ASX Announcement
18 May 2015

Graphene Oxide/SuperSand Pilot Plant Gets the Green Light

Reporting on behalf of its fully owned subsidiary Ionic Industries (Ionic), Strategic Energy Resources (ASX:SER) has now released the results of an engineering scoping study for its planned pilot plant, to compliment the previously released marketing study for SuperSand. Taken together these studies confirm the economic viability of the planned pilot scale graphene oxide and SuperSand facility.

Ionic is setting itself up to be a leading manufacturer of specialised graphene based products for major sectors of the economy. Minnovo Pty Ltd, an independent engineering group, was commissioned to examine the feasibility of a pilot plant to produce graphene oxide (GO) and multiple SuperSand products using Ionic's innovative technology, in order to move forward on the positive findings of the Freedonia Custom Research Inc report which identified niches where SuperSand could compete in the global activated carbon market.

Graphene is not of itself a bulk commodity, but can be incorporated into smart bulk products tailored for specific applications, such as in Ionic's planned first product line, SuperSand. The Freedonia report identified extensive potential for customised SuperSand products to replace activated carbon products. SuperSand consists of an inert substrate, coated with a small amount of graphene oxide - around one percent by weight in current trials.

The unique properties of graphene oxide can also be exploited in many other applications. Ionic will be concentrating on two areas where its research and development team have already made significant advances: graphene based high performance energy storage devices, and filtration in various industries for environmental pollutant decontamination and resource extraction.

Possible applications of Ionic's first product, SuperSand, include water treatment to remove contaminants not easily treated by existing technology, and mercury removal from the flues of coal fired power stations, as required by environmental protection agencies. Both are multi-billion dollar industries in which Ionic hopes to make inroads by leveraging its unique technology to tailor SuperSand for particular applications and exceed the performance of current techniques.

Highlights of the Minnovo scoping study indicate that:

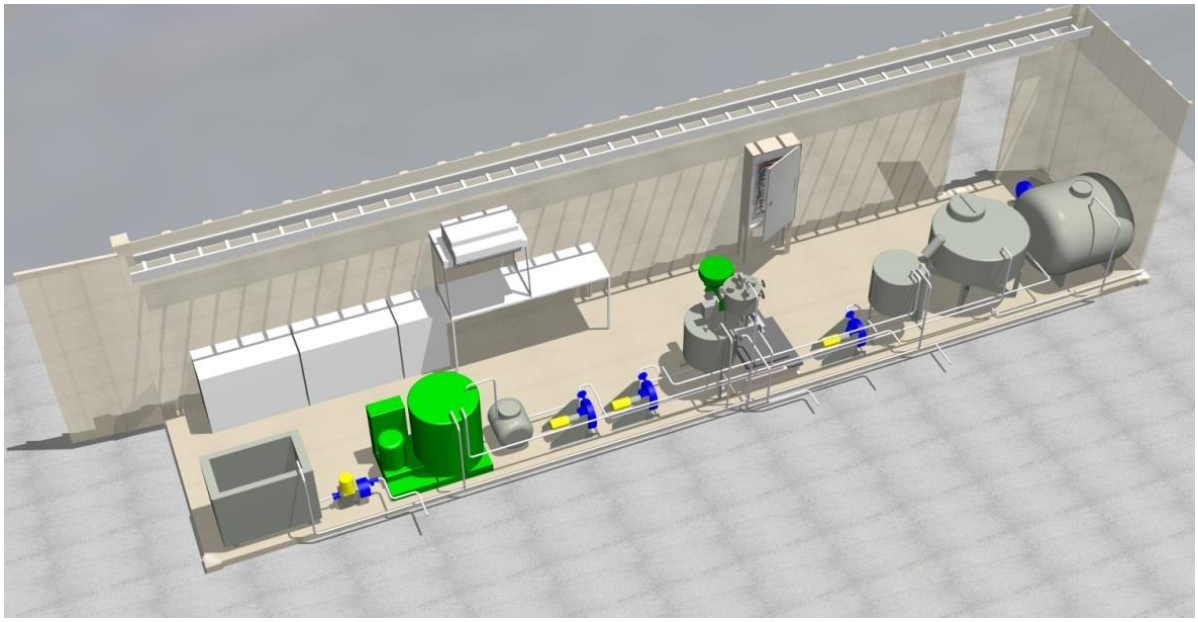
- The pilot plant will be capable of producing five kilograms a day of graphene oxide, which can be further processed into up to 2.5 tonnes a week of SuperSand.
- Preliminary production costs of SuperSand is $2054 per tonne, of which the graphene oxide cost is $1446.
- The pilot plant is estimated to take 26 weeks to build with a CAPEX of $1.275 million.

Pilot Plant

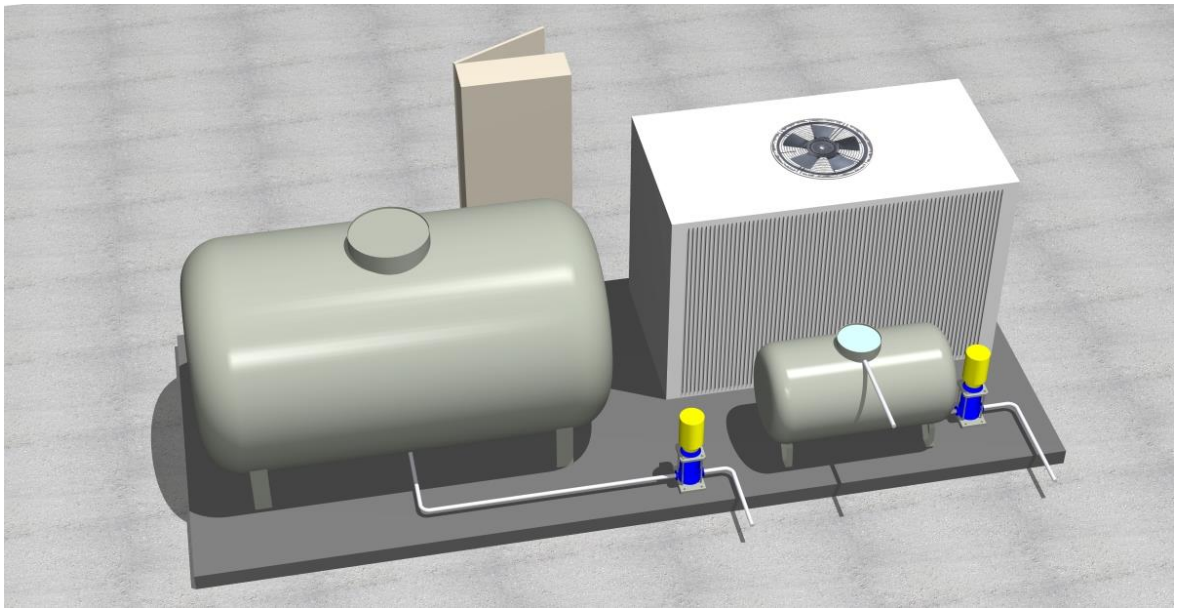
The site for the pilot plant is under review, with good options being explored in both Victoria and South Australia. Discussions with potential customers in the energy and water sectors are currently under way. Ionic is also exploring possible strategic alliances which could strengthen and accelerate our plans.

The aim is to run the pilot plant to produce tailor made products for specific customer needs with a view to upscaling the plant to target broader market opportunities both in Australia and overseas.

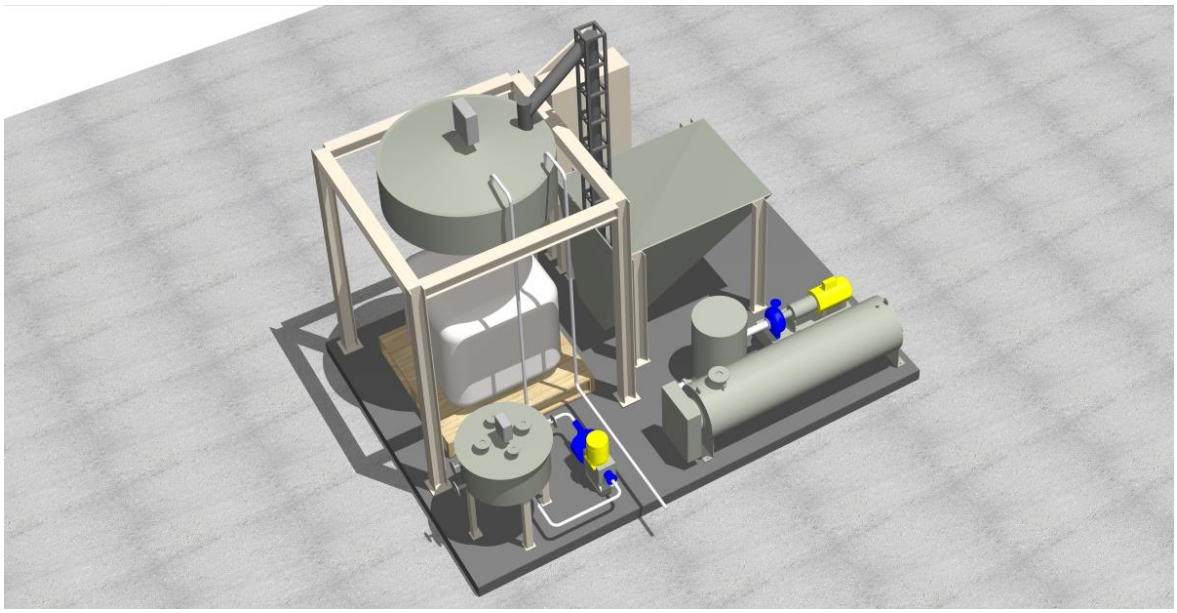
The majority of the pilot plant facility is housed in a modified container. Services and SuperSand mixing/drying is housed on separate skids, allowing for flexibility in the location of items of plant.



Graphene Oxide Pilot Plant inside 40 foot sea container



Graphene Oxide Services Skid



SuperSand Pilot Facility Skid

The $1.275 million capital expenditure (AUD) estimate includes the design and construction of:

- The graphene oxide section of the pilot plant, which is housed in a 40 foot transportable sea container, to produce five kilogram per day of graphene oxide.
- Associated reagents and water services on separate skids to support the production of graphene oxide.
- SuperSand section of the pilot plant on a standalone skid to produce 500 kilogram a day of SuperSand.
- Associated power distribution circuitry to the various skids.
- Interconnecting pipe work in each skid and between skids.
- Engineering, construction supervision and preliminary commissioning of the pilot plant.

Laboratory product

Operating costs

Operating costs have been developed based on the plant operating for 40 weeks per year and producing one batch of graphene oxide (and SuperSand) per day, for a total of 1,000 kilogram of graphene oxide per 100 tonne of SuperSand product per year.

The costs (including assumptions and exclusions) allow for the following inputs to generate either graphene oxide (in drums) or SuperSand (in bulk bags):

- Labour costs for the operators of the plant.
- Feed materials being graphite flake and graded sand.
- Reagents required to modify the graphite flake to graphene oxide and graded sand to SuperSand.
- Power required by the pilot plant.
- Disposal costs for the removal and disposal of waste generated from the pilot plant.
- Other miscellaneous costs associated with the pilot plant operation.

The bottom line is that the cost of SuperSand production will be $2,054, including $1,446 for the graphene oxide (GO) component. This compares favourably with global activated carbon prices.

The Freedonia marketing report indicates that active carbon prices in 2014 ranged from $2,550 per tonne and up to four times as much for specialised products which Ionic will target.

As is to be expected, costs of production will reduce further once the pilot plant is optimised and again once a full scale production plant becomes operational.

Freedonia Global Market Report*

The global market for activated carbon is valued at $4.8 billion dollars (AUD) and is projected to steadily grow by 6.5% through to 2024. Industrial air purification is expected to overtake water treatment as the largest activated carbon market segment by 2019.

Demand in Asia Pacific is expected to increase at a rate 11.3% per year over the next five years, with China being the largest user. North America is expected to overtake Asia Pacific in 2019, whereas Western Europe is expected to maintain steady growth and finally Central and South America, Eastern Europe, Africa and the Middle East is where growth will escalate once these economies expand and industry comes into line with the environmental protection requirements present elsewhere.

Freedonia Global Market Report findings: Potential Markets for SuperSand Products

Industrial air purification is expected to overtake water treatment as the largest activated carbon market segment by 2019. Increasing mercury emission regulations will drive this trend, which will be increasingly beneficial to Powder Activated Carbon (PAC) usage.

The markets for mercury removal, flue gas treatment and other gas phase applications – particularly solvent recovery in coatings, adhesives and printing inks – all appear viable for suitably optimised SuperSand products as replacements for activated carbon.

Flue gas treatment and mercury removal generally requires adsorbents that are effective within the few seconds that it takes the gas to transit through the flue, therefore requiring adsorbents with a high available surface are per volume, for which SuperSand is ideally suited.

Solvent recovery requires the ability to differentially absorb molecules of different sizes, for which the tailorability of the pore sizes in SuperSand makes it ideal.

Given the global pressures of population growth and environmental degradation there will be growing needs for improved access to safe drinking water in developing nations, as well as for the ability to comply with tighter water quality regulations in developed areas. These factors will contribute significantly to continued overall growth in the activated carbon market for water treatment. Freedonia have identified that SuperSand appears to fit within Granular Activated Carbon (GAC) water treatment applications due to the large pollutant particle sizes that need to be removed and that it is also well suited to applications in large water treatment systems for removal of synthetic organic compounds.

Conclusion

Together with the results of the positive marketing report for SuperSand, the pilot plant scoping study confirms the development of a pilot plant as a major step in unlocking the entry to the burgeoning global activated carbon market and is an important strategic decision, which is also financially robust. Given market penetration and acceptance by customers is achieved, Ionic could see SuperSand becoming an important future bulk commodity.

Ionic's vision is to be a leading manufacturer of diverse tailor made graphene based products for a number of major sectors of the economy.

The next steps for Ionic are to continue to engage with potential customers and explore new markets as well as securing funding, commencing, building and commissioning the pilot plant.

Discussions are well underway with a lead funding manager and preparations for the Initial Public Offering (IPO) are advanced. Work has commenced in securing cornerstone investors. Ionic envisages a smooth demerger process and public listing on the ASX.

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*"The Freedonia Custom Research, Inc. (Freedonia) Report represents data, research opinion or viewpoints developed independently on our behalf and does not constitute a specific guide to action. In preparing the Report, Freedonia used various sources, including publically available third-party financial statements; government statistical reports; press releases; and industry magazines. Growth rates in the Freedonia Report are based on many variables, such as currency exchange rates, raw material costs and pricing of competitive products, and such variables are subject to wide fluctuations over time. The Freedonia report speaks as of its final publication date and the opinions and forecasts expressed in the Freedonia Report are subject to change without notice."