

Bayu-Undan – Full Field Reservoir Modeling in a Re-Cycled Gas Reservoir

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The Bayu-Undan Field lies in the Timor Sea to the NW of Australia and is a world scale retrograde gas-condensate accumulation. Bayu-Undan produces 1 bcf/day of raw gas and 110,000 bpd of liquids. Up to 950 MMscf/day of lean gas is re-injected into 4 wells. Partial gas export to the Darwin LNG plant commenced in 2006. Following the plant ramp up, LNG exports will be about 3 million tonnes per annum (Mtpa).

Initial development drilling at Bayu-Undan proved challenging, with significant changes to the field development plan required. Reservoir modelling and the analysis of early key performance data were critical to successfully changing the development plan. The main changes were the implementation of big bore wells, semi-open-hole completions and changes to the bottom-hole locations. The early acquisition of performance data including bottom-hole pressures provided an insight into the expected dynamic behavior. The Bayu Undan reservoir simulation model has been history matched based on a theory of conductive faults. A fault damage zone analysis has been performed leading to an enhanced permeability system associated with certain fault directions.

To maximise recovery and sustain the current rate many challenges exist requiring effective reservoir management. The main challenges relating to maximizing Net Present Value (NPV) of the Bayu-Undan field are: (1) maximization of the sweep efficiency and management of premature lean gas breakthrough due to high permeability conduits, (2) total injection capacity of recycled gas, and (3) delay of water breakthrough.