

ARROW ENERGY

MINE PRE-DRAINAGE

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TODAY'S PRESENTATION

- **CSG and coal mining co-development in the Bowen Basin**
- **How Arrow can add value to mining**
- **Opportunities for regional-scale coal and CSG co-development**
- **Costs and economic drivers**
- **Aligned objectives**
- **Success factors**

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JOINTLY OWNED BY SHELL AND PETROCHINA

- Bowen & Surat Basin CSG resources
- CSG tenements overlap coal tenements
- Commenced gas production in 2004
- 1100 wells – 600 producing
- Providing domestic gas and electricity
- Developing CSG-LNG export capacity

Arrow adding value to mining:

- CSG drainage of future mine projects
- Access to higher value gas markets
- Access to CSG technical capabilities
- CSG ability to offer regional gas integration

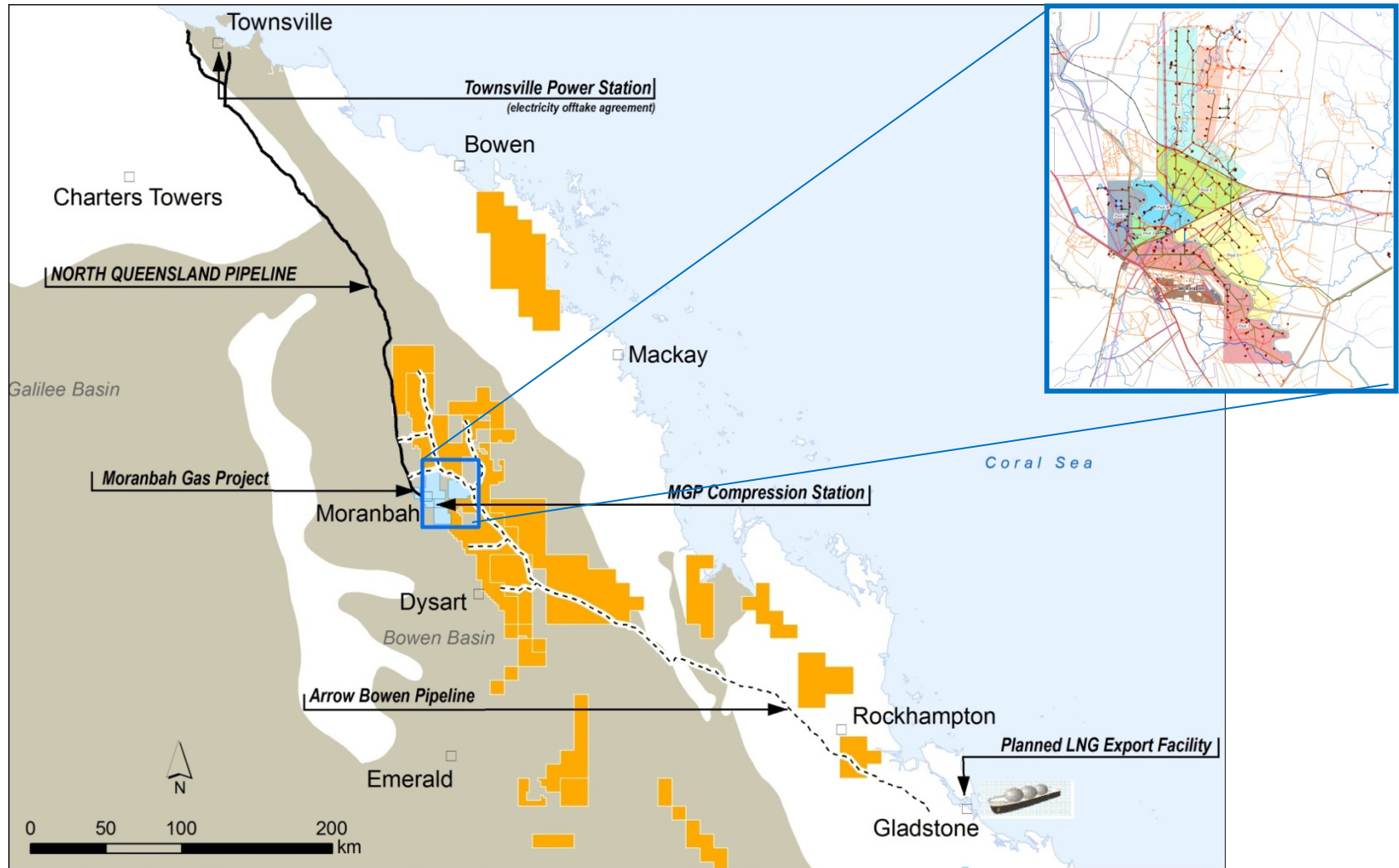


LOCATION

- Bowen Basin in Central Queensland
- World-class coal and CSG resource
- 2011 coal exports worth \$29 Billion
- Methane drainage in underground mines
- Mine site gas power generation 120 MW
- Expanding coal mining development
- Arrow domestic CSG business
- Arrow CSG-LNG development



MORANBAH GAS PROJECT – MINE PRE-DRAINAGE PLATFORM

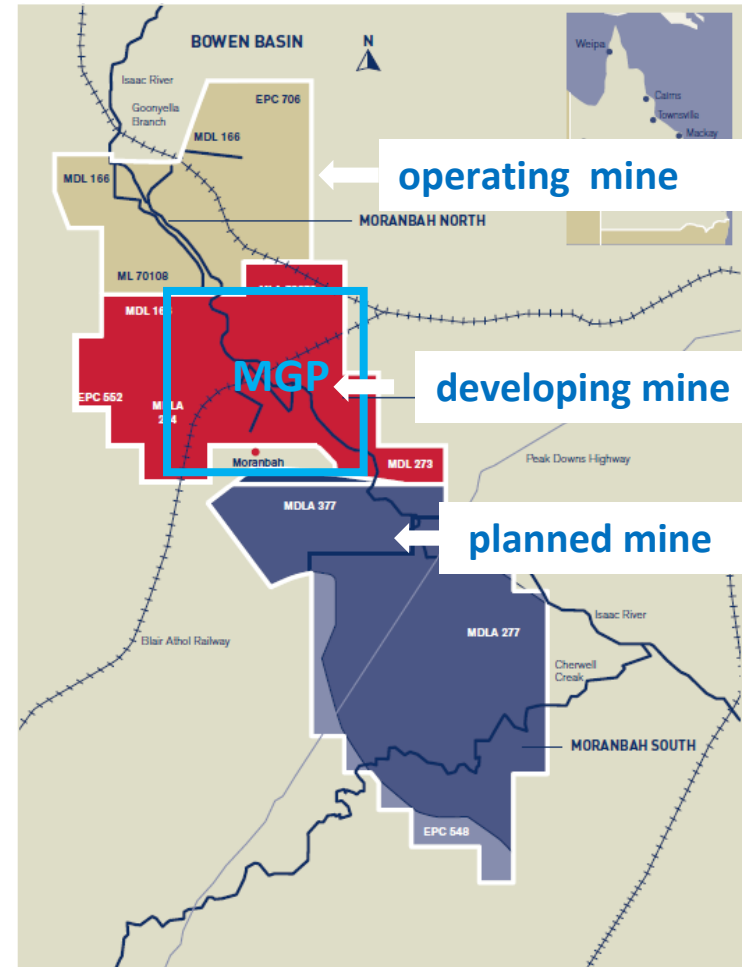


MORANBAH GAS PROJECT AND MINING CO-DEVELOPMENT

- Moranbah Gas Project 2004 start-up
- SIS drainage from mineable seams
- CSG drainage of planned mining project
- Gas off-take from adjacent operating mine
- Several additional adjacent planned mines
- Scope for regional gathering of mine gas
- Future connection to CSG-LNG market

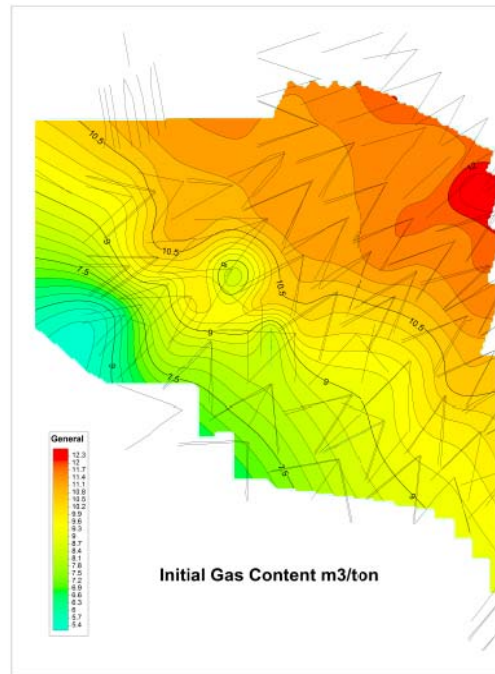
MGP adding value to mining with:

- pre-drainage of planned mining projects
- access to gas pipelines
- access to higher value markets



BENEFITS TO MINING OF ARROW PRE-DRAINING & TECHNOLOGY

Before



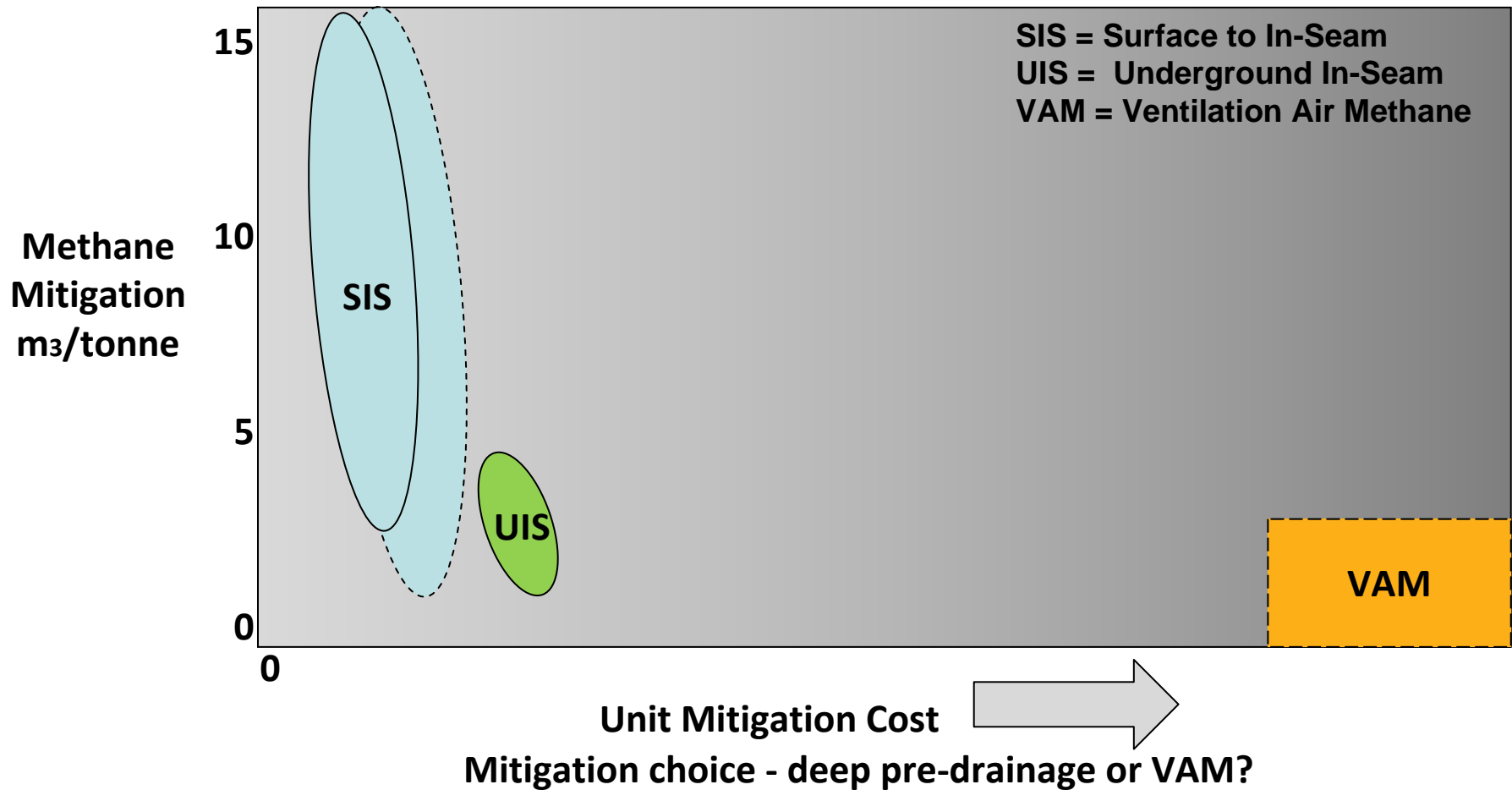
Arrow pre-drainage of mineable coal:

- Gas drainage of planned mines
- Major reduction of mine costs
- No impact on safe and efficient mining

Access to Arrow data and technology:

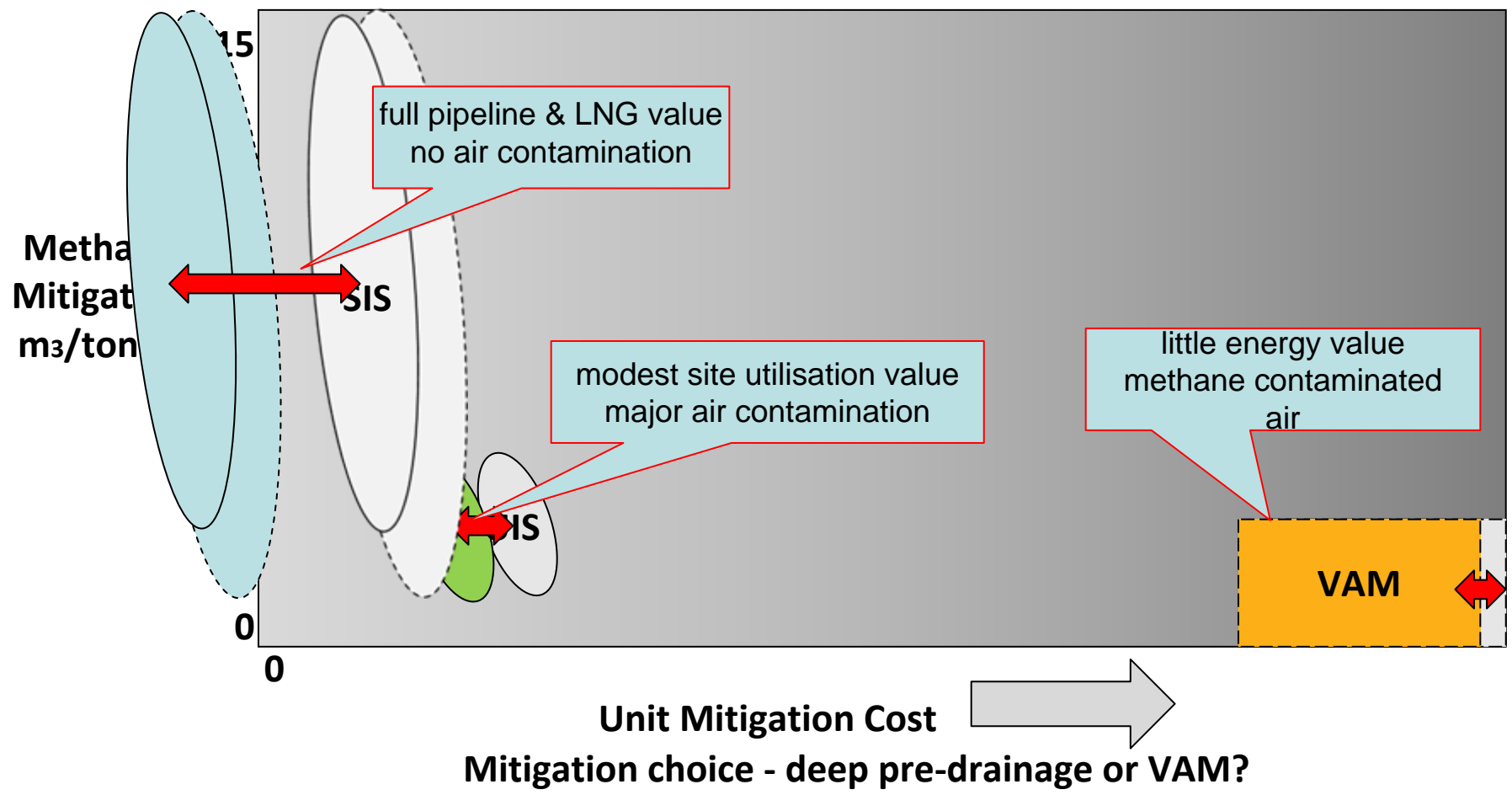
- Exploration, Production & Environmental data
- State of art reservoir modelling
- Regional gas resource variation

MINE METHANE ABATEMENT ILLUSTRATIVE COST OPTIONS



ILLUSTRATIVE COST OPTIONS – NET OF METHANE MARKET

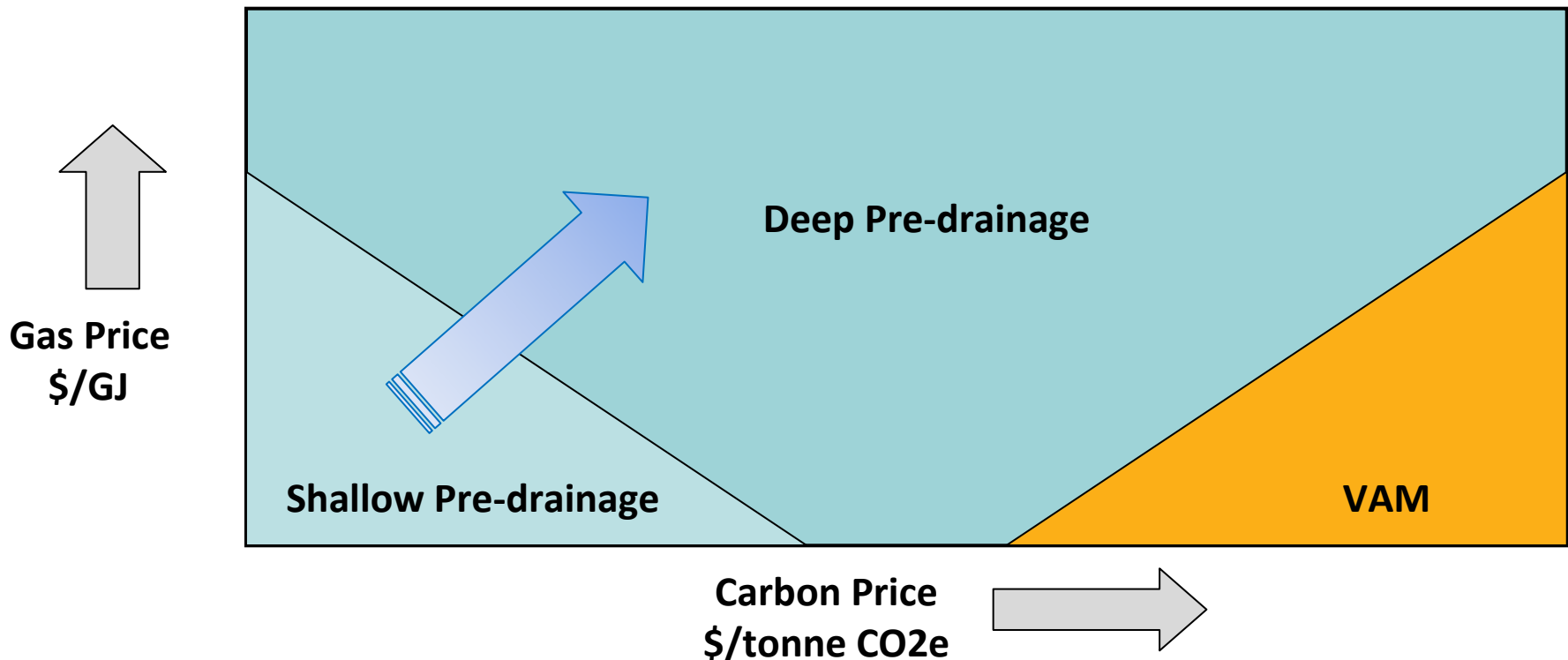
VALUE



METHANE ABATEMENT TECHNOLOGY ECONOMIC DRIVERS

Current Australian pipeline gas and carbon prices drive:

- deeper SIS pre-drainage maximising methane value
- lower residual methane in coal when mined
- lower mining emissions in the absence of viable VAM oxidation



MANAGING VALUE AND COST IN COAL METHANE

Mining company objective

- Optimise mine design, using vent air methane as a design limit
- Mine degassing plan matched to mine plan and lower the target seams gas density for safe access and design limit of ventilation system
- Lower the gas density as safely, quickly and for lowest cost.
- Minimise carbon liability

CSG-LNG company objective

- Optimise drainage design for best economic recovery, and maximum marketable gas yield
- Sequence gas production to LNG facility from lowest to higher production cost
- Lower the gas density safely, at lowest cost and with maximum yield

SUCCESS FACTORS FOR CO-DEVELOPMENT PROJECTS:

1. Committed and aligned parties

- Aligned values - especially safety,
- Both parties seeking win/win outcomes
- Assisted by economic drivers and supportive legislation

2. A robust co-development plan

- defining practical co-development and timing
- effective communication and exchange of data
- maximising mutual opportunities and benefits
- minimising potential constraints and conflicts
- flexibility within agreed framework for planning

3. A robust co-development agreement

- designed for the implementation of the co-development plan
- providing the certainty required for investment

Arrow and Anglo American have worked this way for 10 years

SUMMARY

- Arrow's Bowen Basin CSG tenements overlap world class coal deposits
- Domestic CSG production already degassing coal resources ahead of mining
- Domestic CSG pipeline provides a high-value market for uncontaminated mine gas
- Export CSG-LNG development will expand mine gas off-take opportunities
- CSG production can provide major reductions in mine development costs
- CSG infrastructure provides regional mining access to high value markets
- Access to CSG data and technology assists mine planning

SUMMARY

- Australian gas and carbon prices are driving deeper SIS pre-drainage
- High value markets support deeper pre-drainage and reduce mine emissions
- The gas drainage objectives of mining and CSG companies are aligned
- Success requires aligned values, commitment, and collaborative planning

Arrow is committed to co-development of CSG with coal mining

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Questions

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