



**ECT**

ENVIRONMENTAL CLEAN  
TECHNOLOGIES LIMITED

# Leveraging Japan's multi-billion dollar clean hydrogen investment in Victoria

Broker Presentation

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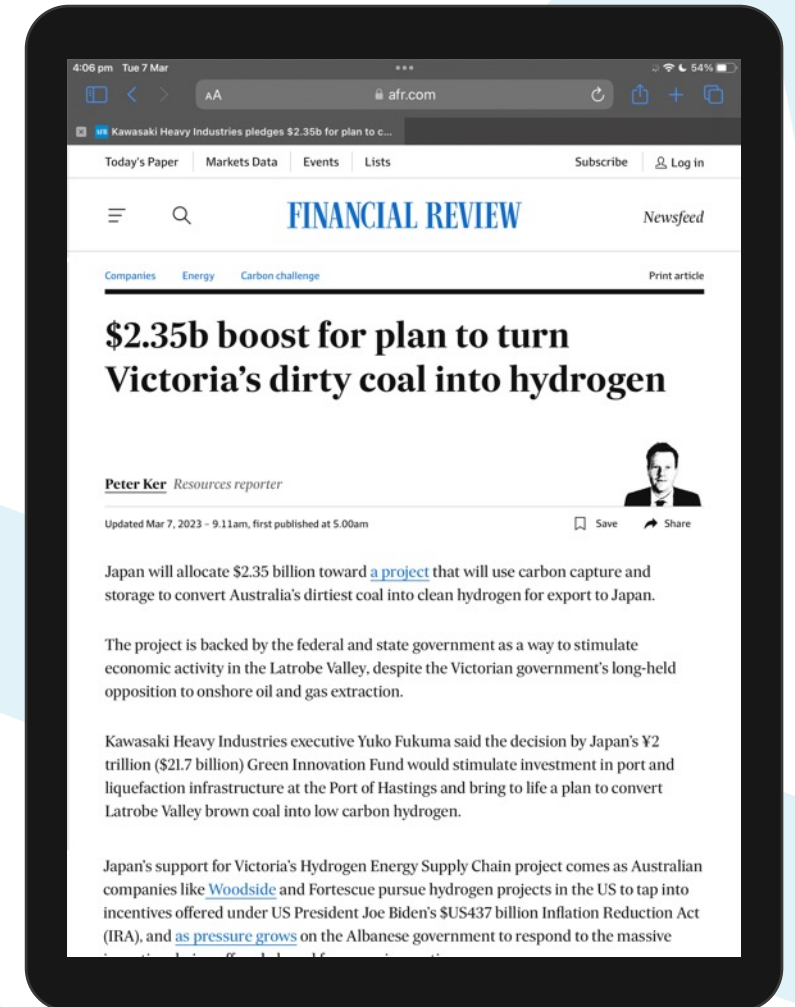
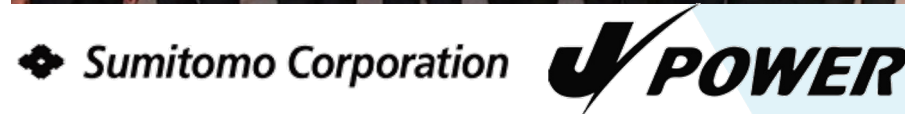
# Japan commits \$2.35Bn to clean hydrogen project in Victoria (HESC)

Japan's \$21.7 billion Green Innovation Fund commits investment to bring to life a plan to convert Latrobe Valley lignite (brown coal) into clean hydrogen.

- Targeting 30,000 tonnes per annum of clean hydrogen production for export to Japan
- Federal and Victorian government support via \$100m grant toward the \$500m

**Hydrogen Energy Supply Chain (HESC)** project over the past 6 years

- Victorian Treasurer and Trade Minister Tim Pallas (third from right) signed off



# The market (& govt) finally catch up to our vision

For over a decade, ECT has advocated for transitioning Victoria's vast, world-class lignite resource from low-value, high-emission use to a higher value, low and zero-emission use.

The market has caught up with this vision.

Government policies are enabling private investment.

ECT COLDry process is the gateway technology that enables the transition.

## Media Release

**Mr Tim Pallas MP**  
Treasurer  
Minister for Industrial Relations  
Minister for Economic Development  
Minister for Trade



Wednesday, 14 September 2022

### VICTORIA LEADS NATION IN JOB-CREATING INVESTMENT

Billions of dollars more in international investment flows into Victoria than any other state – underlining the benefits of the Andrews Labor Government's ambitious investment attraction strategy.

Data from global investment consultant fDi Markets shows Victoria attracted \$8.1 billion in overseas investment in 2021-22, well ahead of New South Wales (\$6.1 billion) and Western Australia (\$5.8 billion).

The Victorian renewable energy (\$4.8 billion), software and IT services (almost \$600 million) and electronic components (more than \$460 million) sectors proved most attractive to overseas investors.

The state's economic development agency Invest Victoria provided its analysis of the nationwide figures as it released a report that showed new investments facilitated by the agency over 12 months will create 3,800 jobs and generate more than \$430 million in wages.

The *International Investment Report 2021-22* shows Invest Victoria's remit to drive innovation resulted in almost \$600 million foreign direct investment in research and development initiatives.

Victoria's \$40 billion digital technology industry and world-class digital technology capabilities have been a strong drawcard for international investors, attracting the likes of IDOM Innovations, a technology and innovation subsidiary of Japan's largest auto retailer, IDOM Inc, to locate its global headquarters in Melbourne.

IDOM Innovations is one of 15 digital technologies projects facilitated by Invest Victoria over the past 12 months, in addition to strong investment across Victoria's other priority sectors including renewable energy and agri-food.

The Government's *International Investment Strategy* was bolstered by a \$65 million package in the *Victorian Budget 2022/23* to attract innovative global companies to the state and help established Victorian businesses expand.

Melbourne, Victoria  
The culture to succeed

# INVEST VICTORIA

International Investment  
Report 2021-22



### Environmental Clean Technologies (ECT)

Environmental Clean Technologies (ECT) is a low and zero-emission technology research and development company, commercialising leading-edge energy and resource technologies capable of delivering financial and environmental benefits.

Since 2006 ECT has been developing and commercialising technology designed to enable net zero emission targets for the energy, agricultural and industrial sectors. Utilising low rank and waste fuel sources, the company is focussed on technologies with global market potential.

To bridge the gap between high-emissions reality and a zero emissions future, the company is advancing a portfolio of technologies that advance emerging clean hydrogen potential alongside a suite of practical solutions that reduce the impact of industrialisation.

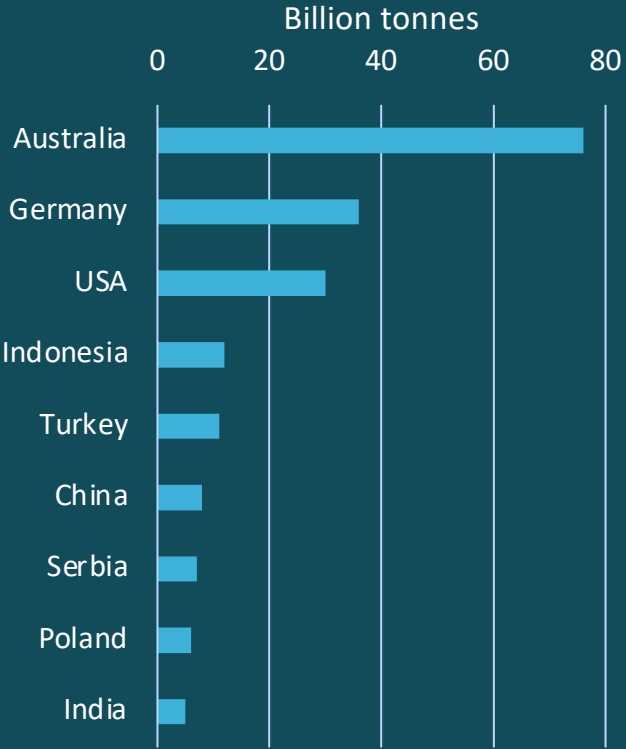
ECT's projects include the net-zero emission COLDry Commercial Demonstration, a Hydrogen Refinery Project and an innovative end-of-life tyres resource recovery facility.

One beneficiary of the R&D Cash Flow Loan program is Environmental Clean Technologies (ECT), the creator of a lignite drying process capable of reducing emissions in the generation of electricity. A loan supported ECT to establish an R&D facility and a feasibility study for a net-zero emission hydrogen refinery in the Latrobe Valley.

See the *International Investment Report 2021-22* at [invest.vic.gov.au](https://invest.vic.gov.au).

# Global Addressable Lignite Market >300Bn tonnes

Major Proved Lignite Reserves\*



\*Source: BP Statistical Review of World Energy 2021

# Our technologies

## COLDry

### Lignite Drying

The world's most efficient drying process for high moisture content feedstocks.

- Gateway solution to a higher value, low and zero-emission use of lignite
- Zero-emissions footprint.

## Viridian Hydrogen

### Clean Hydrogen

Better than blue, cheaper than green. Transition to zero that's reliable and clean.

- Leverages COLDry process for feed preparation
- Waste biomass utilisation
- Net-zero emissions
- Ag char, DME and Formic Acid

## COHgen

### Catalytic Organic Hydrogen Generation

Low cost, low emission hydrogen production from lignite.

- Lower cost
- Lower emissions
- Replace expensive natural gas
- Affordable, abundant, reusable, low cost catalyst

## HydroMOR

### Iron Making

World's first brown coal-based iron-making technology.

- Utilising hydrogen extracted from lignite to decrease costs & emissions
- Economic at a smaller scale than conventional processes
- 30% lower emissions
- Able to recover iron from waste streams such as iron ore fines, millscale and nickel tailings

# COLDry: the environmental choice for drying lignite

- **Problem:**

- Lignite contains ~60% moisture
- Before lignite can enter most hydrogen processes, it needs to be dried to ~15% moisture
- Conventional drying methods are inefficient, expensive and often emissions intensive

- **Solution:**

- ECT's COLDry process is a net zero method for drying lignite, aligning with government policy and can support project's (like HESC) environmental credentials
- Unlike conventional drying methods, ECT's solution dries efficiently, cost-effectively and with zero emissions

- In summary, ECT's patented COLDry technology delivers:

- The world's first zero-emission lignite drying solution
- Lower energy cost than alternative methods
- Optimal physical and chemical properties from the product that maximises gasification performance and H<sub>2</sub> yield
- Capacity to recover clean water from the lignite, supporting the water needs of most hydrogen processes while also reducing plant cooling water consumption
- Australian-made and owned



*“One distinct advantage of COLDry is the relative low heat requirements in the drying process, allowing for the opportunity to make use of waste heat from an industrial facility...”*

**Dr Victor Der** - Former Assistant Secretary for Fossil Energy, US Dept. of Energy & General Manager, North America, Global CCS Institute

# COLDry & Viridian Hydrogen Demonstration plant

**COLDry**

Phase 1

35,000 tonnes output capacity per annum

**COMMISSIONED**  
Date: 31 / 12 / 2022

1. COLDry zero-emission drying
2. Pyrolysis kiln
3. Syngas processing
4. H<sub>2</sub> storage
5. Char silo
6. COLDry silo
7. Lignite bunker
8. Biomass bunker
9. 10MW multi-feed turbine
10. ECT workshop
11. GrapheneX R&D centre
12. H<sub>2</sub> & EV charging station
13. PV solar system
14. Data centre (basement) - waste heat
15. Panasonic fuel cells
16. Water capture
17. Electrolyser

Artists impression

Complete

In progress

Awaiting Start



# COLDry: the gateway solution for Victorian lignite



Measured Resource  
**65 billion tonnes\***  
(25% of world resource)\*



Economic Reserves  
**33 billion tonnes\***  
~825 years at current consumption



High-quality  
**Low sulphur & ash**  
**High in soil chemistry**

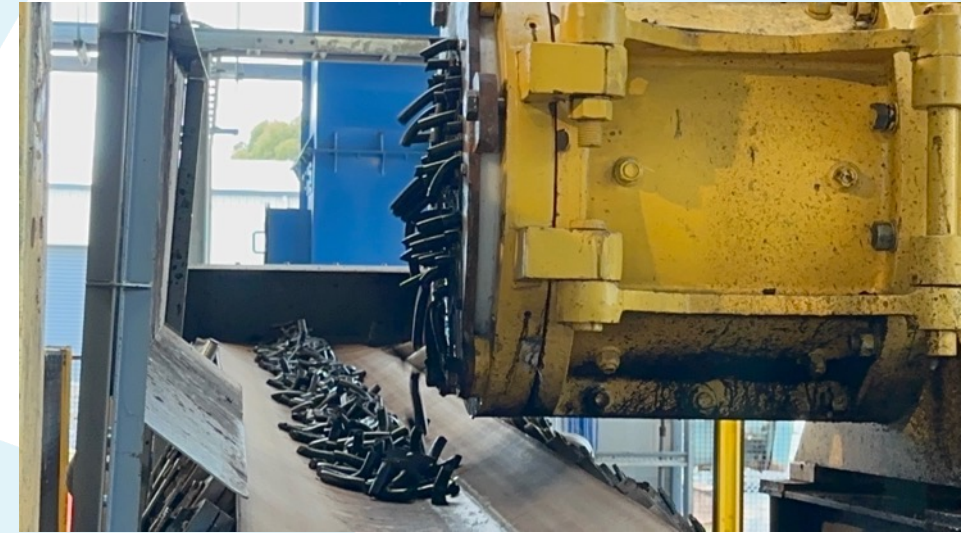


Low Mining Cost  
**\$10 per tonne**



# Positioning ECT for COLDry's commercialisation into 2023

- **Technology readiness:** COLDry Demonstration Project – Phase 1 commissioned (pictured, right):
  - Process validation
  - Scalability confirmed
- **Stakeholder engagement:**
  - Engagement with project proponents and partners
  - Recent visit to Japan to develop further relationships with overseas partners
  - Latrobe Valley Authority – workshops and site visits
  - State Government via InvestVictoria and the Treasurer's office
  - Federal Government via local MP's
  - Industry Groups:
    - Australian Carbon Innovation voting member
    - Gippsland Region Hydrogen Cluster committee member
- **Policy alignment:**
  - Zero-emission government lignite guidelines met
  - Future regional job creation and security
  - Energy & resource security & diversification
  - Supporting the rapid decarbonisation of electricity - 2030 targets



# Corporate Overview

## Board & Key Personnel



**Jason Marinko**  
Chair  
Non-executive Director



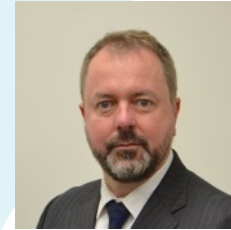
**Glenn Fozard**  
Managing Director



**Jim Blackburn**  
Non-executive Director

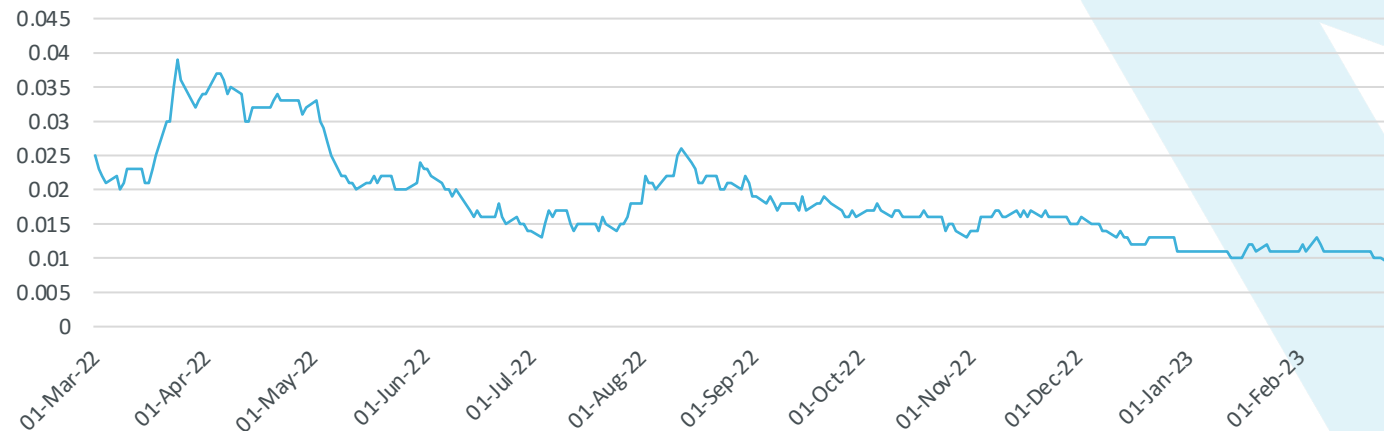


**Tim Wise**  
Non-executive Director



**Ashley Moore**  
Chief Engineer

## Share Price



## Issued Capital (as at 28 Feb 2023)

ASX Code	ECT
Shares (pre-issue)	2,476 M
Market Capitalisation	~\$25 M
Share Price	1.0¢
2022-23 Trading Range	0.9¢ - 3.9¢

## Cash & Debt (as at 28 Feb 2023)

Cash	\$2.5 M
Other Assets (property & R&D refund)	\$3.7 M
Debt (borrowings & trade creditors)	\$2.6 M
Net Asset Position (ex. IP, intangibles)	\$3.6 M

## Shareholders (as at 28 Feb 2023)

Total shareholders	5,670
Top 20	~43%
Top 40	~54%
Top 100	~68%

# Investment Proposition

- ECT has been preparing for the "new dawn" of lignite (brown coal) for over 10 years
- Industry leaders in zero and low-emission lignite technology
- Exposure to projected \$40 billion hydrogen market (2040)
- Total refined product value of lignite in Victoria is in the trillions of dollars. This is 25% of the addressable global market.
- ECT is the only pure exposure on ASX to Victoria's lignite market and those projects that will flow from its future, low emission use

## Project 1

### Small Viridian Hydrogen Project

- Targeting positive cashflow from the demonstration of multiple product streams
- Invested ~\$8M to date
- COLDry scale demonstration commissioned
- Requires a further ~\$3.5m to realise ~\$12m of revenue potential

## Project 2

### Large Viridian Hydrogen Project

- Targeting repurposing of Yallourn mine
- Collaborative partnering approach
- Invested \$500,000 into lignite supply infrastructure with EA
- Own unencumbered property at Yallourn valued at ~\$1.5m
- Lignite supply beyond 2028 is our biggest challenge

## Project 3

### Positioning COLDry for project selection

- Leading drying solution vying for vendor selection into large projects
- \$200M+ of COLDry builds if successful
- ~30x scale of Project 1

*NB: ECT is not currently a partner of HESC*

**Panasonic**

**OPTIMAL**  
optimised energy solutions

GRAPHENEX

**INVEST  
VICTORIA**

**CALLEJA  
GROUP**

 **EnergyAustralia**

AUSTRALIAN  
**CARBON**  
INNOVATION   
Creating a sustainable carbon future

 **Federation  
University**

AUSTRALIAN  
**CARBON**  
INNOVATION   
Creating a sustainable carbon future

 **Federation  
University**



# COLDry

The environmental choice for lignite drying

- ✓ World's only zero-emission drying solution
- ✓ Leaders in waste heat recycling and utilisation
- ✓ Unique demineralised water production capability
- ✓ Australian designed, owned and made



Environmental Clean Technologies Limited (ECT) is an ASX-listed, Australian-based company focused on developing and commercialising technologies that convert low-grade and waste materials into higher-value products with a low to zero emission footprint.

The company's core solution, COLDry is a low-cost, zero-emission lignite (brown coal) drying process that enables the production of clean hydrogen, agricultural char, fertiliser, and battery active carbon.



# ECT

ENVIRONMENTAL CLEAN  
TECHNOLOGIES LIMITED



*“This HESC project aligns perfectly with our vision for the Latrobe Valley and the future of lignite.”*

Glenn Fozard  
Managing Director

**ECT bridges the gap between today's high emissions use of resources and tomorrow's net zero emissions world.**

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 [www.ectltd.com.au](http://www.ectltd.com.au)

# References

## Slide 3:

Article by Peter Ker in the Australian Financial Review on 7 March 2023: “\$2.35b boost for plan to turn Victoria’s dirty coal into hydrogen”  
<https://www.afr.com/companies/energy/japan-pledges-billions-for-victoria-s-coal-to-hydrogen-plan-20230306-p5cprj>.

## Slide 4:

Tim Pallas media release: <https://www.timpallas.com.au/media-releases/victoria-leads-nation-in-job-creating-investment/>

InvestVictoria Report: <https://www.invest.vic.gov.au/how-we-can-help/about-us/international-investment-report>

## Slide 5:

Data sourced from the BP Statistical Review 2021.

## Slide 9:

Data sourced from Victorian Government: <https://earthresources.vic.gov.au/geology-exploration/coal> & internal industry data.

## Slide 12:

- Market projections: Report by H2TCA (Arup and NERA) Powering Up: Seizing Australia’s Hydrogen Opportunity by 2040
- Refined product value of lignite was calculated based on economic reserves in slide 9 multiplied by a hydrogen price of \$5 per kg. This doesn’t include any value that might be derived from other refined products like char and advanced carbons.