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MINE ELECTRICAL SAFETY ASSOCIATION INC.

MINING ELECTRICAL SAFETY 2017 CONFERENCE

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PULLMAN KING GEORGE SQUARE HOTEL, BRISBANE

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Achieving Electrical Worker Competence in the QGC Coal Seam Gas assets

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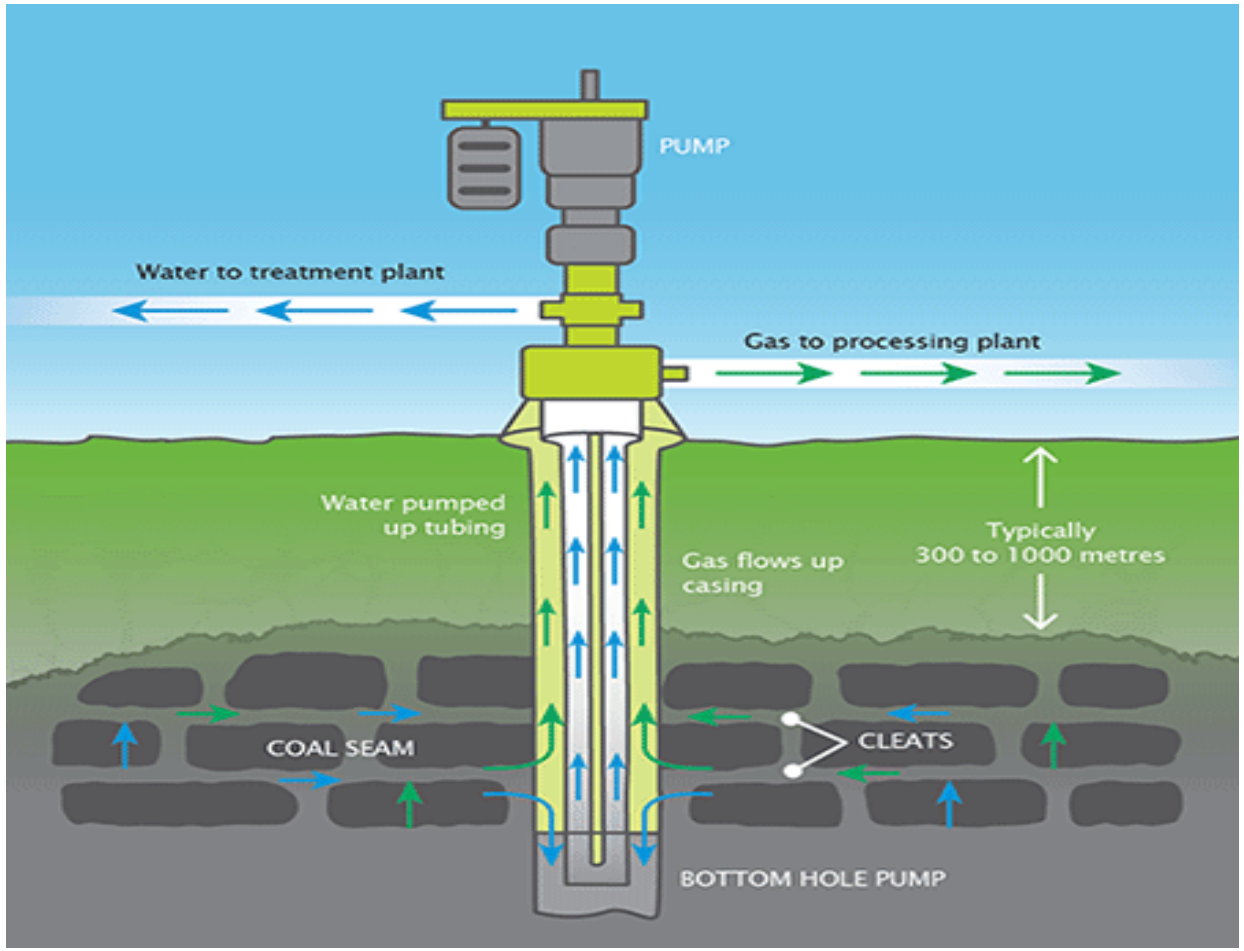
Mining Electrical Safety Conference 2017, Brisbane QLD

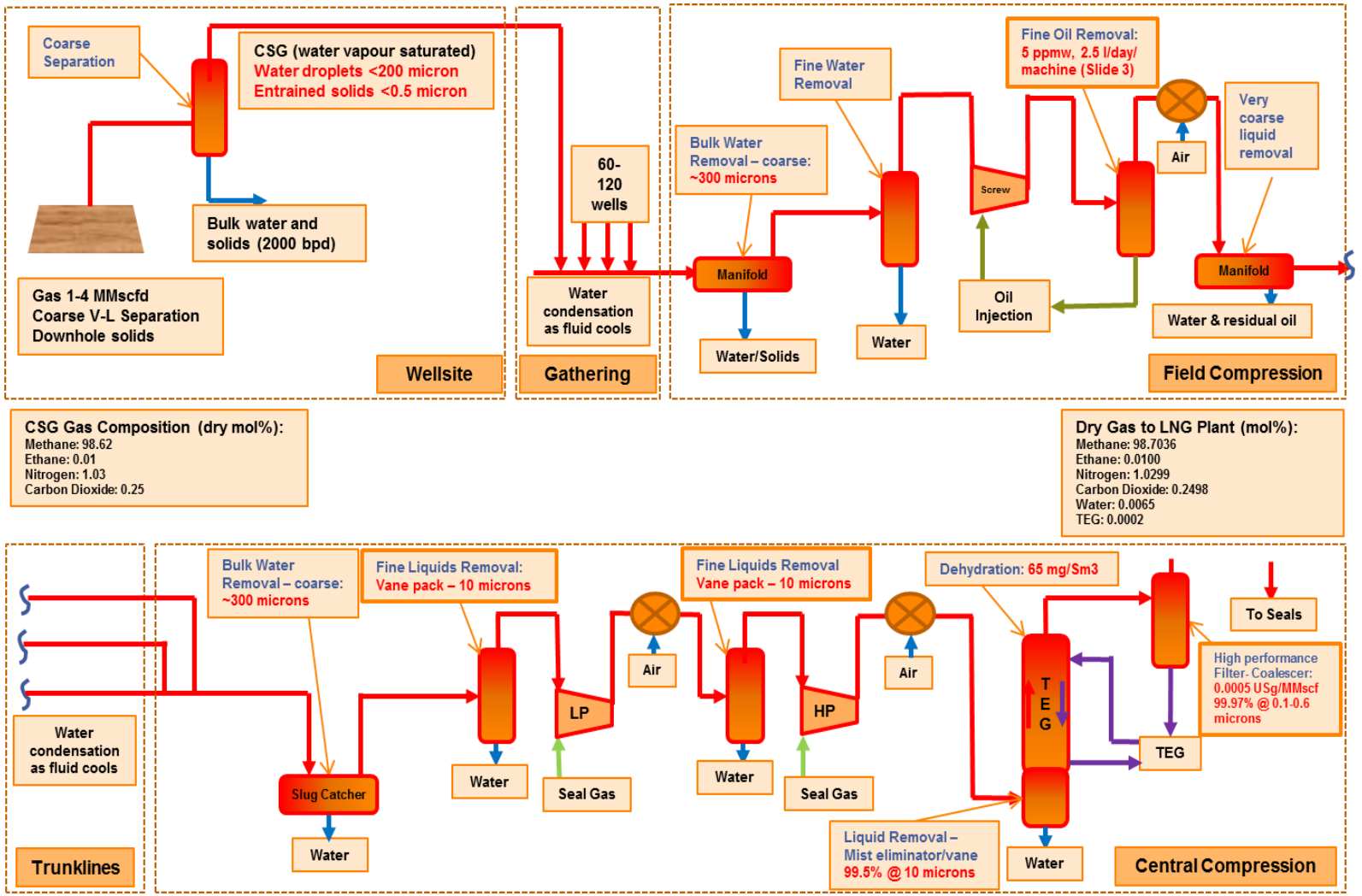
Sim Liew
Lead Electrical Engineer & Technical Authority

Coal Seam Gas to LNG



- Natural gas located in coal seams
- Water pumped from coal seams
- Reduction in pressure of the water releases gas from coal seams
- The CSG to LNG process comprises:
  - Upstream gas extraction at wellheads
  - Water treatment facilities for recovered water
  - Gas compression and transmission infrastructure
  - Liquefaction process at LNG plant

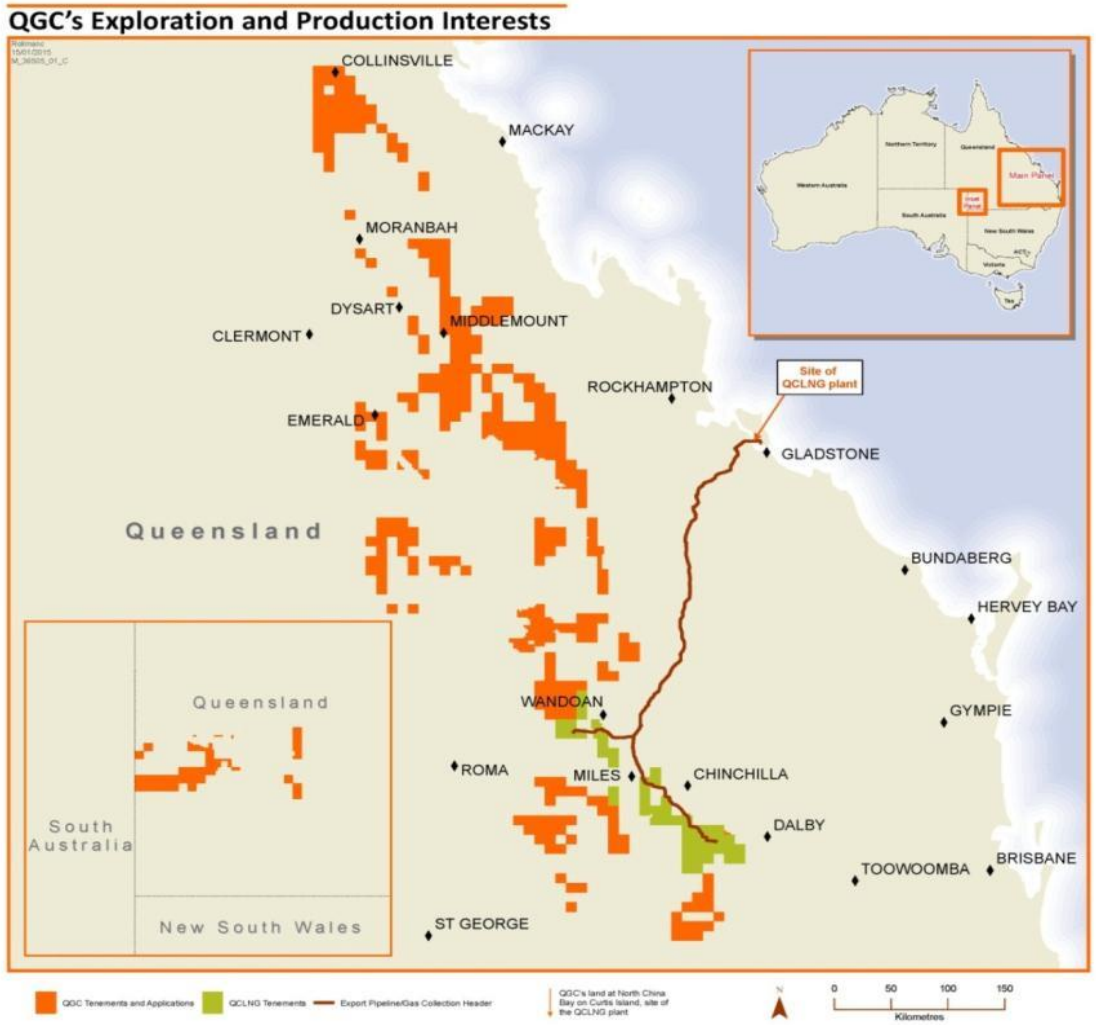
QGC Process Overview



- Majority of the power demand is derived from the HV motors driving the gas compression trains
- Installed motors include:
  - Up to four 6.6kV 3MW at each Field Compression Station
  - Up to three 4.4kV(nom) 25MW at each Central Compression Plant

QGC Tenements and Infrastructure

- QGC has extensive exploration and production interests across Queensland
- The operated tenements – shown in green – cover about 4500 square kilometres in the Surat Basin, west of Brisbane
- The operating asset is subject to the P& G Act, Electrical Safety Act and the Shell HSSE Controls Framework



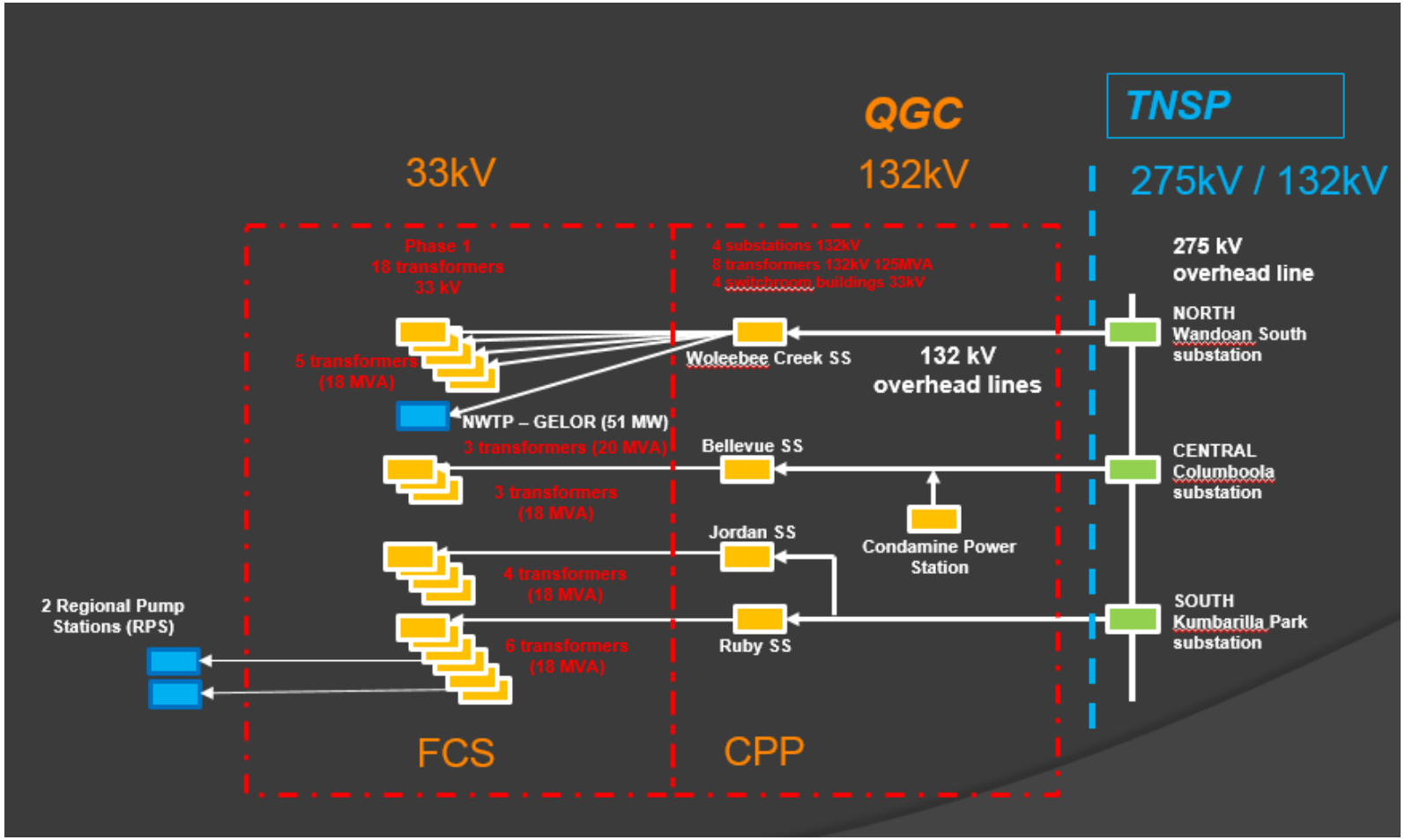
QGC Central Processing Plant

Aerial view of the Bellevue CPP, located approximately 10 km from Miles, off the Warego Highway; comprises:

- 132 kV 125 MVA transformer
- 132 kV Substation
- 33 kV SF6 Switchboard
- 25 MW Variable Speed Drive
- 33/5 kV Four winding VSD transformer
- Filters for 5th, 7th, 11th, and 13th harmonic distortion

Aerial view of the Bellevue CPP, including part of the 132 kV substation on the left

QGC Upstream HV Network

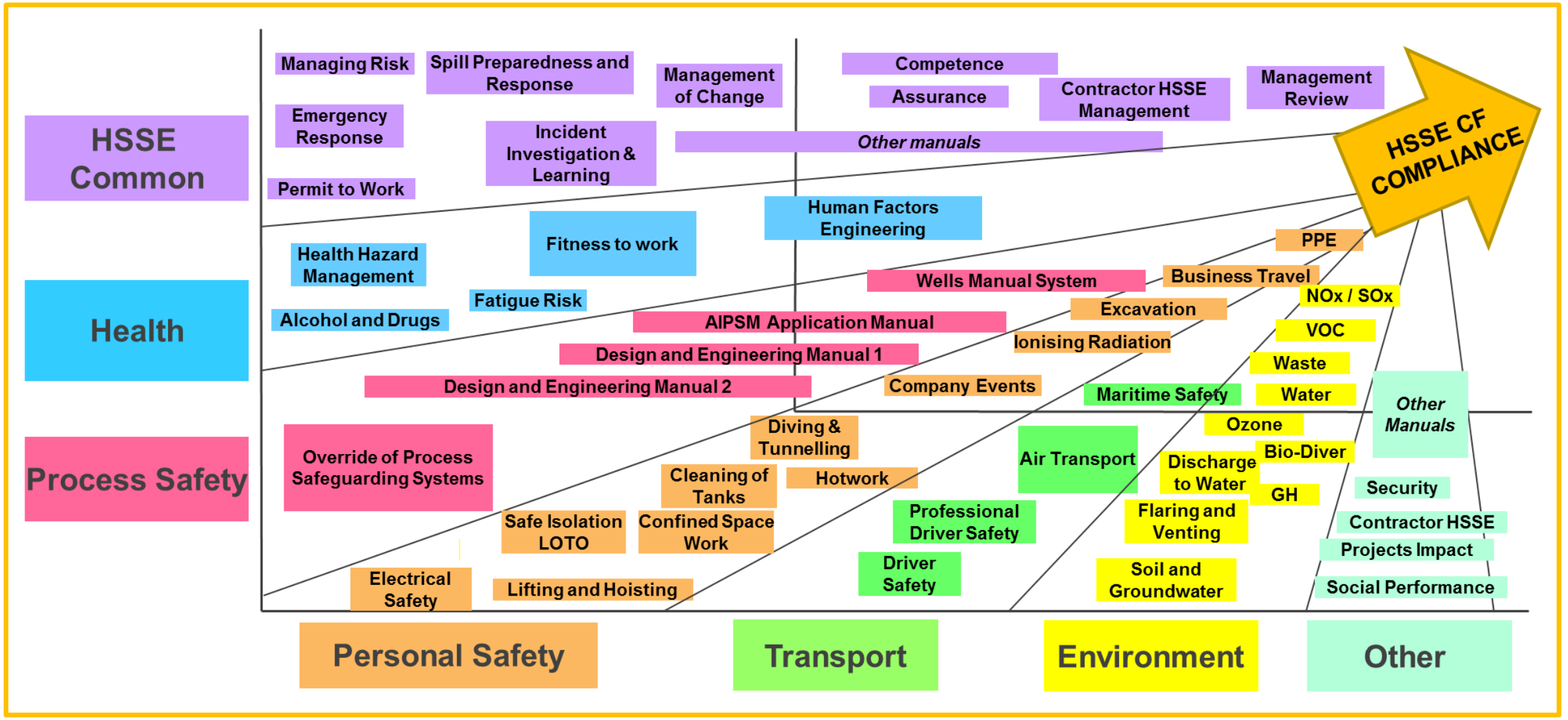


Average 300 MW total power demand

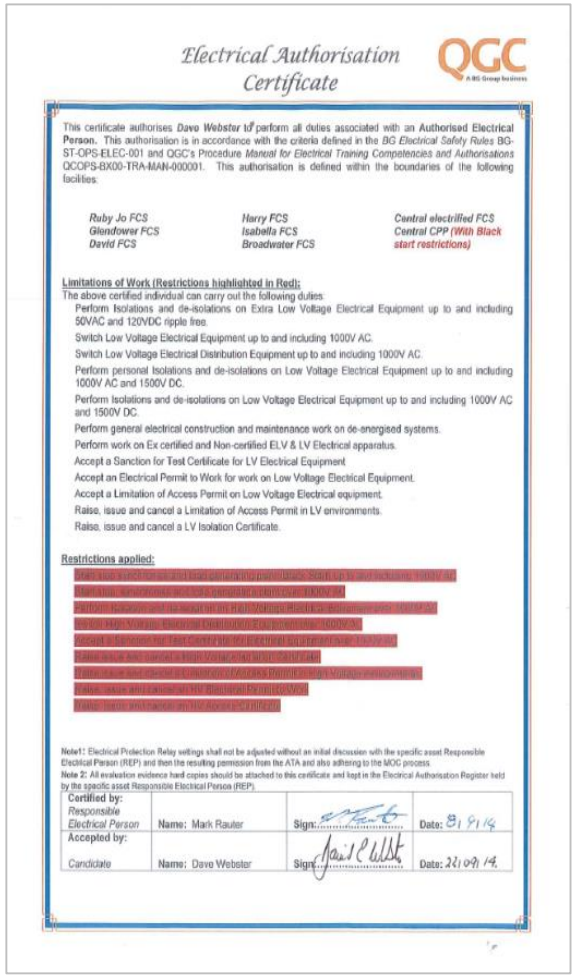
Network stats by the numbers:

- Three TNSP Connection points
- 85 km 132 kV Transmission Overhead Line
- Five132/33 kV Substations
- 800 km 33 kV Underground XLPE cables
- Nineteen 33/6.6 kV Substations
- One144 MW Combined Cycle power station

QGC - HSSE Controls Framework



QGC – Electrical Worker Authorisation



Electrical Authorisation Certificate

QGC

This certificate authorises **Dave Webster** to perform all duties associated with an **Authorised Electrical Person.** This authorisation is in accordance with the criteria defined in the *BG Electrical Safety Rules* BG-ST-OPS-ELEC-001 and QGC's Procedure *Manual for Electrical Training Competencies and Authorisations* QCOPS-BX00-TRA-MAN-000001. This authorisation is defined within the boundaries of the following facilities:

Ruby Jo FCS	*Harry FCS*	*Central electrified FCS*
Glendower FCS	*Isabella FCS*	*Central CPP (With Black start restrictions)*
David FCS	*Broadwater FCS*	

Limitations of Work (Restrictions highlighted in Red):
The above certified individual can carry out the following duties:

- Perform Isolations and de-isolations on Extra Low Voltage Electrical Equipment up to and including 50VAC and 120VDC ripple free.
- Switch Low Voltage Electrical Equipment up to and including 1000V AC.
- Switch Low Voltage Electrical Distribution Equipment up to and including 1000V AC.
- Perform personal Isolations and de-isolations on Low Voltage Electrical Equipment up to and including 1000V AC and 1500V DC.
- Perform Isolations and de-isolations on Low Voltage Electrical Equipment up to and including 1000V AC and 1500V DC.
- Perform general electrical construction and maintenance work on de-energised systems.
- Perform work on Ex certified and Non-certified ELV & LV Electrical apparatus.
- Accept a Sanction for Test Certificate for LV Electrical Equipment.
- Accept an Electrical Permit to Work for work on Low Voltage Electrical Equipment.
- Accept a Limitation of Access Permit on Low Voltage Electrical equipment.
- Raise, issue and cancel a Limitation of Access Permit in LV environments.
- Raise, issue and cancel a LV Isolation Certificate.

Restrictions applied:

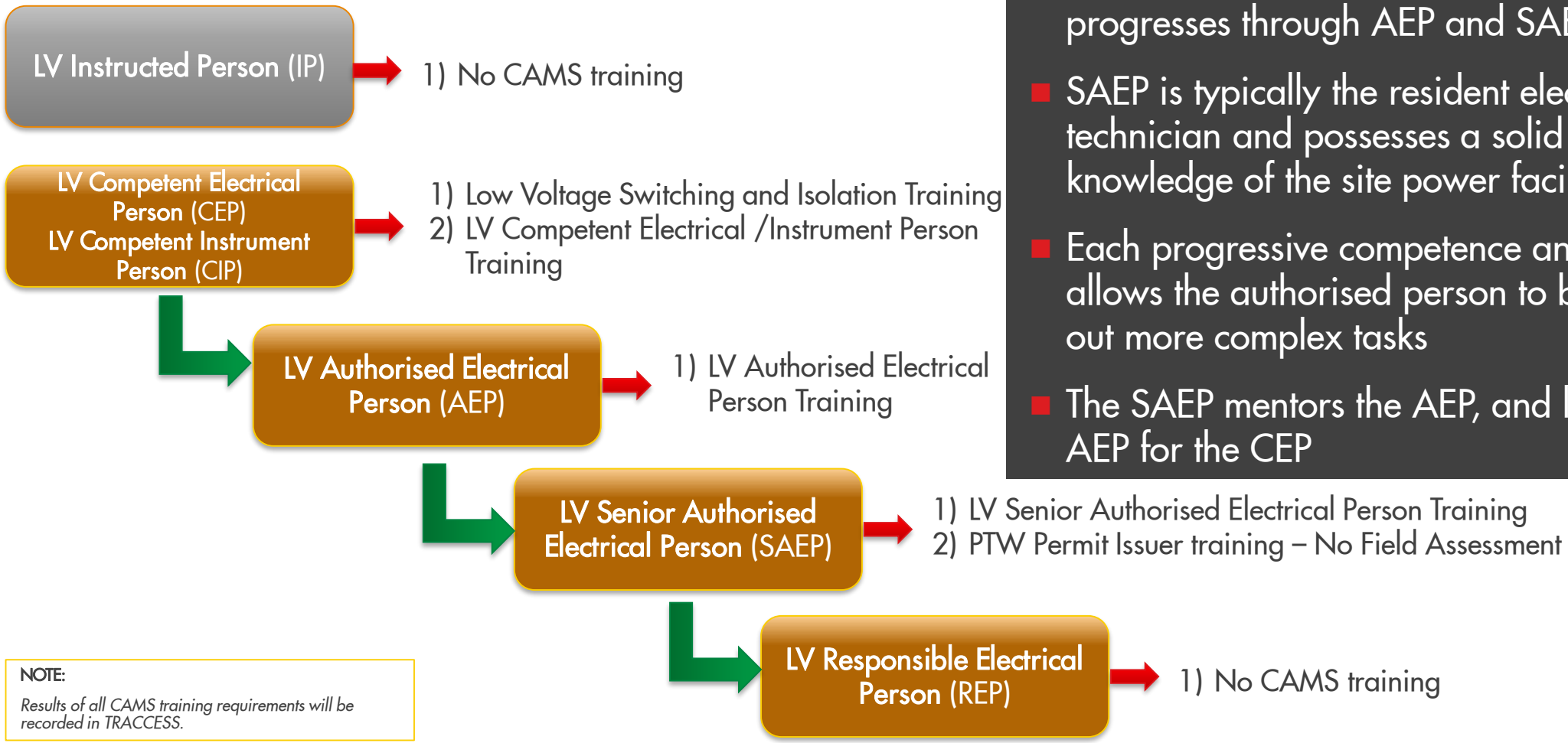
[redacted]

Note1: Electrical Protection Relay settings shall not be adjusted without an initial discussion with the specific asset Responsible Electrical Person (REP) and then the resulting permission from the ATA and also adhering to the MOC process
Note 2: All evaluation evidence hard copies should be attached to this certificate and kept in the Electrical Authorisation Register held by the specific asset Responsible Electrical Person (REP)

Certified by: *Responsible Electrical Person*	Name: Mark Rauter	Sign:	Date: 31/9/14
Accepted by: *Candidate*	Name: Dave Webster	Sign:	Date: 22/09/14

- Documents the scope of a person's authorisation to undertake tasks
- Specifies the limits of that authorisation, and detailing restrictions that are particularly significant
- Empowers the person to use the authorisation certificate to check that tasks to be undertaken are well within the scope of that authority
- Recognises persons with particular site experience and behaviours

QGC – Electrical Worker Competence



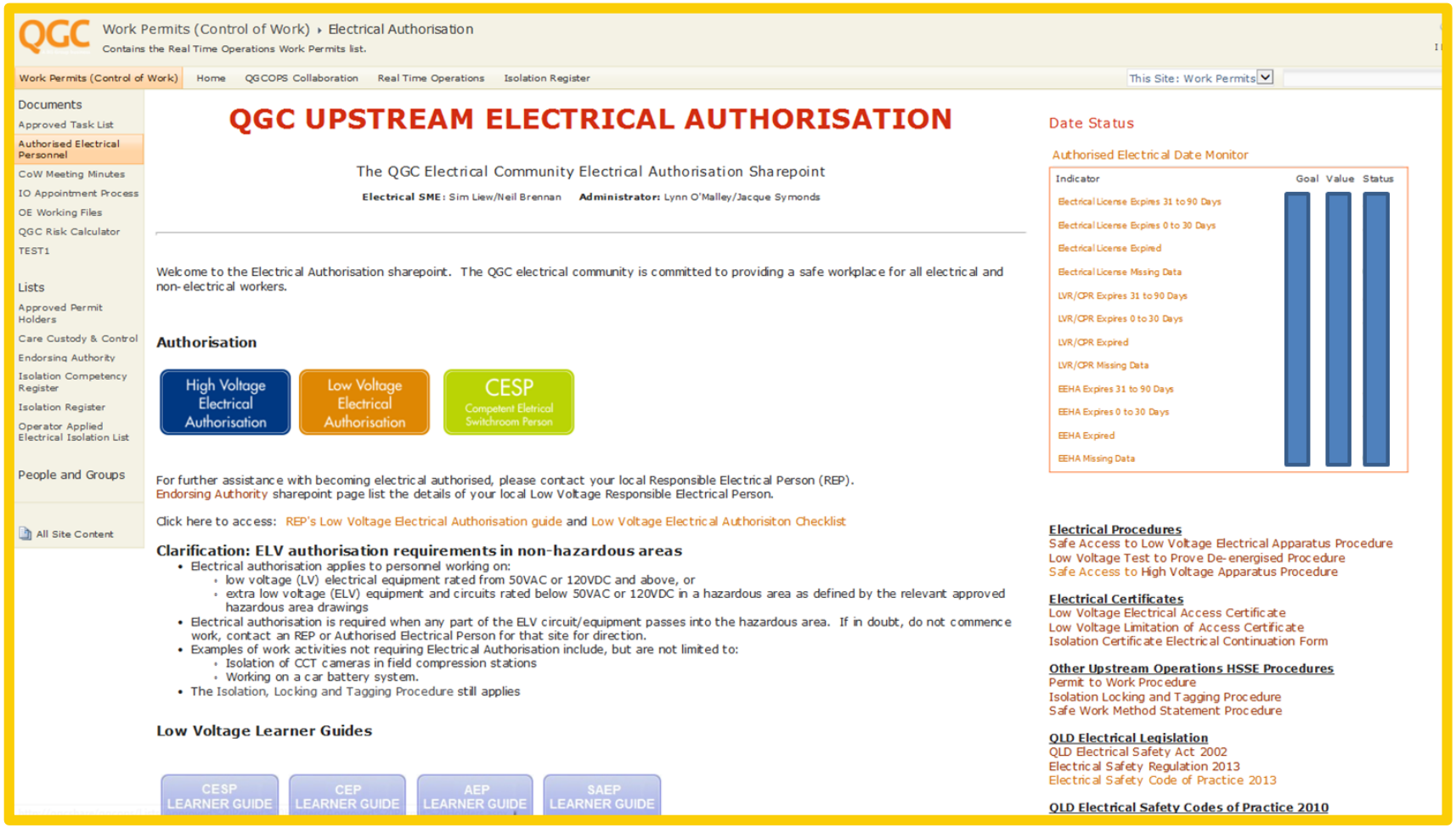
- Electrical worker is assessed starting at CEP and progresses through AEP and SAEP
- SAEP is typically the resident electrical technician and possesses a solid working knowledge of the site power facilities
- Each progressive competence and authorisation allows the authorised person to be able to carry out more complex tasks
- The SAEP mentors the AEP, and likewise the AEP for the CEP

NOTE:

Results of all CAMS training requirements will be recorded in TRACCESS.

QGC – the REP

- The Responsible Electrical Person is the site appointed authority for the day to day operation of the electrical power system for that site
- The REP is the highest level of authority for safe operation of the electrical power system
- Provides a recognisable and accessible point of reference to seek clarification, guidance and validation
- Endorsing authority for control measures associated with high-risk work
- Ensures a uniformed implementation & interpretation of QGC electrical safety rules
- Assesses competence of electrical workers before starting on site



QGC – Lessons learnt

- At times, there is conflicting priorities faced by the appointed REP, who is also the lead electrical person for a site
- Contracts for maintenance campaigns or projects do not always factor costs and schedule requirements to assess and authorise their workers prior to starting on site
- The use of a SharePoint intranet portal to register electrical worker training, licence and authorisation details has worked well, and easily provides dashboard of performance indicators

- High site activity and workforce turnover inevitably onboards new workers that will need to be assessed before working on site
  - Experience, behaviours and site safety culture of individuals vary
  - Large geographical spread of work sites contribute to practices driven by individual site managers
  - Every electrical installation has its own peculiarities in terms of equipment type, network design and switching and earthing arrangements
  - "Lone wolf" subbies may come onto site undetected

Questions and Answers

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