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FROM THE EDITOR…

Sri Lanka has a rich history of Graphite mining and the earliest record dates back to the Dutch period in 1675. Documented historical records show that modern Graphite export began in 1824 with the highest export being in 1899. With the discovery of Graphite in Madagascar which closely resembled Sri Lankan Graphite, production declined slowly with small revivals during the World Wars. Currently, world Graphite market is dominated by China with over 10 million tons of production. Naturally, Graphite is in the form of amorphous Graphite or flake Graphite or vein Graphite. The vein Graphite produced by Sri Lankan mines such as Ragedara, stands out for its remarkable purity, flawless crystal structure, and strong electrical conductivity, making it suitable for various commercial uses. Both lump and flake varieties will be in this range and the main industrial applications are manufactured of crucibles linings of steel furnaces by carbon aluminum bricks, carbon brushes, refractory bricks, carbon–cinema arcs, electrodes, paint lubricants and golf sticks. Further, Graphite of high purity is used in TV screens and reactors as a shield to prevent emission of radiation in nuclear power plants.

The emerging trend towards electromobility on a global scale presents fresh opportunities to revive Sri Lanka's graphite industry. Graphite forms the core anode material in lithium-ion EV batteries, with quantities varying from 10 kg in hybrids to 70 kg in all-electric vehicles. Consequently, the United States Department of Energy classifies Graphite as a critical mineral. Projections indicate global demand for electric vehicles (EVs) will surge to 40 million units by 2030. Consequently, the demand for Lithium-ion batteries for EVs has increased and securing sustainable and reliable critical raw materials (CRMs) has become a policy priority. Purity, extraction sustainability, cost, and geopolitical tensions are vital factors impacting the Graphite supply chain.

Graphene is a single layer of Graphite known as the wonder material today and it is the building block of Graphite. Graphene can be produced through chemical and/or physical exfoliation of graphite. Chemical exfoliation of Graphite produces Graphene Oxide and reduced Graphene Oxide which are highly valuable materials. It conducts heat and electricity very efficiently along its plane. The material strongly absorbs light of all visible wavelengths, which accounts for the black color of graphite; yet a single Graphene sheet is nearly transparent because of its extreme thinness. Microscopically, Graphene is the strongest material ever measured. Scientists theorized the potential existence and production of Graphene for decades. It has likely been unknowingly produced in small quantities for centuries, through the use of pencils and other similar applications of Graphite. It was possibly observed in electron microscopes in 1962, but studied only while supported on metal surfaces. In 2004, the material was rediscovered, isolated and investigated at the University of Manchester, by Andre Geim and Konstantin Novoselov. In 2010, Geim and Novoselov were awarded the Nobel Prize in Physics for their "groundbreaking experiments regarding the two-dimensional material Graphene ". High-quality Graphene proved to be surprisingly easy to isolate. Graphene has become a valuable and useful nanomaterial due to its exceptionally high tensile strength, electrical conductivity, transparency, and being the thinnest two-dimensional material in the world, The global market for Graphene was $9 million in 2012, with most of the demand from research and development in semiconductor, electronics, electric batteries, and composites. Scientists and Engineers of Sri Lanka should work together to capture economic benefits of Graphite and Graphene.

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