DEPARTMENT OF PETROLEUM AND ENERGY

The PNG Gas Project

Project Brief

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THE PNG GAS PROJECT – AN OVERVIEW

Gas Sales to Australia -	**5,500 petajoules (PJ)**
LPG Exports -	**150 million barrels**
Condensate Exports -	**140 million barrels**
Total Sales Revenue -	**US$14,500 million**
Capital Costs -	**US$2,700 million**
Operating Costs -	**US$2,900 million**
Tax & other Fiscal Payments -	**US$2,500 million**
Project Participants -	**ExxonMobil, ChevronTexaco, Oil Search, MRDC, JPP & PNG Government**
Project Gas & Liquids Sales -	**Commencing in 2006/07**
Project Life -	**At least 30 Years**

CURRENT PROJECT STATUS

Several critical milestones have been achieved on the PNG Gas Project.

- The Gas Agreement between the PNG Government and the Project Sponsors was signed in June 2002; this Agreement contains the broad parameters for development of the project, including the petroleum resources that will be dedicated, State participation in the Project and the State's provision of stability in fiscal terms for either 20 years or up to the time when the base quantity of gas (5,500 PJ) has been sold, whichever is earlier;

- The Project Sponsors have already signed conditional gas sales agreements in Australia, totalling approximately 65 PJ per annum with two customers (AGL and CS Energy);

- Active negotiations are currently continuing with other potential gas customers in Queensland and south–east Australia;

- The PNG Gas Project must enter the Front End Engineering and Design (FEED) phase by the end of 2002, to enable gas to be delivered to Australia by the latter part of 2006; FEED is expected to cost US$75 million and will take approximately 9 months to complete;

- Engineering and technical work on the Project has been ramped up by the Project Sponsors, with an estimated expenditure of US$10 million, ahead of a decision to undertake the FEED study, to enhance the Project's ability to deliver gas in 2006;

- The PNG Government has effected all necessary legislative changes to support the Gas Project;

- The PNG Government is putting in place an improved process to manage landowner issues and landowner participation in the Gas Project, so that risks of project interruption by landowner disputes are minimised; and

- The PNG Government is currently working on alternative options to fund PNG participation in the Gas Project, including the option of selling part of the State's equity on commercial terms to interested investors who can provide concessional loans to assist PNG with the equity take up in the Gas Project.

THE PNG GAS PROJECT

1. INTRODUCTION

The Kutubu, Gobe and Moran oil fields are some of the largest natural resource discoveries in Papua New Guinea and their development has provided considerable economic stimulus in terms of employment, investment, contribution to the balance of trade, and taxation and royalty revenues. However, oil production is declining, and while the owners of the prospecting and development licenses have an objective to discover and develop additional oil reserves, a new course of action is required if the petroleum sector is to continue to make a substantial contribution to the PNG economy and to the lives of the local people.

It has been recognised by the PNG Government and the multinational petroleum companies such as ExxonMobil and ChevronTexaco that commercialisation of major gas reserves in the PNG Fold Belt offered the best opportunity to realise long term, sustainable hydrocarbon resource development. The ultimate proposed configuration for developing the reserves is the PNG Gas Project - a world scale project utilising hydrocarbon resources from PNG and producing a number of products for sale on the international markets (crude oil, condensate and LPG) and gas for sale in Australia.

The project will be undertaken in a number of phases, initially developing the existing oil producing fields and selling gas in Australia at rates up to 100 PJ/a (400 MMscfd). Over time, as gas demand in Australia increases, additional oil and gas fields will be utilised, most significantly the large Hides gas field. The system will be capable of being expanded to produce up to 250 PJ/a (600 MMscfd) of sales gas.

The project can be summarised in a number of discrete sections:

The onshore production, gathering and field facilities within PNG

Onshore pipelines connecting the field facilities and transporting natural gas and hydrocarbon liquids to the Omati River in the Gulf of Papua

A submarine pipeline from the Omati River to the Marine Facilities

Marine Facilities located in the Gulf of Papua that will process the gas to produce the specification products

A submarine pipeline from the Marine Facilities to the Australian coast

Pipeline systems within Australia to deliver the gas to customers.

It is intended that APC (a joint venture between AGL Pipelines Limited and Petronas Australia Pty Limited) will build, own and operate the downstream pipeline from the Australian-PNG border in the Torres Strait to the customer delivery points in Queensland. This section alone is a substantial pipeline development with over 2500 kms of large diameter pipeline providing gas to emerging and existing markets in Queensland.

Gas sales for 30 years are under consideration, but it is expected that additional developments and discoveries of natural gas resources in PNG will potentially extend the life of the project past this period.

Figure 1 shows the indicative route of the pipeline from PNG to Australia. The actual land route in Australia could alter depending on the location of gas demand for PNG gas.

Figure 1 Project Scope

2. PROJECT PARTICIPANTS

The PNG Gas Project incorporates gas production from existing Petroleum Development Licenses (PDL) 1, 2 and 4 and 5 in the Papuan Fold Belt. The project sponsors are:

ExxonMobil (leading the Project);
ChevronTexaco;
Oil Search;
MRDC (representing landowner interests); and
Japan PNG Petroleum

The PNG Government has an option to take up a 22.5% equity in the Hides gas field and therefore will become a participant in the Gas Project when the option is exercised. There is a possibility that some or all of the State's equity could be sold on commercial terms to other investors, especially if these investors could provide concessional funding to assist the participation of the State and other PNG entities in this very important resource project.

3. PROJECT SCOPE

The PNG Gas Project proposes to commercialise gas reserves lying in whole or in part within the PDL 1, PDL 2, PDL 4, PPL 101, PPL 138 and PPL 161 license areas. This includes the existing fields of the Kutubu, Gobe and Moran Petroleum Development Projects as well as the Hides Gas Development. In due course it may also include additional discovered but undeveloped fields such as SE Mananda, Juha and Angore, and other prospecting areas.

The project will progress through a number of phases and developments will proceed with integration of new reserves and changing sales gas demand. The initial development will include blowing down the reservoirs of the oil fields at Kutubu and Gobe Main. In the second phase, the Hides gas field will be developed and will be transported via the Central Processing Facility at Kutubu. In the latter stages of the project gas blown down from the Agogo and Moran fields will contribute to gas sales.

3.1 Production, Gathering and Field Facilities

The onshore facilities will vary slightly in the different producing areas, but can be summarised as including:

Well head facilities and pipeline gathering systems that will transport gas from the producing fields to production facilities utilising pipe support racks which mostly follow road infrastructure developed by the oil projects. Existing gathering systems may need to be supplemented by new pipelines.

Figure 2 Kutubu Central Production Facility

Preliminary gas treatment at the production facilities that will involve separating the gas from produced liquids (crude oil, condensate and water) and removing saturated water. The gas will be compressed for transport as a dense phase mixture of light hydrocarbons from methane to pentane+ (C_1 to C_5+).

The oil and condensate separated shall be stabilised and stored in tanks at the site. Produced water will be treated and reinjected into appropriate formations

Camps, roads, airstrips, warehousing, etc sufficient to support remote operations

Capital costs of the upstream development, ie production, gathering and field facilities, are estimated at approximately US$1,200 million.

3.2 Onshore Pipelines

Initially the onshore gas pipeline will be constructed from Kutubu to the Omati River (~190 kms) to transport gas rich in LPG and condensate at high pressure. Hydrocarbon liquids (oil and condensate) will be transported separately utilising the existing Kutubu Export Pipeline from the facilities at Kutubu to the Kumul platform. The gas pipeline system will require intermediate compression and sites have been nominated near Gobe Production Facility and at the existing Kopi Maintenance Base.

As demand increases and reserves decline in the Kutubu fields, the onshore gas pipeline will be extended to the Hides gas field to transport gas to Kutubu for recompression and transfer to the Marine Facility.

3.3 Offshore Pipelines

Due to the difficult coastal terrain in the Gulf Province of PNG, the offshore gas pipeline will follow the Omati River to the Gulf of Papua and then to a Marine Facility located near the existing Kumul platform. The pipeline will cross approximately 25 kms to the mouth of the Omati River and then southeast for 51 kms to the Marine Facility.

3.4 Marine Facility

The rich natural gas will be processed on a Marine Facility located near the Kumul platform to produce:

specification natural gas for sale to Queensland

propane and butane, as separate fractionated products

light naphtha / condensate

The main facility will be a concrete gravity structure, which will have equipment for gas processing, LPG fractionation, condensate storage, accommodation and utilities. The fractionated LPG will be transferred at ambient temperature to a co-located Floating Storage and Offloading vessel (FSO) that will refrigerate and store the two LPG products. The nominal storage volumes are 56,500 m^3 (350,000 bbl) of condensate and 105,000 m^3 (650,000 bbl) of LPG.

The facilities will be located near Kumul as the water depth is suitable for large tankers to berth while loading. Condensate will be loaded to vessels via a single point mooring (SPM) system and the LPG will be transferred via tandem mooring to tankers.

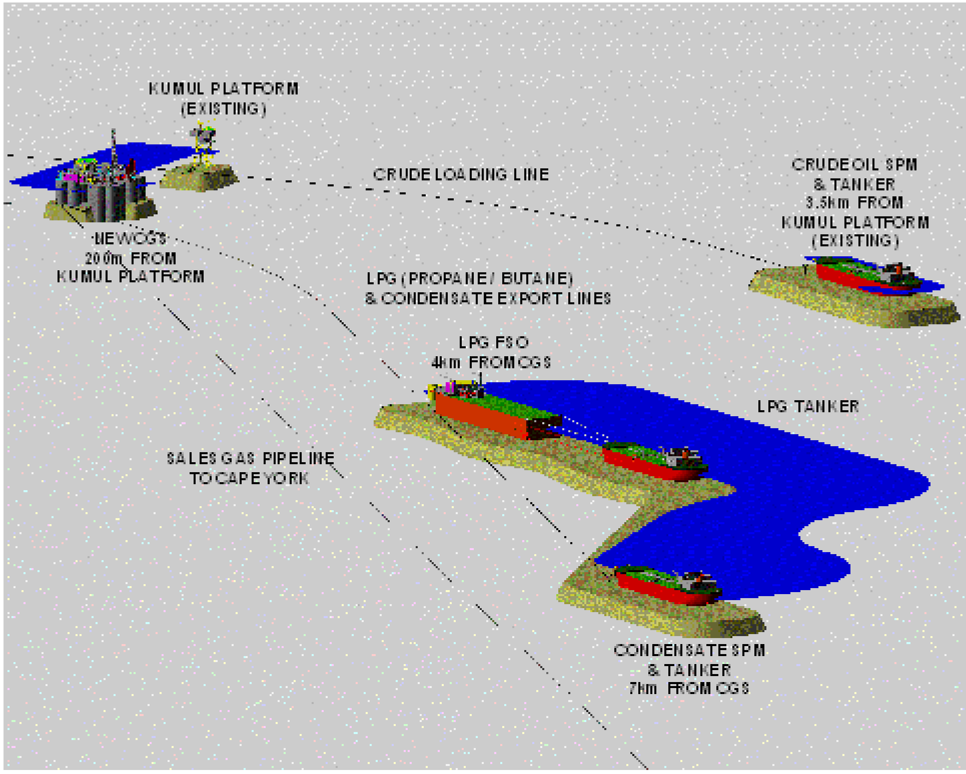


Figure 3 Marine Facility Configurations

3.5 Dry Gas Pipeline

The specification sales gas pipeline from the Marine Facility to Australia will run generally southwest along stable seabed at varying depths. The pipeline will be laid on the seabed or buried, as bottom conditions and other considerations dictate. It will run 403 kms from the Marine Facility through the Gulf of Papua into Torres Strait, across the PNG-Australian border, to landfall on Cape York in Queensland.

The onshore pipeline in Australia will run generally parallel with the east coast from Cape York to Townsville, and then on to Gladstone and Brisbane. The Australian portion of the project will be constructed, owned and operated by APC.

Total capital costs of the Pipeline Infrastructure, i.e. the gas pipelines and associated processing facilities within PNG, are estimated at US$1,500 million.

3.6 Total Project Costs

The total capital costs of the PNG Gas Project are estimated at approximately US$2,700 million. Total operating costs over the life of the project have been estimated at US$2,900 million.

4. MARKETS

4.1 Gas

The ability of PNG consumers to utilise natural gas from the gas fields of the Papuan Fold Belt is currently limited by the small size of the domestic market and the absence of natural gas reticulation infrastructure. This, however, may change in the future if the PNG Gas Project's reliable and long-term supply of natural gas leads to other downstream developments in Papua New Guinea, such as petrochemicals, LNG and electricity generation. Such developments would help to strengthen both demand for this energy source and the economic base of the country. Projects such as these could co-exist with the continued export of natural gas by pipeline to Australia, but there is no such project under active consideration at this time.

The market identified in the Project's development is in Queensland, which produces relatively small quantities of natural gas, but has a high potential demand. Net energy use in Queensland has risen over the last 20 years, with an annual average growth rate of 3.9%, which is significantly higher than the Australian national average of 2.5%. This is a reflection of Queensland's high rates of economic and population growth.

The markets in Queensland can be summarised as:

Power generation in northern Queensland to remove reliance on long distance transmission lines which currently supply electricity from central Queensland

Industrial utilisation in central Queensland, particularly in the Gladstone and Rockhampton region

Power generation and industrial application in the southeast of Queensland – predominantly Brisbane

The PNG Gas Project is expecting to sell up to approximately 200 petajoules (PJ) of gas per year to the Australian market after the initial sale build-up period. Total gas sales are forecast to be 5,500 PJ but there is considered to be potential to increase this with greater penetration of the Australian energy market.

4.2 LPG

PNG enjoys a geographically advantaged position in the world LPG market. It is closer to major SE Asian consumers than the LPG production facilities of the Middle East and is adjacent to the growing premium market areas in eastern Asia. Most of these markets are expanding their LPG import handling and distribution systems. LPG produced in PNG should be able to capture markets such as the east coast of Australia, Japan and China, as it will have a freight price advantage over other potential supplies from the Middle East, Africa, etc.

The PNG Gas Project is anticipated to produce approximately 600,000 tonnes per year of fractionated specification propane and butane (typically in a 2 : 1 ratio of C_3 : C_4). The amount produced is proportional to the sales gas flows and dependent upon which reservoirs are producing (as there is substantial variety in LPG content of the rich gas from each field). Current Asian demand is about 30 million tonnes per year, and hence the PNG Gas Project has the potential to be a significant contributor to regional production.

While markets for LPG within PNG are presently small, they offer significant growth and development opportunities. Locally produced LPG will provide a more competitively priced source of secure, clean fuel for residential, commercial and industrial sectors. Substantial reductions in the cost of LPG for local consumption should be achievable and would do much to encourage demand for LPG within the country, and to promote economic activity based on LPG usage.

A key requirement for the local market will be the establishment of sufficient “critical mass” to reduce unit distribution costs. New large industrial consumers will need to enter the market so that economies of scale can be realised, and improvements to storage and delivery infrastructure can be made. Even with acknowledged limitations in the current distribution system, it is considered that up to one-third of the PNG population could potentially use LPG if encouraged to do so through lower prices, better availability, better awareness and education on safe use of LPG.

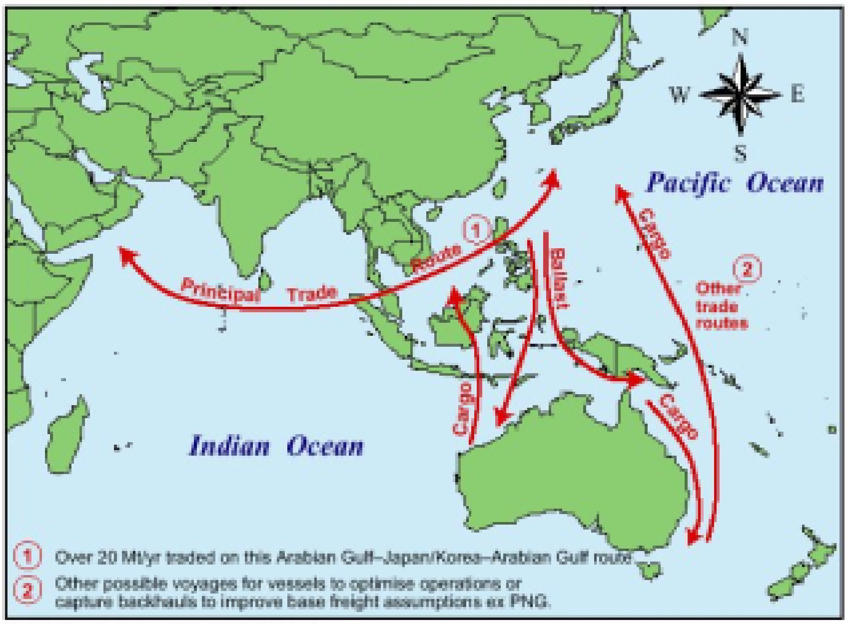
Potential uses are:

Power generation in remote areas, substituting for imported diesel

Household consumption for heating and cooking

Transport systems (buses and taxis in particular) in major centres

Commercial customers, small manufacturers, etc.



Source: Adapted from NGC (1997).

Figure 4 Eastern Hemisphere LPG Supply Routes

4.3 Crude and Condensate

Crude oil has been exported from PNG by the Kutubu, Gobe and Moran projects. Joint Venture Partners market their share of oil independently and the ultimate customers for the crude has varied greatly over time, supplying refiners in China, SE Asia, Australia and USA. Most cargoes are currently sold to Australian refiners.

As gas production increases, condensate production at the field facilities will escalate, creating a lighter crude oil with expected gravity of 48^{o} API. With the introduction of the Hides field in later production years, condensate production may exceed oil production and the marketing strategy for stabilised liquid products may need to be reviewed.

Condensate produced on the Marine Facility will be petrochemical grade feedstock and will be sold in smaller parcels (approximately 350,000 barrel) to the SE Asian petrochemical refiners.

5. PROJECT ECONOMICS

5.1 Benefits of the Project

The PNG Gas Project and associated developments will help to maintain the jobs, government revenues, landowner payments and other benefits currently provided by the Kutubu, Gobe and Moran oil projects. In particular:

In the long term, the PNG Gas Project could lead to productive investments within Papua New Guinea.

Employment opportunities will be significant, both in terms of jobs generated during construction and, more importantly, in terms of maintaining existing permanent jobs and generating new permanent jobs. The estimated 1,000 and 3,300 maintained and new permanent jobs will improve the security of jobs held by PNG citizens. As Papua New Guinea has a large pool of labour with a relatively low level of participation in the cash economy, such employment benefits will be very large.

Declines in PNG Government revenues when oil production begins to fall early this century are expected to be reversed by the PNG Gas Project. The amount of government revenues generated is expected to be between K4.7 billion and K9.9 billion compared to around K2.7 billion in the absence of the PNG Gas Project. (For the analysis, government revenues included company tax, personal income tax, import duties from 1998 and value-added tax from 1999.)

The PNG Gas Project is also expected to help to maintain a strong level of returns to local landowners, based on the assumption that the project will pay a royalty of 2% of wellhead value direct to the landowners. Cumulative landowner revenue of between K400 million and K700 million is expected compared to around K200 million in the absence of the project.

The project has the potential to support the PNG Government's strategies of adding value in-country to basic resource outputs and using such value-added products to replace imports and thereby broaden the economic base of the country.

The project should significantly reduce the cost of LPG for local consumption in Papua New Guinea. This would stimulate demand for LPG within the country and promote economic activity based on LPG usage.

The productive efficiency and economic life of the projects that exploit the hydrocarbon resource (oil and gas) of the Papuan Fold Belt will be substantially extended and optimised.

New gas discoveries in the PNG Highlands, even relatively small ones, will have a greatly improved chance of commercial development due to the existence of the project's gas production and delivery infrastructure.

The gas export component of the PNG Gas Project would, alone, provide substantial benefits to the economy of Papua New Guinea. In addition to these benefits, the project will provide a range of opportunities for gas-based industry development within Papua New Guinea. Some of these opportunities will become available as soon as the PNG Gas Project is developed.

5.2 General Economics

The PNG Gas Project requires large capital and operating expenditures over the 30-year design life and will realise returns from the sale of natural gas, LPG and condensate, plus incremental oil production (with extension of field lives). The markets for the different products vary, with gas sales prices fixed over long term, and the liquid products subject to variations in world price / demand fluctuations.

The Project Sponsors have assessed the PNG Gas Project to be economically viable and the expected rate of return is acceptable to these investors.

6. CURRENT PROJECT STATUS

Several critical milestones have been achieved on the PNG Gas Project.

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Department of Petroleum and Energy

PAPUA NEW GUINEA

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