



Powering PNG

Oil Search's strategy to support the PNG
Government's domestic power objectives

2016 PNG Update: Sustaining Development (in PNG) beyond the Resources Boom

Mr Phillip Caldwell, Managing Director, Oil Search Power Holdings

Oil Search Limited
ARBN 055 079 868

4 November 2016

Good afternoon to everyone and it is a pleasure to be here this afternoon to give you an overview of some of the initiatives that Oil Search is implementing and evaluating to support the Governments broad domestic power objectives.

Contents



- The Challenge For Power In PNG
- PNG Future Power Requirements
- Power Value Chain
- What Can Oil Search Do?
- A Vision To Power PNG
- Power Strategy
- Oil Search Power Solutions
- Key Messages

We will walk quickly through some of the background challenge and future needs. Discuss what is needed to make the value chain work and what Oil Search can bring to the power sector. Finally I will give you some insight into some of the projects that we are working on.

The Challenge For Power In PNG

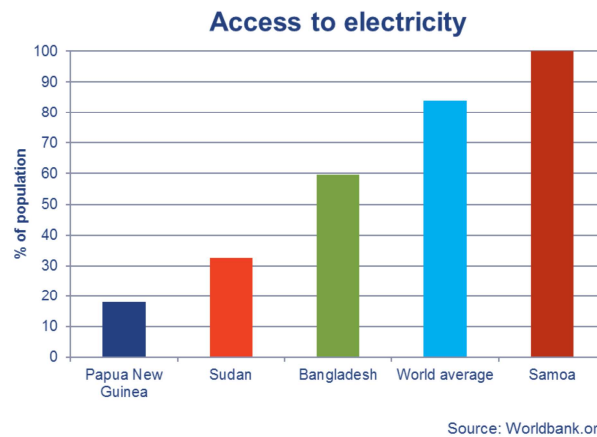


Three small and unconnected power systems operate in PNG:

- Port Moresby
- Gazelle Peninsula
- Ramu

Slow growth into rural areas.

Access to power in PNG is amongst the world's lowest.



What is the challenge - Power remains one of the most significant development challenges for Papua New Guinea. Its mountainous terrain and considerable separation between towns, inhibits an effective nation-wide grid, or system of delivering electricity.

Three unconnected electricity grids currently operate:

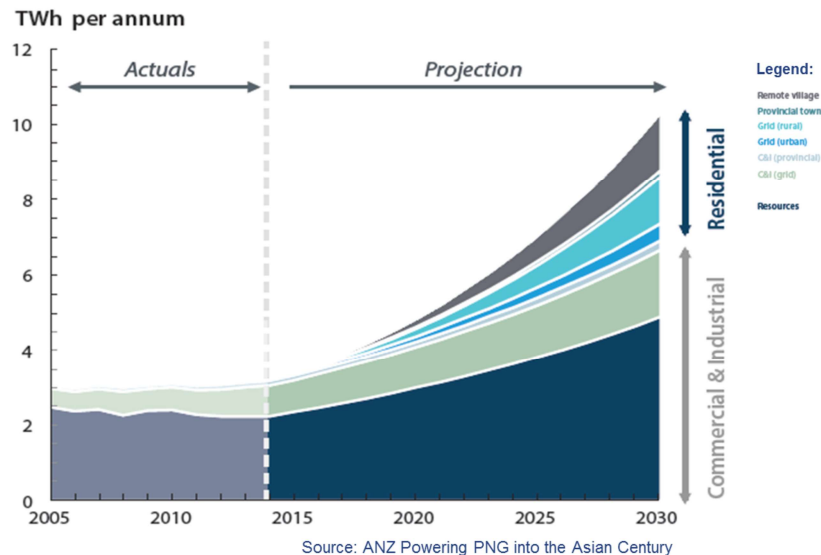
- 1) The Port Moresby System, which serves the National Capital District,
- 2) The Gazelle Peninsula System, which is primarily in place to serve the industries of New Britain, and
- 3) The Ramu System, which spans from Lae up into the Highlands.

Much of Papua New Guinea's rural-based population lies beyond the reach of these grids without access to electricity.

Estimates vary on what percentage of the population does have power. At the low end, data suggests that as few as 6% of the total households in PNG have a supply. The World Bank's data includes households that are electrified through other means (privately owned facilities), and puts the estimate of PNG's access to electricity at around 18% of the population. This is among the lowest access in the world and below those in many other developing countries.

Those lucky enough to get a supply are challenged with one of the highest electricity prices in the world. High prices and low uptake are not good ingredients for feeding PNG's growth needs.

PNG Future Power Requirements



PNG Update Powering PNG

4

Improving Papua New Guinea's electricity access and service is widely understood to be one of the country's key infrastructure and social challenges.

The PNG Government recognises the importance of quality health, education and law and order improvements to the nation, and actively supports initiatives for their improvement.

Increased access to power makes significant differences in these areas. For instance:

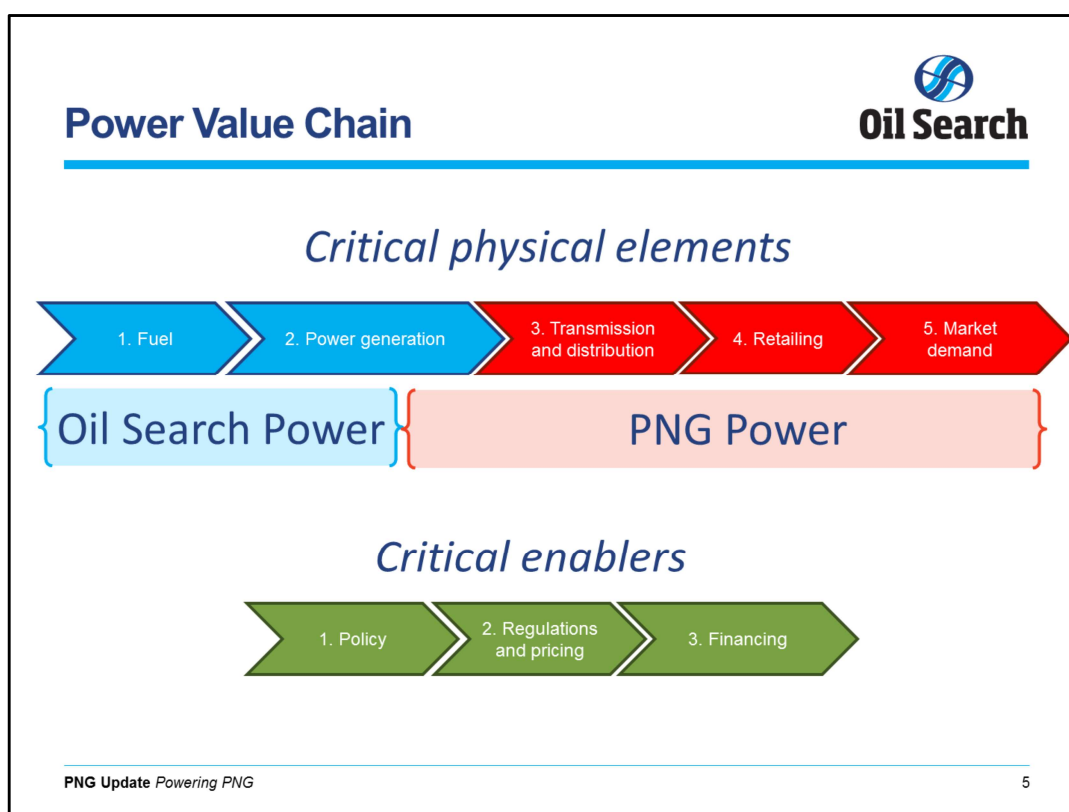
- Electricity enables quality of life improvement, technology options and improves communication.
- Children and students can study in the evenings.
- Foods and medicines can be refrigerated.
- Villagers (in particular - women) are relieved from the time-consuming drudgery and danger of traveling to gather wood for heating and cooking.
- The list goes on...

Power is fundamental to development, and underpins activities which raise the living standards for those who can support the nation's growth.

PNG's growth ambitions, however, will require power, and a lot of it. According to an ANZ Insight Report "Powering PNG into the Asian Century", a staggering tripling of supply is needed to meet PNG's development goals.

[Seeking solutions]

The PNG Government is therefore seeking solutions that substantially improve the population's access to electricity, the reliability of the supply and to reduce its cost. Their ambition is to increase the consumer base of electricity to 70% by 2030. To make this happen the country requires domestic power solutions that are scalable, reliable and that deliver competitively priced energy.



So how does the power business work. We refer to the power value chain, a chain where every link has to be strong if it is to work efficiently.

[A strong power value chain]

While Oil Search principally operates and invests significant funds in the fuel and generation elements of the value chain – we need to have confidence that the chain will not break elsewhere. We therefore need to work closely with PPL to understand the challenges that they face in transmission, retailing and market management. We know from our own experience that managing a profitable business in the remote parts of the country is not easy and we have to be prepared to help them manage their challenges so that they can be successful and make the chain as strong as it can be.

[Building counterpart capacity]

So, we want to see PNG Power develop their capacity and to become a strong counterpart on the chain. While there is understandable frustration with system problems, stripping PNG Power of their revenue earning generation assets may not be the best strategy – partnering, reinvesting and helping make their generation businesses and the rest of the chain profitable will result in a better outcome for the State – one that substantially reduces the need for State backing.

[Generation Capacity not the most pressing issue]

PNG actually has enough generating capacity for current demand, reliability of existing facilities and the network needs to be improved and significant effort needs to be invested in growing demand. Fundamentally, the core business of putting consumers on the grid needs to be viable. Policy decisions on how to best accommodate future generation for uncertain growth in demand need to be made with PNG Power rather than around them to defuse the confusion caused by the multiple sponsorship of large competing concepts at the political level with expectations that PPL are no more than an implementer.

[Viability Of Consumer Connections]

The key risk that we see is around the cost and revenue and therefore the viability of remote consumer connections. What looks like an issue with viability, understandably results in conservatism by PNG Power when they try to minimise business losses.

A combination of strong parties in the value chain, sensible and coordinated policy, regulations and pricing that support financing for power solutions that result in the lowest power price outcomes for PNG consumers and industry. This has to be the goal and all stakeholders in the power sector should examine how they can contribute to this outcome.

What Can Oil Search Do?



So what is Oil Search doing in the power space and how can it help?

[Capability]

Oil Search has made a very successful business in PNG on the back of exporting oil and gas. We believe that you can't export wealth without trying to help create it domestically. Oil Search's future and PNG's domestic development are inextricably linked. In recent times, Oil Search has started to offer its capability to help nation building. We have a charitable foundation that works closely with Government and donors to provide a range of health services across the country. We have recently managed some of the key government funded infrastructure projects. We do this with no corporate gain. It is a way that we can give back to the country, develop relationships outside of our immediate industry and enhance our reputation. We know how to manage and control high value projects in difficult locations under difficult circumstances with integrity.

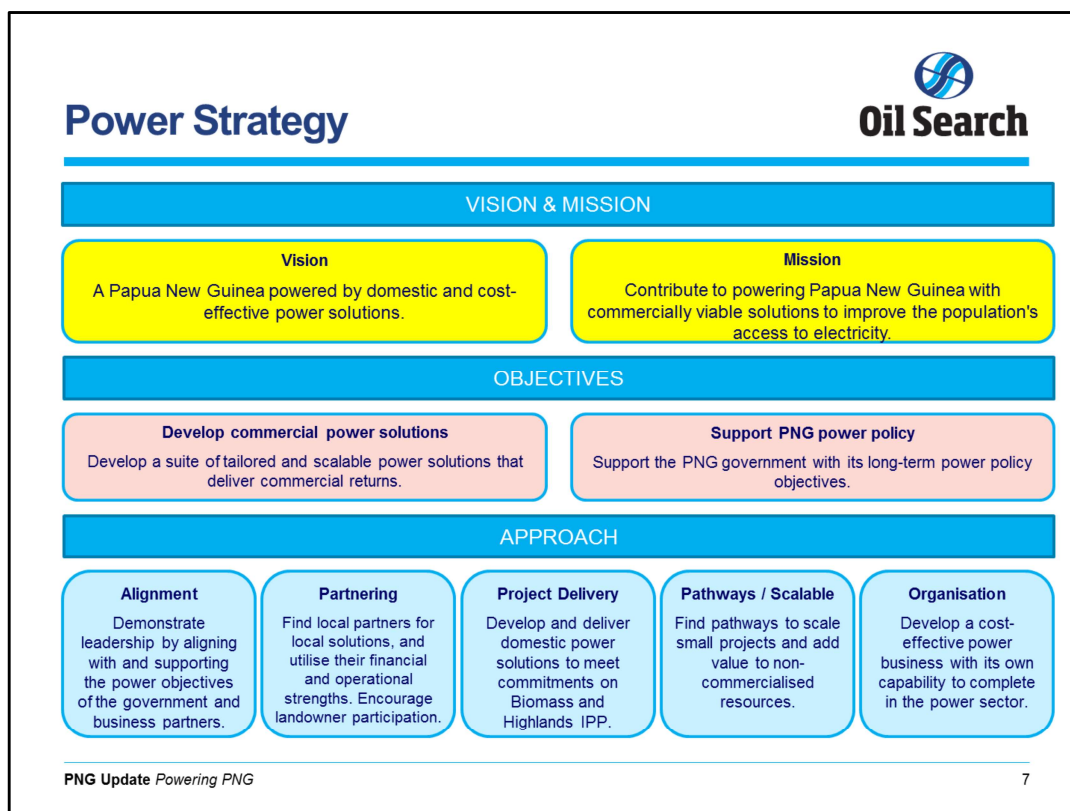
[Creating solutions]

As PNG's largest company, Oil Search is committed to bringing positive, future-oriented change to PNG. So Oil Search's establishment of a new power business has been a strategic and rational move. It demonstrates our commitment to the long-term development of PNG and its citizens by supporting the Government's key development priorities. We intend to leverage our local knowledge, project management and operational expertise together with our understanding of PNG sourced fuels to help the development of the power sector.

[Oil Search in power sector]

Oil Search already operates in the power sector. Our operation at Hides has been supplying gas to generate electricity for the Porgera Gold Mine since 1998. In addition, we operate up to 17 megawatts of our own gas and diesel generation within the oil fields. We are now supporting PNG Power Limited to deliver 24x7 diesel generation in Tari and are in the process of helping them with maintenance contracts for that facility.

Oil Search has also been working on developing the potential of the PNG Biomass Power Project in Markham Valley. In December 2015, we signed a Power Purchase Agreement with PNG Power Limited to provide up to 30 megawatts of reliable and renewable, biomass-fired, baseload power for the Ramu grid, with deliveries commencing in 2019. A similar Power Purchase Agreement was signed for the Highlands, where a study is underway to determine the optimum location for cost-effective gas fired power generation and high voltage transmission.



A business needs to understand where it is, where it is going and how it is going to get there.

Our vision sees us working towards creating a Papua New Guinea powered by domestic and cost-effective energy solutions.

And our mission is to contribute to powering PNG with commercially viable and scalable solutions to improve the population's access to electricity.

We have two simple objectives:

- To develop a suite of tailored and scalable power solutions that deliver commercial returns.
- And to Support the PNG government with its long-term power policy objectives.

We intend to achieve our objectives through five core strategies

Alignment:

- PNG is a tough place to operate – you need to try and align objectives with business partners – working against each other makes the tough impossible
- Working with PPL, there is no-one who knows better how to manage and develop the network
- Good analysis of needs from external experts –we need to refine and implement the plans that exist rather than ignoring them to create something new

Partnering:

- We need local partners for local solutions – project partners need financial and operating strength, we want to include landowner participation
- Kumul Petroleum Holdings are an important stakeholder – we have similar upstream participation, they are the State nominee, they want to develop capability downstream in support of government

Project Delivery:

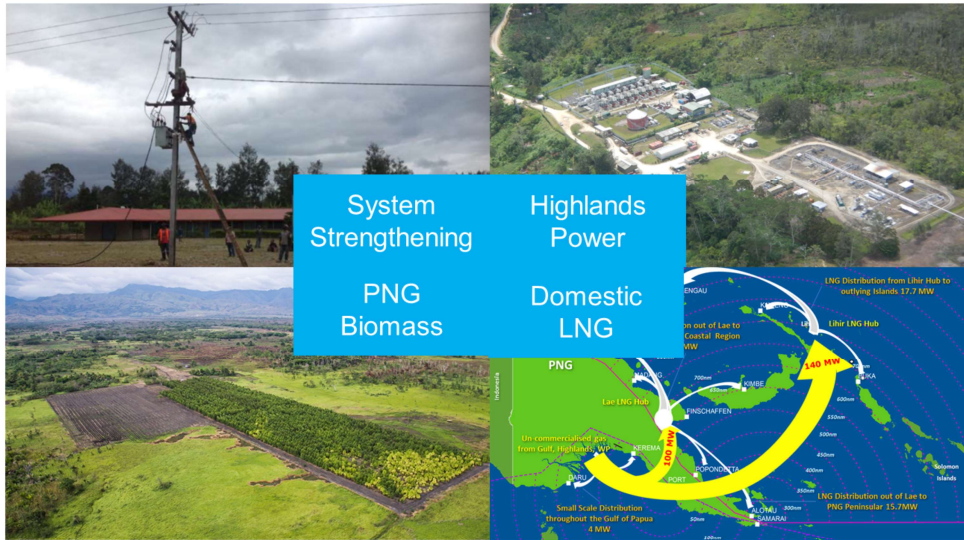
- We can leverage our existing track record of development and delivery
- Meet our commitments on our PPA's for Biomass and Highlands power
- We should promote the sponsorship and pursuit of sensible concepts that result in lowest cost power

Pathways / Scalability:

- We will focus on finding markets for domestically produced fuels
- Our small projects can become pathways to greater opportunity
- We can add value to our discovered but non-commercialised resources

Organisation:

- An Industry specific and fit for purpose management system and governance – this is not the oil and gas business
- Power businesses need to be very cost competitive
- We can create options for the potential for entry of other PNG investors



So I've talked a lot about the background, now for some detail on what we are doing

1. Strengthening systems
2. PNG Biomass Power Project
3. Highlands Power Project
4. Domestic LNG

Small Changes In Tari?



Tari is our home town. We have worked there for many years, we are friends and neighbours and have watched and supported many efforts over the years to try and get better services into the town. Sadly, those previous initiatives have not generally worked.

Last year we decided to get more involved and donated a 1 MW generator to the PPL Tari Compound. We also decided to provide them with fuel at a very competitive cost relative to the expensive local diesel. We have partnered with PPL to ensure that the generating equipment gets proper maintenance and recently we are performing a hook up trial of 100 houses with PPL to assess the viability of the retail part of the value chain. Our intent is to learn about the viability of business in remote locations and to understand and communicate the challenges supported by good quality data and analysis.

Like Port Moresby, change is evident, improved health services and reliable power will change people's lives.

Highlands Power Project



- » The construction of an initial 2 MW gas-fired power project located near Hides in the Hela Province – potential to scale to over 60MW
- » Tie in a transmission line from the Oil Search Hides Gas-to-Electricity Processing Plant to the Tari Power Station

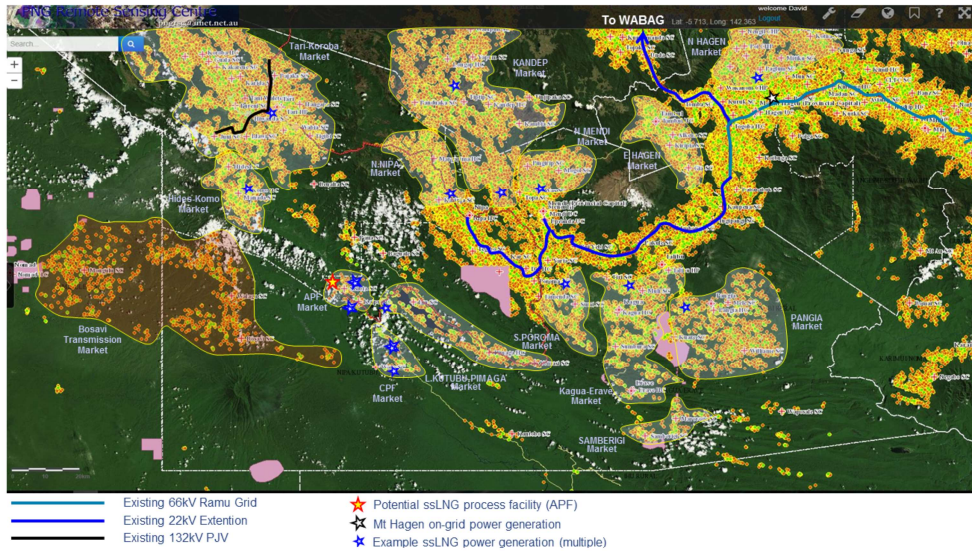


As Hela grows, the Tari compound will eventually reach its limits of output capacity. Oil Search has signed an PPA with PNG Power to provide for future growth in power beyond those limits.

The concept is this: the Highlands IPP aims to source fuel locally, to leverage existing infrastructure to provide power onto the PNG Power network at Tari. Alternatively, where PPL does not have grid infrastructure, Oil Search is looking at an alternative mobile fuel to provide a lower cost solution for offgrid locations. Oil Search is interested to work with all stakeholders to find the lowest cost solution for power prices for consumers regardless of where the fuel comes from. We do not believe that we should be pushing our solutions if they are not the most competitive and provide the lowest power price outcomes.

The current plan is for construction of an initial 2 MW gas-fired power project, with potential to ramp up to 65 MW, located near Hides in the Hela Province. This project will source gas initially from the Hides gas field. The IPP includes installation of a 45 km transmission line from the Oil Search Hides Gas-to-Electricity Processing Plant to the Tari Power Station which will be constructed, operated and maintained by PPL and PPL's selected third party. The late life higher generation capacity will require installation of an export power line from Tari to tie in to the Ramu Grid. Discussions are ongoing regarding how and when that transmission infrastructure will be implemented.

Highlands Integrated Power



PNG Update Powering PNG

11

We have been collecting population data for some time

A Large proportion of PNG's potential electricity consumers live in proximity to the Ramu Grid

approx. 2.3 million people live within 10km of the Ramu Grid
and approx. 3.0 million people live within 20km of the Ramu Grid

Initial demand from these customers is likely to be relatively low and slow to build: in the region of 70MW per million connections

Options for power for these potential customers include on-grid generation exported from Tari area or elsewhere and mini grids using small scale LNG or other technologies.

Under an alliance agreement that was signed in 2016 with PPL, Oil Search will continue to evaluate and progress optimal power solutions for future highlands needs

Markham Valley Biomass



PNG Update Powering PNG

12

The PNG Biomass Power Project in Markham Valley is a 100% Oil Search owned renewable energy initiative to provide up to 30MW of power into the Ramu grid.

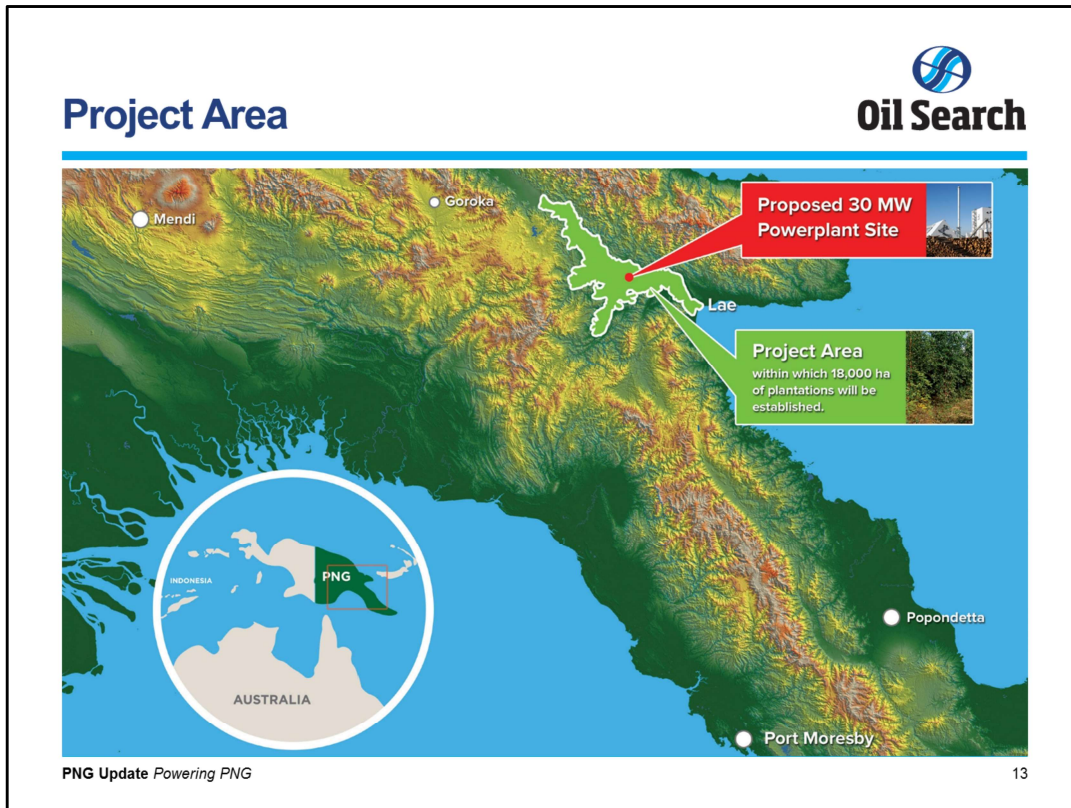
After years of planning and early development – including significant investments on feasibility studies, nursery development, plantation trials, plantation establishment and landowner engagement, with the involvement of world experts on sustainable biomass development – Oil Search announced in mid-2016 that it had acquired full ownership of the Project and had committed to Front End Engineering and Design (FEED).

FEED is targeted to be completed by mid-2017 and is expected to cost approximately US\$15 million. FEED activities will focus on refining the technical and commercial aspects of the Biomass Project to support a Final Investment Decision, which is expected to be made before the end of 2017.

The Project is supported by a 25-year Power Purchase Agreement (PPA) that was signed with PNG Power Limited (PPL) in December 2015. Under the PPA, Oil Search's Biomass Power Project will generate up to 30 megawatts (MW) of renewable, biomass-fired, reliable baseload power for the Ramu grid, with deliveries commencing in 2019.

The Biomass Power Project presents one of the most exciting clean, renewable and sustainable energy initiatives in PNG's history. Oil Search is proud to be driving this exciting power initiative, which will not only enhance generation capacity on the Ramu grid, but will also contribute to the well-being of local communities, create opportunities for future generations and enhance energy independence for PNG without compromising the country's pristine and unique environment.

It will be an iconic renewable energy project that substantially enhances PNG's reputation and international standing – leading undoubtedly to greater interest and investment in PNG.

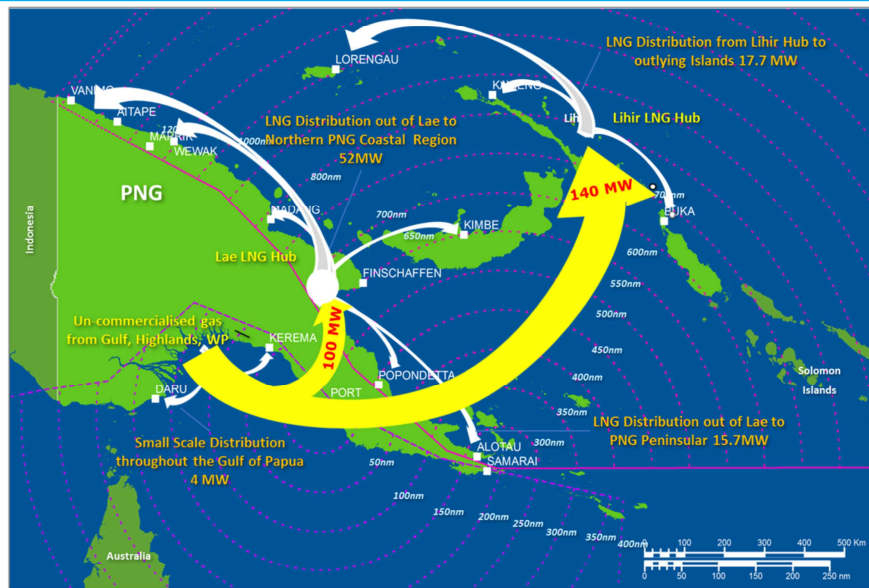


The Markham Valley is an area which is highly suitable for biomass power generation due to its rainfall and proximity to existing infrastructure.

The environmental conditions enable a guaranteed fibre (woody-biomass fuel) supply provided by large scale, specially planted and sustainably managed plantations, located in close proximity to the power plant. By establishing the plantations only on degraded and underutilised Kunai grasslands and grasslands invaded by exotic invasive woody-weed species (such as rain tree), the Project is ensuring it will not contribute to deforestation in PNG. The plantations convert Kunai grasslands into a multiple-use agricultural system that allows for intercropping by local landowners. In addition to the trees, the plantations allow for agricultural intercropping on the same site in the first year and grazing cattle after 18 to 24 months. There are also opportunities for honey production and ongoing cropping on the fire breaks and plantation edges.

The Project uses an integrated approach: the fuel producing project (the plantation) and the power plant are both owned and operated by Oil Search's power business. The power will be generated by a conventional thermal steam plant that employs standard boiler and steam turbine technology, widely and successfully deployed in most biomass power plants around the world.

Domestic LNG Concept



PNG Update Powering PNG

14

LNG has become part of the vocabulary in PNG however none of its is used domestically. Oil Search has been studying potential domestic use since 2013 including significant investigation of barge mounted LNG and regas for power facilities

The concept involves further appraisal and commercialisation of discovered but undeveloped gas resources from the Gulf, Western Province or Highlands to an LNG barge facility, followed by shipping to two major receiving barge mounted terminals at Lae and Lihir with further breakbulk and small load distribution to regional coastal power locations. The commitment of PNG's principle energy companies could see domestic fuels providing competitively priced domestic power.

The concept provides potential for market growth to West Papua, Northern Territory or South Pacific. The use of spot LNG provides potential acceleration and additional project value.

We consider the project to be technologically feasible but requiring the alignment of the government, the upstream sector and major market customers. There is considerable work to be undertaken to de-risk the commercial aspects of resource identification, sponsor and government alignment and market aggregation. We hope to be able to demonstrate progress towards commercialisation of this project over the coming year or so.

Oil Search is also currently exploring the potential to de-risk this concept with PPL and others through early market capture using PNG produced liquid fuel that is currently being exported to Asia.

Key messages



- Oil Search Power has been mandated to find power solutions in support of government goals for electrification
- The focus is on viable, scalable and competitive solutions that can grow in step with demand and with offtakers ability to commit
- Plans have been developed for three significant solutions with a broad area of impact
- The preference is for domestically sourced solutions working with PNG's major energy companies – building strong partnerships
- Solutions need to be tailored to the geography and timeline diversity of demand
- Solutions need to create local employment opportunities

These are some of the projects that we are working on. Not all will succeed but Oil Search has committed to work with government and others to find potential solutions that support government objectives.

- The focus is on viable, scalable and competitive solutions that can grow in step with demand and with offtakers ability to commit
- Plans have been developed across three broad areas of impact
- The preference is for domestically sourced solutions working with PNG's major energy companies – building strong partnerships
- Solutions need to be tailored to the geography and timeline diversity of demand
- Solutions need to create local employment opportunities

➤ Thankyou once again for the opportunity to explain Oil Search's power strategy – good afternoon.

Disclaimer



While every effort is made to provide accurate and complete information, Oil Search Limited does not warrant that the information in this presentation is free from errors or omissions or is suitable for its intended use. Subject to any terms implied by law which cannot be excluded, Oil Search accepts no responsibility for any loss, damage, cost or expense (whether direct or indirect) incurred by you as a result of any error, omission or misrepresentation in information in this presentation. All information in this presentation is subject to change without notice.

This presentation may contain forward-looking statements which are subject to particular risks associated with the oil and gas industry. Oil Search Limited believes there are reasonable grounds for the expectations on which the statements are based. However, actual outcomes could differ materially due to a range of factors including oil and gas prices, demand for oil, currency fluctuations, drilling results, field performance, the timing of well work-overs and field development, reserves depletion, progress on gas commercialisation and fiscal and other government issues and approvals.