

# ENERGIE FUTURE

## LEADING THE UCG CHARGE

pathway to the hydrogen economy

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# A New Leader

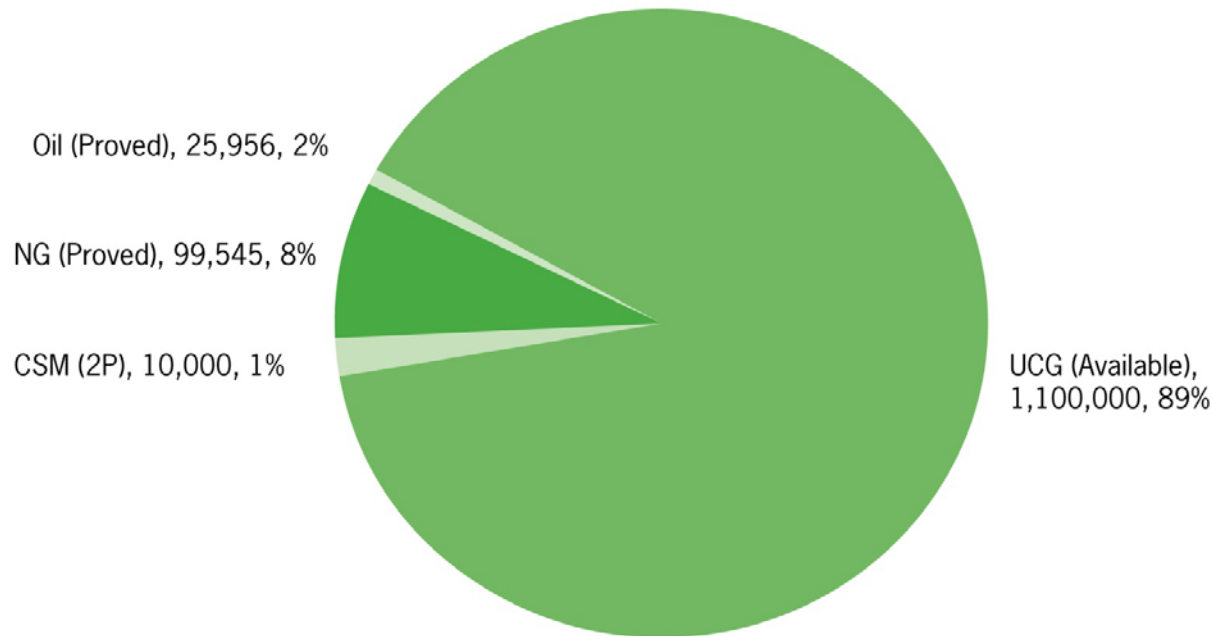
- Energie Future has assembled all of the building blocks necessary to become the leader in UCG development
  - The opportunity to invest in an advanced development with the potential to be under construction in 12 months
  - A non binding MOU for a partnership with world leaders in UCG and Gas to Liquids Technology and established Project implementation expertise
  - An application for a significant resource opportunity adjacent to Australia's largest energy market

# Energie Future Vision

- Energie Future was formed with a vision of providing clean and environmentally friendly energy for the future;
- It will deliver this vision by controlling its key technology; and
- Leveraging its Technology leadership to acquire and develop stranded coal assets around the world.

**Know How is the scarce resource and Energie Future has it!**

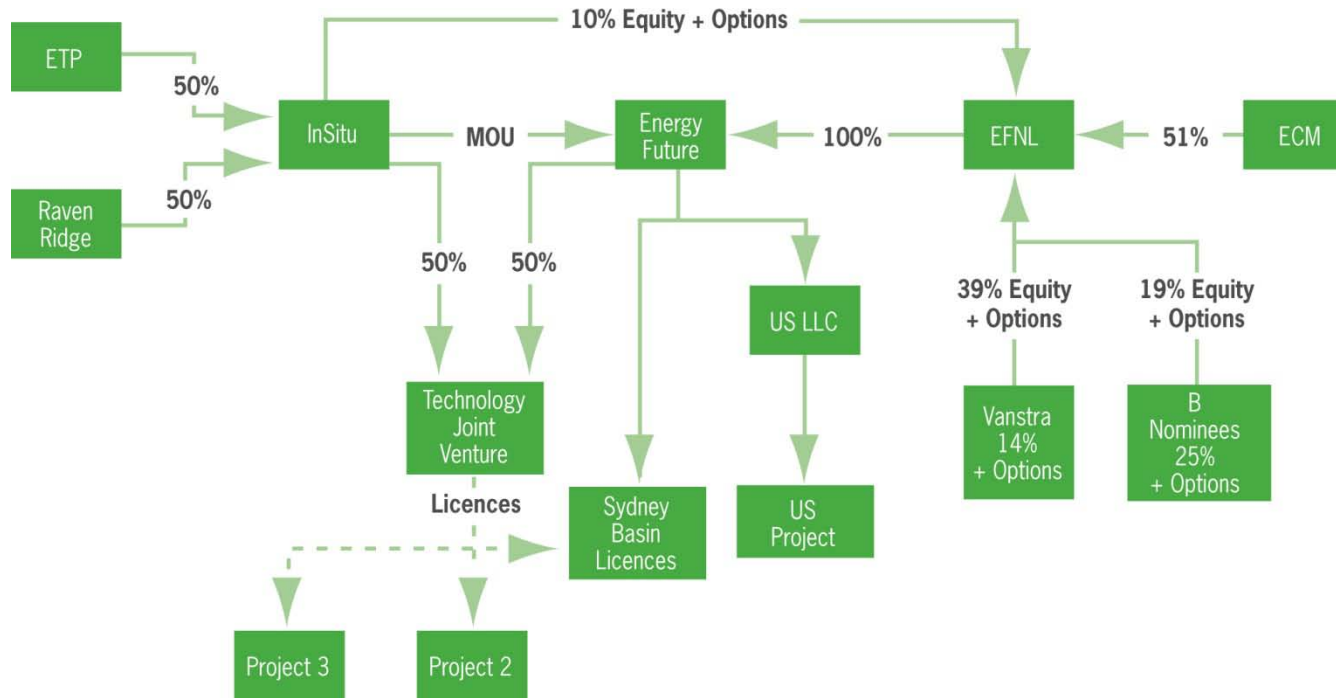
# Australian Resource Mix In PJ



Australian Resource Mix with Available UCG but Excluding Coal (PJ) <sup>20,58</sup>

Price Waterhouse Coopers 2008

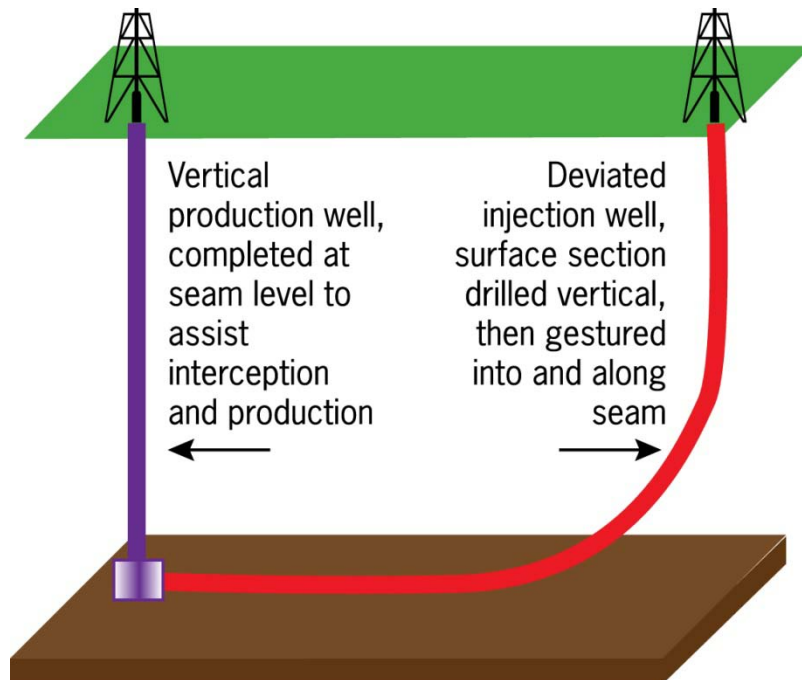
# Ownership Structure Following Exercise of East Coast Option



# Extracting Green Energy

- UCG converts coal, while still in the ground, into a clean gas called “syngas” consisting of hydrogen, carbon monoxide and methane
- UCG involves drilling two wells into the coal, one for injection of oxidants (water/air or water/oxygen mixtures) and another well to bring the product gas to the surface.
- The coal at the base of the first well is heated to temperatures that would normally cause the coal to burn - but through careful regulation of the oxidant flow, the coal instead separates into the syngas.
- The gas can be processed to remove its CO<sub>2</sub> content, providing a source of clean energy with minimal greenhouse gas emissions.
- The process is similar to the production of “town gas”, which has been used for almost 200 years.

# How Does UCG Work?



- Two wells are drilled into the coal seam.
- Oxygen and Water are introduced via the injection well and subsequently the coal is ignited.
- The product gas (syngas) is extracted via the production well.



# UCG Product

- UCG Syngas consists of mixture of Fuels
  - $\text{CH}_4$  – Methane
  - $\text{H}_2$  – Hydrogen
  - $\text{CO}$  – Carbon Monoxide Waste
  - $\text{CO}_2$  - Carbon Dioxide
- Syngas can be used to produce zero emission hydrogen fuel for transport, synthetic natural gas, ultra clean diesel fuel, ammonia for fertiliser or to produce power in low emission power station facilities.
- The project can be carbon neutral, creating a source of green energy to replace carbon-intensive power generation – and enough hydrogen to convert every bus in Sydney, Newcastle and Wollongong to green power.

# Current Status Of UCG Technology

- Technical

- Technology proven in ~50 trials at different conditions, coals, depths with a range of control methods.
- Environmental impact has been addressed with advanced cavity control and site evaluation techniques.
- Process has CO<sub>2</sub> capture and storage advantages, and offers a range of options for lower cost capture and local permanent storage.
- Offshore and coastal schemes are of growing interest.

- UCG as a Strategic Technology

- Ready for use for large scale syngas production.
- UCG offers an important route to exploitation of indigenous coal and contributes significantly to security of supply.
- Feasibility studies for commercial exploitation underway in all the major coal producing countries
- Costs are highly competitive and take-up could be rapid (2012-2018)

# Energie Future's Experienced Partners

- Energie Future has an MOU to become a partner with world leaders in UCG - InSitu Energy (ISE)
- ISE conducted successful US trials in Rawlins Wyoming
- Developed CRIP technology at Rocky Mountains 1
- Ran successful trial in NZ with ECNZ

# UCG Record of Success

- Energy Technology Partners and Raven Ridge are leaders in successful UCG projects.
- These Projects are regularly cited as benchmarks in the industry.
- Rocky Mountains 1 CRIP Technology is basis of Carbon Energy technology<sup>#</sup>

UCG Projects	Type		Duration
Rawlins 1 Wyoming	Steeply Dipping Bed	Feasibility	1 month duration, up to 70 T/D
Rawlins 2 Wyoming	Steeply Dipping Bed	Demonstration	3 month duration with gas utilisation, up to 200 T/D
Rocky Mountains 1	Flat seam	Demonstration	3 month, defining work on CRIP, up to 200 T/D
New Zealand Huntley		Commercial Trial	A series of projects over a 10 year period of time ending in small test burn (1994)

<sup>#</sup> <http://www.syngasrefiner.com/ucg/agenda.asp>

# UCG Operation Rawlins, Wyoming



Underground Coal Gasification Trials at Rawlins Wyoming

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# The Huntley, New Zealand, Demonstration Plant

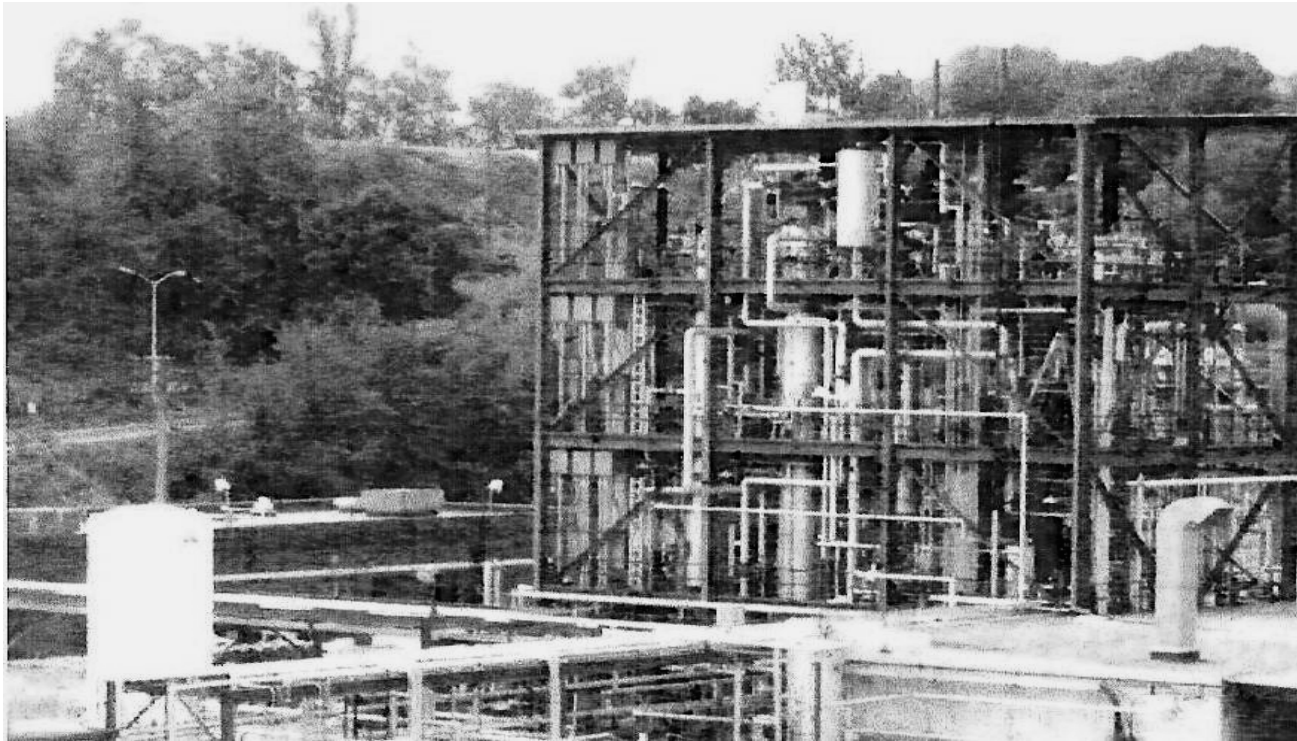


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# Gas to Liquids Technology

- Energy Technology Partners are world leaders in Fischer Tropsch Gas to Liquids technology played leading roles in:
  - The development of the Statoil FT Catalyst & Process now being commercialized jointly by Statoil and PETROSA;
  - An extensive family of advanced Fischer Tropsch catalyst and process patents that were recently sold to a major energy company active in the commercial GTL arena; and
  - The development of the DISOL Process for the Venezuelan National Oil Company.

# 35 B/D F-T Demonstration Plant



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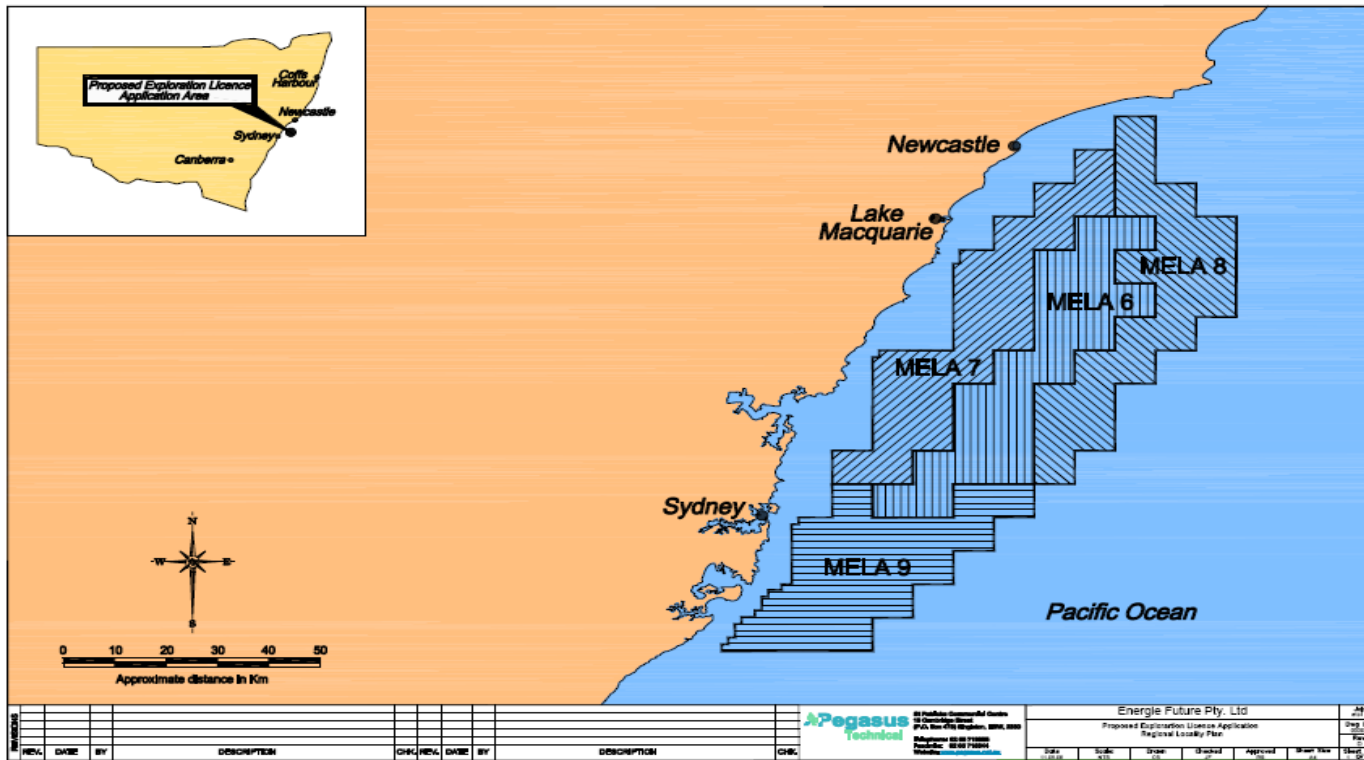
# Advanced US Project

- \$100 million invested in project exploration and pilot plant development
- 12 Month horizon until construction commencement
- Low spend pre financial close <\$5m
- Small Capital Cost for Initial Project <\$150m – 2,500 bpd
- Scope for stepped expansion to 50,000 bpd

# Sydney Basin A World Class Resource

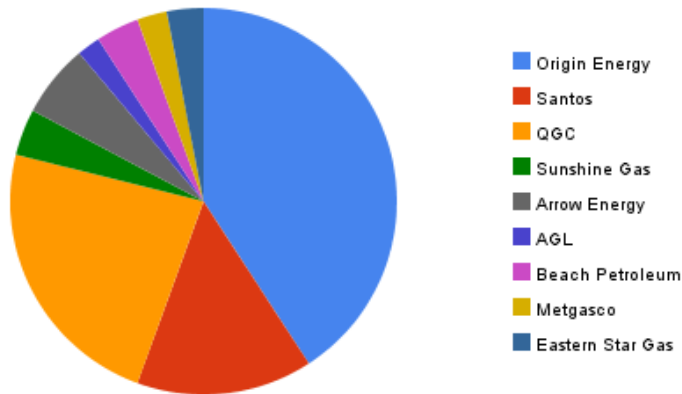
- Lease Application covers almost 6000 sq kms
- Exploration Zone is bounded coal outcropping to the north and south
- Speculative Estimate by Department of Mineral Resources in 1981
  - 28 Billion Tonnes
  - Only to depths of 600m
  - Based on conventional mining techniques
  - Viewed as conservative by the department

# Current Exploration Applications



# What Does 28 Billion Tonnes Mean?

Australian CSG Reserves (2P) - Total 11,640 PJ



- **728,000 Petajoules**
  - 60 times Australia's 2P CSG reserves
- **120,400,000 BOE**
  - More Energy than Kuwait

# Listed Company Comparison

	Energie Future	Linc Energy (ticker LNC)	Carbon Energy (ticker CNX)	Cougar Energy (ticker CXY)
Market Capitalisation		\$551m	\$138m	\$31m
Resources Potential	28 billion tonnes plus	19 billion tonnes plus	300 million tonnes +	75 million tonnes
Have own UCG Technology?	Yes	Yes	Yes (Based on EF Technology)	Limited Licence
Have own Fischer Tropsche Gas to Liquids Technology?	Yes	No licensed from Syntroleum	No - Exploring Methanol as an option	Limited scope with energy units used in lower value power generation.
Technology run successfully at full scale demonstration plant	Yes three pilots at Rawlins 1 in Rocky Mountains	Yes 1 at Chinchilla	Initial Trial underway	Initial Trial Underway
Permitting for first project in place	Yes	No	No	No
Major Resource Located adjacent to large industrial area and major energy market.	Yes	No	No	No
Time to First Commercial Production	4 years +	5 Years +	5 Years +	5 Years +

# All the Elements for Success are There!