



CLEARVUE TECHNOLOGIES LIMITED

# Clear | Energy Producing | Energy Saving

Advanced Glazing & Energy Solutions

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Capital Structure & Governance

# Capital Structure

## **Capital Structure**

(as at 11 October 2021)

No debt.	
Ordinary Shares on Issue	210,278,844

Options on Issue  AUD \$0.20 exercise price – exp. 31 Dec 2022 – 9,575,247  AUD \$0.25 exercise price – exp. 22 Dec 2023 – 800,000  AUD \$0.1425 exercise price – exp. 11 Jul 2024 – 2,750,000  AUD \$0.75 exercise price – exp. 30 Jun 2024 – 2,000,000	15,575,247
Performance Shares Performance Rights	3,000,000 10,000,000
Approx. Market Cap @ \$0.29	≈ \$61 million
Audited Cash Balance (30 June 2021)	≈ \$15.9m

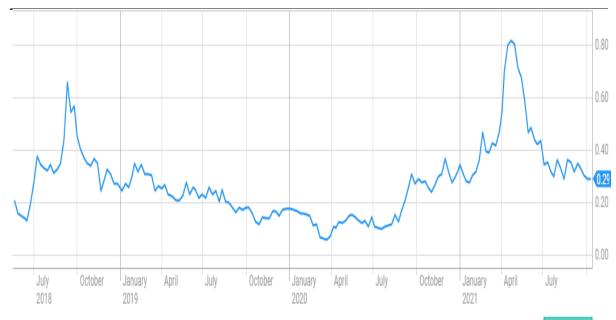
## **Shareholders**

(as at 11 October 2021)

Top 20 holding 40% of Issued Capital

13.42% held by board

### Share Price Performance (25 May 2018 – 11 October 2021)





# Corporate Structure

## **Board**

Directors	Role	Experience	Brief Bio
Victor Rosenberg	Executive Chairman & Founder	25 years glass industry	Serial Entrepreneur. Globally recognised for his contributions to glass industry. Extensive business experience in senior management and sales over approx. 50 years.
Stuart Carmichael	Non-Exec Director	20 years corporate finance	Member of the Institute of Chartered Accountants with over 20 years corporate finance experience. Currently Chairman of Schrole Group Limited (ASX:SCL) and K-TIG Limited (ASX:KTG), and Non-executive Director of De.mem Limited (ASX:DEM), Swick Mining Services (ASX:SWK) and Harvest Technology Group (ASX: HTG).
Roger Steinepreis	Non-Exec Director	30 years corporate law	Corporate and resources lawyer with 30+ years' experience. Legal adviser to a number of public companies on a wide range of corporate related matters. Currently serves as Non-Executive Director on various Boards including Petronor E&P Limited (Oslo Access: PNOR), Latitude Consolidated Limited (ASX: LCD), and is Non-Executive Chairman of Apollo Consolidated Limited (ASX: AOP).
John Downes	Non-Exec Director	30 years' experience in glazing and façade systems	Construction industry professional with over 30 years' experience in glazing and façade systems and construction project management. Currently Global Head of Façade Supply Chain at LendLease based in its London, United Kingdom office. MSc Façade Engineering from the University of Bath, Fellow of the Society of Façade Engineers and a sponsor's board member of the Centre for Window and Cladding Technology chairing the sub-committee on Sustainability in Facades.
Deborah Ho / Brett Tucker	Joint Co Secretaries	Combined over 12 years corporate and compliance	Company Secretaries to a number of ASX listed and private companies and has been involved in numerous public corporate transactions and acquisitions. Mr Tucker is a Chartered Accountant and Ms Ho is an Associate of the Governance Institute of Australia.



# Management

Key Management	Role	Experience	Brief Bio	
Dieter Moor	European CEO	17 years BIPV industry experience	Former co-founder and CEO of ertex solar GmbH – a leading global BIPV supplier with more than 2000 projects delivered worldwide. Dieter has a background in civil engineering with extensive experience with sales and marketing of BIPV systems gained over the last 30+ years.	
Jamie Lyford	COO & GC	25+ years IP law / technology commercialisation	IP and licensing lawyer with over 20 years experience. Previously worked in leading Australian and overseas law firms, BHP, global IT company ATOS and ran Western Australian Government Innovation Centre.	
Geoff Edwards	CFO	30 years experience in CFO, senior financial and commercial roles	Geoff 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 start ups, mergers and acquisitions, high growth businesses, equity and debt capital raisings, turn arounds, building financial systems and procedures and strategic planning and implementation.	

# **Technical Team**

<b>Key Management</b>	Role	Experience	Brief Bio
Steve Coonen	VP Development – Products, Technology & Sales (North America)	38 years experience in photovoltaics; 26 year focus on BIPV	Steve Coonen is a photovoltaic consulting engineer, specializing in building integrated photovoltaics (BIPV) based in California. Mr Coonen is a pioneer in the BIPV field and whilst working on the ClearVue technology development pipeline assists with North American sales opportunities.  Mr Coonen currently has over 3,000 BIPV systems fielded to his credit, including the California Academy of Science in San Francisco, the Whitehall Ferry Terminal in Manhattan and 1,500 new houses for Pulte Homes.
Dr Mikhail Vasiliev	Lead Scientist	20+ years physics	Mikhail has extensive science and technology background, from developing fibre-optic sensors and laser interferometers in the 1990's, to the design of solid-state lasers in the 2000's, followed by 15 years of experience as Senior Research Fellow at Edith Cowan University, where he concentrated on nanotechnology and materials science projects and still supervises PhD students. He has contributed to the design and development of Clearvue core components and technologies, including advanced low-e coatings, glazing systems, luminescent/diffractive interlayers, and solar window systems. He is a multi-skilled expert in the fields of optical physics, optical engineering, photonics, nano-engineered functional materials and also in scientific software development. Mikhail has a PhD (Physics), Victoria University (Melbourne, Australia) and has co-authored multiple (> 50) high-impact research articles published in international peer-reviewed journals.



# **Technical Team**

<b>Key Management</b>	Role	Experience	Brief Bio
Tao Zhang	Structural Engineer	16+ years engineering	Tao is a chartered professional engineer in both Australia and Chinas with 16+ years experience. Tao works as Project Manager & Senior Technical Officer in ClearVue and leads our technical team on ClearVue product certification programs and is involved in all aspects of ClearVue's R&D efforts. Tao also supports our sales efforts and manages our global OEM manufacturer and supplier relationships.
Chris Cole	Mechatronic Engineer	Graduate mechatronic engineering	A recent graduate of Sydney University with a degree in Mechatronic Engineering (first class honours), Chris has a background installing sensing equipment on solar and wind farms. He is involved in the design, development, construction, programming and testing of our Smart Façade prototypes, and brings a knowledge of integrated software, hardware and AI systems to the team.



Company & Technology Overview

# Company & Technology Overview

## **Smart Building Technology Company**



Creating smart building materials that are:

- Sustainable
- Energy Efficient
- Positive environmental outcomes

## Part of the solution for achieving:

- Zero net energy
- Zero net carbon
- Reducing carbon footprint
- Autonomous clear functional windows

## **Technology & Product**



A clear glass panel that is:

- Energy saving/producing
- Highly insulating
- Reduces carbon footprint
- Scalable
- Efficient 3 to 4% conversion of radiance to energy

The ClearVue product can be used to achieve:

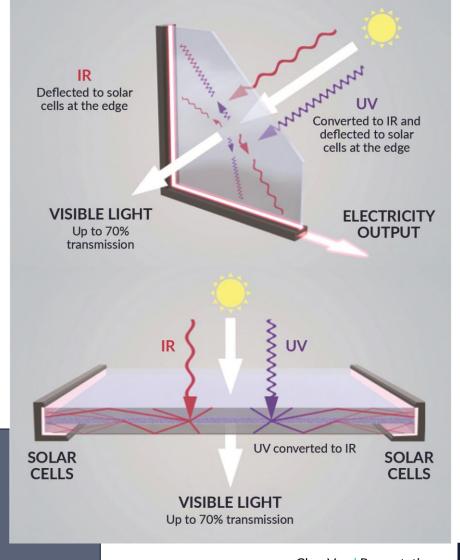
- significant energy cost savings
- prevent unwanted solar radiation (UV and IR) from entering a building; and
- then converting the unwanted radiation into electricity.





# Technology – Overview

- ClearVue's patented technology sits within an activated interlayer between two panes of glass.
- Visible light (VIS) passes through the glass
- Micro & nano particles interact with Ultraviolet (UV) radiation which is down-converted to longer wavelengths and scattered along with Infrared (IR) light to the edges of the glass and is collected by Photovoltaic (PV) cells and produces electricity
- Turns damaging UV and IR radiation into energy
- Insulation properties reduce heating and cooling costs
- Innovation pipeline of new technologies to improve power performance including R&D into inorganic quantum dots





## Products / Services Overview

- Solar PV Glass (Finished IGUs and Framed Windows)
  - fabricated and supplied by OEM suppliers and sold by ClearVue
  - ☐ Sizes: 3+m high x 1.6m wide (up to approx. 4.8 sqm)
- Solar PV Components for use by ClearVue licensees
  - PVB interlayer
  - Solar PV strips
  - Gen 2- glass panes with laminated PV
  - ☐ Gen 3 PVB strips with integrated PV for
    - lamination
- Royalty on licensee manufactured CPV products
- ☐ Licensee Support Services



- **☐** Smart Façade Panels (finished and framed)
- Smart Façade Components

■ Hardware microcontroller incl MPPT/battery controller/WiFi and other comms/IO platform

for IOT sensors and devices

Building Analytics / Data

TOUGHENED GLASS

LOW-IRON GLASS

CLEARVUE PVB FILM LOW-E

SOLAR CELLS

& SEALANT

CLEARVUE PVB LAMINATE LAYER ALUMINIUM Data collected, analysed and sold as a service from network of IOT connected windows (at building, community, city, global levels)





# Smart Façade Developments









# IP & Competitive Advantage Overview

- **85 granted patents** and 40 patent applications throughout the World across **13 patent families** covering CPV system and elements of system
- □ Design protection undertaken for latest versions of Gen 2 and Gen 3 shingled PV products (know-how and trade secret protection on method of manufacture to be used for these developments as well)
- ☐ Trade Mark protection undertaken in most key markets (SA and NZ proving to be only countries where main ClearVue PV branding may not be registrable alternatives filed)
- Domain names (for key trade marks, as well as various generic descriptive type domains)
- Copyright protection on circuit layouts for hardware controller, software/config files for smart façade controller
- ☐ Market lead in <u>clear</u> solar glass (currently) (market leader for <u>tinted</u> solar glass is Onyx)
- ☐ Comparative ease of manufacture and hence licensing; low CAPEX for licensees to participate
- ☐ Gen 1 Products Certified USA UL; Europe MEA & IEC; Australia under AGWA & Intertek











## Commercialisation Overview

- Sales Opportunities
  - Commercial High Rise Buildings
  - Protected Cropping Greenhouses (LHF)
  - Showcase Deployments
- Key Factors
  - Government incentives
  - Government regulation disincentives
  - ESG investment directives
  - Climate and Geography
  - Market Size
- Key Locations
  - USA
  - Northern Europe (Germany)
  - China (JV entry)
  - Australia

## Manufacturing Supply Chain

- PV Strips China / Taiwan / US
- Interlayer Europe / China / US
- Gen 2 Products US (initially)

## ■ Market Entry

- Digital Campaigns & new website
- Licence arrangements (KPI's)
- Direct Marketing (feasibility study's)
- Showcase Deployments

## Partners / Promoters

- Architects
- Façade Engineers
- Project Developers
- Property Fund Managers
- Resellers
- Greenhouse developers
- Growers







# Single & Double Glazing Product Development

### Opens up new market opportunities

- Retrofit
- Transportation
- Markets not yet moved to multi=glazing

## **New Product Designs**

 Based on previously announced improvements to existing technology platform

## **Availability**

- Currently in trial and testing stages
- Estimated commercially available within 12 months, subject to certification and any productions scaling issues











# ClearVue delivers major advantages for reducing carbon footprint of buildings

- ClearVue is working with energy modelling and verification specialists Footprint in Canada, to measure the performance of ClearVue's product against the "Toronto Green Standard". The Toronto standard is one of the World's highest standards for sustainable building design.
- As part of this exercise the ClearVue product has been designed into an energy efficient Archetype building that will serve as a template for the design of a medium scale commercial building that can demonstrate how the ClearVue product can assist architects and engineers in designing net zero or near net zero buildings.
- ☐ ClearVue's work on the Archetype seeks to demonstrate that ClearVue's PV windows make it possible to achieve a low carbon footprint, without sacrificing natural light and views.



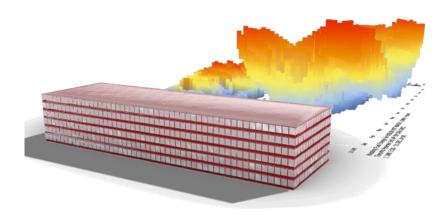
**FOOTPRINT** 

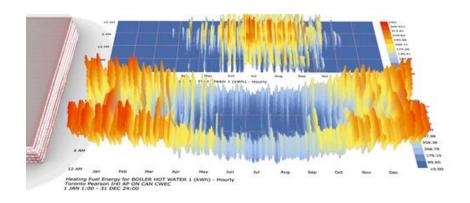
- ☐ The ClearVue Archetype modelling to date has demonstrated that by using CPV Insulated Glass Units (which deliver energy but also have excellent thermal insulation properties) in a particular form of building design is able to produce a building that has a Total Energy Use Intensity (TEUI) as defined by the Toronto Green Standard that exceeds Toronto's standard for new construction after 2030.
- ☐ The Archetype model is for a 15,000m² building that also meets Toronto's requirements for 2030 in terms of the Thermal Energy Demand Intensity (TEDI) gauge (which measures the thermal envelope performance) and the Green House Gas Emissions Intensity Measure (which looks at total carbon produced by the building).



# Archetype Modelling adding further credibility to ClearVue

- Early modelling has shown that with the integration of rooftop PV on top of the Archetype model building and 40% of the building's car parking (as required by the Toronto construction code) the building will deliver NET ZERO performance, with no net greenhouse gas emissions.
- Early modelling shows that the ClearVue technology can deliver this result with a window to wall (fenestration) ratio of 70% glass to 30% wall material.
- Data shows a compelling case not only for new construction but in the decarbonisation of existing buildings that will be a key factor in achieving global carbon reduction targets in the coming years.







# Life Cycle Analysis (LCA) & Environmental Product Declaration (EPD)

- Life cycle assessment (LCA) is a methodology for assessing environmental impacts associated with all the stages of the life cycle of a commercial product, process, or service.
- □ Recently engaged carbon footprinting specialists Pleiades Environmental Accounting have commenced working on the ClearVue PV window product's lifecycle assessment (LCA) to generate an independently verified Environmental Product Declaration (EPD) for the product, for three key target markets, Australia, Europe and the US.
- An EPD is an essential tool for selling the ClearVuePV product to sustainability focused endcustomers.

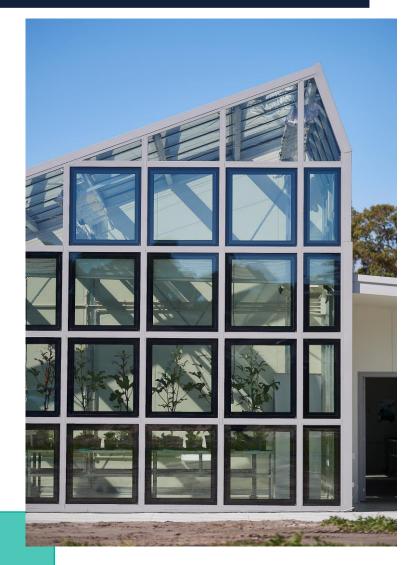
ClearVue's product having an EPD will benchmark the ClearVue PV product's performance and help the buildings that they are installed in achieve accreditation for green building certifications and schemes such as <a href="Leadership in Energy and Environmental">Leadership in Energy and Environmental</a>
<a href="Design">Design</a> (LEED) in the US and <a href="Building Research Establishment">Building Research Establishment</a>
<a href="Environmental Assessment Method">Environmental Assessment Method</a> (BREEAM) across the UN, through the awarding of carbon credits.

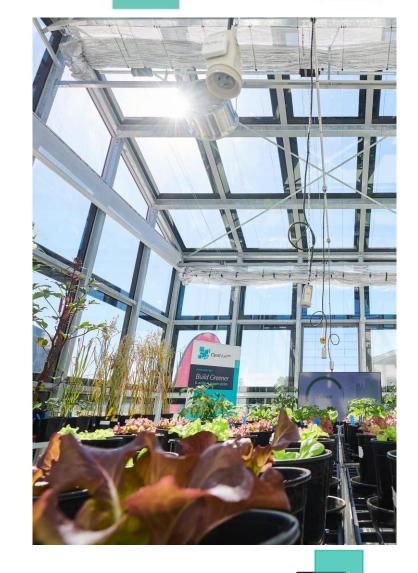




# Murdoch University Solar Glass Greenhouse

- Officially opened 19 April 2021
- World first clear solar glass greenhouse
- Why is it so significant?
  - ☐ Renewable Energy produced
  - High Insulation means less energy use
  - Lower Water Use
  - Higher crop yields
  - Resistant to weather damage
  - Lower Carbon Emissions
  - High Security for Cannabis or medicinal production







# Murdoch University Solar Glass Greenhouse











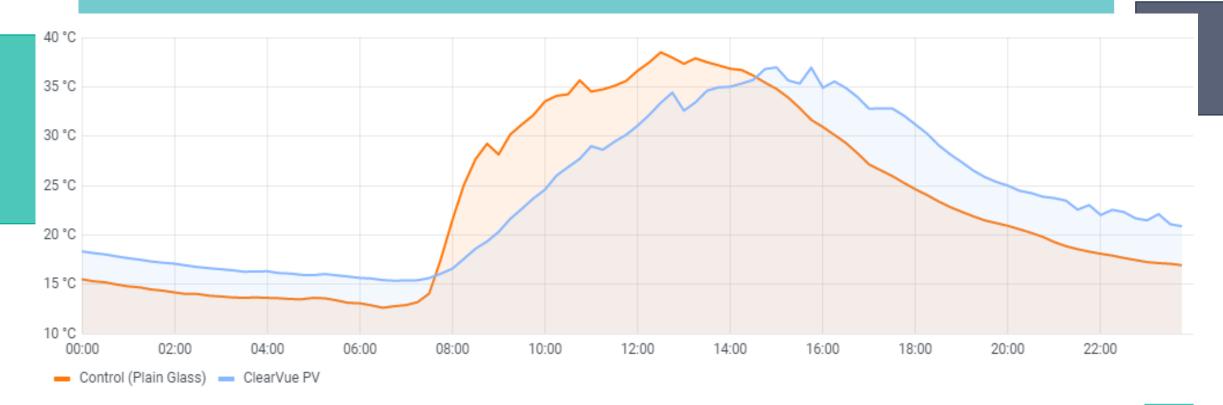
- Glazing and power performance data collection and analysis underway.
- Plant science trials have now commenced with a mixture of grains, legumes, fruit and vegetables (10 types, 480 plants total) including: wheat, barley, strawberry, lettuce, tomato, canola, dwarf bean, lupin, spinach and Arabidopsis.



# Murdoch University Solar Glass Greenhouse



Data from Murdoch R&D Greenhouse application of ClearVuePV Glass – with no HVAC use – the ClearVuePV room is 5-10°C cooler during the day when outside temperature is high, and warmer at night.





# Aqua Ignis Sendai Greenhouse Project



# Tomita Technologies Ltd.

- ☐ ClearVue's glazing will be deployed into the roof of a strawberry greenhouse which forms part of the 'Aqua Ignis Hot Springs' project in Sendai City, Japan.
- 8573 kWh of renewable energy per year based on modelling for that region ClearVue's PV glazing will contribute to the eco credentials of the Aqua Ignis project with the PV glazing panels on the greenhouse expected to generate approximately.
- ☐ The Aqua Ignis Hot Springs project, centered around a natural sodium chloride / bicarbonate hot spring, is set to become a significant tourist attraction int he region with visitors able to visit the strawberry greenhouse and experience ClearVue's world leading solar PV glazing solution.









## **Business & Revenue Model**



### ClearVue will derive revenues from:

- □ **Direct sales:** The Company will initially sell and supply fully assembled IGU/window products direct to distributors and licensed channel partners in Australia and worldwide. Then, as manufacturing licensees are appointed in different territories the revenue streams that follow will apply.
- Component sales (US\$245 m2): The company will sell technology/product components to its manufacturing licensees including its proprietary nano and micro particle doped activated interlayer and its proprietary mini solar photovoltaic strips for use inside of each PV integrated glazing unit\*
- Additional revenue streams: The company will sell its smart façade controller hardware and license associated software (and data) for additional revenue opportunities.
- ☐ Typical minimum sales requirements of a distribution only licensee or a manufacturing/distribution licensee is: 5,000 sqm for year 1, 10,000sqm for year 2, 20,000 sqm for year 3, 30,000 sqm for year 4 & 40,000 sqm for year 5.
- ☐ One licensee (only) achieving their performance criteria equates to over USD \$25m in revenue over 5 years.

### Notes:

\*Complete ClearVue IGU's initially to be sold in Australia by ClearVue to gain market acceptance. Approx. per sqm rate may change based on order quantities and scaling, country and project specific requirements.



## Size of the Market



"By 2060, the world is projected to add 230 billion m<sup>2</sup> (2.5 trillion sq ft) of buildings, or an area equal to the entire current global building stock. This is the equivalent of adding an entire New York City to the planet every 34 days for the next 40 years." <sup>1</sup>

- North American market for window glass installed <u>annually</u> is currently estimated at USD \$120 billion.<sup>2</sup>
- Global market for building-integrated photovoltaic (BIPV) technologies was USD \$2.4 billion in 2016. Market to grow to USD \$4.3 billion by 2021 (with a compound annual growth rate (CAGR) of 12.2% for the period 2016 to 2021).<sup>3</sup>
- ClearVue's target market represents in excess of 2.1 billion sqm<sup>5</sup> of glass per annum (total market size 5.5 billion+ sqm of glass per annum)<sup>4</sup> (*Target Market*).
- It is expected that a small 10 floor 25,000 sqm building could deploy approx. 3,150 sqm minimum of ClearVue product (assuming 3 building sides of 50m long and part floors of 2.1m high only)<sup>6</sup>.
- A single large building, for example the One World Trade Center (Freedom Tower) New York City has over 93,000 sqm of glass.

  Sources:
  - 1. https://zero-code.org/
  - 2. http://raymondjames.bluematrix.com/sellside/EmailDocViewer?encrypt=edddb1da-c175-47ab-b9c8-ca69c60f7531&mime=pdf&co=RaymondJames&id=REPLACEMEEMAIL&source=libraryView
  - 3. https://www.bccresearch.com/market-research/energy-and-resources/building-integrated-photovoltaics-markets-report-egy072C.html
  - 4. https://www.nsg.com/~/media/NSG/Site%20Content/Temporary%20Downloads/Japanese/NSGFGI\_2011%20EN2.ashx
  - 5. ClearVue does not represent that it will be able to obtain such market share or that such revenue can be achieved. See Disclaimer Slide Page 2.
  - 6. See ASX Announcement Technical Update 28/03/2019 https://www.asx.com.au/asxpdf/20190328/pdf/443v6jr2zhbvm7.pdf





# Investment Highlights

### Attractive industry thematic

- ESG investment opportunity in global growth sectors of BIPV, smart cities and food security
- Unique with high consumer buy in
- Regulatory support across multiple jurisdictions
   EU and US focus change in Govt in US
   anticipated to impact growth
- Large Addressable Market

## Proprietary Technology

- First in class product
- Strong IP portfolio
- Regulatory requirements met for sales in key regions
- Price competitive with payback period
- Strong product and tech development pipeline

### Near term catalysts

- Showcase deployments under way
- Continued deal flow
- High quality counterparty engagement

### Refocussed Business

- Investor entry remains low compared to competitors
- New European CEO
- Experienced Board



# Recent & Upcoming Milestones

### **Announced first-half 2021**

- Global digital marketing campaign & new website launched | 1 April 2021
- Distribution Agreement with Tomita Technologies,
   Japan for Greenhouses signed | 12 April 2021
- Showcase Greenhouse Project Murdoch opened |
   19 April 2021
- Listed onto OTC QB to better engage with US market |
   26 April 2021
- Major product development announced single and double-glazed product versions | 18 May 2021
- ClearVue forming JV with eLstar Dynamics BV,
   Netherlands | 26 May 2021
- ClearVue Greenhouse, Murdoch Uni Plant science trials commenced
- Deployment into Sydney park project deposit received, glazing ordered | 28 June 2021

## **Upcoming 2021**

- Demonstration project New York City
- Archetype modelling
- Showcase projects: mini-home
- Japan Greenhouse and Sydney park installations
- Securing additional licensees in target geographies
- Completion of EU presence establishment
- Completion of JV establishment with eLstar Dynamics
- Conversion of showcase projects, licensees and marketing efforts into purchase orders – primary focus on US and European markets, focus on quicker sales (greenhousing)







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