# Multiple existing pathways for green hydrogen offtake being pursued

**Frontier Energy Limited (ASX: FHE; OTCQB: FRHYF)** (**Frontier** or the **Company**) is pleased to provide an update on the strategy for offtake of green hydrogen from the Company's Bristol Springs Renewable Energy Project (**Project**).

The Company is strongly positioned to be one of the first commercial green hydrogen producers in Australia, due to the Project's low operating and initial capital cost for Stage One production. More importantly, the Company has multiple existing domestic market offtake opportunities that are both accessible and ready for early offtake/consumption of green hydrogen.

## HIGHLIGHTS

- **Existing markets where hydrogen can replace current carbon emitting fuel sources that require no technological advancements, mass adoption or legislative changes are the most likely first adopters/consumers of green hydrogen**
- **Energy storage and power generation in a dual fuel peaking plant provides a near term market opportunity, given maturity of the technology and the well-established market for electricity generation**
    - *Frontier has a connection to the WA electricity grid, whilst the WA Government plans to legislate a renewable hydrogen target of 1% for electricity generation on the South West Interconnected System (SWIS)*
- **Blending hydrogen with natural gas into the Dampier to Bunbury Natural Gas Pipeline (DBNGP) for domestic gas supply is another advanced market. Studies on the DBNGP have shown up to 9% hydrogen could be injected immediately. Stage One production would equate to less than 0.5% by volume within DBNGP**
    - *Frontier has entered a collaboration agreement with AGIG (Australian Gas Infrastructure Group), owner of the DBNGP, and continues engagement with potential foundation customers, most notably major LNG gas traders and producers*
- **In the medium term, the long haulage transport industry (diesel replacement), appears to be one of the more lucrative sub sectors and is technologically advanced. An increase in vehicle availability and refuelling stations is, however, required before this market consumes significant volumes of green hydrogen**
    - *The Company is finalising plans for the first publicly available hydrogen refuelling station in central Perth during 2H23*
- **The $2 billion Federal Government 'Hydrogen Headstart' program will provide significant tailwind for the Australian hydrogen industry and will accelerate its development**

- *Potential offtake partners have indicated that further details of this program, including price contribution from the Government, are required before binding offtake commitments can be finalised*

- **Frontier is advancing its project financing strategy, and believes funding will comprise a combination of Government grants, Government supported debt and equity**

**Managing Director Sam Lee Mohan commented:** *"At Bristol Springs, we have structural advantages by virtue of the infrastructure surrounding the Project. We also have an important first mover advantage, having recently completed our Definitive Feasibility Study (DFS).*

*The nearby Landwehr Terminal connecting to the SWIS provides potential for electricity sales in a ready to access market that is forecast to require an increasing amount of renewable generation. Frontier's partner Waroona Energy is rapidly progressing its study of a Dual Fuel Peaking Plant to capture this opportunity and generate early cash flow.*

*The DBNGP provides opportunity for green hydrogen gas offtake to local consumers by blending with domestic gas, subject to regulations being put in place.*

*Utilising the recently announced Hydrogen Headstart funding support that is currently being scoped in detail is a prerequisite to finalising offtake. Frontier continues to work closely with government and to engage a broad range of potential customers, including potential hydrogen gas foundation customers, to secure commercially attractive offtake in the medium term."*

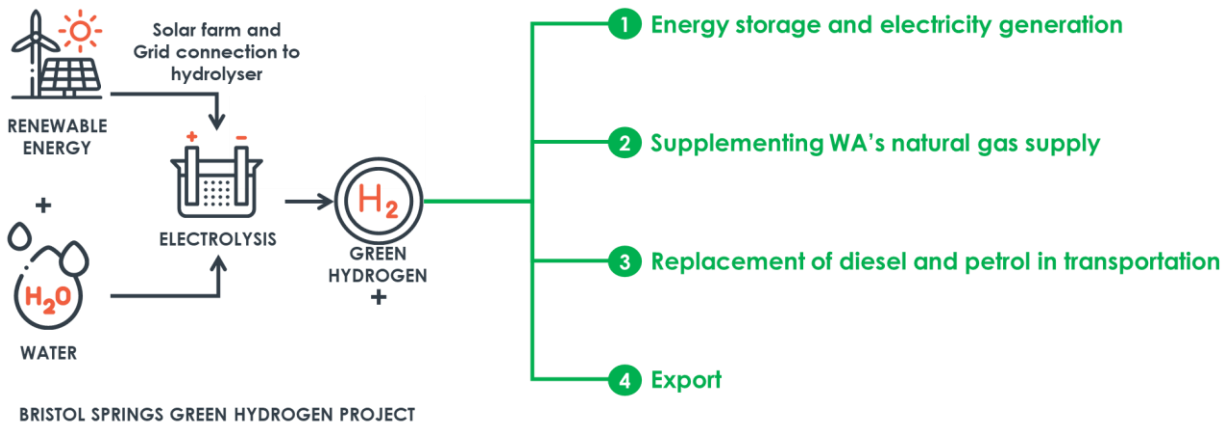


**Figure 1 – Markets for Green Hydrogen**

# Energy Storage and Power Generation

**How**

Frontier has a unique opportunity to supply green energy during peak electricity periods, because of the Project's connection to the SWIS.

As highlighted in the DFS (ASX announcement - 20 March 2023) this not only allows for excess solar energy to be sold into the electricity grid, but also allows for the electrolyser to draw energy from the grid in off peak periods to increase hydrogen production.

The other significant opportunity from having this connection is the development of a dual fuel peaking plant (ASX announcement – 8 June 2023). This allows the Company to benefit from increased electricity pricing during peak demand periods, as well as allow for hydrogen to be blended with natural gas and converted into electricity.

**Benefits**

Peaking plants are an established part of the electricity network throughout the world, including Western Australia. This is arguably the most mature pathway for early hydrogen consumption, given peaking plants are not new technology.

Dual fuel peaking plants are a pathway for gas generators to reach net zero emissions by blending green hydrogen with natural gas. Like natural gas plants, they can be powered up quickly to balance variable output from renewables plants.

By developing a dual fuel peaking plant, Frontier can create its own hydrogen offtake and therefore does not require a hydrogen offtake agreement with a third party to achieve a final investment decision and commence construction.

This sector has also been identified by the WA Government as an early consumer of hydrogen, with the Government proposing a renewable hydrogen target of 1% for electricity generation in the SWIS (see below).

SWIS Demand and supply

The WA Government's[1] recent SWIS demand assessment[2] indicates demand for renewable energy will increase significantly, with new electricity demand of 2.8GW by 2032, a more than 100% increase on 2022 demand. This increase in demand is coupled with the announced closure of all of WA's coal fired capacity by 2030[3]. Coal fired power generation currently accounts for approximately 27%, or 5.5GWh of electricity generated on the SWIS per annum.

While the Government has announced plans for an additional 500MW of battery storage to assist in the transition away from base load coal generation, additional plans for more renewable energy solutions will likely be required to meet the forecast demand.

[1] *The SWIS Demand Assessment is a fast-tracked assessment of future low-emissions electricity demand and an analysis of the network, generation and storage infrastructure that would be required to support it. The SWIS Demand Assessment was announced on 24 August 2022 with the results publicly released on 9 May 2023.*

[2] *See https://www.wa.gov.au/government/document-collections/swis-demand-assessment*

[3] *https://www.wa.gov.au/government/announcements/state-owned-coal-power-stations-be-retired-2030-move-towards-renewable-energy*

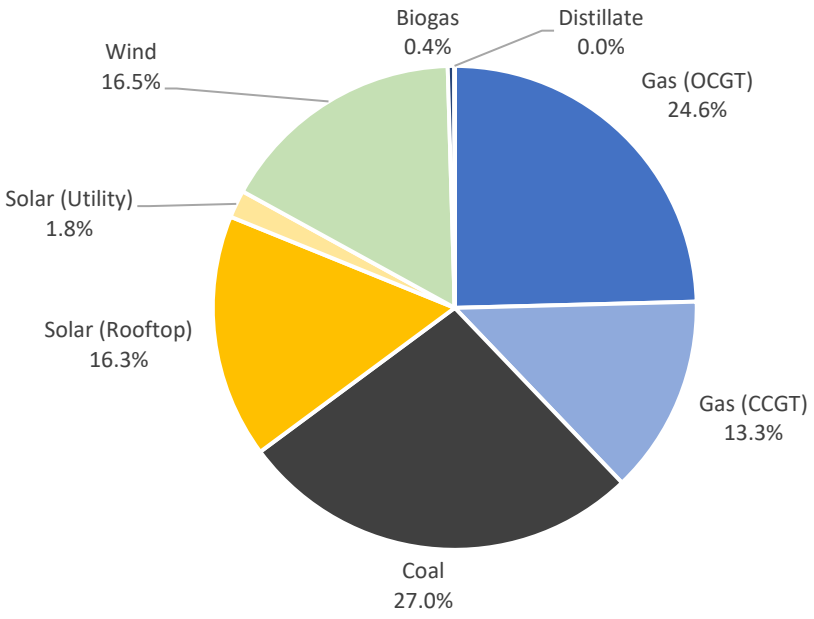


**Figure 2 – SWIS energy generation, twelve months to June 2023[4]**

Pricing Mechanisms

The Wholesale Electricity Market (WEM) in Western Australia consists of two key components:

- **Wholesale market** - where market participants interact to supply and purchase electricity. The average electricity price on the WEM has increased significantly during the past 12 months (from circa $53/MW to $74/MW, annualised basis), with "peak" periods progressively lasting longer and attracting higher prices (See Figure 3 below).

- **Reserve Capacity Credits[5]** - where electricity generators are paid for the back-up energy generation capacity they make available. The reserve capacity price paid for available capacity is currently $193,000/MW[6] which can be secured for five years.

Wholesale market pricing

Wholesale market pricing can fluctuate significantly, driven by numerous factors including the currently installed power generation, time of the day, as well as the season (summer to winter).

These factors result in significant price fluctuations, as can be seen in Figure 3 and Figure 4 below. These Figures show both the average and maximum monthly power prices for each 30-minute interval for each month from January 2021 until May 2023.

The Figures below highlights price increments in different colours:

- Pink - greater than $140/MW
- Orange - $120/MW and $140/MW

[4] *https://opennem.org.au/energy/wem/*

[5] *https://www.erawa.com.au/cproot/23061/2/Notice---Benchmark-Reserve-Capacity-Price-2025-26---Publication-of-Final-determination.pdf*

[6] *https://www.erawa.com.au/cproot/23058/2/-BRCP.2023---2023-benchmark-reserve-cap_e-for-the-2025-26-capacity-year---Final-Determination---for-publication-clean-.PDF*

- Yellow - $100/MW and $120/MW
- Green - between $80/MW and $100/MW
- Blue - between $40/MW and $80/MW
- Grey - less than $40/MW

| Time of day | 2021 January | 2021 February | 2021 March | 2021 April | 2021 May | 2021 June | 2021 July | 2021 August | 2021 September | 2021 October | 2021 November | 2021 December | 2022 January | 2022 February | 2022 March | 2022 April | 2022 May | 2022 June | 2022 July | 2022 August | 2022 September | 2022 October | 2022 November | 2022 December | 2023 January | 2023 February | 2023 March | 2023 April | 2023 May |
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| 00:00:00 | 39 | 33 | 40 | 44 | 47 | 39 | 43 | 39 | 39 | 48 | 42 | 53 | 45 | 54 | 42 | 57 | 48 | 60 | 59 | 64 | 71 | 83 | 76 | 71 | 70 | 72 | 77 | 81 | 68 |
| 00:30:00 | 40 | 30 | 41 | 44 | 42 | 37 | 38 | 42 | 41 | 49 | 42 | 48 | 43 | 51 | 40 | 55 | 49 | 54 | 57 | 58 | 68 | 82 | 77 | 68 | 66 | 69 | 74 | 78 | 69 |
| 01:00:00 | 38 | 32 | 40 | 45 | 43 | 32 | 36 | 39 | 39 | 46 | 44 | 48 | 42 | 48 | 38 | 53 | 47 | 52 | 54 | 56 | 69 | 83 | 76 | 63 | 68 | 69 | 72 | 79 | 65 |
| 01:30:00 | 37 | 29 | 38 | 45 | 42 | 36 | 37 | 40 | 40 | 46 | 42 | 46 | 41 | 46 | 37 | 50 | 45 | 49 | 54 | 53 | 70 | 80 | 75 | 64 | 67 | 69 | 69 | 81 | 67 |
| 02:00:00 | 36 | 28 | 35 | 45 | 44 | 37 | 36 | 33 | 38 | 43 | 40 | 44 | 40 | 46 | 38 | 49 | 44 | 51 | 52 | 51 | 69 | 80 | 71 | 63 | 69 | 69 | 72 | 82 | 65 |
| 02:30:00 | 36 | 27 | 34 | 49 | 42 | 33 | 35 | 32 | 40 | 48 | 43 | 44 | 39 | 44 | 36 | 54 | 44 | 49 | 51 | 51 | 68 | 81 | 70 | 65 | 68 | 69 | 69 | 79 | 64 |
| 03:00:00 | 35 | 29 | 38 | 49 | 45 | 35 | 33 | 37 | 39 | 49 | 41 | 46 | 38 | 45 | 38 | 53 | 43 | 49 | 51 | 52 | 69 | 81 | 73 | 68 | 69 | 69 | 70 | 79 | 66 |
| 03:30:00 | 35 | 26 | 37 | 48 | 43 | 35 | 33 | 39 | 41 | 45 | 42 | 45 | 37 | 43 | 36 | 55 | 44 | 49 | 51 | 54 | 73 | 80 | 73 | 66 | 67 | 68 | 72 | 79 | 67 |
| 04:00:00 | 36 | 31 | 36 | 50 | 43 | 39 | 32 | 42 | 41 | 46 | 44 | 49 | 39 | 45 | 39 | 52 | 48 | 54 | 51 | 57 | 73 | 83 | 76 | 71 | 70 | 68 | 72 | 81 | 69 |
| 04:30:00 | 38 | 34 | 40 | 51 | 47 | 39 | 39 | 40 | 42 | 52 | 42 | 46 | 41 | 47 | 39 | 60 | 51 | 55 | 54 | 57 | 77 | 87 | 79 | 69 | 70 | 68 | 76 | 84 | 72 |
| 05:00:00 | 38 | 37 | 40 | 53 | 50 | 42 | 37 | 38 | 43 | 55 | 44 | 46 | 41 | 49 | 44 | 64 | 55 | 61 | 68 | 67 | 84 | 92 | 83 | 70 | 71 | 71 | 78 | 87 | 71 |
| 05:30:00 | 38 | 35 | 46 | 54 | 47 | 43 | 40 | 43 | 48 | 53 | 39 | 39 | 35 | 50 | 46 | 65 | 56 | 60 | 65 | 62 | 89 | 97 | 77 | 63 | 65 | 72 | 82 | 89 | 79 |
| 06:00:00 | 36 | 38 | 54 | 63 | 59 | 56 | 50 | 58 | 60 | 55 | 43 | 41 | 33 | 52 | 52 | 76 | 72 | 66 | 74 | 82 | 98 | 100 | 76 | 62 | 68 | 74 | 93 | 103 | 86 |
| 06:30:00 | 30 | 32 | 53 | 68 | 71 | 81 | 58 | 69 | 60 | 51 | 45 | 36 | 31 | 52 | 47 | 90 | 85 | 84 | 86 | 105 | 99 | 91 | 70 | 61 | 56 | 73 | 90 | 113 | 96 |
| 07:00:00 | 25 | 28 | 48 | 65 | 93 | 103 | 67 | 83 | 60 | 51 | 40 | 33 | 32 | 50 | 47 | 86 | 100 | 105 | 104 | 116 | 97 | 90 | 65 | 56 | 55 | 68 | 89 | 114 | 111 |
| 07:30:00 | 26 | 25 | 40 | 59 | 85 | 98 | 71 | 75 | 52 | 48 | 37 | 32 | 33 | 45 | 46 | 70 | 88 | 103 | 107 | 99 | 85 | 80 | 53 | 43 | 54 | 69 | 74 | 101 | 103 |
| 08:00:00 | 27 | 23 | 38 | 58 | 76 | 89 | 65 | 62 | 44 | 38 | 29 | 32 | 32 | 40 | 34 | 63 | 73 | 83 | 88 | 93 | 71 | 62 | 45 | 57 | 50 | 60 | 64 | 91 | 90 |
| 08:30:00 | 31 | 23 | 35 | 50 | 72 | 80 | 57 | 51 | 39 | 43 | 25 | 39 | 33 | 43 | 34 | 60 | 67 | 76 | 88 | 79 | 66 | 58 | 42 | 49 | 43 | 57 | 65 | 81 | 81 |
| 09:00:00 | 28 | 16 | 34 | 45 | 57 | 70 | 52 | 49 | 29 | 39 | 33 | 27 | 33 | 37 | 28 | 55 | 59 | 73 | 76 | 72 | 55 | 54 | 35 | 49 | 35 | 52 | 48 | 80 | 75 |
| 09:30:00 | 21 | 18 | 31 | 41 | 48 | 54 | 46 | 42 | 31 | 32 | 29 | 38 | 28 | 36 | 24 | 39 | 55 | 68 | 67 | 58 | 48 | 51 | 26 | 44 | 7 | 44 | 44 | 64 | 60 |
| 10:00:00 | 26 | 21 | 26 | 35 | 50 | 49 | 42 | 36 | 28 | 35 | 34 | 25 | 34 | 37 | 21 | 35 | 44 | 55 | 57 | 51 | 44 | 34 | 41 | 38 | 28 | 46 | 50 | 58 | 39 |
| 10:30:00 | 32 | 22 | 41 | 25 | 44 | 36 | 41 | 34 | 23 | 34 | 21 | 23 | 34 | 54 | 29 | 39 | 46 | 48 | 59 | 49 | 50 | 49 | 25 | 39 | 28 | 46 | 41 | 47 | 31 |
| 11:00:00 | 33 | 21 | 38 | 26 | 42 | 30 | 37 | 11 | 17 | 21 | 15 | 36 | 33 | 59 | 33 | 40 | 36 | 45 | 53 | 31 | 36 | 53 | 27 | 34 | 35 | 54 | 46 | 50 | 44 |
| 11:30:00 | 31 | 25 | 44 | 27 | 33 | 23 | 38 | 11 | 13 | 16 | 25 | 29 | 48 | 66 | 43 | 47 | 34 | 42 | 48 | 33 | 33 | 48 | 37 | 39 | 48 | 63 | 58 | 48 | 32 |
| 12:00:00 | 43 | 28 | 46 | 30 | 36 | 28 | 31 | 15 | 24 | 8 | 16 | 22 | 46 | 62 | 34 | 38 | 46 | 31 | 50 | 21 | 24 | 7 | 31 | 32 | 37 | 64 | 60 | 14 | 24 |
| 12:30:00 | 38 | 32 | 43 | 26 | 42 | 33 | 35 | 13 | 19 | 4 | 4 | 32 | 38 | 62 | 30 | 55 | 40 | 38 | 51 | 35 | 32 | 49 | 34 | 43 | 55 | 57 | 74 | 31 | 58 |
| 13:00:00 | 37 | 20 | 37 | 30 | 41 | 34 | 33 | 19 | 20 | 8 | 14 | 39 | 55 | 57 | 38 | 53 | 42 | 38 | 52 | 26 | 27 | 42 | 8 | 51 | 55 | 60 | 70 | 61 | 60 |
| 13:30:00 | 50 | 33 | 47 | 38 | 50 | 40 | 23 | 29 | 23 | 11 | 14 | 41 | 51 | 64 | 42 | 53 | 45 | 49 | 58 | 44 | 44 | 36 | 23 | 41 | 68 | 55 | 80 | 60 | 59 |
| 14:00:00 | 51 | 28 | 47 | 41 | 50 | 44 | 41 | 24 | 24 | 2 | 9 | 40 | 51 | 71 | 46 | 49 | 52 | 54 | 59 | 41 | 43 | 44 | 30 | 44 | 72 | 53 | 83 | 65 | 67 |
| 14:30:00 | 52 | 35 | 56 | 42 | 58 | 48 | 44 | 41 | 28 | 21 | 15 | 42 | 56 | 66 | 56 | 53 | 50 | 61 | 58 | 52 | 49 | 48 | 38 | 53 | 68 | 59 | 84 | 67 | 79 |
| 15:00:00 | 61 | 36 | 54 | 49 | 57 | 54 | 47 | 43 | 29 | 20 | 15 | 50 | 73 | 77 | 63 | 63 | 59 | 63 | 67 | 56 | 56 | 59 | 42 | 65 | 71 | 77 | 88 | 83 | 84 |
| 15:30:00 | 67 | 41 | 52 | 54 | 71 | 64 | 51 | 45 | 36 | 33 | 32 | 53 | 69 | 83 | 64 | 72 | 58 | 67 | 77 | 63 | 57 | 63 | 52 | 73 | 76 | 80 | 97 | 82 | 99 |
| 16:00:00 | 74 | 49 | 57 | 59 | 75 | 78 | 62 | 50 | 47 | 37 | 37 | 69 | 73 | 89 | 68 | 93 | 70 | 80 | 83 | 75 | 62 | 74 | 67 | 85 | 80 | 82 | 113 | 91 | 112 |
| 16:30:00 | 81 | 53 | 72 | 62 | 89 | 96 | 78 | 61 | 56 | 53 | 53 | 78 | 73 | 95 | 72 | 99 | 91 | 89 | 94 | 90 | 86 | 91 | 91 | 90 | 86 | 83 | 104 | 108 | 139 |
| 17:00:00 | 93 | 56 | 85 | 72 | 105 | 131 | 88 | 73 | 68 | 68 | 57 | 91 | 85 | 99 | 81 | 115 | 97 | 102 | 105 | 103 | 92 | 93 | 99 | 102 | 89 | 103 | 123 | 116 | 176 |
| 17:30:00 | 98 | 63 | 89 | 84 | 123 | 140 | 112 | 85 | 84 | 75 | 67 | 105 | 94 | 106 | 89 | 115 | 110 | 112 | 111 | 128 | 120 | 110 | 129 | 124 | 101 | 120 | 130 | 131 | 202 |
| 18:00:00 | 102 | 71 | 82 | 89 | 109 | 132 | 105 | 89 | 97 | 93 | 72 | 108 | 100 | 104 | 86 | 113 | 95 | 101 | 108 | 141 | 132 | 121 | 144 | 153 | 108 | 133 | 134 | 140 | 175 |
| 18:30:00 | 101 | 68 | 82 | 83 | 93 | 109 | 97 | 87 | 95 | 98 | 78 | 114 | 103 | 102 | 85 | 103 | 80 | 90 | 103 | 131 | 127 | 132 | 157 | 152 | 108 | 118 | 128 | 126 | 151 |
| 19:00:00 | 91 | 66 | 81 | 66 | 80 | 101 | 79 | 80 | 82 | 95 | 77 | 108 | 88 | 97 | 78 | 87 | 73 | 83 | 100 | 109 | 116 | 120 | 154 | 142 | 109 | 103 | 116 | 119 | 128 |
| 19:30:00 | 87 | 59 | 71 | 63 | 77 | 95 | 75 | 71 | 73 | 87 | 72 | 105 | 85 | 97 | 70 | 78 | 71 | 79 | 93 | 96 | 106 | 98 | 116 | 125 | 102 | 97 | 103 | 115 | 123 |
| 20:00:00 | 81 | 55 | 66 | 59 | 72 | 87 | 72 | 66 | 60 | 77 | 64 | 97 | 78 | 90 | 65 | 73 | 66 | 77 | 95 | 98 | 93 | 97 | 104 | 102 | 95 | 88 | 101 | 110 | 109 |
| 20:30:00 | 76 | 51 | 59 | 60 | 72 | 80 | 71 | 65 | 56 | 70 | 58 | 79 | 73 | 87 | 63 | 69 | 71 | 70 | 85 | 92 | 95 | 80 | 103 | 97 | 87 | 85 | 97 | 100 | 97 |
| 21:00:00 | 67 | 46 | 61 | 60 | 67 | 75 | 70 | 65 | 60 | 69 | 57 | 77 | 68 | 87 | 61 | 70 | 64 | 72 | 82 | 86 | 88 | 84 | 94 | 93 | 86 | 85 | 93 | 97 | 87 |
| 21:30:00 | 57 | 42 | 51 | 58 | 57 | 67 | 62 | 59 | 57 | 67 | 55 | 74 | 63 | 74 | 57 | 68 | 63 | 71 | 76 | 82 | 89 | 81 | 86 | 92 | 87 | 81 | 89 | 93 | 82 |
| 22:00:00 | 59 | 40 | 48 | 54 | 52 | 57 | 54 | 57 | 52 | 65 | 56 | 71 | 58 | 66 | 49 | 65 | 58 | 70 | 71 | 75 | 78 | 81 | 88 | 87 | 78 | 76 | 86 | 94 | 78 |
| 22:30:00 | 51 | 39 | 44 | 51 | 55 | 47 | 50 | 47 | 48 | 57 | 50 | 65 | 51 | 59 | 47 | 58 | 56 | 66 | 68 | 70 | 75 | 78 | 85 | 79 | 74 | 76 | 80 | 83 | 73 |
| 23:00:00 | 48 | 37 | 44 | 49 | 50 | 46 | 43 | 44 | 44 | 54 | 48 | 59 | 49 | 57 | 46 | 58 | 54 | 66 | 63 | 63 | 75 | 87 | 84 | 81 | 71 | 73 | 79 | 86 | 73 |
| 23:30:00 | 44 | 35 | 42 | 47 | 49 | 41 | 40 | 41 | 42 | 50 | 45 | 54 | 48 | 55 | 43 | 57 | 47 | 64 | 62 | 63 | 72 | 83 | 83 | 75 | 71 | 73 | 77 | 81 | 70 |

**Figure 3 – Average monthly wholesale power price ($/MWh), in each half hour interval[7]**

Figure 3 shows several trends emerging in the half hourly average WA energy price.

First, the afternoon peak period is increasing in duration from an average interval period of around 2 to 4 hours in 2021 and 1H22, to between 5 to 6 hours constantly through 2H22 and 2023. There is also the emergence of a new high price trend (+$120MW) emerging between 5pm to 8pm, evident for the past 10 months.

Secondly, there is also a new early morning trend appearing between 6am and 8am (except for the summer months), where peak prices are also increasing noticeably.

Finally, the price during solar energy period (7am to 5pm) has increased to an average price of $62/MW during the past 12 months (June 2022 – May 2023). The Company assumed a price of $30MW for electricity sold into the grid in the DFS.

Figure 4 below shows the maximum price over the same time period, in similar half hour intervals.

[7] *Source: AEMO*

| | 2021 | 2021 | 2021 | 2021 | 2021 | 2021 | 2021 | 2021 | 2021 | 2021 | 2021 | 2021 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2022 | 2023 | 2023 | 2023 | 2023 | 2023 |
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| | January | February | March | April | May | June | July | August | September | October | November | December | January | February | March | April | May | June | July | August | September | October | November | December | January | February | March | April | May |
| 00:00:00 | 80 | 97 | 124 | 53 | 134 | 53 | 73 | 60 | 67 | 93 | 88 | 129 | 68 | 89 | 65 | 134 | 86 | 134 | 109 | 114 | 121 | 133 | 123 | 137 | 110 | 102 | 117 | 134 | 86 |
| 00:30:00 | 113 | 92 | 124 | 53 | 107 | 67 | 73 | 60 | 66 | 106 | 61 | 106 | 67 | 115 | 71 | 131 | 95 | 118 | 88 | 103 | 117 | 140 | 124 | 135 | 95 | 89 | 110 | 127 | 105 |
| 01:00:00 | 107 | 61 | 124 | 59 | 125 | 55 | 64 | 58 | 65 | 120 | 58 | 106 | 64 | 109 | 68 | 143 | 76 | 106 | 79 | 96 | 117 | 141 | 132 | 120 | 110 | 88 | 99 | 129 | 79 |
| 01:30:00 | 67 | 52 | 107 | 79 | 125 | 54 | 60 | 57 | 64 | 106 | 64 | 110 | 60 | 106 | 54 | 80 | 72 | 105 | 120 | 99 | 117 | 125 | 121 | 133 | 112 | 80 | 84 | 127 | 81 |
| 02:00:00 | 66 | 51 | 64 | 59 | 125 | 54 | 60 | 56 | 62 | 106 | 69 | 108 | 64 | 104 | 53 | 82 | 69 | 105 | 90 | 85 | 119 | 120 | 133 | 101 | 112 | 89 | 103 | 127 | 78 |
| 02:30:00 | 67 | 51 | 62 | 118 | 107 | 53 | 60 | 52 | 63 | 122 | 100 | 111 | 67 | 68 | 68 | 122 | 58 | 97 | 68 | 85 | 118 | 112 | 110 | 132 | 111 | 89 | 103 | 124 | 79 |
| 03:00:00 | 67 | 51 | 97 | 122 | 125 | 54 | 59 | 52 | 65 | 136 | 68 | 109 | 58 | 68 | 54 | 122 | 58 | 69 | 66 | 85 | 121 | 113 | 135 | 134 | 110 | 89 | 125 | 124 | 83 |
| 03:30:00 | 66 | 51 | 98 | 107 | 125 | 54 | 51 | 52 | 63 | 81 | 104 | 108 | 57 | 65 | 68 | 122 | 58 | 69 | 65 | 84 | 116 | 113 | 134 | 135 | 109 | 89 | 106 | 124 | 90 |
| 04:00:00 | 66 | 54 | 100 | 133 | 125 | 69 | 50 | 64 | 66 | 83 | 106 | 121 | 59 | 65 | 54 | 117 | 79 | 126 | 66 | 94 | 122 | 114 | 131 | 135 | 109 | 89 | 102 | 124 | 91 |
| 04:30:00 | 71 | 57 | 103 | 111 | 107 | 71 | 59 | 64 | 61 | 92 | 66 | 77 | 58 | 83 | 70 | 133 | 109 | 125 | 84 | 88 | 125 | 124 | 137 | 139 | 108 | 79 | 124 | 159 | 102 |
| 05:00:00 | 74 | 75 | 77 | 111 | 132 | 71 | 62 | 60 | 66 | 136 | 102 | 85 | 56 | 98 | 83 | 129 | 111 | 142 | 116 | 115 | 130 | 142 | 119 | 123 | 170 | 89 | 124 | 126 | 113 |
| 05:30:00 | 75 | 63 | 85 | 112 | 86 | 68 | 79 | 72 | 100 | 136 | 85 | 85 | 57 | 137 | 168 | 157 | 103 | 114 | 114 | 106 | 139 | 145 | 128 | 123 | 97 | 100 | 178 | 132 | 132 |
| 06:00:00 | 103 | 64 | 124 | 156 | 134 | 90 | 102 | 117 | 153 | 140 | 102 | 92 | 58 | 138 | 154 | 172 | 155 | 133 | 120 | 123 | 176 | 140 | 136 | 141 | 123 | 130 | 176 | 180 | 128 |
| 06:30:00 | 103 | 66 | 124 | 156 | 162 | 175 | 165 | 133 | 153 | 140 | 100 | 82 | 57 | 140 | 118 | 174 | 175 | 139 | 151 | 149 | 142 | 150 | 129 | 142 | 108 | 101 | 158 | 180 | 146 |
| 07:00:00 | 103 | 65 | 138 | 156 | 267 | 175 | 162 | 149 | 150 | 141 | 79 | 80 | 57 | 97 | 124 | 174 | 175 | 176 | 176 | 151 | 290 | 138 | 136 | 169 | 120 | 123 | 159 | 187 | 324 |
| 07:30:00 | 104 | 57 | 118 | 156 | 170 | 177 | 152 | 149 | 150 | 141 | 75 | 80 | 55 | 95 | 124 | 183 | 175 | 189 | 179 | 143 | 143 | 178 | 138 | 169 | 109 | 115 | 114 | 186 | 324 |
| 08:00:00 | 101 | 56 | 115 | 171 | 179 | 173 | 113 | 131 | 152 | 92 | 62 | 63 | 62 | 83 | 88 | 150 | 174 | 155 | 151 | 179 | 135 | 136 | 128 | 175 | 115 | 100 | 124 | 178 | 150 |
| 08:30:00 | 113 | 56 | 105 | 155 | 165 | 183 | 106 | 126 | 152 | 166 | 56 | 63 | 61 | 69 | 71 | 144 | 154 | 150 | 141 | 180 | 139 | 149 | 134 | 172 | 115 | 108 | 105 | 174 | 126 |
| 09:00:00 | 168 | 58 | 101 | 155 | 155 | 183 | 126 | 109 | 153 | 166 | 111 | 62 | 64 | 69 | 59 | 138 | 154 | 143 | 138 | 180 | 136 | 190 | 124 | 172 | 115 | 123 | 104 | 174 | 140 |
| 09:30:00 | 168 | 62 | 71 | 156 | 155 | 155 | 72 | 139 | 164 | 142 | 61 | 267 | 76 | 88 | 53 | 132 | 138 | 149 | 128 | 180 | 126 | 190 | 178 | 172 | 115 | 105 | 103 | 179 | 122 |
| 10:00:00 | 174 | 62 | 70 | 156 | 156 | 169 | 76 | 114 | 158 | 144 | 60 | 118 | 128 | 102 | 65 | 130 | 87 | 143 | 91 | 175 | 132 | 120 | 175 | 172 | 93 | 96 | 103 | 179 | 75 |
| 10:30:00 | 174 | 62 | 124 | 156 | 156 | 155 | 60 | 114 | 158 | 144 | 61 | 118 | 172 | 172 | 88 | 193 | 79 | 160 | 117 | 195 | 128 | 179 | 175 | 139 | 94 | 124 | 106 | 175 | 77 |
| 11:00:00 | 174 | 95 | 124 | 53 | 156 | 155 | 70 | 69 | 127 | 57 | 88 | 118 | 122 | 173 | 290 | 174 | 55 | 149 | 115 | 128 | 113 | 179 | 57 | 142 | 105 | 177 | 105 | 175 | 99 |
| 11:30:00 | 177 | 120 | 110 | 145 | 119 | 155 | 116 | 59 | 124 | 51 | 88 | 166 | 171 | 173 | 290 | 175 | 79 | 139 | 135 | 129 | 290 | 159 | 290 | 175 | 112 | 131 | 126 | 199 | 140 |
| 12:00:00 | 177 | 162 | 165 | 58 | 75 | 58 | 115 | 146 | 152 | 51 | 88 | 118 | 168 | 173 | 173 | 175 | 290 | 74 | 178 | 66 | 107 | 150 | 120 | 138 | 124 | 178 | 109 | 200 | 186 |
| 12:30:00 | 167 | 162 | 121 | 51 | 156 | 71 | 115 | 146 | 94 | 56 | 122 | 166 | 168 | 173 | 118 | 175 | 118 | 63 | 177 | 128 | 105 | 179 | 179 | 175 | 175 | 124 | 176 | 200 | 186 |
| 13:00:00 | 167 | 74 | 125 | 53 | 116 | 77 | 116 | 146 | 78 | 53 | 121 | 166 | 168 | 129 | 125 | 174 | 118 | 84 | 177 | 109 | 106 | 117 | 110 | 175 | 175 | 131 | 176 | 175 | 135 |
| 13:30:00 | 176 | 169 | 130 | 58 | 156 | 128 | 60 | 146 | 62 | 62 | 61 | 167 | 168 | 173 | 130 | 175 | 119 | 88 | 123 | 90 | 148 | 119 | 102 | 175 | 175 | 128 | 324 | 175 | 135 |
| 14:00:00 | 168 | 85 | 129 | 154 | 156 | 128 | 116 | 64 | 77 | 50 | 134 | 167 | 168 | 174 | 102 | 175 | 154 | 128 | 122 | 126 | 122 | 122 | 110 | 130 | 138 | 124 | 178 | 175 | 137 |
| 14:30:00 | 132 | 139 | 267 | 62 | 156 | 140 | 162 | 152 | 55 | 75 | 94 | 169 | 173 | 132 | 131 | 124 | 118 | 173 | 122 | 108 | 116 | 178 | 120 | 133 | 137 | 172 | 189 | 133 | 144 |
| 15:00:00 | 126 | 136 | 146 | 114 | 156 | 176 | 149 | 152 | 56 | 52 | 107 | 168 | 169 | 173 | 290 | 151 | 164 | 180 | 132 | 171 | 138 | 139 | 118 | 176 | 143 | 172 | 324 | 175 | 145 |
| 15:30:00 | 175 | 130 | 133 | 114 | 267 | 178 | 116 | 119 | 57 | 65 | 170 | 133 | 169 | 175 | 141 | 151 | 121 | 130 | 150 | 130 | 120 | 152 | 101 | 290 | 141 | 125 | 324 | 124 | 147 |
| 16:00:00 | 176 | 132 | 143 | 110 | 267 | 158 | 130 | 116 | 116 | 77 | 170 | 169 | 169 | 150 | 136 | 290 | 155 | 137 | 179 | 131 | 131 | 183 | 175 | 290 | 144 | 159 | 324 | 131 | 190 |
| 16:30:00 | 175 | 124 | 267 | 102 | 173 | 174 | 267 | 152 | 114 | 267 | 172 | 168 | 169 | 166 | 142 | 148 | 139 | 140 | 136 | 135 | 170 | 290 | 290 | 290 | 139 | 141 | 324 | 151 | 324 |
| 17:00:00 | 175 | 126 | 267 | 169 | 173 | 267 | 150 | 123 | 138 | 267 | 171 | 267 | 166 | 142 | 142 | 158 | 147 | 145 | 290 | 145 | 214 | 290 | 290 | 290 | 145 | 324 | 324 | 178 | 324 |
| 17:30:00 | 175 | 126 | 267 | 169 | 176 | 193 | 267 | 134 | 150 | 133 | 138 | 267 | 166 | 150 | 143 | 153 | 153 | 153 | 290 | 290 | 290 | 290 | 1,018 | 290 | 290 | 324 | 324 | 324 | 324 |
| 18:00:00 | 183 | 138 | 133 | 170 | 172 | 182 | 175 | 140 | 169 | 162 | 139 | 267 | 267 | 154 | 138 | 157 | 143 | 148 | 290 | 290 | 290 | 290 | 1,018 | 290 | 290 | 324 | 324 | 324 | 324 |
| 18:30:00 | 175 | 129 | 139 | 170 | 157 | 194 | 141 | 134 | 170 | 145 | 142 | 267 | 170 | 159 | 150 | 157 | 129 | 146 | 290 | 290 | 290 | 290 | 1,018 | 290 | 290 | 324 | 324 | 185 | 324 |
| 19:00:00 | 174 | 127 | 139 | 146 | 157 | 193 | 140 | 134 | 155 | 142 | 135 | 267 | 171 | 157 | 139 | 145 | 133 | 127 | 290 | 290 | 290 | 290 | 1,018 | 290 | 290 | 150 | 324 | 154 | 324 |
| 19:30:00 | 174 | 129 | 130 | 128 | 155 | 178 | 139 | 133 | 143 | 141 | 131 | 170 | 161 | 290 | 140 | 151 | 136 | 144 | 290 | 142 | 290 | 290 | 290 | 290 | 290 | 149 | 148 | 152 | 324 |
| 20:00:00 | 170 | 126 | 124 | 101 | 158 | 176 | 137 | 126 | 128 | 133 | 133 | 267 | 160 | 145 | 153 | 151 | 136 | 144 | 290 | 290 | 271 | 290 | 290 | 154 | 290 | 136 | 149 | 174 | 324 |
| 20:30:00 | 174 | 126 | 119 | 141 | 159 | 176 | 114 | 119 | 119 | 119 | 108 | 163 | 158 | 142 | 130 | 142 | 139 | 135 | 132 | 135 | 290 | 115 | 290 | 134 | 142 | 134 | 149 | 147 | 324 |
| 21:00:00 | 170 | 88 | 117 | 122 | 159 | 176 | 110 | 114 | 121 | 132 | 110 | 162 | 173 | 140 | 126 | 137 | 114 | 137 | 130 | 132 | 162 | 119 | 290 | 131 | 137 | 122 | 151 | 135 | 129 |
| 21:30:00 | 100 | 99 | 109 | 107 | 159 | 160 | 115 | 110 | 119 | 128 | 113 | 161 | 173 | 135 | 116 | 146 | 117 | 137 | 126 | 132 | 268 | 120 | 135 | 142 | 290 | 130 | 150 | 136 | 125 |
| 22:00:00 | 134 | 94 | 101 | 93 | 101 | 89 | 105 | 106 | 105 | 114 | 112 | 161 | 165 | 121 | 89 | 139 | 94 | 133 | 128 | 132 | 124 | 127 | 134 | 136 | 138 | 129 | 152 | 134 | 121 |
| 22:30:00 | 125 | 108 | 124 | 84 | 121 | 74 | 111 | 101 | 71 | 106 | 109 | 127 | 78 | 109 | 71 | 143 | 103 | 137 | 129 | 121 | 129 | 129 | 125 | 134 | 136 | 119 | 141 | 116 | 119 |
| 23:00:00 | 122 | 110 | 124 | 79 | 119 | 73 | 69 | 65 | 70 | 92 | 112 | 115 | 69 | 95 | 82 | 151 | 92 | 136 | 120 | 118 | 123 | 135 | 123 | 138 | 119 | 102 | 136 | 132 | 108 |
| 23:30:00 | 81 | 95 | 107 | 74 | 134 | 69 | 77 | 75 | 65 | 80 | 106 | 106 | 69 | 88 | 63 | 144 | 66 | 141 | 111 | 115 | 115 | 135 | 126 | 140 | 122 | 106 | 136 | 133 | 109 |

**Figure 4 – Maximum monthly wholesale power price ($/MWh), in each half hour interval[8]**

This chart highlights that a peaking plant can take advantage of high price periods throughout the year, and there is an increase in the number of maximum price periods in red (price +$140MW) over time.

Reserve Capacity Mechanism (RCM)

The RCM is an administered capacity market and is designed to ensure that there is adequate generation capacity available in the system to meet forecast peak electricity demand (plus a margin to allow for forecast errors or plant failures).

Under the RCM, electricity generation plants are certified and allocated capacity credits. Electricity retailers are required to procure capacity credits in proportion to their share of the electricity load in the twelve Peak SWIS Trading Intervals[9]. The retailers may meet this obligation by either purchasing capacity credits directly from electricity generators such as Frontier, under bilateral contracts or procuring capacity credits via the Australian Energy Market Operator (AEMO) at an administered price (known as the Reserve Capacity Price or RCP).

A price of $193,400 per MW has been announced by AEMO for the 2025/26[10] capacity year. A 100MW peaking plant for example, would generate revenue of $19.3 million in 2025/26. The Reserve Capacity mechanism guarantees revenue for up to five years, which would be attractive to debt financiers, given it provides a certain, fixed revenue stream.

[8] *Source: AEMO*

[9] *https://www.aemo.com.au/energy-systems/electricity/wholesale-electricity-market-wem/wa-reserve-capacity-mechanism/certification-of-reserve-capacity*

[10] *https://www.erawa.com.au/cproot/23058/2/-BRCP.2023---2023-benchmark-reserve-cap_e-for-the-2025-26-capacity-year---Final-Determination---for-publication-clean-.PDF*

The WA Government[11] is considering a package of further WEM reform initiatives aimed at enhancing investment certainty for renewable and storage proponents in the SWIS. This includes lengthening the period of reserve capacity price guarantee and introducing emissions thresholds, among other things.

**Commercialisation pathway**

A key challenge of delivering electricity is a connection to the SWIS. Frontier has a major advantage in this regard with a connection already in place at Landwehr Terminal, located less than 1km from the Project. Frontier has secured access to a bay - no further access is available to third parties without significant additional capex being spent on infrastructure and associated time to have this infrastructure built.

The other potential challenge for a peaking plant is the procurement of natural gas. Frontier again has a strategic advantage, as the DBNGP passes within 0.3km of the Project.

Finally, given the transition to net zero being undertaken in Australia and WA, Frontier believes it will be more challenging to build and connect a natural gas peaking plant onto any electricity network in Australia, without a clear and defined pathway for decarbonisation (such as using renewable hydrogen as a fuel, as Frontier is planning to do).

**Government Objectives**

Renewable Hydrogen Target for the SWIS

In December 2022, the WA Government announced a plan for an initial 1% renewable hydrogen target for electricity generated on the SWIS (with the aim to develop a broader use-agnostic renewable hydrogen target scheme in due course). The renewable hydrogen target will aim to drive local demand and assist emerging green hydrogen production projects, which are essential to developing the State's hydrogen industry.

| | 2024 | 2030 | | |
|---|---|---|---|---|
| | $H_2$ Median expected cost | $H_2$ volume | $H_2$ Median expected cost | Projected cost ($m in year & % of grid) |
| **1% Target** | $6.60/kg<br>$50.72/GJ | 5.97kt<br>0.72PJ | $4.71/kg<br>$36.23/GJ | $20.82m<br>1.7% |
| **5% Target** | $6.60/kg<br>$50.72/GJ | 29.87kt<br>3.58PJ | $4.71/kg<br>$36.23/GJ | $104.09m<br>8.9% |
| **10% Target** | $6.60/kg<br>$50.72/GJ | 47.79kt<br>5.73PJ | $4.71/kg<br>$36.23/GJ | $166.55m<br>14.2% |

**Table 1 – WA Government expected Green Hydrogen costs and volumes on the SWIS**

[11] *https://www.wa.gov.au/government/document-collections/swis-demand-assessment#:~:text=The%20assessment%20found%20that%20the,over%20the%20next%2020%20years.*

Decarbonisation targets

Approximately 35% of annual electricity generated on the SWIS is from renewable sources, however this is still a long way short of the WA Government's target of at least 70% by 2040[12]. Coupled with the forecast increase in energy demand due to increased electrification of transportation, heating and industrial sectors, a significant increase in renewable energy is required.

In the near term, the Government has also set a whole-of-government 2030 emissions reduction target of 80% below 2020 levels. This target applies to emissions from all Government agencies across the State, including transport, health and education, as well as emissions generated by Government Trading Enterprises. This target is an interim measure to ensure the State reaches net zero emissions by 2050.

**Frontier Actions**

Frontier's collaboration partner Waroona Energy recently announced[13] the commencement of a Dual Fuel Peaking Plant Study. Frontier will jointly undertake this study, which is planned to be completed in 4Q 2023, under its Collaboration Agreement[14] with Waroona.

As the Bristol Springs Project is located near the town of Collie, it is well placed to contribute to Collie's economy and therefore may be eligible for grant funding from the State Government's $200m Collie Transition Fund, set up to support the transition away from coal fired power generation. Frontier is actively engaging with the Collie Transition Fund with a view to securing a grant at the time of FID.

Furthermore, Frontier intends to apply for Australian Renewable Energy Agency (ARENA) Advancing Renewables Program grant once the peaking plant study outcomes are finalised.

Frontier will also apply for debt funding from the Clean Energy Finance Corporation (CEFC) Advancing Hydrogen Fund, which is aiming to invest up to $300m to support the growth of the Australian hydrogen industry (part of CEFC's broader > $4.5b funding available).

The 2023-24 Australian Federal Budget has allocated $2b of revenue support funding to be made available under the 'Hydrogen Headstart' program[15]. The Department of Climate Change, Energy, Environment and Water (DCCEEW) in conjunction with ARENA will jointly run the program and is currently preparing guidelines for the funding process. These are expected to be finalised this year. Frontier is supportive of the program and plans to participate in the industry consultation process.

See Annexure 1 for detail on potential grant and subsidy funding.

**Timeline**

Completing the Dual Fuel Peaking Plant Study in 2023 will enable Frontier to apply for Reserve Capacity Credits in early 2024 for the 2025/26 year, commence early works, seek FID and Financial Close during 2024, with a view to starting operations in 2025.

[12] *https://www.wa.gov.au/system/files/2020-11/Whole%20of%20System%20Plan_Report.pdf*

[13] *See ASX announcement 8 June – Peaking Plant Study*

[14] *See ASX announcement 6 October 2022 – Collaboration Agreement with Waroona Energy*

[15] *See ASX announcement 12 May 2023 – Australian Budget 2023/24 - Hydrogen Headstart*

## Supplementing natural gas

**How**

The DBNGP is WA's most significant gas transmission asset, transporting gas supplied into the domestic market under WA's Domestic Gas Reservation Policy.

The commercial opportunities for Frontier to sell green hydrogen gas into the DBNGP include:

- Injecting green hydrogen into the Mainline South section of the pipeline and blending with natural gas used for domestic gas consumption;
- Selling green hydrogen to an LNG exporter with a domestic gas obligation in WA, to enable the LNG exporter to supplement its domestic gas supply with green hydrogen and thereby satisfying its domestic gas obligation and enabling the producer to export an equivalent amount of higher priced LNG; or
- Selling green hydrogen to a nearby industrial user located downstream from the Project for use in its industrial processes as a partial replacement of natural gas or as feedstock.

**Benefits**

Injecting green hydrogen into the DBNGP would support the WA Government's goal of up to 10% hydrogen in the pipelines by 2030 and also increase the aggregate quantity of energy available to the WA domestic market. Stage One of the Project would account for less than 0.5% energy to the DBNGP on a minimum daily basis when gas flows are at least 250 TJ/day.

The technical risk is low. The AGIG published its technical study[16] in Q1 2022 on the DBNGP to investigate introducing hydrogen into the pipeline. The Study found that up to 9% hydrogen (by volume) can be injected into the south-west section of the DBNGP, known as Mainline South - the main trunkline between Kwinana and Bunbury. Both Mainline South and its associated lateral pipelines are "immediate candidates" for accepting hydrogen, subject to relatively minor technical modifications.

Green hydrogen could be used as a domestic gas offset, thereby enabling an LNG producer to increase LNG exports.

In addition to the DBNGP, the Parmelia Gas Pipeline[17], located approximately 25km from the Project, is Australia's first potential conversion of a gas transmission pipeline to a pure hydrogen service. The Parmelia Gas Pipeline conversion project is being undertaken by APA Group Limited (ASX:APA) and Wesfarmers Limited (ASX:WES) to provide insights into the potential role natural gas transmission pipelines can play in transporting hydrogen. APA Group recently successfully completed laboratory testing of Parmelia Gas Pipeline materials in a pressurised hydrogen environment.

This Pipeline offers the potential for direct hydrogen access for end users (for example the fertiliser industry), as well as a potential export conduit for multiple producers through the Port of Kwinana.

[16] *https://www.agig.com.au/western-australian-feasibility-study*

[17] *https://www.apa.com.au/news/asx-releases/2023/the-parmelia-gas-pipeline/*

**Commercialisation pathway**
The close proximity of the DBNGP to the Project, in a section of the pipeline ready for injection, with an access point located only ~0.3km from the proposed Bristol Springs hydrogen plant, is a significant advantage.

To commence blending of hydrogen with natural gas in a regulated pipeline such as the DBNGP, legislative and regulatory amendments must be made. The Company is working through these processes in collaboration with the WA Government and AGIG.

**Government objectives**
The WA Government is targeting for gas pipelines and networks to contain up to 10% renewable hydrogen blend[18]. WA has a vast gas reticulation network and a unique customer base. Blending up to 10% renewable hydrogen into the natural gas network could reduce the emissions intensity of gas combustion by up to 13%. This offers an opportunity to partially decarbonise gas consumption and is a step towards deeper decarbonisation in the longer term. The WA Government has stated that it will consider supporting studies, trials and projects that demonstrate hydrogen blending in natural gas pipelines.

In addition, both Federal and State governments have begun the process of amending national gas laws and regulations to bring hydrogen blends, biomethane and other renewable gases under the national gas regulatory framework. The expectation is that all amendments will be completed in early 2024. These proposed changes highlight the Australian Government's willingness to decarbonisation their respective gas networks throughout the country.

**Frontier Actions**
Frontier has been focusing on blending opportunities given the technical readiness of the pipeline to accept hydrogen. In May 2023, Frontier entered a collaboration agreement with AGIG[19], the owner of the DBNGP, and the leading group in Australia blending hydrogen with natural gas.

Frontier is actively engaging with multiple LNG producers, who would benefit from increased LNG exports.

**Estimated Timeline**
Prior to the potential injection of hydrogen into the DBNGP amending petroleum legislation to support hydrogen, as well as any approvals to substitute hydrogen as a domestic gas offset is required. The WA Government is well advanced with this process, however, has not provided guidance on the expected timing for the legislation to pass.

In addition, for any potential offtake partner greater understanding on the timing and structure of the Hydrogen Headstart funding is required. Frontier understands that following finalisation of the guidelines, EOIs for Hydrogen Headstart funding are expected to open in early 2024.

Once the support to be provided under Hydrogen Headstart is understood, the Company and a potential offtake partner can further refine potential terms, most notably around pricing.

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[18] *https://www.wa.gov.au/system/files/2020-12/Western%20Australian%20Renewable%20Hydrogen%20Roadmap%20-%20November%202020.pdf*

[19] *See ASX Announcement dated dated 16 May 2023 – Collaboration Agreement with AGIG*

# Replacement of diesel and petrol in transportation

**How**

Hydrogen can be used as fuel to power Fuel Cell Electric Vehicles (FCEV) including cars, buses, trucks, and trains. Refuelling hydrogen cars, buses and trucks requires a network of refuelling stations, similar to the existing petrol station network.

**Benefits**

FCEVs are more efficient than conventional internal combustion engine vehicles and produce no harmful tailpipe emissions. The advantages of hydrogen powered vehicles compared to battery electric vehicles include faster refuelling times and the ability to travel longer distances carrying larger loads before refuelling.

This is perhaps most apparent in long-haul road transportation, which is hugely important to WA's economy, where the combination of battery weight, extended recharging times and limited range are impediments for purely electric solutions. On each of these factors, FCEVs offer an attractive alternative.

When energy contained in fuel and engine efficiencies are accounted for, hydrogen in a FCEV drive is approximately equivalent to 4 - 6 times diesel on a $/kg basis. This implies that a $8-12/kg hydrogen price is equivalent to a $2/kg diesel price (in line with recent prices), as measured by equivalent output in a diesel car or a FCEV. Additional premium for zero emissions is likely to accrue to hydrogen used in transport.

Refuelling station technology and FCEV technology is maturing, with stations and fleets being rolled out globally.

**Commercialisation pathway**

Currently, there are no publicly accessible refuelling stations in place and only a very small FCEV fleet in WA. Furthermore, the availability of hydrogen and the potential transport of hydrogen to refuelling station sites presents a challenge.

**Government Objectives**

The WA Government has identified domestically produced green hydrogen as a key part of the strategy to reduce the reliance on diesel, which is currently all imported. Currently WA imports approximately 6.7b litres of diesel per year, which contains the energy equivalent to 1.8b kg of hydrogen.

**Frontier Actions**

Frontier continues working towards establishing a green hydrogen refuelling station in central Perth which will contribute towards facilitating the uptake of hydrogen in WA. It is expected to be the first publicly available green hydrogen refuelling station in the State.

Eventually, Frontier envisages the development of several green hydrogen refuelling stations alongside major transport routes, with the hydrogen to be supplied from the Project.

Frontier has engaged with major vehicle manufacturers about its development of green hydrogen refuelling stations and has received a letter of support. Frontier has received firm commitments for the lease of FCEVs (subject to securing funding and developing the refuelling facilities).

To support this strategy, Frontier is in the process of submitting an EOI to ARENA's Driving the Nation Fund, which provides $500m to invest in cheaper and cleaner transport solutions.

**Estimated timeline**
Frontier anticipates the finalisation of the location and commencement of construction of the first hydrogen refuelling station in 2H 2023. The Company will make further announcements regarding this initial location, as well as the long term roll out strategy, as agreements are finalised.

## Hydrogen Export

**How**
Liquification of hydrogen or converting it into ammonia using existing chemical processes and exporting by ship.

**Benefits**
Developed nations are encouraging the establishment of a large seaborne hydrogen market[20]. There is already a seaborne ammonia market. The advantage of ammonia is that it has a far higher liquefaction temperature of -33$^{O}$C (compared to -253$^{O}$C for hydrogen) and therefore lends itself to seaborne exports using already existing shipping technology.

**Commercialisation pathway**
Proximity to export ports is required and in this regard, Frontier is well positioned relative to both Kwinana and Bunbury.

The shipping of liquid hydrogen from Australia is in its infancy (trial shipments began in January 2022)[21] and physical hurdles are formidable. Liquifying hydrogen is not currently commercially viable and capital and operating grants and subsidies would be required. For storage and transport of liquified product over several weeks, as might be required for a country in Australia's geographical position, ammonia is preferred over hydrogen.

Given these factors, there needs to be significant Project scale prior to export being considered. Frontier believes this would likely need to be in excess of 1GW of energy as a minimum, and potentially a multiple of this size.

**Government Objective**
WA Government has targeted the same share of global hydrogen exports as its LNG exports today, which is around 12%.

**Frontier Actions**
Frontier continues to engage with potential exporters, who are showing interest in pursuing this opportunity.

**Estimated timeline**
Given the need for significant capital investment in liquefaction plants, terminals and hydrogen to ammonia conversion plants, as well as regulatory change to enable gas transmission in the DBNGP and gas networks to supply export ports, Frontier views this as a long term opportunity.

However, this may be accelerated if Government mandates for green hydrogen export are accelerated.

[20] *https://www.canada.ca/en/natural-resources-canada/news/2022/08/canada-and-germany-sign-agreement-to-enhance-german-energy-security-with-clean-canadian-hydrogen.html*
[21] *https://minerals.org.au/wp-content/uploads/2023/02/Australias-emerging-hydrogen-and-ammonia-industry_REPORT.pdf*

**Authorised for release by Frontier Energy's Board of Directors.**

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# Annexure 1 - Potential Grant and Debt Funding available to Frontier

Table 2 illustrates potential available grant and other funding Frontier is considering.

| Name | Fund Size | Funding type |
|---|---|---|
| **Grants and funding with existing clear structures and guidelines** | | |
| 1. Collie Transition Fund (WA government) | $200m | Grant |
| 2. ARENA Advancing Renewable Program | $2.5bn | Grant |
| 3. CEFC Advancing Hydrogen Fund | $300m | Equity, debt |
| 4. ARENA Driving the Nation Program (Refueller) | $500m | Grant |
| **Grants and funds committed by Government, with structures and guidelines currently being established** | | |
| 5. Hydrogen Headstart – DCCEEW and ARENA | $2bn | Operating subsidy |
| 6. National Reconstruction Fund | $15bn | Equity, debt |
| 7. Powering the Regions Fund | $1.9bn | - |

**Table 2: Potential funding sources**

**Grants and funding with clear structures and guidelines already in place**
Clear guidelines for applications have been established for Collie Transition Fund, ARENA and CEFC and funding opportunities:

1. Collie Transition Fund

The Collie Transition Fund has been established by the WA Government to expand Collie's economy and provide new job opportunities, particularly for coal and energy-sector workers. The WA government plans to retire State owned coal fired power stations by end 2030[22] and the $200 million Collie Transition Fund[23] will support large-scale industrial projects that can provide long-term, sustainable jobs in Collie. The Fund aims to attract new and emerging industries as Collie transitions to new forms of industry and power generation.

Frontier is engaging actively with the Collie Transition Fund, with a view to securing a grant at the time of FID.

2. ARENA Advancing Renewables Program

ARENA Advancing Renewables Program aims to support a broad range of development, demonstration and pre-commercial deployment projects that can deliver affordable and

[22] *https://www.wa.gov.au/government/announcements/state-owned-coal-power-stations-be-retired-2030-move-towards-renewable-energy.*
[23] *https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/collie-industrial-transition-fund*

reliable renewable energy for Australian families and businesses, including improvement in technology readiness and commercial readiness of renewable energy. Grants are expected to be between $100,000 and $50 million, with applicants typically expected to at least match the funding being sought from ARENA. Frontier will be in a position to apply on receipt of the Peaking Plant Study outcomes.

3. Clean Energy Finance Corporation (CEFC)

As part of a broader >$4.5bn funding available, the CEFC Advancing Hydrogen Fund[24] is aiming to invest up to $300 million to support the growth of a clean, innovative, safe and competitive Australian hydrogen industry.

Eligible projects can include those that advance hydrogen production, develop export and domestic hydrogen supply chains, establish hydrogen hubs and assist in building domestic demand for hydrogen.

CEFC has identified that this program will bridge the commercial financing gap for renewable hydrogen production and use by financing large-scale electrolyser deployments or use cases.

Bristol Springs satisfies these CEFC criteria and a funding application will be considered once the outcomes of the Peaking Plant Study are received.

4. ARENA Driving the Nation Fund

ARENA's Driving the Nation Fund, announced in 2022, provides $500 million to invest in cheaper and cleaner transport. This Fund builds on the former 'Future Fuels Fund' (established in 2020), targeting support for business fleets, new technologies for heavy and long-distance vehicles, public electric vehicle charging, hydrogen refuelling stations and smart charging. Frontier is preparing an EOI for submission in June 2023, to support its refueller strategy.

**Grants and funding with structures and guidelines still being developed**

5. Hydrogen Headstart

The 2023-24 Australian Federal Budget allocated $2bn of revenue support funding to be made available under the 'Hydrogen Headstart' program[25] aimed at bridging the gap between the market price of hydrogen and the production cost of green hydrogen (an analogue is the US Inflation Reduction Act which provides up to US$3/kg subsidy for green hydrogen production). This is a major tailwind for the Australian green hydrogen industry in the medium to long term, and Frontier is encouraged that this signals only the start of significant further Government support.

DCCEEW, in conjunction with ARENA, will jointly run the program with the aim of writing the program guidelines for the funding process during the remainder of this year. Frontier is supportive of this program and proposes to participate in the industry consultation process.

Frontier understands that following finalisation of the guidelines, EOIs for Hydrogen Headstart funding are to open in early 2024, to be formally allocated by end 2024, for funding to commence 2026-27.

[24] *https://www.cefc.com.au/where-we-invest/special-investment-programs/advancing-hydrogen-fund/*

[25] *See ASX announcement 12 May 2023 – Australian Budget 2023/24 - Hydrogen Headstart*

6. National Reconstruction Fund

The National Reconstruction Fund Corporation Bill passed through the Parliament on 28 March 2023. The Bill establishes the National Reconstruction Fund (NRF) as a corporate Commonwealth entity modelled on the CEFC with $15 billion to invest in priority areas of the Australian economy. A board and management team are yet to be established.

The aim of the NRF is to capitalise on Australia's strengths by providing targeted investment in projects across seven priority areas, including renewables and low emissions technologies (amongst others).

The NRF will provide a range of finance options including loans, equity investment and guarantees and is intended to be a co-investment scheme, aiming to encourage private investment. Up to $3 billion is allocated for renewables and low emissions technologies.

7. Powering the Regions Fund

The Australian Government will also support the decarbonisation of existing industries and the creation of new clean energy industries through its proposed $1.9 billion Powering the Regions Fund (PRF).

The PRF will provide funding to help in the transition towards net zero emissions by focusing on four key areas:

- Decarbonising existing industries
- Developing new clean energy industries
- workforce development
- Purchasing carbon credits.

The PRF will also complement existing financing programs, including CEFC and ARENA. Consultation on the PRF closed on 3 February 2023. Formal establishment of the PRF is expected sometime in 2023.

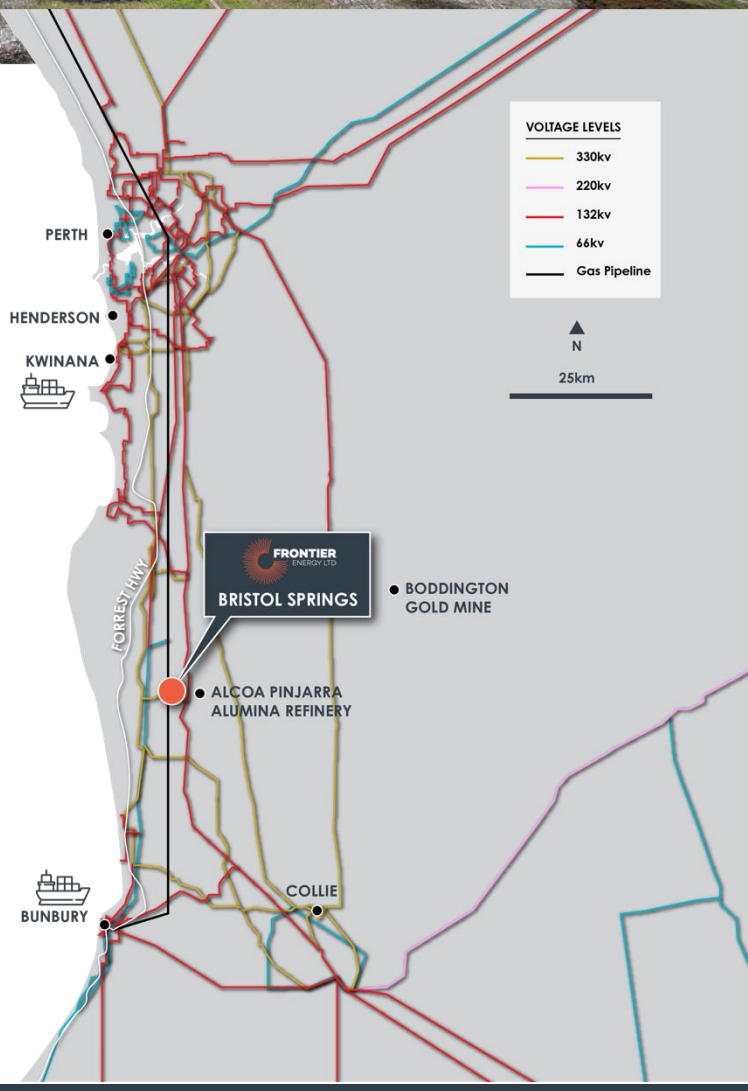
# About Frontier Energy

**Frontier Energy Ltd (ASX: FHE; OTCQB: FRHYF)** is developing the Bristol Springs Green Hydrogen Project (the Project) located 120km from Perth in Western Australia.

The Company recently completed a Definitive Feasibility Study[1] that outlined the Project's potential to be both an earlier mover and one of the lowest cost green hydrogen assets in Australia.

The Project benefits from its unique location surrounded by major infrastructure. This reduces operating and capital costs compared to more remote hydrogen projects, whilst also being surrounded by likely early adopters into the hydrogen industry in the transition from fossil fuels.

[1]ASX Announcement 20th March 2023




## Directors and Management

**Mr Sam Lee Mohan**
Managing Director

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**Mr Chris Bath**
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For a comprehensive view of information that has been lodged on the ASX online lodgement system and the Company website, please visit asx.com.au and frontierhe.com, respectively.