

## TALON ENERGY INVESTOR PRESENTATION

**Talon Energy Ltd (Talon or the Company)** is pleased to provide a copy of its latest Investor Presentation.

The presentation provides a summary of Talon's current operations including the recently announced acquisition of a patented Superheated Steam Technology process for sequestering greenhouse gases, and enhancing the recovery of hydrocarbons from coal seams.

**This Announcement is authorised for release by the Managing Director.**

For further information, please contact:

**Talon Energy Ltd**

David Casey  
Managing Director & CEO  
+61 8 6319 1900  
[david@talonenergy.com.au](mailto:david@talonenergy.com.au)

**Media Enquiries**

Angela East  
Media and Capital Partners  
+61 428 432 025  
[angela.east@mcpartners.com.au](mailto:angela.east@mcpartners.com.au)

# TALON ENERGY LTD

*Building a next generation energy company*

GreenFlame Presentation   
GreenFlame  
energy

*The final piece of the puzzle*

August 2021



This presentation is provided for information purposes only and is not a disclosure document as defined under the Corporations Act 2001 (Cth). This presentation does not constitute an offer, invitation, solicitation or recommendation with respect to the purchase, sale or issue of any securities or any financial product nor does it constitute financial product or investment advice. The presentation does not contain all the information that may be required for evaluating the Company's assets, prospects or potential opportunities and is not intended to be used as the basis for making an investment decision. The presentation has been prepared without taking into account the investment objectives, financial situation or particular needs of any particular person.

No representation or warranty, express or implied, is made as to the accuracy, reliability, completeness or fairness of the information, opinions and conclusions contained in this presentation. Neither the Company, its related bodies corporate, shareholders or affiliates, nor any of their respective officers, directors, employees, related bodies corporate, affiliates, agents or advisers makes any representations or warranties that this presentation is complete or that it contains all material information about the Company or which a prospective investor may require in evaluating a possible investment in the Company or acquisition of securities. To the maximum extent permitted by law, none of those persons accept any liability, including, without limitation, any liability arising out of fault or negligence for any loss arising from the use of information contained in this presentation or in relation to the accuracy or completeness of the information, statements, opinions or matters, express or implied, contained in, arising out of or derived from, or for omissions from, this presentation. In particular, no representation or warranty, express or implied is given as to the accuracy, completeness or correctness, likelihood of achievement or reasonableness of any forecasts, prospects or returns (if any) contained in this presentation nor is any obligation assumed to update such information. Such forecasts, prospects or returns are by their nature subject to significant uncertainties and contingencies. Neither the Company nor its related bodies corporate, shareholders or affiliates, nor any of their respective officers, directors, employees, related bodies corporate, affiliates, agents or advisers guarantees any return or generally the performance of the Company or the price at which its securities may trade. Any investment in the Company is subject to investment risks including the possibility of loss of capital invested and no return of income or payment of dividends. Before making an investment decision, you should assess whether an investment is appropriate in light of your particular investment needs, objectives and financial circumstances and consider seeking your own independent legal, financial and commercial advice. Past performance is no guarantee of future performance.

The distribution of this document in jurisdictions outside Australia may be restricted by law. Any recipient of this document outside Australia must seek advice on and observe any such restrictions.

This presentation may contain certain "forward-looking statements" with respect to the financial condition, results of operations and business of the Company and certain plans and objectives of the management of the Company. Forward looking statements can generally be identified by words such as 'may', 'could', 'believes', 'plan', 'will', 'likely', 'estimates', 'targets', 'expects', or 'intends' and other similar words that involve risks and uncertainties, which may include, but are not limited to, the outcome and effects of the subject matter of this presentation. Indications of, and guidance on, future exchange rates, capital expenditure, earnings and

financial position and performance are also forward-looking statements.

You are cautioned not to place undue reliance on forward looking statements as actual outcomes may differ materially from forward looking statements. Any forward-looking statements, opinions and estimates provided in this presentation necessarily involve uncertainties, assumptions, contingencies and other factors, and unknown risks may arise, many of which are outside the control of the Company. Such statements may cause the actual results or performance of the Company to be materially different from any future results or performance expressed or implied by such forward looking statements. Forward-looking statements including, without limitation, guidance on future plans, are provided as a general guide only and should not be relied upon as an indication or guarantee of future performance. Such forward looking statements speak only as of the date of this presentation.

The information in this presentation is current as at the date on the cover of the presentation and remains subject to change without notice, in particular the Company disclaims any intent or obligation to update publicly any forward-looking statements, whether as a result of new information, future events or results or otherwise.

**Competent Persons Statement.** Any information in this report that relates to Prospective Resource information in relation to the Skymoos and Rocket, Vantage, Thelma, Louise and Buffalo Prospects are based on information compiled by Mr Graham Dore and Mr Paul Young. Mr Dore and Mr Young are each consultant to the Company. Information in this report that relates to Prospective Resource information in relation to the Walyering Prospect and Contingent Resource information in relation to Ocean Hill is based on Prospective Resource and Contingent Resource information compiled by Strike Energy Limited, the operator both EP447 and EP495. Information in this report that relates to Prospective Resource that relates to the Condor Structure is based on information compiled by Mr John Begg and Mr John Lamberto, both consultants to the Company. This information was subsequently reviewed by Mr David Casey BSc (Hons), who has consented to the inclusion of such information in this report in the form and context in which it appears. Mr Casey is a director of the Company, with approximately 30 years relevant experience in the petroleum industry and is a member of The Society of Petroleum Engineers (SPE), the Australian Institute of Mining and Metallurgy (AusIMM) and the Petroleum Exploration Society of Australia. The resources included in this report have been prepared using definitions and guidelines consistent with the 2007 Society of Petroleum Engineers(SPE)/World Petroleum Council(WPC)/American Association of Petroleum Geologists(AAPG)/Society of Petroleum Evaluation Engineers (SPEE) Petroleum Resources Management System (PRMS).The resources information included in this report are based on, and fairly represents, information and supporting documentation reviewed by Mr Casey. Mr Casey is qualified in accordance with the requirements of ASX Listing Rule 5.41 and consents to the inclusion of the information in this report of the matters based on this information in the form and context in which it appears.

# The Energy Industry Game Changer

Green Energy from CO<sub>2</sub>

# The Challenge...



## To be an energy company in an emissions constrained environment

- Every energy company has no choice but to develop a strategy to manage their emissions footprint while still providing for the world's energy needs
- Talon has chosen to approach this from a technology perspective and look at it as an opportunity
- By focusing on its core competencies, new technology will offset Talon's emissions while still increasing production and profitability

BUSINESS NEWS DECEMBER 15, 2020 / 1:46 AM / UPDATED 5 MONTHS AGO

### Exxon Mobil, under pressure on climate, aims to cut emissions intensity by 2025



### Shell: Europe's biggest oil firm sets out carbon neutral plans

By Tom Espiner  
Business reporter, BBC News

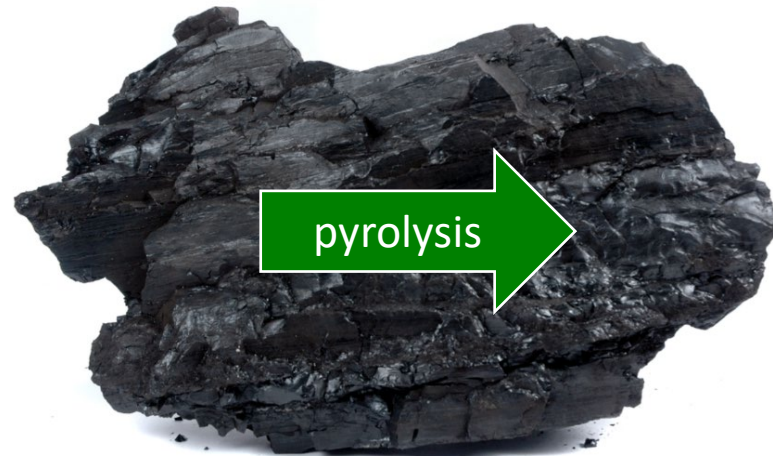


Talon is determined to remain an important energy provider by managing its emission offset obligations

The Solution...

Sequestering CO<sub>2</sub> in coal seams to enhance energy production

CO<sub>2</sub>  
Injection  
(Sequestration)



Enhanced  
CH<sub>4</sub> & H<sub>2</sub>  
Production

---

Talon and Applied Vapor Solutions LLC have formed GreenFlame Energy Pty Ltd

# The Solution...

## Talon (60%) & AVS (40%) GreenFlame energy

- GreenFlame enables Talon to potentially offset any emissions associated with its projects here or overseas
- The underlying premise is **coal pyrolysis** which is the process of subjecting coal to high temperature in the absence of oxygen
- Coal pyrolysis dramatically increases a coal seams porosity and permeability and therefore greatly **increases its capacity to store CO<sub>2</sub> while significantly enhancing methane and hydrogen production**
- As a consequence coals are an ideal sequestration reservoir as they can hold over 100x more CO<sub>2</sub> than a comparable sandstone reservoir

CO<sub>2</sub>  
sequestration



Enhanced  
CH<sub>4</sub> & H<sub>2</sub>  
Production



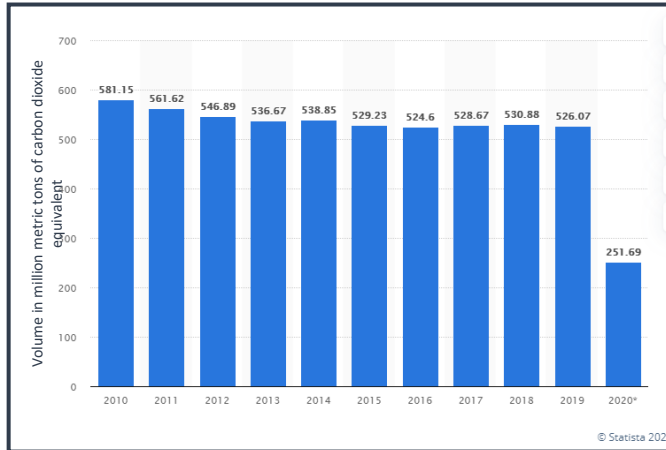
---

Extraordinary volumes of CO<sub>2</sub> can be sequestered in coal especially if supercritical CO<sub>2</sub> is used as the pyrolysis gas

# How much CO<sub>2</sub> can be stored in coal seams?

## Can it make a material difference?

Australia's annual volume of greenhouse gas emissions  
(million metric tons of carbon dioxide equivalent)



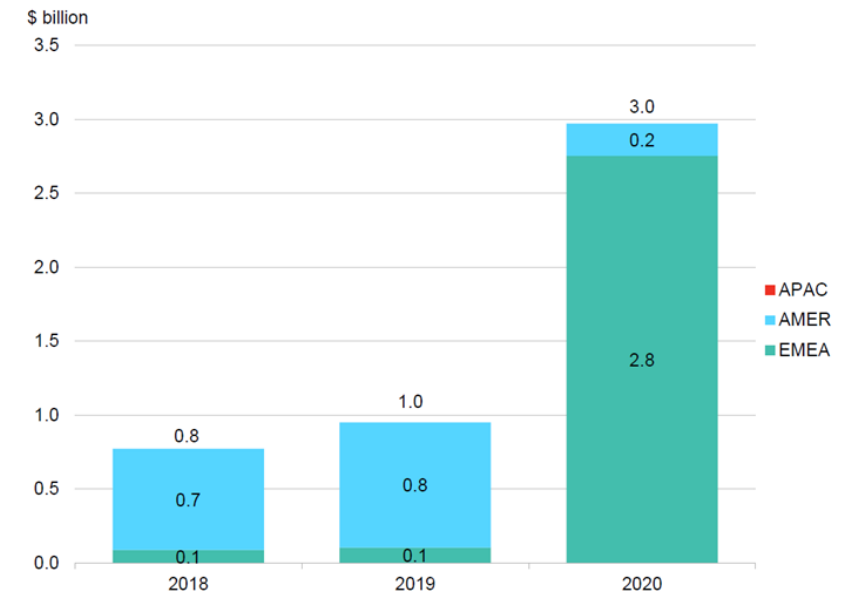
### By way of example:

- At 1,500 m depth and 2,130 psi pressure, a pyrolyzed coal can store 211 kg/m<sup>3</sup> of CO<sub>2</sub>



- Australia's annual volume of greenhouse gas emissions is on the order of 526 million metric tons of CO<sub>2</sub> equivalent
- To sequester this volume of CO<sub>2</sub> in a one metre thick seam would require an area of 2,492km<sup>2</sup>
- **With up to 135m of coal thickness PEL96 alone, when pyrolyzed, could potentially sequester Australia's annual greenhouse gas emissions for 10 to 20 years**

Global investment in carbon capture and storage by region



Source: BloombergNEF. Note: expenditure commitments considered only if recipient is announced.

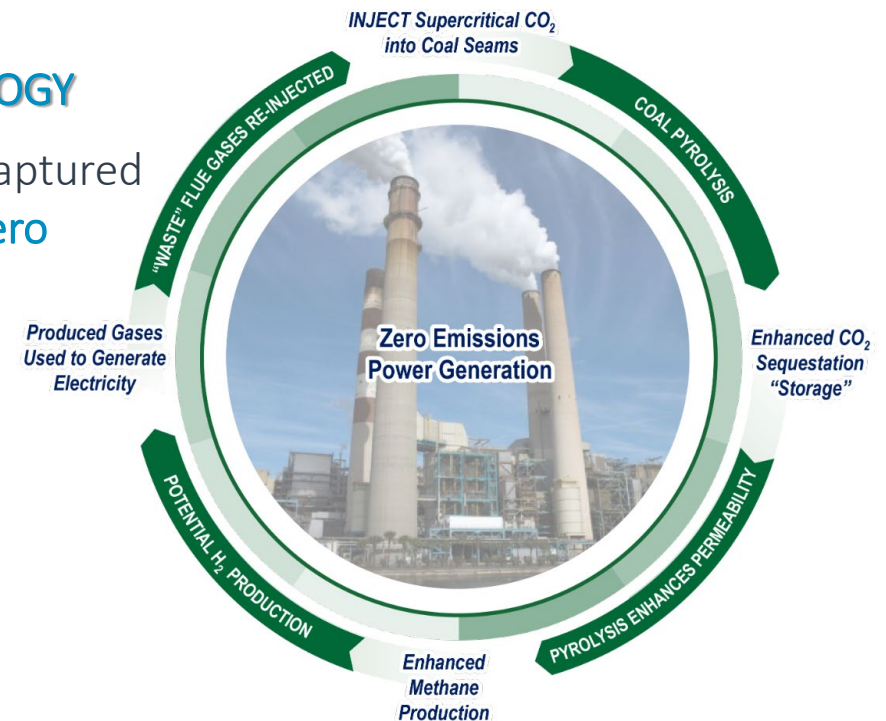
Worldwide investment in Carbon Capture & Storage (CCS) increased markedly in 2020



# The Technology...

## Could Talon become Australia's first carbon negative energy company?

- GreenFlame has a patented and licenced small scale modular Superheated steam generator that can inject all combustion gases into coals seams to initiate pyrolysis
- This is the only technology that can vary the flue gas & gas composition from combustion up to 100% CO<sub>2</sub>
- As a consequence this is a **ZERO EMISSIONS TECHNOLOGY**
- Because power station flue or exhaust gases can be captured and sequestered, this technology can also **generate zero emissions electricity**



With Superheated CO<sub>2</sub> injection, permeability could increase by up to a 1000 times as observed in heavy oilfields

## Hydrogen is another by-product of coal pyrolysis

- The volatile matter in the coal is transformed by heat delivered at the coal face into valuable fuel gases
- Hydrogen (H<sub>2</sub>) is one such gas produced, along with methane, as part of the pyrolysis and CO<sub>2</sub> sequestration process, and by varying the temperature can be as high as **80%**
- In addition, because the CO<sub>2</sub> is re-injected, excess methane can also be used to create H<sub>2</sub> utilising zero emissions electricity turning otherwise “blue” H<sub>2</sub> to “green” H<sub>2</sub>

## ExxonMobil Greening Up via Carbon Capture and Hydrogen, while Eschewing North American Natural

Gas ≡ **NGI** NATURAL GAS INTELLIGENCE



BY CAROLYN DAVIS

March 3, 2021

## Santos to focus on CCS and hydrogen technologies

BUSINESS DEVELOPMENTS & PROJECTS

April 21, 2021, by Sanja Pekic



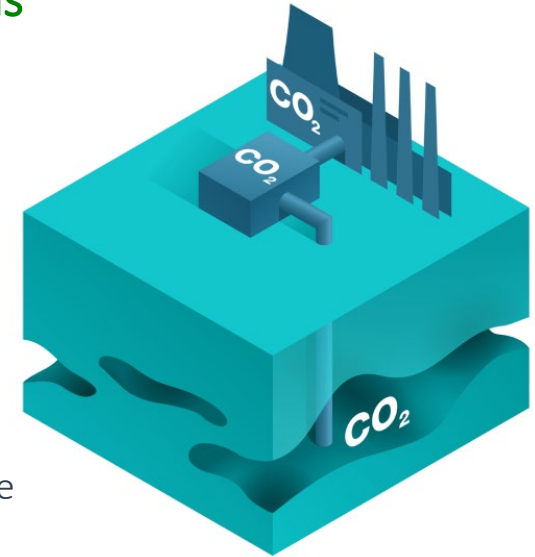
Hydrogen as a by-product can make the task of sequestering CO<sub>2</sub> profitable as opposed to an impost

# The where...to trial technology



## PEL96 – South Australia is a favourable jurisdiction for many reasons

- The challenge particularly for a small company is how to most cost effectively prove any new technology, and PEL96 is an ideal candidate for many reasons:
  - **Minimal capex required** – substantial investment in pre-existing infrastructure
  - **No wells to drill** – 4 deep wells and Jaws lateral completed and accessible with minimal retrofitting
  - **No approvals needed** – wells and required infrastructure already permitted
  - **No need to wait** – existing pilot accelerates process by at least 24 months
- Cooper Basin ideal location to undertake first trial - Moomba gas processing plant alone currently vents 1.7Mt of CO<sub>2</sub> each year
- Cooper Basin is a proven oil & gas province with access to important services and trained personnel



<https://www.petroleum.sa.gov.au/infrastructure-and-energy-markets/new-technologies/carbon-capture-and-storage2>

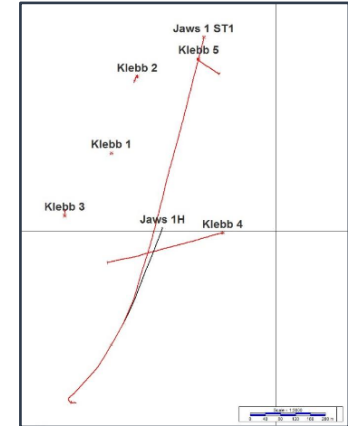
- **Cost of initial trial is covered by Talon's existing cash reserves**
- Outstanding potential return on a risk reward basis and very modest investment

Third Party and Government funding expected to support initial trials and see early commercialization of technology

# PEL96 – the first but not the last?

## Successful application of technology could transform coal seam gas industry

- Excellent geological and engineering database collated by STX who have for obvious reasons transitioned to the Perth Basin
- Existing infrastructure accelerates timetable and will see first trial early next year
- Very thick, deep, undersaturated coals are ideal CO<sub>2</sub> sequestration candidates
- Extensive production history enables unambiguous comparisons to be made on the effectiveness of sequestering CO<sub>2</sub> at supercritical temperatures (coal pyrolysis) and the resultant impact on permeability and enhanced methane production
- Success of any sort, but particularly with respect to enhanced methane production, will be readily transferable to Talon's coal seam gas project in Mongolia
- Talon/GreenFlame already in discussions with third party groups to trial technology elsewhere

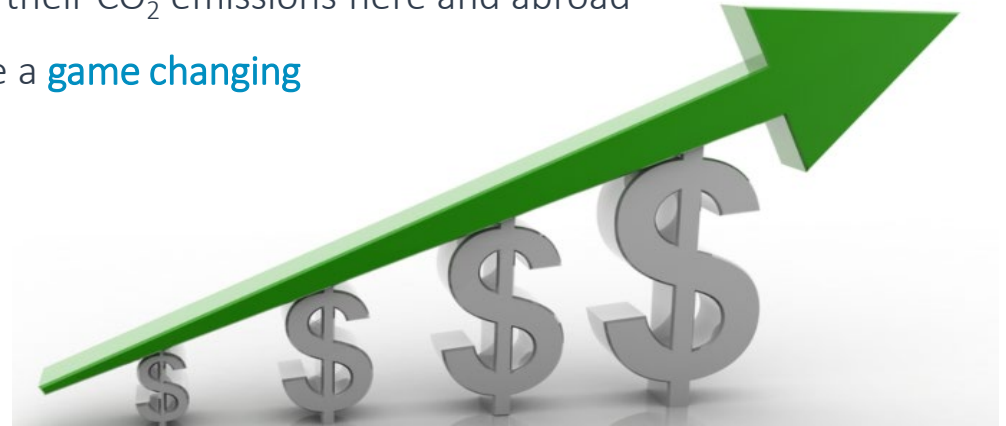


Immediate access to existing wells and infrastructure saves years on permitting, approvals & very costly drilling operations

# What does it mean for Talon?

## GreenFlame's superheated steam/supercritical CO<sub>2</sub> technology could be a gamechanger

- GreenFlame's Technology is an ideal fit with Talon's expertise and existing portfolio which has the potential to significantly enhance CSG production in Mongolia, and by increasing recovery rates, make what we believe will be a **multi-TCF resource even larger and more productive** over time
- Potential to sequester very large volumes of CO<sub>2</sub> to not only **offset emissions across Talon's entire portfolio**, but also assist other companies in meeting theirs
- With a multi-well pilot already drilled, PEL96 will allow Talon to rapidly progress to the technology appraisal phase without lengthy approvals processes and costly drilling operations **enabling field activities to commence in early 2022**
- Success will very likely see **rapid deployment of the technology** across the CSG and broader energy industry as companies look to address the challenges around their CO<sub>2</sub> emissions here and abroad
- Establish the viability and scalability of what could be a **game changing technology with worldwide applicability**



Talon has chosen to be an industry leader and at the forefront of new technologies

GreenFlame ticks all the boxes for Talon



Talon is in a unique position to differentiate itself in a challenging energy environment

### Enhanced Methane Production

- Significantly increase coal seam gas peak production rates and ultimate recovery

### CO<sub>2</sub> Sequestration

- Sequester Talon's equivalent CO<sub>2</sub> emissions and be a technology provider of choice for broader industry

### Hydrogen Production

- Produce H<sub>2</sub> from coal pyrolysis gases and from "green" methane

### Power Generation

- Generate emission free electricity at a fraction of the cost of conventional steam turbines

---

Talon's extensive coal seam gas experience makes the GreenFlame technology an obvious and ideal fit

# The Next Milestones

Mongolia & Perth Basin

# There are other value drivers and near-term catalysts

## Mongolia

- The Gurvantes XXXV coal bed methane Production Sharing Agreement (PSA) awarded last month
- Planning is well underway on this year's program, as is preparation of an independently certified Prospective Resource with anticipated **multi-TCF potential**
- Drilling and testing program expected to see Mongolia's **largest Contingent Resource booked**
- **Mongolia is the ideal next candidate for enhanced CSG production and CO<sub>2</sub> sequestration following successful trials in the Cooper Basin which would see Talon forge ahead with a distinct technological advantage**



Gas content cannisters being unloaded in Mongolia



The 2021 program will represent most efficient return on capital per Contingent Resource “booked”



# The are other value drivers and near-term catalysts

## Perth Basin

- Drilling at Walyering still on track for the back end of the 3<sup>rd</sup> quarter this year
- Significant re-rate for much larger Condor project on successful Walyering result
- Condor has a (P10) upside of **in excess of 700BCF**

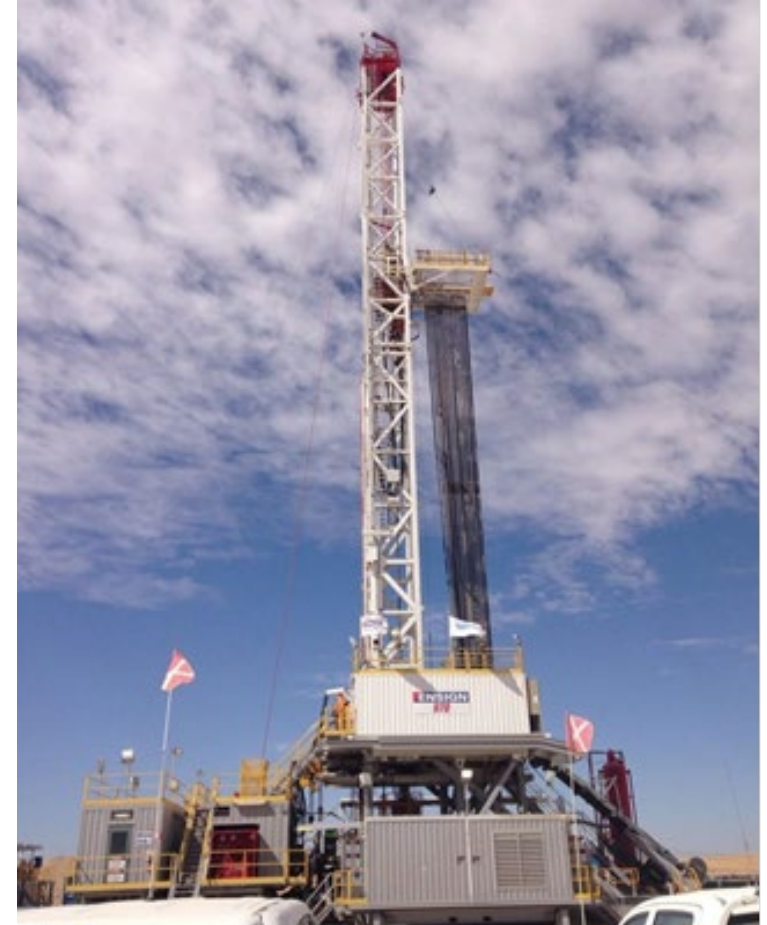
### Net Talon Prospective Gas Resource (bcf)\*

Low (P90)	Best (P50)	High (P10)
202	408	710

### Net Talon Prospective Condensate Resource (mmbbls)\*

Low (P90)	Best (P50)	High (P10)
9.5	20.2	39

For more information on Prospective Resources, refer to ASX announcement dated 17 March 2021. Talon confirms that it is not aware of any new information or data that materially effects the information included in that announcement and that all material assumptions and technical parameters underpinning the estimates contained in that announcement have not materially changed and continue to apply. **Cautionary Statement: The estimated quantities of petroleum that may potentially be recovered by the application of future development projects relate to undiscovered accumulations. These estimates have both an associated risk of discovery and a risk of development. Further appraisal and evaluation is required to determine the existence of a significant quantity of potentially moveable hydrocarbons.**



Talon has laid the foundations for success, and the transition continues

# APPENDIX I

## Transaction Details

# GreenFlame transaction details



## GreenFlame Energy Pty Ltd – Talon 60% AVS 40%

### • General Terms

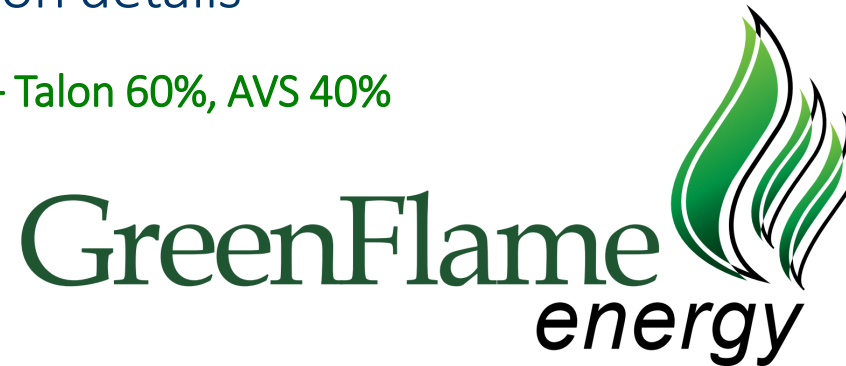
- David Casey and Matt Worner to form GreenFlame Board along with one representative of AVS
- AVS has granted GreenFlame an exclusive licence to the Superheated steam technology for Australia, India, Indonesia, Mongolia, NZ and South Africa (Tier 1); and Argentina and Colombia (Tier 2) (**Selected Countries**)
- AVS has been granted a royalty by GreenFlame of 3% of revenues generated by the AVS Technology
- AVS to provide the first 3 tech unit to GreenFlame at cost; additional units to be provided at cost + 15%; Talon to provide the initial asset to be put into GreenFlame (PEL96)
- Talon to provide initial funding to GreenFlame of up to \$A1.5mm (**TPD Funding Amount**) and based on a budget designed to provide proof of concept (CO2 sequestration in CBM formations)
- Upon Talon providing the TPD Funding Amount:
  - Talon shall be entitled to receive 90% of any production proceeds/revenues; and
  - AVS shall forgo the royalty until such time as Talon has recouped the TPD Funding Amount plus 20%



# GreenFlame transaction details



GreenFlame Energy Pty Ltd – Talon 60%, AVS 40%



## • Exclusivity for Technology – 3 years

- If at the end of the 3-year exclusivity period:
  - GreenFlame has purchased and is operating (or can demonstrate that it has made significant advances towards operating) an additional five (5) units, GreenFlame shall have the right to extend the Initial Exclusivity Period for a period of 12 months (“Extension Period”) in respect of any or all of the Selected Countries; or
  - GreenFlame has not purchased and is not operating an additional five (5) units, but still wishes to enter into the Extension Period, it can pay an annual fee to AVS of A\$300,000 per Tier One Selected Country (**Tier One Fee**) and A\$150,000 per Tier Two Selected Country (**Tier Two Fee**) for an extension.
- Thereafter, the Extension Period can be renewed annually by GreenFlame in respect of individual Selected Countries by way of the payment by GreenFlame to AVS of the Tier One Fee or the Tier Two Fee (as applicable). For the avoidance of doubt, where in any calendar year, GreenFlame has not elected to renew the Extension Period and has not paid the applicable fee in respect of a Selected Country, that country will no longer qualify as a Selected Country and may not be reinstated as a Selected Country (unless otherwise agreed by AVS and GreenFlame).
- If, at any time, GreenFlame is operating fifteen (15) units per year, the Exclusivity Period shall be extended indefinitely without the requirement of an annual fee or purchasing additional units

## • PEL96

- GreenFlame to acquire Strike Energy’s 67% interest in PEL 96 via conditional Share Purchase Agreement for relevant holding company
- Consideration payable:
  - Nominal fee; plus
  - GreenFlame to assume responsibility for relevant rehabilitation liability applicable to Strike’s 67% interest, being an amount equal to A\$1.56mm and replacement of Government Bond (A\$200,000)

# GreenFlame transaction details



## Applied Vapor Solutions LLC

### • Background

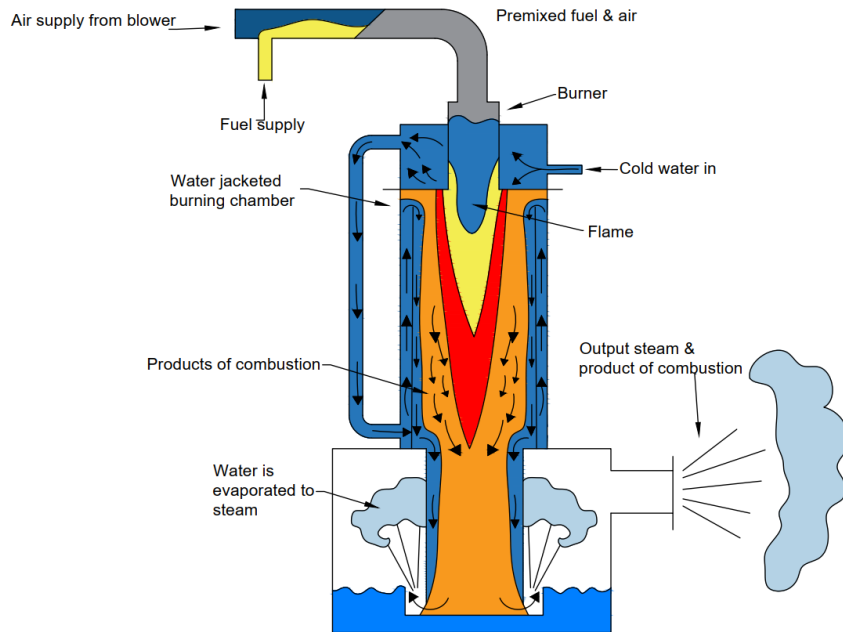
- Principals have combined experience in excess of 100 years in thermal and enhanced hydrocarbon recovery operations globally.
  - Keith Lapeze, former Environmental Section equity partner at the international law firm Vinson & Elkins LLP.
  - Steve Byles CEO of Valkor LLC, world leader in gas processing and facilities.
  - Dr. David Kahn, formerly at Texaco and Enron, and specialist in heavy oil operations
  - Brian Hughes, former COO of Ultra Petroleum and Pennaco.
- AVS has aggregated **PROPRIETARY AND PATENTED** technology and expertise for enhanced, environmentally sustainable, carbon-neutral to negative production of heavy oil and CBM.
- AVS has agreements to use the direct fired superheated steam generator process to recover heavy oil in Utah, Missouri, and Trinidad & Tobago.



# APPENDIX II

## Superheated Steam/Supercritical CO<sub>2</sub> Technology

Patented modular small footprint low capex game changing technology



## Ultra-heated (500<sup>0</sup>+C) Steam and Hot Gas Generator:

- Direct Contact steam generator (150-650<sup>0</sup>C) that injects all combustion gases into the target zone
- Compact, simple and no corrosion zones
- This is a **ZERO EMISSIONS TECHNOLOGY**
- The only technology that can vary the flue gas mass & gas composition from combustion (up to 100% CO<sub>2</sub>)
- Enhances both production and recovery from any reservoir (coal, sandstone, carbonates, shale, oil shale)

## Major Ultra-Heated Steam Strengths:

- Temperature decoupled from pressure
- Creates pyrolysis gases including **hydrogen**
- Emphasizes temperature rather than heat, i.e., only 18% additional energy input over normal steam operations changes the reaction rates from thousands of years to just seconds

Technology is a direct-fired superheater that injects a flame into a stream of water or steam and superheated steam is created in one step within one vessel. All greenhouse gases are injected into the target zone.

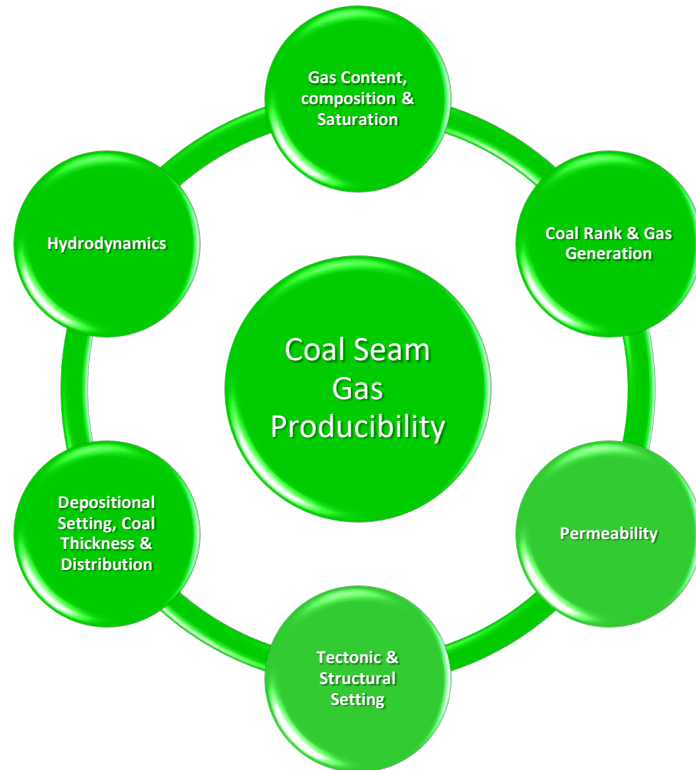
Coal Pyrolysis involves subjecting coal to high temperature (400-450<sup>0</sup>C) in the absence of oxygen

# APPENDIX III

## Enhanced Coal Seam Gas Production



## Permeability & Gas Saturation are the main challenges



- Interplay of Key Factors for Commercial CSG production:

- Tectonic, structural and depositional settings combine to control coal seam thickness and distribution, burial depth and coal rank for thermogenic methane generation and cleat development for coal seam permeability
- Coals must generally be buried at least 2,000 m to reach mainstage thermogenic methane generation, but at such depths coal seam permeability is substantially reduced by overburden pressure
- Tectonic uplift of coals above 1,000 m restores permeability but gas expansion in the coals leads to undersaturation, unless hydrodynamics (groundwater) introduces biogenic methane to re-saturate the coals
- **Many CSG projects are economically challenged because one or more of these essential factors are lacking: low permeability and/or low gas saturation are by far the most typical culprits**

- Opportunity for Superheated Steam Technology:

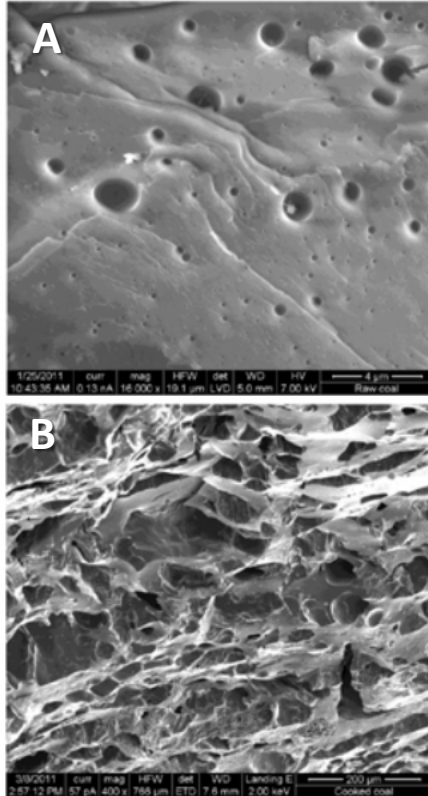
- Superheated steam technology involves injecting a mixture of high temperature superheated steam/CO<sub>2</sub>/flue gas that pyrolyzes the coal, simultaneously creating coal seam permeability and generating methane, **thus resolving low permeability and low gas saturation**

---

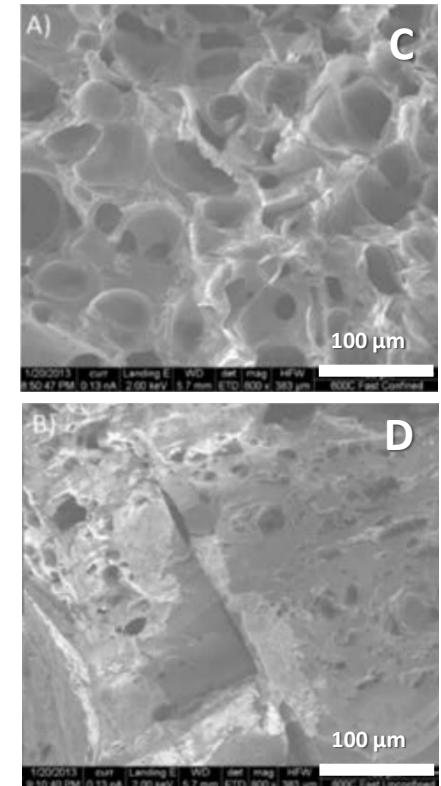
Superheated CO<sub>2</sub> steam resolves the two most important technical challenges in any coal seam reservoir

# Coal Pyrolysis by Superheated CO<sub>2</sub>

## Creates and enhances coal seam permeability (k)



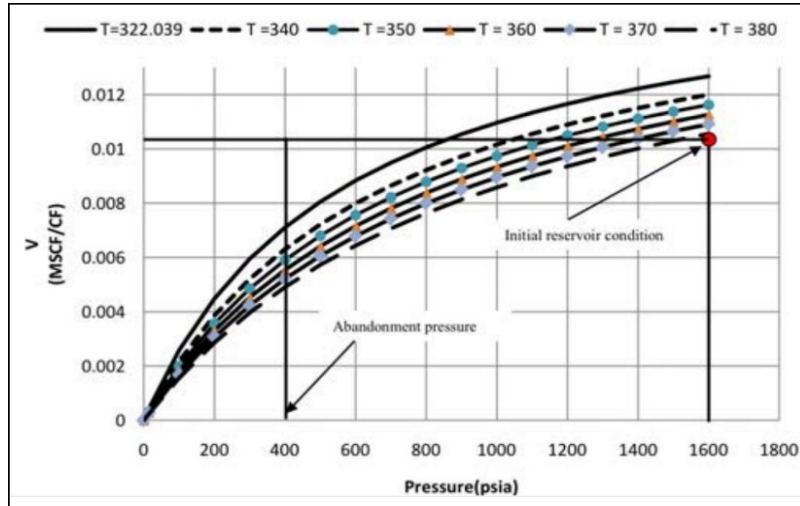
- SEM (scanning electron microscope) photomicrograph of an unheated bituminous coal core from Utah (A) shows coal pores on the order of 2 μm in size
- SEM photograph of a pyrolyzed bituminous coal core from Utah (B) shows coal pores on the order of 100 μm in size
- For confined systems, such as subsurface coal seams, pyrolysis creates much greater surface area, **enhancing both coal seam porosity and permeability**
- SEM photograph of surface area created when a fully confined bituminous coal core was heated to 600°C (C) compared to an unconfined bituminous coal core heated to the same temperature (D)
- Confined deep coal seams have a much higher carbon storage capacity than unconfined systems essentially creating *in situ* activated carbon



With Superheated CO<sub>2</sub> injection permeability could increase by up to a 1000 times as observed in heavy oilfields

# Coal Pyrolysis by Superheated CO<sub>2</sub>

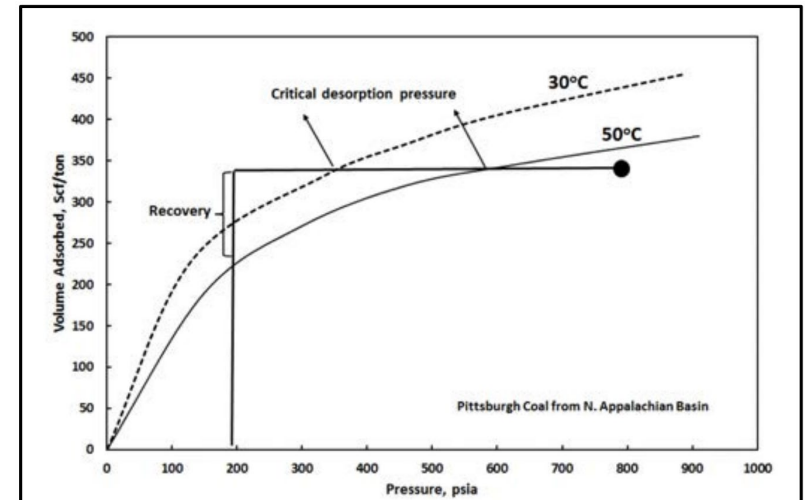
## Enhances methane desorption from coal surfaces



From Lau and others, 2017

- For an undersaturated coal, an increase in temperature can increase the critical desorption pressure at which methane desorption initiates
- Therefore methane production commences at a higher reservoir pressure and gas recovery is incrementally increased above the abandonment pressure

- Sorption of methane on coal is governed by the Langmuir isotherm which in addition to pressure is also temperature dependent
- The ability of coal to adsorb methane is significantly reduced at high temperature
- Heating the coal by injecting superheated steam/CO<sub>2</sub>/flue gas can therefore substantially enhance methane desorption from coal surfaces and thus increase methane production

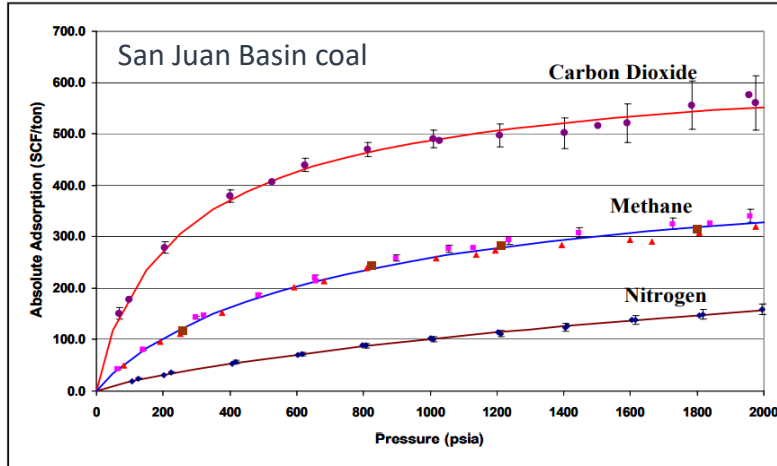


Injecting supercritical CO<sub>2</sub> increases permeability, gas desorption and ultimately methane production

# APPENDIX IV

## CO<sub>2</sub> Sequestration

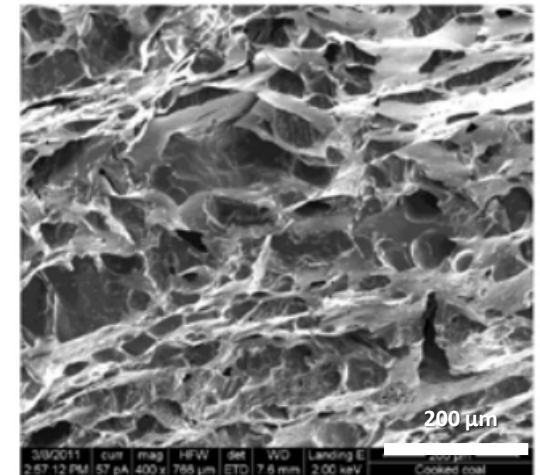
## Coal Pyrolysis enhances CO<sub>2</sub> Sequestration



From Reeves and Oudinot, 2004

- Isotherms measured in the laboratory show that coal adsorbs up to three times as much CO<sub>2</sub> by volume than methane (depending on coal rank), but more importantly, because CO<sub>2</sub> preferentially adsorbs on the coal surface it displaces the methane from the coal surface and can be sequestered in the CSG reservoir
- As pyrolysis increases the rank and macroporosity of the coal, it also significantly increases the potential for carbon sequestration

- Conversion to gas of volatile matter in coal is a function of time and temperature, and as injection of Supercritical CO<sub>2</sub> continues, the volatile matter turns to liquid, gas is produced, and **coal porosity & permeability are substantially increased**
- At completion of devolatilisation, the remaining coal consists of very porous and permeable fixed carbon or char, something akin to a carbon sponge



Extraordinary volumes of CO<sub>2</sub> can be sequestered in coal especially if supercritical CO<sub>2</sub> is used as the pyrolysis gas

## How do different reservoirs compare?

### Sandstone

Average Depth = 1500 meters  
 Average Porosity = 21%  
 Temperature = 66°C  
 Density CO<sub>2</sub> = 540.5 kg/m<sup>3</sup>  
 Geothermal Gradient = 35°C/km  
 Efficiency Factor = 1.2% (Efficiency factor is the total pore volume of an aquifer to the volume of trapped CO<sub>2</sub>)  
 Total Storage Capacity = 5 Giga Tons  
 Mass of CO<sub>2</sub> stored in 1m<sup>3</sup> = 1m<sup>3</sup> \* 0.21 (porosity) \* .012 (efficiency factor) \* 540.5 kg/m<sup>3</sup> = 1.36 kg/m<sup>3</sup>

### Coal

Average Depth = 1500 meters  
 Average Porosity = 37.5% (assume all volatile matter is converted to gas and expelled)  
 Temperature = 66°C  
 Density CO<sub>2</sub> = 540.5 kg/m<sup>3</sup>  
 Geothermal Gradient = 35°C/km  
 Efficiency Factor = 85% (assume water saturation of 15%)  
 Density of Coal = 1300 kg/m<sup>3</sup>  
 Hydrostatic Gradient = 1.42 psi/m  
 Reservoir Pressure = 2130 psi  
 Adsorbed CO<sub>2</sub> = (1100 x [hydrostatic pressure/(hydrostatic pressure + 620)]) (Nelson: 2005, Table 4)  
 Adsorbed CO<sub>2</sub> = (1100 x [2130/(2130+620)]) = 852 scf/short ton  
 Remaining coal = 1300 kg \* (1-.375) = 812.5 kg = .896 short tons  
 Adsorbed CO<sub>2</sub> = .896 \* 852 = 763 scf/remaining ton of pyrolyzed coal  
 Mass at reservoir conditions = 39.59 kg  
 Mass of CO<sub>2</sub> stored in 1m<sup>3</sup> = 1m<sup>3</sup> \* 0.375 (porosity) \* .85 (efficiency factor) \* 540.5 kg/m<sup>3</sup> = 172.28 kg/m<sup>3</sup>  
 Adsorbed + Stored CO<sub>2</sub> in 1m<sup>3</sup> = 172.28 + 39.59 = 211.87 kg/m<sup>3</sup>

- Coal seams per unit thickness hold ~3x more methane than a typical sandstone gas reservoir
- Coal seams also typically hold an average of 3x, but as much as 13x more CO<sub>2</sub> than methane
- **Pyrolyzed coals can store from ~15x to as much as ~155x more CO<sub>2</sub> than sandstone depending on depth and pressure**

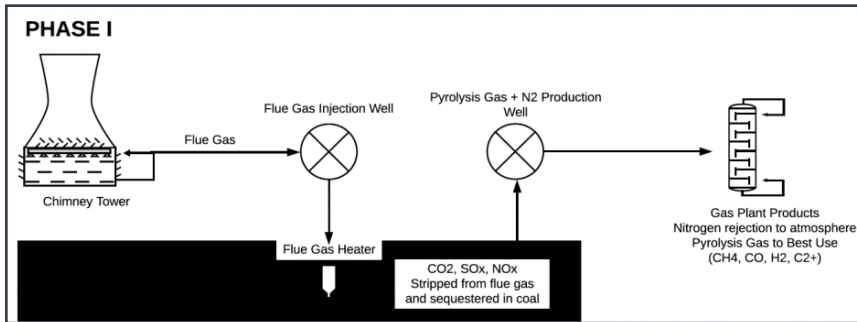
Rock Type	Depth	Pressure psi	Temperature °C	CO <sub>2</sub> Density kg/m <sup>3</sup>	Storage Capacity kg/m <sup>3</sup>	x Difference /m <sup>3</sup> volume
Sandstone	1500m (4921ft)	2130	66°	540.5	1.36	
Coal	1500m (4921ft)	2130	66°	540.5	211.87	x155.8
Coal	457m (1500ft)	650	31°	104.3	59.39	x44.0
Coal	152m (500ft)	217	19°	29.6	21.63	x15.9

Pyrolyzed coals can store significantly more CO<sub>2</sub> than sandstone reservoirs or aquifers

# APPENDIX V

## Hydrogen Production

## CO<sub>2</sub> sequestration, enhanced methane production and...hydrogen



During Phase I, flue gas is delivered to the superheated steam generator configured for heating flue gas and positioned at the coal face. The flue gas is heated to between 450°C to 1000°C and injected into the coal. This converts the volatile matter into pyrolysis gases and produced at the production well. The CO<sub>2</sub> remains sequestered in the coal. The gas plant rejects the nitrogen to the atmosphere and the remaining gases delivered to best use.

- The volatile matter in the coal is transformed by heat delivered at the coal face into valuable fuel gases including up to **80% hydrogen**
- Production of hydrogen can be achieved by varying the temperature, rate of temperature increase, pressure and syngas generating fluid (oxygen, steam CO<sub>2</sub>, hydrocarbons, air) delivered by the superheater
- The production of hydrogen can make the business of sequestering CO<sub>2</sub> profitable rather than an uneconomic burden

Hydrogen as a by-product can make the task of sequestering CO<sub>2</sub> very profitable on a very large scale

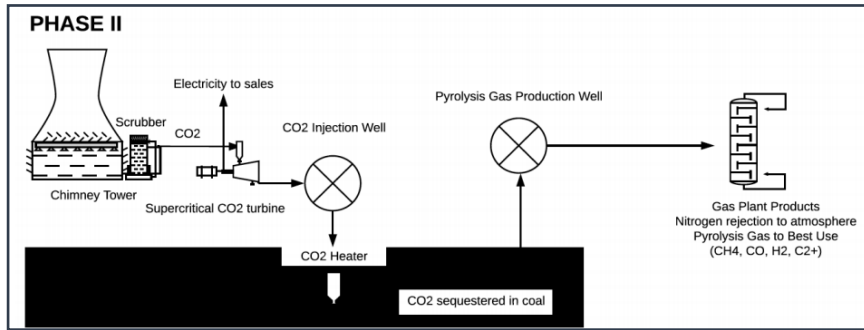


# APPENDIX V

## Power Generation

# Generating “Green Power”

Multiple applications ultimately resulting in zero emissions power generation



Phase II, commences with installation of the post-combustion CO<sub>2</sub> capture. The pure CO<sub>2</sub> is delivered to the superheated steam generator configured for high-pressure high-temperature CO<sub>2</sub> operations and drives the supercritical CO<sub>2</sub> turbine to produce electricity. The turbine is located near the CO<sub>2</sub> injection well and the exhaust of the turbine goes into the CO<sub>2</sub> injection well.

- Hot supercritical CO<sub>2</sub> is much more efficient in turbines than conventional steam and our technology simply heats the CO<sub>2</sub> to supercritical temperature then runs it through the turbine and then into the injection well
- GreenFlame technology is simple and cheap and generates electricity at a fraction of the CAPEX of a conventional steam turbine ( e.g. electricity generation when using our superheater will cost about 2c/kWh with gas costs of \$3/mcf)

Greenflame technology is an emission-free system even when coal is used as the fuel for combustion

### Address

1202 Hay Street  
West Perth WA 6005

### Contact Info

David Casey – Managing Director & CEO  
Phone: +61 8 6319 1900  
[www.talonenergy.com.au](http://www.talonenergy.com.au)

### Corporate Advisor

Chieftain Securities Pty Ltd  
Phone: +61 8 6319 1900  
[info@chiefsec.com.au](mailto:info@chiefsec.com.au)

