Integrated Development of Greater Sunrise Gas

The Timor-Leste National Interest Case

Dili

April 13th, 2007
Agenda

• Purpose of Meeting (Educate, Decide)
• Role of Participants
• Education
  • Overall Benefits to Timor-Leste
  • Pipeline
  • Onshore Plant Location
  • LNG Processing Plant
  • Corporate Structure
  • Markets
• Summary and Conclusions
• Next Steps
Purpose of Meeting

• Identify all local stakeholders

• Raise awareness of timeline risks

• Provide high-level education on situation and options

• Provide recommendations for moving forward

• Agree on ownership, timeline and accountability
Timing Risks

• It is in the best interests of everyone in Timor that design and development begin immediately, regardless of political affiliation.

• Fuel revenues and energy resources are a critical component of any national development strategy.

• Lack of action from this meeting jeopardizes Timor’s future. LNG development takes years and the clock is ticking.

• The relevant Treaty has a Six-year provision for approval of a development plan, once tabled!
Commentary on Energy demand/supply

• It is estimated that the population of Timor-Leste will reach 2 million people by 2020

• How are we going to supply the people with energy (as well as develop an industrial base)?
Two Ways

1. Import fuel – at cost in Foreign Exchange

2. Utilise indigenous fuel and energy sources
Import fuel

• The power sector could be developed through the utilisation of liquid fuels, such as diesel, or,

• Utilising nuclear energy

• Neither of these are preferred options for the development of Timor-Leste
Indigenous fuel and energy sources

• Hydropower
• Renewables
  – Solar
  – wind
• Biofuels
• Wood
• Oil and gas
Indigenous fuel and energy sources

- Hydro – relatively small potential, because of the lack of dam potential (mostly “run of the river”)
- Solar – small potential, useful for “off grid” power supply
- Wind – offshore wind farms could be utilised, but seasonal issues
- Biofuels – needs to be accelerated for rural power, and “off grid” supply
- Wood – alternatives need to be found asap
- Oil and Gas is the only major, flexible energy source
Indigenous oil and gas

• Onshore
  – Timor-Leste is geologically prone to relatively small oilfields - it is necessary to accelerate this onshore development. Local benefit will result.

• Offshore
  – Discovered fields (e.g. Greater Sunrise)
  – Undiscovered fields (“yet-to-find”)
Premier’s South China Sea Interests

Seeps known since the 18th Century
Onshore Hydrocarbon exploration targets

- Southern Onshore East Timor
  - Onshore Viqueque Basins
    - Past drilling unlikely to have been on target
    - Structural discordance with depth
    - No logs, at times no wellsite geologist!
    - Plumbing system not understood
    - Charge & migration models based on Viqueque
    - Only the later wells located by seismic
    - Historically poor seismic imaging
    - Improvements possible
    - Ponded turbidites – plumbing favourable where contact with diapirs- plastic deformation in depocenters – no faults

- ‘Floating Hill’ (!!!) Play (a variation on ‘buried hill’!)
  - Massive, oil-charged olistoliths
  - No serious volume
  - Quoted as evidence of Bobonaro sealing capacity
    - Is it??? How did the oil get there in the first place?

- Mesozoic Play
  - Structurally more exposed areas beneath frontally accreted stacks – or sub-Bobo -possible larger oil accumulations

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The Prize

- Small (to moderate??) *commercial oil*
  - Not a contender

- Moderate size commercial oil
  - Higher risk, more difficult
  - Greater reward
Competing Projects in the region

- Greater Sunrise: 7.7 tcf
- Abadi: ~5 tcf, 3-5 mmtpa
- Scott Reef: 20+ tcf, 7-15 mmtpa
- Greater Sunrise: 7.7 tcf
- Evans Shoal: 6.6 tcf
- Ichthys: 9.5 tcf, 6-12 mmtpa
- Darwin LNG (Bayu-Undan): 3.4 tcf, 3.24 mmtpa
- Pilbara LNG (Scarborough): 8 tcf, 6 mmtpa
- Pluto: 4.5 tcf, 5-6 mmtpa
- Greater Gorgon: ~55 tcf, 10+ mmtpa
- Crux (~2 tcf)
- Echuca Shoals (tbc)

Project in green = Operational, Orange = Probable, Red = Possible

Note: tcf and mmtpa stand for trillion cubic feet and million metric tons per annum, respectively.
Social and Economic Benefits of Gas to Timor-Leste

I would like to suggest that we look at the examples of Brunei, Indonesia and Trinidad as countries that have benefited greatly from the utilization of offshore gas underpinned by LNG projects.
Basic Concepts of LNG Plants

• Raw gas is extracted, purified, separated to extract valuable liquids and chilled to form a stable liquid which is shipped in specialised tankers
• Plant is developed in stages as a series of “Trains” each of which produces a large step in exportable volume
• First Train must bear the cost of pipelines, field development, and export port
• Market is international – largely in Southeast Asia (Japan, Korea, Taiwan) Emerging demand in China, USA
• To underpin initial development, a long-term purchase agreement is generally signed and the gas purchasers often take equity in the producing field and onshore plant
• Sales above contracted volume are sold on the international “Spot Market”
Trinidad Example

• Population 1.3 Million
• Established (small) Oil production but need for Electricity
• Large Gas discoveries now developed
• Now 800 MW installed generation capacity
Map showing Cross border fields/discoveries in Trinidad
Trinidad LNG Plant

• First LNG Train Heavily supported by Government
• Subsequent Trains financed entirely by industry
• Later Developments give higher tax yield
• Rapid growth of Infrastructure and Economy
Gas Based Plants in Trinidad

- 1 Natural Gas Liquids Processing Facility (46 MBPD)
- 3 Liquefied Natural Gas Plant (1600 MMscfd)
- 9 Ammonia Plants (4,485 MTPA)
- 1 Urea Plant (550 MTPA)
- 5 Methanol Plants (2,960 MTPA)
- 4 Iron and Steel Mills (2,560 MTPA)
- 4 Power Generation Plants - Powergen (3) & Incogen
- Other
  - Refinery
  - Cement Manufacture
  - Light Industrial/Commercial Consumers - 96
  - 2 Gas Fired Air Cooling Projects
  - 4000 CNG powered vehicles
Atlantic LNG  Train 1

• Modest Entry into LNG : 3 million tpy (425 MMcfd)
• Utilized Phillips Optimized Cascade Process
• Amoco (now BP) sole gas supplier
• Commissioned - 1st Q 1999
• Government Taxes- US$3 Billion over 20 yrs
• Project “fast-tracked” by simultaneously seeking and finding gas reserves and identifying markets.
• Tax holiday granted to facilitate development
Atlantic LNG Train 2/3 Expansion Project

- The construction of 2 Liquefaction Trains together with storage and related facilities. Liquefaction of 1 billion standard cubic feet per day of natural gas

- Gas to be supplied from fields in the North Coast (BG) and East Coast Marine Areas (BP).

- GORTT to receive US$6 Bn in revenues

- Expenditure commitment of US$160 million minimum in goods and services

- A US$1.1 Billion investment in the domestic economy

- No Tax holidays granted this project
Atlantic LNG Train 4

- June 2003, Government approved Train 4 project
- Processing capacity of 800 million cubic feet per day.
- Largest single LNG train in the world with capacity of 5.2 mtpy when completed in January 2006
- Different equity holdings
- Tolling arrangement
- Marketing to new destinations
- Government capture of upside
OVERALL BENEFITS TO TIMOR-LESTE

The additional benefits to Timor-Leste of the gas onshore from Sunrise option compared:

- Over $20 billion in additional national wealth over the life of the project as measured by GDP (Gross Domestic Product)
- Employment of over 2000 full-time equivalents during construction phase
- Permanent job and skill creation (e.g. Brunei example)
- Development of domestic gas and power sector
- Fertilizer plant development
- “Kick-start” to industrial growth through additional ports and infrastructure
- A World Player in the Energy Business
Social benefits of TL Energy hub

• Creation of new, decentralised town in South East Timor – a “Freeport” to stimulate investment
• Infrastructure development (roads, airport, port, hotels, housing, etc.)
• Able to provide efficient, reliably priced energy to Timor Leste which could decrease the use of firewood, with its bad environmental problems.
• The domestic energy sector would underpin job creation and agricultural wealth in rural areas
Greater Sunrise
Sunrise gas

Woodside: 33.44% equity share and Operator

**Background**

- ~8 Tcf and 300 million barrels of condensate
- Most offshore development and onshore environmental approvals secured
- Internationally competitive
- Project stalled, pending fiscal, legal and regulatory certainty
Development of the Greater Sunrise Field

The Greater Sunrise partnership consists of the operator Woodside Energy, Royal Dutch/Shell, ConocoPhillips, and Osaka Gas. The following three options exist:

1. Transporting the gas to Darwin, Australia and processing it at an existing LNG plant in Darwin.
2. Processing the gas at sea at an LNG (or CNG) plant located offshore.
3. Transporting the gas to Timor-Leste and processing it at a new LNG plant in Timor-Leste. An LNG plant located in Timor-Leste would be much closer to the field than a plant in Australia. It would also provide important stimulus to the local economy. Therefore, the Timor-Leste Government is actively encouraging the partners to give serious consideration to this option.

Assuming that all necessary agreements are in place and a location for the LNG plant agreed by the end of the 2nd quarter of 2007, LNG production could not be expected earlier than 2013, and is likely to be later. It is estimated that the life of the field will be approximately 30 years.

The Greater Sunrise partners are currently looking for buyers for Greater Sunrise gas.
DEVELOPMENT SCENARIO

- Central wellhead platform with 9 wells
- Centrally located Production, Compression, Utilities and Quarters facilities, including:
  - Condensate removal and stabilization
  - Bulk CO2 removal and re-injection facilities
  - Bulk dehydration
  - Pipeline Compression
- Tie-backs from 15 other wells as required (these may be subsea)
- FSO for storage and offloading of condensate
- Gas pipeline to Timor-Leste or Wickham
- Greenfield LNG Liquefaction and export facilities on the south shore of Timor-Leste
- OR Brownfield LNG Liquefaction and export facilities at Wickham (Brownfield facilities can utilize existing LNG loading facilities at Wickham Point. All other facilities shall be included in estimate.)
- Operations shore base on Timor-Leste to support the operation of the Great Sunrise are facilities
Development Concept
Undiscovered “Yet-to-Find” oil and gas

We need to factor in the chances of additional exploration success both within the JPDA area as well as in Timor-Leste’s sovereign waters.

The recent exploration bid round was handled very professionally and transparently by the Ministry of Natural Resources, and resulted in two winners, ENI of Italy, and Reliance of India. These companies are internationally acclaimed companies.

Exploration success is not Guaranteed – it is a gamble. The International companies are hoping to find oil. Perhaps nothing will result, perhaps Oil, perhaps Gas?

“Do not count your chickens until they hatch”
Timor-Leste sovereign offshore, mapped structures

Legend
- TL_wells
- Seismic_survey_lines
- Prospect Areas
- Jpda_psc_contracts
- Greater_Sunrise
- JPDA New Blocks

Area C

Mapped structures

Sunrise Field

By: GGS ASA
Datum: WGS 84
Projection: UTM Zone 51S
OGED, Dili, March 2006
Recompiled by: Mateus da Costa
Oil, Gas and Energy Directorate
Exploration potential, Timor-Leste

Timor-Leste sovereign waters

Reliance to drill the first well in 2009

Timor Trough

Sunrise Field estimated 7.8 tcf

Another Sunrise Field in Timor-Leste sovereign waters?
Success Rates

We need to remember that the commercial success rate in this geological area has been very low with over 45 exploration wells drilled with commercial success from only very few fields.
Stake Holder Discussion on the Timor-Leste option of Sunrise Gas

Dili
March, 2007
PIPELINE

– POTENTIAL ROUTE

– RISKS (including earthquake risks)

– PROPOSED SCHEDULE AND COST
Geotechnical Aspects of Timor Trough and pipeline route

Data Sources: Onshore Topography from NASA SRTM

Offshore bathymetry: Yellow = GGS survey, Red = Geoscience Australia compilation (less accurate) Infill bathymetry from Satellite gravity and digitised general hydrographic contours (least accurate)
Sunrise Field is adjacent to the DEEPEST segment of the Timor Trough – 3300-3350 metres deep
Australian Shelf

Sea Floor is generally smooth, topography steepens as Australian plate bends down under weight of Timor Thrusts. Some normal faulting as rocks are in tension.

Timor Leste

Sea floor is rugged and has many small thrusts and folds as rocks are compressed.

A real seismic profile with topography at ~200m resolution.
Image contains some local data and gridding artefacts
Pipeline Route will cross near deepest part of Trough and over steep slopes.
Sunrise Field is adjacent to major faults and topography at seabed, so pipeline routing WILL be affected
Bathymetric profiles across and along Trough
Real topography will be MORE RUGGED than this profile which is derived from a smoothed grid – especially on the Timor Leste side of the Trough
Example Seismic
Landfall Area – How Steep?

Note steep slopes offshore from Beaco Coast

Gradient \textit{averages} 160 m/km (9 degrees)

Major segments reach 40 degrees

Length scale Arbitrary

Timor Leste Landfall

VET05-775048
Sunrise Area – How Steep?

Note seabed faults near Sunrise field.

Gradient **averages** 330 m/km (18 degrees) on fault-generated slopes.

Shelf-Edge is partly a constructional feature.

Sunrise Field

Seabed Faults

Buried Fault

Trough Axis

Length scale Arbitrary
TROUGH AXIS – How Deep?

Length scale Arbitrary

Likely Crossing Zone

Depth ~3075 m
Seismic gaps may either be future major fractures, or could be geologically quiet. A major seismic quiet zone accommodates our pipeline route.
Seismic Hazards

- Avalanche
- Slump (500 m)
- Thrusts
- Slope Channels
- Major Thrusts

1/05/2007
Recommended next steps – 1) Confirm end points of pipeline route (± 5 km)
Recommended next steps – 2) acquire ~ 1km spaced bathymetry profiles in 20 km wide belt
Recommended next steps – 3) Use 1km profiles to define area for detailed swath bathymetry
• Bathymetry database needs further work

• The final map will change in detail but a DEEP crossing is inevitable (likely ~3075 m)

• Beware of artefacts in the database and grid – some features are NOT real

• There are many recent (possibly active) faults at seabed. These are very high risk zones and should be avoided if possible
Next steps:

- Incorporate additional seismic and other bathymetry
- Update Earthquake and seabed risk maps
- Refine locations of pipeline end-points
- Acquire ~1 km-spaced bathymetry profiles
- Interpret and map new data and define broad pipeline corridor
- Acquire swath bathymetry over corridor (needs specialised vessel)
- Geotechnical interpretation of pipeline route
Pipeline technical options

There have been 2 feasibility studies completed about the possible pipeline: by INTEC Engineering Pty. Ltd.:

1. For Oceanic Exploration in June 2002, and
2. For Woodside dated 10th August 2004

Both studies concluded that a pipeline to Timor Leste is technically feasible – what is disputed is how much such a pipeline may cost.

• A review of the 2nd INTEC study was made by Sverre Lund of LUCON A/S in January 2005, on behalf of the RDTL Ministry of Development and Environment.

• Lund’s conclusions disputed the Woodside/INTEC cost estimates very strongly. He stated that:

“A dedicated reconnaissance survey, which normally should have been performed prior to such a Feasibility Study, is strongly needed prior to any further conceptual work.”
Pipeline technical options

• **Basically, all experts suggest that the pipeline construction is technically feasible – the sizing, route and thus the cost is yet to be determined.**

• Stuart Joynson, a pipeline expert from the U.K. firm of Jee Limited is here today to answer further questions about the technical viability of such pipeline. Mr. Joynson’s attendance has been sponsored by the Transasia group – a multinational resources company.
**ONSHORE LOCATION**

**CRITERIA**
- Oceanic conditions suitable for reliable tanker and berthing operations
- Proximity to commercial centers that could provide raw materials and labor
- Clear areas of land on the coast with a minimum distance from shore to at least 15 meters water depth
- Minimum environment sensitivity
- No densely populated areas
- Stable soils to prevent damage from Timor-Leste’s high level of seismic activity

**A SUMMARY OF POTENTIAL LOCATIONS**
- An evaluation of potential sites is necessary (PeruLNG evaluated 17 sites) before a more detailed assessment, including EIA, can be finalised.
An example site location on the South coast
LNG Project Components

- Liquefaction Plant AND LNG Storage
- Marine Facilities
- Administration, Housing, Infrastructure and facilities
- Sewerage and waste treatment facilities
Liquefaction Plant AND LNG Storage

The plant would contain the following process units:

- Feedgas Receiving, liquid separation, Gas metering and pressure reduction
- Acid gas removal (if necessary)
- Gas dehydration and carbon Adsorption units
- Refrigeration and Liquefaction
- LNG storage
- Refrigerant Storage
Marine Facilities

- Trestle
- Breakwater for wave protection
- Access navigational channel for LNG Tankers
- LNG tanker berth and LNG loading arms
- Tug berths
- Utility dock
- Lighting and navigational aids
Administration. Housing, Infrastructure and facilities

- Administration and operations staff will work (and probably housed) on site
- A permanent community housing area will be necessary for non-local personnel
- The plant will need to be self-sufficient for all utility requirements in water and electricity, with gas-powered turbine generators to provide electricity (and a seawater desalination plant?)
What type of gas will be handled in the LNG project?

• Natural gas, primarily methane, will be transported to the plant through a pipeline from the Greater Sunrise Field development

• The natural gas is likely to be separated from gas liquids before it is transported into the pipeline
What will be produced in this plant?

- LNG is an odorless, colorless, non-corrosive and non-toxic liquid. LNG is made by purifying natural gas and cooling it to a temperature of minus 163 degrees Celsius at atmospheric pressure. The cooling process transforms the natural gas into a liquid and reduces its volume by 600 times.

- LNG quickly evaporates into its gaseous components when it warms, thus needs to be stored in tanks.
Construction stages of LNG Plant

Construction begins after the planning and engineering stages result in an acceptable design. The construction phase includes:

- **Phase 1**
  - Preparation of the land area at the LNG plant site

- **Phase 2**
  - Transportation, mobilization and installation of mobile camps
  - Construction of processing, tank storage and work areas
  - Construction of port facilities and testing of systems and equipment
Environmental Impact Assessment (“EIA”)

• The EIA identifies and analyzes the physical, biological and social aspects of a proposed project and the potential impacts on the area of influence where the construction and operation of a project will take place.

• The EIA is an instrument to identify risks to the environment, evaluate alternatives and design appropriate mitigation measures.
Objectives of the EIA

- Identify the positive and adverse impacts associated with the interaction between the project and the environment
- Evaluate alternatives and design environmental and social management measures to prevent or reduce the adverse effects and enhance the positive effects
- Develop the basis for an environmental management and monitoring plan
- Develop an early relationship with the local community leading to ongoing communication, and if applicable, monitoring throughout the project’s life.
An example – the Tangguh LNG Project
Tangguh Employment

- The construction workforce is expected to peak at 5,800 during 2007.

- Overall, at least 2,000 Papuans are expected to be employed during the main EPC construction phase. These employment numbers are related only to Tangguh site activities.

- Many jobs will be created in other parts of Indonesia. For example, the platforms are expected to be fabricated in Banten Province and require employment of up to 800 people for approximately 9 months. The pipeline coating is expected to be produced in Batam and will employ about 300 people for 2 to 3 months.
Tangguh Employment

• Operations of plant facilities will require a site workforce of approximately 450 people to allow for rotation of personnel. Job opportunities will become available during the operation stage for support and general maintenance services. Recruitment and training of the project’s operations team, including local villagers, has already commenced.

• The Project employs 28 Papuans on the operations team, who are undergoing a 3-year training program in LNG operations at the Bontang LNG facility. The percentage of Papuans in the workforce is expected to increase steadily over the life of project as more local people are trained. The project’s target is 85% Papuan content in the project workforce after 25 years of operations.
Site Selection for Tangguh

During 1996 and 1997, a thorough site selection process was carried out. Initially, 17 broad sites were identified within 250 km of the gas fields.

A screening process was used to reduce the number of potential sites. Sites were eliminated if one or more of the following conditions applied:

- proximity to area of environmental sensitivity, such as a nature reserve;
- clearly excessive development costs due to excessively long pipelines or difficult site conditions;
- (requirement for gas pipeline to traverse extensive tracts of mountainous terrain;
- (absence of deep water near the site, requiring substantial dredging or excessively long jetty structures;
- (port facilities would involve sites of rapid accretion or mobile seabed sediment, which would require repeated dredging to maintain shipping access;
- the presence of physical features such as swamps or cliffs, which are not amenable to site preparation.

While five of these six criteria are based on engineering feasibility and cost considerations, environmental concerns tend to parallel engineering constraints. Sites or routes involving the most difficult terrain require more construction effort and disturb the environment more. Based on a series of desk studies and field investigations, each site was screened for these conditions. Thirteen of the sites were eliminated, leaving a short list of four sites - for further, more detailed evaluation.

The short-listed sites were evaluated in terms of engineering suitability, social acceptability, environmental acceptability, and relative costs

The Tanah Merah location provides several advantages, such as

(i) proximity to deep water, requiring a jetty of only 1,100 m in length;
(ii) a seabed relatively free of sand waves and areas of sedimentation, minimizing dredging requirements;
(iii) a relatively narrow mangrove fringe;
(iv) the presence of a shoreline bluff providing storm protection; and
(v) good ground foundation and drainage.
Regional Market Assessment for Potential Timor-Leste LNG

Report for the Timor Sea Office
March 2007
Demand in the Pacific Basin is currently dominated by Japan, South Korea and Taiwan. These traditional markets will grow modestly, however, China and India are likely to drive demand growth in the region more significantly.
Around 80% of Pacific Basin LNG supplies currently come from Indonesia, Malaysia, Qatar and Australia...

* BG may choose to supply some volumes Atlantic volumes as part of portfolio to supply Chilean contracts
... and there is little upside for incremental LNG supply into the Pacific Basin in the medium term.

All probable capacity is in Australia.

Possible expansions in Russia, Qatar, Indonesia, Malaysia or new supplies from Iran, Myanmar, & PNG.

Not all probable and possible projects will be developed as currently planned.
Demand in the Pacific Basin is constrained relative to supply out to at least 2013 and beyond.

Not all possible and probable projects will be developed as currently planned.
Rising oil prices have been driving Pacific Basin LNG prices upwards.

DES price (US$/mmBtu) versus crude oil price (US$/bbl) (2002-2006)

- NWS-China (Oct-02)
- Sakhalin-Jap (Nov-04)
- Yemen-Korea (Jul-05)
- Gorgon-Jap (Oct-05)
- Pluto-Jap (Dec-05)
- NWS-Jap Roll (Mar-06)
- Tang-China Revised* (mid-06)
- NWS-Jap Roll (Oct-06)
- RL3-Korea (Nov-06)

* Originally signed in Sep-02

Source: Wood Mackenzie estimates
For traditional and new suppliers, there is an opportunity to fill the mid-term demand gap in North East Asia.

- Opportunity for suppliers to meet demand of traditional Asia Pacific buyers (primarily South Korea and Taiwan).

- There is uncontracted supply in the market which could possibly fill the gap.

- However, potential delays in Greenfield projects or failure of existing projects to ensure reliability of supply (e.g. Bontang) is likely to depress actual uncontracted supply availability in the market.
Where Timor-Leste falls within the competitive cost spectrum will significantly influence its position as an attractive supplier.
LNG shipping

- 1 ship/1mt (145,000m³) Round trip 20 Days
- 1.5 ships/1mt (220,000m³) 3 ships/1mt (145,000m³) Round trip 40 Days
- 2 ships/1mt (220,000m³) 3-4 ships/1mt (145,000m³) Round trip 57 Days

Current or prospective LNG terminal locations
LNG supply competition to Asia Pacific markets
LNG supply competition to US markets
There are a number of critical success factors that Timor-Leste needs to fulfill to ensure successful entry into the LNG supply market

- Discovered and unallocated gas resources (satisfactory with Sunrise)
- Proximity to coast (satisfactory if trench issues can be overcome)
- Ability to control costs (strategies to modularize and import process components will aid)
- Liquids support (will enhance project economics)
- Gas quality (will impact and hopefully minimizes gas processing facility costs)
- Proximity to a major markets (Timor Leste will have lower transport cost to North East Asian markets than Australian or Middle East LNG supplies)
- Host country cooperation (Assistance with ports and infrastructure will aid)
- Geopolitical stability (a critical consideration for buyers)
- Limited local demand (adds confidence to longevity and availability of supplies)
- Partners/Shareholders experience
- Partner alignment
CORPORATE STRUCTURE

A common theme in most modern LNG plant projects is that a Special Purpose Company is set up with shareholders that include the major stakeholders.

These are more efficiently handled by the private sector, with the host State obtaining social and economic benefits indirectly.

We suggest that a company, which could be called TimorLNG, be incorporated (not necessarily in Timor-Leste), with an exclusive mandate from the Government. This company could then enlist equity funding from new shareholders, including the Greater Sunrise partners, potential buyers, financial institutions as well as Timorese interests.

This process could be started immediately, with the intention to fund the next steps through the initial seed capital.
Conceptual Timor Leste LNG scheme

Sunrise Field

Woodside 33.4% 56.67%
Phillips 30% 25%
Shell 26.6% 8.33%
Osaka gas 10% 10%

Pipeline to ET 200 kms

ET LNG Company
ET owned Trust Co
Owns the site, LNG plant and terminal
Capex US$3bn
Capacity and throughput charges plus domgas deal
5mtpa capacity
Start building 2011
First Exports 2014/15

Project Development Cycle

2007
Preliminary Scoping - $50k

2008-9
Phase - 1
Design - $5m

20011-14
Phase - 2
Development - $50m
Phase - 3
Construct & Commission US$3bn

25-50 years
Operational

LNG sold on an FOB Basis
SUMMARY AND CONCLUSIONS

• Economics
• Greater Sunrise Development Options
• Next Steps
Economics

- Review of economic rent
- Slide of Bayu-Undan
- Slide of fiscal terms
- CMATS
- Slide of revenue from zBayu-Undan
LNG Value Chain
Bayu-Undan share of total project  $Billion

Australia
$2.1 Bn
9%

Contractor
$9.1 Bn
40%

Timor-Leste
$11.5 Bn
51%

These are undiscounted figures
Timor-Leste petroleum sector revenues

$million undiscounted

Fiscal years (1June - 30July)

- Wages tax
- EKKN
- BU VAT and WHT
- BU Additional Profits Tax
- BU Income tax
- BU Profit oil
- BU FTP
- BU Pipeline payment
- Budget 06_07
Sunrise fiscal arrangement

**JPDA 20.1%**
- Gas valuation - IUA
  - Fixed downstream pre tax return
  - 10.5% if pipeline/LNG; 14% if FLNG

**Non-JPDA 79.9%**
- Gas valuation - ATO rules
  - downstream share of revenue?

**PSC**
- Annex F - ZOCA
  - FTP 10-20%
  - Profit oil 50-70%
  - Profit Gas 50%
  - Inv.Credit 127%

**T.L. PSC “A”**

**Australia PSC “B”**

**Contractor income tax**
- 90% T.L. JPDA Tax “C”
- 10% Australia JPDA tax “D”
  - Indonesia 1999
  - 30% tax; 15% BPT = 40.5%

**Upstream Australian tax rules**
  - Petroleum Resource Rent Tax 40%
  - Income tax 30%
  - Combined rate 58%

**Australian Tax “E”**

**CMATS**
  - Total government revenue from upstream = A + B + C +D + E
  - Each government to end up with 50% of total
  - Each quarter, Australia pays Timor 50% of total minus A + C already received
## Example – using 07/08 budget oil prices

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSC</td>
<td>$ 3.1 Bn</td>
</tr>
<tr>
<td>T.L. PSC “A”</td>
<td>$ 0.4 Bn</td>
</tr>
<tr>
<td>Australia PSC “B”</td>
<td>$ 1.5 Bn</td>
</tr>
<tr>
<td>Contractor income tax</td>
<td>$ 0.1 Bn</td>
</tr>
<tr>
<td>Total government revenue from upstream</td>
<td>$ 22.0 Bn</td>
</tr>
<tr>
<td>Australia</td>
<td>$ 17.4 Bn</td>
</tr>
<tr>
<td>T.L.</td>
<td>$ 4.6 Bn</td>
</tr>
<tr>
<td>+ Downstream</td>
<td>~2bn tax</td>
</tr>
</tbody>
</table>

### CMATS

- Total government revenue from upstream: $A\ 3.1 + B\ 0.4 + C\ 1.5 + D\ 0.1 + E\ 16.9 = 22.0\ bn$ (undiscounted)
- Australia pays T.L. $11.0 - 4.6 = 6.3$
- T.L. ends up with $4.6 + 6.3 = 11.0$
- Australia ends up with $17.4 - 6.3 = 11.0$

### Revenue collected

- T.L. $4.6 Bn$
- Australia $17.4 Bn$
- Total $22.0 Bn$

### Petroleum Wealth

- T.L. $11.0 Bn$
- = Petroleum Wealth of $4.8 Bn\ (NPV4.7\%)$
- = Sustainable Income of $147mm\ (3\%\times P.W)$
Greater Sunrise Development Options

• Pipeline
  – To Darwin LNG
  – To Timor-Leste LNG and domgas

• Offshore
  – LNG
    • Floating
    • Gravity-based structure
  – CNG

• Delay and wait for further discoveries to enhance the economics
Greater Sunrise Development Options

• Pipeline
  – To Darwin LNG – easiest option
  – To Timor-Leste LNG and domgas – T-L needs to devote resources now!

• Offshore
  – LNG
    • Floating – technology issue
    • Gravity-based structure – location?
  – CNG

• Delay and wait for further discoveries to enhance the economics – how will this effect CMATS Treaty?
## Major Risks

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<th>Risk</th>
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<td>Completion</td>
<td>Experienced contractors</td>
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<td></td>
<td>Natural gas price volatility</td>
<td>Some hedging in tariff structure</td>
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Risk of delay

Article 12
Period of this Treaty

1. Subject to paragraphs 2, 3 and 4 of this Article, this Treaty shall remain in force until the date 50 years after its entry into force, or until the date five years after the exploitation of the Unit Area ceases, whichever occurs earlier.

2. If:

   (a) a development plan for the Unit Area has not been approved in accordance with paragraph 1 of Article 12 of the Sunrise IUA within six years after the date of entry into force of this Treaty; or

   (b) production of petroleum from the Unit Area has not commenced within ten years after the date of entry into force of this Treaty;

    either Party may notify the other Party in writing that it wishes to terminate this Treaty, in which case the Treaty shall cease to be in force three calendar months after such notice is given.

3. Should petroleum production take place in the Unit Area subsequent to the termination of this Treaty pursuant to paragraph 2 of this Article, all the terms of this Treaty shall come back into force and operate from the date of commencement of production.

4. The following provisions of this Treaty shall survive termination of this Treaty, and the Parties shall continue to be bound by them after termination:

   (a) Article 2;

   (b) the second sentence of paragraph 5 of Article 4;

   (c) paragraph 3 of this Article; and

   (d) this paragraph.

5. The period of this Treaty referred to in paragraph 1 of this Article may be extended by agreement in writing between the Parties.
Conclusions and “Next Steps”

• Articulate a mission for Timor-Leste to become energy self-sufficient
  – Accelerate onshore oil and gas development
  – Develop Greater Sunrise gas market and pipeline to Timor-Leste

• Put together a devoted implementation team immediately with appropriate authority and responsibility
The next steps - Costs and Funding

1. Site surveys leading to selection of a suitable site for an LNG Plant
2. Survey of possible pipeline routes from Greater Sunrise Field to the LNG plant. This survey should cover direct and near-direct routes, and cover both water depth surveys and seabed surveys.

When the surveys are complete, then 2 Engineering Studies need to be made.

1. A study of the LNG Plant based on actual site information leading to improved cost estimates.
2. A study of the alternative pipeline configurations, leading to selection of the lowest cost / lowest risk option which would be competitive with alternative pipeline options (to Australia).

An Environmental Impact Assessment and baseline study needs to be instituted

In addition it is desirable to have 2 further studies made as input to the decision making Process of the Woodside Partners:

1. A study of the socio-economic benefits which would accrue to RDTL from having an LNG Plant established in Timor-Leste (Multiplier effects)
2. A Study of the Market potential for RDTL LNG in the Asia-Pacific region – to quantify any price consequences for Timor-Leste LNG supplies (country risk, Customer requirements etc. (initial studies by Wood Mackenzie indicate that RDTL has a favourable market position at this time)

It is estimated that the costs of the above work could be:

1. LNG Plant site survey $ 0.5 million
2. Pipeline route surveys $ 1.5 million
3. Eng. study for LNG Plant $ 2.0 million
4. Eng Studies for pipeline $ 1.0 million
5. Socio – economic review $ 0.5 million
6. EIA $1.0 million
7. LNG market survey $ 0.2 million

TOTAL $6.7 million

The work needs to be completed within about 15 months if it is to meet the timetable of the Woodside partners for “Concept Selection” decisions prior to moving forward to “Front-end Engineering (FEED) studies.
This LNG site was a swamp in Kalimantan 30 years ago