Project Description

Background

Winton Shire Council (WSC or ‘Council’) is developing a Geothermal Power Plant to ensure reliable and affordable power to the community. PEAK SERVICES is managing the project on behalf of Council. The power plant will generate electricity by utilising the heat extracted from the existing bore (Town bore No.4) which supplies potable water supply to the township. Currently, water is drawn from the Great Artesian Basin (GAB) at 86 °C and the Council utilises heat exchangers to cool the flow from Bore No.4 prior to reticulation for community supply. The geothermal power project will functionally replace the existing heat exchangers with more efficient modules to facilitate conversion of the rejected heat into electricity. The project does not require any drilling or any modifications/additions to the existing bore head, pad or water allocation. All generation and cooling equipment will be located downstream from the existing bore infrastructure. The Department of Natural Resource and Mines (DNRM) has approved the use of the site and allocation for this purpose (attached).

This geothermal project is entirely owned and funded by the Winton Shire Council. As the project manager, LGE Operating Company Pty Ltd (trading as “Peak Services”) has received an approved Exploration Permit for 17 sub-blocks under EPG104 from DNRM and we are now seeking a Production Lease for only one sub-block (Sub-block ‘S’ under block CLON 2077). Peak Services had a pre-lodge meeting with the Department of Environment and Heritage Protection (DEHP) on 24 July 2017 to discuss the Environmental Authority (EA) for the Geothermal Lease.

Technology and Technical Expertise

Geothermal Technology

Unlike other renewable energy sources, geothermal energy generation can provide a continuous constant output irrespective of weather and seasonal variations. The technology to generate electricity from low temperature bores has been proven feasible and reliable across the world, however, it will be first grid-connected geothermal power generation in Queensland. Peak Services has completed several high-level reviews and partnered with the University of Queensland Geothermal Energy Centre of Excellence (UQGECE) to undertake a thorough study for geothermal energy in Queensland to prove suitability of this technology. To generate electricity from GAB bore at Winton (Town Bore No 4), this project includes the construction of a cooling tower and two Organic Rankine Cycle (ORC) generators. Figure 1 shows the typical schematic layout of the plant.
Figure 1: Typical ORC Plant Layout Schematic

Major components of the plant are:

1. Evaporator – Heat transfer to refrigerant
2. Generator – Hot gas spins the turbine to generate electricity
3. Condenser – Gas is cooled down to liquid
4. Cooling Tower – Ensures cooling water at required temperature
5. Electricity distribution connected to assets or behind the meter
6. Town water supply

Figure 2 shows the pipeline connecting the cooling tower to the ORC generators and Figure 3 shows the graphical side view of the geothermal infrastructure. The two ORC generators will be inside a shed.

Figure 2: Geothermal Plant Infrastructure with Pipeline view
The geothermal plant is located near the Town Bore No 4. The Pipeline shown in figure 3 connects the ORC generator to the bore. The geothermal plant will be wholly within Lot – 113. Winton Shire Council is the trustee of the land (Lot - 113, Plan - AE 95, Title Reference – Res R35 Water Supply) and is in the process of acquiring the freehold interest from the State. The shed containing the ORC generators is approximately 300m2 in area with approximately 70m2 of the land utilised for the cooling towers. Figure 4 below indicates the proposed location of the plant. The existing infrastructure on the site includes an Ergon power transformer, a shed containing three water supply pumps, a switchboard, the existing Town Bore No.4 and an underground pipeline connecting the bore to pump shed. The ORC generators will connect to the existing bore. Some minor trenching is required for underground electricity cables connecting the ORC generators to the existing switchboard behind the pump shed.