

High-margin, solar powered glass with capacity to scale

ClearVue Technologies (ASX: CPV | OTCQX: CVUEF) is manufacturing and commercialising its patented solar PV electricity generating glazing technology ClearVue^{PV}. 2024 was a year of substantial progress for the company with several new customers and licensees coming on board, and the company expanding into new jurisdictions as well as into new market opportunities.

ClearVue^{PV} is a 'one of a kind' technology

ClearVue^{PV} core offering is a patented glazing technology that generates solar energy via clear glass. CPV's offerings are better than competing products because they are more transparent, can generate ~30 watts of electricity (peak) per square metre, can operate autonomously and can be customised to suit all climatic conditions. The diversity of the jurisdictions which CPV's customers belong to is a testament to the latter point. ClearVue^{PV} can play a major part in the world's efforts to decarbonise, and the building & construction sector will need to play a part as it is responsible for over 40% of global emissions. Many investors may not realise this, but the company is pursuing an IP licensing model, thus operating with low capex and high margins.

At a pivotal point

The next 12-18 months will see a major roll out of ClearVue^{PV}. The company secured or expanded several commercial deals in the 2nd half of 2024 and is expecting revenues to flow from those deals imminently. These deals, which we will outline in this report, provide for the distribution of ClearVue^{PV} in several jurisdictions including Australia, the US, the UK, China, the UAE, Saudi Arabia and India. These deals can serve as the foundation for a broader distribution of ClearVue^{PV} in those markets. The recent acquisition of the technological IP of Roots – the Root Zone Temperature Optimisation (RTZO) and Irrigation by Condensation (IBC) technologies – are complementary technologies in respect of greenhouses and can have a more significant impact combined.

Valuation of A\$0.89-1.20 per share

We have refreshed our model on the company. Using a Discounted Cash Flow (DCF) approach, we have valued ClearVue Technology at A\$0.89 per share in our base case and A\$1.20 per share in our optimistic/bull case – accounting for future anticipate dilution. Please see page 19 for our valuation rationale and page 22 for more details on the key risks to our thesis, which include competitive, licensee and personnel risks.

Share Price: A\$0.18

ASX: CPV/OTCQX:CVUEE

Sector: Technology

11 March 2025

Market cap. (A\$m)	48.3
# shares outstanding (m)	268.2
# shares fully diluted (m)	302.4
Market cap. ful. dil. (A\$m)	54.4
Free float	82.4%
12-months high/low (A\$)	0.60 / 0.18
Avg. daily volume ('1000)	376.5
Website	www.clearvuepv.com

Source: Company, Pitt Street Research

Share price (A\$) and avg. daily volume (k, r.h.s.)



Source: Refinitiv Eikon, Pitt Street Research

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Disclosure: Pitt Street directors own shares in CPV.



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The Investment Case for ClearVue Technologies

- 1) **CPV has world-leading technology that can have a positive impact.** ClearVue^{PV} generates electricity from clear glass and in doing this can lower emissions from buildings. Independent modelling has shown that when combined with ClearVue's other product offerings, 27% of buildings can achieve Net Zero operating carbon, 33% near Net Zero, and a material reduction in energy consumption in all the remaining cases. Moreover, it can deliver a payback within 3-8 years in 87% of cases.
- 2) **CPV's technology can be generated on an industrial basis, and it can scale.** It can be incorporated into existing window technologies seamlessly and manufacturing can be done in roughly 5 minutes or less. It can also be seamlessly integrated into existing industrial processes.
- 3) **CPV's high-margin and low-capex business model can drive rapid revenue growth.** We think the key reason this company has been overlooked by many investors is because people think it is a high-labour and capex-intensive manufacturer of glass products. It is not. Instead, it is a supplier of components to the glass and glazing industry, with a licensing model which can be implemented into a glazing company's existing manufacturing process as well as onto existing buildings seamlessly and with minimal cost.

CPV needs only sign up a limited number of licensing partners to derive benefit because these licensing partners can on-sell to their own customers (i.e. sell finished insulated glazing units – double and triple glazed windowpanes). CPV has 12 licensees right now and is aiming to sign a further 23 by the end of 2025. The licensing business model will provide access to supply and distribution capabilities without excessive capital investment on the part of either CPV or its licensees.

- 4) **CPV is in a 'quasi-mandated' environment and is poised to benefit.** There is a push to Net Zero emissions across the world, driven by pressure from governments (and in some instances competing companies) as well as incentives. The building & construction sector is one of the most culpable industries for emissions (building operations is responsible for at least 27% of emissions¹) and will have a particularly large expectation to reduce its footprint. CPV can play a part in this.
- 5) **CPV already has a significant geographic footprint.** The company has a presence in Australia, Europe, the UK and USA; and it has 12 licensing partners in multiple jurisdictions. And even though the company will seek more licensing partners, (as mentioned above) CPV does not need that many to gain a foothold because these partners can on-sell these products, paying CPV a royalty for the use of its technology and a margin for the Components it supplies to the licensees.
- 6) **There are several multidimensional end-market opportunities even beyond the initial target market.** ClearVue has three key verticals which collectively are expected to reach US\$370.4bn in the next few years: Commercial BIPV, Greenhouse/Ag-Tech and Complementary IP. Within these, there are countless potential customers including architects, property developers, property owners and glass fabricators. ClearVue's products could ultimately be used on all building surfaces.
- 7) **The recent acquisition of the IP of Roots could significantly enhance CPV's offerings for greenhouses.** In November 2024, CPV picked up the

¹ <https://www.architecture2030.org/why-the-built-environment/>



RZTO (Root Zone Temperature Optimisation) and Irrigation by Condensation (IBC) technologies. These represent an opportunity in the future – these technologies have been shown to have a significant impact on crop yield and provide energy and irrigation savings. A greenhouse with CPV's technology on the outside and using Roots' RTZO technologies for plants on the inside could have a superior impact. The technologies could eventually form a spin-out company with Ag-Tech ambitions including RTZO and potentially other technology.

- 8) **CPV has a strong leadership team in place.** The company has a strong leadership team, headed by founder and non executive Chairman Victor Rosenberg who has led the company since its inception, played a key role in the research that led to the development of the technology, and led the company to early-stage commercialisation. Façade industry veteran Martin Deil has since been brought on board as global CEO to lead the Company into the future and through its growth phase expected over the next 3-5 years.
- 9) **CPV is at a pivotal point.** CPV is in the middle of a 12–18-month period during which it intends to realise its commercial plan. To this end, it has achievements to boast of including more than tripling project quotes and its licensee pipeline. The company is positioning itself for further growth including by building up a commercial team in the key markets (particularly the USA) as well as building up its capacity and processes to meet future sales volumes.
- 10) **CPV is Undervalued.** We believe CPV is undervalued at its current market capitalisation, having valued it at \$0.89-1.20 per share – or \$276.9m and \$376.0m. As mentioned, we believe the company has been ignored by many investors despite the progress it has made because investor perception that it will be a high-capex and low-margin exercise and thus be unlikely to have a commercial impact. But CPV has already been proving this view wrong with the progress it has already made. We think the company can re-rate if it successfully executes its commercialisation plan, particularly its target for licensees in 2025.



ClearVue's technology and product is ClearVue^{PV}, a frame of glass that features a layer of micro and nano-particles that reflect the sun's rays towards embedded solar cells

ClearVue's Technology

ClearVue's core technology and product is ClearVue^{PV}, a module of double or triple glazed glass (an Insulated Glass Unit or IGU) that features a layer of micro and nanoparticles that reflect the sun's IR and UV rays towards embedded solar cells. The solar rays are converted to energy and the system allows up to 70% of the visible light to pass through - without obstructing the view.

In this section we will recap:

- i) The history of how the ClearVue^{PV} technology was developed,
- ii) How ClearVue^{PV} works,
- iii) Does ClearVue^{PV} work?
- iv) Why a customer would want ClearVue^{PV}; and
- v) CPV's business model.

The next chapter will cover the market opportunity for the company.

The story of how ClearVue^{PV} was developed

ClearVue was listed in 2018, in a deal valuing the company at \$18m, but it traces its history back to 1995. It was founded by Victor Rosenberg, a serial entrepreneur whose successes include inventing the concept of condiments as food pastes in tubes in 1980. When incorporated, the company was known as Tropicglas Pty Ltd and attempted to develop an infrared (IR) blocking method for glass – to absorb and reflect heat from the windows. This product could only reach 59% visible light transmission with a degree of haze. In late 2010, Mr Rosenberg realised the work could be re-used and re-purposed to create a more advanced product to produce a 'solar concentrator' to focus IR for collection and power generation at the edges of windows at the same time as increasing visible light transmission.

Mr Rosenberg and Edith Cowan University (ECU) undertook a research program that focused on using inorganic nano and micro particles integrated into the lamination interlayer of the glass in combination with an external spectrally selective coating. Initial research on this commenced in March 2011, and a proof of concept was created in a matter of months.

The name 'ClearVue Technologies' was adopted for the company, with the product trade mark established as ClearVue^{PV}. The company retained 100% of all intellectual property but agreed to pay an 8% royalty to ECU of net income received in relation to the sale or licensing of rights associated with the technology developed under the agreements. Initially, ClearVue's technology involved use of a window frame to contain the photovoltaic modules used in the system with the nano- and -microparticle interlayer sat between two independent glass panels. Additionally, there was a lot of emphasis on the core IP. ClearVue's technology has moved away from its original core IP and the core product is now the IGU glass unit itself that relies on a wide range of IP developed in-house by the Company in subsequent years.

Since 2011, it has been a long and steady journey to commercialisation. By the time of its IPO, ClearVue had not yet commercialised the technology, but had a minimum viable produce and had just signed a manufacturing agreement with a Chinese glass manufacturer. After its IPO, ClearVue put its technology through several trials, initially non-commercial but subsequently commercial – with the types of companies that would find utility in this technology. The technology has become more versatile – smaller and simpler



with flexibility in being able to be integrated into industrial process and various types of windows, and most importantly more cost effective.

How does ClearVue^{PV} work?

ClearVue's product is ClearVue^{PV} which is a frame of glass containing a layer of nano-particles that reflect the sun's rays towards embedded solar cells

ClearVue's patented technology sits within an activated interlayer between two panes of glass. The interlayer complements the existing glazing industry lamination and manufacturing processes; and requires limited infrastructure investment. Visible light passes through the glass equivalent to about 70% Visible Light Transparency (VLT). Solar PV cells are incorporated around the edges of an IGU used in windows. The company's advanced glazing system combines proprietary nano and micro particles dispersed into an interlayer, a clever internal design and its custom-shaped PV modules.

The patented proprietary nano- and -microparticles interact with UV radiation which is 'down converted' to longer wavelengths. The combined solution prevents heat and unwanted UV and infrared solar radiation from entering a building. The solar radiation is then redirected to the edges of the glass pane for harvesting through standard crystalline PV cells to create clean energy – all while allowing natural visible wavelength light to pass through unaltered to provide maximum natural daylighting. The lamination interlayer also incorporates a spectrally selective coating on the rear external surface of the IGU (see Figure 1 and Figure 2).

Figure 1: ClearVue's technology overview

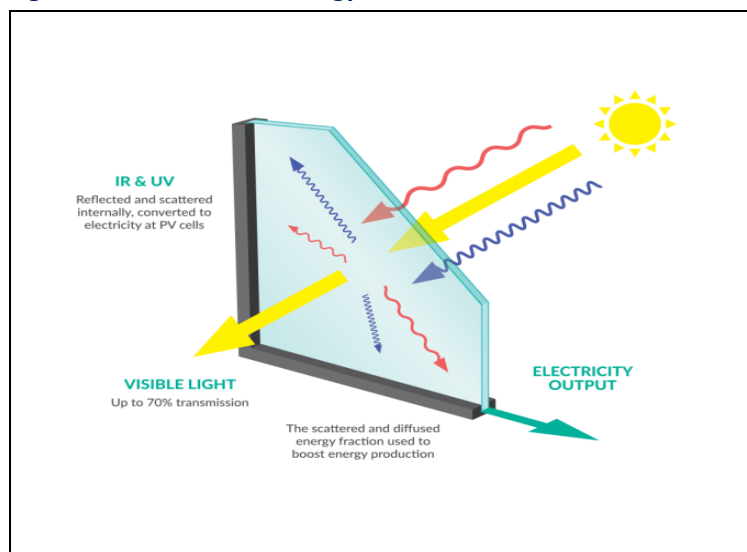
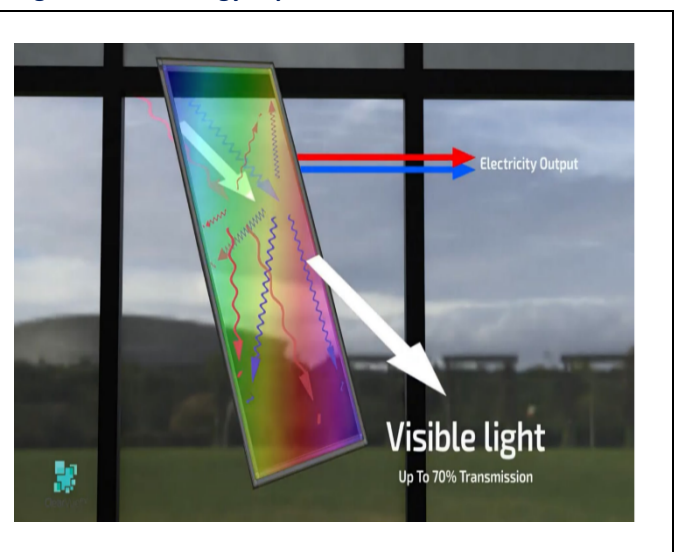


Figure 2: Technology explainer



Source: Company

The biggest and most obvious selling for ClearVue^{PV} is that it is more friendly for the environment.

The appeal of ClearVue^{PV} to its customers

The biggest (and most obvious) selling point for ClearVue^{PV} is that it is better for the environment. By generating renewable electricity on-site, carbon emissions are lower compared to (for instance) mining and burning coal, or by transmitting energy through the grid. This also results in lower energy costs (and overall costs of operating or constructing a building), once it is set up. And this is before you account for potential government subsidies and/or potential monetary consequences for not addressing an environmental footprint – which we will address in the next section of the report. ClearVue^{PV}



represents a clear path for governments and companies to enact their ESG and climate change targets as well as to meet them.

ClearVue^{PV} is designed so that:

- Power of up to 30Wp/m² (watts per square metre) can be generated,
- It can work in all climactic conditions,
- The windows are still transparent (meaning visibility through them is not compromised) but with reduced risk of overheating (this is achieved by the conversion of infrared to electricity rather than through expensive coatings),
- Visible light can pass through the glass at ~70% VLT,
- It can be incorporated into existing window infrastructure or into manufacturing processes without significant capital expenditure, and
- ClearVue^{PV} can be applied in several settings including simple windows, skylights, curtain wall, window-like glass structures like greenhouses and it can also help with outdoor and billboard advertisements.

Production of ClearVue^{PV} generally takes under 5 minutes, - but sometimes even faster – and it can be implemented on window units up to 4 by 3 metres.

From a manufacturing perspective, production can occur rapidly where ClearVue^{PV} is integrated. Generally, it takes under 5 minutes additional assembly time, although certain test production runs have taken under 2 minutes, and one test run showed over 80 windows being produced in under 2 hours. CPV can be integrated into window units up to 4 by 3 metres. The latter point is particularly important because many competitors can only produce smaller-sized clear solar glass units, but it is the large-scale units that customers and architects' desire.

But does ClearVue^{PV} work?

ClearVue^{PV} has undergone significant certification testing to prove that it is safe from an electrical perspective, has a low -combustibility and structurally sound (Figure 3).

Figure 3: Certification tests undertaken

Product	Test	Certifier	Standard	Status
Vision Glass	BIPV product electrical safety	TUV SUD	IEC61730 & IEC 61215	Completed
	Combustibility test	TUV SUD	EN13501-1	Completed
	Industrial age accelerating test	SQI, Intertek	EN1279-2, IGCC, AS 4666	Completed
	Sealed IGUs durability	IGCC	ASTM E 2190	Completed
Solar Spandrel	BIPV product electrical safety	TUV SUD	IEC 61730 & IEC 61215	Completed
	Combustibility test	TUV SUD	EN13501-1	Completed
	Radiant heat combustibility	ATWA	AS 1530.3	Completed



	Structural safety	Intertek	AS/NZS 4284	Completed
Solar Balustrade/Greenhouse Solar Glass	BIPV product electrical safety	TUV SUD	IEC 61730 & IEC 61215	Completed
	Combustibility test	TUV SUD	EN13501-1	Completed
	Radiant heat combustibility	ATWA	AS 1530.3	Completed
Solar Cladding	BIPV product electrical safety	TUV SUD	IEC 61730 & IEC 61215	Completed
	Combustibility test	TUV SUD	EN13501-1	Completed

Source: Pitt Street Research

ClearVue^{PV} has undergone financial and emissions testing too and the results validated the technology.

ClearVue^{PV} has undergone financial and emissions assessment too and the results have validated the technology. An independent assessment of ClearVue's 40-storey building envelope solution has found that it adds less than 2% to the total cost of a building – a quantifiable payback to meet ESG obligations and one that could be realised through reductions in operational costs via energy generation & a reduction of energy usage. There are financial paybacks of 3-7 years and anywhere between 0.4 and 1.83m kg of emissions per annum dependant on the specific jurisdictions (i.e. the types of property to receive installation and what local incentives exist for adoption) (Figure 4).

Figure 4: Financial Payback and Pathway to Net Zero Buildings²

	Financial Payback	Carbon Payback p.a.
Sydney	6 years	1.70m kgCO ₂ e
Melbourne	7 years	1.83m kgCO ₂ e
New York	4 years	0.83m kgCO ₂ e
L.A.	3 years	1.02m kgCO ₂ e
London	6 years	0.40m kgCO ₂ e

Source: Company

²Results are from an independent assessment of ClearVue's 40-storey building envelope solution being deployed across major cities



ClearVue's IGUs provide a host of benefits such as a high thermal envelope performance, visual light transmissions and carbon neutrality

Specific projects have been positive too. Independent performance testing with the Building and Construction Authority (BCA) in Singapore found a 22.8% reduction in cooling and 7.5% overall energy savings after accounting for electricity generation. 71% overall energy savings were achieved with the addition of ClearVue's Spandrel Solution into the mix. A two-year study co-run with Murdoch University, using ClearVue technology in a solar glass greenhouse found energy consumption offset by 40%³. ClearVue's technology in greenhouses also has demonstrated higher plant yields for certain species. Trials of ClearVue^{PV} in the 2023 growing season completed at the Murdoch University research greenhouse have shown increased yields of between 52% and 170% in snow peas, capsicum and Roma tomatoes compared to regular greenhouse glass. Trials in 2024 showed yield increases of between 16% and 93% in spinach, Bok choy, dwarf beans and various snow pea varieties⁴ (Figure 5). It is yet to be tested but it is expected a greenhouse with ClearVue^{PV} on the outside and using RTZO on the inside could demonstrate even greater yield increases.

Figure 5: Greenhouse research preliminary outcomes

2024 Grow Season Crop Yield Results	Control Average Yield	ClearVue Rooms Average Yield	ClearVue Rooms & Increase
Spinach	28.7	33.4	16.2%
Bok Choi	81.4	115.4	41.8%
Dwarf beans	57.8	76.3	31.9%
Snow Peas (Oregon Dwarf)	42.3	55.0	30.0%
Snow Peas (Yukamo Giant)	32.6	63.0	93.3%

Source: Pitt Street Research

Looking briefly at the issue of heat gain on windows that ClearVue competitors have struggled to overcome: Testing conducted in Singapore has shown heat gain is reduced by under 23% whilst still generating power and conserving energy.

Moreover, CPV has won several industry awards and recognition emerging victorious in the GreenBuild People's Choice Innovation Webinar in the US, the very prestigious Hong Kong GreenTech Challenge (where ClearVue was selected as one of 8 finalists from 6000 entries) as well as being highly commended in the AGWA Most Innovative Product.

Testing has shown that the technology can help a building reach Net Zero in 27%, near to it in another 33% and a material reduction in energy consumption in all the remaining cases. Moreover, it can deliver a payback within 3-8 years in 87% of cases.

³ <https://www.murdoch.edu.au/news/articles/groundbreaking-greenhouse-offsets-energy-consumption-by-40-per-cent>

⁴ ClearVue ASX announcement 28 November 2024



CPV's licensing business model will provide access to supply and distribution capabilities without excessive capital investment on the part of either CPV or its licensees.

CPV's business model

CPV's business model is to focus on selling its products through licensees, typically existing glazing, façade and curtain wall fabricators. This will provide access to supply and distribution capabilities without excessive capital investment on the part of either ClearVue or its licensees. CEO Martin Deil has used the metaphor of a 'Lego model' approach to describe how the model works⁵. ClearVue will provide its clientele with a kit of component parts easily incorporated into standard windows, transforming them into power-generating windows. The components will be assembled locally and shipped in smaller, lighter packages.

As noted above, ClearVue^{PV} will be integrated seamlessly into production lines – it is designed for this to be possible. The company will make revenue by:

- Licensing fees, which will vary dependant on the size of the organisation and local market conditions, and will typically last for 3-5 years;
- A renewal fee every 3-5 years;
- A royalty from Solar Vision Glass on a square metre basis;
- Sales of components including nano- and -microparticle interlayers, solar photovoltaic modules, connection modules and associated system components, and;
- Sale of complementary products in the form of solar spandrel panels, solar cladding panels and other related system components.

ClearVue's Flash Testing machine (used in quality assurance) is supplied to license manufacturers separately and this is done by negotiation between ClearVue and the licensee. As we will come to shortly, CPV has a total of 10 licensees as at 31 December 2024 and is aiming to secure 23 new licensees all up for 2025. Each and every individual licensee represents a pipeline of opportunities.

It is important to note that it can take time for new buildings with ClearVue^{PV} to be constructed. Smaller greenhouses (i.e. the size of those at the Murdoch University trial) can take 7-9 months, and larger buildings like office buildings can take several years. For this reason, ClearVue is prioritising smaller buildings and greenhouses as its initial target market.

⁵ Q&A presentation 6 March 2024, slide 9



ClearVue is at a pivotal point

CPV finished CY24 with 80% more executed licensing agreements, along with a sales pipeline quadrupled in size.

ClearVue had a spectacular 2024 that got better and better as the year progressed (Figure 6). Compared to 12 months ago, ClearVue has 80% more executed license agreements, a licensee pipeline quadruple what it was 12 months prior, and project quotes now more than triple. The company, while continuing to invest in its capacity and processes, undertook global certification and testing, opened its expanded US office with an expanded US team, and made its first installation in Melbourne.

Figure 6: CPV's achievements in the second half of CY24

Event	Date	Details
Repeat order from System USA	July 2024	Greenhouse System USA, a greenhouse solutions provider in California, made an A\$175,000 order (the second it has made) to create a demonstrator greenhouse exhibiting ClearVue's technology.
Alutec partnership	August 2024	Alutec is Qatar's largest glass processor. It signed a five-year agreement to manufacture and distribute CPV's Solar Glazing and Insulated Glass Units in Alutec's key markets – Qatar, the UAE and Saudi Arabia.
Prefabulous	September 2024	Prefabulous is a Wagga Wagga-based modular housing manufacturer. Prefabulous and CPV are collaborating to integrate CPV's technology into Prefabulous' new 'FabZero' prototype – a modular home designed to meet net-zero energy requirements.
100 St George's Terrace Installation	October 2024	CPV secured a first order for its solar building envelope solution for the construction of an equipment screen on the Enex100 building located at 100 St George's Terrace in Perth, Australia.
My Glass Projects (MGP)	November 2024	MGP - a glass fabrication company headquartered in London - was granted non-exclusive rights to manufacture and distribute products using CPV's technology in the UK market.
Maxblue	November 2024	Maxblue and CPV have a five-year OEM Manufacturing agreement. Maxblue, a leading architectural glass solutions manufacturer based in China, will provide glass using CPV's technology
Alutec deal expansion	January 2025	Roughly 6 months since the original deal with Alutec, the deal was expanded to permit sub-distribution into the UAE through related entity, Dune Trading.

Source: Pitt Street Research

CPV is in the middle of a 12–18-month period during which it intends to realise its commercial plan and is gradually seeing its plans come to fruition

CPV is in the middle of a 12–18-month period during which it intends to realise its commercial plan and is gradually seeing its plans come to fruition. The company already has achievements to boast of including more than tripling project quotes and its licensee pipeline, as mentioned above.

The company is positioning itself for further growth including by building up a commercial team in the key markets (particularly the USA) as well as building up its capacity and processes to meet future sales volumes. It has a target of 23 new licensees by the end of CY25, which would amount to a total of 31 – specifically 7 in the first half of the year and an extra 16 in the second



half. Growth will not only come from deals with new clients but also from expanding deals with existing clients. For instance, ClearVue anticipates expanding its agreement with Aria Holdings (Alutec) to cover a subsidiary in India and one in Saudi Arabia, to target both jurisdictions' construction markets.

CPV's key markets are the Americas and the Middle East.

CPV's key geographic markets

CPV's key markets are the Americas, Asia and the Middle East (Figure 7). The US holds promise for the company for product sales and capital markets access – we will address what the new Trump administration could mean for the company on the next page. There is opportunity for CPV to manufacture in the US, potentially through a partnership. The company has made substantial efforts in building up its presence in the USA including:

- Establishing a team of sales agents for the USA,
- Hiring Paul Ogburn as Director of Operations in the US – Mr Ogburn is a PVB scientist, glass lamination, glass tempering and IGU expert,
- Opening an office and showroom/warehouse in San Jose, California; and
- Attending commercial conferences in the US including ECO El Paso Sustainability and Greenbuild.

ClearVue is aiming to license 5 fabricators in the USA in 2025. Down the track, the company may even manufacture in the US given incentives to manufacture locally, and potential disincentives to manufacture externally (i.e. tariffs).

The Middle East is a region where ClearVue has made clear progress with its licensing partnership with Alutec. This deal alone could be pivotal for its expansion in the region given Alutec has a significant presence in neighbouring countries.

The EU is a promising market too with the EU Green Deal and REPowerEU. The EU Solar Strategy aims to bring 320GW of solar photovoltaic power online by 2025, which would be more than double 2020's numbers, and 600GW by 2030. The EU solar market is on track to achieve the latter goal⁶, although the rapid scale up was partly forced by Europe's need to reduce reliance on Russian fossil fuels for energy. If the EU is to reach the target, it is going to need solutions like ClearVue^{PV} which can be adopted rapidly and generate significant return on investment as well as a reduction in admissions.

Turning to Australia, and even though it will never be as big a market opportunity as the Americas and Europe, it will have some importance (financial as well as sentimental). This is because it is the location of the company's birthplace and headquarters, and it has been the site of some of the most important developments and tests of CPV's technology. The installation of ClearVue products at landmark Perth office tower 100 St George's Terrace, which is underway and will be completed in mid-2025, will be an invaluable reference source. In the short to medium term, Australia will likely be where certain manufacturing takes place because the company has secured a grant from the WA State government to establish a production line for part of its core IP – the micro- and -nanoparticles – in Perth.

Australia remains the location of CPV's headquarters and the site of some of the most important tests. It will likely be CPV's manufacturing base in the short to medium term.

⁶ <https://www.solarpowereurope.org/insights/outlooks/eu-market-outlook-for-solar-power-2024-2028/detail>



Figure 7: CPV's geographic markets



Source: Company⁷

A repeal or expiry of the Inflation Reduction Act (IRA) would not mean the end of US production incentives altogether.

Does Trump's return to the White House mean the 'Green Push' is over?

Not necessarily, at least as far as CPV is concerned. Some may worry that the decarbonisation push will slow down and/or that incentives available under the Inflation Reduction Act (IRA) will not continue after their expiry later in 2025.

But it is important to remember that whatever Washington decides, cities and individual states can determine their own carbon objectives. Moreover, it retains strong market interest. For instance, San Jose in California (where ClearVue has set up its US headquarters) requires all new commercial buildings built from 2030 to be zero net energy and existing commercial buildings will need to be retrofitted to reduce their energy consumptions.

One tailwind that could aid the company at a federal level is the administration's proposed 30% tax credit with domestic content.

⁷ These estimates are from Allied Market Research, Grandview Research and Markets & Markets.

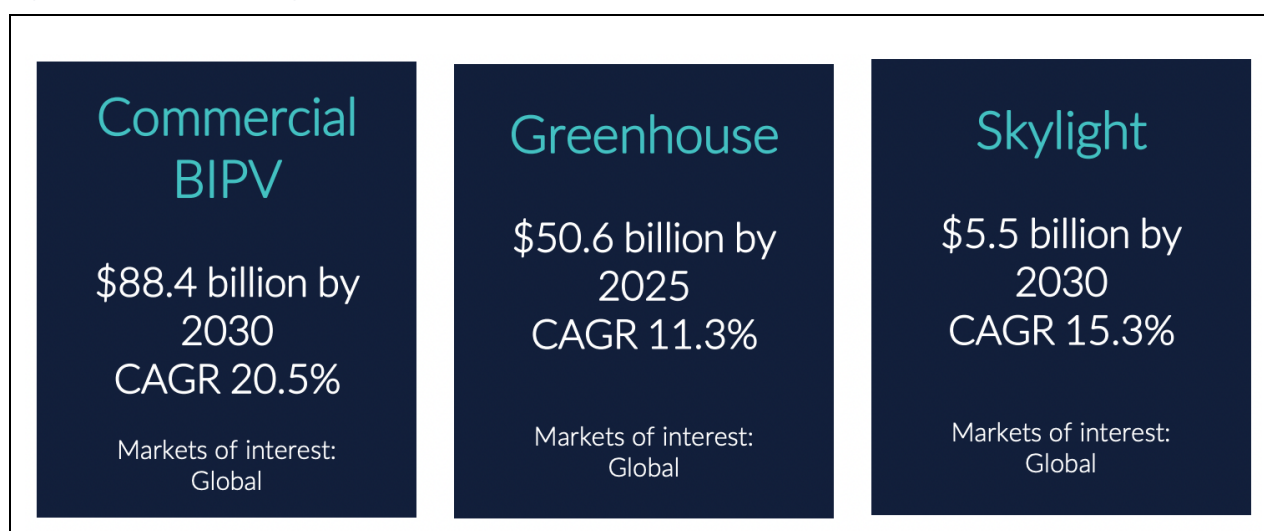


**CPV has 3 market segments:
Commercial BIPV (Building-
integrated Photovoltaics),
Greenhouse and Skylights.**

CPV's market segments

CPV has three market segments: Commercial BIPV (Building-integrated Photovoltaics), Greenhouse and Skylights. The company considers that ClearVue^{PV} could be used on *any* glass surface (with the balance of building surfaces covered with ClearVue's spandrel and cladding PV products) but is focusing particularly on these 3. Commercial BIPV will be the largest by 2030 (Figure 8), although greenhouse will arguably be the easiest to penetrate because they can be built up quickly with less regulatory compliance obligations. On one hand a greenhouse can be set up in 7-9 months (some smaller ones may be quicker although most these days tend to be larger constructions of up to 2km long, at least in respect of those that serve supermarkets). On the other hand, larger buildings can take several years to get out of the ground – and sometimes up to a decade or more to complete. CPV has additional credentials for the greenhouse market in the form of demonstrated plant yield improvements in the testing it has conducted above. The acquisition of Roots' IP (see Appendix I) could aid plant yields further and be yet another catalyst for market expansion in the greenhouse segment.

Figure 8: CPV's market segments



Source: Company⁸

The key catalyst for CPV's market growth is the world's decarbonisation and trends affiliated with these efforts.

Catalysts for market growth

The key catalyst for CPV's market growth is the world's decarbonisation and trends affiliated with these efforts including Net Zero targets, behavioural change, and the growth in renewable energy markets. Global governments with Net Zero Targets represent 92% of global GDP, up from 68% in December 2020⁹. The building and construction sector is a particularly large contributor to global emissions, at potentially more than 25%¹⁰, and this does not include companies manufacturing building materials such as aluminum, iron steel and

⁸ These estimates are from Allied Market Research, Grandview Research and Markets & Markets.

⁹ <https://zerotracker.net/insights/net-zero-targets-among-worlds-largest-companies-double-but-credibility-gaps-undermine-progress>

¹⁰ <https://www.architecture2030.org/why-the-built-environment/>



cement. As we have demonstrated, ClearVue^{PV} can lower an individual building's emissions and clients adopting it will know they are mitigating their own carbon footprint. The more clients adopt ClearVue^{PV}, the greater the cumulative global impact.

World decarbonizing, behavioural change, renewable energy market, growth in urban areas.

Facades, Greenhouses, billboard advertising and skylights

ClearVue's Leadership Team

CPV's leadership team is as follows (Figure 9 and Figure 10).

Figure 9: CPV's board of directors

Board of Directors	
Name and Designation	Profile
Victor Rosenberg Non-Executive Chairman & Founder	<p>Mr Rosenberg has 25 years of glass industry experience and is a serial entrepreneur globally recognized for his industry contributions. He brings extensive senior executive sales and management experience to ClearVue, having led multiple start-ups in the pharmaceutical and food manufacturing industries.</p> <p>Mr Rosenberg, a former pharmacist, has won an International Innovation Award in Germany for developments in food processing technologies, and now through his passion to achieve energy security through sustainable sources has turned his vision to glass. Mr Rosenberg believes energy generation and protecting our environment are two of our most important challenges and his dreams of producing a product to address both have now become a reality.</p>
Jamie Lyford Executive Director and Chief Legal Officer	<p>Mr Lyford has over 20 years' experience working in the areas of IP, commercialisation and technology both as an IP and commercialisation lawyer and as a technology commercialisation specialist. In his work as a lawyer, he has worked with several well-known local and interstate law and patent firms and internationally with a specialist IT law firm as well as in-house with BHP Steel (now Bluescope) and multinational IT services provider SchlumbergerSema (now ATOS).</p> <p>As a commercialisation adviser, Mr Lyford has assisted a number of start-up and early-stage companies both as an adviser and a director. He has also operated and managed the Western Australian government's Innovation Centre incubator under two separate outsourced consultancy terms where he was responsible for assisting innumerable innovative West Australian businesses on their path to successful commercialisation.</p>



<p>Chuck Mowrey President and CEO North America, Executive Director</p>	<p>Mr Charles ('Chuck') Mowrey has over 5 decades of experience in the commercial glass and glazing industries. Mr Mowrey was, immediately prior to joining ClearVue as its US CEO, the CEO of leading US contract glazier 8G Solutions. Mr Mowrey who was formerly President and CEO of Harmon Inc. (a part of Apogee NASDAQ APOG), was brought into 8G Solutions in 2019 to lead it through a growth strategy that includes growth by project size, scope and geography with a vision to expand across the U.S. Prior to G8 Solutions and whilst at Harmon, Mr Mowrey was responsible for increasing revenue from USD \$87m to over \$300m and assisted with various acquisitions and internal startups.</p> <p>Mr Mowrey is passionate about innovation in the glazing industry. After 22 years with Harmon/Apogee he spent approximately 3 years with View Inc. (NASDAQ VIEW) from 2008 as Executive Vice President assisting it to complete its Series B funding to get it to full commercial manufacturing. Mr Mowrey then spent the next 8 years from 2011 with Guardian Glass (a part of Koch Industries) as its Managing Director of Emerging Technologies.</p>
<p>Gerd Hoenicke Non-Executive Director</p>	<p>Mr Hoenicke is a recognised industry leader in facades and curtain wall systems – a senior level executive with more than 35 years of progressively responsible experience in the international facade industry. Mr Hoenicke has served as CEO of Gebrüder Schneider GmbH a German Façade contractor before he joined Seele GmbH in 2009 as its Technical Director. He has also served as Director Consulting International Projects for Schüco International KG. Mr Hoenicke currently operates an independent building envelope consultancy that engages with architects and façade engineers on large construction projects in the US and Europe.</p> <p>Mr Hoenicke's impressive project portfolio includes the German Chancellery building in Berlin, Central St. Giles in London, EZB in Frankfurt, the Kimbell Art Museum in Dallas, 5 Broadgate in London and The Broad Museum in Los Angeles. Each of these and many other projects reflect his attention to detail in façade design and innovation. In 2019 Mr Hoenicke established his own façade consultancy business and where he has continued to be involved in various prestigious projects in the US and the UK including recently Parcel 9 in Washington DC and Landmark Pinnacle London.</p>

Source: Company

Figure 10: CPV's senior management team

Senior Management Team	
Name and Designation	Profile
<p>Martin Deil CEO</p>	<p>Mr Deil brings a deep knowledge of the international façade and architectural envelopes business to ClearVue having spent the past 22 years in various senior management roles of increasing responsibility including as CEO, Deputy CEO and COO within the Permasteelisa Group in different locations globally. Mr Deil has a Bachelor of Science (Honours) Degree in Management and Systems from City University London.</p>
<p>Geoff Edwards Chief Financial Officer</p>	<p>Mr Edwards is qualified CPA with over 30 years' experience in CFO (including ASX listed companies), senior financial and commercial roles across a variety of service organisations. During that time, Geoff has acquired a wealth of knowledge with startups, mergers and acquisitions, high growth businesses, equity and debt capital raisings, turn arounds, building financial systems and procedures and strategic planning and implementation.</p>



Clifton Smyth Chief Business Development Officer	Mr Smyth brings 20+ years in façade, architectural & construction sector with extensive experience in global supply chain management, risk management and securing projects across Europe and the Middle East. He has held senior positions with McMullen Facades Ltd, Linder Group, Multiforms and Kann Finch Group (UAE).
Doug Hunt Chief Operations Officer	Mr Hunt is the former Chief Executive of Europcar Asia Pacific and former Regional Director Asia Pacific for Europcar International, responsible for 31 countries in the APAC region. He has extensive international experience in international franchising and licensing and brings extensive experience in the application and integration of alternative energy solutions, with seven years' experience in the renewables industry in the USA and Australia.
Earle Harper Chief Commercial Officer	Mr Harper has over 25 years' of corporate and federal government experience. His broad commercial background includes time at the Australian Trade Commission, where he was a Senior Trade Adviser for the fintech, ICT and renewable energy sectors. As a senior corporate adviser, Mr Harper has worked with multiple financial services and corporate clients where his key responsibilities included stakeholder engagement, investor relations and business strategy. As a commercialisation adviser, Mr Harper has assisted multiple start-up companies through their commercialisation journey from product ideation, corporate responsibilities and communications strategies.
Teun Wagenaar Head of Out of Home (OOH) Media	Mr Wagenaar is an industrial designer and serial entrepreneur who was a founder of Peer+ which was sold to Merck KGaA and formed the basis for its Merck Eyrise liquid crystal dynamically switchable glass solution. Co-founder of Lusoco, Mr Wagenaar is driving the growth of the Lusoco technology platform, integrated within ClearVue, with focus on Out of Home (OOH) media in the outdoor advertising, automotive and architectural markets.
Anna Abrossimova Head of Marketing	Ms Abrossimova comes with over 20 years of experience in marketing and advertising with a proven track record of achieving strong business results. In her last role as a Marketing Manager, she managed a team of 9 driving strategy and managing day-to-day activities for a global brand. She has expertise across all major areas of marketing including research and analytics, brand management, marketing automation and CRMs, websites, social, campaigns, content marketing, and engagement.

Source: Company

Our valuation of ClearVue

We value ClearVue at \$0.89 per share in our base case and \$1.20 per share in our bull case.

We have remodelled ClearVue and now value the company at \$0.89 per share in a base case and \$1.20 per share in an optimistic (or bull) case (Figure 11). On a market capitalisation basis (using 312.6m shares on issue accounting for future dilution – see below), these amount to \$276.9m in our base case and \$378.1m in our bull case. We have used a Discounted Cash Flow approach only and our assumptions are as follows.

Revenue model. We have modelled revenues based on revenue per project/licensee and the number of licensees. We have assumed typical revenue per project of A\$0.95m – which is a rough median of the various revenue CPV can receive from individual projects from \$0.15m to \$1.5m¹¹. We start with the pipeline of 59 projects and assume the company can reach

¹¹ Slide 20 of 2024 AGM Presentation



100% of this by the end of FY28. Thereafter, we assume an extended pipeline to 100 projects and that it takes another couple of years to penetrate this. We assume revenue per project increases by 3% per annum

Operating expenses. We assume 50% cost of sales¹² growth over the first couple of years with 30% thereafter. For other expenses (consulting, employee benefits, general & administrative and other), we assume 5% growth per annum. Depreciation is modelled as a percentage decrease of 20% of the opening book for PPE, 50% for Right of Use Assets, and we assume an average of 29% amortisation of intangibles. By the end of the life of our model, CPV has a 68% gross profit margin, a 51% EBITDA margin, a 42% pre-tax profit margin and a 32% post-tax profit margin.

Capital Structure (additional shares have been assumed). We assume CPV raises a total of \$20m in FY25. It has already raised \$7.5m in October 2024 through an institutional placement, raising 23,437,500 shares. We assume \$12.5m is raised in further equity, partly through the issue of new equity and partly through the existing "At-the-Market" (ATM) facility.

CPV's ATM facility. CPV established the facility with the issue of 10m shares to Alpha Investment Partners (Alpha) announced to the market on 23 October 2023. The announced facility indicates availability of up to AUD \$30m capacity as a cap - the actual facility capacity is a function of share price and available capacity over a request and option exercise period.¹³ To date the Company has announced use of the facility on two occasions – the first raising A\$1.725m through the issue of 3m shares and the second raising \$2.733m through the issue of 5m shares. The facility currently has 2m shares remaining with Alpha.

Tax: We assume 25% corporate tax rate, equivalent to the local tax rate for companies based in Australia with profits below \$50m.

Discount rate and terminal value growth rate: We have used a WACC (Weighted Average Cost of Capital) of 13.0%. This is derived from a risk-free rate of 4.0%, a beta of 1.5, and an equity premium of 6%. We have assumed terminal growth rate of 2%.

Figure 12 shows the sensitivity of our valuation to various WACCs.

Figure 11: Our Valuation of CPV

ClearVue Valuation (A\$m)	Base case	Bull case
Enterprise value	274.4	373.5
Net (debt) cash ¹⁴	(2.5)	(2.5)
Equity value	276.9	376.0
Diluted shares (m)	312.6	312.6
Implied price (A\$)	0.89	1.20
Current price (A\$)	0.19	0.19
Upside (%)	366.3%	533.1%

Estimates: Pitt Street Research

¹² CPV does not formally use 'cost of sales' in its annual reports, but we have put material costs and costs of product testing as such.

¹³ From Note 7.6 in the Company's last 4C: ".....The actual facility capacity will change up or down over time. The Company may not sell shares through the facility to Alpha above the maximum AUD\$30m which operates as a cap on the facility. It should also be noted that the Company may never issue Alpha a request for Alpha to exercise its option to buy shares at or above the Company's nominated floor price (the Company has discretion). Where the Company does make a request and Alpha acts upon the request even where terms are "favourable" Alpha may choose not to exercise the option or may only choose to partially exercise its option to buy shares (it is Alpha's decision to buy once ClearVue has made the request). Whilst an ATM is a "facility" it is also a "sold contingent option", contingent on the company activating the option and Alpha exercising that option, and the Appendix 4C does not properly cater for the cashflow from options, or potential future placements that are subject to prevailing placement capacity that may or may not require shareholder approval which may not be obtained. In keeping with Australian Accounting Standards and the intent of 4C reporting, the Company has prudently chosen to not report any ATM facility amount in item 7.3, to ensure it is giving a true and fair view of facility positions that have conditions precedent for the funding to be attained."

¹⁴ Because the facility has not yet been drawn down, it does not show as debt on CPV's balance sheet.



Figure 12: Sensitivity analysis of target price for varied WACC and terminal growth rate (base case)

		WACC						
		10.0%	11.0%	12.0%	13.0%	14.0%	15.0%	16.0%
Terminal Rate	1.125							
	0.50%	1.16	0.99	0.92	0.83	0.75	0.69	0.63
	1.00%	1.20	1.03	0.94	0.86	0.77	0.70	0.64
	1.50%	1.24	1.07	0.97	0.87	0.78	0.71	0.65
	2.00%	1.29	1.11	1.00	0.89	0.80	0.73	0.66
	2.50%	1.35	1.17	1.03	0.92	0.82	0.75	0.68
	3.00%	1.42	1.22	1.07	0.95	0.85	0.76	0.69
	3.50%	1.49	1.28	1.11	0.98	0.87	0.78	0.71

Estimates: Pitt Street Research

Catalysts for a re-rating

ClearVue is currently trading below our valuation range. We believe the following factors can contribute to the re-rating of the stock in the direction of our valuation range:

- CPV's first sales from its own pipeline and CPV's first licensing revenues flowing onto the company's cash flow and income statements with its strong pipeline bolstered by global strategic manufacturing and distribution partnerships. The company is aiming to sign 23 new licensees in 2025, and it has circa 60 projects in its pipeline spread across various geographies and sectors. If it can execute even only some of those, there is potential for rapid revenue growth especially in respect of licensees because they can on-sell to their own clients.
- The company is set to benefit from the decarbonisation of the economy. Government stimulus (such as the EU Green Deal and RePower EU) will play a big part in the transition to renewable energy.
- Continued testing results for ClearVue^{PV} for individual clients and governments (eg. Hong Kong) including:
 - i) Reduced emissions,
 - ii) A financial payback from generating electricity on site and from better thermal control,
 - iii) Higher plant yields for clientele using ClearVue^{PV} for greenhouses,
 - iv) A quick return on investment from financial and environmental standpoints



Risks

We foresee following key risks to our investment thesis for ClearVue:

- **Competitive risk:** ClearVue is in a highly competitive market. There is risk of major competitors obtaining the market share through development of superior technology in the race to achieve net zero emissions.
- **Macroeconomic risk:** Changes in economic conditions and/or government policies may adversely impact the company. The reduction of government subsidies could hurt the company.
- **Licensee risk:** There is risk that the company will not be able to engage licensees to manufacture and distribute its products, or that the actions of ClearVue's licensees may impact the final products and the company's reputation.
- **Supply chain risk:** ClearVue's ability to commercialise its technology will depend heavily on its ability to source underlying products and to manufacture them to an acceptable quality. Any disruption to supply chains will impact the delivery of its products.
- **Cost inflation risk:** There is the risk that the company could be hit by cost inflation that could erode company margins.
- **Key personnel risk:** ClearVue's performance is highly dependent on its management team and the staff. There is a risk that the company might lose these individuals and might be unable to replace them and/or their contribution to the business.



Appendix I: CPV's RTZO

In November 2024, ClearVue acquired the IP and assets of ROOTS Sustainable Agricultural Technologies (ROOTS). The former ASX-listee had developed a technology to improve crop yield and quality. Its Roots Zone Temperature Optimisation (RTZO) system cools and heats roots of plants as needed dependant on input from temperature sensors placed in the area (Figure 13). The system maintains an optimum range of temperatures for plant growth. The root temperature is the most important factor in plant physiology for growth and quality.

Figure 13: RTZO (Root Zone Temperature Optimisation) spikes with combined in-built irrigation and fertigation



Source: Company

The benefits of the system include:

- It dramatically reduces energy costs and environmental pollution by lowering or increasing the reliance on air heating/cooling systems to create a favourable growing environment
- It delivers increased yield,
- Crop quality is superior as fruits and vegetables tend to be larger, tastier, and mature earlier,
- The growing season is shortened, and so the plants can be brought to market earlier,
- Irrigation savings are delivered, and
- There is a reduced need for pesticides by helping plants resist infestation and building in their immune systems.

ROOTS has other systems too, but the other most important one (in other words, the most relevant to CPV in the short term) is its RTZO technology that can significantly reduce energy needs for heating and cooling in a greenhouse setting.

For outdoor field crops ROOTS' Irrigation by Condensation (IBC) technology enables standalone irrigation using air humidity to extract water from the air (Figure 14) – a feature particularly attractive for desert growing regions such as in the MENA region. Humidity in the air is condensed on the external surface of water pipes. An insulated water tank is cooled to below dew point temperatures. The chilled water is then circulated through pipes in the field (or potentially a greenhouse), and these pipes are placed on the ground in either a horizontal or zig-zag layout. The humidity that condenses on the pipes flows by gravity to the soil, irrigating and cooling the plants. In many locations, no additional irrigation is needed to maintain plant survival and food production.



Figure 14: Roots' Irrigation by Condensation (IBC) technology



Source: Company

CPV believes these technologies are complementary to its existing product suite, as they offer the intention to offer Net Zero solutions, but also as solutions for greenhouses. ClearVue^{PV} could be used on the external of a Glasshouse, whilst RTZO and IBC could be used on plants inside the greenhouses, and both have demonstrated material yield improvements.

CPV picked up the IP for just NIS431,400 plus VAT (which is roughly A\$170,000 plus Israeli VAT), because the original owners went bankrupt. CPV picked up these assets without acquiring any liabilities or past debts of ROOTS – just the obligations of maintaining IP rights and regulatory obligations in respect of IP rights.



Appendix II – ClearVue’s Capital Structure

Security Class	Number	%
Ordinary shares	268,170,974	88.7%
Options	19,752,262	6.5%
Performance Rights	14,500,000	4.8%
Total	302,423,236	

Source: Company – Appendix 2A 5 December 2024

Appendix III – ClearVue’s patents

CPV has a long list of patents, and we do not intend to list all of them here. Some of the most important include:

WO 2013, 003890, *A spectrally selective panel*, priority date 29 June 2012, invented by Victor Rosenberg, Mikhail Vasiliev and Kamal Alameh

- The patent discloses a spectrally selective panel comprising a diffractive element (such as a phase grating) etched/embossed on the panel. The panel comprises an air-filled gap, wherein the diffractive element is placed. The element is made from a partially light-transmissive material and features grooves filled with epoxy containing luminescent scattering powders and pigments. The panel allows transmission of visible light while deflecting infrared light to cool interior spaces without the need for energy-intensive cooling systems.
- Applications for the patent were filed in the US, Japan, Europe, Denmark, Spain, Mexico, South Korea, Portugal, Poland, Malaysia, China, Canada, Brazil, Australia, Norway and South Africa. It has also been filed as a WIPO application.
- The patent has been granted in multiple geographies, such as the US, Canada, Europe, South Korea and Japan.

WO 2015, 024046, *A device for generating electric energy*, priority date 15 August 2014, invented by Mikhail Vasiliev, Kamal Alameh and Victor Rosenberg

- The patent pertains to a device (in the form of a window, etc.) for generating electricity from light using photovoltaic (PV) elements. The device comprises a partially light-transmissive panel featuring multiple PV elements placed on the edges to convert incident light into electric energy. The panel redirects the incident light to the PV elements for energy conversion that are further coated with an optically transmissive material for protection.
- Applications for the patent were filed in the US, Europe, Canada, Japan, China, Mexico, Malaysia, Denmark, Lithuania, Portugal, Spain, Australia and South Korea. It has also been filed as a WIPO application.
- The patent has been granted in multiple geographies, such as the US, Europe, Australia, Japan and South Korea.

WO 2020, 010385, *Device for generating electricity*, priority date 12 July 2018, invented by Jamie Lyford, Victor Rosenberg and Kim Harmer



- The patent discloses a device (for installation into window frames, etc.) to generate electricity using PV panels. The device comprises 3 glass panels with PV elements arranged in the cavities between the panels to convert incident light into electrical energy. The device prevents overheating of the building interiors while generating renewable energy, addressing major environmental concerns.
- Applications for the patent were filed in the US, Europe, Australia and China. It has also been filed as a WIPO application.
- As of now, the patent has been granted only in Australia.

WO 2021, 022316, *Self-powered building unit*, priority date 21 May 2020, invented by Jamie Lyford, Victor Rosenberg, Christopher Cole and Steven Coonan

- The patent relates to a building unit comprising 2 light transmissive panels with a cavity in between. The cavity features PV cells and electrical devices powered by the electricity generated by the PV cells. The electrical devices can be air dampers, fans, LCDs, e-inks or pumps equipped with sensors and controlled via autonomous or remote means. The building unit allows transmission of visible light and capturing of heat to generate electrical energy, helping achieve significant savings.
- Applications for the patent were filed in the US, Europe, Japan, China, South Korea, Australia and Canada. It has also been filed as a WIPO application.
- The patent is recent and has not been granted in any geography yet.



Appendix IV - Analysts' Qualifications

Stuart Roberts, lead analyst on this report, has been an equities analyst since 2002.

- Stuart obtained a Master of Applied Finance and Investment from the Securities Institute of Australia in 2002. Previously, from the Securities Institute of Australia, he obtained a Certificate of Financial Markets (1994) and a Graduate Diploma in Finance and Investment (1999).
- Stuart joined Southern Cross Equities as an equities analyst in April 2001. From February 2002 to July 2013, his research speciality at Southern Cross Equities and its acquirer, Bell Potter Securities, was Healthcare and Biotechnology. During this time, he covered a variety of established healthcare companies, such as CSL, Cochlear and Resmed, and numerous other emerging companies. Stuart was a Healthcare and Biotechnology analyst at Baillieu Holst from October 2013 to January 2015.
- After 15 months over 2015–2016 doing Investor Relations for two ASX-listed cancer drug developers, Stuart founded NDF Research in May 2016 to provide issuer-sponsored equity research on ASX-listed Life Sciences companies.
- In July 2016, with Marc Kennis, Stuart co-founded Pitt Street Research Pty Ltd, which provides issuer-sponsored research on ASX-listed companies across the entire market, including Life Sciences companies.
- Since 2018, Stuart has led Pitt Street Research's Resources Sector franchise, spearheading research on both mining and energy companies.

Nick Sundich is an equities research analyst at Pitt Street Research.

- Nick obtained a Bachelor of Commerce/Bachelor of Arts from the University of Sydney in 2018. He has also completed the CFA Investment Foundations program.
- He joined Pitt Street Research in January 2022. Previously he worked for over three years as a financial journalist at Stockhead.
- While at university, he worked for a handful of corporate advisory firms.

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