

PACIFIC ENERGY SUMMIT

Unlocking the Potential of Natural Gas in the Asia Pacific.

1. Overview

Papua New Guinea (PNG), lies south of the equator, 150 kilometers north of Australia, sharing border with the Indonesian province of West Papua (formerly Irian Jaya) and Asia to the west, sea border with Australia to the South, East with the rest of the Pacific Island countries.

The 2000 National Population Census in PNG place the population at an 5 190 786, average economic growth rate has been 7 percent since 2002, and population growth of 2 percent.

A developing economy, PNG is endowed with diverse natural resources. Amongst these are the mineral, and petroleum land, itself, is very fertile lowland valleys to alluvial flood plains and mangrove swamps, oil and gas.

Mineral and petroleum sectors, currently provides large part of the income for Government, while agriculture, forestry, fishing and others rest of the national income. PNG is a new player in gas development and production.

It is expected that by 2014, Papua New Guinea would have developed and exported gas. At current indication, Papua New Guinea has proven recoverable gas reserves of 15 trillion cubic feet (TCF). Based on relatively conservative estimates in 2007, annual exports from the LNG project utilizing gas discovered fields could peak at US\$ 2.0 billion annually creating an estimated revenue stream US\$ 300 billion over thirty years.

Besides, licensing activities in the country represents a huge potential for future developments. Of 160 different licenses issued since 1990, 127 are prospecting licenses, 9 are development licenses and 14 are retention licenses, representing huge potential assets for the future.

Papua New Guinea's gas development strategy takes into account, that gas development requires substantial upfront investment in development of gas fields and requisite infrastructure such as pipeline systems, and conditioning plants. Also Gas Commercialization is characterized by marked economies of scale. These factors would underpin considerations by Government in investing in various aspects of the LNG Project.

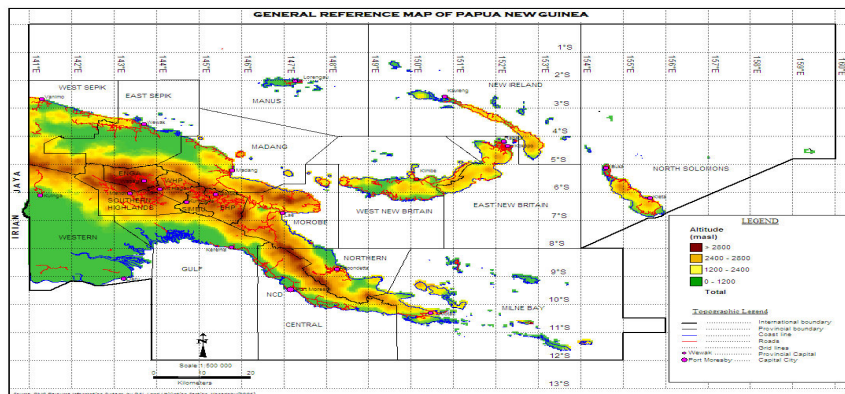
The Government's overall strategy for developing its gas resources will be through;

- i. Export of gas through the development of LNG and LPG industries;
- ii. The development of a gas-based petrochemical industry;
- iii. The development of a gas-fired rural electrification program;
- iv. The promotion of energy-intensive minerals processing industries, such as aluminum smelting; and
- v. The promotion of exporting pipeline gas to the north and north-eastern energy markets in the future.

The Government expects revenue generated from gas exports will fund Papua New Guinea's development priorities and, as a result promote broad based economic development and growth in the next the thirty years from 2014. These underpinnings are likely to take centre stage in government consideration for the long haul. The issues of food security, health, education and key infrastructure developments are vital considerations by the PNG Government.

2. Main Discussions

Figure 1: Map of Papua New Guinea



What factors will affect decisions by Papua New Guinea to build infrastructure for domestic gas use versus infrastructure for export as it develops gas fields?

Global gas business is capital intensive. The government has steered clear of developing infrastructure for gas development leaving that up to the proponents of the project. In the case of

Papua New Guinea the remoteness of gas fields, absence of critical infrastructure such as road and bridges as well as high costs of construction of gas pipelines has and will continue to influence the Government's investment decision. The current thinking is to ensure that it takes account of global demands, and the factors affecting markets such as alternative energy sources like geothermal, solar, biofuel and biomass. The government in its draft clean energy policies recognizes that these alternatives will also drive demand in the future, especially in the context of emerging gas efficiency regulations which are likely to affect investment decisions of major gas and oil companies.

In respect to current export-based LNG (foundation) project, the Developer has undertaken to invest US\$ 15 billion over 4 years (2010-2014) to build the entire infrastructure required by the project on behalf of its project partners, based on equity as well as licensing considerations. Therefore upstream considerations are clearly factored in midstream considerations and market underpinnings. Government legislation encourages opening bids on licenses upstream and the licensees have first rights to provide development proposals to the government and other stake holders. Equity participants are based on market considerations, save for the government's equity which is prescribed in law.

The PNG Government and the petroleum industry in the country regard the PNG LNG Project infrastructure as an important

foundation for the gas industry in PNG to grow. The Government is confident that more oil and gas companies will invest their dollar in upstream exploration in order to find new oil and gas resources with the possibility of utilizing the PNG LNG Project foundation infrastructure. Licensing results have demonstrated this outcome quite clearly.

2.1 Exports?

Gas can be used in the agricultural sector as fertilizer/urea. This calls for gas to be processed and therefore downstream processing is critical. The need to attract investment in petrochemicals and urea is critical to support agriculture and other manufacturing and textile industries. This allows developments to address food security, agriculture exports, and petrochemicals and food products.

Gas can be used directly in the agricultural sector to dry coffee beans and other product as well as in the food industry such as drying fish, potato, etc.

Gas can be used as a fuel in the form of LPGs to replace imported LPGs and also to replace kerosene which has high Carbon emission.

LPG (cooking gas) can very easily replace firewood if it was produced domestically and issues pertaining to affordability,

accessibility and reliability are being addressed by the Government.

Gas-based power generation is another important sector where natural gas can be used in a big way to power the PNG economy. Gas-fired electricity can easily replace expensive imported heavy diesel in the mining industry where the cost of imported diesel per annum is in hundreds of millions of dollars. This obviously has a negative effective in foreign exchange reserves and balance of trade.

2.2 Domestic Gas Use?

At present the domestic gas market is not well developed and mature. However, the PNG LNG Project and the other export-based gas projects which are currently promoted will create many new opportunities for PNG in the domestic gas-based industries.

In regard to the promotion and development of domestic-based gas projects and usage, there are many challenges because of the high cost associated with gas business. Unlike the export-based gas projects which are large and therefore can achieve economies of scale, hence commercially feasibility, domestic-based gas projects are often small in comparative terms and therefore the challenges are to achieve a balance between concessions and financial feasibility based on internal rates of return considerations. No investor will build domestic gas infrastructure

if the entire project economics are not commercially attractive. The Government could consider taking on infrastructure costs but how does that affect its own interests as an equity participant in the project.

In PNG, the Government recognizes the importance of the domestic gas sector and the need to promote investment in gas-based and value added industries such as LPG extraction, gas-based power generation, DME/Methanol production and petrochemical manufacturing. LNG (Foundation) Project will enable domestic-based gas projects by piggybacking on its infrastructure to create opportunities. The challenge is to ensure that a balanced creation is achieved in respect to baseline prices on IRR as well as domestic market obligations.

The Government has recognized the importance of stimulating growth in the domestic gas business and gas infrastructure and therefore had already made some key decisions to promote and establish special Economic Zones (SEZ) for downstream processing of Gas.

The principal idea is to establish an “industrial zone” where investors such as service companies of petroleum industry would invest in order to share costs and reduce risks where common facilities and infrastructure are built in SEZ or by the investors. Developing a compromise energy mix in SEZs has an important

contribution to reducing overall cost of energy, however, the infrastructure requirements and its costs is a concern.

3.0 Does the government have a strategy for using gas to support broader economic development goals? What will be the structure for the domestic gas market?

The LNG gas project will provide Papua New Guinea stakeholders a substantial revenue stream of an estimated US\$ 300 billion over a thirty (30) year period.

The Government expects revenue from gas exports will assist fund Papua New Guinea's development priorities and, as a result promote broad based economic development. The government, has introduced a 50 years development plan, Vision 2050 which calls for structured development utilizing the revenue generated from the LNG projects. This effectively means that using gas to produce affordable clean energy to support the Small to Medium Enterprises (SME) to encourage its citizens to participate in the economic development creating the envisaged wealth.

3.1 Strategy to support broader development goals and objectives?

The government has inaugurated its 40 year development in Vision 2050. Its principal budgetary underpinning is the large gas revenue post 2014. A foundation gas commercialization project

will facilitate the development of other gas-based industries the foundation project will be of sufficient scale to justify the substantial upfront investment infrastructure. While the government is an equity holder in the foundation project, it has not subsidized development costs of the pipeline. The construction is funded by the project consortium on market consideration. However, once the initial investment is undertaken in the 'backbone' infrastructure, the viability of other gas commercialization options will improve significantly. We have signed a second project agreement and a third will be announced soon.

In fact, the other gas commercialization options that would not be viable would now be able to 'piggy-back' on the 'backbone' (or common access) infrastructure of the foundation project making it more cost effective. The markets orientation in upstream and midstream has helped created a boost in exploration applications and licensing work.

3.2 Structure of the Domestic Gas Markets?

Petrochemicals and Other Gas Commercialization Options has created high investment interest for foreign direct investments (FDI)'s.

The structure of the gas market perhaps will be characterized by a few big and more established players in gas-fired power

generation where the targeted consumers will be mining industries, and commercial sectors while in the retailing market, only LPG is expected to feature strongly with relatively small growth. Gas competing with electricity and LPG through gas reticulation (city or town gas through pipeline) is a possibility but perhaps will require careful planning and better policy initiatives.

In addition to an LNG Project or Projects, under its gas commercialization policy the Government is also targeting investments in LPG and a range of petrochemicals including methanol, dimethyl Ether (DME), synthetic fuels such as Gas-to-Liquids (GTL), ammonia, and urea). Over the past two years in particular, the Government has received a significant number of expressions of interest from enthusiastic investors targeting LNG and petrochemicals.

The Government is in close dialogue with companies that are exploring options to establish aluminum smelting plants in Papua New Guinea. Aluminum smelting is very energy intensive and these companies have been attracted to Papua New Guinea by the policy to promote the development of gas-fired power stations that will provide abundant cost-effective power.

4.0 How does the Ministry encourage public-private partnerships and/or encourage state –owned enterprises such as Petromin PNG to partner with private companies (domestic or foreign)?

PNG’s legislative, regulatory and policy framework is designed to ensure that the foundation project will facilitate the development of other gas-based industries. Under the Oil and Gas Act, there are provisions for certain pipelines and processing facilities to be designated as ‘strategic’ infrastructure. In accordance with the Act strategic pipeline are subject to rules and regulations that are intended to encourage third party use of the pipeline, and to accommodate proposals to extend the pipeline and/or expand its capacity.

4.1 Public Private Partnerships

The framework also encourages a Public Private Partnership which allows for the private sector as well as state Owned Enterprises (SOE)’s to form partnership allowing for synergies.

SOE’s such as Petromin are encouraged to form strategic partnerships with global businesses in the industry to explore and extract process gas in the sector.

Project Agreement makes it mandatory for a consortium to invite a state nominee to hold equity on behalf of the State. Equity financing is the responsibility of the State and it is funded based on commercial considerations.

5.0 For a country like Papua New Guinea, what are the advantages and disadvantages of extracting and distributing hydrocarbons (especially gas)?

Papua New Guinea is developing economy and is concise of development challenges, as an economy it endeavors to balance economic development with environment considerations.

5.1 Advantages

The advantages of PNG developing its hydrocarbon resources are:

- development and monetization of the petroleum resources provide PNG a strong revenue base to support and grow the national economy and this is good for PNG as a developing nation;
- The development of petroleum resource, especially natural gas is very good because, apart from the economic gains, PNG will contribute towards the global initiative to reduce greenhouse gas emission since natural gas emits virtually zero carbon.

- The affected landowners and communities benefit from cash and infrastructure projects as all the existing petroleum projects in PNG are located in some of the most remote and secluded part of the country; &
- The development of PNG petroleum resources now provides a profound opportunity for PNG nationals to be employed in the industry and to acquire advanced skills and technology in order to become skilled technical workers and leaders in the industry and country.

5.2 Disadvantages

- Development and extraction of petroleum resources is the danger of PNG becoming a victim of the “Dutch Disease”. For example; the current PNG LNG Project is getting so much attention in the country as it is a world-class project entailing over US\$14 billion and if the Government gives so much attention and focus on this project and the affected provinces, districts, landowners and communities, and forgets to support other sectors of the economy and the people, PNG will struggle to translate the LNG generate revenue into tangible wealth creation for the benefit of all citizen.
- Environmental damages and issues are greater in the mining as opposed to petroleum sector which has less environmental

issues because of the way the industry is operates. However, this does not mean there is absolute guarantee of zero environmental issues like oil spillage, gas explorations, river/sea siltation, etc. There are inherent environmental dangers which are invariably associated with petroleum developments and that itself is a disadvantage although those dangers can be managed.

6.0 Natural Gas for Development and Its Contributions to low Carbon Development Path

The overall demand for LNG will continue to be strong and we expect that the LNG will continue to provide impetus for growth for the future. We note that renewable energy sources will also affect parts of the gas demand, accounting for 30-40% of energy mix. PNG is endowed with potential renewable energy sources such as geothermal energies, hydro, which forms a significant part of current power generation, solar and biomass. PNG is actively promoting renewable energy options are different scales via the new electric industry policy, currently being developed. The use of gas revenues will assist in developing infrastructure requirements under the auspices of the Vision 2050. PNG plans to be carbon neutral by 2050.

7.0 Closing Remarks

Growing international concern over green-house gas emissions and global warming has promoted greater interest in gas-based energy products and gas-fired power generation. Natural gas is a low green-house intensity fuel and gas-based energy products are comparatively clean and environmentally friendly.

As well, gas-fired power stations generate far less emission than their coal or diesel-fired equivalents. The confluence of high energy prices and concerns over pollution levels more generally, has increased the commercial viability of ultra-clean gas-based fuel products such as synthetic fuels produced by gas-to-liquid conversions technologies (GTL). In the years ahead, global policies that are designed to counter green-house emissions are likely to further improve the economic returns to gas-based energy products.

As a growing economy, Papua New Guinea considers climate change as a fundamental development challenge and considers the LNG or any Gas projects in the country would contribute immensely as a clean development mechanism contributing to the overall objective of Papua New Guinea to reduce green house gases (GHG) between 50-75 percent by 2030 and become carbon neutral nation before 2050.

