




Arrow Energy

TSBE webinar

Reviewing Energy Supply Chains - Opportunities and innovation for the future

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 Safe Work. Strong Business.





- Arrow is an integrated energy company owned 50/50 by Shell and PetroChina
 - 17,000km² of tenements over the Surat and Bowen Basins in Queensland
 - ~1450 gas wells currently
 - ~6,500 petajoules of 2P gas reserves to date
 - supplies gas to Townsville, Moranbah and Braemar 2 power stations and to operators of Swanbank E, Daandine and Braemar 1 power stations
- Generation capacity = supply for ~800,000 Queensland homes
- The Surat Gas Project (SGP) is underpinned by the largest gas sales agreement on the east coast of Australia, with the Shell-QGC joint venture
- Last Friday, Shareholders made a Final Investment Decision (FID) for phase one of the 27 year project, and Arrow sanctioned construction to start in 2020
- Peak construction - 2021-2025; first gas - 2021
- Phase one development areas
 - expansion north and south from Arrow's current operational areas at Daandine and Tipton
- Later phases include the Wandoan and Cecil Plains areas.



Top 10 SGP phase one activities:

1. Drilling
2. Well Services
3. Construction
4. Engineering
5. Environment & Water Management
6. Camps & Accommodation
7. Transport and Warehouse
8. Logistics
9. Rotating Equipment
10. Other Maintenance and support contracts



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- 5 large domestic operating fields
 - Tipton, Daandine, Kogan, Stratheden in Surat Basin
 - Moranbah Gas Project in Bowen Basin
- Arrow currently produces the equivalent of 40% of Qld's domestic gas demand
- \$850 million expansion of Arrow's Daandine and Tipton fields during 2016 - 2018 in the lead up to the Surat Gas Project



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Highlighted activities require ramp up

- 200+ construction jobs in phase one
 - Full SGP ~1000 jobs
 - (800 construction, 200 long term in operations)
- 600 new wells in phase one
 - ~300 TJ/d at peak production
 - Full SGP ~2,500 new wells; 700 TJ/d at peak production
- Path to market for ~5 trillion cubic feet (TCF) of Arrow gas - full SGP
- By comparison, Queensland's projected 2020 domestic gas consumption is 126PJ – or about 0.12 TCF.



1. Automation and remote management

- Reduced human interaction with automated tools
- Monitoring control centres for production
- Remote working and reduced footprint
- Reduction in kilometres driven
- Unmanned Aerial Vehicle (UAVs)

2. Data and logistics management

- Data information - Arrow Energy Corporate Information Factory
 - stored centrally and used regularly for decision making
 - use of mobile data collection and storage
 - predictive maintenance
- Operational and maintenance - equipment efficiency and utilisation
- Workforce management - tracking and efficiency
- Well in a box - logistics automation through standardised materials delivery

3. Collaboration

- COVID19 - risk and issue collaboration - APPEA led
- Industry collaboration - Safer Together - requirements standardisation, training, HSE
- <https://www.safertogether.com.au/resources/initiatives/covid-19>



- 2/3 Arrow Surat tenure is over unique black soil farms
- The traditional 800m and 800m vertical grid field represented a high impact risk in these areas
- Arrow developed multi-well pads, grouping four to eight *deviated* wells from each pad, on the boundaries of properties, to minimise impact to 2% during construction, and less than 1% during operations
- Multi well pads (as seen here on Arrow's *Theten* farm) are located on the boundaries of these highly intensive properties. They reduce workover frequency and maximise gas efficiency
- These well pads now account for more than 60% of all wells in Arrow's field development plans



Government concern about risk of FIFO/DIDO staff and contractors into regional Queensland

- Crisis Management Team mobilised in March to implement controls for business continuity
- **Immediate staff and contractors controls**
 - FIFO / DIDO workers reduction by 20%
 - New Arrow charter flights with social distancing – Bne to Mor
 - New Arrow charter buses with social distancing – Bne to Dby; Mor to camps
 - Additional Arrow nurses
 - Daily temperature checks
 - Inter-state and intra-state exemption letters for essential contractors and individuals - 30+
 - Health Declarations for all staff; full Arrow Health Plan submitted to QH regional centres
 - Separation of local and FIFO/DIDO workforces in local communities - including work offices
 - New camps, and new health and hygiene controls
- **Major stakeholder engagement program**
 - Contractors
 - Contractor calls with 180+ contractor representatives weekly
 - Robust weekly assurance process in place
 - Customers, operating communities, government agencies



