Leigh Creek Energy

Pre-Feasibility Study

November 2020

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This presentation may also contain non-IFRS measures that are unaudited, but are derived from and reconciled to the audited accounts. These should only be considered in addition to, and not as a substitute for, or superior to, our IFRS financial measures. All references to dollars, cents or $ in this presentation are to Australian currency, unless otherwise stated.

Gas Resources Compliance Statement

The PRMS resources estimates stated herein are based on, and fairly represent, information and supporting documentation prepared by Timothy Hower of MHA Petroleum Consulting, Denver USA. MHA Petroleum Consultants LLC is now part of Sproule International Limited. Mr Hower is a member of the Society of Petroleum Engineers and has consented to the use of the Resource estimates and supporting information contained herein in the form and context in which it appears. All estimates are based on the deterministic method for estimation of petroleum resources.

LCK is not aware of any new information or data that materially affects this information and all the material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed.

Mineral Resource Compliance Statement

Estimates of Mineral Resources reported in this announcement are based on the latest information and data available. The recently updated Geological Model and JORC Resource Estimation report, prepared by Warwick Smyth and Lynne Banwell of GeoConsult Pty Ltd during March 2019 was used in this latest PRMS estimation. A copy of the GeoConsult report on the updated Geological Model and JORC Resource Estimation is available to view at www.lcke.com.au.

LCK is not aware of any new information or data that materially affects this information and all the material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed.

Cautionary Statement

The Preliminary Feasibility Study ("PFS") referred to in this announcement has been undertaken to assess the alternative commercialisation pathways for the produced syngas and recommending a path forward. It is a preliminary technical and economic study of the potential viability of the Leigh Creek Energy Project ("LCEP"). Operating and capital costs are based on a Class 5 scoping study prepared by thyssenkrupp in 2018. A Class 5 study allows for an expected accuracy variation range of Low -20 to -50 and High +30 to +100% . Further evaluation work and appropriate studies are required before LCK will be in a position to provide any assurance of an economic development case. The PFS is based on the material assumptions outlined below. These include assumptions about the availability of funding. While LCK considers all of the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by the PFS will be achieved. To achieve the range of outcomes indicated in the PFS, total funding of in the order of [$3.8 billion] will likely be required. Investors should note that there is no certainty that LCK will be able to raise that amount of funding when needed. It is also possible that such funding may only be available on terms that may be dilutive to or otherwise affect the value of LCK's existing shares. It is also possible that LCK could pursue other 'value realisation' strategies such as a sale, partial sale or joint venture of the project. If it does, this could materially reduce LCK's proportionate ownership of the project. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the PFS.

Material Financial Model Assumptions

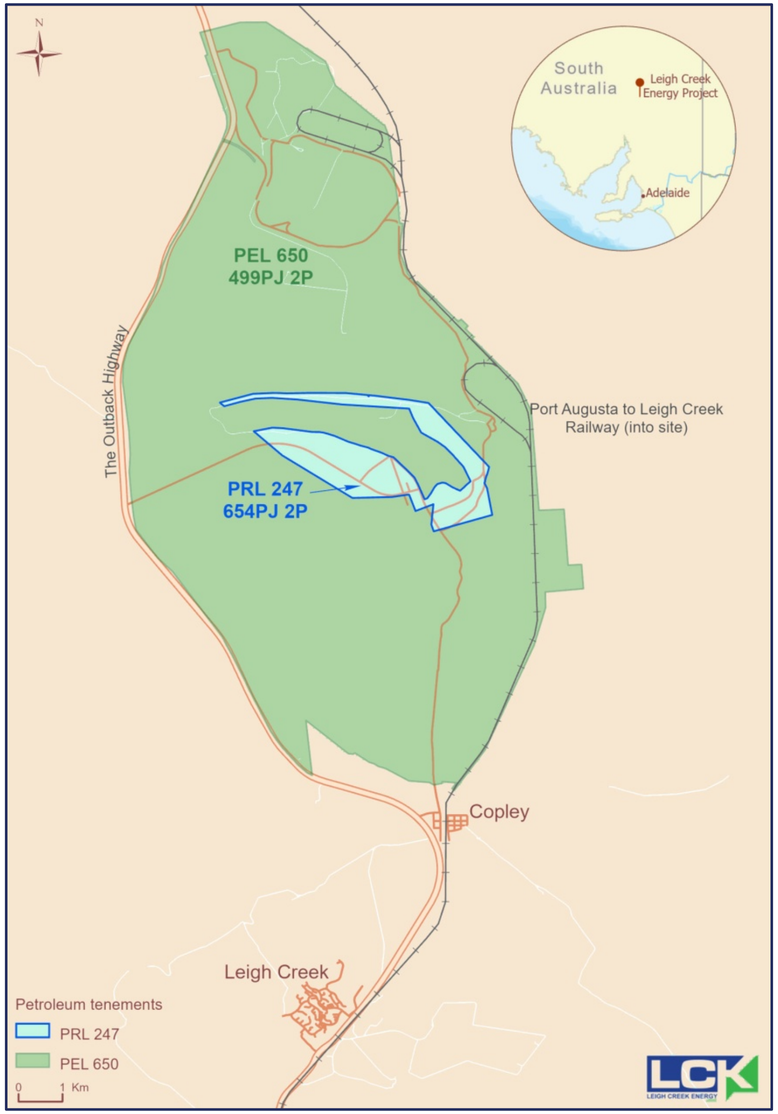
Dollar figures are in AUD unless otherwise stated

Debt Raised	50% of capital costs to be debt funded
Loan Repayments	Rolling 7 year facility extending over the project life
Interest expense	Borrowing rate 6%
Income Tax Payable	Financials included in this report are before income tax
Urea pricing	Available CRU forecast to 2030, escalated thereafter
Royalties	Average 9% of gas revenue, comprising SA Government (subject to negotiation) and overriding royalties
	Per thyssenkrupp 2018 scoping study, ex-plant only
Gasifier operating costs	Management assumed gasifier operating costs based on demonstration plant experience
Gasifier replacement	Management assumed gasifier replacement costs based on demonstration plant experience
Capital costs	Per thyssenkrupp 2018 scoping study

Leigh Creek Energy Project

Overview

- 100% owned LCEP, in South Australia, 550km north of Adelaide
- The LCEP aims to initially produce 1mpta of urea utilising ISG technologies from the coal resources
- The project will provide long term economic growth and employment opportunities in regional South Australia
- The LCEP sits within PEL 650 and PRL247, which overlay the existing Leigh Creek Coalfield and contain a combined total of 1,153PJ[1] of gas reserves
- The coalfield sits in the Telford Basin which is approximately 8 kilometres by 5 kilometres reaching depths of up to 1.0km
- The Leigh Creek Coal Measures occur in three main sequences, the Upper Series Coal (100 metres thick) , Main Series Coal (20 metres thick) and Lower Series Coal (60 metres thick)



1. Based on 31% of the project's coal reserves

Leigh Creek Energy Project

Large uncontracted gas reserve	Commercially proven technology	Petroleum Retention Licence	Existing infrastructure	All required inputs present on site
The site has 2P gas reserves of 1,153PJ plus indicated and inferred coal resources of 301.2Mt	ISG technology has been developed over the last 100 years and is well proven in multiple jurisdictions Leigh Creek geology is ideally suited for ISG production as it enables underground works to be contained In-situ gasification (ISG) demonstration plant successfully flowed gas in 2019	The Company holds permits, PRL 269 and PEL 650 over the now closed Leigh Creek coalfield Petroleum Production Licence, the final petroleum licence required for commercial upstream operations has been submitted	The Leigh Creek site has high quality existing infrastructure (road, rail, water and power), access to a local workforce, is an existing disturbed area and is covered by a large geological database	Strategy to develop both upstream and downstream operations Upstream: produce commercial quantities of syngas using ISG technology Downstream: construct a urea plant using syngas as feedstock

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LCEP PFS

Pre-Feasibility Study Highlights

PFS highlights the robust economics for the development of a urea production plant

- Annual urea plant capacity of 1.0 million tonnes per annum
- Initial capital cost $2.3 billion
- Commercial life of over 30 years
- Nominal production cost of $109/tonne
- Hydrogen production potential
- Pre-tax leveraged Net Present Value (NPV) $3.4 billion
- Internal Rate of Return (IRR) 30%

1 Based on 31% of the project's coal reserves

Basis of the Pre-Feasibility Study

- The Pre-Feasibility study (PFS) examined the technical and financial feasibility of developing Leigh Creek Energy's ISG project to provide syngas as a fuel/building block for:
  - Power generation (large and small scale)
  - Domestic synthetic natural gas
  - Methanol
  - Fertiliser/urea
  - Hydrogen
- Preferred downstream processing option for syngas is the production of ~1Mtpa of fertiliser (urea)
- The PFS was prepared by LCK management with key inputs from:
  - Prudentia Process Consulting Pty Ltd: surface plant design, mass balance and class 5 capital and operating cost estimate for power, SNG and methanol concepts
  - thyssenkrupp: urea plant design
  - Profercy/CRU: fertiliser market analysis
  - Persistence Market Research: market analysis (ammonia)

Expert Advisors

Activity	Consultant
PRMS reserves estimation	MHA Petroleum Consulting
Concept selection	thyssenkrupp
Pre-feasibility study	Prudentia Process Consulting
Drilling	Ingauge Engineering
Hydrology	WMV Environmental
Hydrology	AusGEMCO
Hydrology	Water Technology/AWE
Geotechnical	Sherwood Geotechnical
Geotechnical	GEONET Consulting Group
Geotechnical	SMEC
Environmental	CNR Consulting
Gasification	HRL
Geology	Challenger Geological Services
Geology	GeoConsult
Geology	JB Mining consultants
Gasification	Africary
Gasification	GTI Energy

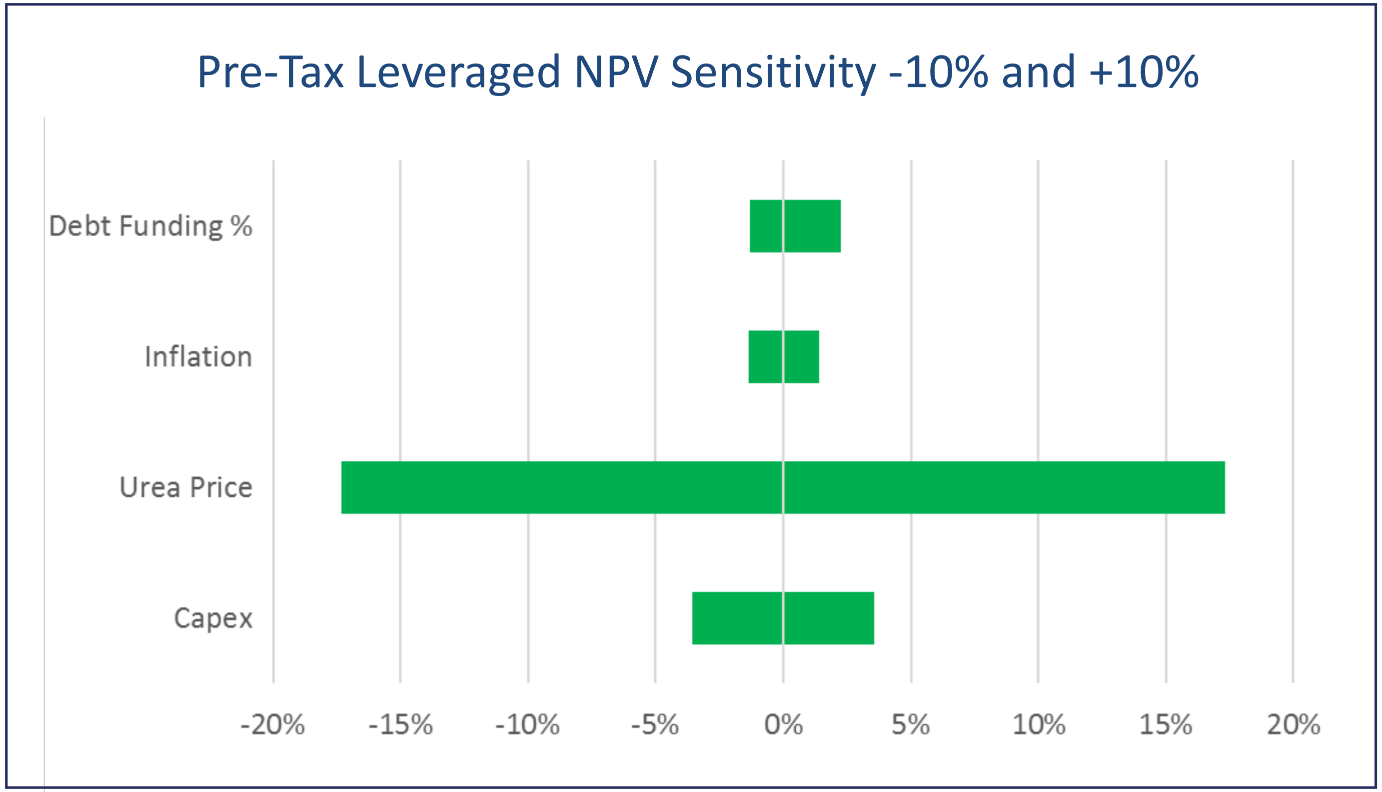
Assumptions

Pricing, capex and opex sourced from independent international bodies, CRU and thyssenkrupp

- Urea revenue forecasts based on CRU Urea FOB Middle East Granular forecast to 2030, escalated with assumed inflation rate thereafter
- Inflation rate 2.5% applied to convert nominal operating costs to real costs
- Total royalties comprising SA Government and overriding royalties 9%. SA Government ISG royalty is subject to further negotiation
- Cost of debt 6%
- Operating costs represent ex-plant costs only and do not include transport or logistics
- Up front capital costs 50% debt funded
- Loan repayments based on 7 year rolling facility with a total term of 31 years
- Capex and opex costs are sourced from a report commissioned from thyssenkrupp, entitled “LCEP Ammonia & Urea Plant Concept Study Report“ in 2018, which is has an AACE Class 5 scope giving it an accuracy range of between Low -20 to -50% and High +30 to +100%

Sensitivities

- Value estimate is highly sensitive to the urea price
- Estimates for urea prices are based on CRU estimates escalated after 2030



Pre-Feasibility Study Financial Summary

Project Metrics		
Syngas produced per year	PJ	35
Urea produced per year	t	1.0
Discount Rate	%	9%

Net Revenue/tonne[1]	$/tonne	410
Pre-Tax Opex/tonne[2, 3]	$/tonne	109
Capex/tonne[3]	$/tonne	82
Pre-Tax Net Cash Flow/tonne[1]	$/tonne	219

Economic Assumptions		
Urea Price	A$/tonne	348
Exchange Rate		0.71
Annual Inflation Rate		2.5%

Physicals		
Life of Project	Years	31
2P Gas Reserve	PJ	1,153
2C Gas Resource	PJ	1,469
Life of Project Production	Mt	30.5
Annual Plant Capacity	Mt	1.0

Project Value Metrics		
Discount Rate		9%
Leveraged Pre-Tax NPV_9	$m	3,431
Leveraged Pre Tax IRR		30%
Leveraged Pre Tax Payback Period	Years	4

1. CRU 2024 forecast pricing
2. Operating costs represent cost of production to the factory gate
3. Average life of mine, nominal figures

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Life of Project Cash Flows

Cash Flow		
		Real
Urea Revenue	$m	26,868
Royalties	$m	(375)
Gross Revenue	$m	26,493
Labour	$m	(773)
Insurance	$m	(608)
Maintenance	$m	(2,431)
Fresh Water	$m	(201)
Catalysts	$m	(422)
Chemicals + syngas	$m	(1,030)
Total Opex	$m	(5,465)
Facilities - Syngas Production	$m	(553)
Facilities - UREA Production	$m	(2,080)
Total Capex	$m	(2,633)
Project Cash Flow	**$m**	**18,396**

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First 10 Years of Cash Flows

Project Cash Flows	Real	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Urea Revenue	$m	0	0	205	449	477	568	641	673	698	716
Royalty	$m	0	0	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
Operating Costs											
Labour	$m	0	0	(8)	(17)	(18)	(18)	(19)	(19)	(20)	(20)
Insurance	$m	0	0	(7)	(14)	(14)	(14)	(15)	(15)	(15)	(16)
Maintenance	$m	0	0	(27)	(55)	(56)	(58)	(59)	(60)	(62)	(64)
Fresh Water	$m	0	0	(2)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Catalysts	$m	0	0	(5)	(10)	(10)	(10)	(10)	(10)	(11)	(11)
Chemicals + syngas	$m	0	0	(11)	(23)	(23)	(25)	(25)	(26)	(26)	(27)
Capital											
Facilities - Syngas Production	$m	(68)	(68)	(68)	0	0	0	0	0	0	0
Facilities - UREA Production	$m	(693)	(693)	(693)	0	0	0	0	0	0	0
Project Cash Flow	$m	(762)	(762)	(629)	314	339	427	496	525	547	561
Debt Raised	$m	381	381	381	0	0	0	0	0	0	0
Loan Repayments	$m	0	0	(14)	(15)	(16)	(17)	(18)	(19)	(21)	(22)
Cash Flows from Debt	$m	381	381	366	(15)	(16)	(17)	(18)	(19)	(21)	(22)
Leveraged Cash Flow	$m	(381)	(381)	(262)	299	322	410	478	506	526	539

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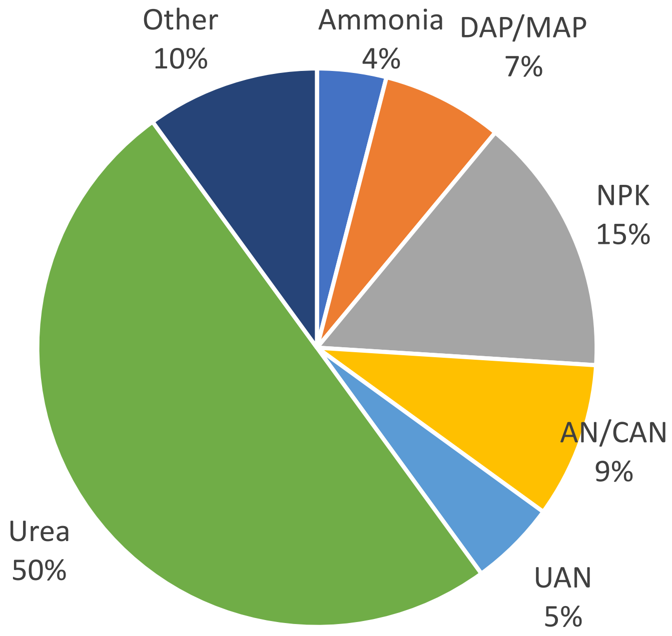
Urea and Fertiliser Markets

Urea Fertiliser Facts

Rising global agricultural production	Global crop production has tripled over the past 50 years[1]
Resulting increased fertiliser demand	Global fertiliser consumption forecast to increase by 1.6%pa, to 188Mt in 2022[2]
Nitrogen is one of three primary fertilisers	Three main agricultural fertilisers are: Nitrogen, Potassium and Phosphorus, otherwise known as NPK
Nitrogen fertiliser improves crop yields	Nitrogen fertiliser improves crop quantity while Phosphorus and Potassium based fertilisers improve crop quality. In Australia more than twice the amount of N fertiliser is used as P and K combined
Nitrogen fertiliser converted to urea for ease of transport	Nitrogen fertiliser has an ammonia base, but ammonia products are difficult to store and transport, so they are processed into more refined products, such as granular urea, for transportation. Approximately 50% of Nitrogen fertiliser is sold in the form of urea
~2Mtpa of urea consumed in Australia	Slightly less than 2Mt of urea is used in Australia each year[3]
Australia relies on imported urea	95% of Australia's urea is imported from Asia and the Middle East
Annual application of urea required	Urea must be applied to soil before planting to maintain yields
Variables affect urea demand	Demand for urea is determined by factors such as rainfall, crop mix, price, subsidy schemes, regulation and innovation

Nitrogen Products

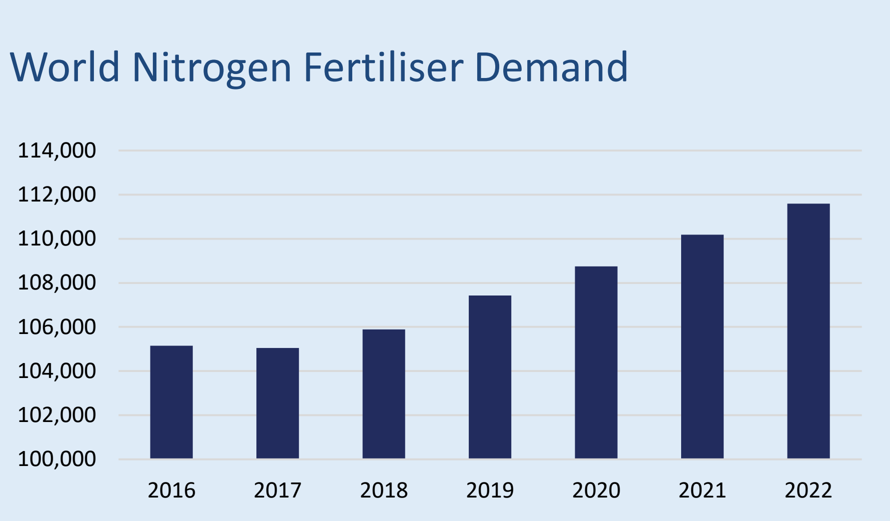


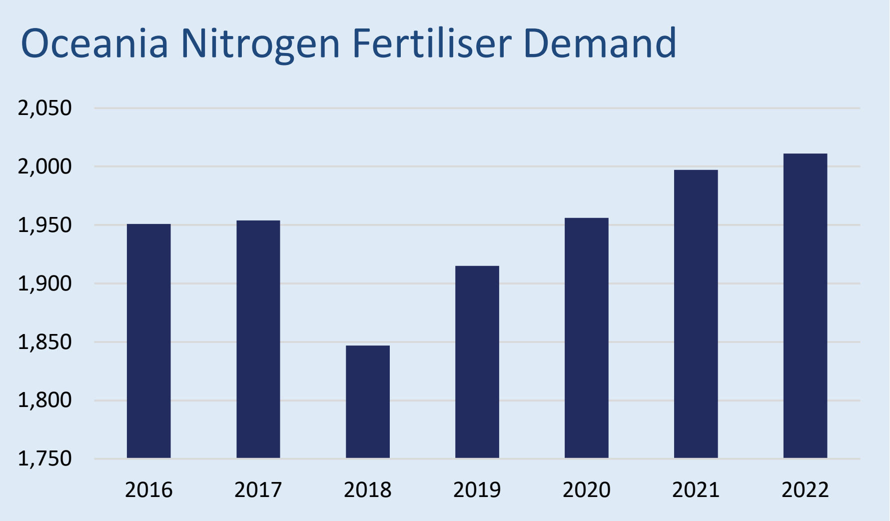
1. Source: https://www.fertilizer.org.au/Fertilizer-Industry/Fertilizer-Feeds-The-World
2. Source: FAO report World fertilizer trends and outlook to 2020
3. Source: https://www.fertilizer.org.au/Fertilizer-Industry/Australian-Fertilizer-Market

Urea Fertiliser Market

Fertiliser Demand and Supply

- Annual fertiliser sales in Australia average 5.4Mtpa[1], small in a global context. Urea fertiliser sales in Australia are ~2mtpa[2], less than 2% of global demand[3]
- Approximately 1.8Mt[2] of Australia's urea demand is imported each year. The remainder is produced at Incitec Pivot's Gibson Island plant in Brisbane
- Majority of Australia's urea supply is imported from the Middle East with the remainder being sourced from the Asian region
- Import costs and logistics are a major contribution to the domestic price of urea, on average it takes 24 days to ship product from the Middle East
- Global nitrogen fertiliser demand 180Mt per annum. Growth rate has been 1.7% over past 10 years



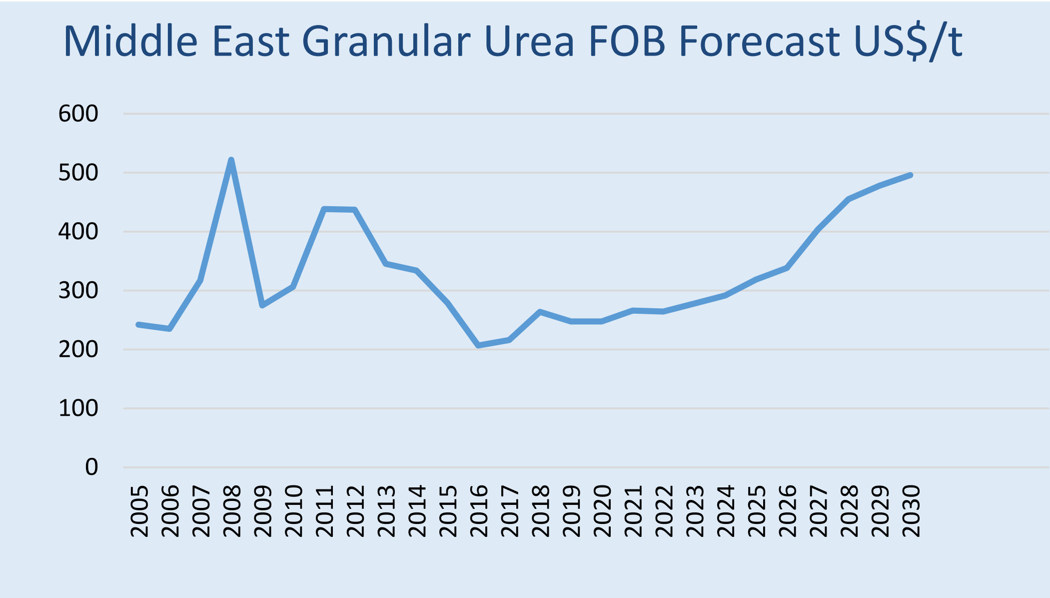


1. Source: https://www.afsa.net.au/industry/what-is-the-industry
2. Source: https://www.fertilizer.org.au/Fertilizer-Industry/Australian-Fertilizer-Market
3. Source: https://www.fertilizer.org.au/Fertilizer-Industry/The-Global-Fertilizer-Market

Urea Fertiliser Market

Urea Cost and Prices

- Global urea costs average approximately A$281/t (versus LCK of A$109) excluding transportation and logistics
- FOB prices for urea have fluctuated over recent years with the oil and gas prices
- Average CRU price forecasts are US$275 to US$375/t over the next decade
- Average volume weighted global urea cost is $268/t, the LCEP production cost is expected to be $109/t[1] which places the project in the first quartile of global prices

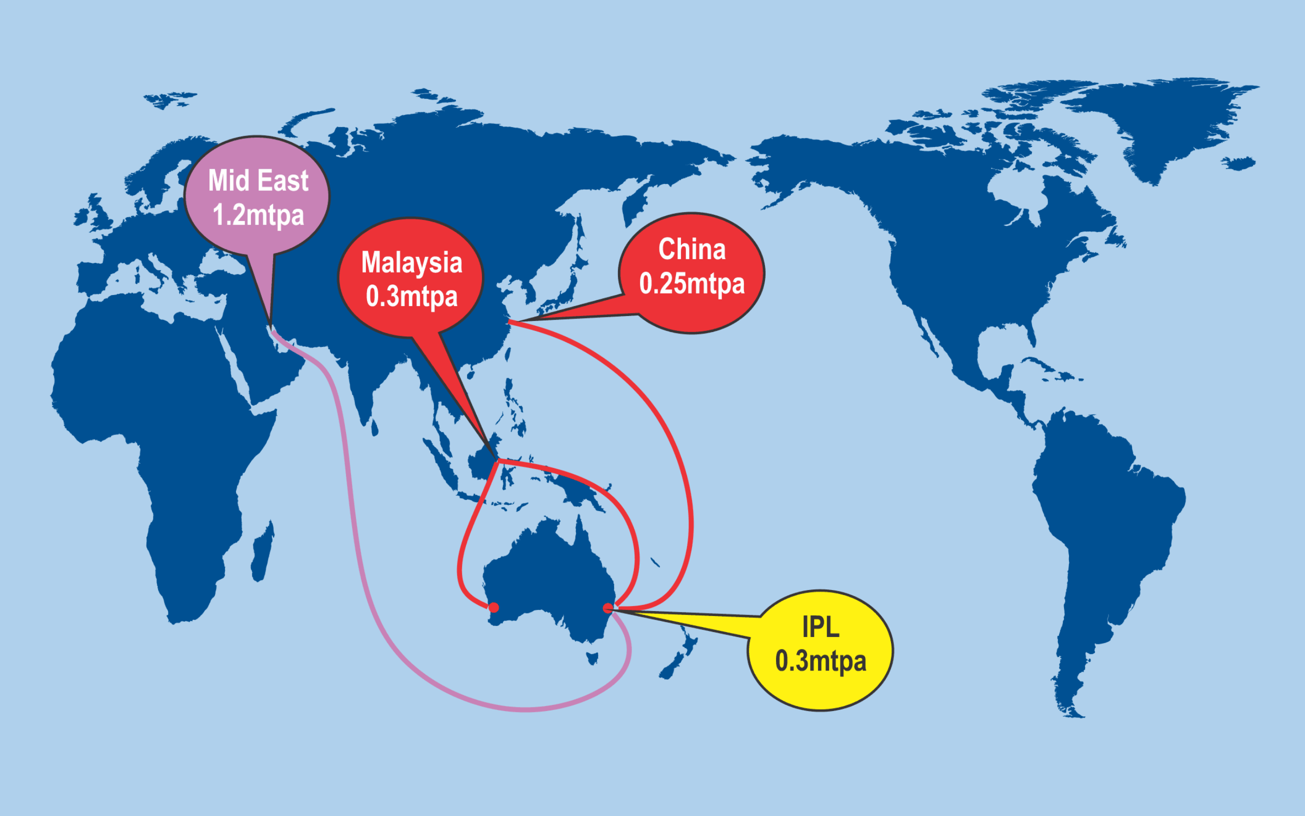


1. Nominal cost, pre-tax and logistics based on a 1.0 million tonne per annum urea plant

Urea Fertiliser Market

Australia Urea Imports

- Importation of urea into Australia adds to the cost base for local consumers
- Import costs account for an additional US$15-30/t
- LCEP’s cost position and freight advantage drive competitive position against low cost Middle East Producers
- LCEP exports have the ability to be competitive into the SE Asian market



Strategic Drivers of the LCEP Urea Option

Cheap, reliable urea production

- Security of agricultural production in Australia relies on access to urea

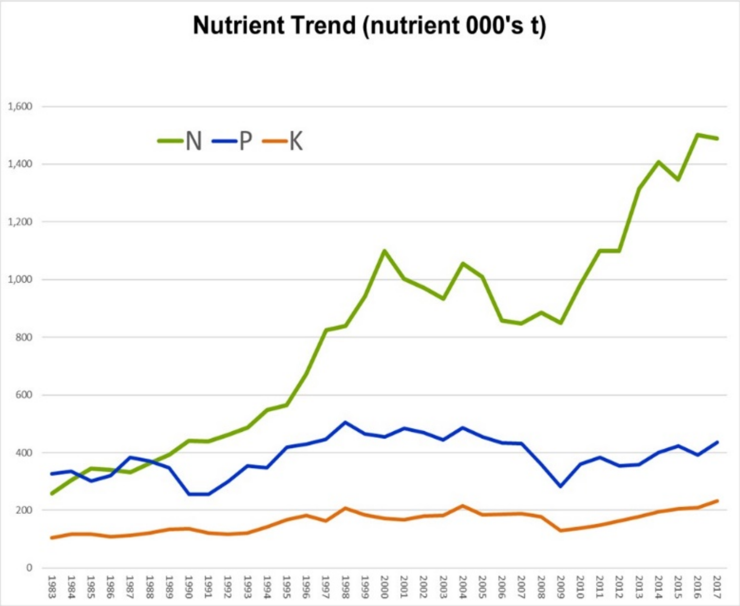
  In Australia 20,000 farmers apply urea to more than 11 million hectares of land annually. Urea represents ~37% of all fertiliser used in Australia[1]. It is estimated that at least 30 to 50% of crop yield is attributable to commercial fertiliser nutrient inputs[3].

- Competitive economics compared with imported urea

  Of the ~2Mtpa of urea used in Australia, 90% is imported[2] from the Middle East, China and Malaysia. Locally produced urea avoids the risks and costs associated with transport, exchange rates, commodity prices and import logistics.

- Fully integrated urea production eliminates supply risk
- Current Australian urea manufacturers buy, rather than produce, gas

Nitrogen (N, urea), Phosphorus (P) and Potassium (K) are the primary sources of agricultural fertiliser



Source: Fertiliser Australia https://www.fertilizer.org.au/Fertilizer-Industry/Use-Trends

Supply chain resilience plus positive economics create a compelling strategy

1. Source: Land Management and Farming, 2016-17 https://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4627.0Main%20Features82016-17?opendocument&tabname=Summary&prodno=4627.0&issue=2016-17&num=&view=
2. Source: Fertiliser Australia https://www.fertilizer.org.au/Fertilizer-Industry/Australian-Fertilizer-Market
3. Source: Fertiliser Australia https://www.fertilizer.org.au/Fertilizer-Industry/Fertilizer-Feeds-The-World

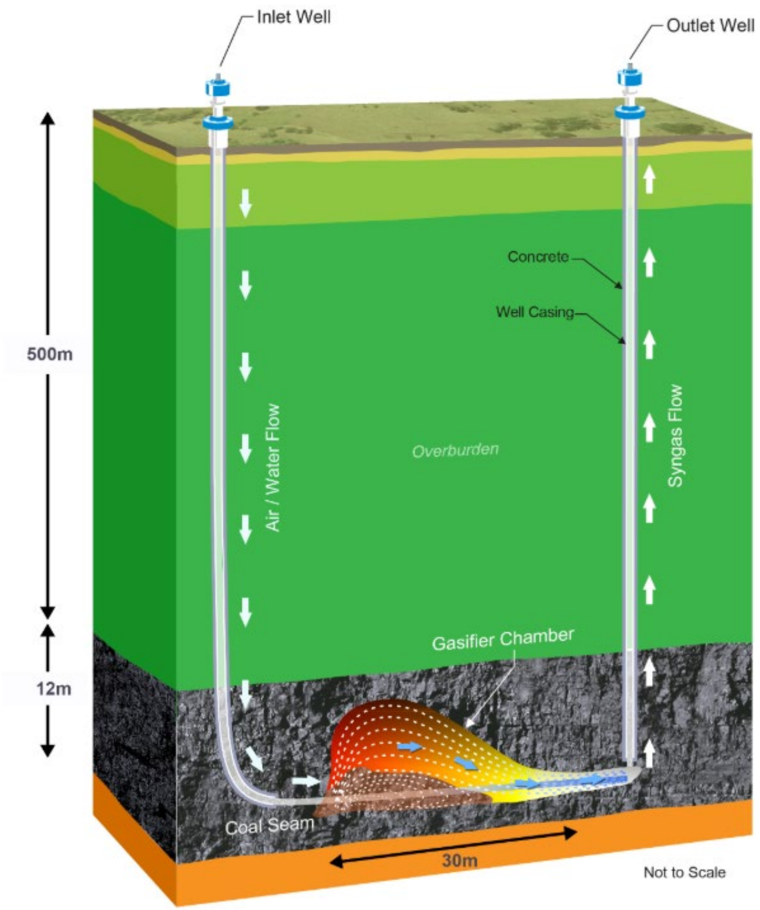
Urea Production Process

Leigh Creek Energy Project

In-Situ Gasification Technology

- The Leigh Creek Energy Project (LCEP) is being developed to generate syngas from coal using in-situ gasification ISG technology
- ISG technology has been developed over the last 100 years and has been used successfully in power plants in Uzbekistan and South Africa
- ISG is produced by heating coal underground, resulting in the generation of syngas, comprised of methane, hydrogen and other valuable components
- The natural surrounding strata forms the gasifier chamber and provides a barrier to ensure isolation of the chemical, thermal and mechanical effects of the process

How coal gasification works



Urea fertiliser production process

Urea production process simplified

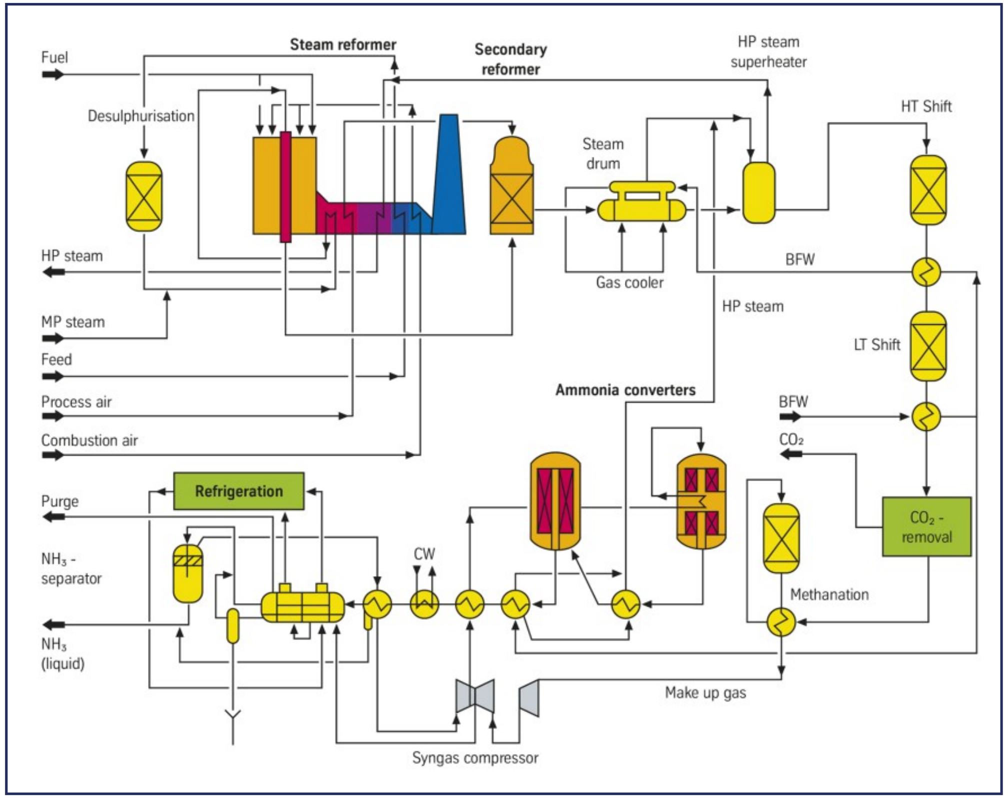
- Syngas is fed into a gas processing facility, outputs are Hydrogen (H_2), Nitrogen (N_2) and Carbon Dioxide (CO_2)
- Resulting H_2 and N_2 are then fed into an ammonia plant where they are converted in Ammonia (NH_3)
- NH_3 is then fed into a Urea plant where NH_3 and CO_2 are combined to form Urea (CH_4N_2O)

Description	Reaction
Methane plus steam converted into H_2 and carbon monoxide (CO)	$CH_4 + H_2O \Rightarrow 3H_2 + CO$
Reformation of methane (using CO) into water (H_2O) and CO_2	$CH_4 + 2CO \Rightarrow 2H_2O + CO_2$
Combustion of H_2, convert to H_2O	$2H_2 + O_2 \Rightarrow 2H_2O$
CO converted into H_2 and CO_2	$CO + H_2O \Rightarrow H_2 + CO_2$
H_2 and air are fed into the ammonia synthesis unit for conversion to ammonia gas (NH_3)	$3H_2 + N_2 \Rightarrow 2NH_3$
Ammonia from the ammonia synthesis unit is combined with compressed CO_2 and fed to the urea synthesis plant for conversion to urea (CH_4N_2O) and H_2O	$2NH_3 + CO_2 \Rightarrow CH_4N_2O + H_2O$

Urea fertiliser production process

- Design of the LCK urea plant will be finalised during the FEED stage of development by the engineering partner, which will be selected during the EPCM phase
- This flowsheet diagram, produced by thyssenkrupp, shows an Uhde ammonia plant employing the conventional sequence of process steps that form the basis of most present-day ammonia processes
- The main process units include:
  - Syngas Treatment: Preheating and Desulphurisation, CO Conversion, CO_2 Removal, Process Air Compression, Reforming and Waste Heat Recovery, Methanation
  - Ammonia Synthesis: Synthesis Gas Compression, Ammonia Synthesis, Refrigeration, Ammonia Recovery, Hydrogen Recovery, Deaerator and Boiler Feed Water Pumps
  - Urea Plant: CO_2 Compression (Unit 1201), Ammonia Pumping, Urea Synthesis, Recirculation, Evaporation, Urea Granulation, Desorption and Hydrolysis, Steam, Condensate and Cooling Water System
  - Balance of Plant (BOP): Power, Storage and Handling, Safety, Air Separation (ASU), Cooling Water, Raw Water Treatment, Safety Units

thyssenkrupp - Uhde process and design for ammonia plants



Source: https://www.thyssenkrupp-industrial-solutions.com/en/products-and-services/fertilizer-plants/ammonia-plants-by-uhde/ammonia-plants-500mtpd/the-uhde-ammonia-processes

Leigh Creek Investment Conclusion

Company Strategy

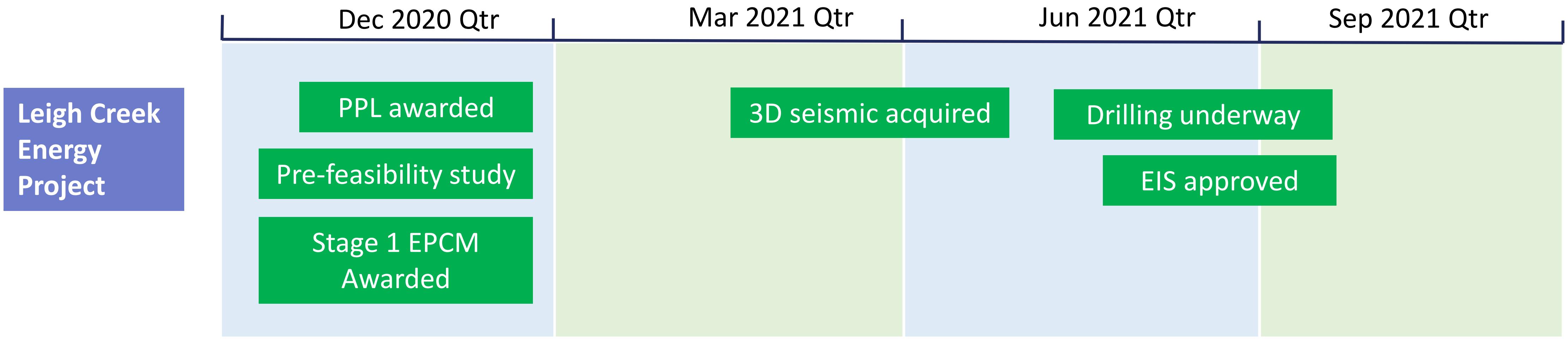
Harnessing gasification and urea production technology in support of Australia's food security

- **Significant future uplift potential** through development of a fully integrated urea production facility
- **Creating shareholder value** by successfully de-risking development of the flagship Leigh Creek Energy Project
- **Commercialise** the Project with an offtake partnership to manage marketing and distribution of urea
- **Production optionality** with potential to produce hydrogen and/or methane from syngas

Near term price catalysts

- ***Leigh Creek Energy Project***
  - ✓ Pre-Feasibility Study completed
  - ▪ PPL awarded
  - ▪ Upstream EIS
  - ▪ Upstream EPCM
  - ▪ Urea offtake agreement

Near Term Milestones



Leigh Creek Energy Limited
L11, 19 Grenfell Street
Adelaide SA 5000
Phone +61 (8) 8132 9100
Email contactus@lcke.com.au
Website http://www.lcke.com.au/

The Executive Chairman
authorised this to be given to ASX

Phil Staveley | Managing Director

Nicola Frazer | Investor Relations
Tony Lawry

Appendices

Company Snapshot

Leigh Creek Energy is a South Australian energy developer focused on production of syngas for use in urea and, more recently, conventional oil & gas exploration in the Cooper Basin

Capital Structure

ASX Code	LCK
Share Price[1]	$0.115
Shares Outstanding	657.6 million
Market Cap	$75.6 million
Cash on hand[2]	$5.0 million
Debt[2]	Nil

Share Price[1]

Top Shareholders [1]

Name	Shares Held	%
China New Energy Group	136,333,334	20.73%
Crown Ascent Development	29,501,347	4.49%
Citicorp Nominees Pty Ltd	18,513,215	2.82%
Hephzibah Pty Ltd	15,895,940	2.42%
Rubi Holdings Pty Ltd	13,516,584	2.06%

Recent Milestones

Awarded two Cooper Basin permits	1 July 2020
Oversubscribed placement completed	24 June 2020
Granting of the Petroleum Retention Licence	10 June 2020
China New Energy Joint Venture Agreement	20 April 2020
Environmental approval for further drilling	3 April 2020

1. As at 2 November 2020
2. Cash on hand as at 30 September 2020

Cooper Basin Oil Exploration

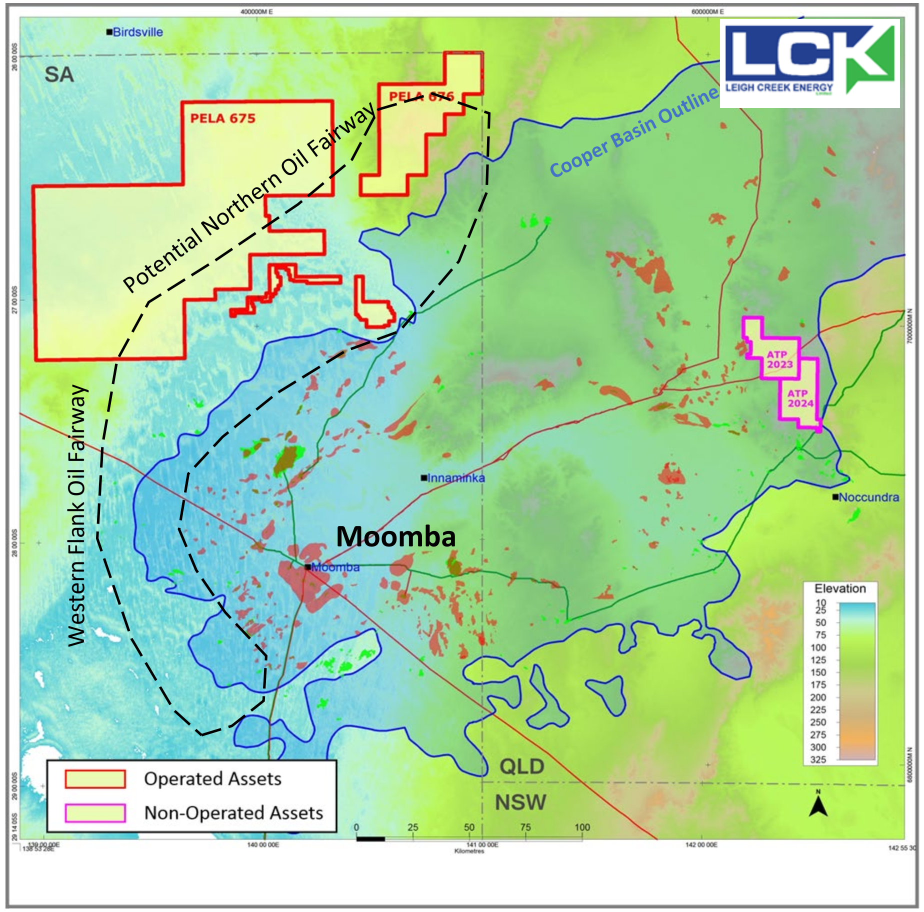
PELs 676 & 675

- Permits awarded in the South Australian 2019 gazettal
- Stratigraphy mirrors the Western Flank Oil Fairway, targeting oil accumulations in the Birkhead Formation and Namur Sandstone
- Leads identified from existing 2D seismic, 3D seismic required to mature to drillable prospects
- Farm down process to commence once drillable prospects identified

ATP 2023 & 2024

- February 2020, farm-in executed with Bridgeport Energy
- Farm in obligation to acquire a 20% interest with an option to acquire 40%
- Multiple leads focused on oil in the Hutton Sandstone and gas in the Toolachee Formation
- Two 300 square kilometre 3D seismic surveys to be undertaken

Leigh Creek Cooper Basin Oil Exploration permits



Other Potential Opportunities

Sale of hydrogen

- Increasing the pressure of air pumped into the gasification wells will result in syngas with a higher hydrogen content, lower pressure increases the methane content
- Hydrogen can be produced in vast amounts and extremely cost effectively, giving optionality
- Potential hydrogen markets are being investigated
- Support from both the Australian and South Australian Government

Gasification technology consulting

- Discussions are underway with China New Energy

The Australian Government released its National Hydrogen Strategy in November 2019

LEIGH CREEK ENERGY

Glossary

Abbreviation	Description
CAPEX	Capital Expenditure
CCS	Carbon Capture and Storage
CO_2	Carbon Dioxide
CRIP	Controlled Retractable Injection Point
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FID	Final Investment Decision
Gasifier	A singular gasification cavity within a panel
GJ	Gigajoule, a unit of energy, equivalent to 1 billion (109) joules
Inlet well	The well which allows for injection of oxidant and steam to the gasifier
ISG	In-situ Gasification
LCEP	Leigh Creek Energy Project
LCK	Leigh Creek Energy Limited
Outlet well	The well which allows for the exit of syngas from the gasifier to the surface plant
PCD	Pre-Commercial Demonstration
PFS	Pre-Feasibility Study
PJ	Petajoule, a unit of energy, equivalent to 1 quadrillion (1015) joules
PPL	Petroleum Production Licence
PRL	Petroleum Retention Licence
PRMS	Petroleum Resources Management System
SPE-PRMS	Society of Petroleum Engineers - Petroleum Resources Management System
Stage 1	Small Scale Power Plant
Stage 2	Large Scale Plant