



*SAY HELLO TO CLEARVUE  
SOLAR GLASS GREENHOUSES*



# POWERING THE FUTURE

ClearVue has been working for years perfecting a technology that utilises an age old building material, one that protects us from and connects us to our environment, clear glass!





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Secured assets for your farm's future.

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# THE AUSTRALIAN PROTECTED CROP MARKET

- 29% of Australia's farmers use some form of protected cropping
- Protected cropping produces **over \$2 billion per annum** at the farm gate
- Industry is growing in Australia with a 6.6% CAGR driven by:
  - Higher productivity per m<sup>2</sup> farmed
  - Lower water usage
  - Climate Change impacts

**Power costs per kWh and cost of connection are a major barrier to increased take up.**



# PROTECTED CROPPING OUTLOOK

- Australia is adding around 500,000m<sup>2</sup> p.a. of protected cropping
- Annual new building market is approximately 100s of new commercial greenhouses
- 4-6% CAGR on existing protected cropping facilities
- New construction will increase power generation demand by between 5-10 MW p.a.
- When built, new conventional greenhouses will produce approximately 2,300 tonnes of CO<sub>2</sub> emissions p.a.

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## INDUSTRY EXPECTATIONS:

Increased plant growth rates, driven by demand for higher quality year-round produce, due to Woolworths and Coles' domestic activity and increased export demand.



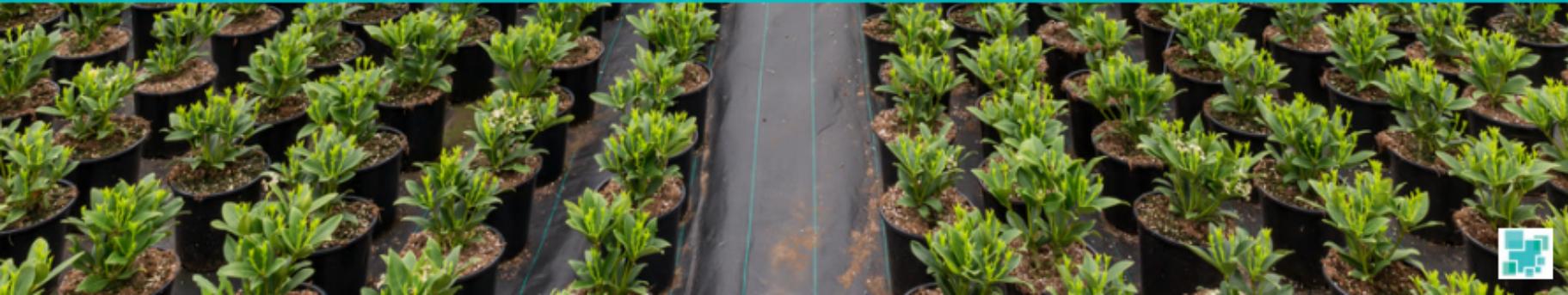


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Protected cropping improves production by a factor of 300-800% per m<sup>2</sup> compared to field cultivation.

The use of ClearVue product can lead to 20-30% in plant growth rate improvements, compared to standard greenhouses.

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# OUR GREENHOUSES:

- Are sealed, permanent buildings, instead of temporary structures.
- Produce their own power through custom, state of the art, clear, solar glass panels.
- Guarantee regular indoor temperature all year round.
- Provide measurable and adjustable water flow and rate.
- Can be completely customizable for individual greenhouse needs



# TEMPERATURE CONTROL: ADVANTAGES OF CLEARVUE

## Regular Greenhouses

- Temperature range of +/-6° from the optimum temperature.

## ClearVue Greenhouses

- Temperature range of +/-2° from the optimum temperature
- Increased growth rate of up to 20-30%



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Greenhouses can increase yields by 2-4 times with multiple seasons a year.

CGIAR

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# BENEFITS OF CLEARVUE SOLAR GREENHOUSES

-  Low operating costs - low energy and water use
-  Durable structure
-  Weather and climate-proof crops
-  Guaranteed high-quality yield each year = guaranteed income
-  Long-term asset for continued high yields for 25 years plus
-  Low to no pesticide costs - works as a safeguard against pests
-  Preemptive investment to protect from future regulation changes





# TYPICAL PAYBACK CALCULATIONS

Revenue (3000m <sup>2</sup> Typical Greenhouse)	\$6,500,000
CO <sub>2</sub> Injection value	+ \$650,000
Temperature Control value	+ \$650,000
Less annualised cost of CO <sub>2</sub> Capture	- \$100,000

<i>Revenue Projection for a Solar Carbon Sink Greenhouse</i>	<u>\$7,700,000</u>
<i>Net Revenue Increase</i>	<u>\$1,200,000</u>

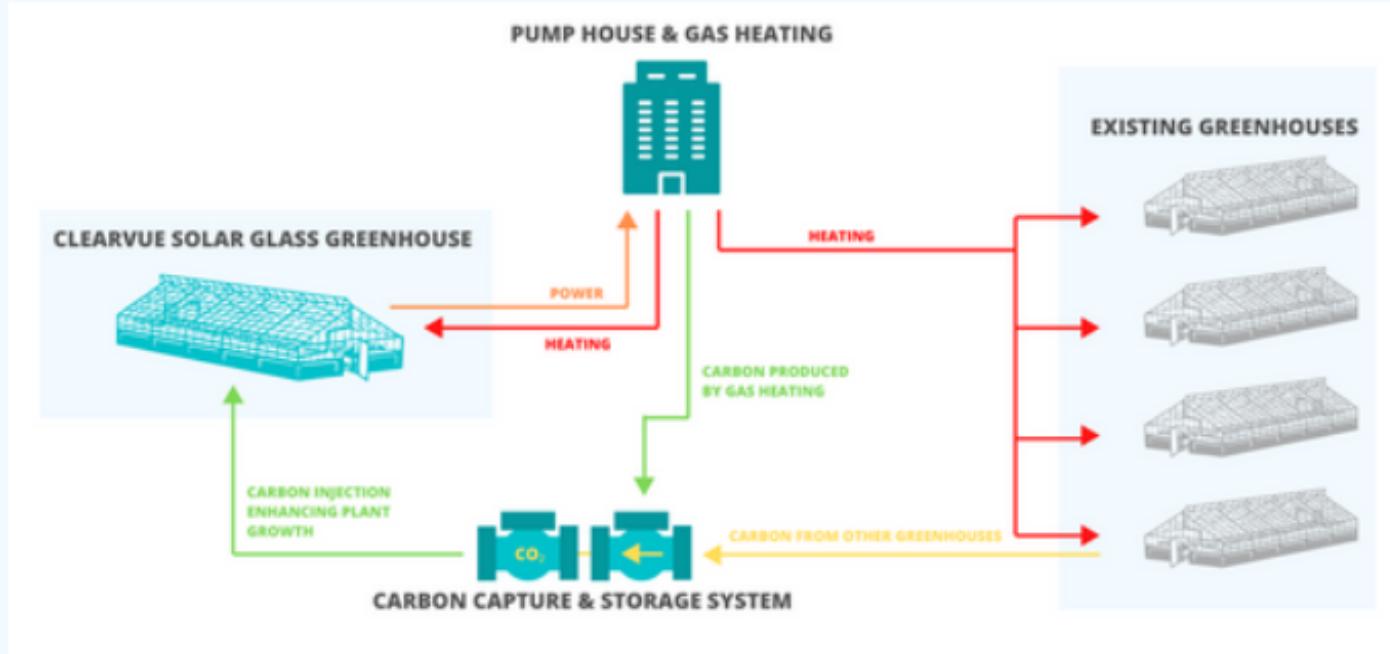
Additional Cost of Greenhouse	\$800,000
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Payback Period	Less than 12 months
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(Calculated for an Australia-based 3000m<sup>2</sup> solar greenhouse, accounting for the expected productivity improvements and energy production.)



# CARBON-SINK GREENHOUSES



# ENERGY PRODUCTION & CARBON OFFSET

- The Solar Greenhouse of area 3000m<sup>2</sup> will deliver approximately 0.25MWh of solar energy daily back to the grid (or to battery array for off grid installations).
- Equivalent to installing a solar farm rated at 60kWp, integrated into a transparent building structure.
- Enough energy to power 12 average residences.

250kWh production per day will offset over 1.3 tonnes of CO<sub>2</sub> emissions each day.





## ENERGY CONSUMPTION

The ClearVue glass installation will produce **substantially more energy** than required for daily operation and CO<sub>2</sub> Capture & Storage System, seen in typical commercial greenhouses.

There will be sufficient energy production to **operate the carbon sink system, pumps and all other equipment off-grid**, with the addition of battery storage. This eliminates the need for future installations to be grid connected, thereby **substantially reducing connection costs**.

We can collect data in terms of energy use factoring the impact of the **significantly higher insulation properties** of the ClearVue product. We will be in a position to **calculate the energy reduction** and if Net Zero is achievable

The insulation factor of the ClearVue product is significantly more than typical greenhouse projects, leading to **high confidence in the ability to achieve a Net Zero building in future projects**.





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Typically, the farmer must pay for electrical wiring from the front gate of his property.

Given the expanse of Australian farms, this cost would be significant, yet not required with a ClearVue Greenhouse.

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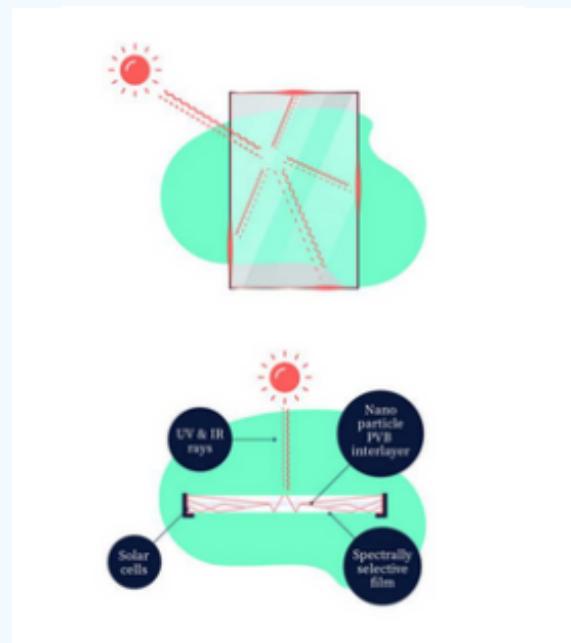
# HOW CLEARVUE SOLAR GLASS WORKS

ClearVue uses nano technology to internally diffuse and reflect elements of the incoming light towards the edges of the frame, where it is collected by silicon based PV modules.

Current efficiency of the glass product is 3.3%, measured at standard test conditions (STC).

The nano technology laminate has been tested at over 5000 hours of high intensity light in varying temperature conditions and remains stable, with no evidence of degradation or reduction in transparency.

**Degradation rate of the collectors is in line with that of a high quality solar panel. Leading to more than 80% of rated output after 25 years.**





# CERTIFICATIONS

The ClearVue product has been independently tested to achieve the following certifications:

- IEC 61215
- IEC 61730
- UL 790 (Fire Testing)
- UL 61730 (Electrical Testing)

TUV SUD is a Clean Energy Council (CEC) approved inspector and the product will be added to the CEC register, similarly to traditional solar panels, once the final certification is received.

*\*These certifications are subject only to manufacturing location inspection which has been delayed by COVID-19.*



## U.S. FEDERAL INCENTIVES

2020	2021	2022
26%	22%	10%

### Business Energy Investment Tax Credit (ITC)

In building your greenhouse with ClearVue PV, your farm will be eligible for a 26% tax credit in 2020.

### Federal 100% Bonus Depreciation

(*2018, Tax Reform Bill*)

Allows for 100% expensing for property placed in service between 17 Sept 2017 and 1 Jan 2023.

### USDA - Rural Energy for America Program Grant (REAP)

(*30,000 Population or Less*)

Provides financial assistance to agricultural producers and rural small businesses to purchase, install, and construct renewable energy systems.



# BENEFITS & TECHNICAL DETAILS

- High thermal insulation. Approx. 4 times higher R-value of thermal insulation compared to single-pane clear glass walls and roof. This is due to a triple-glazed structure, solar-control low-e film, and high visible transparency of near 70%.
- The greenhouses were originally designed for use in colder climates (like Japan), and require high uptake of incoming solar light and heat, together with high thermal insulation to keep the trapped heat inside, strongly reducing the heating costs in winter. Cooling in summer, even in Australia, isn't a major issue and is addressed by ventilation and water sprinklers.
- Reduced water consumption, due to better control over the internal environment, compared to most conventional greenhouse types.
- Solar energy generation (tens of kWh/day for approx. 200 m<sup>2</sup> of floor area), offsetting electricity costs and reducing the internal wiring complexity, if self-powered blinds-integrated windows are used to actively control the solar heat gain and (to an extent), thermal insulation.
- Generation of clean energy on-site
- Power generated can be used to run water pumps, heat water, run networks of weather and environment sensors, power electronics that regulate environmental control energy savings. This optimises the running costs, offsetting potentially a very large fraction of total energy costs.
- More efficient running costs because the high LED lighting costs are reduced due to strong natural daylighting – due to high transparency.
- Suitable for vertical cropping, has potential to improve the core performance parameter which is the plant growth rates and biomass productivity.

**ClearVue products integrate with systems that capture carbon emitted from gas-burning heater operations, purify CO<sub>2</sub> to food-grade, then use that to feed plants, improving growth rates. A combination of plant growth rate improvement with substantial thermal energy savings, due to high insulation, leads to significant commercial payback time reduction in greenhousing operations.**



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