

# PAPUA NEW GUINEA

- Papua New Guinea's total primary energy demand is projected to increase from 1.4 Mtoe in 2002 to 3.8 Mtoe by 2030, driven mainly by robust oil demand growth for industry.
- The slow rate of oil discovery, depleting reserves and high oil demand growth will make Papua New Guinea a net oil importer after 2015.
- The expansion of export markets for oil and natural gas will initiate fuel diversification efforts in the electricity sector.

## RECENT ENERGY TRENDS AND ENERGY POLICY

Papua New Guinea's energy consumption is one of the smallest in the APEC region, at 1.4 Mtoe in 2002. Energy consumption grew robustly at 4.7 percent per year between 2002 and 2005. High rate of industrialisation, growth in infrastructure and improved living conditions have been the key factors for the rising energy consumption over the past years. Oil consumption for new mines has exhibited the fastest growth and accounted for 5.3 percent of the total energy consumption over the past three years.

To support the economy's growing energy needs, Papua New Guinea has intensified the exploration, development and exploitation of indigenous oil and gas resources (both offshore and onshore). As a result, a small new oil field at the South East Mananda has commenced operation and is producing at about 7,000 barrels of oil per day augmenting the economy's low oil production output.

Much of the growth in energy consumption has been from petroleum products and is being met by imports. However, with the commissioning of the first oil refinery in 2004, all petroleum product imports (excluding LPG) have now been replaced by domestic production from the new refinery.

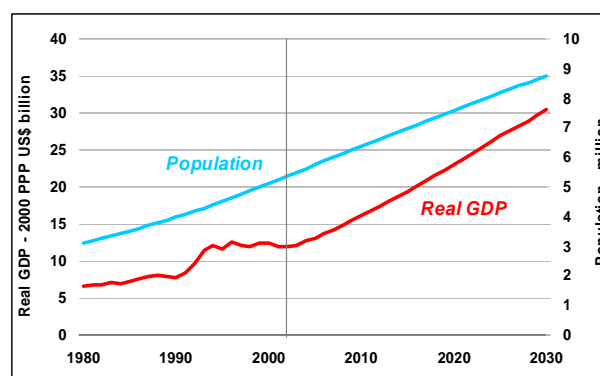
The growing awareness on oil dependency amid depleting reserves has prompted the economy to seek other alternative energy sources. Papua New Guinea has initiated the PNG National Energy Policy Statement and Guidelines document which will among others set the economy's future policy direction on energy.

## ENERGY DEMAND DRIVERS

Papua New Guinea's economic performance since the 1990s has generally been weak. Over the last two decades GDP achieved modest growth of 2.6 percent, with GDP per capita increasing only at 0.1 percent annually. Papua New Guinea's export-oriented economy and capital intensive mineral sectors would however be the major area of growth, generating export revenues, particularly from oil and

gas. With the strong growth in the industrial sector, the economy is expected to grow annually at 3.4 percent from 2002 to 2030. Expansion and development of infrastructure (in agriculture, mining, and industry) would require sustained growth in energy demand in the same period.

Figure 74 GDP and Population



Source: Global Insights (2005)

High population growth has constrained the economy's development for nearly two decades. Half of the people in Papua New Guinea are still poor and living below the poverty line. Over the outlook period, population is expected to moderately grow at 1.8 percent per year as living conditions improve.

Population is expected to increase from 5.4 million in 2002 to 8.8 million by 2030. Increased agricultural and industrial activities, particularly in mining, oil, and gas exports are expected to generate new and additional jobs, improve living standards and encourage urban migration and movement of people away from rural areas. Urbanisation therefore is expected to increase from 13 percent in 2002 to 20 percent in 2030, and grow at an annual rate of 1.6 percent until 2030, faster than the previous decades of 0.1 percent.

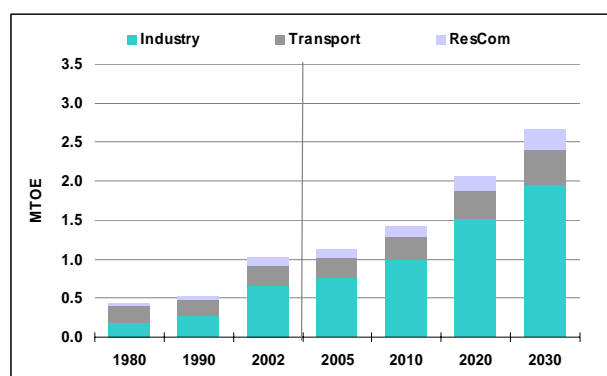
## OUTLOOK

### FINAL ENERGY DEMAND

Final energy demand is projected to grow annually at 3.5 percent from 1.0 Mtoe in 2002 to 2.7

Mtoe in 2030. The growth is mainly from the industry sector, which will grow from 0.7 Mtoe in 2002 to 1.95 Mtoe in 2030 and will account for 74 percent of the total energy demand, followed by transport (15 percent), and residential and commercial sectors (11 percent).

**Figure 75 Final Energy Demand**



Source: APERC Analysis (2006)

### Industry

Energy demand in the industrial sector is projected to grow at an average annual rate of 4.0 percent during the outlook period. The robust growth in industrial value-added of 4.0 percent per year, is due to the increased government promotion of local manufacturing industries, which is expected to contribute significantly to this projected growth in energy consumption. With the commissioning of the first oil refinery in 2004, the oil refining industry is expected to play an important role in the economy.

### Transport

Energy demand in the transport sector is projected to increase from 0.27 Mtoe in 2002 to 0.44 Mtoe in 2030, growing at an annual rate of 1.7 percent. Despite the steady growth, per capita transportation energy demand will not show much difference through 2030. Underdeveloped road transport infrastructure has placed limitations on the mobility of road transport.

### Residential and Commercial

Along with moderate population and income growth and gradual expansion of the industry base<sup>87</sup>, energy demand in the residential and commercial sectors<sup>88</sup> is expected to grow at 3.6 percent per year throughout the outlook period, slower in comparison

<sup>87</sup> The PNG government plans to promote small to medium scale enterprises to strengthen the economy as a drive towards the government goal of 5 percent GDP growth in the medium term.

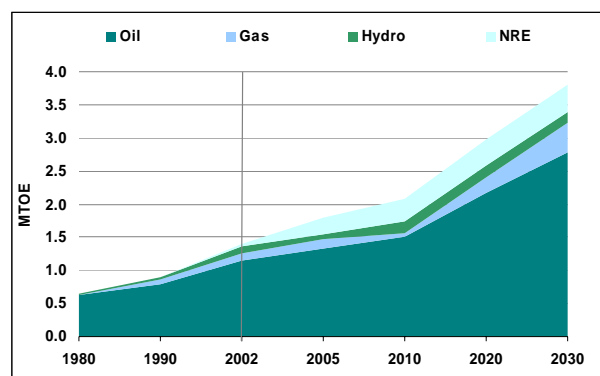
<sup>88</sup> Due to a lack of disaggregated national data for the residential and commercial sectors, energy demand for the two sectors will be combined over the outlook period.

with the previous decade of 5.8 percent. Electricity is the dominant energy source in the residential and commercial sectors and is projected to grow at 4.6 percent annually, driven by moderate spending by consumers as income increases. The share of electricity in the total residential and commercial sectors is expected to increase from 62 percent in 2002 to 80 percent in 2030. Demand for petroleum products is expected to increase by 1.3 percent annually and account for 20 percent of the total residential and commercial energy demand in 2030.

### PRIMARY ENERGY DEMAND

Total primary energy demand is projected to grow by 3.6 percent annually over the outlook period. Oil will grow at 3.2 percent and will maintain the dominant share of total primary energy demand at 73 percent by 2030. Oil demand will increase from 1.2 Mtoe in 2002 to 2.8 Mtoe in 2030.

**Figure 76 Primary Energy Demand**



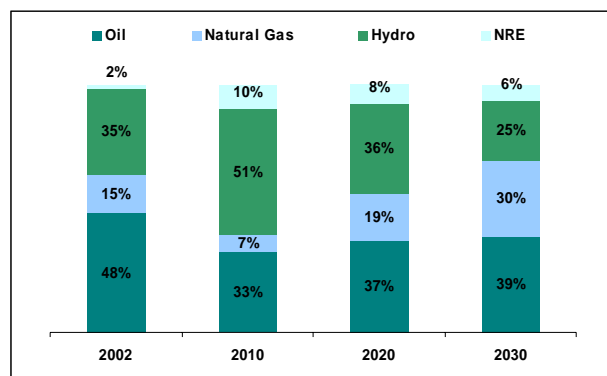
Source: APERC Analysis (2006)

Oil will maintain the largest share in total primary energy demand and the greatest share of the demand will be concentrated in the industry sector, followed by electricity and transport. The demand for natural gas will be driven by the electricity generation sub-sector.

### ELECTRICITY

Electricity demand is expected to double from 3.0 TWh in 2002 to 7.8 TWh in 2030 driven mainly by the industry and residential sectors. Electricity demand will be supplemented by hydro, natural gas (starting in 2010) and geothermal electricity generation. In 2030, oil will dominate the electricity generation mix at 39 percent, followed by natural gas (30 percent), hydro (25 percent) and renewables (6 percent).

Figure 77 Electricity Generation Mix

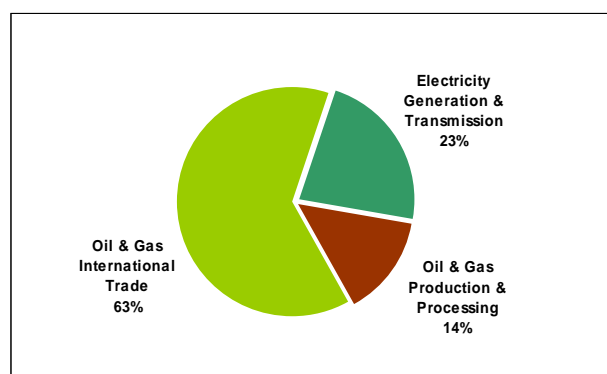


Source: APERC Analysis (2006)

### INVESTMENT REQUIREMENTS

Over the outlook period, the total investment requirements necessary to support the economy's energy infrastructure development are expected to reach between US\$7.98-9.06 billion in 2030. Investment in oil and gas international trade will have the largest share of 63 percent followed by electricity generation and transmission (23 percent) and oil and gas production and processing (14 percent).

Figure 78 Investment Requirements

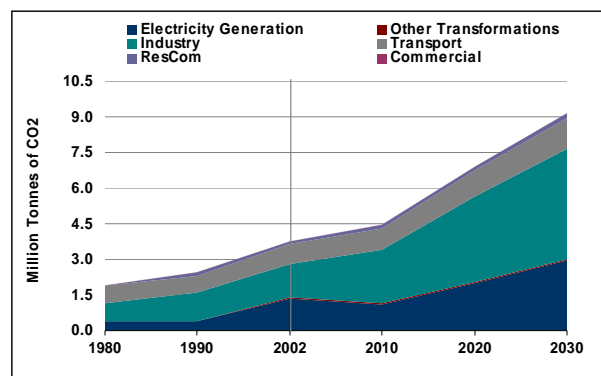


Source: APERC Analysis (2006)

### CO<sub>2</sub> EMISSIONS

CO<sub>2</sub> emissions from the energy sector are projected to reach 9.1 million tonnes of CO<sub>2</sub> in the outlook period which is 2.4 times higher than the absolute levels in 2002. The biggest volume of CO<sub>2</sub> emissions will come from the industrial sector. In comparison with other APEC member economies, the increase in CO<sub>2</sub> emissions will still be minimal.

Figure 79 CO<sub>2</sub> Emissions by Sector



Source: APERC Analysis (2006)

### MAJOR ISSUES

Unless new investments in oil exploration are realised, Papua New Guinea's oil reserves will be reduced with the economy becoming a net oil importer after 2015.

In Papua New Guinea's bid to generate the much needed revenues, the economy will build the first natural gas pipeline to Australia. Natural gas export to Australia is expected to commence operation in 2009.

The government has passed amendments to the Oil and Gas Act to fast track the PNG gas pipeline project to export gas to Australia from 2009. The amendment includes licensing provisions which will have a life span of 25-30 years to ensure that the tenure of the petroleum development and pipeline licenses are secured over the life of the project. The "security of tenure" was a fundamental requirement for both investors and lenders to the PNG pipeline gas project.

New fiscal incentives were offered to oil companies which include a reduction in income tax from 50 to 30 percent and removal of the Additional Profit Tax (APT). This incentive is already attracting new investors who are now undertaking exploration activities for oil and gas.

In addition, the government will release the National Energy Policy Statement and Guidelines document in early 2007 in order to clarify policy direction of the energy sector, and to improve investors' confidence, not only in oil and natural gas explorations, but also in infrastructure development.

### IMPLICATIONS

Fresh initiatives and incentives offered by the government have attracted modest investments in the energy sector. Perhaps it is the economy's rugged terrain that has increased infrastructure costs and

which has hampered exploitation of resources. In addition, sensitive customary land tenure systems, near uncertain political instability, social conflicts and non transparent and poor governance have all contributed to lukewarm investors' interest. In this regard, the release of the National Energy Policy Statement and Guidelines document will be a good start to clarify the economy's energy policy goal and priorities in the energy sector development and to increase investors' confidence.

Although Papua New Guinea's dependence on imported oil will be inevitable in the next 10 years, it might help to study the optimum use of other indigenous resources like hydro and geothermal for electricity generation. Careful analysis and optimisation modelling of the economy's electricity generation requirements may lean towards coal as an alternative resource (from Indonesia and Australia), rather than using its high valued natural gas for its own electricity generation.

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