ARROW ENERGY
WHY WE ARE HERE TODAY

• Provide an update to the community
• Moving to next development stage – more details to share:
  • Environmental Impact Statement (EIS)
  • Refined project development plan
  • Reduced footprint
  • Area Wide Planning.
ARROW ENERGY
SESSION OVERVIEW

• Presentation:
  • Environmental Impact Statement (EIS) update
  • Coal seam gas (CSG) to liquefied natural gas (LNG) refresh
  • Project overview
  • Water management
  • Area Wide Planning
  • Landholder compensation.

• Information booths:
  • Surat Gas Project (SGP) development
  • Water and salt
  • Land access
  • General Arrow information.
Key milestones
- process commenced in 2009 (impact assessment)
- lodged draft EIS in Dec 2011

Queensland Government approval
- EIS approved for public release in March 2012
- State approved in Oct 2013

Federal Government approval
- currently under Federal assessment

Next steps
- Environmental Authorities
- Conduct and Compensation Agreements
- Area Wide Planning
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CSG TO LNG REFRESH

- CSG is natural gas trapped in underground coal beds by water and pressure
- To extract CSG a 300-750m deep well is drilled
- Water is pumped from the coal seams to release gas
- Gas and water flow up the well to the surface separately
- Wells are constructed to isolate coal seams from groundwater aquifers.
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CSG TO LNG REFRESH CONTINUED

- At the surface, CSG is compressed and purified for transportation to the LNG plant in Gladstone via a high-pressure pipeline.
- At the plant, CSG is turned to LNG by cooling it to -162°C.
  - this reduces the volume to about 1/600th original size.
  - reduced volume makes transportation easier.

Pipeline to LNG plant pic
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PROJECT OVERVIEW

- Project stages
- Refined project development plan
- Subsurface and wells
- Gathering flowlines and rights of way
- Centralised gas processing facilities (CGPFs)
- Development phases
- Accommodation villages and workforce.
- Concept studies complete
- Includes community feedback from engagement and EIS process
- Working towards next project phase – Area Wide Planning
- Refined project development plan – 2 LNG trains to 1 LNG train:
  - reduced footprint
  - overall intensity of development reduced
  - phased development sequence.
### Surat Gas Project update

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ARROW ENERGY
SUBSURFACE

- Coal seam depths are shallower in the east
- Shallower coals have lower gas content but also have better permeability so the gas flows better
- Coal properties change with depth, which affects:
  - the types of wells Arrow drills
  - how the wells respond to gathering system pressures.
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WELL TYPES

- Deeper coal seams - deviated wells from multi-well pads
  - typically 8 wells on a pad
- Shallower coal seams - single vertical wells
- Surface spacing between well sites ranges from ~800m (average) up to 2km.
• Area Wide Planning - discussion process to understand constraints, overland flow patterns and arrive at the best layout
  • locate well sites where least impact on land (honour exclusions)
  • route low pressure gas, water and underground power lines to follow existing tracks where possible
• Access priorities defined for different farming and project activities.
• Area Wide Planning - discussion process with landholders to understand constraints and arrive at the best layout
  • possible use of overhead power lines where safe
  • locate well sites where least impact (honour exclusions)
  • route low pressure gas, water and underground power lines to make use of existing tracks
• Access priorities defined for different landholder and project activities.
1 CGPF per drainage area:
   - dries and compresses the gas to pipeline specification for transmission
   - includes water storage dams
   - includes offices for maintenance staff

No CGPF will be located on IFL.
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DEVELOPMENT PHASING

- Arrow will develop the drainage areas in phases:
  - phase 1: Wandoan, Miles, Chinchilla and Daandine
  - later phases: Tipton, Cecil Plains, Millmerran and Kumbarilla

- Development by drainage area will work outwards from the CGPF

- Area Wide Planning will start in the red and orange areas over the next 12 months.
The schedule below shows centralised gas processing facility (CGPF) construction timeframes to ensure LNG train is full.

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ARROW ENERGY
WORKFORCE ACCOMMODATION VILLAGES

- Up to 6 accommodation villages over 20+ years
- Capacity for 400 - 1,000 people
- Self-contained villages
- Strict policies enforced on staff - alcohol consumption, behaviour, safety standards and transportation.
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**CONSTRUCTION WORKFORCE**

- Peak construction workforce is ~2,700
- Eases off to 600 during operations.

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- **Kumbarilla CGPF**
- **Wells and gathering**

*Workforce levels through construction*
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WATER MANAGEMENT

Project overview • Water management • Area Wide Planning • Landholder compensation

- Groundwater modelling
- Connectivity studies
- Groundwater monitoring and ‘make good’
- Water management.
• Arrow will offset its groundwater impacts to Condamine Alluvium
• Predicted groundwater impacts have come down (OGIA model)
• Minimal impact predicted on Condamine Alluvium.
The Condamine Interconnectivity Research Project (CIRP):

- An OGIA program
- Investigates interconnectivity between Condamine Alluvium and Walloon Coal Measures
- Used to verify model of Arrow’s potential impacts
- Long-term program will further reduce model uncertainties.
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WATER: GROUNDWATER MONITORING AND ‘MAKE GOOD’

- Groundwater monitoring network
  - 36 monitoring bores in place
  - 50 additional bores drilled by 2016
- ~470 baseline assessments carried out
- Arrow will ‘make good’ when licensed bores are impaired:
  - no impairment predicted for Condamine Alluvium
  - impairment predominantly predicted for Walloon Coal Measures
- ‘Make good’ assessments completed
  - only 3 bores were installed in the Walloon Coal Measures and require ‘make good’ agreements.
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WATER: MANAGEMENT AND NEXT STEPS

• Arrow continues to further refine the scope of its water management plan
• Evaluating collaboration opportunities with other CSG companies for water treatment
  • will offset its impact to the Condamine Alluvium
  • will maximise beneficial use of treated CSG water
  • additional water treatment infrastructure dependent on:
    • collaboration outcome
    • assessment of existing facilities
• Arrow is participating in a joint CSG industry initiative for salt management.
• The process
• Example field layout.

Project overview → Water management → Area Wide Planning → Landholder compensation
Design

Discuss

Identify

Check

Confirm

Agree

Begin

= Direct discussion with landholder
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AREA WIDE PLANNING

Schematic area wide field plan

Right of way for access, gathering

Surface spacing (800m up to 2km)

Well pad

Overland flow
Through engaging with and listening to landholders, Arrow has implemented a new compensation model that recognises the value of prime farming land and the potential impacts of CSG operations properties.
Compensation categorised into 3 payment types:

1. Conduct and Compensation Agreement signing – 
   One off payment

2. Construction – 
   Limited payments to consider construction impacts

3. Operations – 
   Annual payments for life of CCA
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Legend:
- Major Towns
- Proposed CGPF
- Arrow Surat Pipeline
- Highway
- Condamine River
- CDR Rail Network (CDRN)
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