



## Opportunities for building clean energy transition partnerships between Australia and Korea

Annual Joint Meeting of  
Australia-Korea & Korea-Australia  
Business Councils  
Perth - 2 September 2024

PILOT ENERGY LIMITED  
ASX:PGY



*Kwinana Carbon Solutions marine transport - Conceptual CO<sub>2</sub> handling infrastructure (illustration only)*

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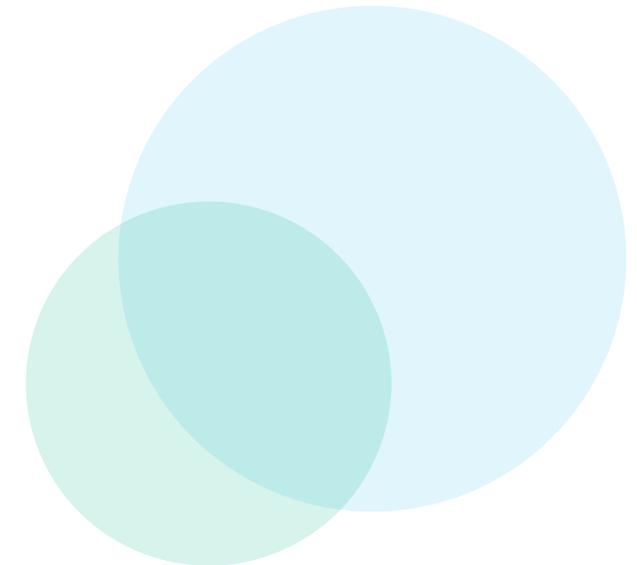
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## Competent Persons Statement

This announcement contains information on conventional petroleum and CO<sub>2</sub> Storage resources which is based on and fairly represents information and supporting documentation reviewed by Dr Xingjin Wang, a Petroleum Engineer with over 30 years’ experience and a Master in Petroleum Engineering from the University of New South Wales and a PhD in applied Geology from the University of New South Wales. Dr Wang is an active member of the SPE and PESA and is qualified in accordance with ASX listing rule 5.1. He is a former Director of Pilot Energy Ltd and has consented to the inclusion of this information in the form and context to which it appears.

## Authorisation

This presentation has been authorized by the Chairman and Managing Director on behalf of the Board of Directors of Pilot Energy Limited



# Acknowledgement of Country

We acknowledge the Traditional Custodians of the lands on which we meet today and their ongoing connection to lands, waters and communities.

We pay our respect to their culture and to Elders past, present and emerging.



*Antonio Chrysostomou © 2016*

# Key messages



## Mid West Clean Energy Project is an integrated carbon storage to Clean Ammonia export project

- Pilot is a producing oil and gas company transitioning to become a carbon-free energy producer and supplier
- The Mid West Clean Energy Project (MWCEP) is Pilot's flagship clean energy transition project
- This development is ideal for producing low-cost carbon-free energy for export and providing permanent carbon storage
- Ammonia (NH<sub>3</sub>) is emerging as the ideal carbon-free energy transition fuel
- Ammonia produced with full carbon capture (FCC) and renewable power (RP) can be both clean and low-cost
- It can be produced at scale, supplied through existing supply chains and as an energy source is carbon-free
- The MWCEP will produce over 1 million tpa of Clean Ammonia for export to Korea from 2028
- Pilot also aims to provide up to 5 million tpa of permanent storage for Captured Carbon exports from Korea

***There are substantial clean energy transition partnership opportunities between Australia and Korea***

# Strategy

Deliver low-cost clean energy by building off natural competitive advantages



Western Australia - a natural partner of production and supply of Clean Ammonia



Australia  
Western, South, Queensland, Tasmania etc.

- Natural gas
- Renewables
- ★ Mid West Clean Energy Project

The Deliverables - Clean, Low-Cost and Achievable



# Clean energy transition partnership opportunities

There are at least three near-term clean energy transition Australian-Korean partnership opportunities

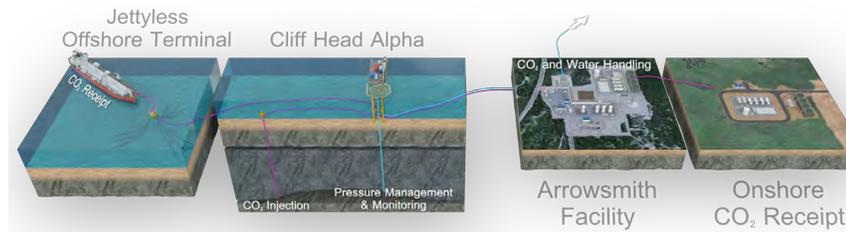
## Opportunity 1

Australia as Clean Ammonia producer and supplier



## Opportunity 2

Australia as provider of permanent cross border carbon storage export destination



## Opportunity 3

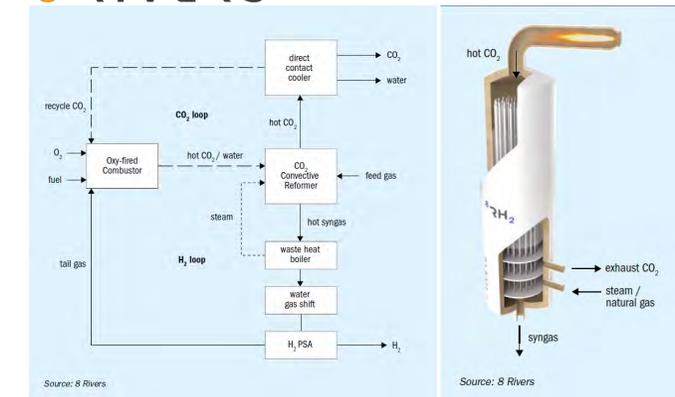
Korea as Clean Technology provider



## KNCC 40 K LCO2-EP with Submerged Turret OffLoading System



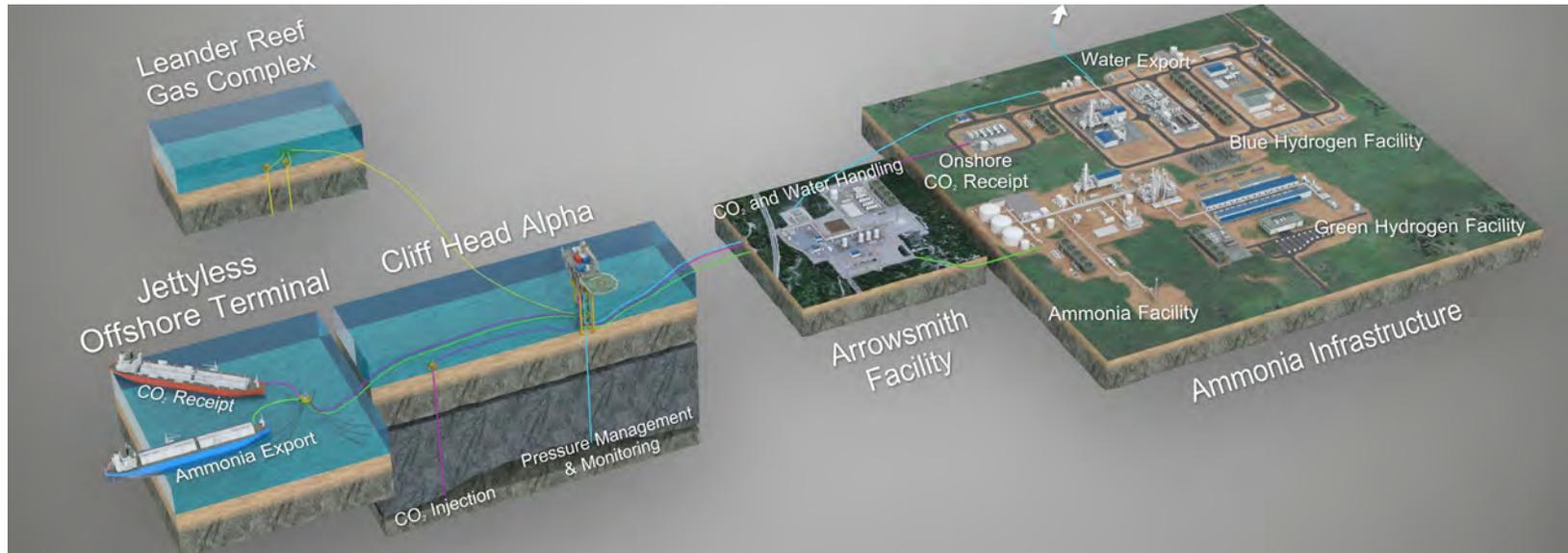
## 8 RIVERS



# Mid West Clean Energy Project presents all these partnering options



## A Clean Ammonia export project with full carbon capture through integrated CCS



### Carbon Storage: Timing: ~2026

- Targeting over 2.5 tpa CO<sub>2</sub> injection from 2026
- Conversion of offshore oil field into permanent Carbon Storage Facility
- Continuous carbon injection capacity beyond 2050
- Plan to expand storage capacity to over 100 million tonnes
- Increase injection capacity to 5.0 million tpa enabling carbon imports
- Estimated levelized cost of storage (LCoS) less than \$20/tonne

### Clean Ammonia Production: Timing: ~2029

- Targeting Clean Ammonia production of over 1.0 million tpa
- Clean Ammonia produced from conventional ATR with full carbon capture
- Full carbon capture will be provided by Cliff Head Carbon Storage Facility
- Ammonia plant to be fully powered by renewable power micro-grid
- Aim to produce Clean Ammonia with carbon-intensity of less than 0.1 kg

# Opportunity 1 - Low-cost – cost competitive clean ammonia



## Cliff Head Carbon Storage enables cost competitive industrial scale Blue Hydrogen production

### Ammonia is produced through proven and well established, scalable technologies

- 95% of 190mtpa of global ammonia production is from natural gas

### Ammonia production can be made virtually carbon free with direct/integrated CCS

- Ammonia production with carbon has been in commercial operation since 1982

### Ammonia from natural gas with carbon capture is both a low cost and clean energy source

- Blue ammonia expected to be lowest-cost clean option<sup>1</sup>

### Excellent solution for transport and supply of hydrogen

- Ammonia excellent “vector” and lowest cost form of clean energy transport and supply

### Established market and supply chain

- Well established, large-scale production and global supply chain

### Clean Ammonia is a carbon-free energy source

- Clean Ammonia when can be used as a fuel with no carbon or other GHG emissions

Source: Global CCS Institute Blue Hydrogen Report April 2021. Figure 6 (RHS of slide) taken from the same report.

### Hydrogen for power | Samsung wins \$100m deal to build ammonia facilities for co-firing at controversial new coal plant

insight Subscribe

A rendering of Samsung C&T's forthcoming ammonia-handling infrastructure at the Samcheok coal plant. (Photo: Samsung C&T)

Leigh Collins  
Editor, Hydrogen Insight

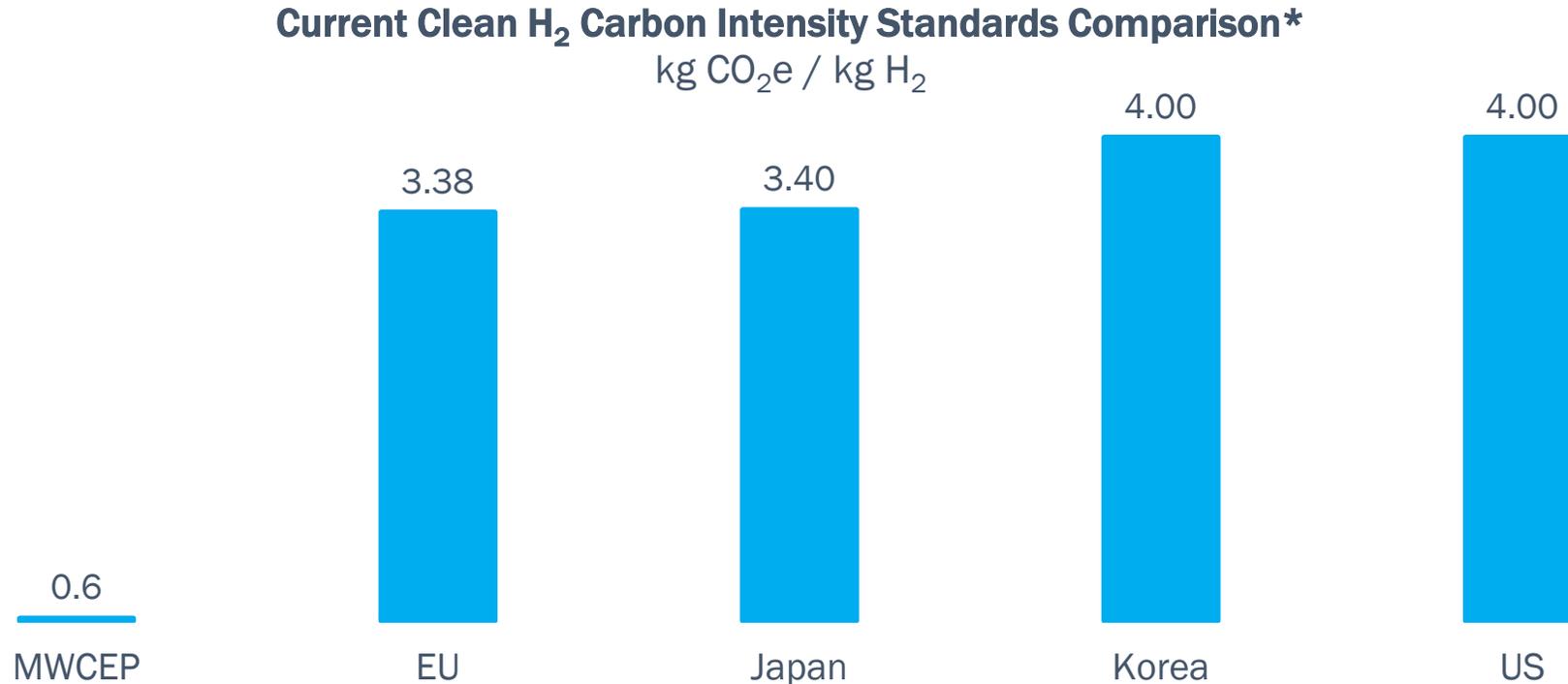
Published 8 April 2024, 22:23

Samsung C&T has signed a 140bn-won (\$103m) contract to build facilities for unloading, storing and transporting ammonia at the controversial 2.1GW Samcheok coal-fired power plant in eastern South Korea.

# Opportunity 1 - the carbon intensity comparison



Mid West Clean Energy Project exceeds current Clean H<sub>2</sub> Carbon Intensity standards for EU, Japan, Korean & US



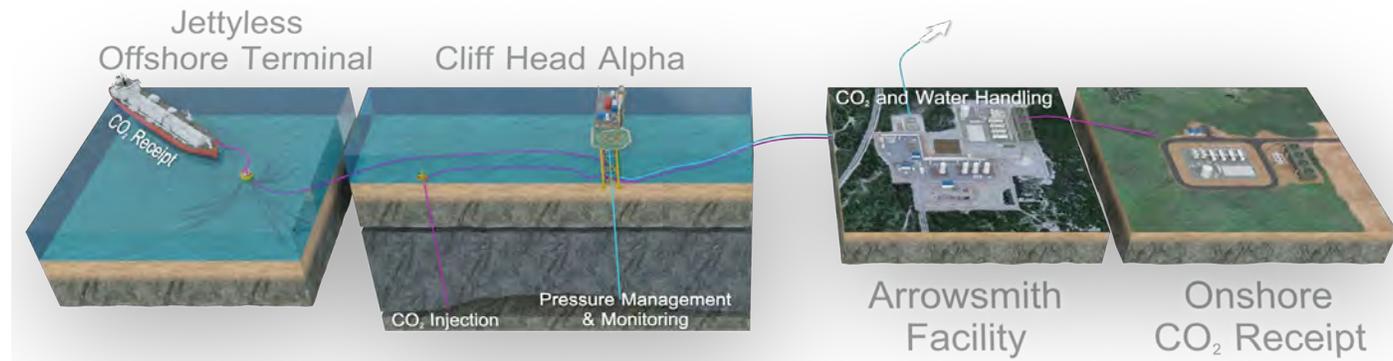
**Combination of integrated CCS and behind-the-meter renewables delivers low Carbon intensity**

\*Sources: Argus Media article 18 April 2023 - South Korea outlines clean hydrogen certification system and Pilot Feasibility Study ASX release 28 March 2022, 8 Rivers Gen2 8RH2 Design Basis Scope 1 MWCEP ammonia emissions

# Opportunity 2 - Permanent Carbon Storage facility

## Cliff Head Carbon Storage Facility is a key enabler

- Cornerstone development project
- Enabler of Clean Ammonia production
- Brownfield re-development utilizing existing facilities
- Clear regulatory pathway and received first Commonwealth approval
- Minimal risk and capex requirements through re-use of existing reservoir & facilities
- Aiming to provide over 1 million tpa of Carbon storage continuing through 2050
- Levelized cost of storage (Capex + Opex + DeCom) less than A\$20/tonne
- Project cost of carbon offsets in 2026 ranges from A\$41-71/tonne (real)\*
- Targeting first Carbon injection in 2026



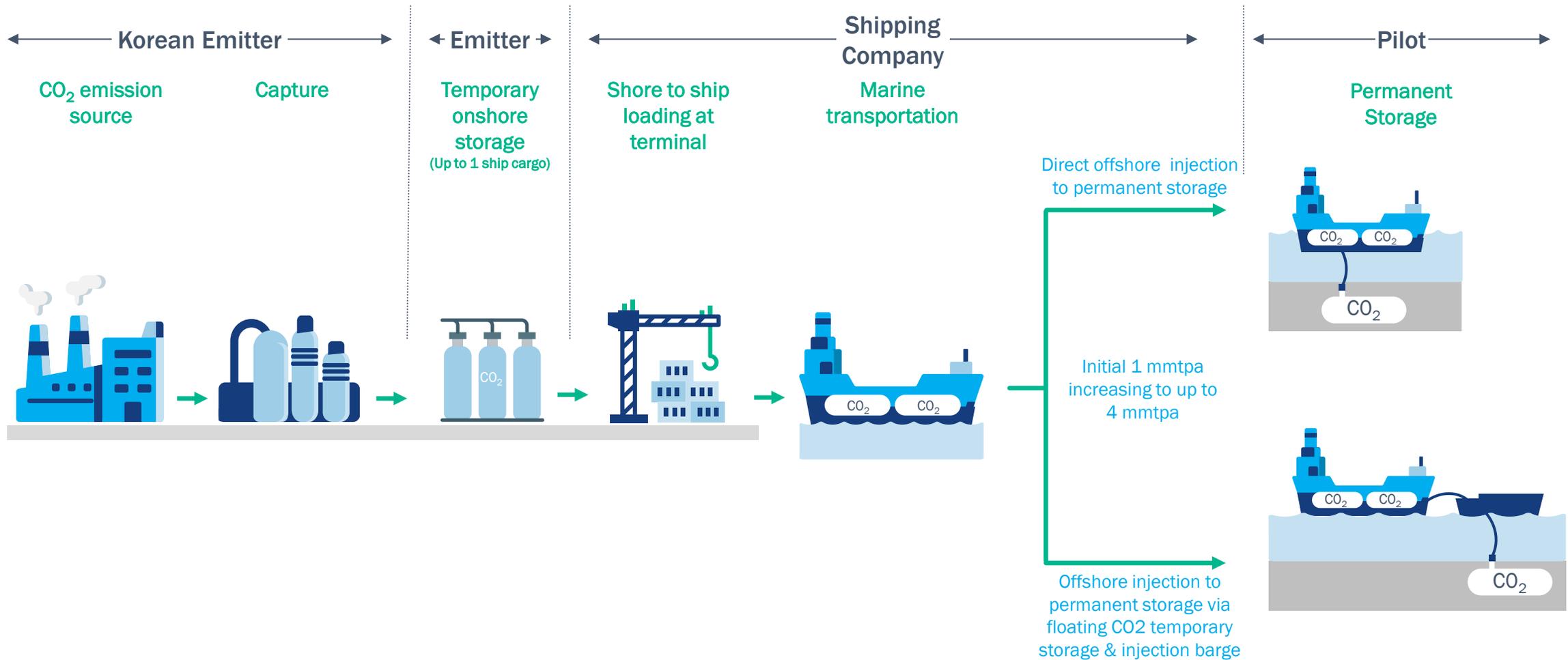
See Pilot Energy website for CCS Project video at

\*Reputex Long-term Carbon Price Forecast March 2024



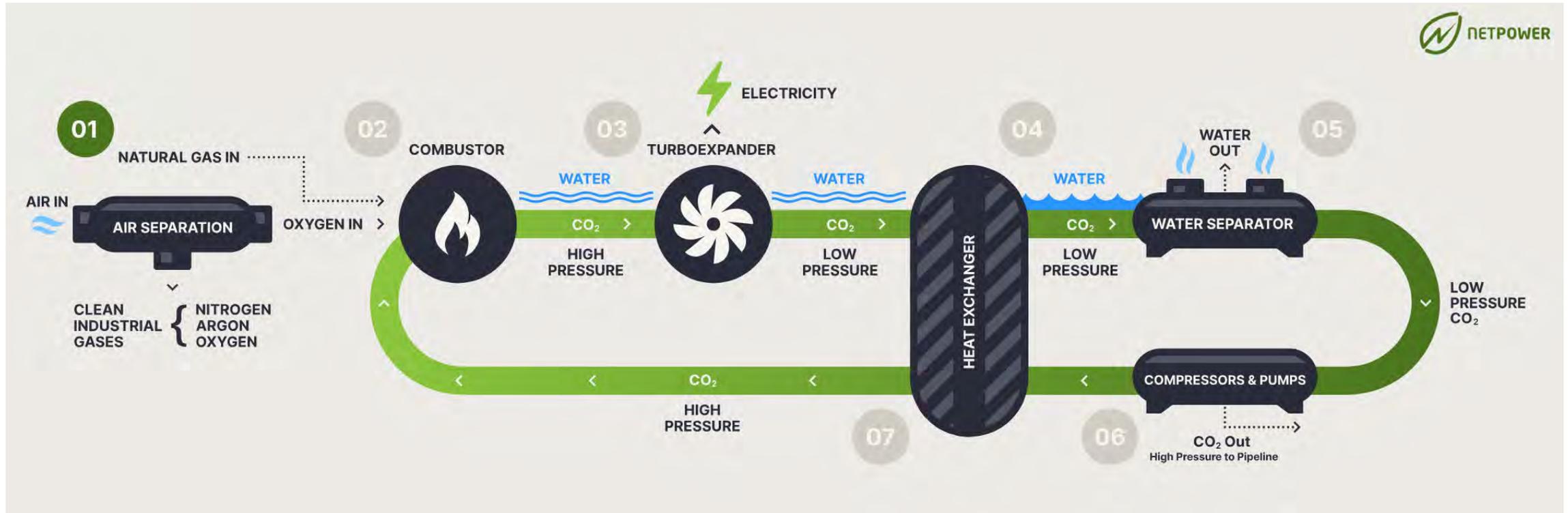
# Opportunity 2 - Korea carbon capture to Cliff Head permanent storage

Putting it all together - a straight-forward solution opening the door to material CO<sub>2</sub> emissions reduction for Korea



# Opportunity 3 – clean technologies – oxy-fuel / oxy-combustion

Re-powering existing LNG-fuelled power generation with AFC power generation can deliver substantial low-cost carbon abatement through zero-cost capture & low-cost marine carbon transport and storage

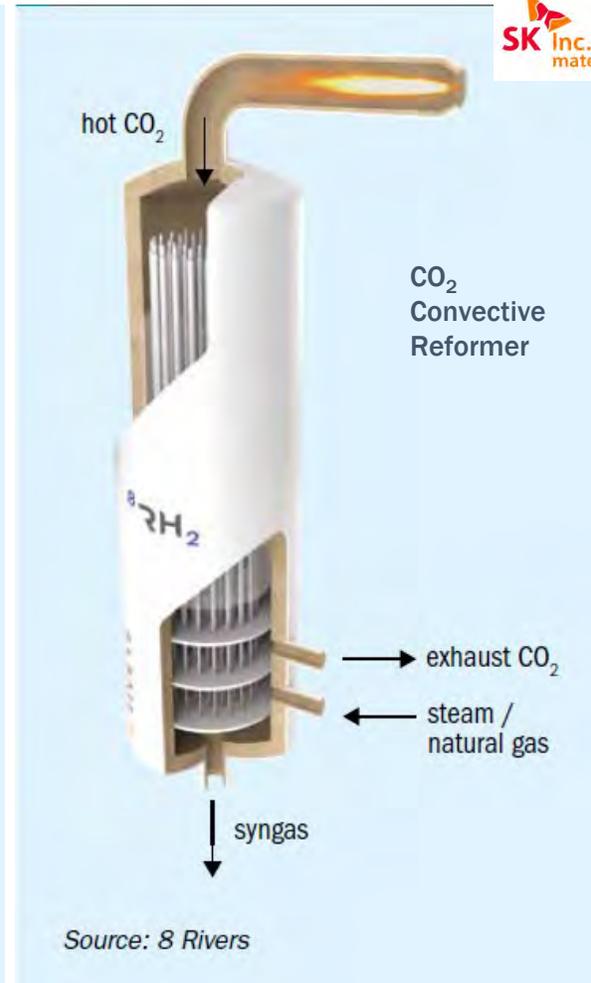
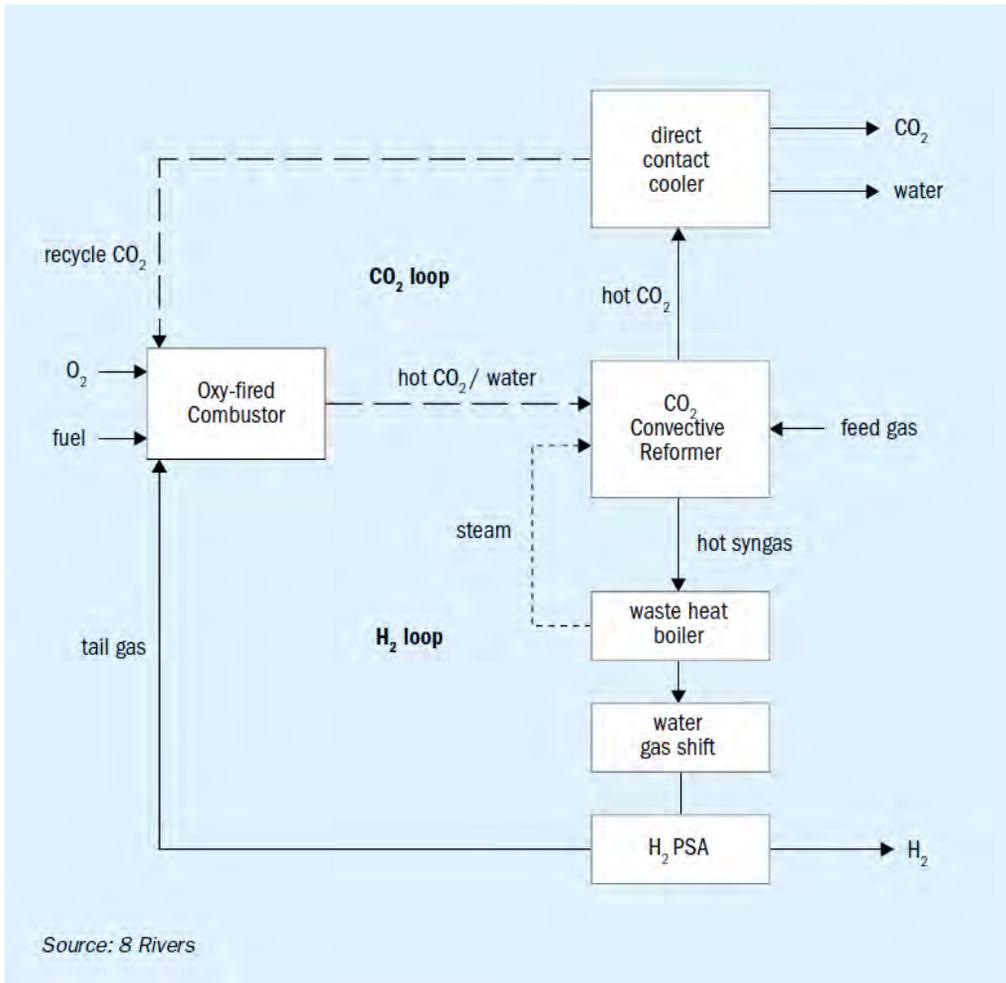


Repowering existing older LNG-fired power plants takes advantage of existing LNG supply chain, captures over 97% of CO<sub>2</sub> generated and delivers approximately 820,000 tpa reduction in carbon emissions per 300 MWe at 92.5% generating plant capacity factor

# Opportunity 3 – clean technologies 8 Rivers blue hydrogen



## CO<sub>2</sub> Convective Reformer (CCR) – Making CO<sub>2</sub> part of the solution delivers 99% capture at a lower cost\*



- 8RH2 Convective CO<sub>2</sub> Reforming (“CCR”) technology delivers improved natural gas-to-hydrogen generation efficiency with 99% CO<sub>2</sub> capture
- Conventional SMR/ATR process limited to 95% CO<sub>2</sub> capture
- 8RH2 CCR innovative use of high pressure/temperature CO<sub>2</sub> to drive reformation results in two separate flow streams like SMR at high pressure similar to ATR.
- CCR use of CO<sub>2</sub> as its working fluid enables inherent capture of 99% of produced CO<sub>2</sub>
- CO<sub>2</sub> generated in Blue Hydrogen production is in supercritical form ready for storage without expense of SMR/ATR post combustion capture
- Pilot and 8 Rivers completing Pre-FEED basis of design study detailing use of CCR at MWCEP

# 2023 – Key achievements



**Transition from feasibility to project development**

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**Advanced regulatory approvals for the Project**

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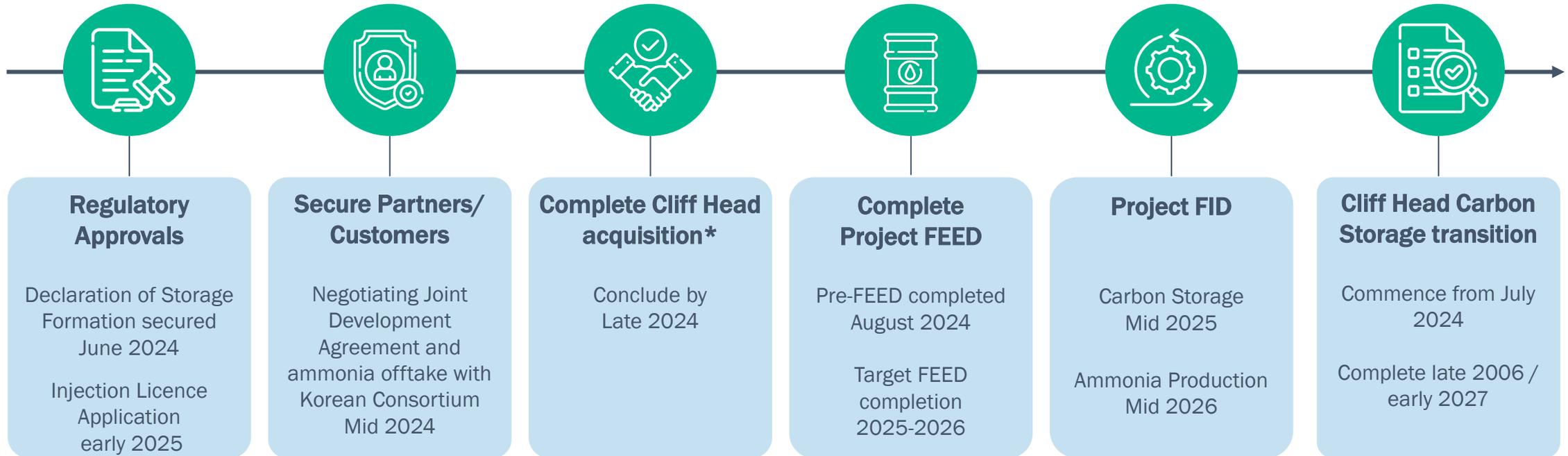
**Key focus on locking in binding arrangements with Korean partners/customers**

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**Funding and Capital Raising**

# 2024/2025 MWCEP milestone targets



# Key next steps

Over the next 12-18 months Pilot will be focused on the activities to deliver the Cliff Head Carbon Storage Project



## Corporate

- Conclude arrangements with prospective project partners & customers
- Conclude corporate and project funding arrangements

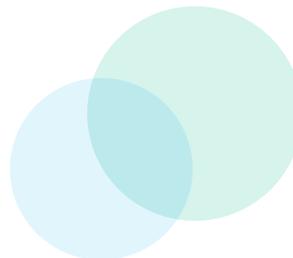


## Project implementation

- Complete Permitting
- Secure binding Commercial Offtake
- Complete Carbon Storage and Ammonia Project FEED
- Commence prospective Engineering Procurement, Construction and Maintenance contractor engagement



Next 12 - 18 months aimed at securing necessary regulatory approvals, securing commercial off-take arrangements and completing a FEED to enable final investment decision (FID)



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