



Solar Beam Pumps – Lessons Learnt

Stage 2B – 34 Beam Pumps

December 2021

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Lead organisation: Santos Limited		
Project name: Conversion of Remote Crude Oil Pumps to Solar & Battery Project		
ARENA Project Page: https://arena.gov.au/projects/conversion-of-remote-crude-oil-beam-pumps/		
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Contact name:	Chad Wilson	
Position in organisation:	Energy Solutions Manager	
Email:	Chad.Wilson@santos.com	Phone: +61 8 8116 7921

Lessons Learnt

Lesson Learnt 1: Weather and Site Considerations

Category:	Construction and Logistics
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Summer months presents hot (>35°C) and wet weather in the Cooper basin. This delayed installation progress by restricting access to the lease sites when dirt roads were wet. Heat was managed through breaks and utilising air-conditioned battery containers. Ideally installation times would be executed from April to October to avoid heat and wet weather implications.

Unstable road conditions to the implementation site resulted in damage to the solar PV panels and battery units. This resulted in the units having to be disassembled/reassembled prior to transport, increasing transport time. Transporting at very low speeds and detouring to bitumen roads when available was found to be more time effective and was implemented for the remaining installations.

Lesson Learnt 2: Load Requirements

Category:	Technical
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Some units are now found to be undersized due to increased loads during well life maturity, resulting in having to switch to genset to meet load requirements. Gensets are not designed to start and stop in short timeframes and would sometimes fail on start up. It is recommended to design the systems to be expansion ready, with modular plug and play options to expand or contract the renewable energy capacity to match each stage in the well's life. Systems may also be relocated to lower load intensive wells when no longer useful on current well.

Cyclic loading during the beam pump operation was poorly understood during the first six installations, resulting in under sizing. It is recommended to ensure installation is sized to cope with both the peak demand (while lifting counterweight) and consistent load changes.



Photo 1: Stimpee-1 installation Cooper Basin

Lesson Learnt 3: Multiple Designs

Category:	Technical
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Multiple standard designs during both Phase 1 and 2, increased the complexity around campaigning maintenance, design optimisation and source reliability issues. In future projects it is recommended that after initial trials, that the number of standard designs are minimised by providing clear scope in the EPC contract for a set number of final designs.

The ABB battery designs were also found to be complex for the rural environment. The complexity resulted in several alarms triggering at once. This made it hard to determine the cause of battery faults. A simpler design would improve maintenance times and root cause analyses.

Lesson Learnt 4: Maintenance

Category:	Contract
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The EPC contract signed requires AGL to conduct all hardware maintenance to retain the unit warrantee, which delayed remediations due to the site's remoteness. It is recommended to ensure that the contract allows operator maintenance for non-complex faults to increase renewable system availability. These operators are closer to the installation site and will be able to resolve issues more quickly.

Spares list was kept by AGL, restricting the ability to conduct simple repairs. Including a spares list as a requirement in the contract would ensure they are documented during installation.