The Wayang Windu Geothermal Power Plant, West Java

- Star Energy Profile
- Wayang Windu - Lessons Learned after 10 years of operation
- Exploration in Jailolo, Eastern Indonesia
Star Energy Group Companies

- Privately held
- Majority Indonesian Ownership

Oil & Gas Businesses
- Kakap
- Sekayu
- Sebatik
- Banyumas

Geothermal Businesses
- Wayang Windu
- Jailolo
Locations of Operations

- Kakap PSC.
- Sebatik PSC.
- Sekayu PSC.
- Wayang Windu
- Banyumas PSC.
- Jaiolo

LOCATION MAP
Case Study:
Wayang Windu Geothermal Power Plant

Key Facts:

- Energy Sales Contract with National Electricity Authority for 400MWe, term of 30 years per Generating Unit, Base load operation;
- Concession area 12,960 Hectares (50 sq miles)
- Existing Net Production 225 MWe with two identical turbine/generator Units.
Strategic Characteristics

- Dedicated Geothermal Group within the company
- All aspects of development are covered – identification of potential, exploration, development, operation
- Dedicated project management group
- No manufacturing capability, hence able to search for the best in the marketplace
- Specialist consultants at all stages of development if required
- Peer review of all key decisions
- Long term staff commitment
- Focus on safety, efficiency, continuous improvement – reward performance
- Strong support from shareholders who understand the risks
- Strong focus on training and career development to attract, develop and retain staff
Development Phases

- Unit 1, 110MWe – commercial operation June 2000, development cost approx $400M (undertaken by previous Developer) – then taken over by Banks
- Unit 2, 117MWe – commercial operation March 2009, development cost $210M
- Unit 3, 127MWe – planned commercial operation 2014, development budget $285M
- Unit 4 dependent on confirmation of reserves – to complete 400MWe
- Unit 5 & beyond – if reserves are confirmed.
Key Values and Goals

- Environmental Excellence
- Zero Harm
- Optimum performance

First Step – Establishment of a Business-wide Management System based on these values

- 2004 – Star Energy acquired Wayang Windu
- 2006 – Full implementation of the WWMS
- 2007 – Certification to ISO 14001
- 2008 – Certification to OSHAS 18001
- 2009 – Focus on Staff health and safety at work
- 2010 – Focus on Community and CSR
- 2011 - Focus on Energy Efficiency
Environmental Excellence

- Registration of Management System to ISO 14001;
- Continual improvement to meet international standards;
- Audited to Equator Principles as a requirement of development funding;
- Top ranking in national environmental & CSR audit, 2008;
- Registration of Unit 2 development for carbon credits.
- Issued first Sustainability Report in 2010
Zero Harm

- Extend Management System to achieve certification to OSHAS18001;
- Programs to reduce accidents in the work place, particularly with contractors;
- Introduction of mandatory contractor standards and pre-contract screening;
- Extensive work with the community, development of “SHE Passport”;
- Residential staff, encourage exercise, stop smoking, advice on nutrition.
Optimum Performance

- Long term availability >97%; Capacity Factor near 100%;
- O&M by permanent staff, operating cost approx 1.3c/kWh;
- Staff incentivized to achieve good performance;
- Safety is top priority; >2.7M manhours without lost-time accident.
Long term reliability

- Initial focus on following manufacturers’ SOPs;
- Gathering of key data and identification of critical plant/components;
- Long term involvement of OEMs;
- Identification of alternative key maintenance partners;
- Computer based scheduling of tasks, inventory control, trend analysis with plant-wide data;
- Predictive and preventative maintenance, new KPIs;
- Use of up-to-date techniques, vibration monitoring, thermal imaging, ultrasonic diagnosis;
- Upgrade of staff skills and general education, use of computer-based learning, apprentice program;
- Long term optimization of plant.
Personnel Issues

- While Universities have good programs for Geoscience training, there is a serious lack of experienced people in Indonesia to cover all of technical and operational matters.
- Operational training during construction is most beneficial – using permanent staff to perform testing and commissioning duties ensures a sound understanding of all plant & equipment.
- Star Energy has developed a graduate training program to ensure that we have new staff coming through to take the lead in future
- Star Energy has also developed an Apprentice Training Program to ensure that we have good young staff, particularly technical disciplines, coming through for future needs – covers all technical aspects of our activity.
Drilling

2010 – RMI Rig

2007 – Apexindo Rig
MBD well pad showing four production wells
Operator Adjusting Secondary Valve

Main Step-up Transformer
Installation of Unit 2 Rotor

Installation of Unit 2 Turbine
Turbine during Maintenance Inspection
Unit 3 and Beyond
Steam pipes to Power Station
Distributed Control System
Power Plant, Cooling Tower and PLN Switchyard
Halmahera
Jailolo Concession
Exploration Phase

- Jailolo Geothermal Concession awarded in competitive tender, for up to 70MWe potential
- Exploration undertaken to confirm details of geothermal field and identify potential drilling targets
- Feasibility Study being finalized to confirm viability to supply small local loads and upgrade in future to meeting technical and capacity demands of major mining exploitations.
- Funding for Feasibility Study from USTDA to encourage US industry involvement
Drilling Plan & Conceptual Model
Development Concept

- Commence drilling early 2012
- Initial development of small power station at Jailolo to feed local load, 2 x 5MWe by 2014
- Confirmation of additional resource area to north of existing concession
- Development of up to 200MWe in stages to feed mining developments which are currently being established
- Scope will include generation & transmission development
Corporate Social Responsibility Program
Community Relation Concepts

Programs at Wayang Windu focus on three major areas:

- Education Assistance,
- Economic Empowerment Program incl. a new micro-finance program,
- Infrastructure & Environment incl. reforestation projects.
Community Relations

- Financial assistance with medical treatment, cleft palate etc.
- Support in case of emergency such as earthquake
- Financial support for local residents in need.
Income Generation

- Arabica Coffee Development
- Development of Silk Worms
- Provision of dairy cows and milking shed.
Thank You