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Potential for Future Petroleum Resource Growth in PNG

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Gas was first discovered by drilling activity in PNG in 1956. However it was almost 60 years before the ExxonMobil operated PNG LNG Project became the first large scale commercialisation of the country's prolific gas resources with export of the first LNG shipment in May 2014. The proven Late Jurassic and Early Cretaceous fluvial-deltaic and Tertiary carbonate reservoirs are prolific petroleum producers. When combined with the high quality liquid-rich nature of the gas and the onshore location this has resulted in Papua New Guinea's LNG projects being some of the lowest cost and most profitable LNG projects globally. The success of the PNG LNG Project and substantial identified existing and yet-to-find gas resources has generated a recent resurgence of exploration interest in PNG as a globally significant LNG supplier.

In 2015 Oil Search undertook a country-wide petroleum prospectivity review using its extensive integrated sub-surface database and in-country knowledge. The key deliverables were firstly a country-wide Common Risk Segment ('CRS') analysis that highlighted under-explored extensions of proven petroleum plays and frontier areas with potential to contain big oil and gas fields, and secondly an estimate of PNG's remaining petroleum prospective resources.

Approximately 4.8 billion barrels of oil equivalent recoverable resources (2P & 2C) have been discovered in PNG to date of which approximately 85% is gas. Oil Search's 2015 assessment determined an additional 7 billion barrels of oil equivalent prospective resource still to be discovered (comprising 40 trillion cubic feet plus 550 million barrels). Pool-size distributions and a country-wide Prospects & Leads inventory suggest discovery is likely of new giant fields of sufficient scale to support future LNG projects.

In 2016 Oil Search embarked on an ambitious program to further quantify the highly prospective under-explored focus regions identified in 2015. This yielded a fully integrated structural, stratigraphic, burial, maturation, migration, uplift and erosion model of PNG's total petroleum system extending from West Papua to the oceanic crust in the eastern Gulf of Papua ~1,500km to the east.

New Mesozoic and Cenozoic lithospheric plate visualisations define the basin setting and boundary conditions for deposition of play elements, including source rock pods and their maturation history. The influence of tectonic events at plate and basin scales has been re-assessed and correlated within a country-wide revised PNG chrono-stratigraphy. The new chrono-stratigraphy defines regionally mappable stratigraphic sequences and flooding events and whether these are exacerbated or subdued by Global sea level events.

The extensive Base-Tertiary Mega-Sequence Boundary mappable over the entire onshore, shallow and deepwater region has been investigated to constrain the distribution and maturity of Mesozoic source rocks. In excess of 125 1D basin burial models have been completed and along with restored 2D structural and stratigraphic cross sections, have contributed to a new regional

petroleum charge model of the Foldbelts, Foreland and Offshore regions. It is concluded that petroleum was generated during Late Cretaceous times in parts of interior PNG substantially pre-dating the foldbelt. In other areas petroleum was generated during foldbelt formation near the present day mountain front where it continues to be generated at the present day.

A new holistic 4D charge model is presented here. It explains why young traps both at, and hindwards, of the present day frontal mountain monocline have been charged despite some foldbelt oil and gas fields residing in traps either too young to have received pre-Tertiary petroleum charge or having no obvious communication with recently generating source kitchens.

Speaker Biography

Dr John Warburton holds a PhD in Structural Geology from Swansea University. He has 33 years of international petroleum industry experience mostly with BP, Lasmco/Eni and Oil Search. He is Chief Geoscientist at Oil Search Ltd with responsibility for the Geoscience Function and the exploration planning & portfolio team. John is an Independent Non-Executive Director of Senex Energy Ltd, Non-Executive Director and former Chief Executive Officer of Imperial Oil & Gas Ltd, and serves on the External Advisory Board for Petroleum Engineering & Geoscience at the University of Leeds. John is a Fellow of the Geological Society of London and a Member of the Australian Institute of Company Directors