LNG Importation Initiative

Saldanha – Cape Town Corridor

Fossil Fuel Foundation – 21 May 2014
Cape West Coast Gas Development

- Western Cape Provincial Cabinet defined natural gas as a strategic priority (May 2013)
- Prefeasibility study on the importation of LNG concluded (April 2013)
- Provincial Treasury makes funds available to drive agenda (Sept 2013)
- Transaction Advisor appointed (October 2013)
- Ongoing engagements with key stakeholders
Cape West Coast Gas Development

Conceptual Design Phase (Pre-Feasibility), followed by a Preliminary Engineering Phase

Phased FEED Study

- Configuration Analysis
- Design Feasibility
- Initial cost estimation
- ROI Prediction

- Basic engineering package
- Key equipment specifications
- Sanctioned cost estimate
- Equipment quotes
- Plot plan
- EPC Plan

Prefeasibility study on the importation of LNG concluded.
**Pre-feasibility study**

- **Gas Market:**
  - Conducted an extensive market update to verify value of “convertible” gas market

- **Gas supply options:**
  - piped gas from neighboring or near-neighboring countries
  - indigenous gas reserve
  - importation of LNG/CNG

- **LNG Terminal Infrastructure:**
  - offshore submerged terminal
  - submerged terminal – Port of Saldanha Bay
  - conventional terminal - Port of Saldanha Bay

- **Onshore infrastructure:**
  - ± 116 km transmission pipeline
  - ± 126 km Distribution pipeline
Potential gas markets - Atlantis, Cape Town Metropolis

- Existing 1 350 MW Ankerlig OC peak power station near Atlantis
- Ankerlig can be converted to 2070 MW CCGT mid-merit power station
- Future potential gas-fired power stations in Milnerton and/or Saldanha Bay

- Existing commercial & industrial markets in Atlantis & Cape Metropolis region
- Total identified market approximately 89 MMBtu/y (±1.8 MMt/a LNG)
Potential gas markets - Transportation Sector

- Existing Western Cape Transport Fleet – 8 179 vehicles:
  - MyCity – 267 busses
  - Golden Arrows – 1073 busses
  - Sibanye – 78 busses
  - CCT & WCPG Fleets – 6 500 trucks & corporate fleets
  - Logistics & distribution Fleets – 260 delivery vehicles

- Total fuel consumption – 28.3 million litres per annum (± 1 MMGJ/a equivalent)
Industrial hubs - Atlantis & Cape Town Metropolis
 Potential gas markets - Saldanha Bay

- **ArcelorMittal:**
  - Expansion of Electric Arc Furnace and caster rolling mill operations

- **Rare Metals Industries:**
  - Processing of titanium slag stockpiled at Exxaro smelter

- **BHP Billiton:**
  - Manganese smelter

- **Steel Authority of India:**
  - SAEL steel smelter

- **Frontier Rare Earths:**
  - Rare earth separation plant for production of rare earth oxides
  - Dedicated chlor-alkali plant for production of hydrochloric acid
Potential electricity requirements - Saldanha Bay

- An initial power requirement of 280 MW:
  - ArcelorMittal – 120 MWe
  - Exxaro Namakwa Sands – 80 MWe
  - Back of port industries – 80 MWe

- Potential expansion programs (2014 – 2016):
  - ArcelorMittal – 60 MWe
  - Rare Metals Industries (RMI) – 160 MWe

- Future potential programs (≈ 2018):
  - BHP manganese smelter - 580 MWe
  - SAEL steel smelter – 160 MWe
  - Frontier Rare Earths – 70 MWe
LNG supply options

Evaluation of LNG supply availability (2018/9)
q Portfolio suppliers
q East Africa
   ☝ Mozambique - (Anadarko, Eni East Africa)
   ☝ Tanzania - (Ophir Energy, StatoilHydro)
q West Africa
   ☝ Angola - (Angola LNG)
   ☝ Nigeria - (Nigeria LNG, Brass River)
q Middle East
   ☝ Oman – (Al Qalhat LNG)
   ☝ Qatar – (QatarGas LNG Company, RasGas’ Ras Laffan City)
q Australasia
   ☝ Australia – (Chevron ‘s Wheatstone LNG)
LNG delivery description

- FSRU connected to demountable buoy serving as LNG terminal
- LNG shuttle tankers delivering LNG to the FSRU from supplier(s)
- LNG availability from either technology providers or LNG supplier(s)

- Initial studies indicate a scheduled delivery every 15 days (pending size of FSRU & shuttle vessels)
- Approximately 30 hrs to connect, discharge & disconnect
- Methodology provide anchorage flexibility in Saldanha Bay region
- Security of supply – LNG availability
- Short lead time
International FLNG projects

FLNG Supply technology

- 22 FSRU re-gasification projects worldwide
- Approximately 30 projects currently evaluated
  - 16 projects in Asia/Middle East
  - 6 projects in South America
  - 11 projects in Europe/Africa
- 83% of new projects in benign waters (side-by-side offloading)

- 17% of projects in rough marine environmental conditions (tandem offloading)
- FSRU technology well suited to countries lacking natural gas infrastructure
LNG Terminal Option – Offshore

- Semi-submerged LNG Terminal
- Phase 1 – Atlantis, Cape Metropolis, Paarl & Wellington
- 69 Km Transmission Pipeline
- 105 KM Distribution Pipeline
- Phase 2 – Saldanha Bay
- 62 Km Transmission Pipeline
- 13 Km Distribution Pipeline
LNG Terminal Option - Port of Saldanha Bay

- Port of Saldanha Bay
  - Quayside terminal with land-based storage tanks
  - Semi-submerged LNG Terminal with permanently moored FSRU
  - Breakwater construction with side-by-side offloading
Economic Results – Net Present Value

Net Present Value

- Total Gas Offtake
- Total Capital Cost
- Net Present Value

Cases:
1. Case 1.1.1
2. Case 1.1.2
3. Case 1.2.1
4. Case 1.2.2
5. Case 2.1.1
6. Case 2.1.2
7. Case 3.1.1
8. Case 3.1.2
9. Case 3.2.1
10. Case 3.2.2

MMGJ:
- 500
- 700
- 900
- 1100
- 1300
- 1500
- 1700
- 1900
- 2100
- 2300
- 2500

Million USD:
- $200
- $250
- $300
- $350
- $400
- $450
- $500
- $550
- $600
- $650
- $700
Economic Results – Sensitivity Diagram

Sensitivity to Input Scenario

- Gas Sales Volume
- Sales Price
- LNG Terminal Opex
- Feedstock Cost
- Capex

NPV, $ mill

Sensitivity Diagram
# Project Work Plan and Milestones

## Cape West Coast LNG Development - Typical Schedule of Activities

<table>
<thead>
<tr>
<th>Year</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
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<tbody>
<tr>
<td></td>
<td>Planning &amp; Permitting Period</td>
<td>Engineering Procurement &amp; Construction Period</td>
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### Key Dates:
- NERSA/Governmental Approvals
- EIA Approval
- Final Investment Decision
- First Commercial Gas

### Licencing:
- EIA Authorization & Approval
- Nersa License Applications & Approvals
- Transmission, Distribution & Trading
- Gas Importation Registration

### Government Permitting:
- Application for Gas Importation
- Application under Sea Shore Act
- Permit - Prevention of Marine Pollution
- Application to NPA - National Ports Act
- SA Reserve Bank
- South African Treasury

### Legal Agreements:
- Gas Supply Agreements
- Gas Transportation Agreements
- Gas Sales & Purchase Agreements

### Project Funding

### Construction Periods:
- Ankerlig Conversion

### Onshore LNG Receiving Terminal Saldanha Bay
- Transmission Pipeline Development
  - Saldanha/Atlantis/CT
- Distribution Pipeline Development
  - Saldanha Bay, Atlantis/Cape Town

### Offshore LNG Terminal
- Transmission & Distribution Pipeline Development
  - Phase 1 - Offshore to Atlantis/CT
  - Phase 2 - Atlantis to Saldanha Bay

### Distribution Pipeline Development
- Phase 1 - Atlantis/Cape Town
- Phase 2 - Saldanha Bay
Progress & the way forward – March 2014

Western Cape Provincial Cabinet defined natural gas as a strategic priority

Provincial Treasury makes funds available to drive agenda

Prefeasibility study on the importation of LNG (April 2013)

Transaction Advisor appointed (October 2013)

Studies in progress
  q Assessment for Marine Environmental Conditions
  q Socio-economic Impact Assessment
  q Environmental Screening & Safety Study

Promotion of LNG Importation to relevant government & private institutions
  i.e. NERSA, DoE, DPI, National Treasury, Eskom, PetroSA, IDC, DBSA, EIUG, etc