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PILOTING THE PATHWAY TO CLEAN ENERGY PRODUCTION

Meet Pilot Energy. A junior oil and gas company transitioning to become **one of Australia's first globally competitive clean energy providers**. By repurposing its existing oil assets and infrastructure to be used for carbon capture and storage (CCS), Pilot is capturing a significant first mover advantage in pursuit of an integrated wind and solar power generation opportunity that will see it produce clean hydrogen and clean ammonia for export into key Asian markets. The opportunity is being explored through its Mid West & South West projects that collectively will provide exposure to multiple commercialisation pathways and diversified revenue streams, with the potential to deliver world-class competitive clean energy at scale. **The feasibility studies have been completed and have confirmed the viability of Pilot to become an integrated clean energy provider.**

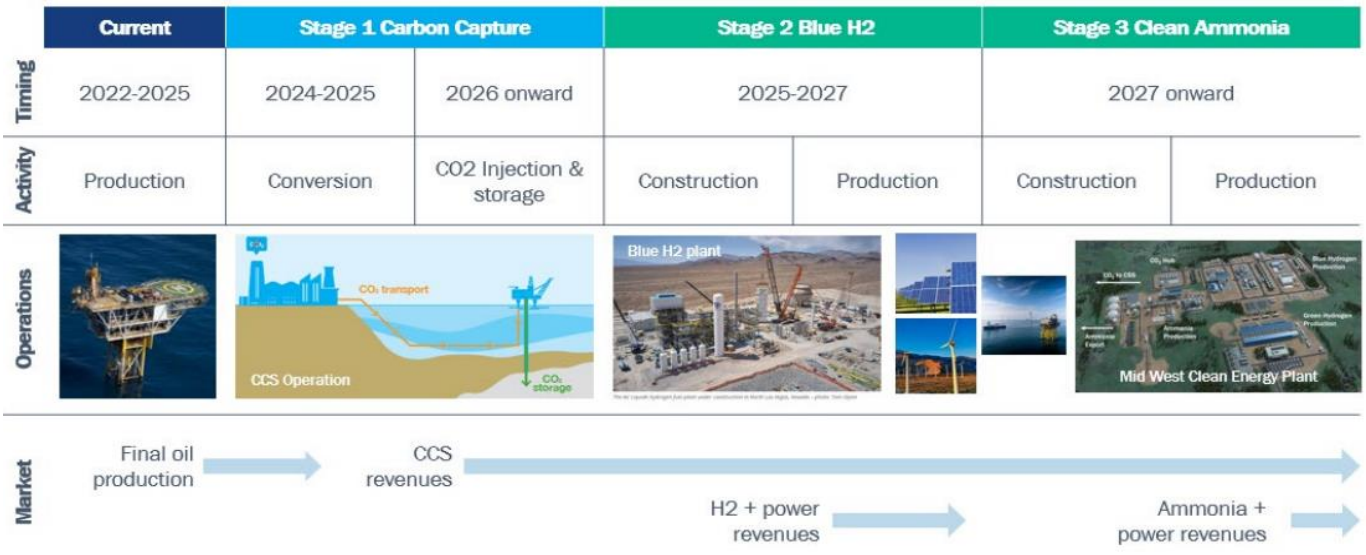
COMPANY SNAPSHOT	
Ticker	**ASX: PGY**
Price (12 Aug 22)	A$0.022
30-day VWAP	A$0.018
Shares on issue	602.4M
Market capitalisation	~A$13.6M
Cash (30 June 22)	~A$3.1M*

KEY MILESTONES

- **Mar-22:** Announced the successful completion of the feasibility studies that confirmed Pilot can produce ~61,000 tpa of clean hydrogen, which can subsequently be used to produce ~350,000 tpa of clean ammonia for export into Asia
- **Apr-22:** The Cliff Head Joint Venture (CHJV) confirmed new oil sale and export arrangements via the Port of Geraldton, enabling continued oil production & the opportunity for other Perth Basin producers to export through CHJV facilities. Revenue from oil sales will be used to accelerate cash flow and assist with financing initial phases of the Project
- **Apr-22:** CHJV announced Pilot and Triangle Energy (ASX: TEG) will restructure their ownership arrangements in light of the proposed CCS project. Pilot's interest will increase from 27.5% to 57.5% upon approval by the National Offshore Petroleum Titles Administrator (NOPTA) to have the Cliff Head Oil Field reservoir declared a Greenhouse Gas (GHG) Storage formation. This process is underway with the application expected to be lodged this quarter
- **Jun-22:** Pilot announced MoU with 8 Rivers Capital (8 Rivers) to invest $1 million in the Mid West Project, including an offtake option for 172,500 tpa of clean ammonia to be exported into key Asian markets.

THE ROAD AHEAD

We believe the next 6–12 months has the potential to be pivotal for Pilot, as it begins to execute Stage 1 of its 3-stage development plan shown below. Initially, the focus will be on gaining the relevant regulatory approvals to allow the conversion of Cliff Head oil field from oil production to CCS. We anticipate this will alleviate any regulatory concerns surrounding the Project, which could deliver a material re-rating to the Company. At the same time, Pilot is engaging with prospective parties regarding commercial off-take arrangements for the export of its clean hydrogen & ammonia. This will serve as strong validation of Pilot's Mid West Project, particularly after the recent offtake announcement with 8 Rivers.



**Excludes share of funds held in TEG (direct interest holder in Cliff Head Joint Venture) of ~$1.0m*

PROVEN TO BE FEASIBLE

In November 2021, we released our initial desk note on Pilot. At the time, Pilot was set to commence its feasibility studies and had just announced it had formed a consortium with APA Group and Warrego Energy to assist with part of its studies. Fast forward to March 2022, and Pilot announced the successful completion of its feasibility studies. Most significantly, this did not represent the completion of a single feasibility study - but rather the combination of four individual feasibility studies, including:

1. Mid West Blue Hydrogen and CCS study (**CCS and Blue H_2 Study**) focused on the Cliff Head Oil field
2. Mid West Renewable Energy Study (**Renewables Study**)
3. 8 Rivers Blue Hydrogen Technology Study (**8 Rivers Study**)
4. WA 481P CCS Study (**WA 481P CCS Study**).

The key outcome was that the feasibility studies confirmed the viability of Pilot to develop a large-scale clean hydrogen production project in the Mid West. This included the integration of CCS capabilities for blue hydrogen production, and renewable resources (namely a combination of onshore and offshore wind and solar farms) for green hydrogen production. The project will leverage Pilot's existing oil and gas infrastructure at Cliff Head oil field by repurposing it for CCS, which in turn will provide Pilot with a significant first mover advantage (from both a time and money perspective). In addition, it will allow for cost-effective transition into green hydrogen production. The final stage of the project will utilise the green hydrogen to produce globally competitive clean ammonia that can be exported into emerging Asian clean energy markets. Figure 1 below provides a graphic depiction of the Project, and Figure 2 provides a summary of the feasibility study results. Please refer to Appendices for further details.

Figure 1: Graphic depiction of the Mid West Clean Energy Project

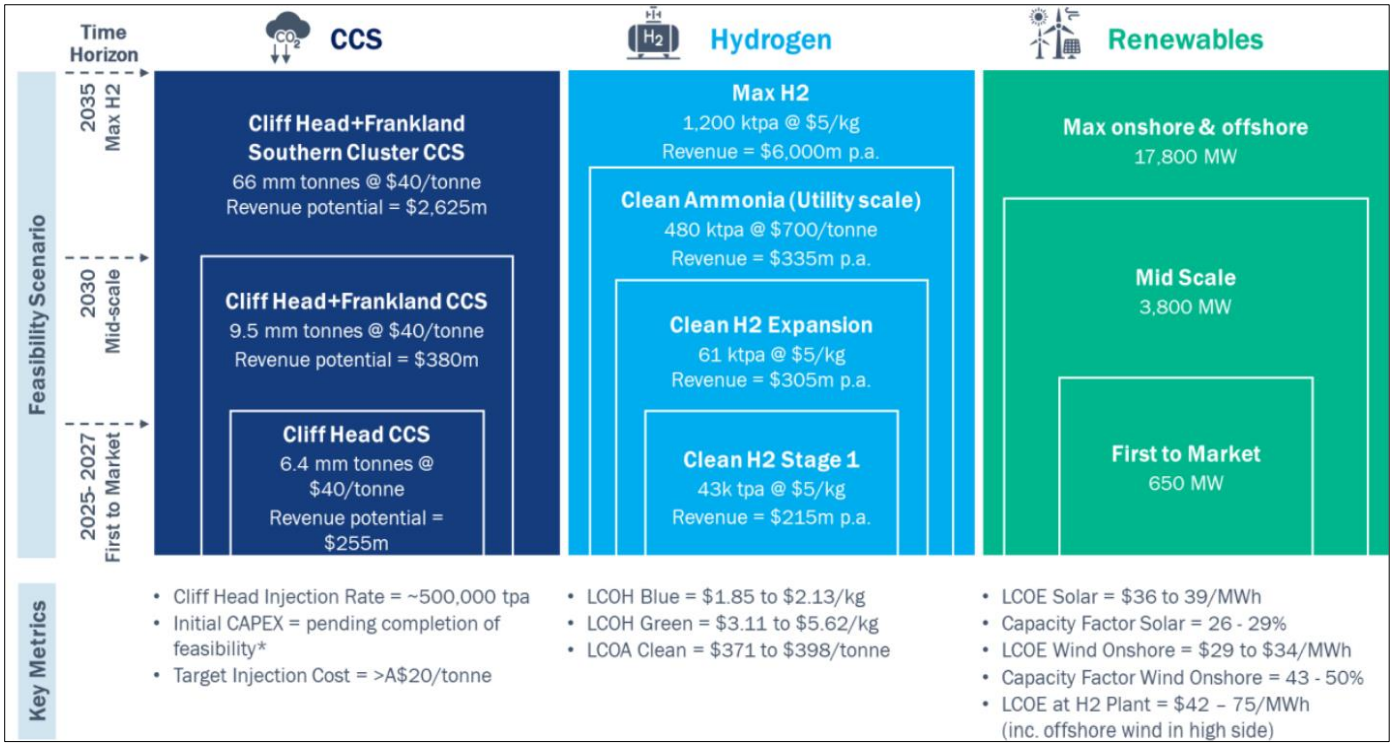


Figure 2: Feasibility Study Results Summary

THE CLIMATE GAME CHANGER

If you aren't already familiar with Pilot's operations (including its assets and infrastructure), we recommend reading this first. Here we will provide a background summary to provide some context to the Project, before we shift the focus from '*what*' to '*how*' as Pilot progresses through its key milestones.

Firstly, what is CCS and why is it important? CCS is the process of directly capturing, transporting, and storing CO_2 in underground geologic formations (in Pilot's case – depleted oil and gas reservoirs). The primary goal of CCS is to keep CO_2 from entering the earth's atmosphere and further exacerbating the effects of excess greenhouse gases that are the main driver of global warming. It is one of the few technologies able to adequately displace CO_2 from coal and gas-fired power stations, and the only technology capable of reducing large-scale emissions from a myriad of industrial sources. As climate change concerns continue to grow, it is easy to see why demand for large scale CCS projects is increasing. This is evidenced by 48% growth in CCS project capacity from December 2020 to September 2021.

Unfortunately, decarbonising the global economy is not simply about capturing and storing CO_2 underground, with heightened focus recently being placed on switching from fossil-fuel based power to renewable-sourced power. Due to its potential to be used as an alternative to current fuels in a wide range of new applications, hydrogen is a leading candidate. In fact, current estimates point to a hydrogen solution for around 35% of global CO_2 emissions, or ~26% of global greenhouse gas emissions. However, today's global hydrogen industry remains dominated by fossil-fuel based production (known as grey hydrogen – discussed further below).

With reference to Figure 3 opposite, hydrogen produced with natural gas is known as **grey hydrogen.** While the cost of grey hydrogen is the cheapest at just c.USD$1/tonne, it is heavily criticised for its negative impact on the environment due to very high greenhouse gas emissions. In fact, 6% of global natural gas and 2% of global coal goes into its production – and as a result, grey hydrogen production emits around 830 million tonnes of CO_2 per annum.

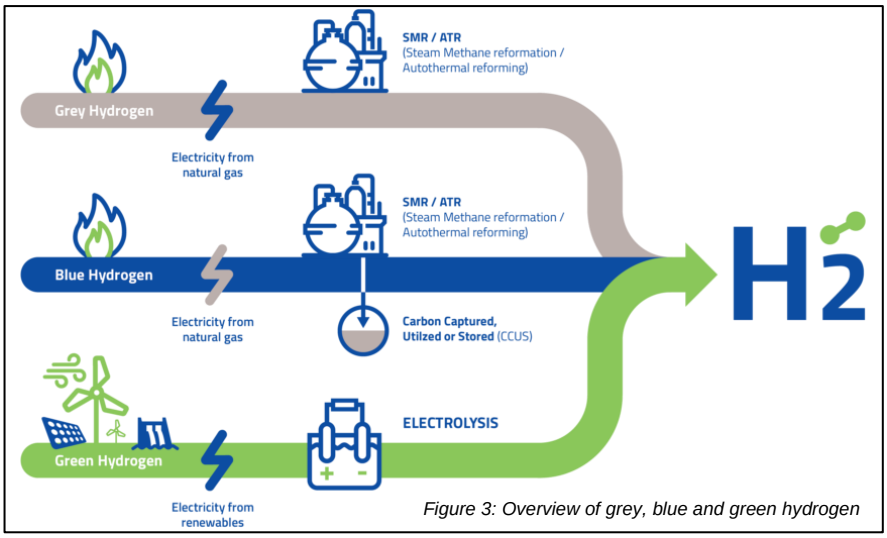


Figure 3: Overview of grey, blue and green hydrogen

With the increase in company's announcing net zero targets by 2050, attention has shifted towards the development of **green hydrogen**. Green hydrogen is formed via the electrolysis of water using 100% renewable power, resulting in no carbon emissions. While favourable to the environment, the production of green hydrogen is typically expensive (current cost is c.USD$4/kg) because it requires a large amount of water and renewable power (e.g. from wind and/or solar farms). Therefore, there is a significant need for investment in order to make large scale production viable. This is further compounded by additional challenges surrounding transportation and storage.

As a result, **it is widely acknowledged that scaling up blue hydrogen will provide a clear, low-cost pathway to transition to green hydrogen production.** Blue hydrogen is formed using the same method as grey hydrogen, but uses CCS to reduce CO_2 emissions. Similar to green hydrogen, blue hydrogen production is typically expensive and requires significant investment in CCS technology and infrastructure to make its production feasible at scale. However, production becomes significantly more cost effective (and significantly less time intensive) if existing CCS infrastructure can be leveraged. To this end, by repurposing its existing oil and gas assets for CCS, **Pilot gains a considerable first mover advantage alongside a unique opportunity to pioneer the clean energy transition**. By combining its existing Cliff Head infrastructure with the proposed establishment of onshore and offshore wind turbines, and an onshore solar farm (that transmits energy into the Western Power grid), **Pilot will be able to make a meaningful, low-cost transition into green hydrogen production at scale**. Not to mention the potential to partner with other large gas players within proximity to Pilot's operations, which would enable the fast-track of its development and assist in opening multiple commercialisation pathways and diversified revenue streams.

But how do we get there? **Pilot has proposed a staged development plan that will be carried out over the next 5-8 years, with Stage 1 estimated to become operational by 2025.**

3 STAGES TO SUCCESS

After the successful completion of its feasibility studies, Pilot announced the following 3-stage development plan that would see it produce ~61,000 tpa of clean hydrogen and ~350,000 tpa of clean ammonia ready for export:

- **Stage 1 - Carbon Capture & Storage:** Development of a CCS operation to provide CCS services to third parties and to support the subsequent production of blue hydrogen and clean gas-fired power
- **Stage 2 – Blue Hydrogen Production:** Development of a blue hydrogen generation project utilizing the 8 Rivers clean hydrogen technology ($^8RH_2$) and clean power technology to produce ~43,000 tpa of blue hydrogen with near zero emissions
- **Stage 3 - Renewables and Green Hydrogen Project:** Integration into the Mid West Blue Hydrogen Project of approximately 220MW of renewable power (generated from both onshore and offshore wind and solar farms) to produce a further 18,000 tpa of green hydrogen.

A diagrammatical overview is shown in Figure 4 below.

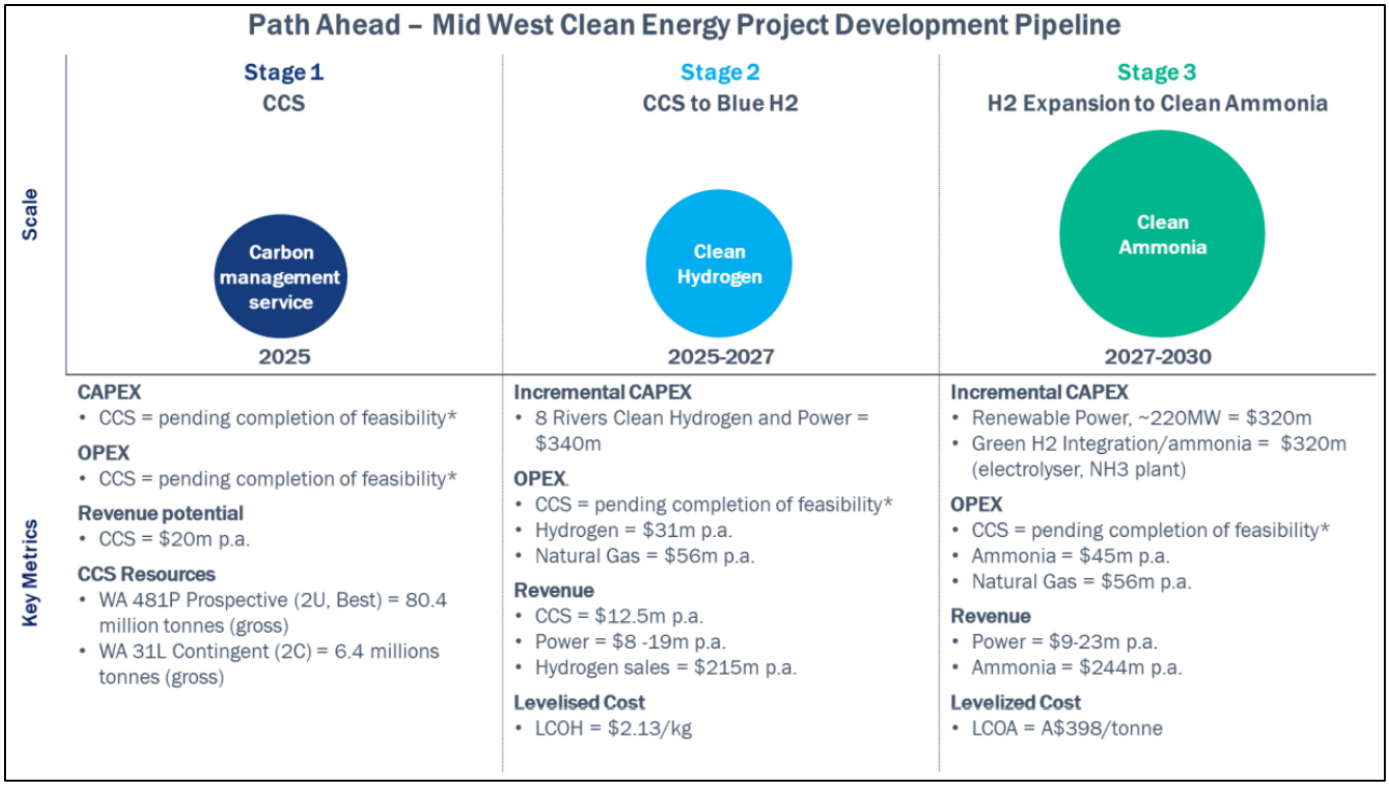


Figure 4: Mid West Clean Energy Development Pipeline

STAGE 1 – CARBON CAPTURE & STORAGE

Stage 1 of the Project (currently underway) involves the conversion of the Cliff Head oil field from oil production to a CCS operation. Firstly, regulatory approval must be granted by the National Offshore Petroleum Titles Administrator (NOPTA) to allow the Cliff Head oil field reservoir to be declared a Greenhouse Gas Storage Formation. Subsequently, Pilot must apply to NOPTA for a Greenhouse Gas Injection Licence - specifically for the injection of ~500,000 tpa of CO_2 into the Cliff Head oil field reservoir for permanent sequestration. The receipt of this license will allow the CCS project to be operational by 2025.

The Cliff Head oil field is currently jointly held by Triangle Energy (78.75%) and Pilot Energy (21.25%). In April 2022, Triangle and Pilot announced the agreement to restructure the Cliff Head JV interests to align with the proposed conversion of the facilities and CCS operations moving forward. Under the agreement, Pilot and Triangle have restructured their interests such that Pilot will hold a direct 57.5% participating interest in the existing oil and CCS projects, and Triangle will hold a direct 42.5% interest in both projects. The change in interest is subject to the approval of the declaration by NOPTA. Pilot is currently progressing the application and anticipates it will be submitted in the next quarter.

To assist in Stage 1, Pilot engaged Genesis Energies and CO_2Tech to assess whether the wells, pipelines and infrastructure at Cliff Head are suitable to be converted from oil production to CCS. The studies confirmed this could be completed with minimal modifications over the following three basic stages:

1. Storage Reservoir Preparation
2. Facilities Conversion
3. CO_2 Injection Operations

In addition, it was confirmed the initial CO_2 Injection Operations can be expanded to increase the CO_2 injection rate from 500k tpa up to 1.1m tpa, as well as the overall storage capacity from 6Mt up to 16Mt. Further information on each step of Stage 1 can be found here and is summarised in Figure 5 below.

	Storage Reservoir Preparation	Pre-CO2 Injection	CO2 Injection
Operation	Final oil production	Facility Conversion & Installation	CO2 Injection
Objective	Prepare Cliff Head oil field reservoir for CO2 injection	• Prepare Cliff Head wells and infrastructure for CO2 injection • Install onshore CO2 receiving facilities	Commence supercritical CO2 injection at a continuous rate of at least 550,000 tpa for at least 15-years
Timing	**CY Q1 2023**	**Late CY 2024-2025**	**CY 2026**
Duration	**36-48 months**	**6-12 months**	**20+ years**
Permitting	Existing production license	GHG Declaration + CO2 injection license	GHG Declaration + CO2 injection license
Work Activities	• Increase production to up to 60,000 BWPD from existing wells • Install additional rental oil/water separation units • Install additional 200 kW power unit module on CHA • Re-commission water disposal well at ASP	• Workovers 3 existing water injection wells and 2 production wells • Externally reinforce existing pipelines for CO2 operation • Construct onshore CO2 receiving facilities • No further drilling required to accommodate 550,000 tpa injection rate and 6Mt of CO2 storage	• Transport supercritical CO2 to CHA via existing onshore/offshore 10" pipelines • Inject supercritical CO2 into reservoir through 5 existing wells • Deepen two existing wells + drill 1 new well to increase storage capacity to up to 16Mt and injection rate to at least 1.1 mmtpa
Expected Outcomes	Creation of ~6 million tonnes of CO2 storage capacity with expected additional oil production generating significant free cash flow	Completion of a conversion of all offshore and onshore facilities necessary to commence CCS injection operations	Commence continuous CCS injection operations

Figure 5: Breakdown of Stage 1 – Carbon Capture and Storage

In parallel with the regulatory approval process, Pilot is also commencing engagement with prospective third-party customers seeking near-term effective, high-quality carbon reduction solutions for their existing businesses. The Company has identified several large, long-term sources of industrial CO_2 emissions in very close proximity to the Project as potential customers. Pilot believes these parties will seek long-term arrangements to manage their existing and future CO_2 emissions, thus supporting the long-term commercial utilisation of the Project. Additionally, they may also seek to secure equity participation in the Project as part of putting into place CCS contracts.

Overall, the Cliff Head CCS Project estimated to deliver gross project real pre-tax NPV of ~$110 to 210 million and project IRR of ~30% to ~40%. A summary is shown in Figure 6 below. For further information on the commercialisation and funding of Stage 1, refer to Page 4 and 5 of Pilot's announcement here.

100% Basis, Real A$ 2022	**Scenario #1 550,000 tpa**	**Scenario #2 1.1 million tpa**
Initial CCS Project capex	$110 million	$110 million
Timing	Mid-2025	Mid-2025
Storage Expansion capex	$60 million	$60 million
Timing	~2027	Mid-2028
CCS project opex	~$16/tonne	~$9/tonne
Project life	~30 years	~15 years
Project NPV (pre-tax 8%)	$110 million	$210 million
Project IRR	~30%	~40%

Figure 6: Estimated pre-tax NPV and IRR at 550,000 tpa and 1,100,000 tpa injection rate of CO_2. Estimates based on inputs from previously advised completed feasibility studies and internal assessment of operating expenditures

In progressing its development path, over the next 12-months Pilot will be focused on securing all necessary regulatory approvals, securing commercial off-take arrangements and completing a full bankable feasibility study and FEED package. This will enable the Company to take a final investment decision (FID) for the Stage 1 Project, which is anticipated to occur by mid-2023.

STAGE 2 – BLUE HYDROGEN PRODUCTION

Stage 2 of the Mid-West Clean Energy Project (2025 – 2027) involves the construction and production of a blue hydrogen production plant utilising $^8RH_2$ hydrogen technology developed by 8 Rivers Capital LLC (8 Rivers). 8 Rivers is the premier Net Zero solutions company globally for industrial decarbonization. **It's industry leading $^8RH_2$ technology can generate clean hydrogen with full carbon capture at a cheaper cost than all other hydrogen technologies.** An overview of the process is shown in Figure 7 below. You can read more about 8 Rivers and the $^8RH_2$ technology here.

The 8 Rivers Study assessed the integration of its technology to produce blue hydrogen (as a standalone case), as well as the integration of additional renewable energy sources and electrolysers to produce green hydrogen and ammonia (discussed further below). The study concluded that **~43,000 tpa of globally competitive blue hydrogen can be produced at a levelized cost of $2.13 per kg.** Based on 95% carbon capture, this equates to ~510,000 tpa of CO_2 emissions.

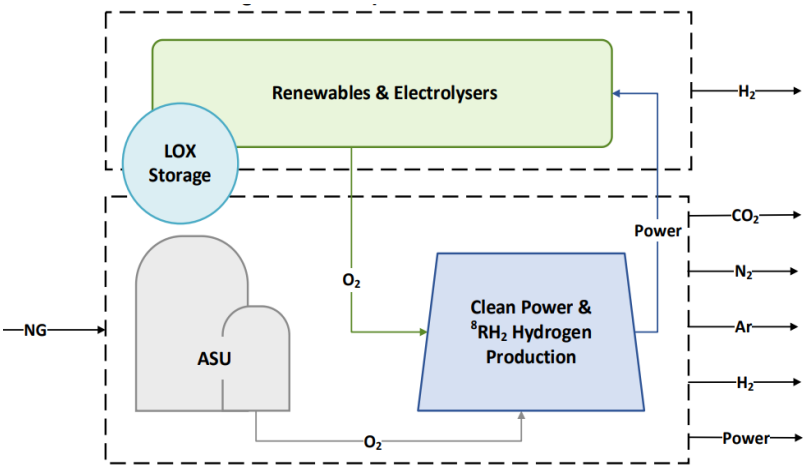


Figure 7: 8 Rivers Capital $^8RH_2$ process overview

At this production level, Pilot would receive ~$215m in annual revenue from hydrogen sales (based on $5 per kg of hydrogen). Furthermore, the power generated and carbon captured by the $^8RH_2$ process can be sold for an additional ~$8-19m and ~$12.5m per annum respectively. Please refer to Page 3 of the feasibility studies for further information, including project assumptions.

STAGE 3A - GOING GREEN WITH RENEWABLES

Stage 3 of the Mid West Clean Energy Project (2027 onwards) involves the integration of renewable energy, namely onshore and offshore wind and solar, to enable low-cost production of green hydrogen at scale. **The Mid West is considered one of Australia's highest rated renewable energy resource regions**. This makes it an attractive location for a combined wind and solar project – and an even more attractive location for an integrated clean energy project, especially when existing oil and gas assets can be leveraged for CCS.

The Renewables Study was conducted to assess the viability of the Mid West region for the development of large-scale wind and solar projects, as well as the potential to commercialise each project through the production of clean hydrogen. Pilot engaged various industry leading consultants for each focus area of the feasibility study (summarised in Figure 8 opposite). Please refer to Appendix B here for details. As a summary, we note the following:

Offshore and Onshore Wind, electricity transmission and port assessments	LAUTEC
Onshore Solar	Green Fuel Development
Hydrogen Production and Feasibility Reporting	TEN Technip Energies; GENESIS

Figure 8: Consultants engaged for each focus area of feasibility studies

- **It was confirmed the Mid West region contains 18.7 GW of total technical renewable energy resource**, including onshore and offshore wind and solar and potential in three core development areas
- **15 large scale potential development sites were identified across the three core development areas**
- An extension to the 8 Rivers Study investigated whether renewable energy could be integrated into $8RH^2$ technology to enable the production of green hydrogen. **The study confirmed ~220 MW of renewable power generated from both wind and solar could produce a further 18,000 tpa of green hydrogen**

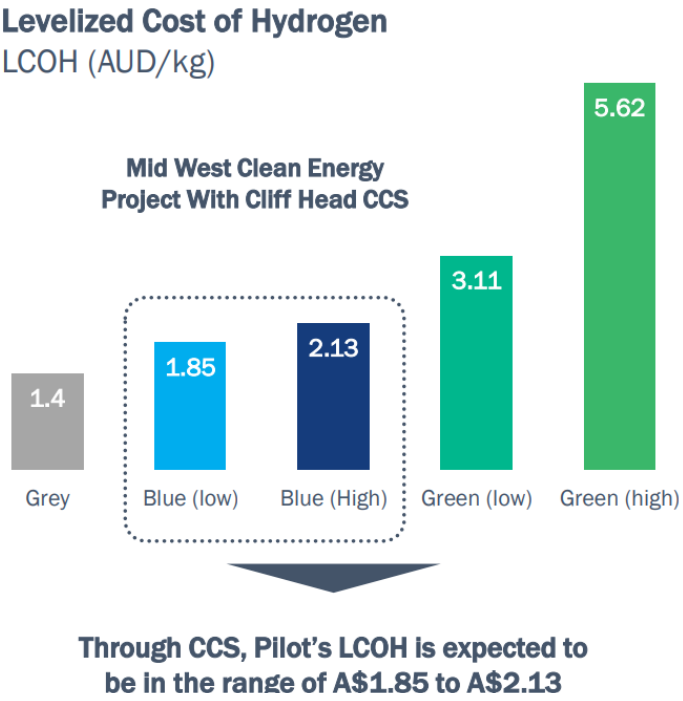


Figure 9: Mid West Clean Energy Project's LCOH under low and high scenarios. Refer to feasibility studies for input assumptions

- **The LCOH for the mid-scale onshore scenario was calculated at $3.11 per kg**, which is within the expected range of pricing for an optimal project. The current global estimate for early 2030 is approx. $2.95 per kg. However, we note this typically excludes the cost of compression, storage and aspects of transmission that have been included in Pilot's analysis, thereby making Pilot's case compelling.

Collectively, the 8 Rivers Study estimated the blue LCOH to be $1.85/kg (utility scale) and the Renewables study estimated the green LCOH to be $3.11/kg. A comparative summary is show in Figure 9 opposite. When compared to other clean energy projects around the globe, and in the context of global hydrogen forecasts, **there is a clear near-term opportunity for Pilot to become a globally competitive exporter of clean hydrogen.**

STAGE 3B - LOADED WITH AMMO-NIA

Taking advantage of the already-existing ammonia market and the operational synergies, the final scenario investigated by Pilot and 8 Rivers was the integration of a clean ammonia plant. This was investigated with a view to exporting the clean ammonia into key Asian energy markets - namely those countries that rely heavily on imports due to a lack of natural resources.

Firstly, a bit of background on ammonia to help understand the opportunity. Ammonia is a colourless gas composed of nitrogen and hydrogen. It is used in the production of many everyday products, with its main application being the manufacture of agricultural fertilizers, which makes it one of the most important industries in the world. Without the crop yield made possible by ammonia-based fertilizers and chemicals, it is estimated the global population would be at least two to three billion less than it is today. With increasing food security issues and growing population, **the global production capacity of ammonia is forecast to increase from ~235m metric tonnes (2019), to ~290m metric tonnes by 2030**.

More recently, the focus has shifted towards clean ammonia. Clean ammonia, formed using blue and green hydrogen, is anticipated to become a next generation fuel due to its unique and favourable properties. Namely, it does not emit CO_2 when burned, does not require cooling to extreme temperatures, and has a higher energy density than liquid hydrogen, making it more efficient to transport and/or store. **As we approach a clean energy future, importing countries are intimately aware that they will have to include imported zero-carbon fuels into their future energy portfolio if they are going to be successful in reducing their carbon emissions.**

For example, let's look at Japan. In 2017, Japan's energy self-sufficiency ratio was estimated at just 9.6% (34th in the world), compared to Australia's ratio of 306.0% (2nd in the world). Japan has already announced its commitment to cut its greenhouse gas emissions by at least 46% by 2030 and reach net zero by 2050. To this end, Japan has been public about its plan to stop importing coal and to transition towards importing clean ammonia - and has set a target to achieve 3 million tonnes of clean ammonia import by 2030 and 30 million tonnes by 2050.

This initiative is supported by Japan's biggest power company, JERA, which has announced it will co-fire their coal plants on ammonia, aiming for 20% co-firing by 2035, with a goal to running their thermal power plants on 100% ammonia by 2050. Therefore, one can safely assume that Japanese coal plants currently importing Australian black

coal will soon be searching for clean and affordable ammonia from Australia to supplement, and eventually replace, those imports.

The feasibility studies conducted with 8 Rivers confirmed the viability to produce clean ammonia in the Mid West using $^{8}RH_2$ technology. Overall, the economic results of Pilot and 8 Rivers Study are nothing short of compelling, especially amidst the rapidly growing clean ammonia market. Key findings included:

- **Low-cost blue hydrogen production can be used to produce approximately 240,000 tpa of globally competitive clean ammonia.** By integrating renewable energy into an industrial scale facility, this can increase to approximately 345,000 tpa. Based on a selling price of $700 per tonne of ammonia, Pilot would stand to receive **~$244m in revenue per annum from the sale of clean ammonia**
- **The levelized cost of clean ammonia was estimated at ~$398 per tonne, including as low as ~$371 per tonne on an industrial scale.** This is competitive against even unabated ammonia, which fluctuates between $300-$450 per tonne on the global market! The cost of clean ammonia is considerably more expensive, with Bloomberg New Energy Finance projecting its cost to be $650 per tonne in 2030.

AMMONIA OFFTAKE

As a reflection of 8 Rivers' commitment to the Mid West Clean Energy Project, Pilot recently announced a Memorandum of Understanding (MoU) with 8 Rivers to invest A$1 million into the Project. The funds will be directed towards accelerating the engineering and commercialisation of Stage 2 (blue hydrogen) and Stage 3 (clean ammonia) of the Project. In addition, 8 Rivers has also been granted an option to enter into a long-term ammonia offtake agreement for an initial tranche of up to 172,500 tpa of zero-carbon ammonia production from the Project. To hear more about the partnership from the CEO of Pilot Energy, Brad Lingo, listen here. The MoU will assist in aligning both parties to progress development, while also serving as a major commercial validation of Pilot's Mid West Clean Energy project.

VOLTE'S VIEW

Despite adverse market conditions, **Pilot has continued to deliver on each of its objectives and has successfully laid a strong foundation for the execution of its clear staged development strategy**. In our view, the achievement of recent milestones is not accurately reflected in the share price - particularly the recent completion of the feasibility studies that confirmed the Project's viability. We see this as a significant de-risking step that reinforces Pilot's unique position and potential to capitalise on a significant first mover advantage.

Over the next twelve months, Pilot will focus on gaining regulatory approvals and securing commercial partners. The achievement of these milestones should mitigate any market uncertainties surrounding potential regulatory challenges, while also providing further validation to the Company's project. **We believe this could deliver a significant re-rating to the Company and further highlights the value proposition of Pilot.**

For further information, please contact Volte Corporate Pty Ltd
www.voltecorp.com.au