ARROW ENERGY
TODAY’S AGENDA

➤ Overview of Arrow Energy
➤ The exploration process
➤ Exploration in the Capricorn area
➤ Arrow Bowen Pipeline update
➤ Community engagement
➤ Questions
ARROW ENERGY OVERVIEW
ARROW ENERGY
COMPANY OVERVIEW

Arrow is a leading coal seam gas company with five domestic gas supply operations, interests in three gas-fired power stations and plans to deliver liquefied natural gas to the international market through a world class plant in Gladstone.

• Queensland based company which started in 2000
• Joint venture Shell (50%) and PetroChina (50%) established owners committed to safety, environment and long term relationships with stakeholders
• Currently have almost 500 producing coal seam gas wells across Queensland
• Provide approximately 20 per cent of Queensland’s gas needs which is primarily used for electricity generation
ARROW ENERGY
OUR STORY

Gross Reserve Position (PJ)

- First gas sold
- Shell / PetroChina Takeover
- Today's value $5bn (indicative)

Staff numbers

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<th>Year</th>
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<td>432</td>
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*year to date
ARROW ENERGY
OUR PROJECTS

Arrow LNG
- Surat Gas Project
- Bowen Gas Project
- Arrow Surat Pipeline
- Arrow Bowen Pipeline
- Arrow LNG Plant
- Power Development

Domestic operations
- Tipton
- Daandine
- Kogan
- Stratheden
- Moranbah Gas Project

Power stations
- Braemar 1
- Braemar 2
- Townsville
ARROW ENERGY
WHERE DO WE EXPLORE?

54,088km² of acreage

- Bowen Basin – QLD
- Surat Basin – QLD
- Clarence Moreton Basin – QLD and NSW
- Nagoorin Graben – QLD
- Capricorn Area – QLD
- Styx Basin – QLD
- Hillsborough Basin – QLD
- Galilee Basin - QLD
ARROW ENERGY
DOMESTIC GAS OPERATIONS

- Our domestic gas and electricity supply business has been in operation since 2004.

- We currently supply approximately 20 per cent of Queensland’s gas needs which is primarily used to create electricity.
THE EXPLORATION PROCESS
COAL SEAM GAS (CSG)

WHAT IS CSG?

• Natural gas – methane

• Commonly used for electricity generation and industrial uses (e.g. refining)

• Coal seams contain both gas and water. The gas is kept in place by water pressure and ground pressure

• Gas is produced from coal seams by drilling wells, pumping water from coal seams, which allows the gas to be released

• CSG is very different to Underground Coal Gasification (UCG)
THE EXPLORATION PROCESS

RIGHT TO EXPLORE

• Right to explore provided by “Authority to Prospect” (ATP)

• Granted under the *Petroleum and Gas (Production and Safety) Act, 2004*

• Administered by Department of Employment, Economic Development and Innovation (DEEDI)
THE EXPLORATION PROCESS
WHAT DOES EXPLORATION MEAN?

• Exploration is a three step process to identify and assess the potential of coal seam gas (CSG) resources in an area to determine:
  1. The presence, depth and extent of coal seams
  2. Whether the coal seams contain gas
  3. Whether the gas can be ‘produced’ (ie brought to the surface)

• Exploration is one key part of deciding if a CSG resource can be developed into a project – also need to obtain environmental, Government and commercial approvals
THE EXPLORATION PROCESS

EXPLORATION DRILLING

• Landholder consultation

• Flexible approach

• Site inspection/survey (eg environment/vegetation/cultural heritage)

• Site preparation for drilling activity only (70m x 70m)

• Drilling and logging testing

• Cementing of well

• Drilling and testing timeframe – approx one month

• Rehabilitation of site
THE EXPLORATION PROCESS
EXPLORATION - SEISMIC SURVEYING

• Seismic surveying is a process that generates a 2-D image of the subsurface which helps determine the presence and extent of coal seams.

• The process requires acoustic signals to be passed through the surface of the Earth in straight lines, these are reflected by the interfaces of different rock types. The reflected signals are received by geophones and recorded for interpretation into a 2-D image.

• Advantages:
  • Low impact alternative to drilling
  • Can be conducted along existing roads in many areas
THE EXPLORATION PROCESS
BASICS OF DRILLING

• Hole diameter is about 120mm (5 inches)

• Hole depth depends of geology – but generally less than 800m

• Multiple strings of casing – isolation of well from surroundings

• Water flushed down the drill string to the face of the bit, to allow cuttings to be flushed back to surface

• Cuttings at surface are captured in a small ground pit

• All strings cemented in place to isolate any aquifers

• Qualified drilling personnel

• Strong safety focus – lifesaving rules

• Site rehabilitated after drilling

• *Exploration wells will not be converted to production wells*
THE EXPLORATION PROCESS
EXPLORATION DRILLING

Exploration wells
- Chip hole – to determine presence of coal
- Core holes – to determine gas contents
- Exploration drilling is low intensity, sites several kilometres apart
- Level of site preparation deemed necessary in consultation with landholder and assessed on case by case basis

Landholders are compensated in accordance with the Petroleum & Gas Act
- 3-6 weeks duration depending on depth and type of exploration hole
- Small, truck mounted rigs and support vehicles (water, drill rods, personnel transport, testing services etc)
THE EXPLORATION PROCESS
PILOT TESTING

- Drilling up to five individual wells

- Wells in close proximity (between 100m – 500m apart)

- Water and gas brought to surface – water stored in small purpose-built dam

- Pilot testing may last up to 18 – 24 months
EXPLORATION IN THE CAPRICORN AREA
ARROW ENERGY
CAPRICORN AREA EXPLORATION ACTIVITIES

• ATP 716 (Capricorn Area) extends for approximately 160km from Bajool in the south to Stanage Bay in the north.

• Arrow is exploring in three separate basins within the Capricorn area
  1. The Herbert Creek Basin
  2. Yaamba Basin
  3. Casuarina Basin

• Previous drilling for oil shale has shown significant carbonaceous sections, including coaly and lignitic oil shales that may source significant gas.

• Arrow is currently at the very early stages of exploration so not much is known about the potential of the area.
In 2007 three exploration wells were drilled in the ATP716 area at two sites:

- Yaamba 1 – approximately 5km north of Yaamba
- Herbert Creek 1 and 1a – approximately 26km north-east of Marlborough

Wells drilled at both these sites were unsuccessful due to poor ground conditions.
CSG EXPLORATION
EXPLORATION ACTIVITIES

• Three additional wells have been drilled in 2011
  • Casuarina 1 – approximately 17km south-east of Rockhampton (Sep/Oct)
  • Yaamba 2 – approximately 5km north of Yaamba (Oct/Nov)
  • Herbert Creek 2 – approximately 26km north-east of Marlborough (Oct)
CSG EXPLORATION
EXPLORATION ACTIVITIES

- Two more wells are currently planned for 2012, dependent upon results from the 2011 drilling program
- Two seismic surveys are planned for 2012 in the Herbert Creek and Yaamba Basins, dependent upon results from the 2011 drilling program
- Both seismic programs will be designed to ensure minimal environmental impact
- Further exploration beyond 2012 will be dependent upon the results from the 2011 and 2012 drilling programs
- Preliminary results in the Yaamba Basin have been favourable
ARROW ENERGY
PRODUCTIONAL COAL SEAM GAS WELL AT SURFACE
ARROW BOWEN PIPELINE UPDATE
ARROW BOWEN PIPELINE UPDATE
RECENT ACTIVITY ON THE ARROW BOWEN PIPELINE (ABP)

Arrow Bowen Pipeline (ABP) update

• Pipeline Survey Licence
• Environmental Impact Statement (EIS) terms of reference
• Two ecological field surveys
• Contacted all potentially affected landholders

Next steps (6 – 12 months)

• Continue discussions with landholders
  – negotiate access to conduct detailed ecological assessments and cultural heritage surveys
  – landholders will be shown detailed alignment plans for discussions regarding easements
• Plan to submit the EIS in December 2011
  – sent to landholders and also available in community libraries
  – information sessions will be held to discuss the EIS in 2012
ARROW BOWEN PIPELINE UPDATE
PROPOSED ARROW BOWEN PIPELINE (ABP) ROUTE
ARROW BOWEN PIPELINE UPDATE
ARROW BOWEN PIPELINE (ABP) IMPACTS

Arrow Bowen Pipeline (ABP)

- Proposed 600km long buried steel transmission pipeline
- Up to 650 jobs during construction
- Five temporary camps along pipeline route

Roads

- Under the Petroleum and Gas Act, Arrow must adhere to “notifiable road use” standard
  - Compensation and upgrade/maintenance requirements over 10 000 tonnes per year
- Road and traffic management plans will be developed in collaboration with local Councils
COMMUNITY ENGAGEMENT
BRIGHTER FUTURES – COMMUNITY INVESTMENT PLAN

Employee committees assess applications for donations, sponsorships and partnerships on the following focus areas:

• Health and safety
• Education
• Environment

Successful applicants in the region to date include:

• Isolated Children’s Parents’ Association
• Outback Barbarians Rugby Club
• Camboon Campdraft & Recreation Club Inc
• Birri Indigenous Organisation
• Theodore District Health Council Inc.
• The Salvation Army (Qld) Property Trust for Samaritan House Mackay
Questions and Answers

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