2 November 2020 **ASX RELEASE (ASX:LCK)**

Leigh Creek Energy Limited ("LCK" or "the Company") today announced the results of the Leigh Creek Energy Project (LCEP) Pre-Feasibility Study (PFS) which confirmed the positive project economics for the development of a urea production facility supported by syngas feedstock.

Highlights

- The LCEP PFS highlights the robust economics for the development of a urea production plant to provide fertiliser to the domestic Australian market and potentially for export. Key project parameters include:
    - Average nominal production cost of $109/tonne places LCEP in the lowest cost quartile of the global urea cost curve
    - Pre-tax leveraged Net Present Value (NPV) A$3.4 billion, Internal Rate of Return (IRR) 30%
    - Annual urea plant capacity of 1.0 million tonnes per annum, with medium term scope to increase to 2.0 million tonnes per annum
    - Total capital cost estimate $2.6 billion
    - Commercial life of over 30 years supported by our 1,153PJ of in situ 2P reserves
    - Hydrogen production potential to be determined once engineering design is finalised
- The Company is in discussions with several potential offtake partners. LCK aims to have commercial partnerships and offtake covering 100% of production capacity
- The In-Situ Gasification (ISG) technology to be utilised has been successfully demonstrated at the site by LCK and leverages existing and proven production methods
- PFS verified by Prudentia Process Consulting
- Next steps are creation of the LCEP field development plan and then further drilling

LCK's Managing Director, Phil Staveley commented that, "completion of the PFS moves LCK a step closer to initiating construction of this major project that will stimulate the South Australian regional and state economy and underpin Australia's agricultural sector by producing nitrogen-based fertiliser and hydrogen products for local and international markets.

"LCK's facility will be the only fully integrated urea production plant in Australia, with an on-site 100MW power plant and nameplate 1 million tonne per annum capacity, with potential to increase to 2 million tonnes per annum in the future."

"The project is expected to be carbon neutral by 2030 and will encompass the latest proven technologies in its upstream (sub-surface ISG) and downstream urea manufacture and associated logistics, supply chain and distribution network infrastructure such as power, water and railway."

"LCK will also be the lowest-cost sovereign producer of urea, providing additional security to a critical product for the Australian agricultural sector."

"It also has the proven the ability to produce hydrogen, and at half the cost of the Federal Government's target."

"Building significant infrastructure in a remote part of Australia will not be without its challenges, but the LCEP will be a fully integrated urea production project with gas feedstock generated on-site and the PFS has reduced and eliminated a number of potential project risks. We express our gratitude to and acknowledge the support of the project team members including contributing consultants and reviewers for their thorough detailed work."

Executive Summary

The release of the LCEP PFS reflects the chosen pathway to commercialise the 1,153PJ of insitu gas 2P reserves at the LCEP. The construction of a 1.0 million tonne per annum of urea processing facility provides the most value-accretive pathway for the development of the project.

The ability for urea produced from the LCEP to displace imported urea fertiliser will provide the Australian agriculture sector with locally sourced urea in a cost-effective and more timely manner and will help improve national food security.

Key Metrics	Unit	PFS outcome
Annual Urea Production	t	1.0 million
Annual Production Cost (average, nominal)	$/t	109
Total Capital Cost	$Bn	2.6
Project Life	Years	31
Debt Financing		50%
Discount Rate		9%
Exchange Rate	AUD/USD	0.71
Average Nominal Urea Price	$/t	Per CRU forecast pricing
Pre-Tax Leveraged IRR		30%
Pre-Tax Leveraged NPV	$Bn	3.4
Payback Period	Years	4.0

Note: additional information will be supplied in the LCK PFS Presentation to be released to the market

The PFS was prepared by LCK management based on a Class 5 scoping study prepared by thyssenkrupp in 2018. The scoping study results were refined in the PFS by engaging with ammonia technology licensors to identify the best two technologies from an engineering, commonality, efficiency perspective.

The optimum capacity for the proposed urea processing facility of 1.0 million tonne per annum has been determined following consideration of the gas reserves, capex requirements, market, and technology licensing partner plant options, which results in a slightly higher cost of production than the 2.0 million tonne per annum plant option originally assumed in the thyssenkrupp scoping study.

The PFS includes input from:

- Prudentia Process Consulting Pty Ltd: surface plant design, mass balance and class 5 capital and operating cost estimate for power, syngas and methanol concepts;

- thyssenkrupp: urea plant design;
- Profercy/CRU: fertiliser market analysis;
- Persistence Market Research: market analysis (ammonia).

The Leigh Creek Energy Project

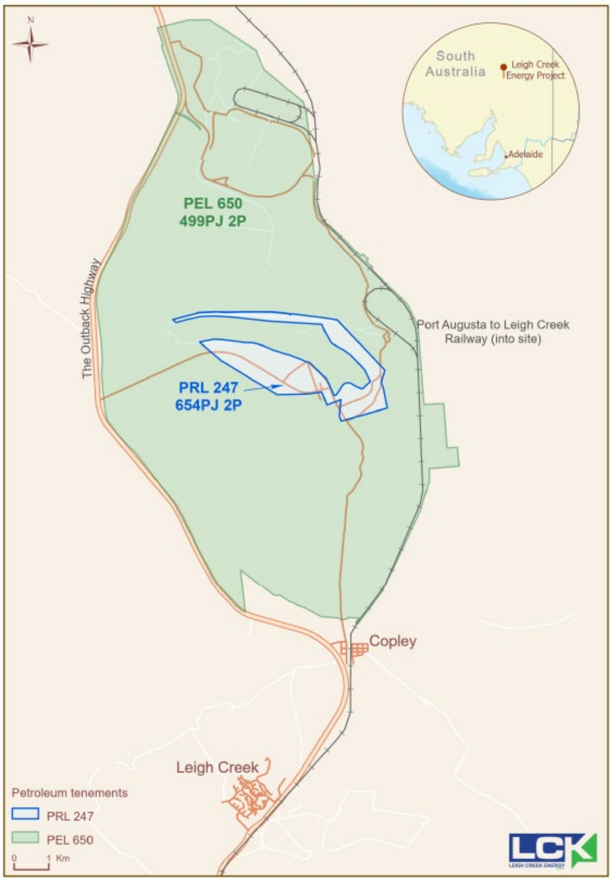


Figure 1 – LCK site area

The 100% owned LCEP (see *Figure 1*) is located in South Australia 550km north of Adelaide. The LCEP sits within PEL 650 and PRL 247, which overlay the existing Leigh Creek Coalfield. The LCEP aims to initially produce 1mpta of urea utilising in-situ gasification (ISG) technologies from the coal resources at Leigh Creek. The project will provide long term growth and employment opportunities to the communities of the northern Flinders Ranges and South Australia.

The Leigh Creek coalfield sits in the Telford Basin which is an asymmetrical, ellipse shaped basin approximately 8 kilometres by 5 kilometres reaching depths of up to 1,000 metres. The Leigh Creek Coal Measures occur in three main sequences, the Upper Series Coal, Main Series Coal and Lower Series Coal. The Upper Series Coal comprises approximately 100 metres of interbedded mudstone, siltstone and numerous coal layers with minor fine grained sandstone. The Main Series Coal comprises a zone of coal up to 20 metres thick and some interbedded mudstone, and the Lower Series Coal contains two coal layers with dark grey, silty mudstone in a zone approximately 60 metres thick.

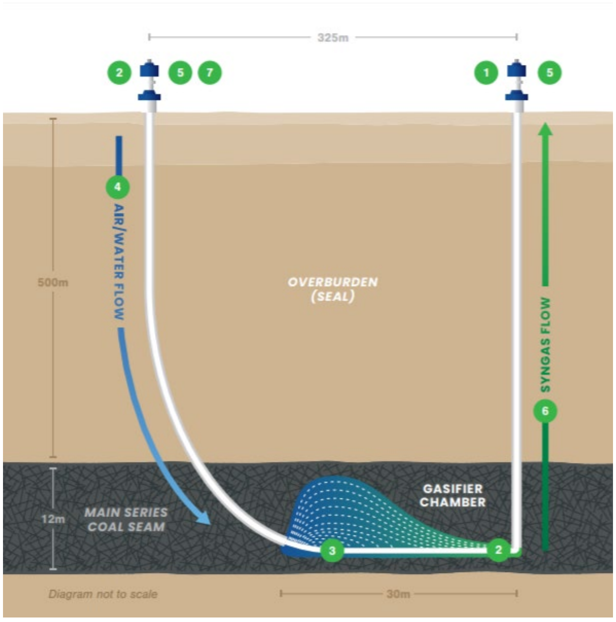
The project contains 1,153PJ of 2P gas reserves plus 301.2Mt of indicated and inferred coal resources.

Field Development Plan Concept – leveraging known technology

LCK plans to produce syngas from its coal reserves, which will be further refined for the production of urea based fertiliser. Syngas generated using the ISG process, which converts coal from its solid state into a gaseous form, contains methane, hydrogen and other valuable components. Syngas can be used to either produce electricity directly or may be further refined into a variety of products including methane, ammonia and fertiliser.

In the simplest ISG configuration, two wells are drilled into an underground coal seam, one is an inlet well for the addition of air and water, and the other is the outlet well for the extraction of syngas. A horizontal inlet well and vertical outlet well will be used for the project to create a direct linked system in which the two wells meet (see *Figure 2*).

The ISG process starts by heating the underground coal, then an oxidant (air or oxygen) is injected into a section of the horizontal well to gasify the coal. Once the section of coal at the injection point has been consumed, the injection point is then retracted to the next point, exposing more coal to the oxidant, allowing the gasification process to continue.



1. Outlet well is drilled to intersect coal seam
2. Inlet well is drilled and steered to link up with Outlet well
3. Initiation tool is placed down the inlet well to heat the coal and start the gasification process
4. Addition of air and water creates a series of chemical conversions transforming coal to syngas
5. Process is controlled by using inlet and outlet wells to manage the flow of air and water
6. Syngas will flow up through the outlet well and is treated at surface
7. Process can be stopped by turning off air and water supply from the inlet well

Figure 2 – in-situ gasification diagram

Based on current designs, there will be a total of 41 gasifiers constructed. The coal that will be gasified will range in depth from 200 metres to 1,100 metres. Syngas will be collected via a network of pipes and dispatched to an above-ground gas processing facility, before it is sent to the on-site power station and downstream processing facilities.

The benefits of ISG over similar coal-gas extraction methods include that it:

- Allows for the efficient recovery of the energy from solid coal seams that are too deep or uneconomic to mine without extensive use of traditional mining operations;
- Creates little surface disturbance as above-ground facilities are easily located away from sensitive areas without impacting access to targeted reserves;
- Allows a safe working environment where only small amounts of equipment, rather than people and large machines, are underground;
- Provides groundwater protection as ISG can be conducted away from any nearby groundwater resources (which for the LCEP are saline and therefore not used for livestock, agriculture or domestic purposes);
- Is deployed where the geology around the solid coal is tight and thick so gases produced are contained within the chamber and cannot escape in an uncontrolled way;
- Eliminates much of the energy waste associated with moving waste rock as well as usable product to the surface;
- Has potential for subsurface geologic CO_2 storage (carbon capture and storage); and
- Has lower capital and operating costs as no additional surface gasification facilities are needed.

Thyssenkrupp was engaged by LCK to complete a concept study to consider the production case for nitrogen-based fertiliser. In the process assumed by thyssenkrupp, the syngas passes through the gas processing facility and is combined with nitrogen from the air to form ammonia (NH_3). The process continues with ammonia reacting with CO_2 to form urea ($CO(NH_2)_2$)

The consumption of CO_2 during the urea manufacturing process will reduce the carbon footprint of the plant when compared to ammonia synthesis alone. On a mass basis the production of 1 tonne of urea will consume 730 kilograms of CO_2.

The Fertiliser Market

Global fertiliser demand has grown at 1.7% per annum over the last 10 years and is forecast to increase by 1.6% pa to 188Mt in 2022, as the world's growing population requires increased agricultural output. Fertilisers are applied in the agriculture sector to increase crop yields. Several broad types of fertilisers are utilised for specific benefits and applications. Nitrogenous fertilisers (N) which are predominantly urea-based are applied to improve crop quantity and typically increases yields by 300 per cent. Nitrogen based fertilisers are being used in Australia on more than 11 million hectares by 20,000 broadacre and horticulture farmers. Other main types of fertiliser are Phosphorus (P) and Potassium (K) based, both of which improve crop quality. Urea is applied before planting to maintain yields, whereas P and K is stored and absorbed into soil for longer periods.

Australia is a small player in the global fertiliser market, with a nitrogen fertiliser demand of just under 2Mtpa, the bulk of which is sourced from imports. The Gulf states (Saudi Arabia, Qatar and Oman collectively) provide almost 60% of Australia's import supply. A further 25% is provided from within the Asian region (Malaysia and China). Domestic production of urea comes from the Incitec Pivot Limited Gibson Island plant in Brisbane which provides up to 300ktpa.

China has historically been a major exporter of urea. However, in the last five years, a major rationalisation of Chinese facilities has seen production fall by around 10% as older, less efficient coal gasification plants were shut down.

The lack of domestic, and broader regional production of urea presents an attractive strategic opportunity for the LCEP to produce urea. The two main benefits of domestic Australian production and distinct competitive factors for the LCEP are:

- the ability to produce urea at or below import price parity; and
- to improve security of supply of a key ingredient of the Australian agricultural sector.

As the season for urea application in Australia is relatively short (generally March to July) , the opportunity exists to export urea into New Zealand and South East Asia, where multiple applications of urea each year exist due to increased rainfall. This will assist LCK in managing logistics and working capital.

Carbon Footprint

LCEP is expected to be carbon neutral by 2030 and has a strong environmental, social and governance profile including access to clean energy and infrastructure.

The LCEP urea plant will be designed to produce ammonia which is then combined with CO_2 to form urea. As the urea synthesis process consumes CO_2 this will result in lower CO_2 production and carbon footprint. Remaining CO_2 could be disposed of via carbon capture and underground storage (CCUS) or offset by revegetation. Further research will be done in the Feasibility Study phase so that the project will ultimately be carbon neutral.

Hydrogen Optionality

The recent interest in the "hydrogen economy", particularly in Europe and Asia, is due to the potential for hydrogen to be a zero carbon emissions fuel. Despite political and environmental groups lobbying and promoting hydrogen as a clean alternative source of energy, a market does not currently exist in Australia, while the international market is in a pre-formative state with consumers as well as producers.

The hydrogen (H_2) market in Australia has significant future potential but is immature with no commercial users currently identified.

In urea production, H_2 is separated from the syngas and reacted with nitrogen to form ammonia (NH_3), which is then used as the feedstock chemical for urea. In addition to being an intermediate product, ammonia is also a relatively safe and economical means of transporting H_2 in liquid. While other means of transportation are possible, the industry is currently in the inception stage with no commercial H_2 liquefaction facility available. For the H_2 industry to develop to a commercial scale the most feasible means of safely transporting it, with existing supply chain logistics, is in ammonia (liquid) form.

LCK successfully produced significant quantities of H_2 at the LCEP pre-commercial demonstration in 2019. The LCEP has the potential to produce over 200 million kg of hydrogen per year at less than $1/kg, which compares favourably to the Federal Government's aspirational production target for H_2 of $2/kg.

Next Steps

LCK is focussed on the development of its ISG production capability to facilitate the downstream production of urea. LCK now plans to advance the LCEP by production of a Bankable Feasibility Study that will define and progress the critical path activities including funding, urea production technology selection, and site activity preparation.

LCK will commence the downstream Stage Bankable Feasibility Study in early 2021, and, in parallel, progress the upstream field development plan. The Company will also be conducting 3D seismic acquisition to determine the most prospective coal seams in which to drill further ISG wells. The Company anticipates having all the data required for an EIS submission for operation in the second half of 2021. Upon the completion of the seam identification process, the Company intends to drill up to five additional gasification wells that will supply a 5MW power station.

The Board of Leigh Creek Energy authorised this announcement to be given to ASX.

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About Leigh Creek Energy

Located in South Australia, Leigh Creek Energy Limited (ASX:LCK) is an emerging energy company focused on developing its Leigh Creek Energy Project (LCEP). The LCEP will produce nitrogen-based fertiliser and/or hydrogen products at Leigh Creek by utilising In Situ Gasification technologies.

LCK is committed to developing the LCEP using a best practice approach to mitigate the technical, environmental and financial project risks.

For information on the ISG process CLICK

Reserves Disclosure Statement

The PRMS reserves 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 Reserves estimates and supporting information contained herein in the form and context in which it appears. A copy of the report by Mr Hower is available to view at www.lcke.com.au.

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 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 $2.6 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
Operating costs	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