

Cost Effective Maintenance to Increase Performance and Reliability in Wayang Windu Geothermal Power Station

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Abstract

This paper explores maintenance management system that has been used by Star Energy Geothermal Wayang Windu Ltd (SEGWL) in Indonesia. It describes the maintenance strategy during previous condition, current condition and future strategy which has been improved time to time in order to aim the best plant availability and reliability for Wayang Windu (WW) geothermal operation with cost effective maintenance. This paper also describes several cases of performance and reliability improvement which subsequently increase electricity generation and reducing maintenance cost. The first case is modification of condenser nozzle and inlet screen of unit 1 cooling tower (CT). The modification of full cone type GCZ nozzle's diameter and fine wire mesh installation which was completed in 2005 improved the condenser performance and stopped the reduction of CW flow caused by fouling. The annual average condenser pressure reduced from 0.13 Bara to 0.11 bara. The average cooling water flow is increased by approximately 3.5%. Furthermore, the improvement in condenser performance increased the average power generation by approximately 2 MW. The second case is replacement of unit 1 CT fan stack with taller fan stack. The fan stack replacement work was completed in Dec 2011. CT performance test reveals data of decreasing of approach temperature as much as 1.44°C, an increasing of range temperature as much as 1.92°C, and increasing of CT effectiveness as much as 5.17%. The impact is equivalent with generation improvement of 1.44 MW. The third case is replacing low reliable cooling tower gearbox with better reliable gearbox and increasing number of fan blades to improve CT performance during CT upgrading project in 2016 till 2017. The low reliable gear reducer has been replaced with the new one, and the thermal performance of the cooling tower has improved. This change make generation improved to about 0.58 MW and increase the revenue to about USD 454.000 per year. In supporting asset management program, several condition monitoring programs to monitor asset performance and condition such as vibration analysis, oil analysis, thermal imaging, ultrasound monitoring, partial discharge analysis etc are also applied to provide important data for deciding proper maintenance strategies with cost effective.