Chevron Australia
Greater Gorgon
Fantastic Fields and How To Flow Them

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AOG Conference
March 2019
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Biography

Australian Business Unit Gas Portfolio Facilities Engineering Team Lead, previously Perth Global Technology Centre Manager.

Over 30 years' experience in oil and gas, refining and petrochemicals. Varied roles from technology development, to contract negotiation and developments through all project phases. Experience includes design and commissioning of 10 mega or major projects.
deepwater technology plan

what got you here, won’t get you there
Chevron operating in Australia since 1952

Operations in 1993
- North Rankin A
- Varanus Island
- Griffin FPSO
- Others?
Greater Gorgon

[Map of Greater Gorgon project including Jansz-IO Field, Gorgon Field, Barrow Island, Gorgon Plant Site, Dampier, Karratha, Onslow, Exmouth, and Western Australia with a scale of 50KMS.]
Greater Gorgon overview

- **5x tallest building**: The distance from the ocean surface to the bottom of the Jansz-Io field reservoir is five times the height of the world’s tallest building, Burj Khalifa in Dubai.
- **3.5 thousand average size cars**: The liquefaction module for LNG Train 1 – one of 31 modules on the plant – weighs more than 3,500 average size cars.
- **72x Olympic-size swimming pools**: Each LNG tank can hold 6.3 million cubic feet (180,000 cubic meters) of LNG. That is equivalent to about 72 Olympic-size swimming pools.

- **500+ miles of pipelines**: More than 500 miles (800 km) of pipeline has been laid onshore and offshore. That is about the driving distance from New York to Washington, D.C., and back.
- **4x steel bridges**: The amount of steel used in the plant is equal to more than four Sydney Harbour Bridges.
- **3x aircraft carriers**: One of the largest subsea installations in the world with more than 253,631 tons (230,000 tonnes) of steel pipe and structures that equals the weight of three aircraft carriers.

- **Jansz-Io**: 9,106 – 10,330 feet (2,774 – 3,155 m) beneath the seabed
- **Gorgon**: 11,350 – 12,600 feet (3,459 – 4,445 m) beneath the seabed
- **Display Formation**: 6,136 ft (1,875 m)

**Fast facts about Gorgon**
- Located on Barrow Island, about 37 miles (60 km) off the northwest of Western Australia
- Annual production capacity of 13.6 million tonnes of liquefied natural gas (LNG)
- Chevron operated with 47.5% interest
Greater Gorgon
Jansz-Io scarp crossing

In 2014, the Jansz-Io Subsea Pipeline Scarp Crossing won the “innovation and development” category at both the Western Australian and the National Engineering Excellence Awards.

The concepts and methods developed will provide the enabling technology for future deepwater pipeline projects.
Wheatstone microtunnel

An innovative shoreline crossing solution to preserve the Ashburton River Delta, which serves as habitat for the green sawfish and other species.

Chevron Australia was awarded the 2015 Golden Gecko Award for Environmental Excellence by the Government of Western Australia, Department of Mines and Petroleum for utilising the micro-tunnel shoreline crossing solution.
Wheatstone O-tube

In 2014, the STABLEpipe project won the Australasian Industrial Research Group (AIRG) Medal for Australasian Major Industry Technological Innovation for its cutting edge O-Tube program. These were Woodside Energy Ltd, Chevron Australia Pty Ltd, Wood Group Kenny Pty Ltd, Atteris Pty Ltd and UWA.

Chevron used the O-tube for studies to optimise pipeline design for Chevron-operated Wheatstone Project, providing significant savings.
Announced on 14 April 2018, Gorgon Stage Two is part of the original development plan for Gorgon and includes the expansion of the subsea gas gathering network required to maintain long-term natural gas supply to Barrow Island. The development involves new wells in the Gorgon and Jansz-Io fields, and accompanying offshore production pipelines and subsea structures.
Greater Gorgon
Jansz-lo compression

Ongoing work includes the next stage for the Jansz-lo reservoirs. One option is subsea compression to boost pressure from the fields to offset depletion drive.

Significant development work is ongoing with an expected start-up in the 2025 – 2026 timeframe.
Upcoming developments
50 TCF of total discovered resources

- Geryon - Eurytion
- Chrysaor and Dionysus
- Clio - Acme
- West Tryal Rocks

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Upcoming developments

Chrysaor and Dionysus
Opportunity is in Phase 2, concept selection, with RFSU targeting 2027. Potential development could be:
• 5-6 production wells, central manifold in 1000m water depth
• 40 – 50 km tie-back to Gorgon trunkline, 20” – 24” diameter
• MEG and utility service lines, control umbilical. Scarp crossing north of existing Jansz crossing

Geryon and Eurytion
Opportunity is again in Phase 2, with RFSU targeting 2031 or potentially earlier. A development could be:
• 5-6 production wells drilled from a central manifold
• 40 km tieback to Jansz trunkline, 24” diameter. Tie-in with Jansz-lo compression
• MEG and utility service lines, control umbilical
Upcoming developments

Other developments

A number of future tie-backs and projects follow Chrysaor & Dionysus, and Geryon & Eurytion in the development sequence.

Staged 5-8 years apart out to 2048, these are required to keep the Gorgon and Jansz trunklines full.

- West Tryal Rocks
- Gorgon compression
- Satyr, Achilles, Dino and Isoceles
- Semele
- Orthrus, Maenad, Orthrus Deep
- Chandon
- Yellowglen

Other opportunities include Clio-Acme, Sappho, Urania, etc. These are in deepwater other than West Tryal Rocks.
Future developments
what got you here, won’t get you there

depthwater technology plan

- CVX screening indicates significant CAPEX & OPEX reduction, improved reliability & availability, increased recovery from LDTB technologies. Potential UDC reduction 33%
- Six strategies under development:
  1. MEG reduction
     - Incremental reduction of system conservatism (Perth GTC)
     - Hybrid inhibition development (UWA LDTB chair)
  2. Standardisation
     - Ongoing MWQ, IOGP initiatives via ETC
     - Trees
     - Manifolds
     - Wells and completions
  3. Electrification
     - ETC qualification of Alcatel direct current fibre optic (DCFO)
     - Total & Statoil eSCSSV JIPs
     - FMC AES JIP
     - GE AES JIP
  4. Enhanced recovery
     - Aker subsea compression (proposed for Jansz compression)
     - OneSubsea WGC6000 multi-phase compressor (ETC qualification)
     - Alginates (to mitigate water cut)
     - Separation (to separate produced water)
  5. Power distribution
     - Power cables, including dynamic sections
     - Subsea variable speed drives
     - Subsea switchgear
  6. Low cost flowlines
     - Reduced flowline material and fabrication costs
     - Eliminate hydrotest

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Gorgon project
local benefits

From 2009 to 2040, the benefits of the Gorgon Project are estimated* to result in:

- **$440 billion** added to Australia’s gross domestic product
- **60,000+** direct and indirect full-time equivalent jobs created in Australia
- **$69 billion** direct taxation revenues paid to the Federal Government

Q&A