Garbutt Substation Upgrade Project Update

ERGON ENERGY NETWORK
Part of Energy Queensland

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More than meets the eye - Garbutt Substation is transforming

Transforming Garbutt substation

A transformation is taking place inside the new building at Garbutt substation that even Optimus Prime would appreciate! The installation of the gas insulated switchgear (GIS) is now complete, and the cables for the first five 66,000-volt feeders, have been run into the substation and positioned ready to be connected to the GIS – see figure 1.

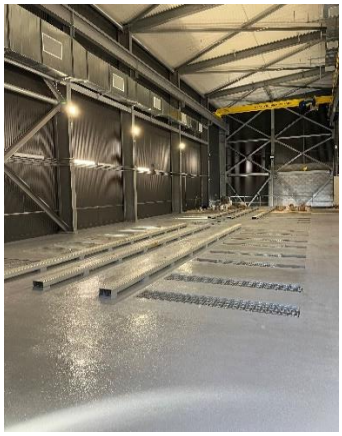

Fig 1 – The transformation inside the Garbutt substation building - the first high voltage cables have been run and the GIS installed.

The first five high voltage feeders being installed at the Garbutt substation will supply electricity to Ergon Energy Network's Hermit Park, Aitkenvale, Bohle, Neil Smith, and Townsville Port substations.

While it takes barely a second to flick the switch that powers our essential items and favourite devices, there's more to 'plugging in' the new Garbutt substation than meets the eye.

It's a complex job that requires a range of specialised crews, including the transmission underground team, who have been on site at the Garbutt substation over recent weeks, connecting the high voltage cables from the substation to the surrounding network. In this update, we have a behind the scenes look at the work they have been doing.

Behind the scenes – high voltage cable connections

With 66,000 volts running through each cable, 'plugging in' a new substation requires meticulous planning and execution to ensure the safety and reliability of your electricity supply.

We start by wrapping the end of each cable in a special blanket that heats the cables to 90°. The cables heat for around 9-10 hours to soften the outer layers of insulation and the cables encased within - see figure 2.

Using a specialised stripping tool, the layers of semi-conductive insulation and shielding are removed, and the exposed end of the cable is cut to ensure the cable end is level and undamaged – see figure 3.

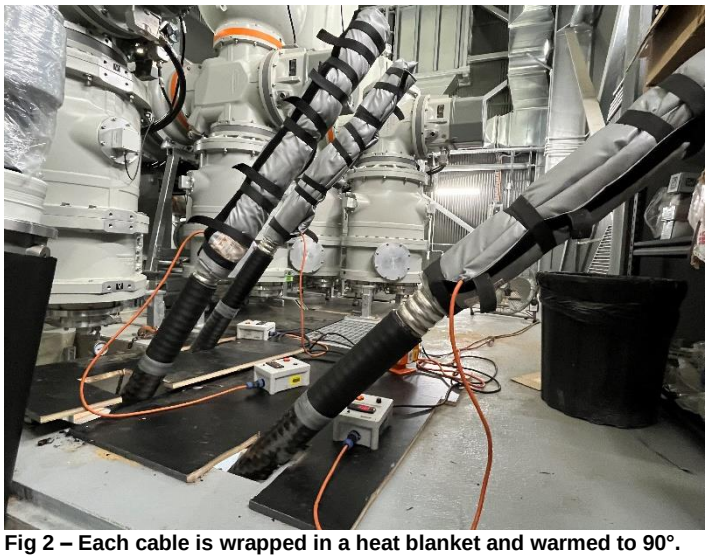

Fig 2 – Each cable is wrapped in a heat blanket and warmed to 90°.

Fig 3 – The insulation is stripped back to reveal the cable.

Once stripped, the team meticulously separates each strand of the conductor, removing the water block material between the strands, and then reassembling and polishing the conductor before the termination kit that connects the cable to the GIS or overhead network can be installed – see figure 4.

Fig 4 – Each wire in the conductor is meticulously separated, water block material removed, cleaned, and reassembled.

The termination kit is then installed on the end of the cable and the heat shrink sleeve readied. The termination head is then ratcheted onto the cable. This specialised termination head connects the cable to the GIS. The heads are sanded and polished once assembled, and then carefully wrapped in plastic, to keep them clean until they are installed in the GIS – see figure 5.

The cables and equipment are cleaned regularly to keep out dust, dirt and other impurities that could affect the electrical transmission and overall cable performance. Much of the work involved in preparing the cable terminations must be done without gloves, so hands and surfaces can be thoroughly cleaned to reduce the chance of contaminant transference.

Fig 5 – Termination kits assembled onto each phase which is cleaned (and cleaned again) and wrapped in gladwrap.

Once assembly is complete, the cables are lowered into the pit and positioned beneath the GIS pot. The GIS chamber pot is degassed and ready to accept the cable termination – see figure 6.

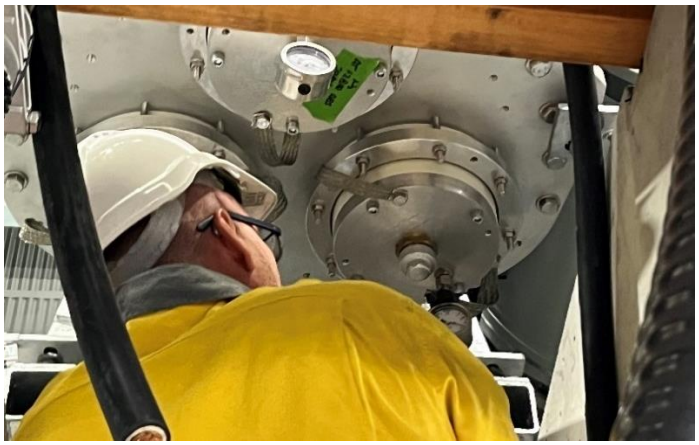

Fig 6 – Ready to degas the GIS pot.

Next, the termination assembly is unwrapped and the polymer head is cleaned (yet again) before grease is applied to the termination and GIS pot – see figure 7.

Fig 7 – Termination positioned below the GIS, cleaned, and greased.

One by one, each of the cables is carefully manoeuvred from the pit below into the GIS unit and secured in place. Finally, the heat wrap is positioned over the termination kit and a heat gun is used to shrink the wrap over the termination, protecting the components of the termination within – see figure 8.

Fig 8 - One by one the phases are manoeuvred into place in the pots and connected to the GIS. Then heat is applied to the heat wrap sealing the termination.

Each of the three phases of the cable are connected to the GIS – see figure 9. They are now ready to be tested and energised by another specialised crew.

Fig 9 – The three phases of a 66kV feeder connected to the GIS.

We're also taking to the skies

While the team inside the substation have been connecting one end of the 66kV cables to the GIS, another specialist transmission underground crew have been outside the substation preparing the other end of the 66kV cables.

Metres in the air atop a scaffold platform - see figure 10 - the team have been busy heating, stripping, and cleaning the cables, before preparing the overhead terminations that connect the high voltage cables to the surrounding electricity network – see figures 11.

Fig 10 – Scaffolding around a pole for 66kV cable termination works.

Fig 11 – Behind the scaffold shroud high in the air the team thoroughly strip the cable, remove water blocker material, and reassemble before greasing the polymer cup and slipping it over the cable in preparation for the final components of the termination kit to be installed.

Each of these 66kV feeders requires three cables which connect the substation to the electricity network. The team have run almost 4,500 metres of cable for the first five feeders.

This meticulous process, requiring extreme dexterity, concentration, and care, has been repeated 30 times in the last couple of weeks to connect the five feeders to the GIS and start to connect them to the surrounding overhead network.

The team will return to complete the process again when the two remaining cables are ready.

Dalrymple Road works.

In late May, civil work commenced in Dalrymple Road to construct two new cable joint bays. These pits are where the underground cables from Garbutt substation join with the underground cables to Belgian Gardens substation, that feeds the eastern suburbs.

Under close supervision, the cables for these feeders are mechanically winched off the cable drum and drawn into the substation – see figure 12. It's a massive operation with each of the cable drums weighing almost 5,000kg and needing a specialist team and equipment to haul them into the substation.

Fig 12 – The 66kV underground cables fed into the substation.

The work, which commenced in late May, is expected to take around 8 weeks to complete.

Getting in touch with us

Want to know more? You can visit our project webpage for more information. You can **register for future project updates by simply scanning the QR code,** or contacting our Senior Community Engagement Advisor, Kate Austin on 1300 653 055 or email us at: NetworkProjectEngagement@energyq.com.au