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EDEN ENERGY IN AUSTRALIAN PRODUCTION FIRST

OF SUPER-STRENGTH "CARBON NANOTUBES"

A Perth company is set to become by the end of the year, Australia's first commercial producer of the high strength but micro-sized and environmentally friendly "carbon nanotubes" - a product expected to generate new-world markets worth billions of dollars a year.

The high-in-demand nanotubes have a wide range of modern day technological, construction and electronic applications, and will be produced in the Denver, Colorado laboratory of ASX-listed Eden Energy Limited (ASX: "EDE").

Eden said today it had now made a decision to proceed during 2011 with the scaling up of its initial batch plant installed in Denver last year after the Company acquired full rights to the nano-technology from its former project partner, the University of Queensland.

"The decision to scale-up the plant by year's end follows the successful trial batching over Christmas which saw our plant run in a continuous production cycle for the first time," Eden Energy's Executive Chairman, Mr Greg Solomon, said today.

"Our trial plant, which we used more to perfect the production and quality control process rather than focus on output, can probably produce up to about 3 tonnes of nanotubes a year," Mr Solomon said.

"The scale-up, however, will take that capacity more to between 25–100 tonnes per annum and that makes Eden's nanotubes supply competitive on the world-stage."

The largest manufacturer in the world currently is a Chinese company named Cnano which is reported to produce around 500 tonnes per year. Europe's Bayer Corporation is currently the second largest global producer at 200 tpa but there are other similar sized producers in Germany and France. The largest number of manufacturers, however, around 27 and albeit at small volumes, is in the United States.

Ohio-based Pyrograf is planning a 1,000 tpa nanotube plant.

Strong emerging global demand

Mr Solomon said it was Eden Energy's belief that while nanotube technology had been the subject of research efforts since their discovery early in the 1990s, global demand was growing rapidly and prices were coming down as production achieved better economies of scale, increasing their product application rates.

"This adds to their appeal for more general consumption and although conventional nanotube products are being priced at between US$100-700 a kilogram, absolute top shelf products can still fetch between $20,000 and $50,000 a kilogram," Mr Solomon said.

"We expect Eden's premium products to currently attract somewhere around the $400 a kilogram price level, with nanotubes commanding significant price premiums to nanofibres.

"Their potential does seem endless and while there are conflicting reports on the exact scope for future sales, figures of around US$7.72 billion by the year 2015 – up from just US$6 million in 2004 – are fairly consistent. Some forecasters go as high as US$26 billion within four years.

"Compound annual growth rates of around 11% are predicted but at least the general consensus is that the price floor in a nanotube sector will annually be worth billions in US dollars within 5-10 years."

Global focus for Eden customers

"Commercially, our end of year focus is on emerging nanotube markets in the United States initially, but then progressively expanding to India, Asia, Europe and elsewhere," Mr Solomon said, "probably through existing marketers and industry partners in the first instance."

"Samples of our product are currently with a number of these commercial distributors in US for their analysis, both by TEM (transmission electron microscope) or SEM (a scanning electron microscope) which actually takes images of these molecules to confirm their tube-like carbon structure, and also possible testing of the actual product in various material applications."

Hydrogen by-product

An Australian Research Council grant helped Eden progress its technology in partnership with the University of Queensland, producing carbon fibres (proportionally longer sticks of very fine small particles of carbon) and nanotubes (atomic sized tubes of carbon atoms in a hexagonal configuration similar to chicken wire, but between 10-100 millionths of a millimetre in diameter, and potentially up to several millimetres in length).

Eden's process sees natural gas (CH_4 - one carbon atom and four hydrogen atoms) piped into a reactor where it is heated in the presence of a catalyst to produce a hydrogen gas stream and a solid carbon stream comprising either carbon nanotubes or their similar carbon fibres.

The reaction process does not produce atmospheric polluting carbon dioxide yet delivers a carbon product which has hundreds of times the tensile strength of steel and becomes an ideal additive for concrete, steel, plastics, heat resistant materials and many other structural applications.

Mr Solomon said the pace of research into how nanotubes or their similar nanofibre products could be applied, was intensifying and dozens more structural and electrical applications were being achieved.

"From a constructor's point of view, adding about one percent of carbon nanotubes in a concrete batch has been reported to increase the compressive strength of that concrete by about 45% which could significantly reduce concrete requirements for applications like foundations and pylons," Mr Solomon said.

" It is also being tested to determine whether it can be used to enable concrete to conduct electricity which could enable structures to be earthed and to not build up static electricity.

"Other possible emerging applications include possible use in car tyres, with nanotubes replacing the conventional carbon black, thereby potentially producing much longer lasting and tougher tyres.

"It is being used increasingly in composite plastics from a heat, conductivity, strength and non-cracking perspective and can be used in many applications as a substitute material for steel and aluminium for example, and also in batteries, lighting, computers, telecommunications – it is a rapidly expanding list.

"However, from Eden's point of view, with a range of hydrogen related products that it is presently marketing, there is an additional significant benefit. This new production process will generate large quantities of hydrogen equivalent to one third of the mass of carbon that is produced, as a valuable but inexpensive by-product of the carbon. Eden plans to capture the hydrogen and in due course use it to help expand and accelerate the commercialisation of its Hythane® and hydrogen technologies that we are promoting in India and USA, where the cost of hydrogen is currently one of the major hurdles that must be overcome."

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