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## The World's First Agricultural Waste Graphite/Graphene Producer





Transforming an abundant and renewable waste product, palm kernel shells, into the highest quality artificial graphite and graphene materials critical to EV batteries, semiconductors, medical technology, etc.



Starting industrial scale production during Q3 2024, with a growing pipeline and contracted potential customers.



A secure source of supply to U.S. technology customers from reliable production sites in trade friendly Malaysia



Frost & Sullivan 2023 Awards for Technology Innovation Leadership, Entrepreneurship and Market Leadership in the Graphite and Graphene Industry

# Graphjet's award winning proprietary manufacturing technology provides:



Up to 83% reduction in carbon footprint



Up to 80% reduction in cost



## **Team Overview**



Our team is dedicated to clean and sustainable manufacturing of graphene and graphite materials using

renewable waste products.



Aiden Lee Ping Wei Chief Executive Officer

Mr. Wei has over 10 years of experience in the engineering, construction, property development, telecommunications, energy and utilities industries. He has completed and managed multi-billion high value listings in China, Hong Kong and Malaysia.





**Liu Yu** Head Of Research

Mr. Yu has vast knowledge in biodiesel, base oil, and heavy oil, and holds a number of patents and utility innovations from China and Malaysia. Extensive experience in the field of mining and investment fund management.



**Aw Jeen Rong** Executive Director

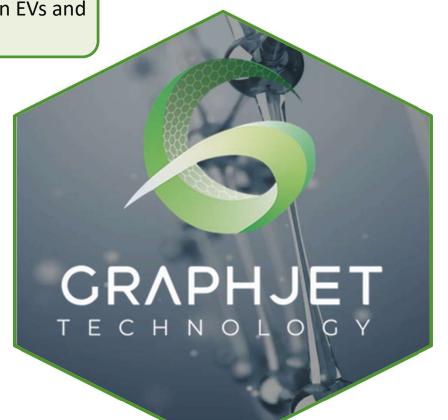
Mr. Aw was appointed by a public listed company as a consultant to assist on expanding the group business to wide range of industries. He has years of experience in business development and cutting-edge businesses.

## Investment Highlights



There is a growing global market for graphite and graphene necessary for critical applications in EVs and technology.

The global market for graphite was \$17.5B in 2022, reaching a projected market size of \$25B in 2027, with a CAGR of 7.3%



Graphjet's agriculture waste feedstock reduces the carbon footprint by up to 83% and provides a sustainable business model.

Vertical integration of Graphjet's material reduces costs by up to approximately 80%.

The current high demand for graphite and graphene, with Graphjet's reduced costs, drive a competitive sales model.

Graphjet's strong ESG proposition correlates with higher equity returns, from both a tilt and momentum perspective.

## **Graphite & Graphene Overview**



#### **Overview:**

- **Graphite** is used in steel manufacturing and electronic devices.
  - Graphite, a strong heat and energy conductor, is used in electrical devices such as electrodes, batteries, and solar panels.
  - Graphite ranks above lithium as the key ingredient in the lithium-ion battery.
- **Graphene** is a high-profile revolutionary new material known for high conductivity, high strength and ultra-light weight also known as the "black gold" and the "king of new materials".
  - A two-dimensional carbon nanomaterial with a hexagonal honeycomb lattice composed of carbon atoms and SP2 hybrid orbitals.
  - Used in automobile composition and coating, biomedical equipment, electronics and home appliances, energy storage, electric vehicle batteries, strength enhancement, sensors, semiconductors, etc.

#### **Applications:**

Graphene is integral in the manufacturing of the hightechnology products of the future.

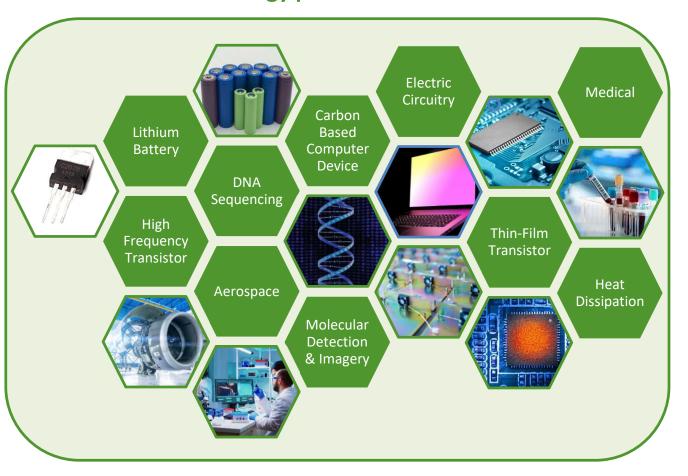


Image Source: NanoGrafi

## **Graphene Properties**



### The King of New Materials in the 21st Century



# **High Electric Conductivity**

100 times better than silicon crystal or Nano-carbon



# High Thermal Conductivity

10 times better than metals such as copper and aluminium



# High Strength (Hardness)

Exceeds that of diamond, and the fracture strength is 100 times that of steel



#### **High Transparency Level**

Light transmittance up to 97.7%



#### **High Specific Surface Area**

Per gram is 1130m<sup>2</sup> higher than that of activated carbon, reaching 2630m2/g

## **Graphjet Proprietary Production & Manufacturing**



#### **Graphjet's state-of-the-art manufacturing plant:**



#### **30,000 Tons**

Dried palm kernel shells (after removal of waste moisture)







#### **10,000 Tons**

**Palm Based Graphite** 



#### 60 Tons

**Palm Based Graphene** 





Graphjet expects to open its state-of-the-art manufacturing plant in the Kuantan district of Pahang State.



Industrial scale manufacturing at existing facility expected to commence during Q3 2024, representing the first and only production of Biomass waste palm kernel shell based Green Graphite



and

Graphjet cares about the environment, as our processes use green technology for production eliminating emissions and pollutions

#### The potential amount of palm graphite and graphene in Malaysia:

At current levels of palm oil production, Malaysia will annually generate enough palm kernel shells to supply about 5 million tons of dried palm kernel shells.

The supply of palm kernel shell guarantees a sustainable green and recyclable source for the production of graphite and graphene.

## **Graphjet Palm Kernel Shell Graphene**



- Graphjet produces its own graphite, used as raw material to make graphene
- Patented Technology enables Graphjet to produce graphene cost-effectively and market it at about 80% less than current market price
- Graphjet produces higher purity graphene than traditional sources
- Graphjet can remove the market volatility due to production inputs
- Graphene will be broadly available at lower cost, enabling worldwide technology advancement

#### **Palm Kernel Based Graphene Production Flow Chart:**



## A Globally Responsible and Lower Cost Feedstock



Malaysia is the second largest palm kernel shell waste producer, generating ~5.0 million tons of palm kernel shells annually. Graphjet easily sources raw materials and is able to produce at significantly lower cost and at higher quality compared to existing market suppliers.

Graphene	Mineral	(Commodity) Artificial Coal / Petroleum Based	Palm Kernel Shell Graphene 99%	
Single Layer Ratio	95-99%	N/A		
Purity	95%-99%	N/A	99.++%	
Diameter Consistency	Low	N/A	High	
Direct Material Cost (USD/ton)	6,000 to 10,000	N/A	3,498 (made by Graphjet)	
Price (USD/gram)	\$167 to \$450	N/A	\$15	
Graphite	Mineral	(Commodity) Artificial Coal / Petroleum Based	Palm Kernel Shell Graphite	
Resource Type	Natural Resources (limited resources)	Artificially made (limited resources)	Unlimited	
Price (USD/ton)	\$8,000 to \$11,000, High	\$20,000, High, Volatile Market	\$4,545 Cost Effective	
Mass Production	Yes	Yes, but limited to coal mining / crude oil refinery and volatile prices	Yes, Annual Palm Kernel Shell production in Malaysia 5m tons	

<sup>\*</sup>Note: Exclusion of the coal/petroleum based artificial graphite source in this comparison table because it is not used in the industry to produce graphene.

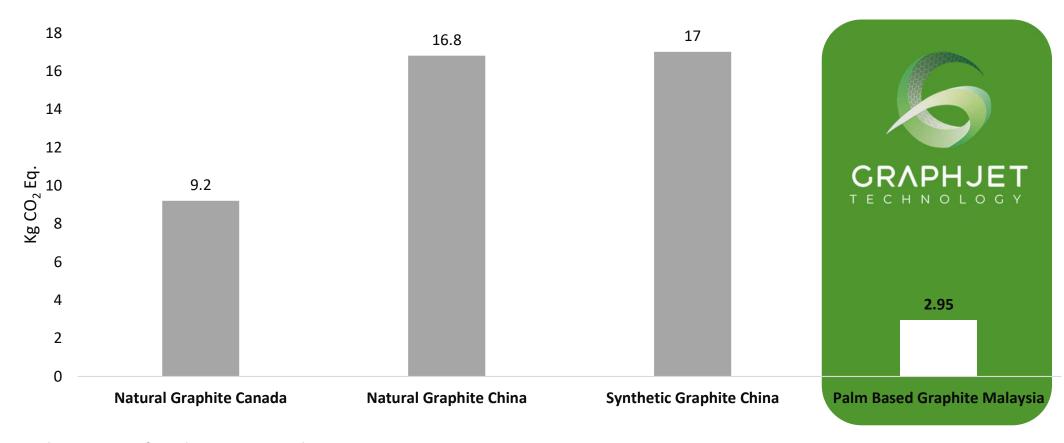
Source: Market data and company estimates

## **Reduced Carbon Footprint**



Graphjet's proprietary **palm kernel shell** graphite production **reduced carbon emissions by up to 83%** over competitors around the world.

### Producing 1 kg of graphite generates the following carbon emissions (kg $CO_2$ Eq.):



Source: Norton Graphite Minviro Life Cycle Assessment February 2022

## **Global Market Value of Graphite**





The global graphite market is anticipated to grow from US\$22B up to US\$50B at an 8.5% CAGR from 2021 to 2031.



Graphite is a vital cathode material used in EV batteries required to support the growth of EV manufacturing.



Source: Fact.MR

The market is slated to expand 2.3x over the next 10 years, thereby offering opportunities to market participants



Augmenting demand from the developing lithium-ion battery industry is rising steel production in Asia and the Middle East.



Size in 2021: US\$7.1B

East Asia Market

Middle East & Africa Market Size in 2021: US\$1.5B South Asia & Oceania Market Size in 2021: US\$3.8B

CRAPHJET

## **Massive Global EV Market**



### **Graphene Dependency**

Graphene is core component in Energy storage system, which is expected to grow steadily with rise in clean infrastructure

Graphene research and development (R&D) are making significant strides in the battery and semiconductor industries, offering a wide range of potential applications.



#### **EV Market Growth**

The global EV market is forecasted to grow at an estimated 29% CAGR 2020 to 2030



Automakers sold 6.6 million plug-in electric cars in 2021, more than double the 3.0 million sold in 2020.









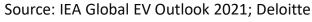












Insights Electric Vehicles: Setting a course for 2030

## **Global Market Value of Graphene**



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#### Global Graphene Market Size and Forecast, 2023 – 2033F (US\$B):



Growing product demand in application industries including electronics, biomedical technologies, energy storage, composites & coatings, and water & wastewater treatment is likely to fuel the market growth. Graphene exhibits an ability to improve the charge rate and energy capacity of modern-day rechargeable batteries. In addition, graphene is highly beneficial in improving the lifespan of lithium-ion batteries and helps reduce the overall weight of the battery assembly. Thus, the growing use of graphene in the EV industry is expected to propel market growth.

Source: Market.US

# **Global Graphene Sourcing Comparison**

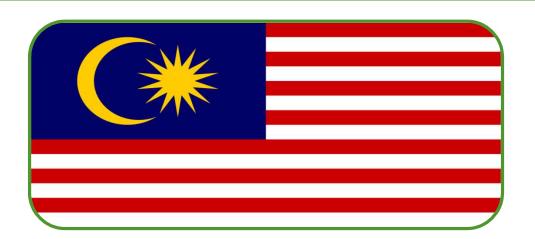


	Graphjet Technology	Talga Resources Ltd.	Versarien PLC	Saint Jean Carbon INC	Fangda Carbon Material Co., Ltd	Baotailong New Materials Co Ltd
Headquarters	Malaysia	Australia	UK	Canada	China	China
Year of Establishment	2019	2009	2010	1997	1965	2003
Raw Materials	Biomass	Natural Graphite	Hydrocarbon Gases	Natural Graphite	Natural Graphite	Natural Graphite
Production Capacity	60 tons/year (Graphene) 10,000 tons/year (Graphite)	8,500 tons/year (Graphene)	100 tons/year (Graphene)	5,000 tons/year (Graphene)	15,400 tons/year (Graphene)	150 tons/year (Graphene)
Cost	Low	Medium-High	High	Medium-High	Medium-High	Medium-High
Volume Production Feasibility						•
Commercialization Prospect	***	***	**	***	***	***
Price	Medium	High	High	High	Low	Low
Quality	High	High	High	High	Low	Low
CO2 Emissions	Low	Medium	Medium	Medium	High	High
Sustainability	****	**	***	**	**	**

Source: Frost & Sullivan

## Signed Offer Letter with Government for Manufacturing Facility





The new 20-acre plant, downstream and upstream processes, is expected to be completed within 18 months from the closing of the Business Combination Agreement.

Expected to generate up to 700 jobs over the next four years.

The RM400M facility is expected to generate RM3.6B in Graphjet revenue.

Land and local permission secured; targeting start of production by end of Q4 2025.\*

### **Our Partners and Corporate Members:**









The University of Manchester

## **Reducing Reliance on China**



#### China is the largest producer of graphite and graphene, primarily using high pollution approaches

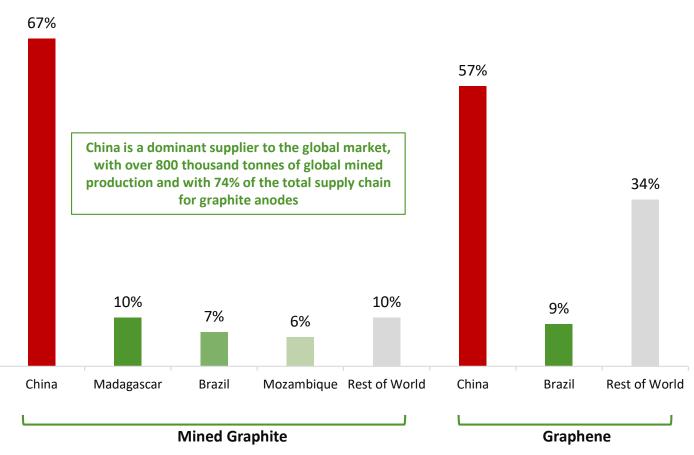
The **European Union** and the **United States** have identified a strong reliance on China for critical raw materials as a key security threat.

- Identified graphite and graphene are critical to battery production.
- Anticipating massive increases in demand in conjunction with green energy and carbon reduction policies.

# China restricts exports of graphite as it escalates a global tech war

 On December 1, 2023 China began requiring government approval for exports of graphite, a move widely perceived as a response to U.S. led restrictions aimed at China's technology industry.

#### **Top Global Manufactures (% of Global Production)**



## **Government Initiative: EU & USA**





The US Inflation Reduction Act incentivizes green energy and electric vehicles with sizeable tax credits, but only if the raw materials are sourced from or processed in a US trade friendly country.



With the **Green Deal Industrial Plan**, the Commission will promote the creation of a more supportive environment for deploying the clean tech manufacturing capacity required to meet Europe's ambitious green targets – including to make Europe the first climate neutral continent by 2050.

- Quick deployment of manufacturing capacity
- Critical Raw Materials Supply
- Net-Zero Industry Act
- Promote regulatory sandboxes
- Electricity Market Design reform



- Green and digital skills
- European Skills Agenda, Partnership for Skills



- National and EU funding
- InvestEU, REPowerEU, Innovation Fund, State aid Temporary Crisis and Transition Framework, a European Sovereignty Fund



- Diversified access to critical inputs
- Free Trade Agreements, Critical Raw Materials Club, Clean Tech/Net-zero Industrial Partnerships



## **Awards and Programs**



# World Economic Forum: Consortium of Global Leading Companies Focused on Innovation and Sustainability:

- Dynamic, high-growth companies championing new business models, emerging technologies, and sustainable growth strategies.
- Emphasizing energy transition and carbon emission reduction technologies.
- Connects emerging technologies to largest global corporations.



#### **Graphjet is the first Malaysian company to join the MIT ILP program:**

- The program was founded in 1948.
- The ILP directly connects global leading member companies with MIT resources to address global challenges and anticipate future needs.
- 240 MIT ILP member companies include: **BOEING**











# International Innovation Awards: Recognized among global companies as Outstanding Innovation Leader:

- Recognized for innovation in using palm kernel shell waste product to create graphite and graphene.
- 1 of 39 global companies were recognized.
- 200 applications across 19 countries were judged across three categories: Product, Service & Solution, and Organization & Culture.



## **Investment Highlights**





**Uniquely Positioned** to be a leading producer of graphene and graphite materials with state-of-the-art technology for the manufacturing of graphene and graphite.



**Breakthrough Technology** transforms an abundant and renewable waste product, palm kernel shells, into highly valued artificial graphene and graphite



Integral to Future High Technology Products used in a wide variety of applications in Biomedical, Automotive, Sensor & Semiconductor, Digital Product and Energy Storage / Battery industries



Patented Technology & Raw Material Sourcing enables production at significantly lower cost and at higher quality compared to existing market suppliers.



**Experienced Management Team** proven track record dedicated to clean and sustainable manufacturing of graphene and graphite materials using renewable waste products.

