A REVIEW OF DOWNSTREAM NATURAL GAS PORTFOLIO SELECTION CRITERIA IN TRINIDAD AND TOBAGO

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AGENDA

- Background to downstream industries
- Review of downstream portfolio selection criteria
- New realities facing the natural gas industry
- Historical analysis of downstream sub sectors:
  - Efficiency – Output per bcf
  - Employment – Headcount per bcf
  - Value – Output value per bcf
- Conclusions/Recommendations
BACKGROUND TO DOWNSTREAM INDUSTRIES

- Upstream Gas discoveries
- State led downstream investments
- Technical and marketing challenges
- Structural adjustments and privatization
- FDI led downstream investments
- Financial incentives
Upstream Natural Gas

- Discoveries
  - Late 1960s
  - 1970s
  - 1990s
  - Early 2000s
Natural Gas Monetization

- Previously vented/flared – no value
- Government policy - create value
- Development of markets – export oriented
- Investments in infrastructure
Best Use of Our Petroleum Resources, 1975

- Government conference
- Expansions/Upgrades to:
  - Power Generation
  - Ammonia and urea production
  - Petroleum refining
  - Cement production
- Establishment of export based plants for:
  - Alumina
  - Iron and steel
  - Methanol
  - LNG

Source: Boopsingh et al, 2014
DOWNSTREAM SELECTION CRITERIA

- Energy efficiency
- Local content
- Employment
- Value added
- Environmental Impact

STATE PROJECTS IMPLEMENTED

- Electricity expansion
- Production of DRI (ISCOTT, 1980)
- Urea (1983)
- Methanol (1984)
- Cement (1984)
SUBSEQUENT DOWNSTREAM DEVELOPMENTS

- State Divestments (Late 1980s to early 1990s)
- Product related price formula (1987)
Proposals by GCA 2002

- Methanol & Ammonia - no additional expansion
- LNG - continued expansion
- Gas-to-liquids - limited state support
- Iron ore reduction & Aluminum - employment
- Power - Price electricity to recover costs.
- Ethylene and polyethylene - world-scale plant
- LPG - Continue Caribbean sales expansion
- CNG - development of Caribbean markets
- Added value products: private investment

Source: Oil and Gas Journal, 2004
# Recent Private Sector Proposals

## Downstream Output
- Methanol, propylene & polypropylene
- Ethylene & Polyethylene
- Ammonia, UAN, Melamine
- Ammonia, urea, ammonia sulfate
- Steel
- Bitumen to Synthetic Crude
- Aluminum Smelter
- Aluminum Smelter
- Calcium Chloride
- Maleic Acid

## Company
- Lurgi/Basell
- Westlake
- MHTL, AUM I (2010)
- MHTL, AUM II
- Essar
- Reliance Industries Limited
- ALCOA
- Alutrint
- Carisal
- Isegen
Upstream Natural Gas – New Realities

- No **major** gas discovery since early 2000s
- Depleted larger fields
- Declining natural gas production in T&T
- Higher cost of upstream production
  - Smaller fields
  - Aging infrastructure
  - Lower condensate yields
Upstream Natural Gas – New Realities

- Needs relative higher gas prices for feasibility
  - Availability of cheap natural gas in other countries
  - Investments in primary petrochemicals globally
  - Not business as usual
Annual Natural Gas Production (BSCF)
Natural Gas Utilisation in T&T

- LNG
- Ammonia and Ammonia Derivative
- Methanol
- Power
- Other
Ammonia and Methanol Prices

Price of Ammonia (US$/Tonne)  
Price of Methanol (US$/Tonne)
Gas Utilization Efficiency

- Output capacity – tonnes per annum
- Throughput capacity – bscf per annum
- Efficiency - tonnes per bscf
LNG Gas Utilisation Efficiency
tonnes/bscf
Ammonia Gas Utilization Efficiency
tonnes/bscf
Methanol Gas Utilization Efficiency

Methanol Gas Utilization Efficiency in tonnes/bscf

- M1: 35,000
- M2: 30,000
- M3: 25,000
- M4: 20,000
- M5: 40,000
- M6: 35,000
- M7: 20,000
**Employment/Unit of Gas**

- Number of employees
- Throughput capacity – bscf per annum
- Employment per bscf
Employment per bscf
**Output value/Unit of Gas**

- Value of output – based on average destination price
- Natural gas utilization
- Output value per bscf
Output Value (US$M per bscf)
Price Trends of Natural Gas Derivatives

- Ethylene
- Maleic anhydride
- Melamine resins
- Propylene
- Propylene polymers and other Olefins
- Anhydrous Ammonia
- Methanol

Conclusions

- Declining domestic natural gas production
- Evolving international market conditions
- Varying – efficiency, employment and value per unit of resource
- Several projects have been cancelled
RECOMMENDATIONS

- Further downstream – greater value in terms of employment and revenue
- Plant conversion vs new plants
- Opportunities – gas supply contract renewals
- Risks - High price correlations
- Product based natural gas pricing
- Risks – to midstream, and upstream
Thank You!