



November 2016

**Cheap Reliable Energy**



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# Leigh Creek Energy Disclaimer

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This presentation has been completed by Leigh Creek Energy Limited. It may contain forward looking statements that are subject to risk factors associated with the energy industry. It's believed that the expectations reflected in these statements are reasonable, but they may be affected by a variety of changes in underlying assumptions which could cause actual results or trends to differ, including but not limited to: price fluctuations, actual demand, currency fluctuations, drilling & production results, reserve estimates, loss of market, industry competition, environmental risks, physical risks, legislative, fiscal & regulatory developments, economic & financial market conditions in various countries & regions, political risks, project delay or advancement, approvals & cost estimates amongst other items, & the cumulative impact of items.

This presentation may also contain non-IFRS measures that are unaudited, but are derived from & reconciled to the audited accounts. All references to dollars, cents or \$ in this presentation are to Australian currency, unless otherwise stated.

## **Mineral Resource Statement**

Estimates of Mineral Resources reported in this announcement were initially reported & released to the ASX on 8 Dec 2015. We are not aware of any new information or data that materially affects the information included in the 8 Dec 2015 announcement & all the material assumptions & technical parameters underpinning the estimates in that announcement continue to apply & have not materially changed.

## **Gas Resources Statement**

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# Market Opportunity

Section 1 |

# Right market, right time, right place

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## **The right market, the right time:**

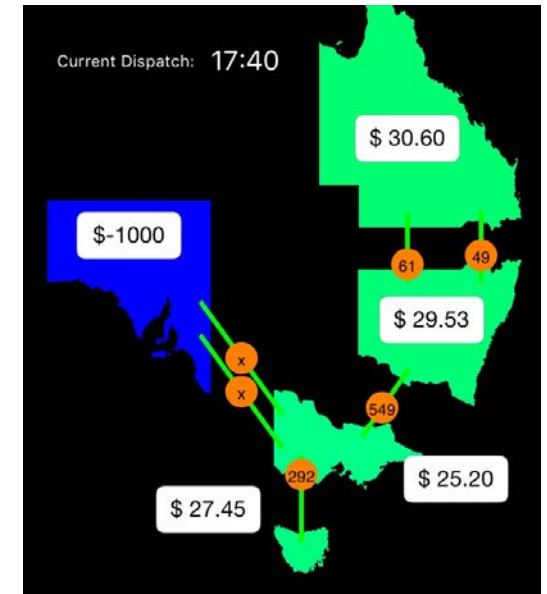
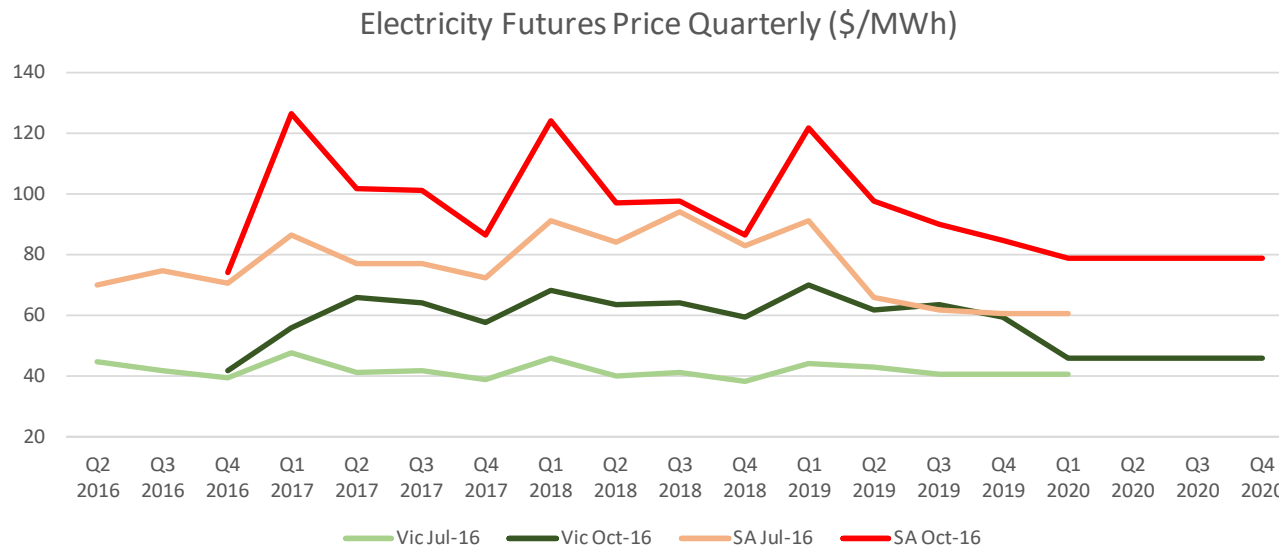
- Stability of energy supplies in crisis
- Dramatically rising power and gas prices
- Longterm supply constraints

## **The right place:**

- Ideal project location for ISG
- Strong local demand from major customers
- Legal and regulatory certainty in South Australia
- Very supportive government

# Expensive and Unreliable Power in SA

The Australian National Electricity Market (NEM) is in turmoil, with South Australia at the epicentre. Prices have risen despite falling demand, averaging A\$104/MWh since July, 2016.



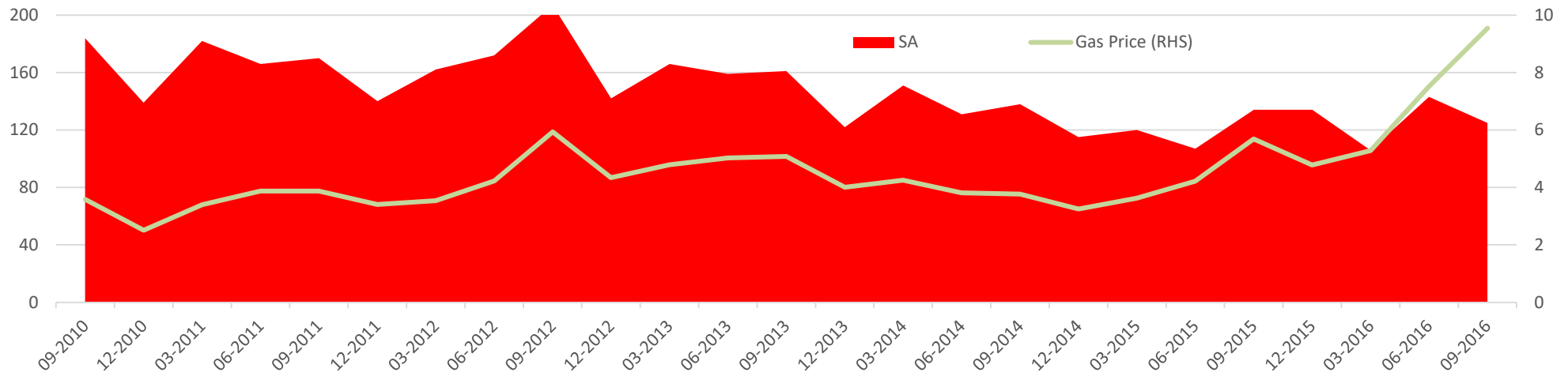
The National Electricity Market on the day of the South Australian Blackout, 28 September 2016

Grid stability is becoming an important concern due to:

- Intermittent power
- Renewable mandates and certificates
- Withdrawal of both base-load and peak-load fossil supply

# Gas prices rising, LNG Exports driving demand

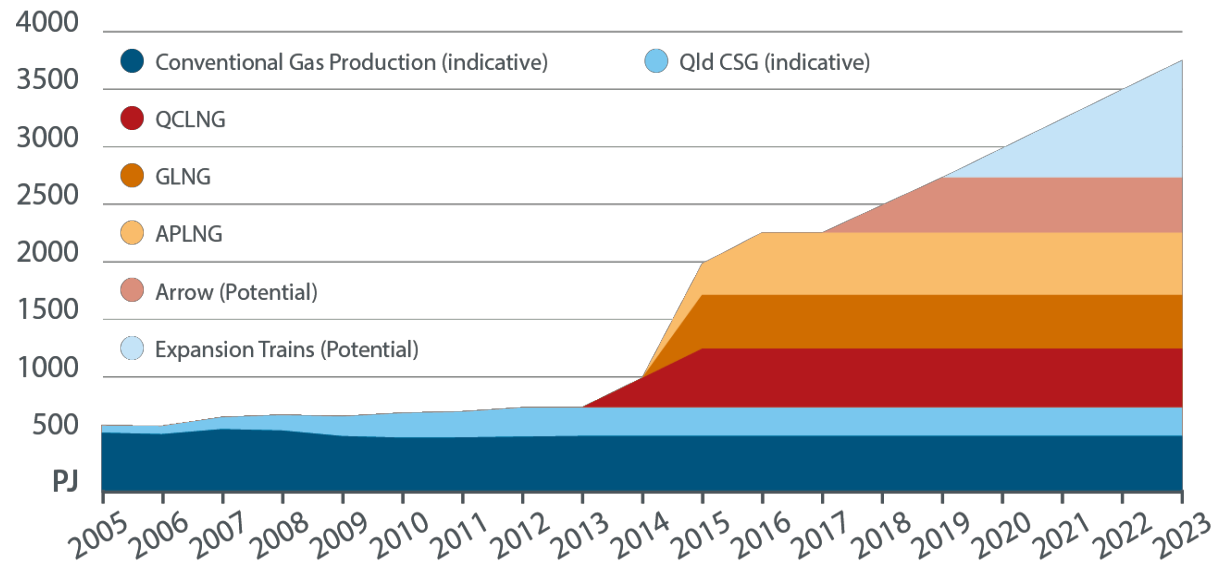
SA Daily Gas Consumption for Power (TJ) and Price (A\$/GJ)



Despite gas demand for electricity generation falling, prices have more than doubled to A\$9/GJ in Adelaide since 2014.

Except for SA, other States are limiting supply of new gas.

Further gas shortfalls are anticipated as the 3 LNG plants in QLD ramp up.



# Regional demand for 500-900MW

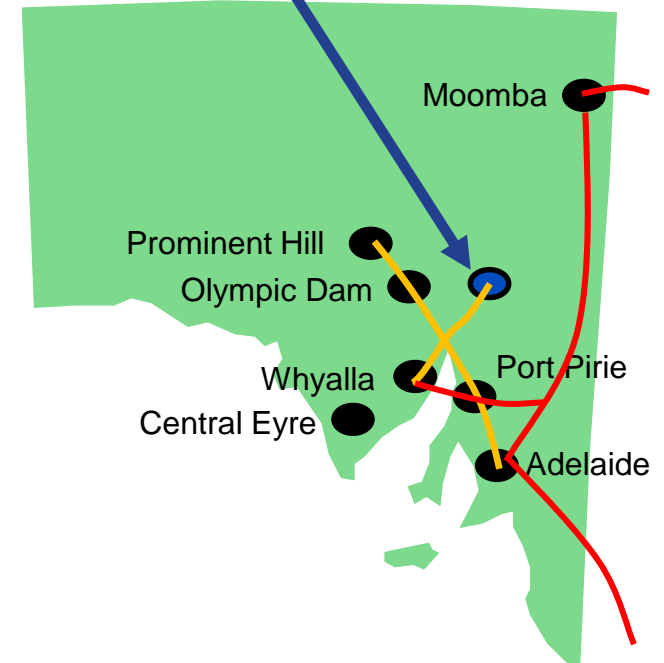
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**LCEP is near major energy consumers:**

- Olympic Dam (Cu/U)
- Prominent Hill (Cu)
- Carrapateena (Cu)
- Whyalla (Steel and Hydromet)
- Port Pirie (Pb)
- Central Eyre (Iron Ore)

As well as the metropolitan demand centre in Adelaide.

## Leigh Creek Energy Project (LCEP)



Transmission Lines

Gas Pipelines

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# LCK Solution

Section 2 |

# The Leigh Creek Energy Solution

Plentiful energy from in-situ gasification (ISG) of coal will permit, in a staged development, low cost domestic supply of:

- Electricity – reliable baseload for SA
- Natural Gas – into the East Coast system
- Further development – fertilisers and explosives

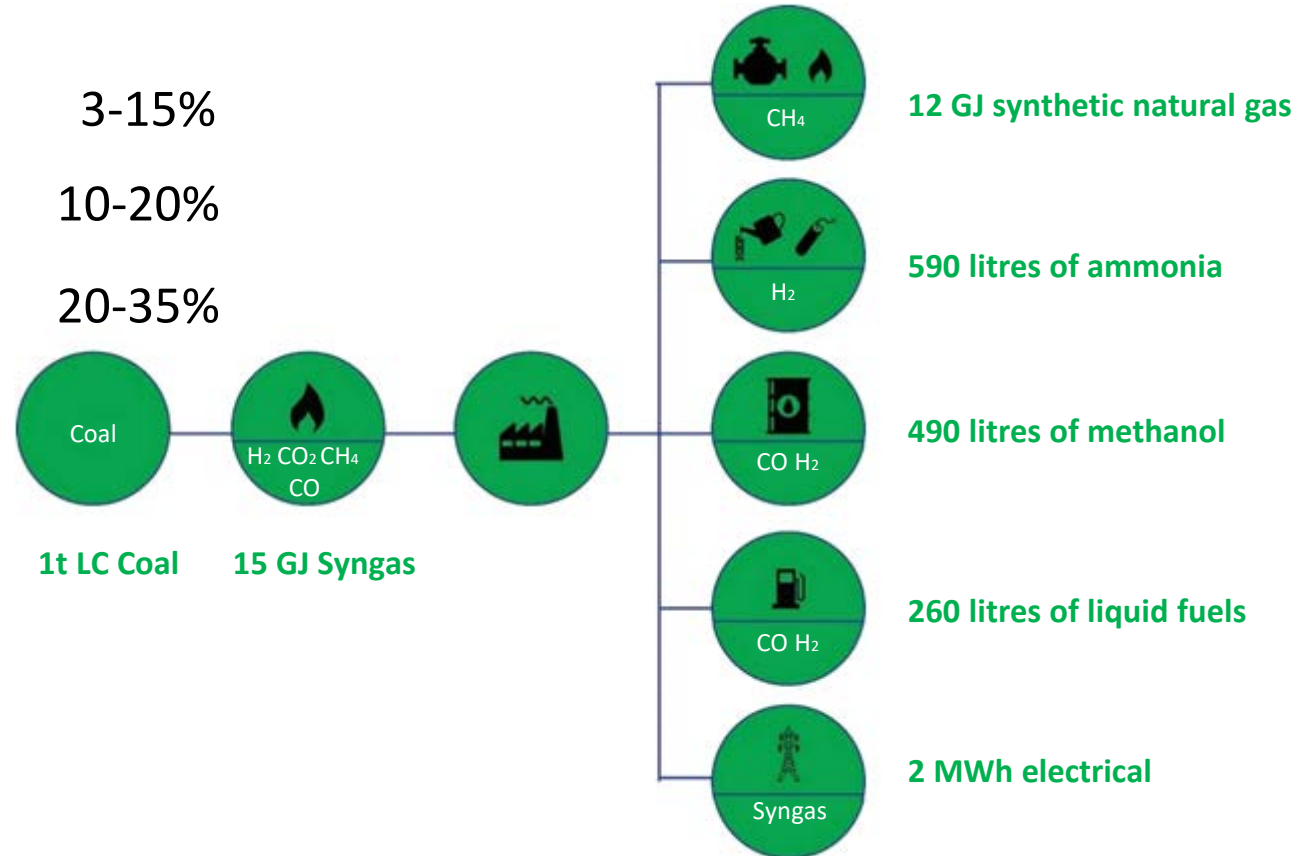
LCK's primary focus is to provide reliable electricity supply to major energy consumers in SA and the metropolitan demand centre in Adelaide.



# Syngas composition and uses

ISG produces a syngas which contains a variety of components. The composition and energy content changes depending on whether the gasifier is Air-blown or Oxygen-blown. The main fuel components <sup>(1)</sup> are:

- Methane – CH<sub>4</sub> 3-15%
- Carbon monoxide – CO 10-20%
- Hydrogen – H<sub>2</sub> 20-35%



(1) HRL Process Modelling of ISG for Leigh Creek Coal, December 2015

# Gas and Coal Resources

Coal resource: JORC 2012: 377 million tonnes inferred. <sup>(1)</sup>

Gas resource: SPE-PRMS: 2,964 PJ 2C. <sup>(2)</sup>

Category	1C	2C	3C
Gas Resource (PJ)	2,748	2,964	3,303

- Resources will likely convert from 2C to 2P Reserves once gas demonstration is completed in the middle of 2017.
- Option to produce power or annual production of up to 80 PJ of saleable natural gas.
- Offering 25-50 years of production, depending on production profile.

(1) Refer ASX release dated December 8, 2015

(2) Refer ASX release dated January 8, 2016

# South Australia is an excellent jurisdiction

South Australia consistently ranks near the top of the world's mining provinces as a place to do business. <sup>(1)</sup>

- Clear title and development pathway
- ISG is included in existing legislation
- Government support for Unconventional Gas
- Native Title process well understood
- Highly skilled labour in need of employment
- Identified as the state which supported natural resource development the most.

## Leigh Creek Energy Project (LCEP)



**SA has a roadmap for unconventional gas, has encouraged a migration of gas companies into the state, and has established a A\$24m PACE Fund to assist in the proving of new resources.**

(1) Fraser Institute 2015 survey placed SA 10<sup>th</sup> out of 109 regions worldwide

# Government funding supports

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## Federal R&D tax offset on PCD spending:

- Advance Finding Certificate awarded from Federal Government on eligible activities on our Pre Commercial Demonstration
- Estimated expenditure on eligible activities totals A\$21m
- Implied cash rebate totalling A\$9m
- Financing options are being investigated

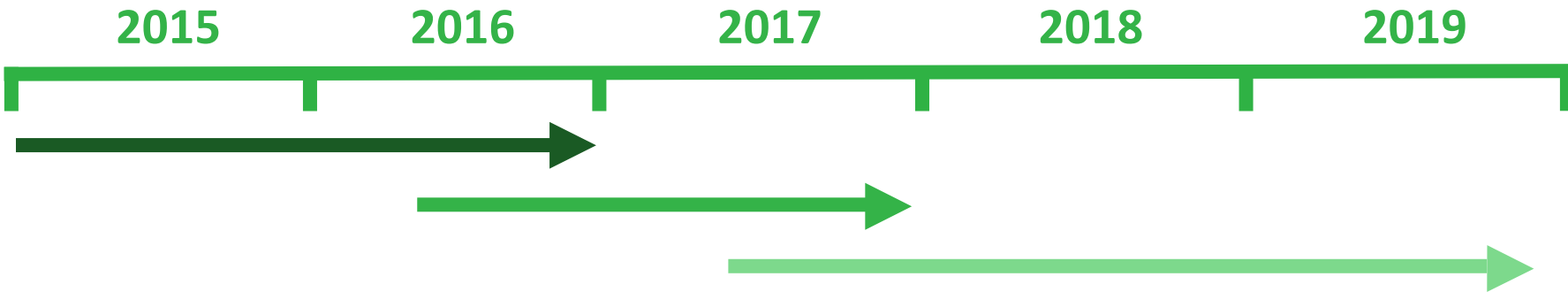
**Furthermore, LCK has A\$45m in available tax losses**

## SA Government PACE grant:

- The South Australian Government has announced a A\$24m scheme to “Accelerate Investment in Gas Projects”
- LCK will be an applicant for matching funds for the PCD
- The maximum application amount is A\$6m

# Next steps for LCK

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- JORC 2012 resources
- Gas certification
- Site environmental characterisation



- Approvals
- Construction
- Cold and hot commissioning
- Syngas demonstration (mid-2017)



- Approvals
- Construction
- Cold & hot commissioning
- Electricity and syngas production (2019)
- Plant expansions

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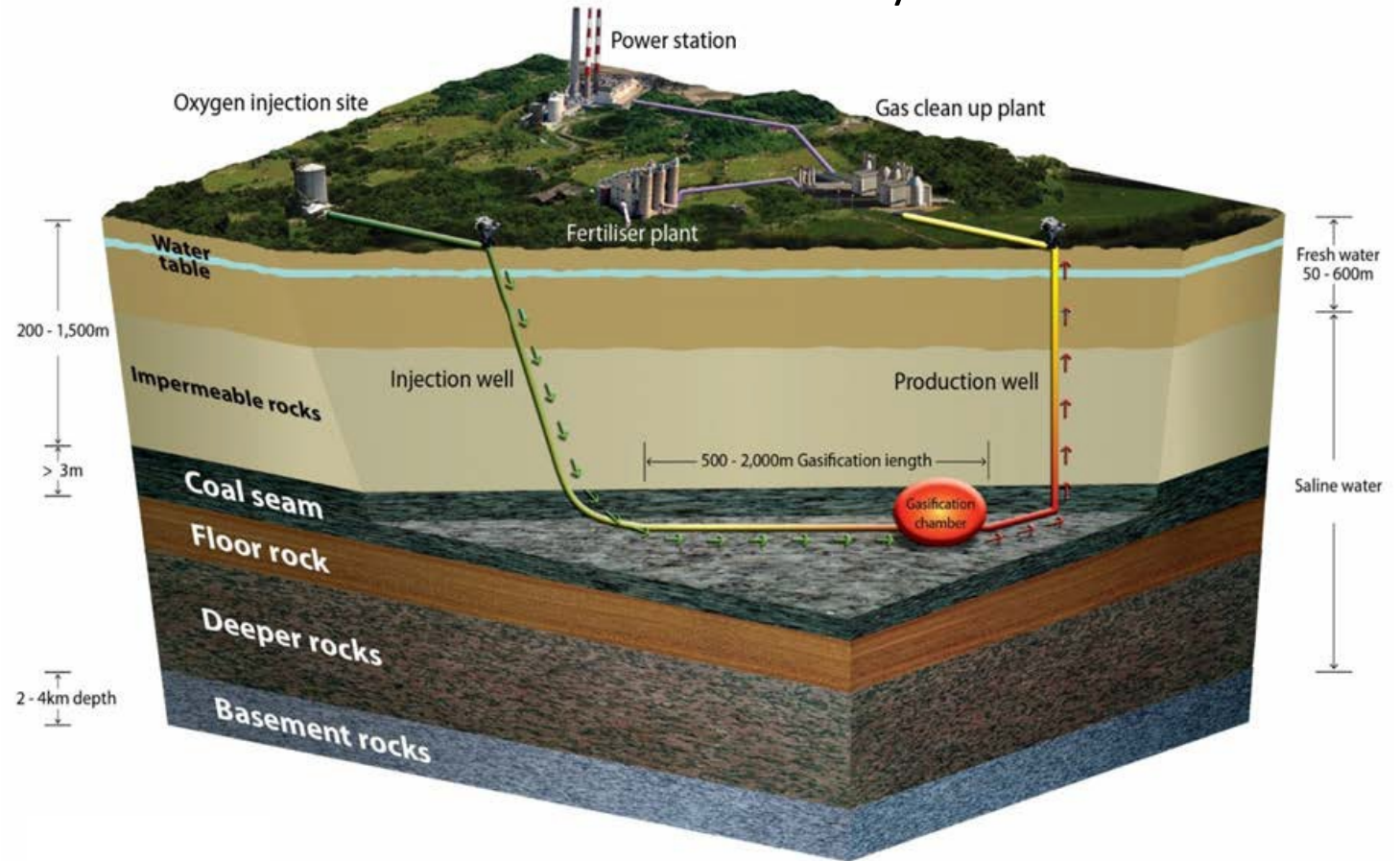
# ISG Technology

Section 3 |

# In-Situ Gasification (ISG)

The ISG process converts coal to syngas underground and then brought to the surface. The syngas is processed and can be used in a number of ways:

- Power
- Methane
- Methanol
- Fertiliser
- Others



Standard oilfield equipment is used in the process.

# Leigh Creek Coal Field – ideal for ISG



Leigh Creek is an existing mine site. It produced coal for 60 years for the Port Augusta power station, 250km away.

## Ideal Location with existing infrastructure:

- Remote from major populations
- Self-contained groundwater system
- Power transmission lines
- Sealed road, airport, rail, water
- Major gas pipeline 125km away
- Township of Leigh Creek



# ISG gas demonstration

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**Demonstration will show community and government that ISG can operate:**

- Safely
- With minimal impact to the environment

**Data Obtained from Demonstration Allows:**

- Government to approve Commercial Project
- Development of safety and environmental controls
- Optimisation of plant design
- Operating costs discovery

**Crucially, for a total spend of A\$20m LCK will likely convert 2,964 PJ of 2C resources into a similar amount of 2P reserves.**

# Key Engineering Contracts Awarded

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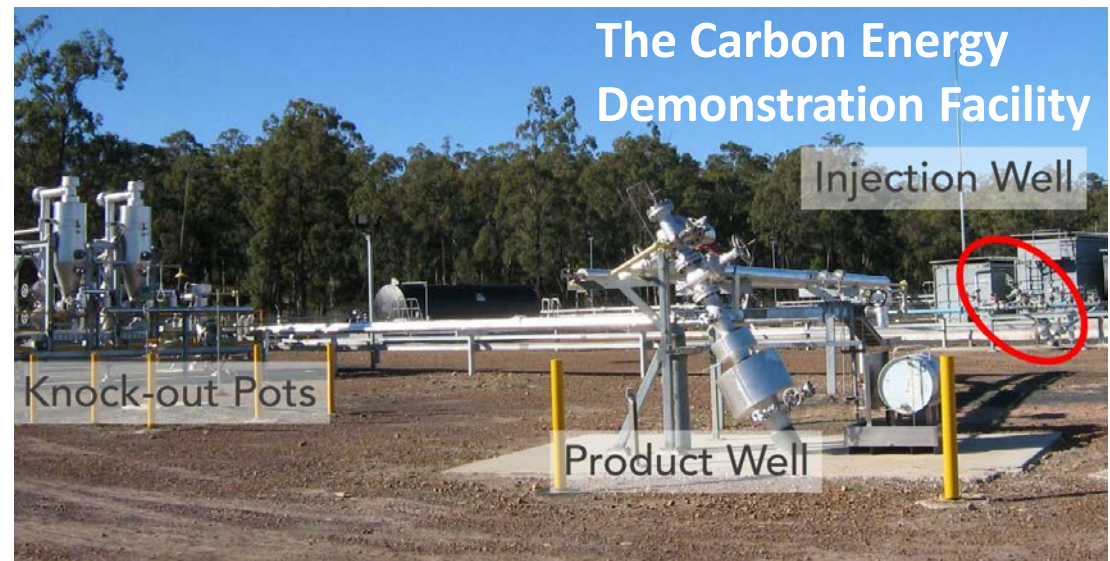
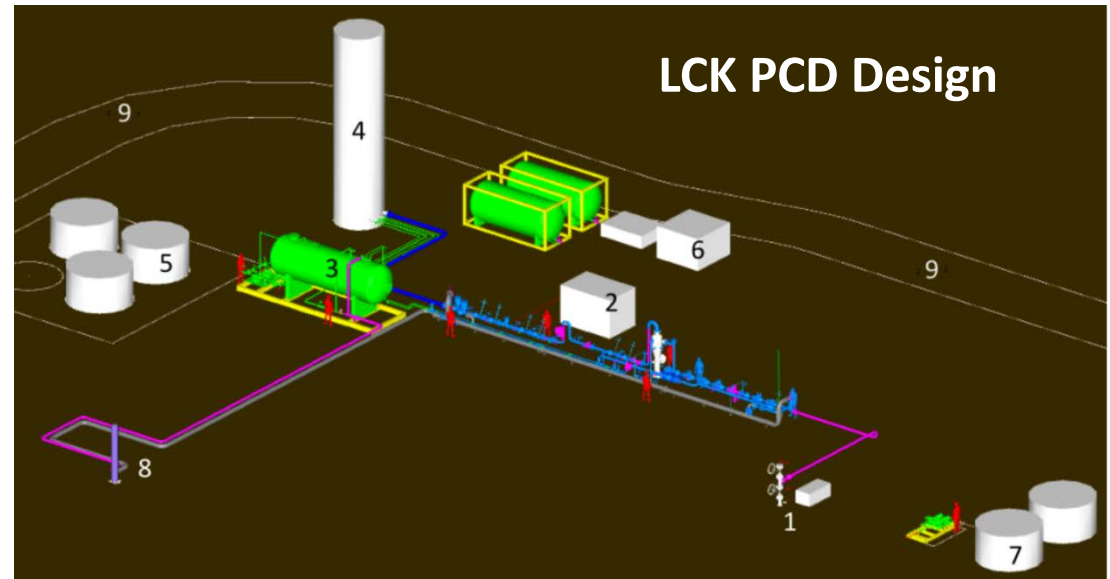
## LCK PCD Engineering Design

1. Production well
2. Gas analyser
3. Condensate separation tank
4. Thermal oxidiser
5. Condensate buffer tanks
6. Generators and diesel storage
7. Water injection facility
8. Cold Vent/Safety Vent
9. Access Road

LCK has awarded the contract for the Thermal Oxidiser and Cold Vent package to Gasco Pty Ltd.

LCK corporate video and ISG explanation:

<https://youtu.be/w1-4gYzT8Ek>



# The worldwide experience of ISG

## Commercial Operations:

- Angren, Uzbekistan: 60 years of operation
- Eskom, Majuba, South Africa – co-firing power station with syngas

## North American Experience:

- 40 years of trials & demonstration
- Multiple sites, techniques, outcomes
- Utilised standard oil-field

## Australian Experience:

- Linc Energy – demonstration facility operated for 11 years
- Carbon Energy – demonstration facility operated for 5 years

## Carbon Energy Bloodwood Creek Project

*Queensland Government's Chief Scientist, Dr. Geoff Garrett AO, confirmed that Carbon Energy:*

- *Met the key recommendations of the government appointed Independent Scientific Panel (ISP).*
- *"It is clear that Carbon Energy has contributed to the collective understanding of UCG and the conditions under which the operation is likely to be both safe and successful."*
- *Demonstrated safe and effective decommissioning and completing of a plan for rehabilitation which were independently reviewed by experts appointed by the DEHP.*

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# Corporate & Financial

Section 4 |

# LCK Corporate Summary

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LCK Capital Structure			Top Shareholders		
Shares		265.9m	Allied Resource Prtnrs.	104.8m	39.4
Options		40.4m	CITIC Australia	17.2m	6.5
<b>Market Cap @ A\$0.13</b>	A\$	34.6m	RBC Investor Services	6.7m	2.5
Cash (as at 30-Sep-16)	A\$	5.4m	One Design Skiff & Sails	5.2m	1.9
Debt	A\$	0.0m	HSBC Custody	4.6m	1.7
<b>Enterprise Value</b>	A\$	29.2m	<b>Top 20</b>	<b>176.1 m</b>	<b>66.2</b>
<b>EV/Resource (2C)</b>	<b>A\$/GJ</b>	<b>0.01</b>			



Leigh Creek (LCK) has 2,964 PJ of PRMS certified syngas and is aiming for commercial production from 2019.

First syngas demonstration is due in the mid-2017.

# Experienced Team

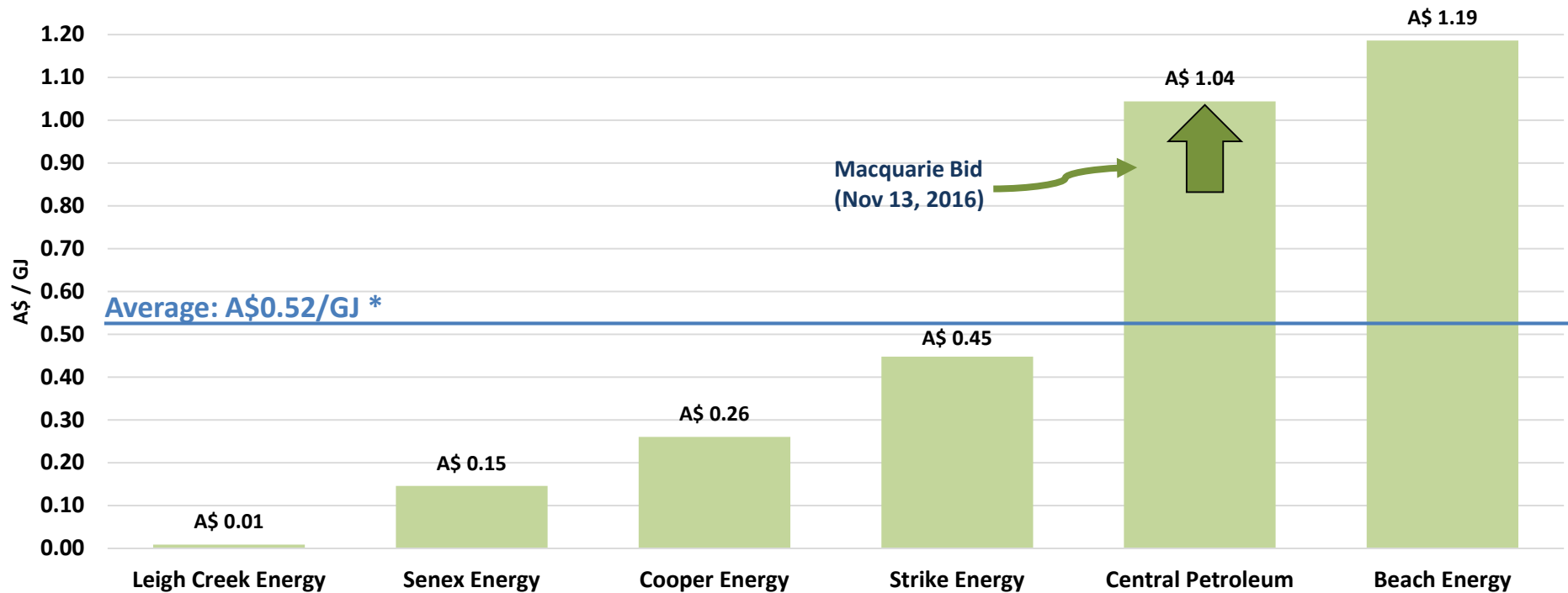
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The Team	Experience
<b>Justyn Peters</b> Executive Chairman	Senior exec with Linc Energy (LNC), the Australian pioneer in ISG, and previously held senior roles in the Queensland EPA. Major shareholder in Allied Resource Partners (ARP).
<b>Phil Staveley</b> CEO	30 years working in oil and gas and mining in planning, commercial and finance roles for firms like Schlumberger, SAGASCO, SAOG, and Normandy.
<b>Justin Haines</b> COO	Broad experience across engineering and geological services. Most recently, worked as Technical Manager for Carbon Energy, successfully operating their ISG facility.
<b>Mark Terry</b> CFO	CPA with more than 20 years of experience in the mining industry, including KPMG, Normandy, Newmont, and Xstrata.
<b>Andrew Harrington</b> GM – Project Finance	20 years across consulting, project finance, institutional banking, and stockbroking. Was a #1 rated equity analyst by Reuters.

# LCK compares very cheaply

LCK is trading at an EV/Resource of only A\$0.01/GJ.

EV/Resources (2C)



2C Resources	2,964 PJ	1,273 PJ	361 PJ	164 PJ	143 PJ	1,255 PJ

\* LCK Resource' Under Avg Valuation: A\$1,541m

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# Conclusion: Right market, right time, right place

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LCK is ideally placed close to major South Australian (SA) energy consumers, infrastructure, as well as the metropolitan demand centre in Adelaide City, where LCK can provide a cost effective solution to an energy market in turmoil.

## LCK will provide:

- Cheap Electricity
- Reliability of supply
- Supply to a natural gas market in shortage

## Key Points:

- Spending ~A\$20m to convert 2,964 PJ (3tcf) of 2C syngas into a similar amount of 2P syngas.
- The South Australian government is very supportive of the unconventional gas industry

# Appendix 1 - Commercial electricity production

The application of ISG is new, but the equipment for both gas handling and the power station is standard:

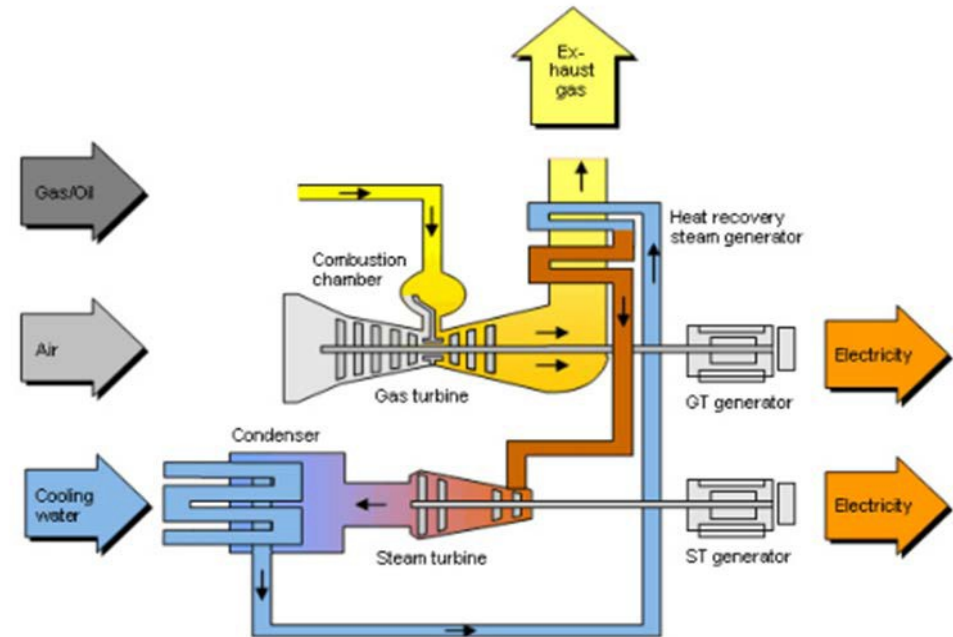
- Performance guarantees from turbine suppliers
- Gas clean-up and upgrading into natural gas (>93% CH<sub>4</sub>)

## Relationships:

- ElectraNet – transmission routes
- CQ Partners – power market studies
- APA – gas pipeline routes
- Shanghai Electric Group – power station construction

## Indicative Timeline:

- Approvals by early 2018, then 18 month construction time



Syngas produced from ISG can be used to fuel a standard Open Cycle or Combined Cycle gas turbine. Feasibility is underway for a staged 100-500MW power station option.