

ASX RELEASE | CLEARVUE TECHNOLOGIES LIMITED  
(ASX:CPV | OTC:CVUEF)

**ClearVue Gen-2 IGUs Surpass Greenmark Platinum in BCA Test  
to deliver significant energy generation, efficiency savings  
and carbon benefits**

## HIGHLIGHTS

- Singapore Building and Construction Authority (BCA) completes testing on ClearVue's Second Generation IGUs
- Testing confirms CPV high energy-output clear solar glass technology offers significant energy savings when compared against BCA's 'Greenmark Platinum' rated double-glazed low-e product
- 22.8% reduction in cooling load and 7.5% overall energy savings after accounting for energy generation (Gen-2 IGUs only)
- 71% overall energy savings achieved with the addition of ClearVue's recently announced Spandrel Solution (Gen-2 IGUs plus the Spandrel Solution)
- Improved thermal comfort for building occupants (PMV index within ASHRAE comfort zone for 96.1% of time)
- Improvement in imperceptible glare (75.2% of the time v 45.8% for reference cell)
- Significant carbon benefits

**Perth, 3 October 2023:** Smart building materials company ClearVue Technologies Limited (ASX:CPV OTC:CVUEF) (*ClearVue* or the *Company*) confirms results from recent testing in Singapore that provides independent, third-party verification of ClearVue PV's real-world performance benefits for tropical climates.

The testing was completed with the Singapore Building and Construction Authority (**BCA**) through its Skylab facility, which conducted comparative testing of ClearVue Technologies' second generation photovoltaic insulated glazing units (**Gen-2 PV IGU**) system as well as testing of its Spandrel Solution, both [announced 18 May 2023](#).

The BCA found that ClearVue's high energy-output clear solar glass technology Gen-2 PV IGUs reduced cooling load by 22.8% and overall energy savings by 7.5% after accounting for energy generation. It also improved thermal comfort for building occupants 96.1% for of the time and reduced imperceptible glare by 75.2% - considerably above control cell levels. When the Gen-2 IGUs are used in conjunction with the Spandrel Solution energy savings of 71% can be achieved.

Over a four-week period in July-August 2023<sup>1</sup>, BCA SkyLab directly compared the performance of a West-facing<sup>2</sup> test cell fitted with ClearVue's Gen-2 PV IGU system against a control cell deployed with Singapore's BCA 'Greenmark Platinum' certified<sup>3</sup> double glazed low-e windows.

A range of metrics were measured under real-world, southwest monsoon season weather conditions in Singapore to evaluate the energy savings and comfort benefits provided by the triple glazed Gen-2 PV IGU technology.

These results from the main independent regulatory authority in the region confirm the suitability and significant paybacks ClearVue PV's can provide to building owners and developers across Southeast Asia and beyond. Like ClearVue's first generation IGU product, the second generation integrates solar cells directly into windows to generate electricity while improving a building's energy efficiency. The BCA test results also follow the [announcement on 4 September](#) that the Gen-2 PV IGU design can now be produced at mass-scale on unmodified glazing industry standard production lines.

ClearVue Chief Executive Officer Martin Deil said:

*"The BCA SkyLab results validate ClearVue PV as an outstanding integrated product that delivers strong thermal and energy outcomes. The test data proves our technology's ability to simultaneously cut costs and enhance occupant comfort in the tropics by reducing solar heat gain.*

*"We are thrilled the benefits of the Gen-2 PV IGU products have once again been confirmed. Excitingly, the technology is expected to deliver even better energy performance in more favourable climatic zones and we anticipate improved carbon outcomes in cities with higher grid emission factors, providing greater potential CO<sub>2</sub> savings and accelerated carbon payback from ClearVue's PV IGUs.*

*"BCA's comprehensive testing program clearly shows the advantages our PV glazing technology provides - as both an energy generator and passive design solution. This is not only good for the environment but will help companies meet the increasing pressure on the building sector to reduce their carbon footprint to meet clean energy targets and current and incoming sustainability mandates.*

*"ClearVue's building envelope solutions can meaningfully improve the sustainability and efficiency of new and existing buildings."*

## Energy Performance

The test results show ClearVue's Gen-2 PV IGU system provide significant energy savings:

- Cooling energy usage was reduced by an average of 22.8% compared to the control cell. This can lead to substantial savings on air conditioning costs in tropical climates
- Total building energy consumption (from cooling, lights, fans and plug loads) was 6.1% lower on average versus the conventional façade

<sup>1</sup> note: sub-optimal testing period of July and August in Singapore is the southwest monsoon season.

<sup>2</sup> note: sub-optimal orientation during testing cycle – normally Skylab facility rotates 360 degrees to ensure all directions are measured however during the testing period the Skylab facilities' revolving platform was out of service and remains so.

<sup>3</sup> See: <https://www1.bca.gov.sg/buildsg/sustainability/green-mark-certification-scheme/green-mark-2021>

- The Gen-2 PV IGU facade generated an average of 0.37kWh of electricity per day from the integrated solar<sup>4</sup>
- After accounting for a small increase in lighting usage, overall electrical energy consumption was reduced by 7.5% against the control cell when factoring in solar power generation from the Gen-2 PV IGU facade
- The Spandrel Solution delivered an average of 1.661 kWh per day during the test cycle. When the Spandrel solution energy generation is added to the facade glazing generation the overall electrical energy consumption in the same setting can reduce by 71%.<sup>5</sup>

### Thermal Performance

The Gen-2 ClearVue system delivered improved thermal comfort within the test cell:

- Internal glazing surface temperatures on the Gen-2 PV IGUs were up to 3.5°C cooler compared to control windows during daytime hours. Less solar heat gain reduces cooling loads
- 96.1% of occupied times saw acceptable thermal comfort levels (PMV -0.3 to 0.3) within the test cell, versus 94.7% for the control cell. Occupants will feel cooler and more productive.
- Glare levels were also 75.2% imperceptible when looking out of the Gen-2 PV IGU facade—a major improvement over only 45.8% for the conventional DGU type windows of the control. This enhances visual comfort.

The results indicate that integrating ClearVue's PV double and triple glazed technology into buildings can deliver multiple benefits by reducing both energy usage and costs while enhancing thermal comfort for occupants. With the potential for significant long-term savings on cooling and electricity, the Gen-2 PV IGUs offers a highly sustainable solution for tropical climates such as Singapore.

### Carbon benefits

The reduction in energy consumption and integration of on-site solar power generation using ClearVue's Gen-2 PV IGU technology translates directly into lower greenhouse gas emissions and carbon footprint for buildings. Based on Singapore's grid emission factor<sup>6</sup>, the 7.5% average reduction in total electricity usage from the ClearVue Gen-2 IGUs (ignoring adding the Spandrel Solution) equates to annual savings of over 0.37 tonnes of carbon dioxide emissions per 100m<sup>2</sup> of Gen-2 PV IGU facade installed.

Over the expected lifetime of 25-30 years, the Company believes that a typical installation could avoid over 9.5 tonnes of CO<sub>2</sub> emissions from the grid. When accounting for the emissions offset through solar power generation as well, the Gen-2 PV IGU provides an estimated 4.75 year carbon payback period. This highlights the potential for the technology to deliver meaningful and long-

<sup>4</sup> For the BCA testing only 8 active glazing panels were able to be installed as a PV array into the Skylab facility giving rise to a sub-optimal ratio of PV microinverters to IGU panels – a typical installation would use a much higher number of PV glazing panels (typically up to 24) for each microinverter. The BCA report acknowledges this aspect. ClearVue expects energy generation in an optimal arrangement with the correct ratio of microinverters to panels to deliver up to 0.61kWh of electricity per day for the same 8 window array size as tested in the same climactic conditions and geography.

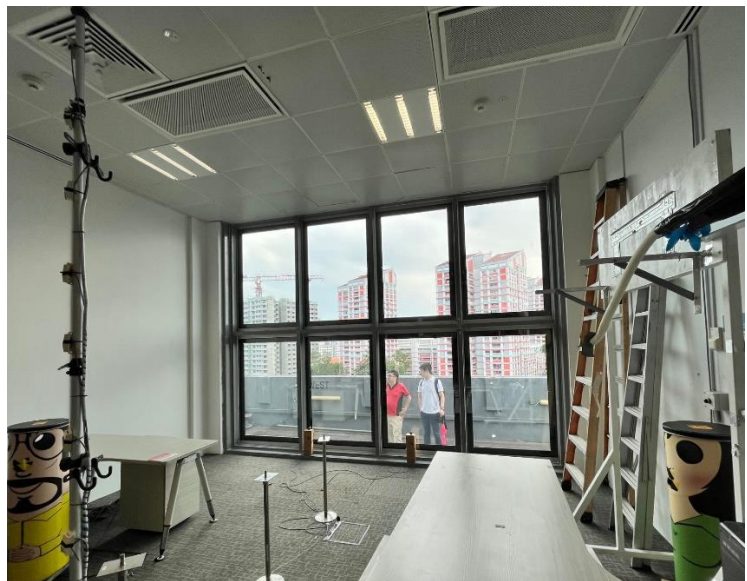
<sup>5</sup> In a real-world installation the Spandrel Solution would be added between each floor of Gen-2 PV IGU clear glazing.

<sup>6</sup> Singapore's 2022 grid emission factor is 0.526 kg CO<sub>2</sub>/kWh (Energy Market Authority).

lasting emissions reductions that support climate change mitigation efforts across the construction and property sectors.

Annual CO<sub>2</sub> emission and carbon payback numbers are expected to be further reduced through the addition of the Spandrel Solution and through optimal installation engineering including to minimise microinverter losses.

**Authorised by the Board of ClearVue Technologies Limited.**



*Second Generation ClearVuePV vision glass testing IGU's and spandrel panel units (above the glazing) installed and being prepared for commencement of BCA testing.*

#### FOR FURTHER INFORMATION, PLEASE CONTACT:

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#### ABOUT CLEARVUE TECHNOLOGIES LIMITED

ClearVue Technologies Limited (ASX: CPV) is an Australian technology company that operates in the Building Integrated Photovoltaic (BPIV) sector which involves the integration of solar technology into building surfaces, specifically glass and building façades, to provide renewable energy. ClearVue has developed advanced glass technology that aims to preserve glass transparency to maintain building aesthetics whilst generating electricity.

ClearVue's electricity generating glazing technology is strategically positioned to complement and make more compelling, the increased use of energy-efficient windows now being regulated in response to global climate change and energy efficiency goals.

Solar PV cells are incorporated around the edges of an Insulated Glass Unit (IGU) used in windows and the lamination interlayer between the glass in the IGU incorporates ClearVue's patented proprietary nano and micro particles, as well as its spectrally selective coating on the rear external surface of the IGU.

ClearVue's window technology has application for use in the building and construction and agricultural industries (amongst others).

ClearVue has worked closely with leading experts from the Electron Science Research Institute, Edith Cowan University in Perth, Western Australia to develop the technology.

To learn more please visit: [www.clearvuepv.com](http://www.clearvuepv.com)

### FORWARD LOOKING STATEMENTS

Statements contained in this release, particularly those regarding possible or assumed future performance, revenue, costs, dividends, production levels or rates, prices or potential growth of ClearVue Technologies Limited, are, or may be, forward looking statements. Such statements relate to future events and expectations and, as such, involve known and unknown risks and uncertainties. Actual results and developments may differ materially from those expressed or implied by these forward-looking statements depending on a variety of factors.