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GROUP REF. : SC B3
PREF. SUBJECT : 3
QUESTION N° : 1

Transpower has adopted an efficiency play where we lease from the service provider, and they install as a package, including a Starlink satellite link and two pan-tilt-zoom (PTZ) high-definition day-night webcams to provide wide area overwatch of the remote site, plus individual inspection and remote capture of Condition Assessment data and incident response from the on-site independent mobile robot. All this functionality is provided as a service, not needing to be hosted or transmitted through our critical Transpower IT and OT systems. Our service providers and control centres can access the imagery via an external isolated, secure web portal.

Performance outcomes are:

Provides an efficient and timely (<15 minutes booting up and getting the robot moving) fault response to the remote site, 24 hours a day. The robot is effectively an extension of fault responder personnel, using the responder's knowledge and experience to view equipment condition and health.

Through a Microsoft Teams feed, engineers and subject matter experts can view and direct the robot and off-site operator as required, enhancing our response.

This has negated NZ\$250k per annum cost of the prior need to have permanent on-site presence of personnel.

An exemplar is the robot has facilitated bi-weekly visual checks of the SF6 gauge associated with CB172 at the Tūai, (Waikaremoana 'sea of rippling waters', North Island) power station interconnection substation to the National Grid. This allowed early routine intervention in the form of top-ups to prevent low alarms and the potential lockout of the breaker, providing assurance to the business and our generation customer.

Savings: Removed total road drive time 87 hrs for scheduled two weekly driving events of 24 in last 12 months

Robotic performance: robot deployed 17 March 2020, with robot caused unavailability 2 days out of 559

CB 172 SF6 Leak Management: This required bus changes that took 12 months to realise before we could provide safe access to the leaking breaker, due to complex planning and design requirements as both Eastland and Waikaremoana generation would be significantly impacted by the works. Work was coordinating with Genesis machine overhauls and careful management of supply to Eastland customers. **Saving of 1.8 tonne CO₂ in total**

The robot now provides fault response and incident investigation time of < 15 minutes, realising a saving of NZ\$250k Previously we required the permanent presence of a maintenance operator, based at Transpower's Tuai GXP before the deployment of the robot. This is supplemented by an agreement negotiated with the Genesis generation operators, based at the power station providing cover for emergency switching, specifically for Eastland. (Eastland own the 110kV circuits to Wairoa and Gisborne, and in an emergency require assurances from TP that the circuit is isolated and earthed).

Site Design inputs & Verification from the comfort of the office saving travel time and cost have been achieved. Microsoft Teams is used in place of site visits to prepare a Solution Study report for the remote operation of earth switches (for instance), removing the need to travel to a remote site. **Saving 290 kg CO₂ per trip**

Other Benefits: Driving is the largest safety issue with personnel exposure reduced by >100 hrs per annum. Once on site other unidentified savings opportunities are being realised, e.g. security patrol, changing grass cutting from scheduled to condition-based identified by a painted line on fences observed via robotic camera,

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