PNG LNG PROJECT
101 – Presentation to NEFC

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The PNG LNG Project.
Why so much attention?

- The PNG LNG Joint Venture members are strong: ExxonMobil, Oil Search, Santos, Nippon, Eda Oil & MRDC
- The JV have all the required components: owns gas resources, can find funds, have access to gas sales markets, and can build LNG plants
- The preliminary LNG economics look good and critical foundation commercial agreements have been agreed
- Now in FEED ($400M investment), the process which may lead to a Final Investment Decision and Construction of an LNG plant in PNG.

The Project prospects is high: it will normally happen

- If the Project goes ahead it will fundamentally change the fiscal position of PNG for decades
  - Project spend over $10,000m (2007 Real)
  - 30yr State take about $32,000m (2007 money)
- A great opportunity for the local economy and industry and should bring huge benefits to the nation.
  - Massive up-skilling and training initiative
Review of Hydrocarbon Production

- An oilfield has multiple wells drilled in a single reservoir
- Relatively expensive in PNG
  - Kutubu: 60 wells
  - Moran: 13 wells
  - Hides: 4 wells
  - Gobe: 25 wells
- In reality, fields produce a combination of:
  - Hydrocarbons
  - Water
  - Nitrogen (little in PNG)
  - Carbon Dioxide (little in PNG)
  - Hydrogen Sulphide (only in Pandora in PNG)
  - Helium (little in PNG)
  - Mercury (little in PNG)

The components of all oil/gas fields:
- The cap-rock or seal
- The permeable reservoir rock
- Source rock
- Reservoir fluids
### Hydrocarbons - what they are

<table>
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<tr>
<th>Formula (C&lt;sub&gt;x&lt;/sub&gt;H&lt;sub&gt;2x+2&lt;/sub&gt;)</th>
<th>Name</th>
<th>State @ RT</th>
<th>Use</th>
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<tr>
<td>CH&lt;sub&gt;4&lt;/sub&gt;</td>
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<td>Gas</td>
<td>Fuel/Chems</td>
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<td>Gas</td>
<td>Fuel/Chems</td>
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<td>C&lt;sub&gt;4&lt;/sub&gt;H&lt;sub&gt;10&lt;/sub&gt;</td>
<td>Butane</td>
<td>Gas</td>
<td>Fuel/Chems</td>
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<td>C&lt;sub&gt;5&lt;/sub&gt;-&lt;sub&gt;10&lt;/sub&gt;H&lt;sub&gt;(12-22)&lt;/sub&gt;</td>
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<td>Gas/Oil</td>
<td>Petrol</td>
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<td>C&lt;sub&gt;11&lt;/sub&gt;-&lt;sub&gt;12&lt;/sub&gt;</td>
<td>Kero/Jet A1</td>
<td>Oil</td>
<td>Aviation</td>
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<td>C&lt;sub&gt;13&lt;/sub&gt;-&lt;sub&gt;17&lt;/sub&gt;</td>
<td>Light Gas Oil</td>
<td>Oil</td>
<td>Diesel</td>
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<td>C&lt;sub&gt;18&lt;/sub&gt;-&lt;sub&gt;25&lt;/sub&gt;</td>
<td>Heavy Gas Oil</td>
<td>Oil</td>
<td>Bunker fuel</td>
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<tr>
<td>C&lt;sub&gt;26&lt;/sub&gt;-&lt;sub&gt;38&lt;/sub&gt;</td>
<td>Lubs &amp; waxes</td>
<td>Thick Oil</td>
<td>Lubrication</td>
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<tr>
<td>C&lt;sub&gt;38+&lt;/sub&gt;</td>
<td>Residuum</td>
<td>Very thick Oil</td>
<td>Tar, asphalt</td>
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</table>
The composition of Oil and Gas fields

A gas field has a high proportion of low carbon hydrocarbons

In PNG, oil is exported, associated gas re-injected and other gas not produced. (Stranded gas) Liquefying the gas (1/600 volume) makes it practical to export

An oil field has a low proportion of low carbon hydrocarbons
Changing Gas to Liquid
(Pressure/Temperature relationship)

Gas becomes liquid by:

1. Increasing Pressure, called Compressed Natural Gas (CNG) like LPG
2. Decreasing the temperature, called Liquefied Natural Gas (LNG)
The LNG Process

Field Production

Gas Conditioning Plant (Field)

Pipeine Transport

PNG Field

Remove unwanted gas/liquid

Three stage LNG cooling train

Storage in tanks

Shipping

PNG POM

Storage in tanks

Regas plant

Gas distribution network

Gas Buyer

Other Country
The Value of LNG

- Delivered LNG is used for:
  - Power generation in gas fired power generators
  - City gas (cooking, heating)
  - Industrial consumption (smelters, petrochemicals)

- LNG (like oil) is aimed at the Global market
  - Not tied by pipelines
  - Swaps and arbitrage

- PNG LNG will target Japan, Korea, Taiwan, China and India.
  - JCC Market (linked to oil price)
Historical LNG Demand

Global LNG Imports

- Americas
- Europe
- India
- Taiwan
- Korea
- Japan

mt p a

Future LNG Demand

Growth Comparison by Fuel, World 2003-2025
(Base 2002=100)

Source: Energy Information Agency (EIA) International Energy Outlook 2005
The Regional LNG Market

**Good Points for PNG LNG**
- Predicted to grow
- Very strong demand in large emerging countries (India & China)
- Delays to competing projects (good for us)
- Indonesia supply reductions
- Strong LNG prices linked to oil price

**Bad Points for PNG LNG**
- Global LNG alternatives, particularly AU & ME
- Alternative untapped sources available
- Security of supply and construction risk
- High delivery cost to plant
Atlantic LNG

**Startup**
- Train 1: 1999
- Train 4: 2006

**Capacity, MTPA**
- Train 1: 3.0
- Train 2: 3.3
- Train 3: 3.3
- Train 4: 5.2

**Owners**
- Atlantic LNG
- BP
- British Gas
- Repsol
- NGC
- Tractebel
Idku, Egypt

**Startup**
Train 1 May 2005
Train 2 Sept 2005

**Capacity**
4.1 MTPA
4.1 MTPA

**Owners**
BG,
Petronas,
Egyptian Natural Gas
Egyptian General Petroleum.
Darwin, Australia

**Startup**
Dec 2005

**Capacity**
3.7 MTPA

**Owners**
ConocoPhillips,
ENI,
Santos,
INPEX,
Tokyo Electric
Tokyo Gas
Sites under construction

- Large construction site
  - Reducing in size when facility finished
LNG carriers are Big Ships

- Moss Tanker
  - 290m x 48m x 11m
- New membrane
  - 300m x 50m x 12m

- Will require new ports, special tugs, and other special handling services
Many oilfields are nearing the end of their life.

All gas fields are incidental to oilfield exploration.

All gas fields are currently stranded, (except HGTE)

The major certified gas fields are:

Hides, Juha, Angore, Kutubu and Gobe

These are dedicated to the PNG LNG Project.
1P Proven “bankable” resources called reserves: 7TCF
2P Proven and probable resources, or likely resources: 14TCF
3P Proven, probable and possible resources: 24TCF
PNG Oil Production

Added over 45mmstb by investment in LOF

P50 Base
Hides GTE
P50 2008 Programme
P50 Contingent Resources-LOF

Oil Rate (bopd)

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000


PNG Oil Actuals Base Hides GTE Fcst 2008 Program Life of Field Hides GTE Actuals Decline Before OSL
PNG Oil & LNG Production

- **Condensate**
- **Gas boe**
- **Crude Oil**

![Graph showing trends in PNG Oil & LNG Production from 2007 to 2037](image)

- Key metrics:
  - KBOE/D (Thousands of Barrels of Oil Equivalent per Day)
  - Years: 2007 to 2037

The graph illustrates the production trends for Condensate, Gas boe, and Crude Oil over the years, indicating significant declines in production by 2037.
Project Overview:
**Production Facilities and Pipelines**

- **Fields:**
  - Hides, Angore
  - Kutubu, Moran, Gobe (using oil wells)
  - Juha (later)

- **Gas production facilities:**
  - Hides Gas Conditioning Plant (HGCP)
  - Juha Production Facility (JPF) ~ year 10
  - Amendments to Oil Field processing plants

- **Main Pipelines:**
  - Gas Pipelines
    - Juha to Hides Gas Conditioning Plant (HGCP)
    - HGCP to Omati River landfall
    - Omati River to LNG facility site, (POM)
  - Condensate and Liquids Pipelines
    - JPF to HGCP (liquids)
    - HGCP to Kutubu Central Processing Facility
Project Overview.
The LNG Facility

- LNG facility will be on Portion 152
- LNG facility—
  - Gas Scrubber
  - Twin 3.4MT/yr trains
  - LNG is stored in insulated tanks at the facility
  - 2km LNG loading jetty
  - Approx. 35 x 185kt shipments/year
- Supporting facilities and infrastructure:
  - Large camp for construction (~7,500)
  - Permanent Operations camp (~500)
  - Material offloading facility
  - Upgrade of existing road between LNG facility and Port Moresby
  - Rerouting of the road around the LNG facility
  - Very large temporary lay-down areas during construction only
Key Commercial Concepts

- **Financial**
  - Total Project Costs (w/o fees) over US$10-11b (2007 Real)
    - Very big project for any country
    - Biggest LNG Project Finance arrangement ever
  - State back-in will be about 19.4%

- **Powerful JV strength**
  - State and L/O
  - EM experience & size
  - OSL with PNG experience
  - STO with AU experience

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### Estimated final Equity Participants (after government back-in)

<table>
<thead>
<tr>
<th>JV Partners</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>ExxonMobil (LNG Operator)</td>
<td>34.0%</td>
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<tr>
<td>Oil Search (Oil Operator)</td>
<td>27.8%</td>
</tr>
<tr>
<td>State &amp; L/O</td>
<td>19.4%</td>
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<tr>
<td>Santos</td>
<td>14.4%</td>
</tr>
<tr>
<td>Nippon</td>
<td>4.4%</td>
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ACIL Tasman Independent Economic Impact Report 6 February 2008

- Based on a $36:65:100 oil price model
- “Affects economy of PNG and its balance of trade situation profoundly”
- GDP will more than double (K8.65bn (2006) to K18.2bn average during production phase)
- Oil & gas exports increase 4 fold
- Huge cash flows to Government – national and provincial - and landowners through tax, royalties, levies and equity participation (direct cash payments of about K100bn to PNG Gov’t / Landowners over 30 years)
- Economic (Gas) Agreement allows quick return to the State
- More than fills the gap left by other projects decline
- Up to 7,500 jobs in initial phase, (latest estimate is higher), 20% by nationals; 850 full time positions, developing national workforce over time

Builds initial infrastructure for national gas development

- Other gas developments almost certain to follow

Step change for PNG’s credibility internationally

- Easier access to finance for secondary projects
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<th>Year</th>
<th>2007</th>
<th>2008</th>
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<th>2010</th>
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<th>2012</th>
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**State Schedule and Milestones**

- **Sanction**
  - Pre-FEED
  - FEED

- **FID**
  - Construction
  - Commission

**Pre-FEED**
- Gas Agreement
- Economic Modelling
- Land Access
- BSA principles

**FEED**
- EIS
- Licence strategy
- Financing planning
- Early Works start-up
- Labour planning
- Logistics Organisation
- BSA

**Construction**
- Finance activation
- License approval

**Commission**
- BSA
- Landowner interaction
- Regulation
- Coordination

- Regulation
- Coordination
State Deliverables

- Some important milestones already delivered
  - Gas Agreement
  - Amendments to 9 Acts and 3 Regulations
    - No exemption from Work Permit or Visa process (first “Project” ever)
  - Gas Agreement
- Many State Deliverables critical to the Project’s success
- Many different Departments, Agencies and Government Offices impacted
  
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<th>Department, Agency, or Office</th>
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- State have created the Gas Project Coordination Office to assist in coordinating this
Gas Coordination Structure

Ministerial Economic Committee

PNG LNG Project FEED Committee

Government Departments

PNG LNG Project Coordination Office

PNG LNG Project

Treasury (Chair)
5 Key Ministers
Total of 14 members

PNG LNG Project FEED Committee:
- Dept 1
- Dept 2
- Dept 3
- Dept 4

Ministerial Economic Committee:
- Treasury (Chair)
- DNPM, DPE, DLPP, DEC, AG, IPBC, GPCO

Government Departments:
- Dept 1
- Dept 2
- Dept 3
- Dept 4

PNG LNG Project Coordination Office:
- NEC Decision 161/2008, 7th August
GPCO Organisation

Dairi Vele
Director

Key advisors

Department
Secondees

Brian Rapson
Coordination

Carl Okuk
Legal

Lars Mortensen
Financial

Support Staff as required

- Established by NEC Decision 161/2008 on the 7th August
  “to be the focal point for the Project for all contact and engagement with the State, with the responsibility for the management, leadership, facilitation and coordination of all the technical inputs from respective State Agencies”

- Will be located on 11th floor Pacific Place
GPCO Key Deliverables

- **Coordination**
  - Work with Project to understand requirements
  - Work with government agencies to plan their position.
  - Facilitate meeting between the State and the Project
  - Document process, milestones, issues, minutes

- **Planning**
  - Develop Integrated Work Plan for State deliverables
  - Maintain the “issues database” related to State deliverables
  - Watch for opportunities for the State falling off the “train”

- **Communication**
  - Keep the impacted government agencies up to date with Project and the Integrated State’s Progress
  - Point of contact for both the State and the Project
THANK YOU