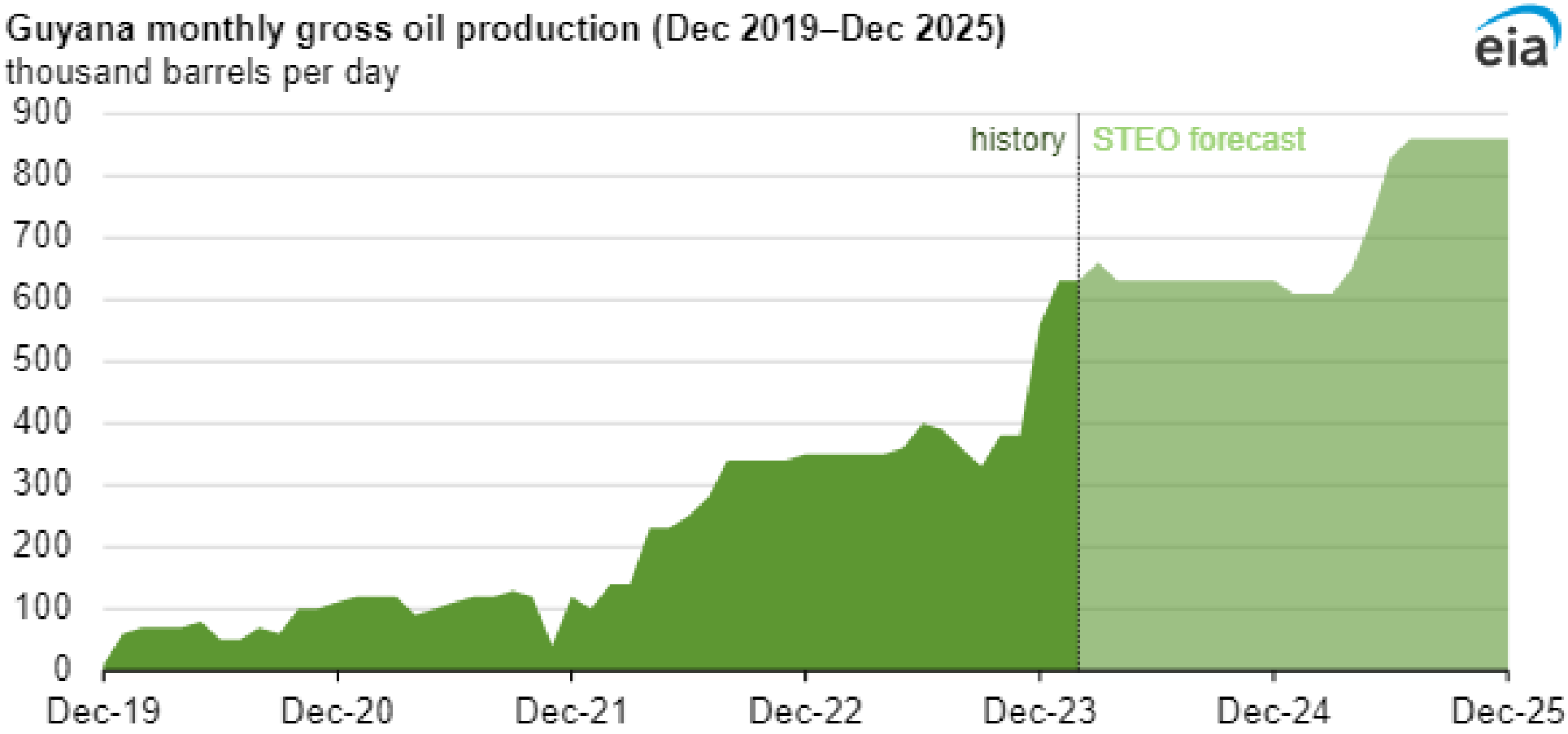
- Oil and Gas are formed by the same process, in varying proportions, depending on geological factors
- Oil and Gas are stored underground in reservoirs:
  - alone (oil reservoirs or "non-associated" gas reservoirs) or
  - together ("associated gas")
- Companies make more money from oil:
  - Oil is much more valuable than gas ($80 vs $24 per BOE)
  - Oil is cheaper to move from the producing field to market
  - Oil has a wider range of markets
  - Producing Gas reservoirs can be cheaper, but gas requires high-cost transportation infrastructure and/or processing plants
- Order of priority/profitability:
  1. oil only >
  2. associated gas >
  3. non-associated
- High-carbon oil being produced now,
- "Cleaner" natural gas production deferred

Country	Land Area (sq km)	Population (2023)
Trinidad and Tobago	5131	1400000
Guyana	214970	800000
Suriname	163820	600000
Namibia	825615	2500000

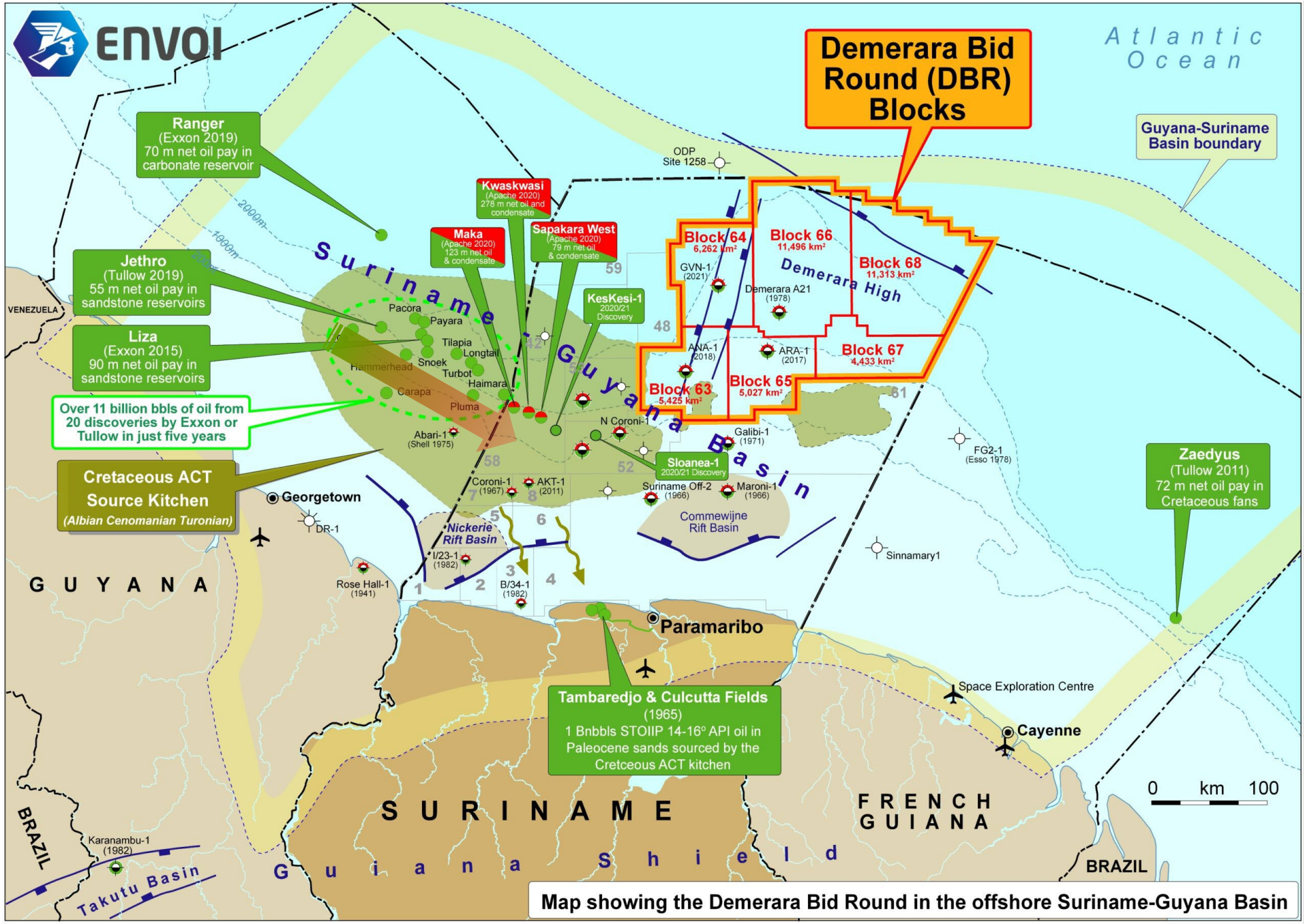
Recent Major Discoveries to Production

Country	Field/Discovery	Water Depth (m)	Distance from Shore (km)	First Discovery	First Production
Ghana	Jubilee Field	1,100 to 1,700	60	2007	2010
Senegal	SNE Field (Sangomar)	1,100 to 1,400	100	2014	2023
Mozambique	Rovuma Basin (Area 1 and Area 4)	1,500 to 2,500	40 to 50	2010	2022
Namibia	Venus Discovery	~3,000	300	2022	2029 (projected)
Namibia	Graff Discovery	~2,000	300		
Guyana	Liza Field	1,500 to 1,900	190	2015	2019
Suriname	Block 58 Discoveries (Sapakara, Maka Central, Kwaskwasi)	1,000 to 2,000	150 to 200	2020	Not yet

Guyana – Daily Oil Production

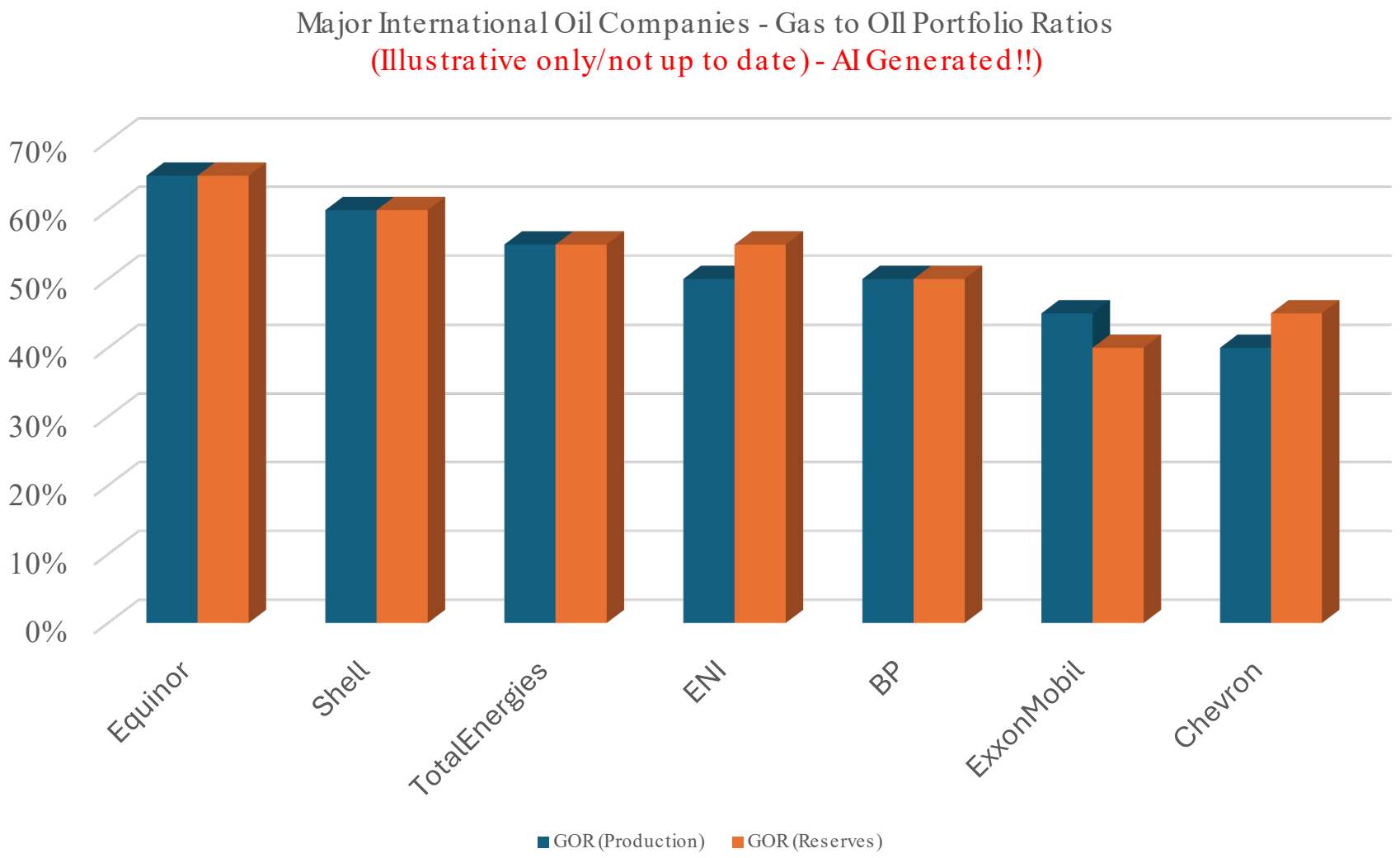


Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO), May 2024



Map showing the Demerara Bid Round in the offshore Suriname-Guyana Basin

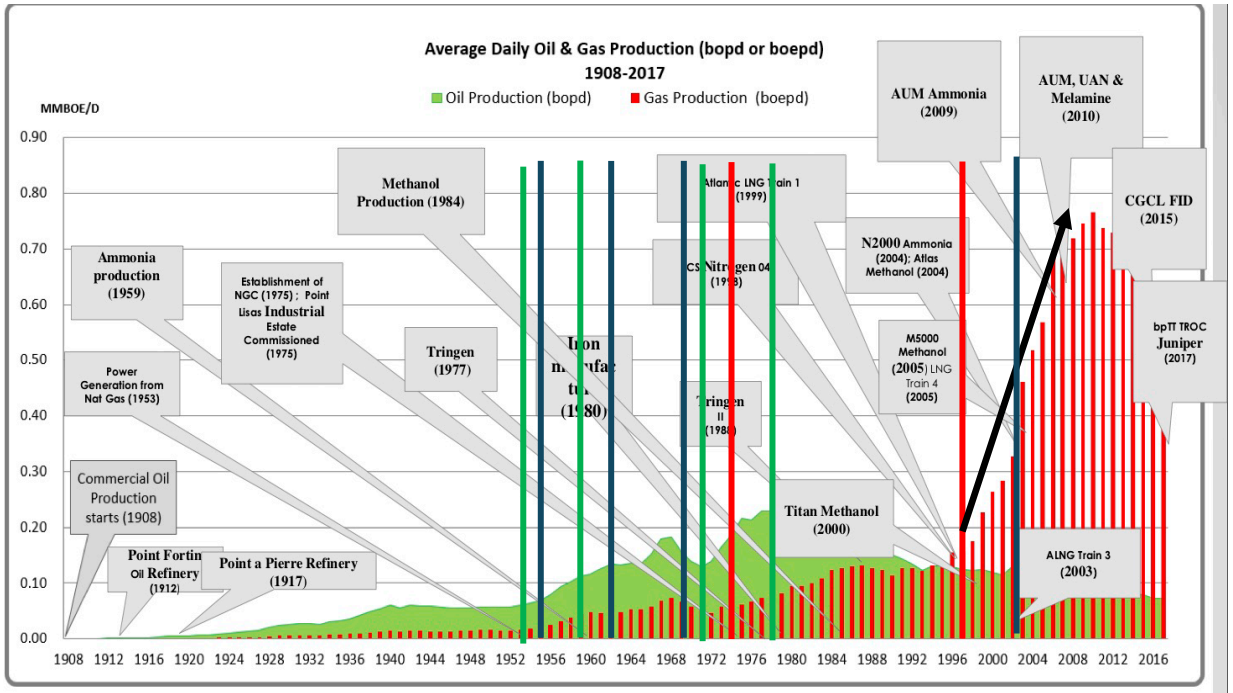
Phase 1 of the transition – Oil to Gas

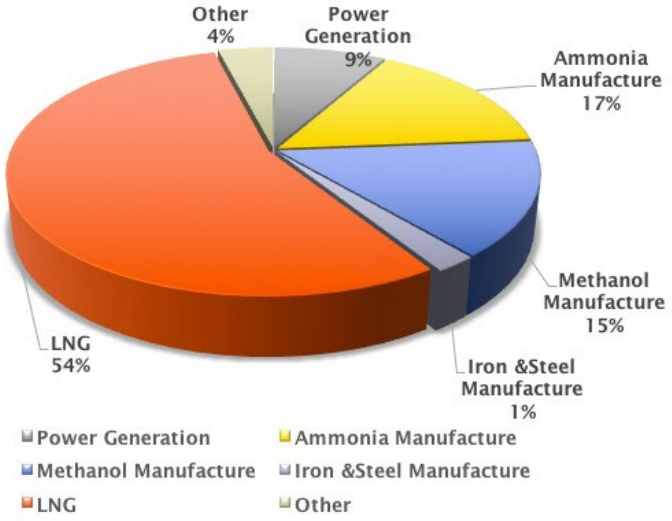


Warning – These data are not accurate or up to date

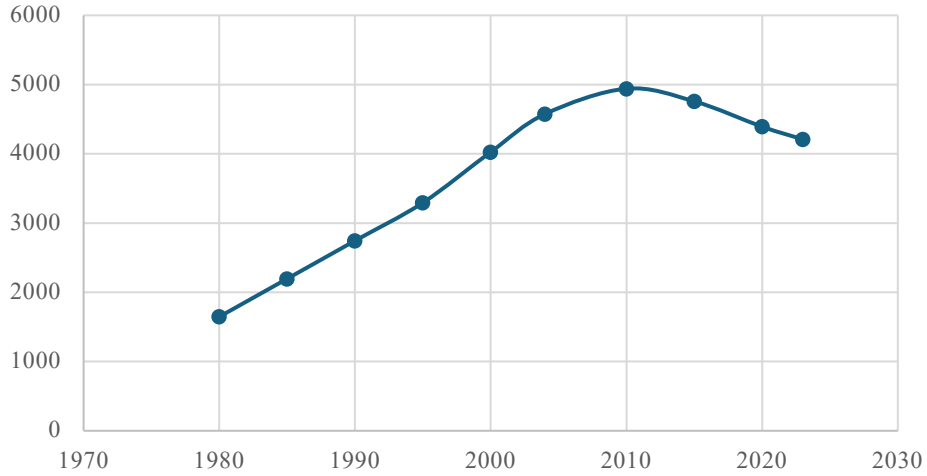
Generated by CHAT-GPT

Trinidad & Tobago – Long History of Natural Gas Usage





Reserves (MMBOE)



PORTFOLIO

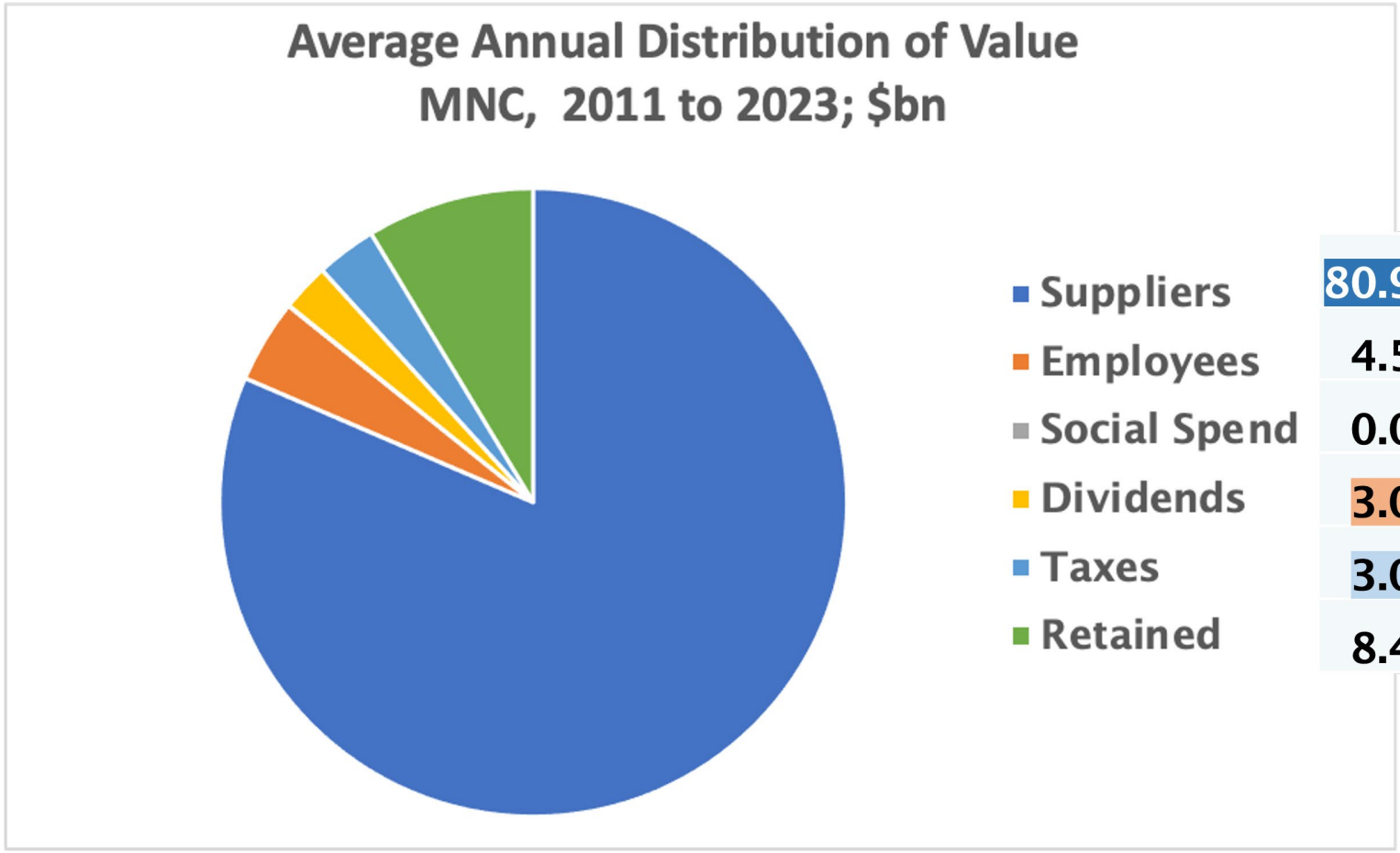
Point Lisas Industrial Estate:

- 1 Natural Gas Liquids Processing Facility (46 MBPD)
- 10 Ammonia Plants (5,800 MTPA)
- 1 Urea Plant (550 MTPA)
- 7 Methanol Plants (6,590 MTPA)
- 1 Methanol to Power facility
- 1 A-U-M Complex, comprising:
  - 1 Ammonia plant
  - 1 Urea plant
  - 1 Nitric Acid Plant
  - 1 Ammonia Nitrate plant
  - 2 Melamine trains
- 4 Iron and Steel Mills (2,560 MTPA)

Other Locations:

- **4 Liquefied Natural Gas Plants(2300 Mmscfd/15.3 MTPA)**
- 1 Crude Oil Refinery (160 mbpd)
- 6 Power Generation Plants - (~2,500MW)
- 1 cement manufacturing plant
- Over 120 Ligh Plant Ownership consumers (ai
  - Jointly owned by a combination of international and local companies
  - Managed by nationals of Trinidad & Tobago

Where does the Value Go (Major MNC example)
Almost all Revenue Generated from Sale of Oil, Gas & Derivatives

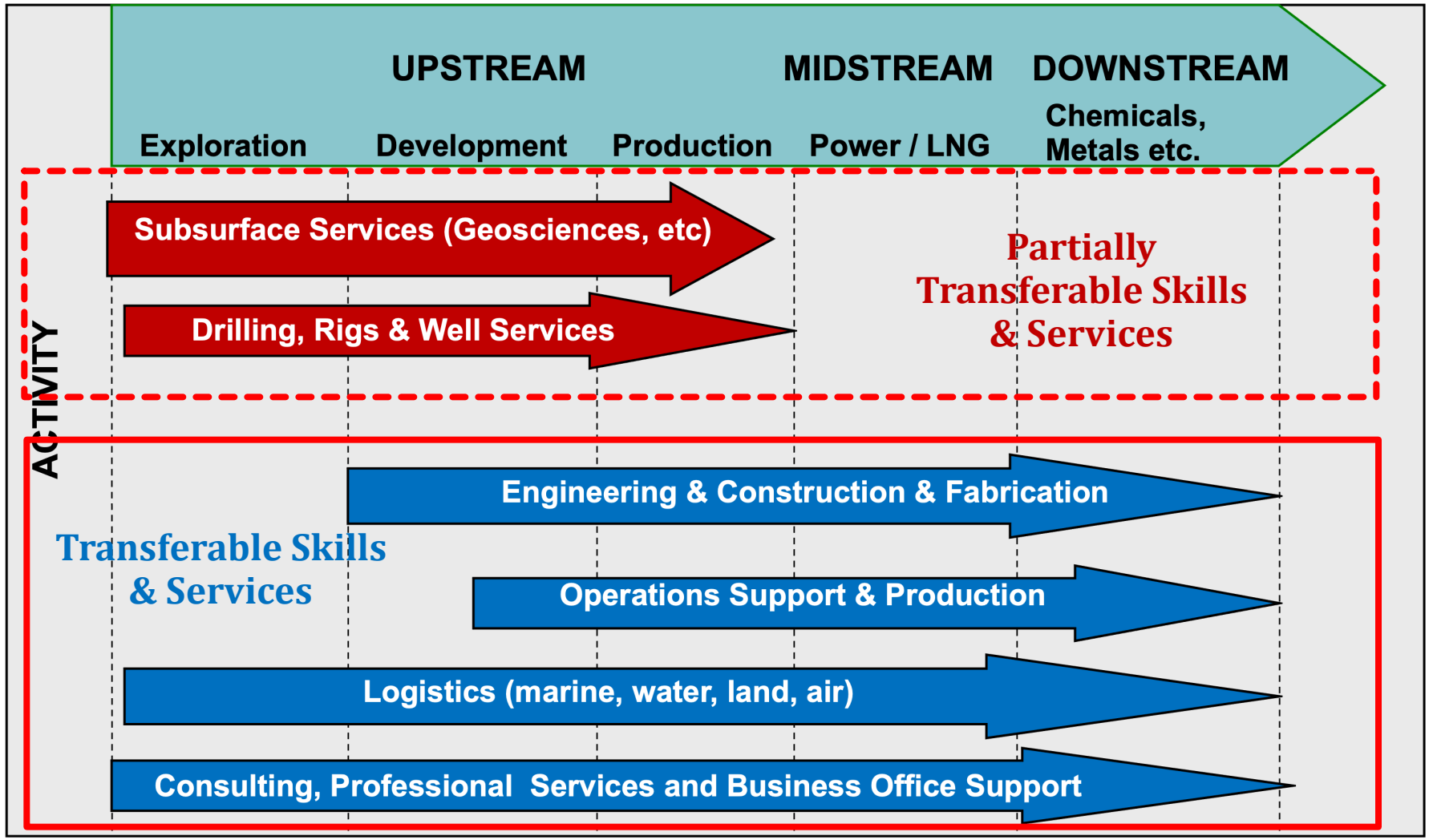


Average Annual Revenue 2011-2023:

- ✓ $277.2 Billion
- ✓ Upstream ~25%
- ✓ **Downstream >70%**
  - ✓ ***much outside producing countries***

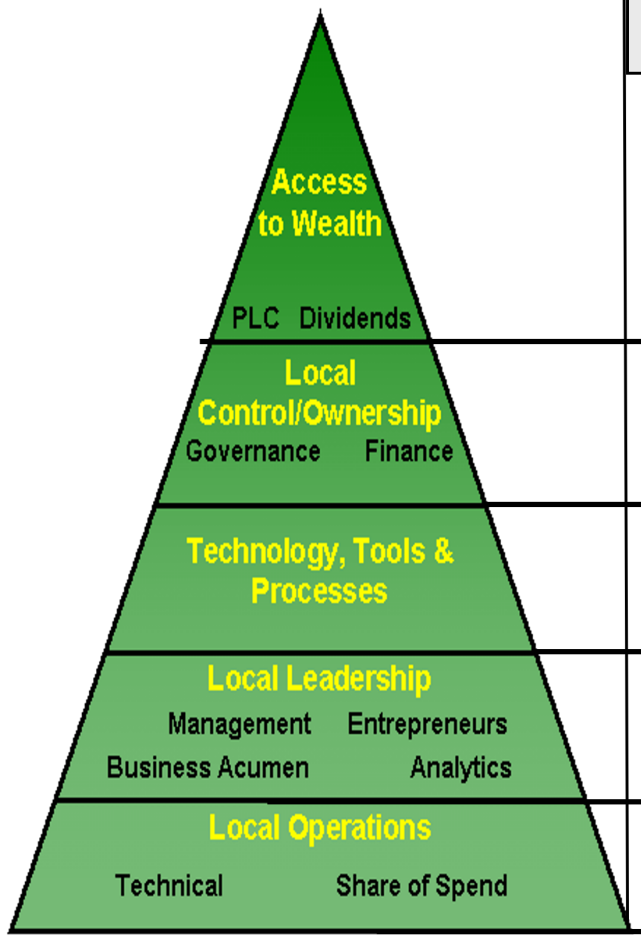
Major Third-Party Services - sub-sectors, spend & transferability

- Some activities develop and use skills and services that are entirely transferable to other sub-sectors & industries;
- Others support specialised areas like geosciences and drilling (e.g. ITC and management of major projects and risk) and are themselves transferable
- Developing and using these can be an effective mechanism for sustainable development and preventing/reversing effects of "Dutch Disease"



Can A Competitive Oil & Gas Supply Chain Support Namibia's Local Content & National Development & Diversification Objectives?

Framework for LC&P



Local Capacity Development Upstream Sector Impacts

Engineering	Fabrication	Sub-Surface (geology, geophysicist)	Logistics (boats. helicopter)	Production Operations Maintenance	Drilling/ Rigs	Well Services	Business Support
◑	●	◕	●	◑	●	◑	◕
◑	●	◕	●	●	◑	◑	●
●	●	●	◑	◕	●	●	●
◕	◑	●	◑	◑	◑	◑	●
◑	●	◔	◔	●	◕	◕	◑

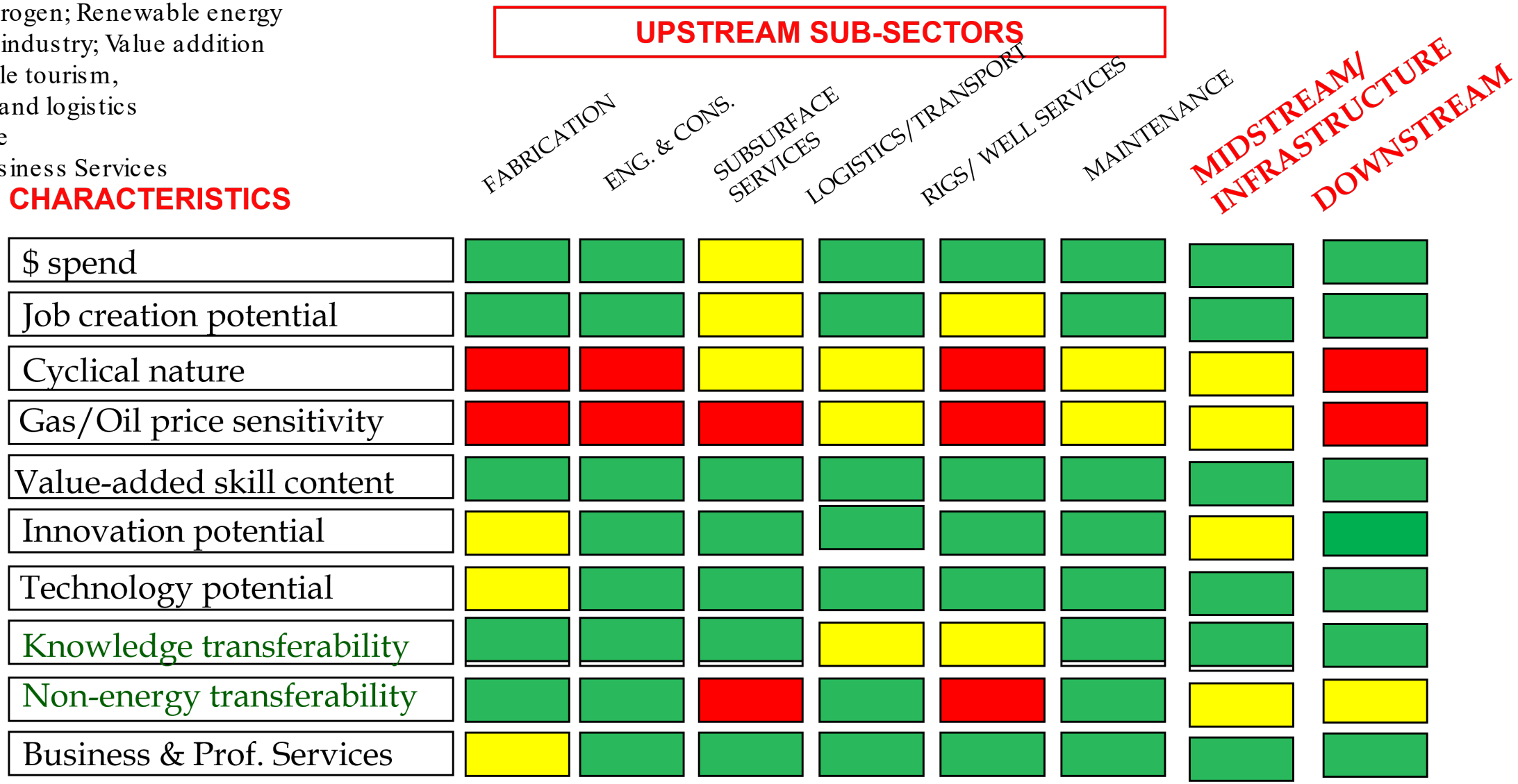
KEY: Level of Potential for Sector to impact LC&P objectives

● Very high ◕ High ◑ Medium ◔ Low ○ Very low

A. Paul, 2005

Can A Competitive Oil & Gas Supply Chain Support Namibia's Local Content & National Development & Diversification Objectives?

- Green hydrogen; Renewable energy
- Chemical industry; Value addition
- Sustainable tourism,
- Transport and logistics
- Agriculture
- Global Business Services



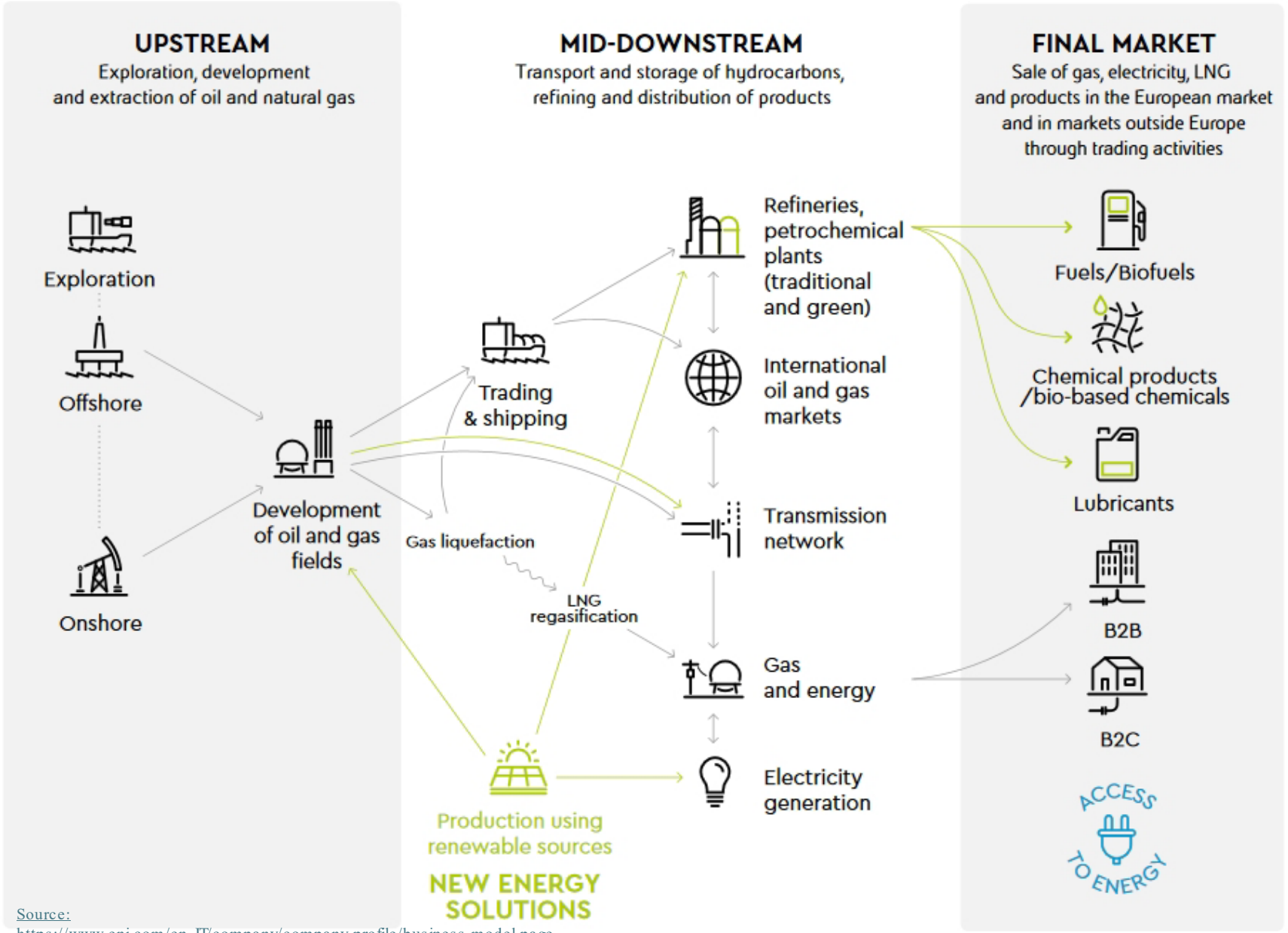
A. Paul, 2003

RT Impact on Sustainable Development

RT potential positive impacts	Wind	Solar	BioFuel	BioDiesel
Economic				
Economic Diversification				
Energy Efficiency				
Energy Conservation				
CERs Production				
Offsetting Subsidies Distorsions				
Innovation Driven Competitiveness				
FDI				
Capital market development				
Agriculture development				
Maritime development				
Tourism development				
CARICOM leading				
Social				
Energy Security				
Crisis Backup System (dry / flooding seasons)				
Particulate and other emissions reduction				
Local Content				
Employment				
CARICOM people Integration				
Rural life style				
Environmental				
GHG Mitigation				
Preventing land degradation				
Preventing soil erosion				
Biodiversity				
Protection of watersheds				
Emissions in land and in air (nitrogen, sulphur)				
EcoTurism development				

Legend	Hi	Medium	Low

Leveraging Oil & Gas Assets for Renewables - some advantages of biofuels for transition



Source: https://www.eni.com/en_IT/company/company-profile/business-model.page

- Hydrocarbon-based fuel
- Transferrable skills for existing labour force
- Adaptable to similar uses as conventional fossil fuels such as:
  - Transportation (fuel blends)
  - Power Generation
- Can retrofit and use existing available infrastructure for:
  - Production
  - Refining
  - Transportation
  - Storage
  - Utilization
  - Reduced CapEx

Darrian M. Paul
UCL Biotechnology 2018

Why Algae?

- No food source competition
- Less land usage
- Much higher yield compared to 1st and 2nd generation

Expression System	Barrels/Hectare/ Year[1]	toe/Hectare/Year[2]
1st gen – Soybean	2.5	0.35
2nd gen – Jatropha	12	1.68
3rd gen – Microalgae & Cyanobacteria[3]	360 – 1,500	50 - 210

1. Dragone G, Fernandes B, Vicente AA, Teixeira JA. Third generation biofuels from microalgae. [cited 2018 Mar 13]; Available from: https://repositorium.sdum.uminho.pt/bitstream/1822/16807/1/3067.pdf
2. Conversion base : 1 barrel = 0.14 toe
3. Based on % dry weight obtained from various microbial strains. Minimum 16% from Cylindrotheca sp. to maximum 77% from Schizochytrium sp.

EXTRACTING FROM EXTRACTIVES:
A UNIQUE CHANCE FOR TRANSFORMATION

Blue Sky Thinking

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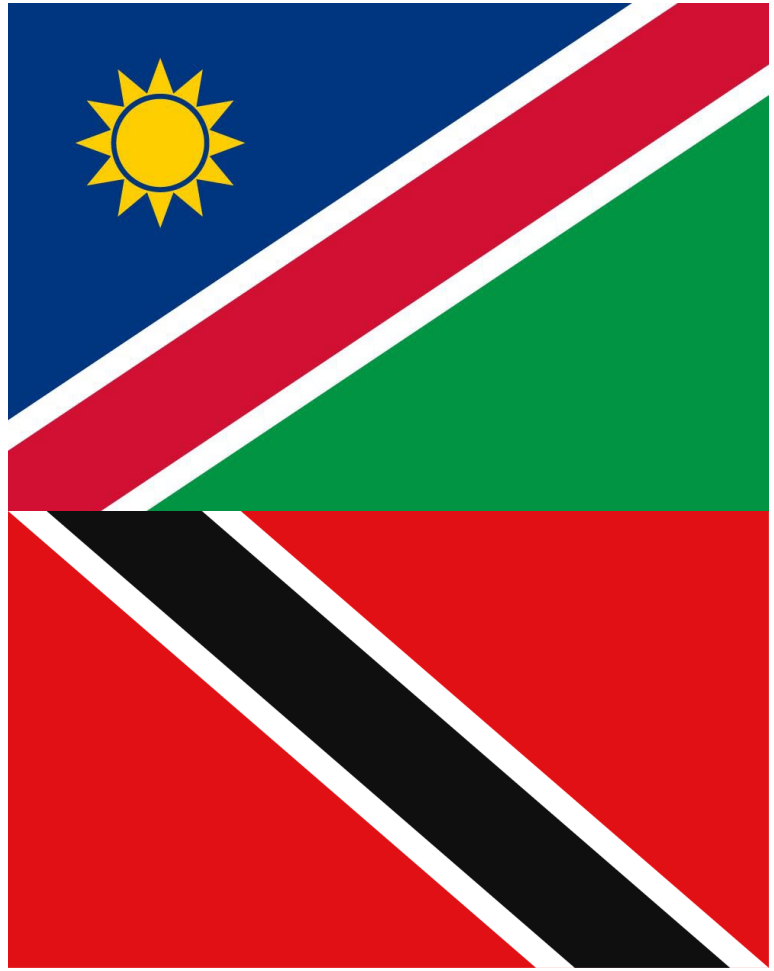
"There have been **attempts to persuade us that the simplest and easiest thing to do would be to sit back, export our oil, export our gas, do nothing else and just receive the revenues derived from such exports** and as it were, lead a life of luxury – at least for some limited period.

This, **the Government has completely rejected**, for it amounts to putting the entire nation on the dole.

Instead, we have **taken what may be the more difficult road** and that is, accepting the challenge of entering the world of steel, aluminium, methanol, fertilizer, petrochemicals.

We have accepted the challenge of **using our hydrocarbon resources in a very definite industrialization process**."

Eric Williams, Founding Prime Minister, 1976



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