CLEAN SCALABLE ENERGY STORAGE™

31 January 2020 ASX:14D

QUARTERLY SHAREHOLDER UPDATE

- GAS-TESS business case driven by value not efficiency
- GAS-TESS pilot lessons being used for commercial Mark II model
- Aurora Solar Energy Project in Port Augusta will be clean power station with TESS-GRID
- Technology development focus on scaling silicon storage to meet needs of new projects
- Cash position $3.9m at end quarter and circa $2m R&D refund in process

1414 Degrees is pleased to provide its December 2019 quarterly update.

The quarter saw the maturing of your Company's strategy of obtaining commercial pilot sites for its devices. As many shareholders would be aware, the industrial scale of the Company's storage devices means we need to trial them in operating plants that can use both heat and electricity outputs:

- GAS-TESS: SA Water provided us with the opportunity to trial our prototype GAS-TESS unit at its Glenelg Wastewater Treatment Plant (WWTP), allowing us to determine the operating specifications, and perhaps even more importantly, providing the basis to design and demonstrate a commercial product that can be sold with confidence into the very large wastewater utility market.
- TESS-GRID: To fulfil our prospectus objective of grid scale storage, we acquired the Aurora Project near Port Augusta and two other solar projects in NSW through the purchase of Solar Reserve's Australian subsidiary, now renamed SiliconAurora Pty Ltd.
- TESS-STEAM: In December we delivered the technical feasibility study for a TESS-STEAM pilot at the Stone & Wood brewery in northern New South Wales (originally intended for Pepe's Ducks).

These projects are critical to your company realising the revenue potential of its technology worldwide. For example, considering the GAS-TESS as a replacement for gas engines used by global wastewater utilities suggests a market potential of billions of dollars. The market for the TESS-GRID is potentially even larger, as the worldwide energy market transitions to increasing amounts of intermittent renewable generation requiring energy storage for reliability.

The basis for this earnings potential, which will be demonstrated through the Aurora Project, is the large number of revenue sources available through its versatility of operation. For example, the TESS-GRID is largely unique in its ability to tap into both recurrent and opportunistic revenue sources, ranging from the sale of heat and electricity under PPA's to current and future proposed grid stability payments. The latter include robust grid stability services that can only be supplied by turbine generators or synchronous condensers. However, in contrast to turbine generation, the condensers have no ability to provide recurrent income, indeed they are a passive cost of renewable generation.

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The TESS-GRID will also be able to charge from the grid at high current flows sourced at times of excess generation – therefore low priced – and regenerate at high rates for longer periods than batteries, while also supplying heat to displace gas and reduce emissions. The Aurora Project will allow us to demonstrate and confirm our product's potential to a global market.

SA Water Glenelg Wastewater Treatment Project

During the quarter the pilot GAS-TESS Mark 1 (Mk I) at the Glenelg WWTP provided important data and operating specifications to drive its business case. Importantly the lessons learnt from this unit are also being used to define the specifications for the production model of the GAS-TESS Mark II (Mk II). A planned series of capability upgrades commenced with installation and commissioning of a co-firing burner to increase the temperature delivered to the turbine. This new burner system is fully functional with first tests showing an increase in temperature of the gas stream consistent with engineering predictions. This will significantly increase both the power output and efficiency of the turbine. Testing has been suspended while our engineers and the manufacturer resolve a leak in the external heat exchanger. Further improvements of the Mk I are planned, however, some will be best implemented with the optimised Mk II device.

GAS-TESS Business Case: We are expecting that the business case will be ready in time for a midyear decision point for the Mk 1 device. We are progressing with the design of a larger Mk II device, optimised for the plant, for delivery within 12 months of order.

The current pilot device at the Glenelg plant was the result of an invitation from SA Water to trial a TESS at minimal cost to compare with gas engines. The focus is on how to deliver value from biogas, with the added benefit of timeshifting to increase the energy value inherent in the biogas.

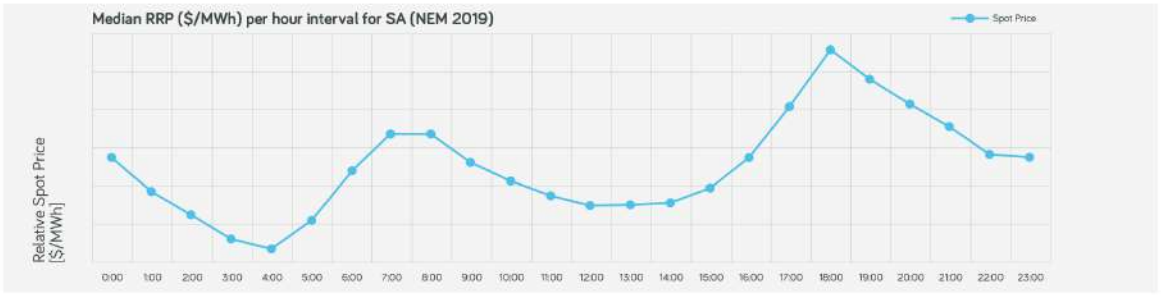
We do not yet know the operating efficiency of the gas engines for direct comparison to the TESS in the context of the Glenelg WWTP. The rated electrical efficiency of the engines is not attainable because the biogas has low methane content compared to natural gas. The use of the gas engines is further complicated by the presence of hydrogen sulphide (H_2S) and silicones (also known as siloxanes) in the gas. The H_2S degrades the gas engine oils, while the silicones oxidise to abrasive silica, causing wear. By contrast, the TESS burners fully combust the biogas without moving parts or lubricants that could be contaminated, and so do not incur the high maintenance costs of the gas engines.

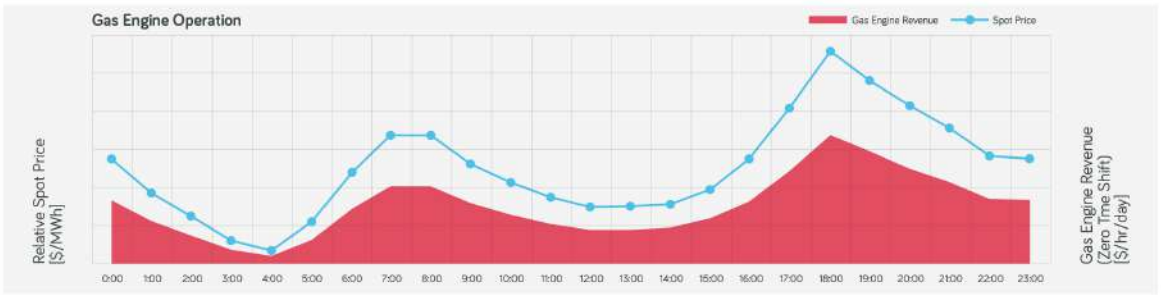
Therefore, the performance of the GAS-TESS should not be measured against the CHP efficiency of the gas engines, but by its ability to timeshift the value of the biogas and reduce operating and maintenance costs compared to engines. The average electricity price profile on the National Electricity Market (NEM) means that the ability to timeshift electricity generation can result in a substantial uplift in value compared to continuous output from engines without energy storage.

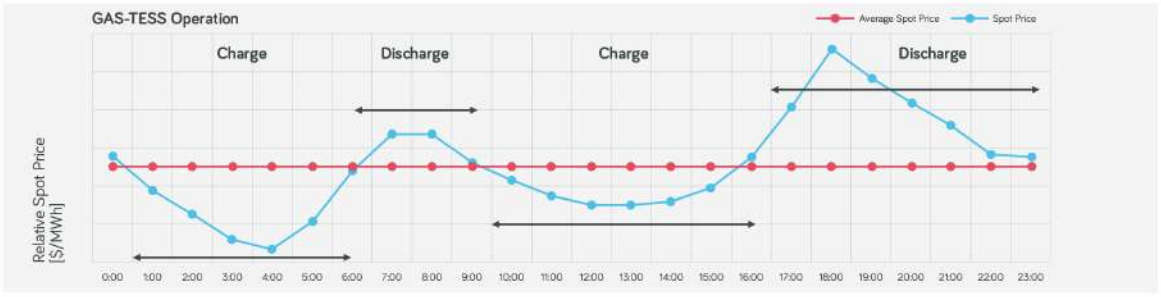
I believe this point is not well understood by commentators who focus only on efficiency when comparing our devices to batteries or gas engines. These devices and the TESS have advantages and disadvantages that go beyond just their efficiency as machines. They must be compared in terms of their value in transforming input fuel to output energy. It should be noted that this value is dependent on the operational situation and the timing of energy imports and exports to the electricity market or behind the meter considerations. The graphs below illustrate this principle.

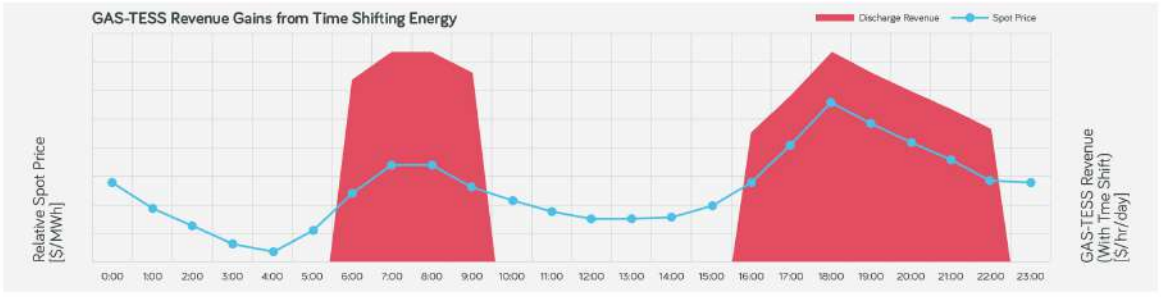
Illustration available at https://1414degrees.com.au/gas-tess-illustration/

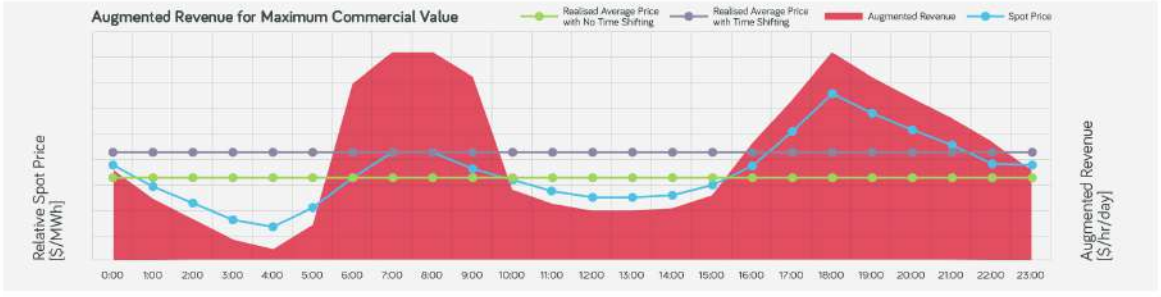
Illustration of augmentation of gas engine biogas revenue with TESS time shifting











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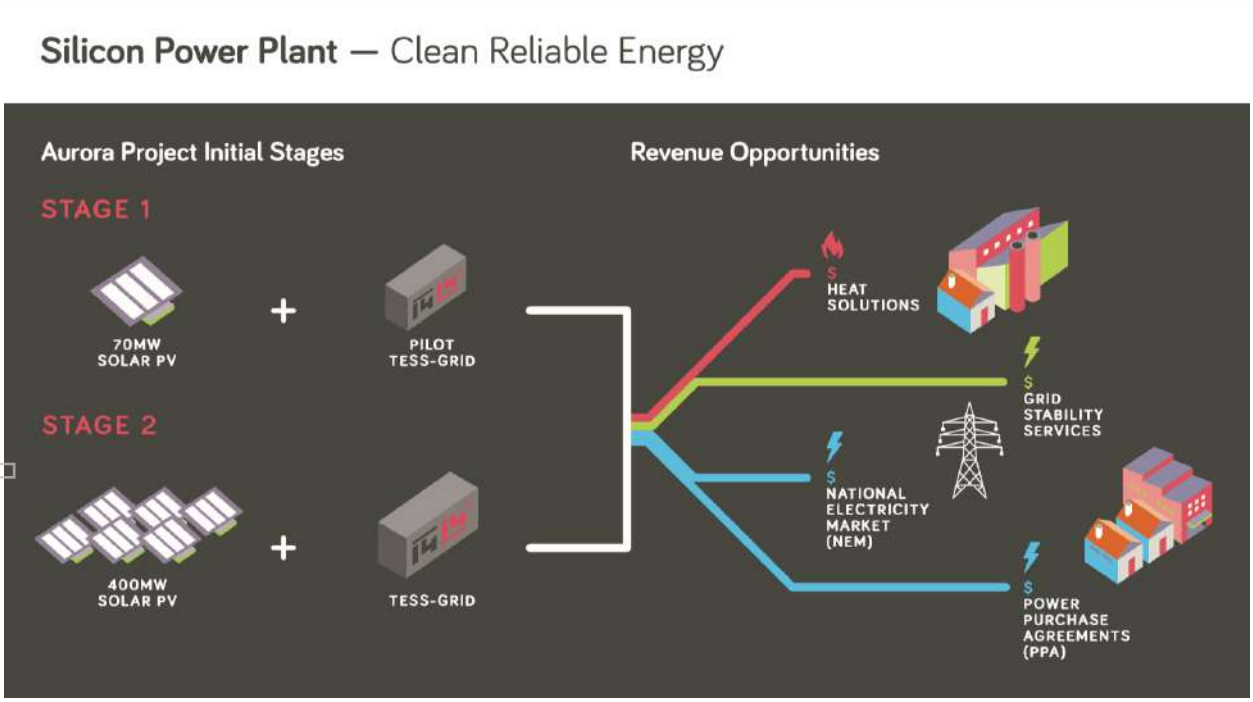
A further complication is that SA Water's current gas engines are fully integrated into the WWTP whereas the TESS is not. The Glenelg WWTP has also recently installed solar PV generation, further complicating the value calculation – the biogas must be burnt even while the solar PV is generating, and the GAS-TESS will do this and store the energy for regeneration when the sun sets. These considerations explain why the business case is a complicated exercise and how, even though the electrical efficiency of the TESS (like any storage) is less than direct generation in engines, the TESS can generate more revenue. I hope this clarifies that the preparation of the business case must take into account many matters, not the least being maintenance cost. On these considerations we estimate that our business case will be very competitive.

Aurora Solar Energy Project

Your Company acquired the Aurora Solar Energy Project through the acquisition of Solar Reserve Australia II Pty Ltd (renamed to SiliconAurora Pty Ltd) in December. It is approved for a 150MW concentrated solar plant (CSP) plus 70 MW of solar PV. As stage 1, 1414 Degrees is planning to progress with 70MW of Solar PV and then proposes a lower risk staged development of up to 400 MW of solar PV charging several GWh of TESS-GRID modules distributed on the transmission grid. This TESS-GRID storage could also be charged from third party solar and wind farms under PPA, or through electricity purchased on the NEM at times of low demand. Our analysts have been undertaking financial modelling showing positive earnings from multiple sources including network stability revenues, adjusted for current and future trends in the NEM.

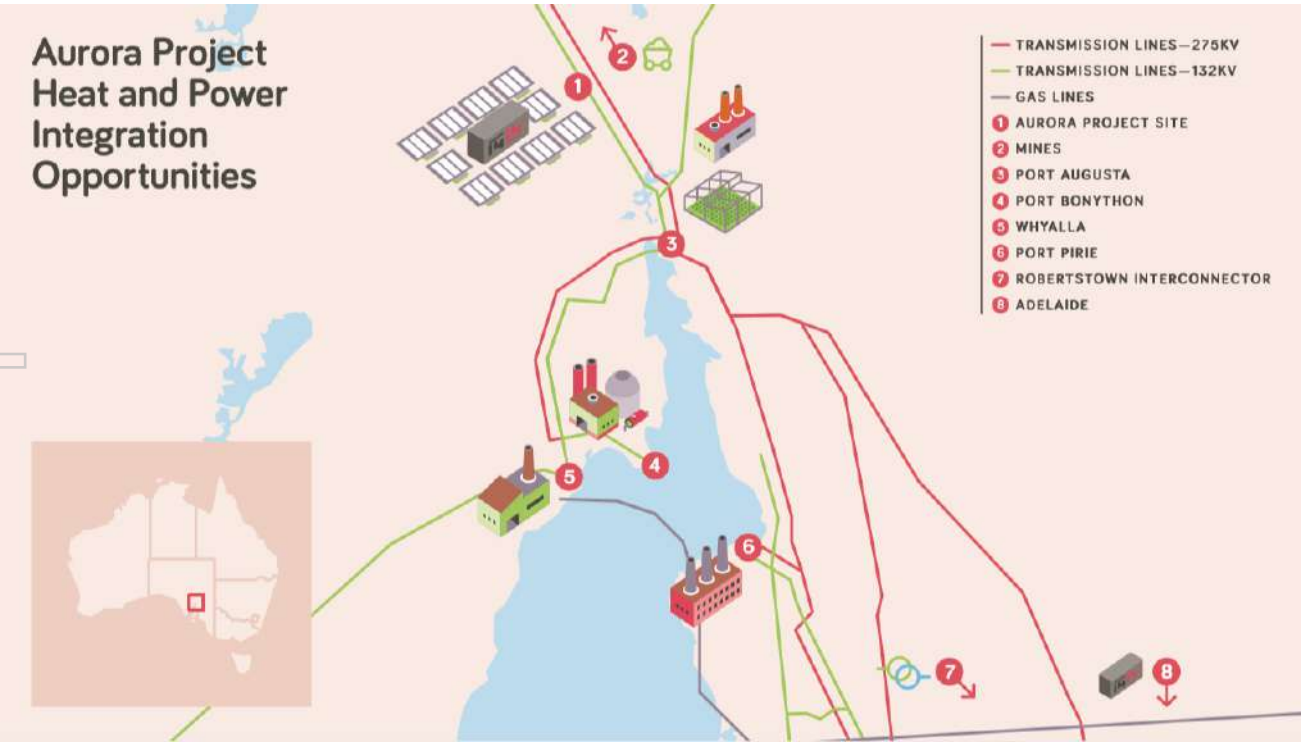


The pairing of solar PV generation with 1414 Degrees' TESS-GRID is a new clean Silicon Power Plant technology offering increased reliability through firmed electricity and heat supply that can be distributed through the network. The ability to timeshift the power supply will mitigate future issues with margin loss factors (MLFs) that are affecting investment in solar projects. The TESS-GRID can also generate revenues from grid stability services in support of new solar PV projects.

1414 Degrees appointed Marie Pavlik as CEO of its subsidiary company, SiliconAurora Pty Ltd, to deliver the Aurora Solar Energy Project. Marie has been working closely with our Business Development Manager, Maretta Layton, meeting with key stakeholders in Port Augusta, including the Council and community.

L to R: Maretta Layton and Marie Pavlik

The Aurora Project is positioned in the "Iron Triangle" industrial area as shown in the illustration below. Over the past two years, our business development team has been contacted by industries seeking to replace gas consumption with emissions free heat from our TESS-GRID. This Project will facilitate our ability to generate recurrent revenue from long term heat contracts with these customers. While there is currently no direct value in emissions reduction in Australia, industries are becoming increasingly aware of the need to address emissions reduction, and we expect that this will lead to new value streams from carbon offsets and air quality measures in the future. We also expect that regulators will move toward providing a charge for storage as a service for grid reliability and security, replacing very substantial government subsidies for construction of pumped hydro and batteries. This will encourage investment in lower cost and environmentally responsible grid stability solutions, such as the TESS-GRID.



Stone & Wood brewery project

During the quarter a feasibility study was prepared and sent to the Stone & Wood brewery management. The study recommended replacing the current LPG heat supply with a TESS-STEAM generating steam into the existing accumulator. Electricity generation would follow in a later stage. Although the efficiency of the device is high, the pricing structure for electricity supply in the New South Wales Government's distribution grid is not conducive to timeshifting of renewable generation, because the utility charges by the amount of electricity transmitted rather than a connection charge based on the maximum as, for example, is the case in South Australia. Our business development team have contacted the utility to seek an arrangement that encourages off-peak energy storage. This demonstrates the complexity of current business cases based on geographical location, both within Australia and globally for all storage technologies. As part of the transition to renewables, and the recognised need for storage, we expect such market mechanisms will evolve.

Technology

The imminent requirement to deploy large TESS units for the two proposed commercial pilot projects, in addition to the GAS-TESS at Glenelg, has provided further impetus to our core technology team developing larger scale silicon energy storage solutions. To protect our IP, we do not comment in detail on the nature of these exciting initiatives, but they include containment of molten silicon phase change materials (PCMs) in combustion environments from 1000°C to 1500°C, supported by advanced research laboratories in Europe. The scalable storage solution will facilitate higher electrical efficiency and heat output, suitable for both the biogas and the electrically charged versions. The aim is to achieve a rated electrical efficiency of up to 44% from a co-generation turbine system, substantially increasing the competitive position of our CHP solutions.

Finance

During the quarter the Company reviewed its R&D tax structuring with KPMG prior to lodging its FY19 tax return. This review resulted in a decision to recognise R&D assets for tax purposes and consequently depreciate assets over life of the projects. This will change the timing of claims with a likely revision to prior year tax returns and the deferral of some rebates into future years, but is not expected to have a material effect on the total amount of rebates paid to the Company over the project life.

Your company has sufficient cash reserves at present as it awaits payment of its FY19 rebate from the tax office. The magnitude of our tax rebates underscores the fact that our capital requirement on an annual basis is 43% less than the cash expended. Nevertheless, the one-off purchase of the SolarReserve assets depleted cash reserves and working capital is required to advance the Aurora Project to financing and prepare the GAS-TESS business case for decision mid-year. It is therefore appropriate to review the financial outlook for the company.

Capital requirements:

The GAS-TESS project has been funded in partnership with the SA Government Renewable Technology Fund grants scheme with a final grant remittance expected. As part of the business case modelling, our operations team is evaluating the relative merits of expending an additional $1m to substantially upgrade the capability of the current device or preserving capital toward building the optimised Mark II model.

The financial plan for the Aurora Solar Energy Project includes $110 million of loan funding allocated by the federal government for the Port Augusta based CSP project. Our case is that the modularity of the TESS-GRID, and its ability to charge from grid as an alternative power source, provides more reliability and flexibility than the CSP alternative. Moreover, our revised development plan calls for less upfront capital and performance risk compared to the CSP because capital funding is spread over several stages of generation and TESS storage construction. The first stage includes a TESS-GRID pilot to provide confidence for investment in the following stages.

Earnings outlook:

GAS-TESS earnings outlook: Management are confident that the company faces a large uplift in value from the commercialisation of its products. According to the World Biogas Association investment in the Australian global biogas industry was estimated at $3.5 - $5 billion in the five years to 2020. We expect the GAS-TESS to demonstrate commercial readiness early in the next financial year through the sale of the current unit and/or an optimised Mark II version, thereby opening a potential billions of dollars a year global market over coming decades.

TESS-GRID earnings outlook: The TESS-GRID is aimed at a potentially larger worldwide market than the GAS-TESS, as intermittent renewable generation grows and emissions reduction measures include the substantial gas heat market. Further, our technology is likely to be recognised as preferable when the less desirable aspects of current grid stability technologies start to be realised, for example, the environmental costs of mining increasing quantities of battery components and disposal of vast numbers of exhausted batteries. We expect to deploy the TESS-GRID in infrastructure-funded vehicles supported by revenue from heat and electricity sales with additional revenues from grid stability services. SiliconAurora Pty Ltd is the first of these special purpose vehicles (SPVs), and we are working on the business case to present to institutions and shareholders who wish to directly participate in this income stream. The intention is for 1414 Degrees to own the projects through the SPVs, which will be financed by underlying investment vehicles. Solar Reserve used this scheme, registering a financing subsidiary we will rename SiliconAurora Finco.

We are working hard to realise value for shareholders and I look forward to reporting further progress.

Dr Kevin Moriarty

FOR FURTHER INFORMATION PLEASE CONTACT:

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ABOUT 1414 DEGREES LIMITED

1414 Degrees is working to create a sustainable energy future, where energy is available to all, at all times. Its clean energy storage is set to reduce energy costs by increasing the efficiency of renewable generation and stabilising grid supply. The 1414 Degrees thermal energy storage system (TESS) is unlike any other energy storage system in the world.

1414 Degrees' technology stores energy generated from electricity or gas and supplies both heat and electricity in the proportions required by consumers. It is unique in its combination of low cost, flexibility of location, scalability, and sustainability. Following years of effort by the Company's engineering team and the successful development of its commercial demonstrator, the Company is commercialising its scaled up products.

For more information please visit www.1414degrees.com.au

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