

M E S A



MINE ELECTRICAL  
SAFETY ASSOCIATION INC.

**MINING**  
**ELECTRICAL**  
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CONFERENCE

10 – 12 JULY 2017

PULLMAN KING GEORGE SQUARE HOTEL,  
BRISBANE

Achieving Electrical Worker Competence in  
the QGC Coal Seam Gas assets

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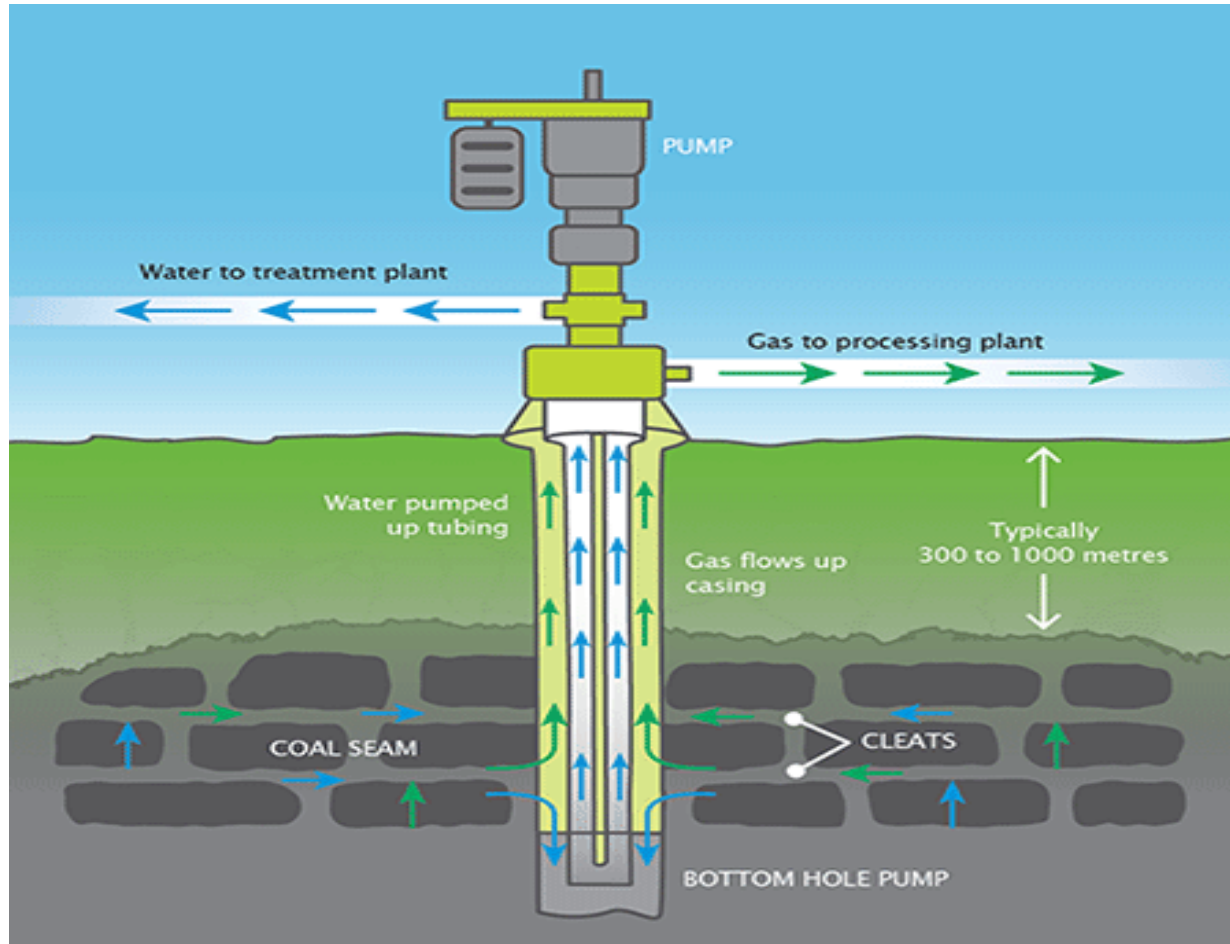
# Achieving Electrical Worker Competence in the QGC Coal Seam Gas assets

Mining Electrical Safety Conference 2017, Brisbane QLD

**Sim Liew**

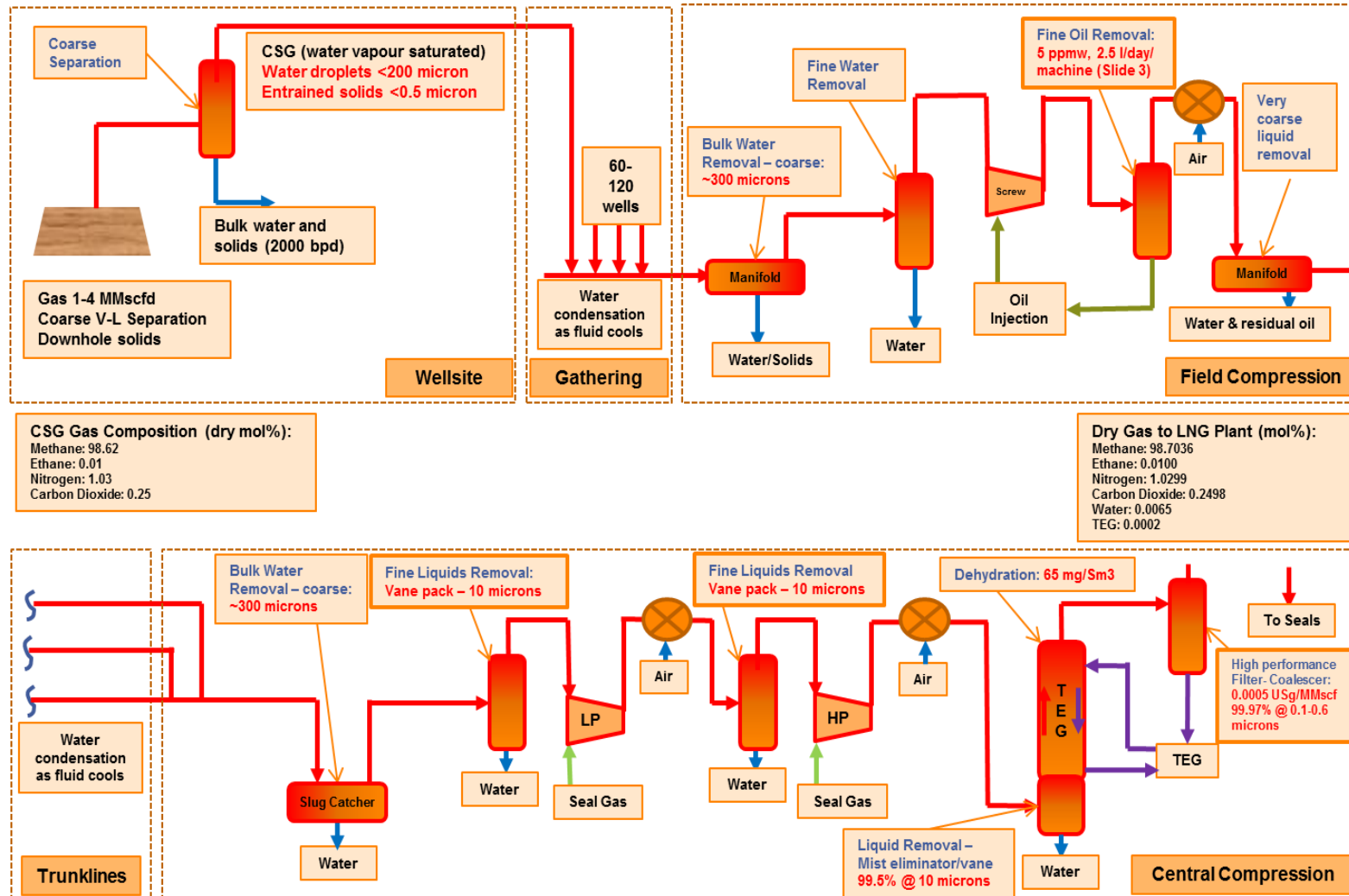
Lead Electrical Engineer & Technical Authority

# 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



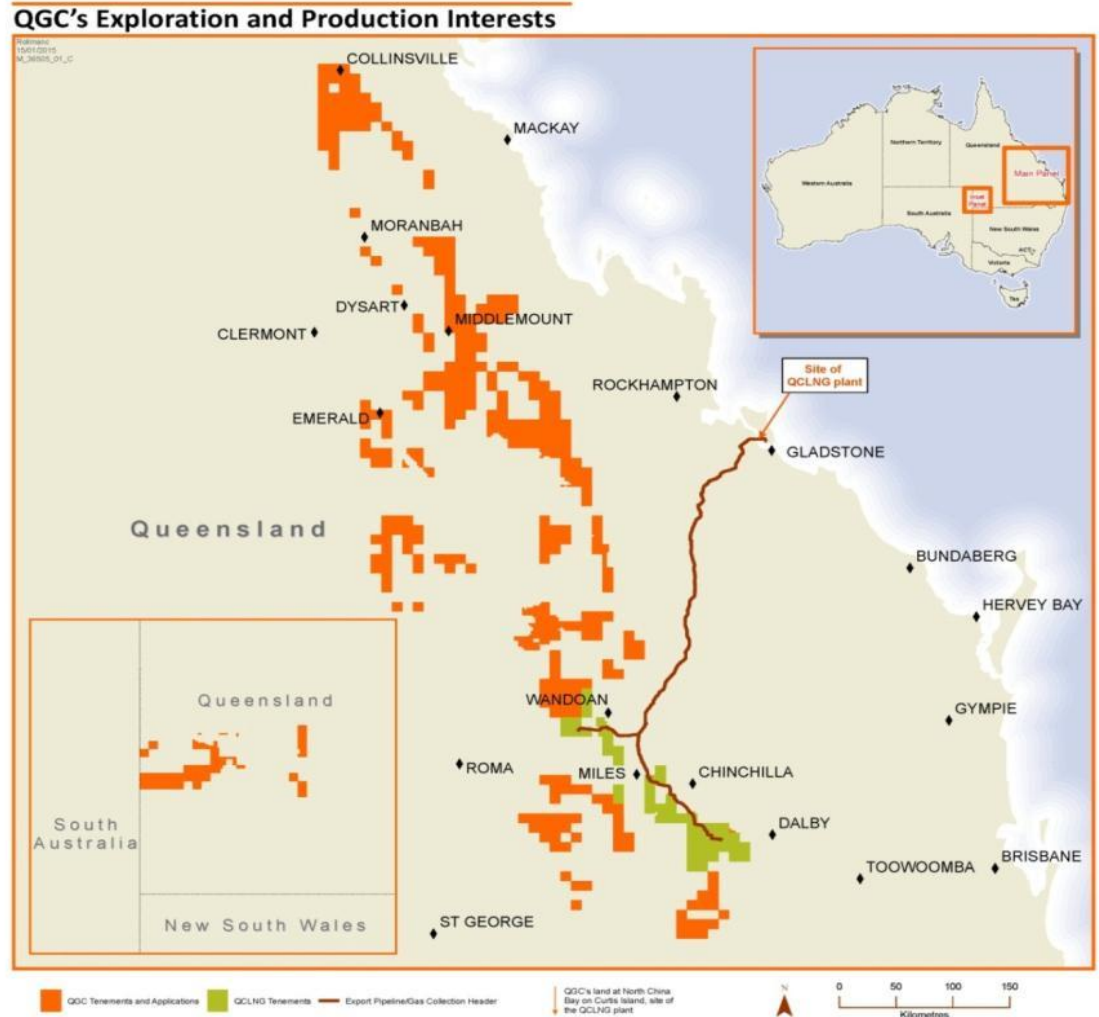
**CSG Gas Composition (dry mol%):**  
 Methane: 98.62  
 Ethane: 0.01  
 Nitrogen: 1.03  
 Carbon Dioxide: 0.25

**Dry Gas to LNG Plant (mol%):**  
 Methane: 98.7036  
 Ethane: 0.0100  
 Nitrogen: 1.0299  
 Carbon Dioxide: 0.2498  
 Water: 0.0065  
 TEG: 0.0002

- 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





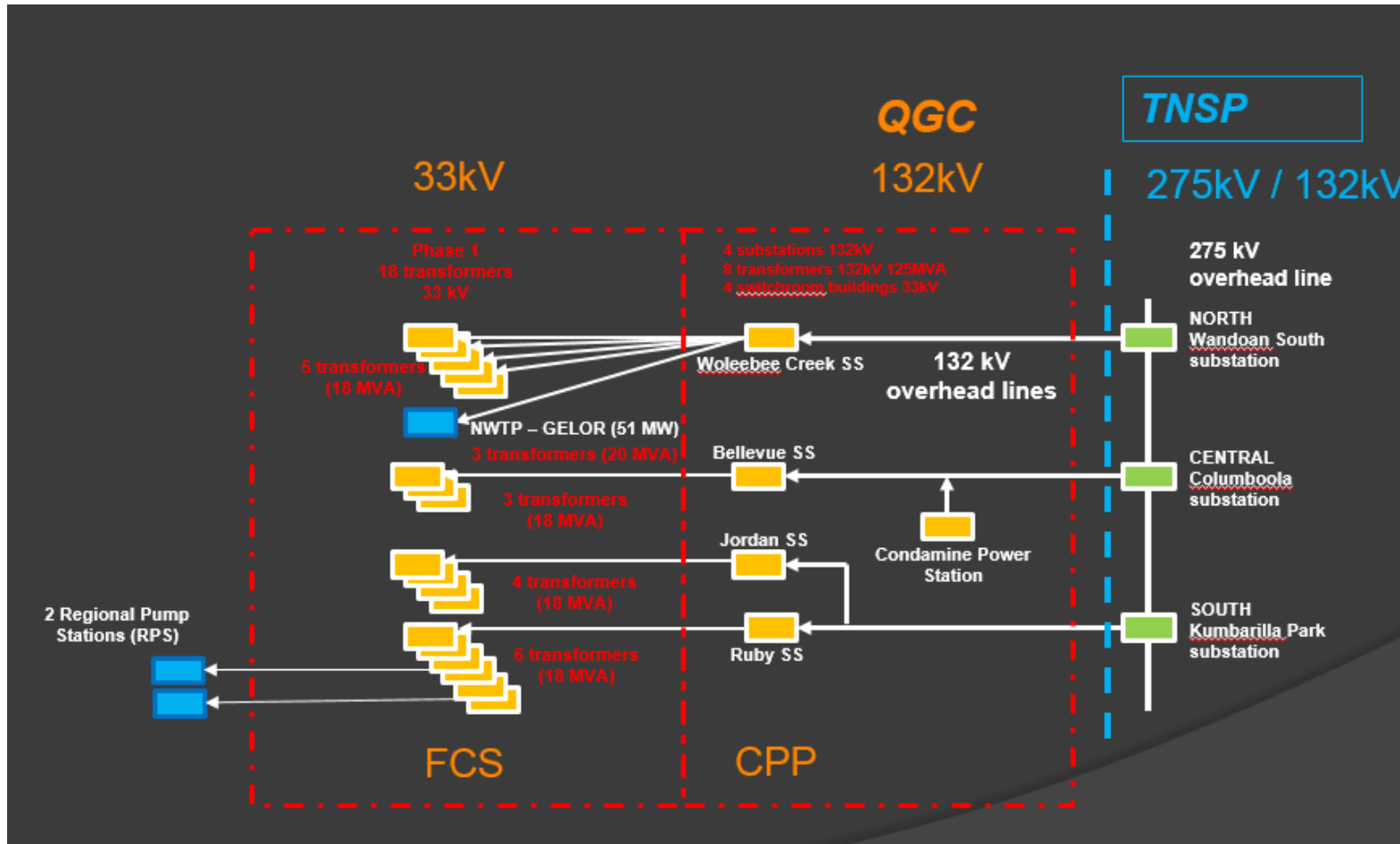
# QGC Central Processing Plant

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



# QGC Upstream HV Network

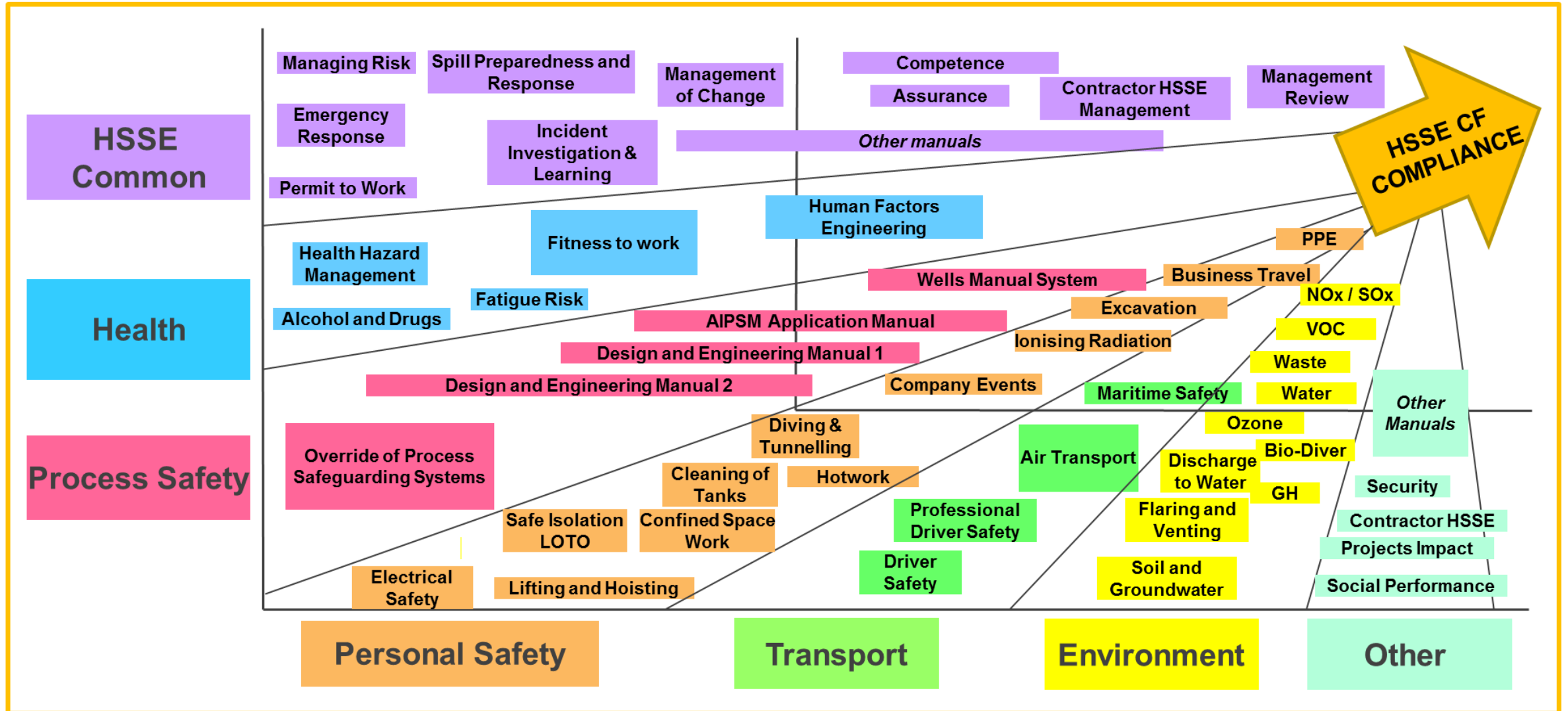


Average 300 MW total power demand

Network stats by the numbers:

- Three TNSP Connection points
- 85 km 132 kV Transmission Overhead Line
- Five 132/33 kV Substations
- 800 km 33 kV Underground XLPE cables
- Nineteen 33/6.6 kV Substations
- One 144 MW Combined Cycle power station

# QGC - HSSE Controls Framework





# QGC – Electrical Worker Authorisation



*Electrical Authorisation Certificate* **QGC**  
A BGC Group business

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 QCOFS-BX00-TRA-MAN-000001. This authorisation is defined within the boundaries of the following facilities:

<i>Ruby Jo FCS</i>	<i>Harry FCS</i>	<i>Central electrified FCS</i>
<i>Glennfower FCS</i>	<i>Isabella FCS</i>	<i>Central CPP (With Black start restrictions)</i>
<i>David FCS</i>	<i>Broadwater FCS</i>	

**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:**

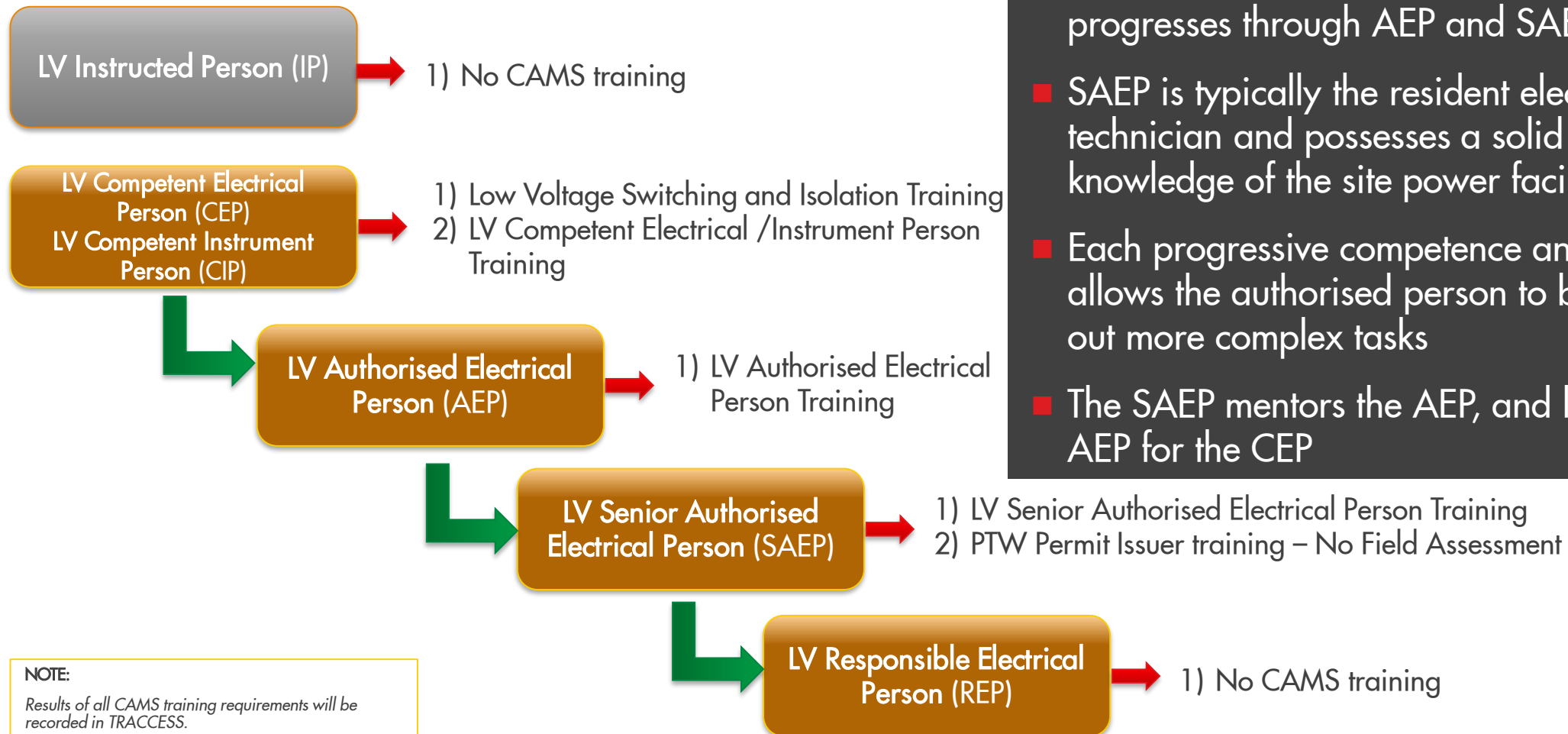
[Redacted restrictions]

Note 1: 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 MQC 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: <i>[Signature]</i>	Date: 21/09/14
Accepted by:			
Candidate	Name: Dave Webster	Sign: <i>[Signature]</i>	Date: 21/09/14

- 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 UPSTREAM ELECTRICAL AUTHORIZATION**

The QGC Electrical Community Electrical Authorisation Sharepoint  
Electrical SME: Sim Liew/Neil Brennan Administrator: Lynn O'Malley/Jacque Symonds

Welcome to the Electrical Authorisation sharepoint. The QGC electrical community is committed to providing a safe workplace for all electrical and non-electrical workers.

**Authorisation**

- High Voltage Electrical Authorisation
- Low Voltage Electrical Authorisation
- CESP Competent Electrical Switchroom Person

For further assistance with becoming electrical authorised, please contact your local Responsible Electrical Person (REP). Endorsing Authority sharepoint page list the details of your local Low Voltage Responsible Electrical Person.

Click here to access: [REP's Low Voltage Electrical Authorisation guide](#) and [Low Voltage Electrical Authorisation Checklist](#)

**Clarification: ELV authorisation requirements in non-hazardous areas**

- Electrical authorisation applies to personnel working on:
  - low voltage (LV) electrical equipment rated from 50VAC or 120VDC and above, or
  - extra low voltage (ELV) equipment and circuits rated below 50VAC or 120VDC in a hazardous area as defined by the relevant approved hazardous area drawings
- Electrical authorisation is required when any part of the ELV circuit/equipment passes into the hazardous area. If in doubt, do not commence work, contact an REP or Authorised Electrical Person for that site for direction.
- Examples of work activities not requiring Electrical Authorisation include, but are not limited to:
  - Isolation of CCT cameras in field compression stations
  - Working on a car battery system.
- The Isolation, Locking and Tagging Procedure still applies

**Low Voltage Learner Guides**

- CESP LEARNER GUIDE
- CEP LEARNER GUIDE
- AEP LEARNER GUIDE
- SAEP LEARNER GUIDE

**Date Status**

Authorised Electrical Date Monitor

Indicator	Goal	Value	Status
Electrical License Expires 31 to 90 Days			
Electrical License Expires 0 to 30 Days			
Electrical License Expired			
Electrical License Missing Data			
LVR/OPR Expires 31 to 90 Days			
LVR/OPR Expires 0 to 30 Days			
LVR/OPR Expired			
LVR/OPR Missing Data			
EEHA Expires 31 to 90 Days			
EEHA Expires 0 to 30 Days			
EEHA Expired			
EEHA Missing Data			

**Electrical Procedures**

- Safe Access to Low Voltage Electrical Apparatus Procedure
- Low Voltage Test to Prove De-energised Procedure
- Safe Access to High Voltage Apparatus Procedure

**Electrical Certificates**

- Low Voltage Electrical Access Certificate
- Low Voltage Limitation of Access Certificate
- Isolation Certificate Electrical Continuation Form

**Other Upstream Operations HSSE Procedures**

- Permit to Work Procedure
- Isolation Locking and Tagging Procedure
- Safe Work Method Statement Procedure

**QLD Electrical Legislation**

- QLD Electrical Safety Act 2002
- Electrical Safety Regulation 2013
- Electrical Safety Code of Practice 2013

**QLD Electrical Safety Codes of Practice 2010**



## 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 onboard 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

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# Questions and Answers

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