



ASX ANNOUNCEMENT

FOR IMMEDIATE RELEASE TO THE MARKET

PPK GROUP LIMITED – ASX Code: PPK

12 August 2021

White Graphene Ltd Production Update

PPK Group Limited (ASX Code: PPK) is pleased to announce that its ~60% owned subsidiary, White Graphene Ltd ('WGL'), is currently assembling its initial production module prior to commissioning for full scale production expected in Q1 CY22. White Graphene is a nanomaterial with well recognised commercial potential. It parallels the characteristics of graphene but presents several additional and superior properties to graphene while matching its strength and functionality.

WGL is aiming to manufacture White Graphene on a commercial scale and expects its unique manufacturing process to produce low-cost high quality White Graphene to market end users.

Background

WGL operates under a Joint Venture Research Agreement with Deakin University (Deakin). PPK's fellow shareholders in WGL are Deakin with ~22% and BNNT Technology Ltd (BNNTTL) owning the remaining ~9%. With the assistance of PPK, WGL raised \$2.8m of seed capital (~9%) in late 2020 for research and development as well as to build a prototype manufacturing plant.

Moving to Full Scale Production

Following the delivery of major items of equipment for the first White Graphene production module, the installation process has now begun at WGL's facility at the ManuFutures advanced manufacturing hub in Geelong, Victoria, part of Deakin's Institute for Frontier Materials. A 6-month production R&D phase is also commencing to refine the many operating parameters required for full scale continuous production prior to commissioning for such production in Q1 CY22. This is Stage One of the Project.

WGL has also reported on the preliminary results of its initial research and testing efforts to identify suitable applications for White Graphene. WGL's testing has shown significant benefits when using its WG product for: improved strength in flow coatings for concrete flooring; greater strength and cleanability in paints for timber and metal; stronger fiberglass resins; crack resistance for faux leather; stronger and lighter ballistic polymers; and greater electrical insulation for wire coatings. Beyond these areas, WGL is continuing to research the incorporation of White Graphene in pipelines and vessels for hydrogen transportation and containment, a nascent and potentially highly lucrative market.

The WGL Board is currently reviewing these results with a view to approving specific projects in the near term to develop these applications as proven technologies and enter commercialisation agreements with selected industry partners over the coming 12-18 months.

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Stage Two of the Project will see more advanced and automated production techniques incorporated and significant capacity expansion for higher volume outputs.

White Graphene and BNNT

BNNTTL, PPK's 50% owned subsidiary and co-shareholder in WGL, and Deakin have enjoyed ground-breaking technical success in the production of high purity Boron Nitride Nanotubes (BNNT). This highly relevant expertise has contributed to the progress of WGL.

White Graphene is the name commonly given to Boron Nitride Nanosheets (BNNS), flat 2-D sheets with microscopic thickness. They share many of the important properties of BNNT such as high strength, thermal stability up to 900 deg C, excellent thermal conductivity, electrical insulation and radiation shielding.

White Graphene versus Graphene

White Graphene shares its atomic structure with graphene but the chemical compositions of graphene and White Graphene are completely different. Graphene is an array of carbon atoms configured in multi-layered sheets whereas White Graphene is equal numbers of boron and nitrogen atoms configured as extremely thin monolayer sheets.

The most significant difference between the two nanomaterials is that graphene is electrically conductive whilst White Graphene is electrically insulative. Other areas in which White Graphene may be superior to graphene include:

- Thermal conductivity
- Micro tensile strength
- Thermal & chemical stabilities
- Corrosion resistance
- Neutron & radiation absorption capability
- Fire resistance
- Anti-bacterial action

White Graphene is also non-toxic to the human body, colourless in material composites, and it can generate electricity when mechanically manipulated.

Executive Chairman of PPK, Robin Levison noted:

"It is very encouraging to witness the ongoing success of PPK's University technology incubation and commercialisation strategy. I congratulate the WGL team on its rapid progress and in particular, the early identification of initial target commercial applications for the product and the fact they expect to be ready to undertake commercial scale production of this new nanomaterial as early as 2022.

PPK Group regards White Graphene as highly complementary to our investment in BNNTTL, giving PPK shareholders further exposure to extremely large commercial opportunities with global scale."

This announcement has been made and authorised by the PPK Group Board.

(Deakin University IFM – Institute for Frontier Materials White Graphene Production Report attached)

For further information contact:

Robin Levison

Executive Chairman of PPK Group Limited
On 07 3054 4500.

WHITE GRAPHENE PRODUCTION REPORT

White Graphene Production Plant – Deakin University, Waurn Ponds

3rd August 2021

To: Board of Directors
White Graphene Limited

Dear White Graphene Board Members,

I am pleased to provide this report after receiving delivery of the major items of equipment for the first White Graphene production module. This machinery is currently being installed and we have commenced a subsequent research and testing phase to refine the many operating parameters involved in our unique manufacturing process.

This phase is expected to take 4-6 months, prior to commissioning for full scale production.

I am also extremely excited to report the preliminary results of our latest R&D efforts which have proven the enormous benefits our White Graphene can provide when added to paints, polymers, resins and coatings. Based on these results, I recommend we immediately commence the attached list of research projects which I consider to be the easiest and quickest to market.

I look forward to providing a further update at the completion of this research and testing phase, in readiness for full scale production.



Dr Luhua Li
Chief Technical Officer / Head Scientist

WHITE GRAPHENE PROJECTS

		Concrete Floor Coatings	Acrylic & PU Timber Coatings	Paint	Glass Fibre Reinforced Epoxy	PU (Faux) Leather	Ballistics	Wire Sheaths & Coatings
KEY BENEFITS	Compressive strength	•				•		
	Compressive modulus	•				•		
	Compressive strain	•				•		
	Tensile strength		•		•	•	•	•
	Tensile modulus		•		•	•	•	•
	Tensile strain		•		•	•	•	•
	Flexural strength				•		•	•
	Flexural modulus				•		•	•
	Flexural strain				•		•	•
	Hardness	•	•	•	•	•		•
	Adhesion		•	•				
	Wear resistance	•	•			•		•
	Friction coefficient	•	•			•		•
	Wettability/Contact angle	•	•	•	•	•		•
	Colour change	•	•	•		•		
	Thermal stability	•	•	•	•	•	•	•
	Fire retardancy	•		•	•	•		•
	Water vapor permeability		•	•		•		
	Anti-bacteria	•	•	•		•		
	Thermal conductivity				•	•		•
Electrical insulation							•	
UV aging resistance	•	•	•	•	•		•	
Microstructure analysis	•	•	•	•	•	•	•	
Cleanability			•					
Water & oil absorption	•				•			