

ARROW ENERGY UPDATE COMMUNITY INFORMATION SESSIONS JULY 2016

Arrow Energy update

Community information session 26 – 28 July 2016

Introduction

In July 2016, Arrow Energy (Arrow) held a series of community information sessions to provide an update on Arrow's operations across the Surat Basin.

Following a formal presentation, attendees were invited to ask questions of Arrow staff members.

These notes reflect the questions asked and answers provided during the information sessions. While the notes include some paraphrasing and summarising, every effort has been made to preserve the integrity of the discussions.

Information sessions were held from 26 to 28 July 2016, and included both 'drop-in' style sessions with no formal presentation or question and answer session; as well as formal presentations and question and answer sessions. Information sessions were held as follows:

Wandoan	26 July 2016	Drop-in information session
Miles	26 July 2016	Drop-in information session
Chinchilla	27 July 2016	Presentation, questions and answers
Dalby	27 July 2016	Presentation, questions and answers
Cecil Plains	28 July 2016	Presentation, questions and answers

A copy of the presentation is available on the Arrow website: www.arrowenergy.com.au

How to read these notes

Questions and comments from the audience are in bold type, with the response from Arrow staff also provided. In some cases responses have been summarised. In others, additional information is included to provide further context or explanation; this information is italicised following the answer.

If you have questions or comments about the project or these meeting notes, please contact the project team during working hours on:

freecall 1800 038 856

email: info@arrowenergy.com.au

Acronyms

OGIA – Office of Groundwater Impact Assessment
UWIR – Underground Water Impact Report
QGC – Queensland Gas Company
BG – British Gas Corporation
CCA – Conduct and Compensation Agreement
LNG – Liquefied Natural Gas
CSG – Coal seam gas
EHP – Department of Environment and Heritage Protection
ATP – Authority to Prospect
SGP – Surat Gas Project
EIS – Environmental Impact Statement
SREIS – Supplementary Report to the Environmental Impact Statement
DNRM – Department of Natural Resources and Mines
IAA – Immediately affected area

Legislation

Regional Planning Interests Act 2014 (Regional Planning Act)
Water Act 2000 (Water Act)
Petroleum and Gas Act 2004 (P&G Act)
Environmental Protection Act 1994 (EP Act)
Coal Seam Gas Water Management Policy 2012

Date:	28 July 2016
Time:	10am – 2pm
Venue:	Cecil Plains Community Hall
Presenters:	Katie Whittle, General Manager New Opportunities, Arrow Energy Stephen Denner, Hydrogeology Team Lead, Arrow Energy Carey Bradford, Compliance Manager, Arrow Energy
Facilitator:	Nathan Williams, Articulous

1. How many wells are at the Meenawarra Pilot site?

It is a standard pilot site with six wells, three have been worked over to date.

2. Why didn't you do all six?

We drilled the pilot back in 2009 and didn't get good data from the wells. We don't know if it was a false negative. If we get good data, we might workover the additional three wells. The decision has not been made yet. We think it will be a slow process, so we don't see a decision being made in the near term.

3. What is the timeframe for these workovers?

The Meenawarra Pilot was drilled into a tighter coal seam; it doesn't give up the gas easily. We are learning from our operations in the Bowen Basin to take the water slowly where there is less permeability. If we drawdown the water slowly, there will have a greater influence in the coal seam. It could take upward of three months for the drawdown to occur. Where permeability is greater, we would drawdown quicker.

4. So it will be at least three months?

At the three month mark we will know if we are getting reasonable gas flow and would then like to operate the well for a further six to nine months to see what data can be gathered.

5. Your recent seismic survey activity – we are very interested in seeing the map in relation to ground infrastructure. Could you show us the map again in relation to Cecil Plains?

Arrow would be happy to email you a copy of the map.

A copy of the map is also available under the community information session resources section of the Arrow website.

6. What is the life expectancy of gas and reserves?

It depends on the areas – basically there is a 20 year life cycle on wells.

7. When you finish, do you just walk away from it?

When we abandon a well, we pump cement from the bottom to the surface. There is no oxygen in the well, so the cement is essentially like a rock in the ground. At this point, the well has been decommissioned.

8. Have you worked out what you can do with the data you got from seismic – like placing deviated wells? Can you tell us where you can do deviated wells based on the depth?

Yes the map of the Horrane Fault helps to work out the depth of the coals. Our cut off for deviated wells is 400 metres so the deeper areas can be accessed with the deviated wells while the areas less than 400m will require single vertical wells.

9. So the lighter on the map is the deeper?

Yes the purple is deeper.

10. I hope you are developing in accordance with the Regional Planning Legislation. At no time should the Condamine Alluvium be accessed by anyone other than licence holders. Licence holders want a guarantee that there will be no impact on the water level in the aquifer. As you consider moving into the planning stage of your project, make sure it takes into account the Regional Planning legislation.

We are well aware of the requirements under the legislation and we will work with landholders accordingly.

I don't want you to even think about coming onto IFL without abiding by Regional Planning legislation.

We will act within the Act.

11. What interaction is there between coal seams and the Condamine Alluvium when you dewater the seams? Is there no connectivity between the layers, can gas move upwards through the seams?

Data collected from the tests verified that there is only a low level of hydraulic connection between the Condamine Alluvium and the underlying Walloon Coal Measures.

Details of the findings from the Daleglade and Lone Pine Groundwater Interconnectivity Trials are available on the Arrow website:

www.arrowenergy.com.au/sustainability/environment

12. So what about the gas seepage in Chinchilla?

The geology of the Chinchilla area is significantly different from the areas overlain by the Condamine Alluvium. In the area of the Condamine River gas seeps, the coal seams are almost fully saturated with gas, so gas that is desorbed can readily be made mobile. This set of circumstances is rarely found together in the Surat Basin and does not occur where the Condamine Alluvium is present.

By contrast, gas saturations in the area overlain by the Condamine Alluvium are significantly under-saturated and particularly so in the upper coal seam packages. The seams themselves are close to flat lying, with a very gentle dip. The low dip angle means the buoyancy of any free gas is minimal and the low saturation means that any gas that is potentially made mobile will be readily re-adsorbed onto the updip coal.

The low connectivity between the Condamine Alluvium and the Walloon Coal Measures has been demonstrated by the Condamine Interconnectivity Research Project led by OGIA (including aquifer pumping tests and coring undertaken by Arrow).

Evidence of the low degree of connection between the Condamine Alluvium and the Walloon Coal Measures is also supported by the abstraction of large volumes of water from the Condamine Alluvium for around 50 years. This has led to large drawdowns in some parts of the Condamine Alluvium without any apparent change in water quality in the Condamine Alluvium or reduction in water levels in the underlying Walloon Coal Measures.

13. I've seen pictures of gas bubbling in the river at Chinchilla, so it's because of a steep incline in the coal seam?

In the Chinchilla area, there is a deep basement initiated structure called the Undulla Nose. In this area the Bowen Basin underlies the Surat Basin which has been draped over the top. In the Undulla nose area the coal is fractured and heavily saturated with gas.

In the upper coal seams the gas saturation is around 100 per cent – almost fully saturated. This is one of the few instances where if gas is made mobile, it will find the quickest and closest route to surface.

Geologically, within the Chinchilla area there is an anticlinal structure [*in structural geology, an anticline is a type of fold that is an arch-like shape and has its oldest beds at its core*], which was formed in the geological past. This means the highly saturated Walloon Coal Measures are shallow and close to the surface. In some areas, the Springbok Sandstone has more deeply eroded into the top of the Walloon Coal Measures, which may also have an impact on gas migration.

14. Your slide showed where you are today and the area wide planning process, when is your Final Investment Decision?

We don't have a date for FID. We are value-driven and not schedule driven. When we do have dates we will come back to the community and let them know.

Investment decisions are a matter for shareholders - Arrow cannot speculate.

15. What is Area Wide Planning?

It is about getting landholder constraints early in the planning stages to ensure the placement of infrastructure takes landholder constraints into account. It is about working with landholders.

Area Wide Planning would happen around two years prior to development in the area.

From the Area Wide Planning pilot completed in Cecil Plains, we've taken learnings back to the business that have been incorporated into the business planning process.

16. I have a question that relates to the transmission line through Gladstone. Will you go through with development and then export to Gladstone through current transmission lines? Is there opportunity for connection to current domgas business?

Arrow has a number of options for providing the gas to markets, and there are numerous existing export routes that provide connections to different markets. These options and discussions are commercial-in-confidence so I can't elaborate. However, we do look at all these options, including domestic gas markets. Using existing infrastructure makes sense to us, and we are undertaking collaboration discussions.