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# Leigh Creek Energy

Urea, the Key to  
Growth



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## Gas Resources Compliance Statement

The PRMS resources estimates stated herein were initially reported to the ASX on 27 March 2019. 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

The JORC resource estimates stated herein were initially reported to the ASX on 8 December 2015 and were updated on 27 March 2019. 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 \$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
Urea plant 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





# The Urea Opportunity for LCK



The world's population is expected to increase by 2 billion people in the next 30 years, from 7.7 billion to 9.7 billion



With a growing population comes an increase in demand for agricultural produce



Farmers are needing to produce more, using less land and less water



Commercial fertilisers increase yields by 30 to 50% in crops such as wheat, barley and rice



Urea is one of the most popular fertilisers as it has a high nitrogen content, is easy to transport and apply and is quickly absorbed by plants

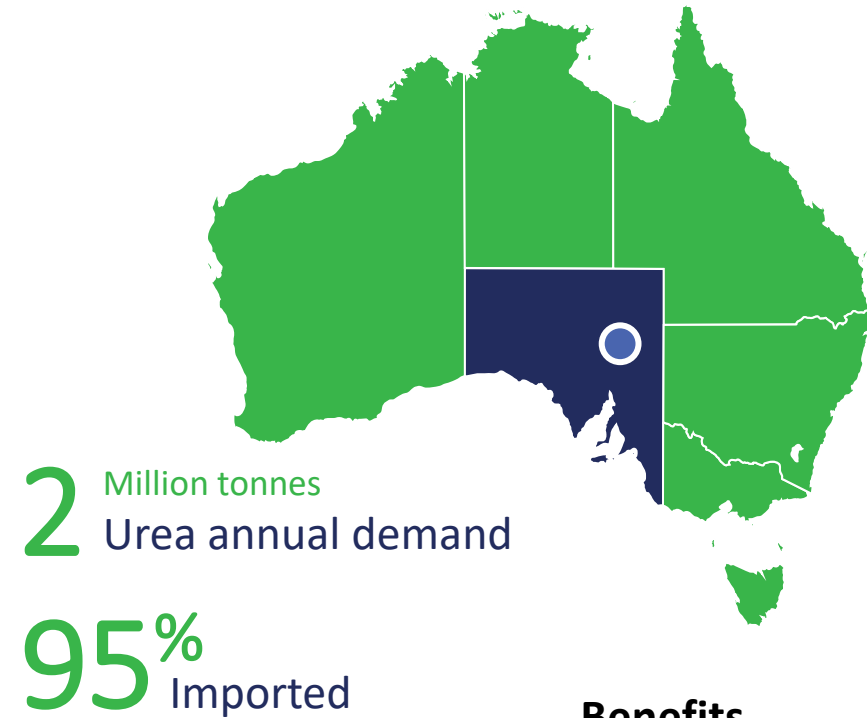


In Australia 20,000 farmers apply urea to more than 11 million hectares of land annually consuming approximately 2Mtpa



# Leigh Creek Energy Project

- Leigh Creek Energy's (LCK) flagship project is the Leigh Creek Energy Project (LCEP), located in South Australia, 550km north of Adelaide
- The LCEP will initially produce 1Mtpa of urea from a dedicated facility at a low cash cost using syngas sourced from its wholly owned resources
- Of the 2 million tonnes of urea used in Australia each year, 95% is imported<sup>1</sup> from the Middle East and Asia
- Australian produced urea will avoid the risks and costs associated with transport, exchange rates, commodity prices and import logistics
- LCEP plans to send granular urea by rail to domestic markets. Excess urea outside of the main demand seasons in Australia will be exported overseas



## Benefits

- ✓ Competitive price
- ✓ Domestic production
- ✓ Australian jobs

# Leigh Creek Energy Project Advantages



## Reliable Supply of Syngas

Syngas has been successfully produced at LCEP using in-situ gasification (ISG) during the Project's pre-commercial demonstration phase

Leigh Creek geology is ideally suited for ISG due to the nature of the coal resource and local geology



## 30+ Years of Gas Reserves

Exploration and production permits have 1,153PJ<sup>1</sup> 2P gas reserves and 301.2Mt coal resources

Reserves sufficient to operate a 1Mtpa urea plant for 30+ years



## Inputs for Urea Production On Site

Urea operations are vertically integrated as gas and electricity will be produced on site. This eliminates commodity and supply risks associated with buying gas and power for urea production



## Access to Infrastructure

The Leigh Creek site has access to existing road and rail infrastructure for transport to domestic and export markets

LCEP urea will be competitive in the wholesale Australian market as it's cheaper, faster and less risky for urea traders than importing it from the Middle East and Asia



## Low Cost Urea Producer

Average nominal operating cost for the urea plant forecast to be \$109/t, putting the project in the lowest cost quartile of global urea producers

This is possible because syngas can be produced for \$1 per gigajoule

# ESG Goals and Activities

The Company established ESG processes early and they have continued to evolve as we grow



## Environmental

- Commitment to be carbon neutral by 2030
- Carbon capture and underground storage plan
- Zero emissions (water and chemical)
- Macro and micro “Going Green” initiatives



## Social

- Continue outstanding safety record
- Maintain positive, enduring stakeholder relationships
- Community education and sponsorship programmes
- Staff mental health initiatives
- Develop ethical supply chains



## Governance

- Abide by United Nations Global Compact standards
- Adhere to strategic framework
- Continue strict regulatory compliance
- Develop sustainability reporting

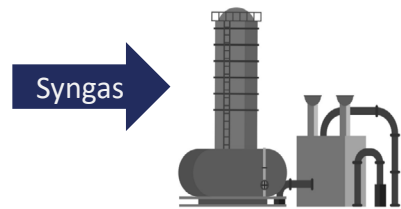
# Carbon Neutral by 2030

Leigh Creek Energy has committed to be carbon neutral by 2030

## Carbon production activities

### Scope 1 Emissions

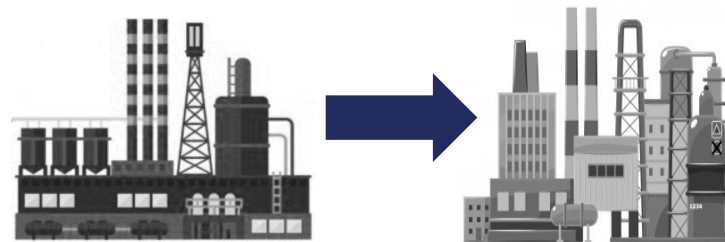
#### Gas Processing



### Scope 2 Emissions

#### Ammonia Synthesis

#### Urea Production



In preparation for future carbon reduction activities, we have embedded our plans into the design of the first stage of LCEP commercial operations

## Carbon reduction activities

### Urea Production

0.73 tonnes of CO<sub>2</sub> are used<sup>1</sup> per tonne of urea produced

### Geosequestration

Redundant gasifiers used for the capture and storage of CO<sub>2</sub> at depth

### Carbon Farming

Investigating opportunities for farmers to optimise CO<sub>2</sub> stored in soil

### Carbon Offsets

Revegetation and use of renewable power to offset CO<sub>2</sub> emissions

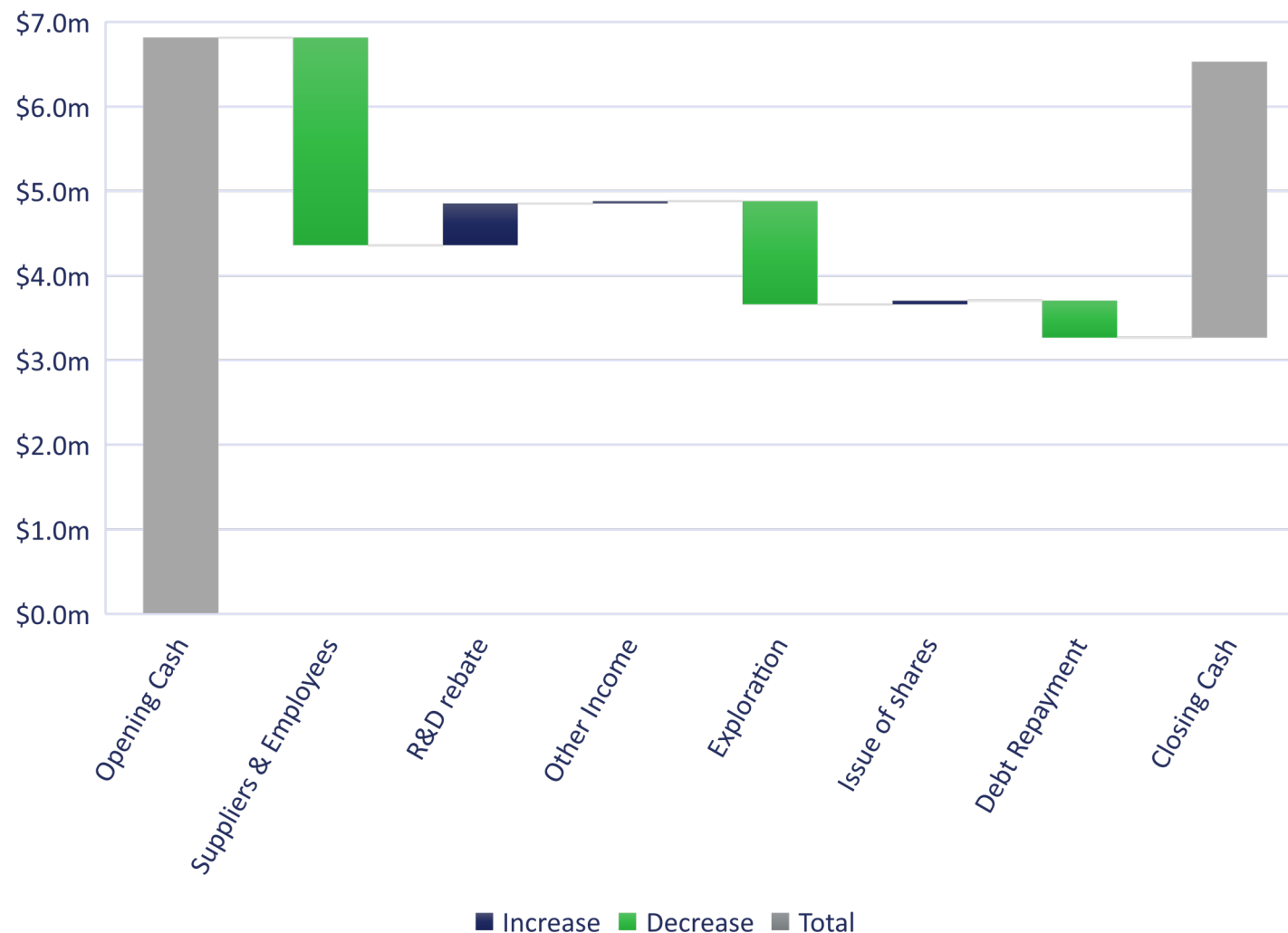
<sup>1</sup>. Based on thyssenkrupp's 2018 scoping study



# December 2020 Half Year Results

- Consolidated operating loss for the half year to 31 December 2020 was \$4.0 million (2019: \$3.2 million)
- Expenditure incurred on the Leigh Creek Energy Project capitalised as Exploration and Evaluation expenditure was \$1.2 million (2019: \$1.2 million)
- In January 2021 the Company conducted an Institutional Share Placement to the US-based institutional investor Energy Exploration Capital Partners LLC, consisting of phased payments of up to \$18 million

## December 2020 Half Year Cash Movements



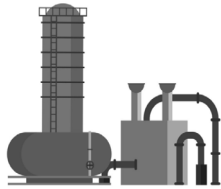
# Urea and Fertiliser Markets



# LCEP Manufacturing Process

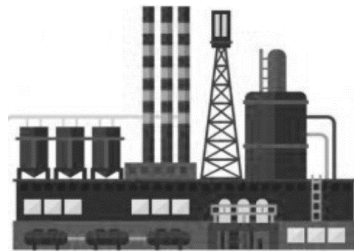
Urea is manufactured for distribution to market using a three-step process

## 1. Gas Processing



Syngas is fed into a gas processing facility, where it is split into Hydrogen ( $H_2$ ), Nitrogen ( $N_2$ ) and Carbon Dioxide ( $CO_2$ )

## 2. Ammonia Synthesis



The resulting  $H_2$  and  $N_2$  are then fed into an ammonia plant where they are converted into liquid Ammonia ( $NH_3$ )

## 3. Urea Production



The  $NH_3$  is then fed into a Urea plant where  $NH_3$  and  $CO_2$  are combined to form Urea ( $CH_4N_2O$ )



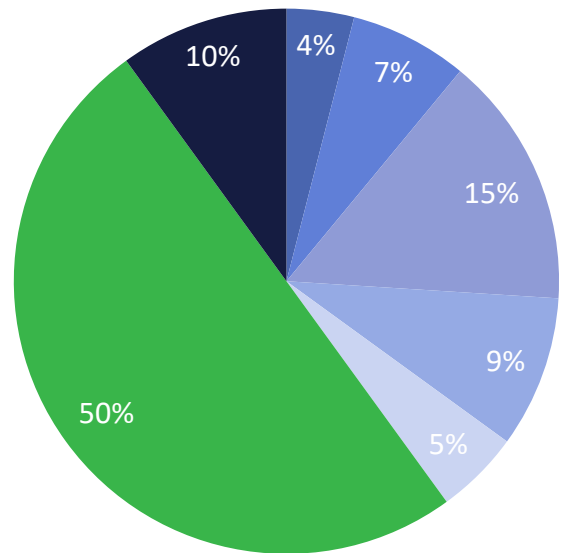
Granular urea is shipped or trucked in bulk and buyers may blend it, as required, for agricultural use

# Urea Fertiliser Facts

## Global urea demand is driven by the need to expand crop production volumes

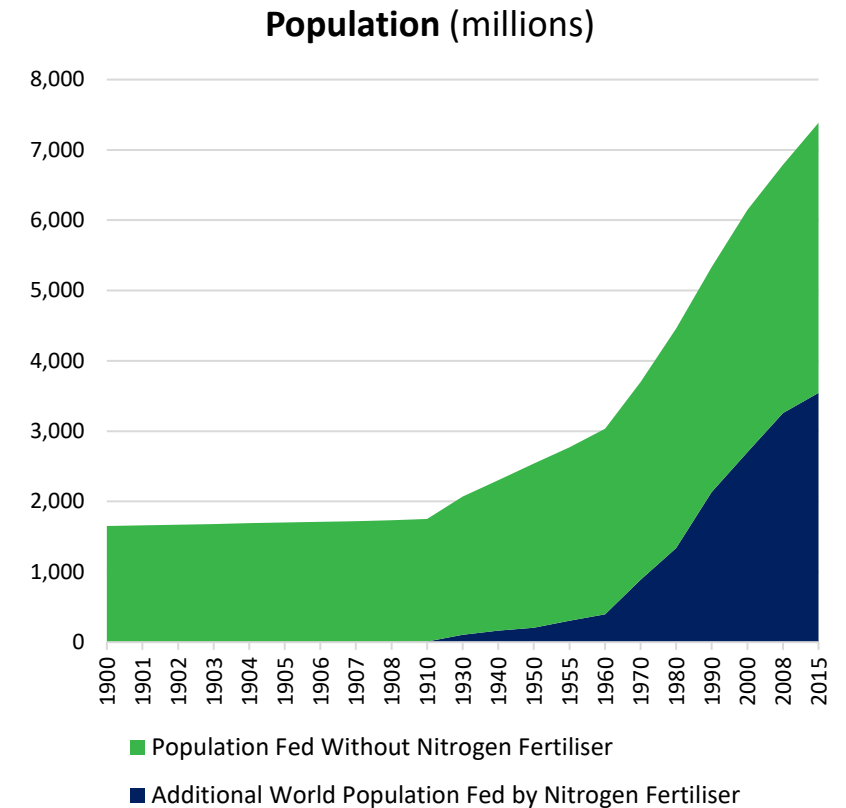
- Nitrogen based fertilisers improve crop **quantity** while Phosphorus and Potassium fertilisers improve crop quality
- Over half of all Nitrogen fertiliser is sold as urea
- Nitrogen fertiliser has an ammonia base, ammonia is difficult to store and transport, so it is processed into a granular state, for transportation
- Urea fertiliser sales in Australia are ~2Mtpa<sup>1</sup>, representing less than 2% of global sales, 95% of Australia's urea is imported

## Urea Represents half of all Nitrogen fertiliser products



Ammonia DAP/MAP NPK AN/CAN  
UAN Urea Other

## Nitrogen fertiliser feeds half the world's population<sup>1</sup>



<sup>1</sup> Source: <https://ourworldindata.org/how-many-people-does-synthetic-fertilizer-feed>



# Global Urea Market Summary

## Granular urea is traded globally as a homogenous product

- The granular urea market is a fragmented industry, with close to 300 prominent producers globally
- 220Mtpa of urea are produced globally, of this approximately 50Mtpa is internationally traded
- Top global urea traders include: Yara, Ameropa, KOCH, and Transammonia
- Key urea supply influences are seasonal demand, access to suitable port and sea freight, and gas prices (low in the Middle East)
- The capital cost of constructing a urea plant is the main barrier to entry
- Demand for urea is influenced by factors such as rainfall, crop mix, price, subsidy schemes, regulation and innovation



# Australian Urea Market

95% of Australia's urea is imported from Asia and the Middle East

On average it takes 24 days to ship urea to Australia from the Middle East and costs approximately A\$30/t



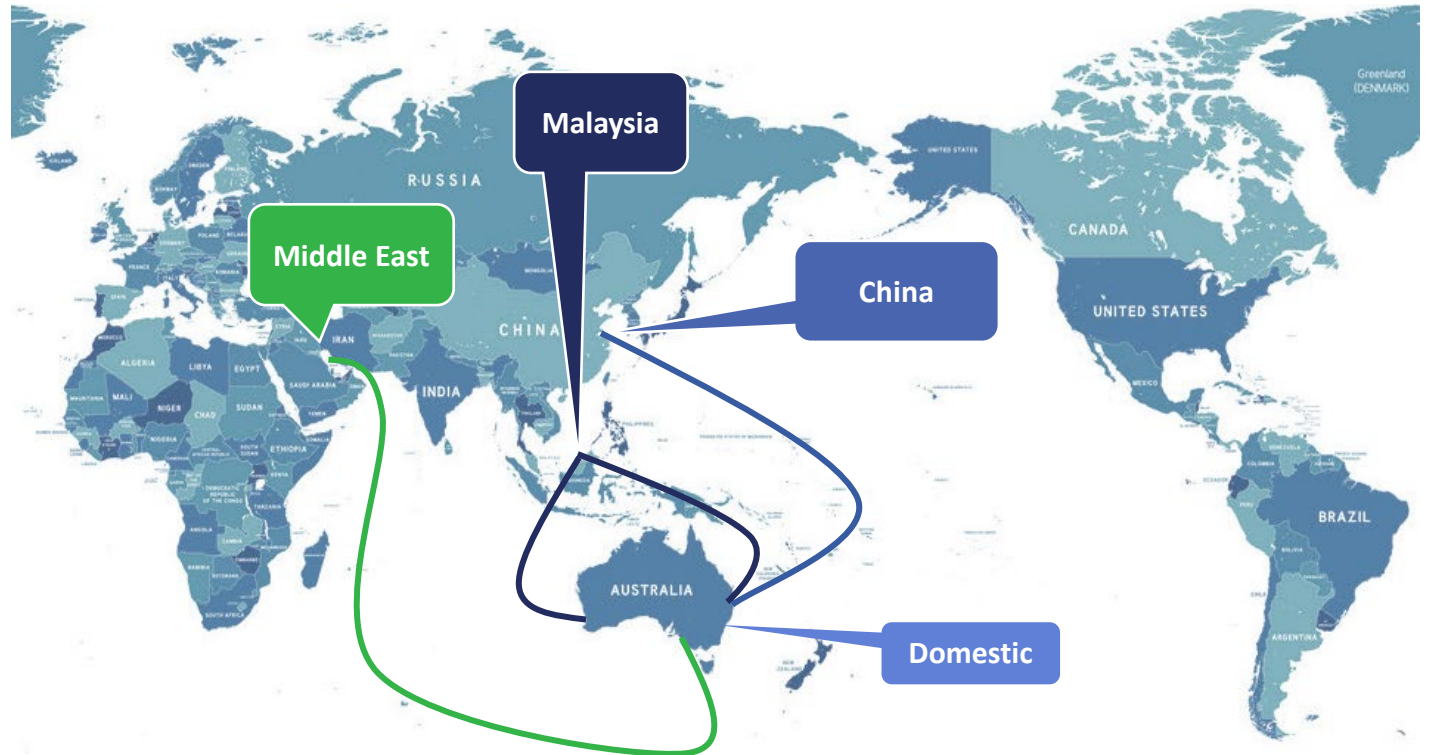
Importers face risk and cost associated with transport, exchange rates, commodity prices and import logistics



The remaining 5% of fertiliser used in Australia is domestically produced using expensive east coast gas



## Australian Urea Sources



# LCEP Urea Market

**Target markets for LCEP urea are domestic users, plus international fertiliser traders and distributors**

**LCEP urea will be globally competitive because:**



It's cheaper, faster and less risky for distributors to buy LCK urea for sale to Australian farmers than to ship it from the Middle East or Asia

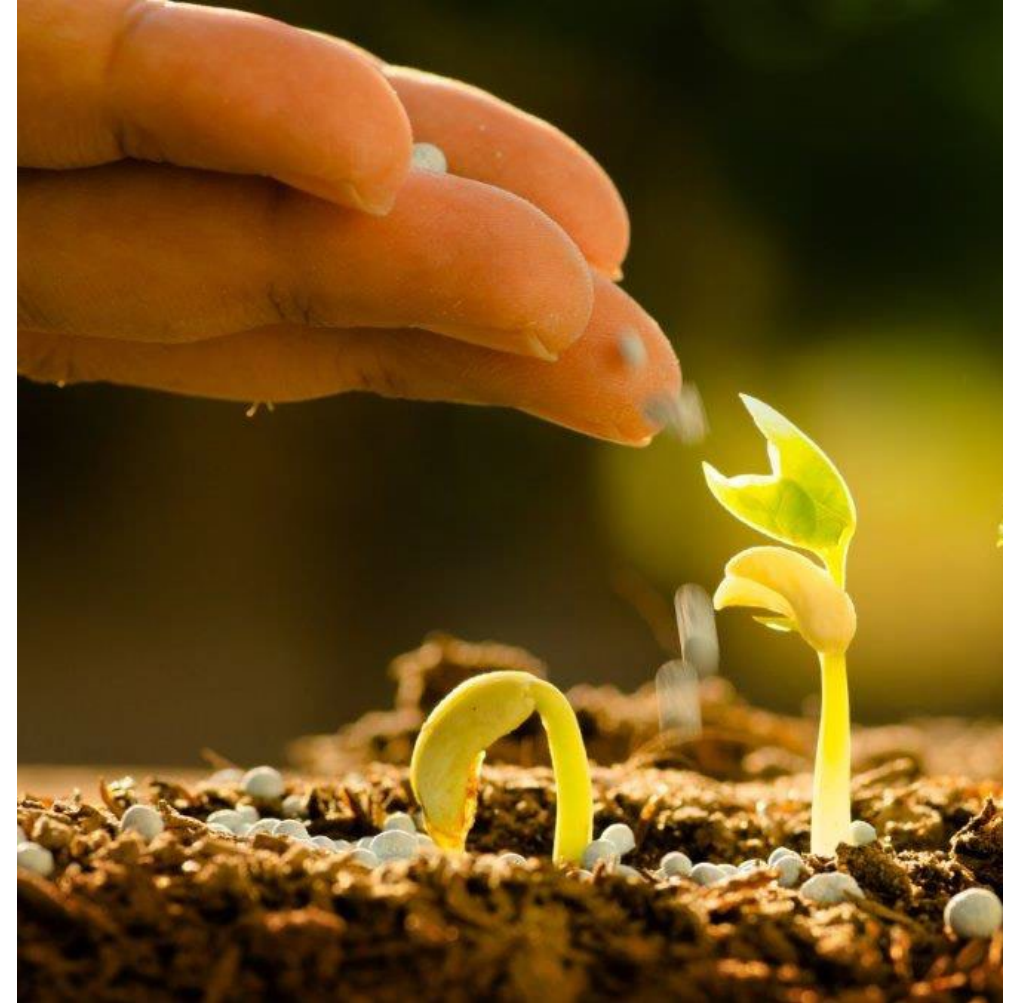


Ports accessible from Leigh Creek are central to the main Australian urea markets



LCEP operating costs will be very competitive as it can produce syngas on site for as little as \$1 per gigajoule

LCEP plans to export a proportion of its urea to take advantage of both the autumn-winter Australian season and the spring-summer Asian market





# Pre-Feasibility Study



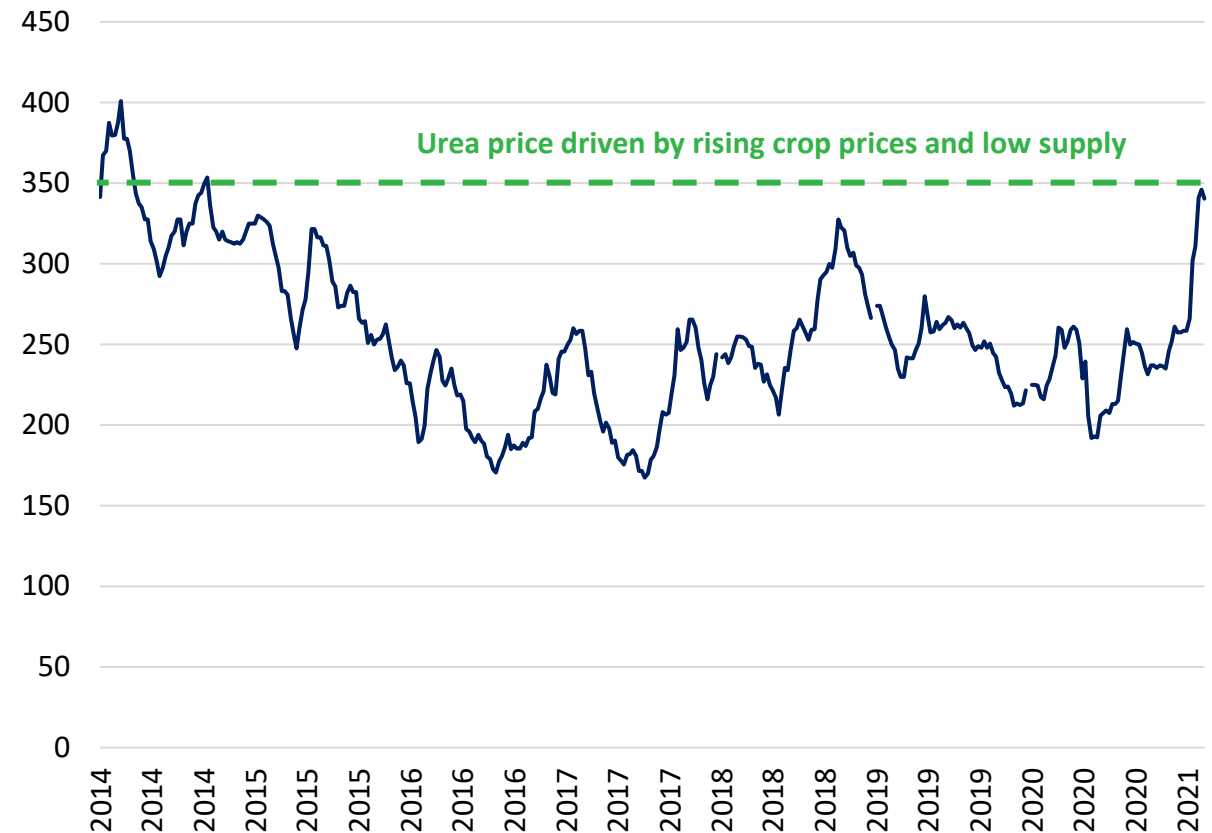


# Pre-Feasibility Study Financial Summary

## The PFS released in November 2020 highlighted robust economics for urea

- Initial annual urea plant capacity of 1.0 million tonnes per annum
- Initial capital cost \$2.3 billion
- Commercial life of over 30 years
- Nominal operating cost of A\$109 per tonne of urea compared with a spot price of A\$480<sup>1</sup> per tonne (February 2021)
- Hydrogen production potential
- Pre-tax leveraged Net Present Value (NPV) \$3.4 billion
- Internal Rate of Return (IRR) 30%

## Urea Granular Bulk FOB Middle East (all netbacks) Spot USD/t<sup>1</sup>



# Pre-Feasibility Study Financial Summary

## Project Metrics

Syngas produced per year	PJ	35
Urea produced per year	Mt	1.0
Discount Rate	%	9%
Net Revenue/tonne <sup>1</sup>	\$/tonne	410
Pre-Tax Opex/tonne <sup>2, 3</sup>	\$/tonne	109
Capex/tonne <sup>3</sup>	\$/tonne	82
Pre-Tax Net Cash Flow/tonne <sup>1</sup>	\$/tonne	219

## Project Value Metrics

Discount Rate	%	9%
Leveraged Pre-Tax NPV <sub>9</sub>	\$m	3,431
Leveraged Pre Tax IRR		30%
Leveraged Pre Tax Payback Period	Years	4

## Economic Assumptions

Urea Price <sup>4</sup>	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 Urea Production	Mt	30.5



# Urea Project Development



# Commercial Development Pathway

Demonstration  
Stage  
Completed 2018

Gas



Pre-Commercial  
Demonstration

Power company

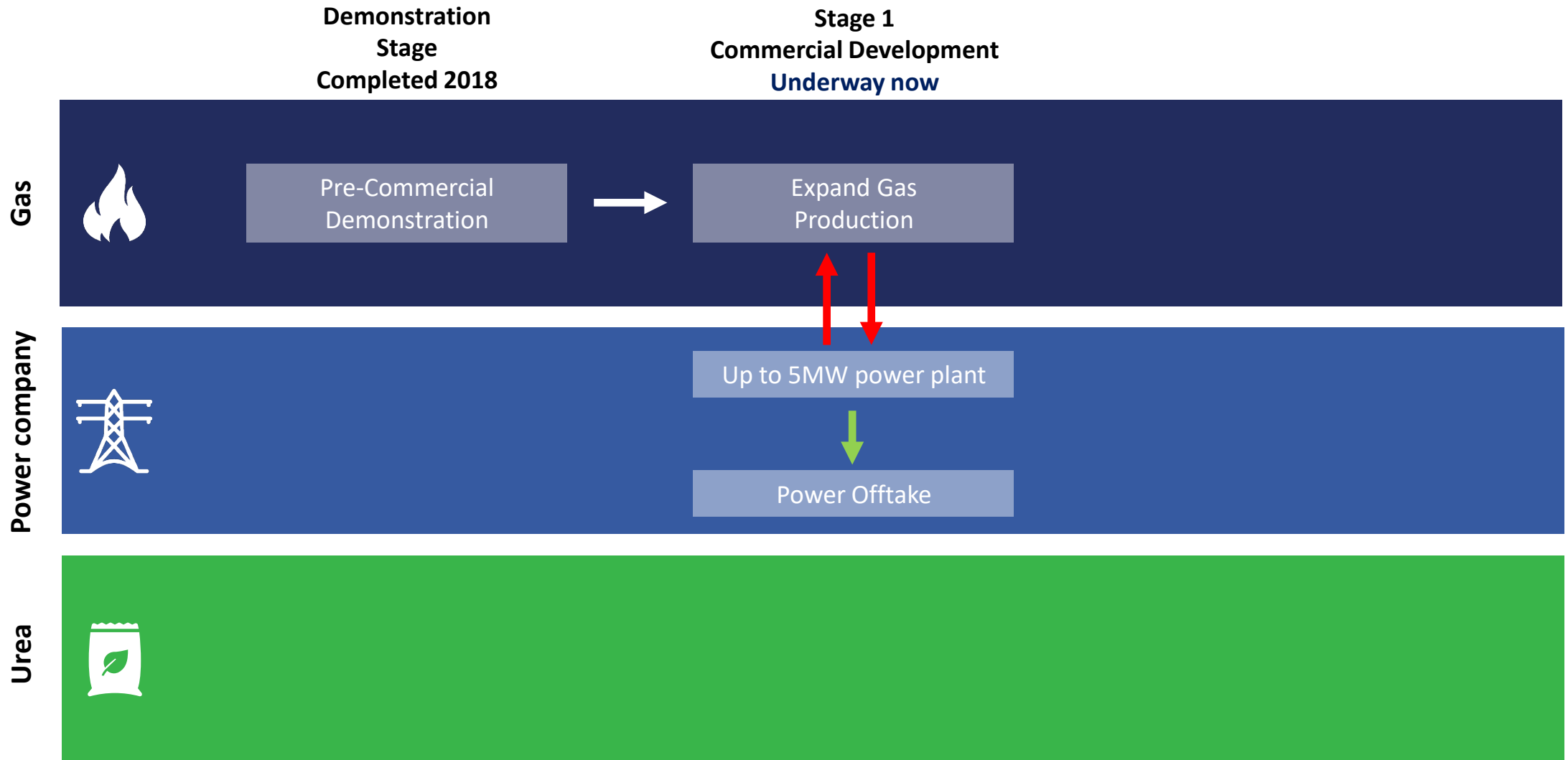


Urea

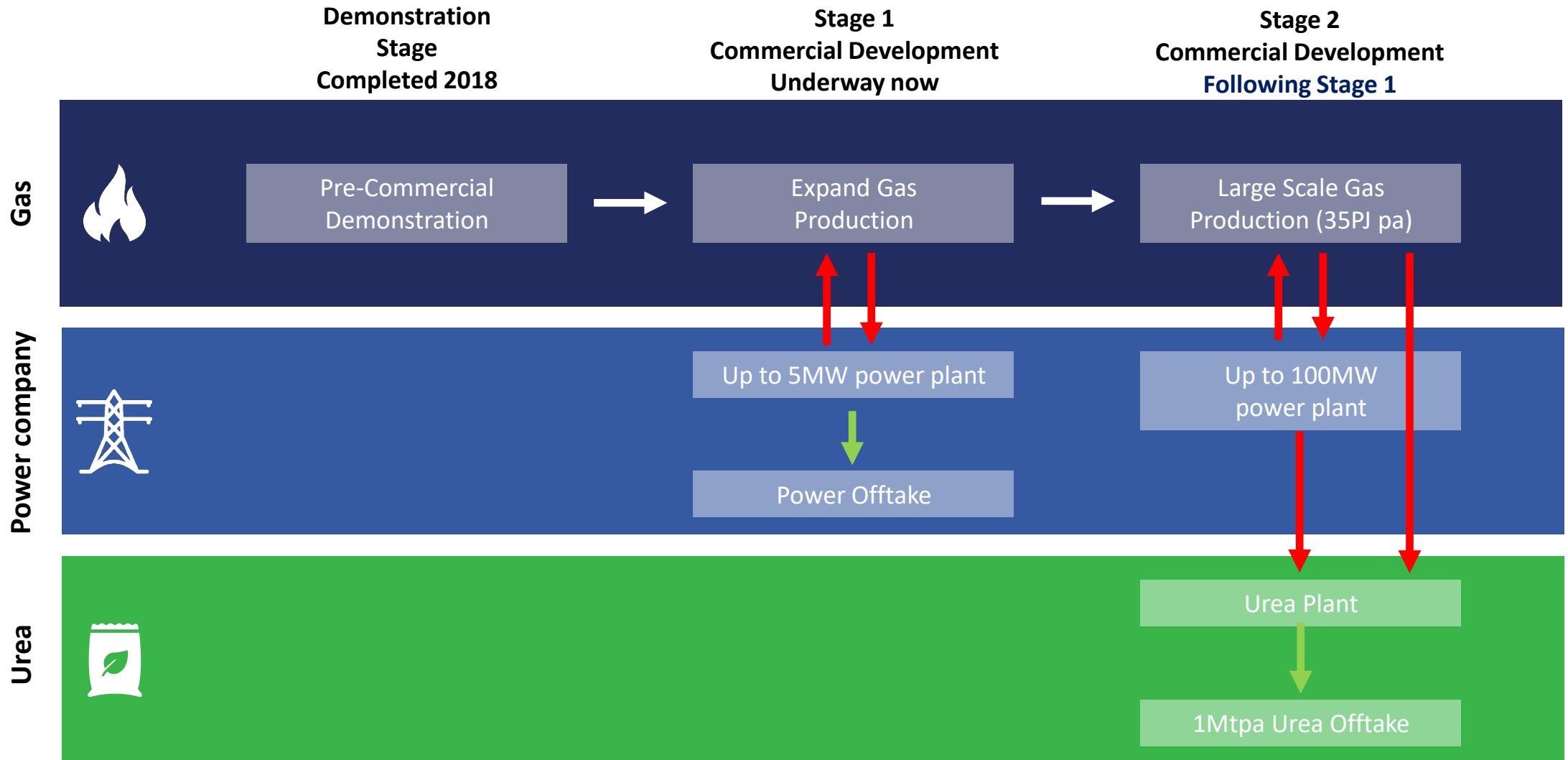




# Commercial Development Pathway

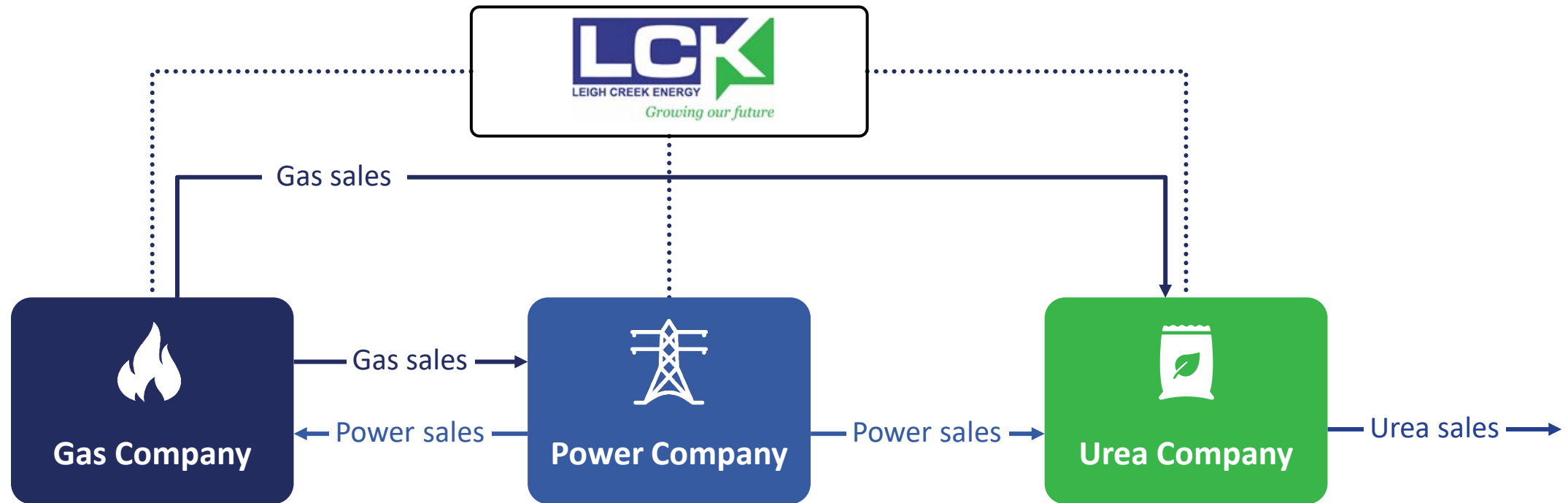


# Commercial Development Pathway



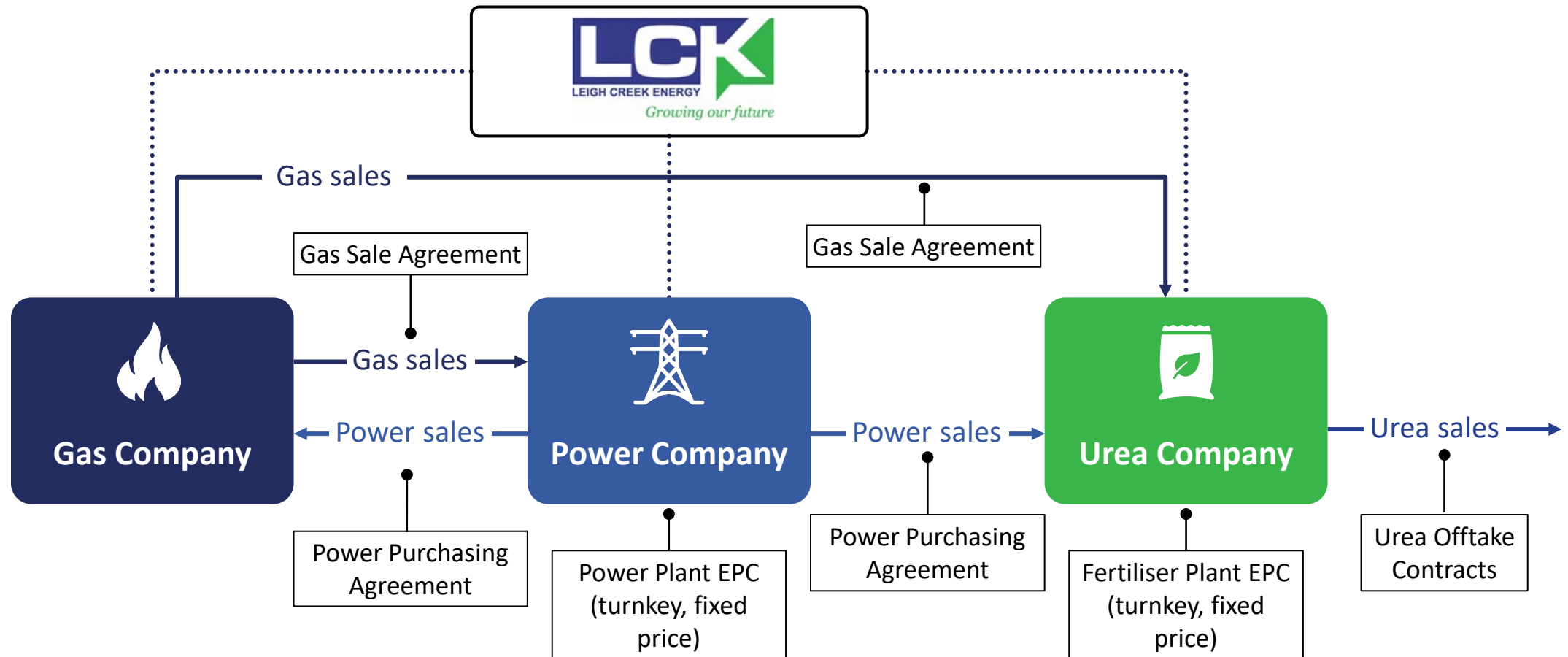
# Proposed Commercial Structure

Potential to split Gas and, gas generated Power used in Urea production



# Proposed Commercial Structure

All relationships controlled under contractual agreements





# Commercial Development Milestones

## Stage 1 Commercial Development

Expand gas production + commence earning revenue	PFS	PPL	EPCM	FID	EIR & SEO	Field Development Plan
	Completed	Issued	Awarded	Approved	In Progress	In Progress

- Gasification wells
- Up to 5MW small scale power plant






## Stage 2 Commercial Development

Final large scale gas + urea production	PFS	EIS	EPC	Feasibility Study	FEED	FID
	Completed	In Progress	In Progress	Planned	Planned	Planned

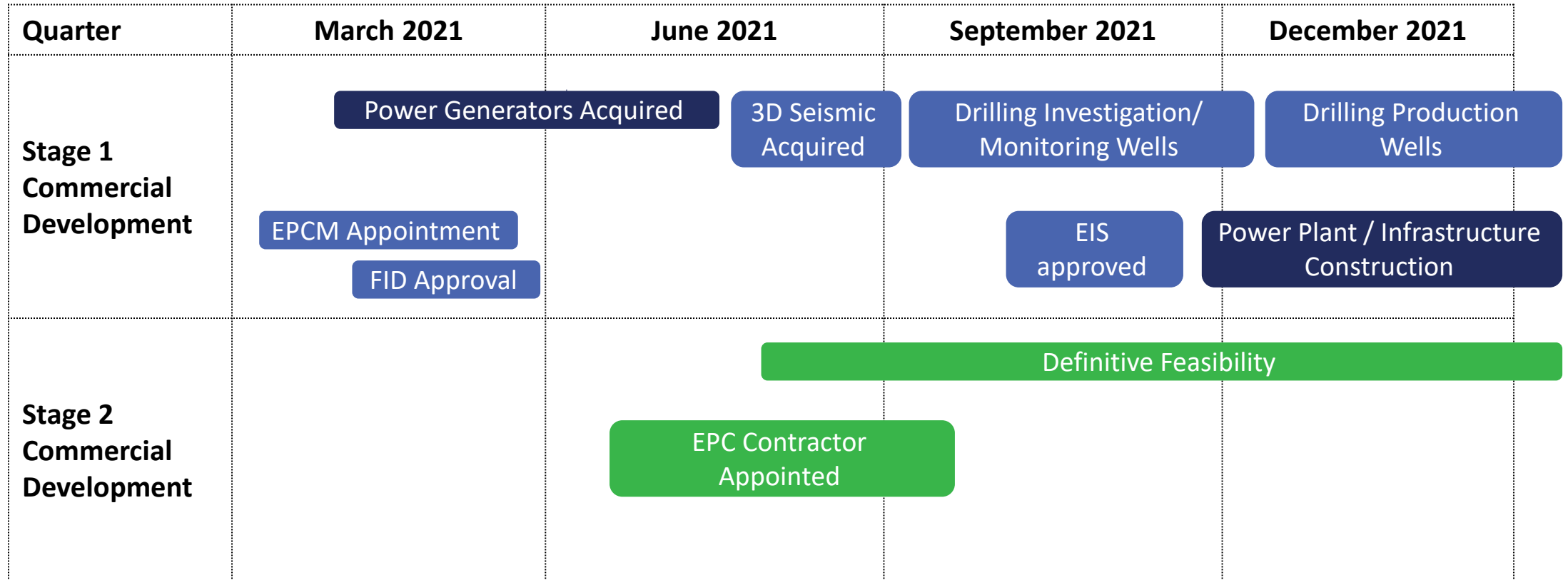
- Large scale gasification well drilling campaign
- Large scale power plant
- Construct urea plant

# Project Risks

LCK is working to systematically reduce project risk at each stage of development

Risk	Addressed or Progressed
 Regulatory approvals	Petroleum licencing approval for upstream development attained
 Technical know-how	Technical capability proven with successful operation of the pre-commercial demonstration plant and faultless post operation environmental monitoring. The LCK expert technical team is growing as development activities progress
 Financing	Combination of debt, equity and strategic partner injection is expected. Discussions with proposed strategic partners have commenced
 Construction	Small scale, up to 5MW, power plant to be acquired and installed to enable commissioning of future gasifiers. The Stage 2, large power plant and urea plant construction to be managed under turn key, fixed price contracts to reduce risk
 Commercialisation	In discussions regarding initial offtake agreements

# Near Term Activities



# Proposed Project Funding Sources

## Funding Option

### Strategic partner equity



### Equity raising



### Debt



### Urea plant fixed price EPC



## Developments to Date

- Discussions with potential strategic partners has commenced
- Planning to offer project equity in exchange for funds for construction

- Up to A\$18 million to be received from US based investors
- Future equity raisings to be undertaken as the project develops

- Per the pre-feasibility study released in November 2020 it is anticipated that the project will be at least 50% debt funded

- Shortlist of potential EPC partners determined. Contract details yet to be negotiated



# Conclusion



Urea is a key input to ensure certainty of global agricultural supply



Australia currently imports 95% of the urea it consumes, which could be replaced with domestically produced urea



The LCEP has access to gas feedstock and transport infrastructure for urea, once produced



The LCEP PFS indicated a nominal operating cost of A\$109 per tonne ex-plant compared with the spot price of A\$480<sup>1</sup> per tonne (February 2021) and an IRR of 30%



LCEP's low cost feedstock gas enables it to be extremely competitive in both domestic and export markets



# Thank you

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Investor Relations

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

