



31 July 2019

ASX:14D

## QUARTERLY SHAREHOLDER UPDATE

### HIGHLIGHTS

- **GAS-TESS commissioned, generating electricity and heat to site**
- **Enova Energy signs MoU for joint venture on renewable heat and electricity sales**
- **Nectar Farms signs MoU to collaborate on advanced greenhouse developments**
- **NSW brewing plant proposed by Enova Energy as TESS-IND pilot site**
- **TESS-IND commercial model to draw on multiple revenue streams**
- **TESS-GRID site selection progressing**
- **Strong cash position \$9.7m, outgoings decrease after GAS-TESS completion**

1414 Degrees Limited (ASX:14D) is pleased to provide its June 2019 quarterly update.

The second quarter saw the Company deliver on key objectives in its path to commercialisation while maintaining focus on its core technology development.

The Company's cash balance remains strong because monthly outgoings have decreased following the commissioning of the GAS-TESS. The \$9.7 million cash balance at the end of the quarter is expected to be boosted by an estimated \$2.5 million R&D rebate later in the year.

### **GAS-TESS Operations**

The first GAS-TESS was successfully commissioned at our first commercial site, with all systems becoming operational surprisingly quickly considering this is completely new technology with no prototype. Commissioning occurred so swiftly that the GAS-TESS was able to export hot water and electricity to the site well before the wastewater treatment site's integration systems were fully operational. Late in the quarter, the device received interim approval as an embedded generator on the National Electricity Market (NEM). We have now commenced a series of characterisation tests to determine the performance of the technology as installed. It is expected these tests will be followed by modifications to increase performance and improvements to the next model.

Although the semi-commercial arrangements with SA Water will generate some revenues, the intent is to demonstrate the versatility of the GAS-TESS as a low cost alternative to purchasing gas burning engines. Utility service charges are determined from their asset base, so asset augmentation is their preferred model. Following this test phase, we will design production models for sale to wastewater utilities as an alternative to gas engines whose high maintenance costs reduce net revenues, and do not allow time shifting of electricity and heat output to minimise energy costs.

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## Technology focus

1414 Degrees is a technology focused company, working closely with technology partners and suppliers to deliver more compact and robust silicon storage.

TESS-GRID: our team is designing and testing grid scale storage technologies, the first stage being an electrically charging 40MWh module, followed by 200MWh and 1GWh devices.

GAS-TESS: our engineers have been testing the functionality of the technology to achieve maximum efficiency within the operating environment at SA Water's Wastewater Treatment Plant. The maximum operating temperature of the GAS-TESS heat store has now been measured at 1350°C, so the silicon phase change material (PCM) is being configured to melt at less than 1300°C and achieve similar latent energy storage to pure silicon. In addition, the combustion products from burning biogas must be isolated from the silicon PCM. The GAS-TESS is operating well utilising the sensible heat of silicon bricks and a trial quantity of lower melting point silicon PCM. On completion of the characterisation tests, our engineers will be able to assess storage and other design and operating parameters to achieve optimal performance.

TESS-IND: an important aspect of the GAS-TESS pilot is that silicon storage technology for its challenging environment is expected to benefit future builds of the electrically charged TESS-IND. The TESS-IND team is working to achieve higher electrical efficiency and more compact layout for the next model, due for commissioning in the next quarter.

## Grid scale progress

We are continuing to advance the storage technology and financial modelling for our grid scale storage solution, the TESS-GRID. We intend to use the smaller TESS-IND to test and refine the systems for energy trading and technical control of the larger devices because these systems will scale up. Connection to the National Electricity Market (NEM) will allow us to test the revenue model in the electricity market, buying low and selling high and effectively helping to stabilise electricity supply.

There is a risk that the TESS-IND will be completed well before it is approved to supply electricity to the NEM. The approval processes by distributors and regulators on the NEM can be very slow, even for smaller synchronous spinning generators like the TESS-IND that provide increasingly important native frequency control and stability services as large coal and gas fired turbines are decommissioned and more solar or wind farms are connected. The current plan is to initially connect the TESS-IND to the NEM at our Southlink facility and to then increase the revenue base using heat sales to the brewery or one of our previously disclosed pilot sites.

The first 40MWh TESS-GRID module must be built next to a site with substantial heat consumption. Ideally, it will be an existing operational site with visionary management (like SA Water provided for the GAS-TESS development) to ensure fast integration of the TESS heat output. We have assessed several suitable sites within Australia and overseas, the most favourable being next to a refinery and transmission substation. A site visit with technical support from the owner and our team resulted in a positive scoping study, however - as was the case with our partnership with SA Water - progressing the integration of new technology will require high level corporate commitment.

## Commercial path for electrically charged TESS

Our path to revenues from the electrically charged TESS has become clearer during the quarter, driven by changes in renewable energy financing terms. The Renewable Energy Certificate (REC) scheme and favourable finance terms from the Clean Energy Finance Corporation, which have underwritten the expansion of renewable generation for several years, are no longer attractive to industries that require fast payback on capital investment, as the price of RECs have fallen dramatically across the past year.

Businesses want reliable energy supply at a lower cost but they are understandably reluctant to lock up capital for the long term when it could be better deployed to increase production and profits in the near term. However, the fall in price of certificates has been paralleled by massive growth in large-scale solar and wind generation, causing a dramatic fall in the price of Power Purchase Agreements (PPAs) - to the point where it can be more economical to draw on a PPA over the network.

Notwithstanding, renewable PPAs are not a preferred solution for industry because the supply is intermittent and variable. Reliable energy supply is essential for maintaining productivity and mitigating risk. 1414 Degrees' TESS provides the means to firm renewable electricity generation and concurrently replace fossil fuel sourced heat. Industries and consumers generally prefer to purchase a supply contract not a technology solution, so your Company is working with partners to package energy solutions.

There are a number of advantages in this approach: it enables multiple revenue streams from electricity and heat sales, trading, and grid stability service fees; it builds a recurrent revenue base; it means your Company retains ownership to protect intellectual property in the TESS technology; it provides time to prove the technology for performance guarantees to drive future sales.

### Energy solutions joint venture

This energy solutions strategy is now a core target. In the last quarter, we reported an approach from retailer Enova Community Energy Ltd (Enova), a community-owned energy retailer operating in regional New South Wales, with plans to shortly expand to metropolitan areas within the state and other states and territories. Enova offers a range of renewable energy plans for households as well as businesses. We have now agreed a memorandum of understanding (MoU) with Enova to investigate jointly providing energy solutions to Enova and its industrial heat customers.

The joint venture (JV) would include firming renewable electricity supplied under long term PPAs, using 1414 Degrees' TESS to ensure reliable electricity and heat solutions for sale to consumers. Enova has introduced a brewery seeking solutions to reduce their reliance on LPG for process heat. The brewery has a daily heat demand and feasibility has commenced into sequentially replacing their gas boilers with TESS. The site is a financially attractive site for the 10MWh TESS-IND commercial pilot, particularly when compared to our other proposed customer plants because the displaced LPG is more valuable, and the TESS solution would significantly reduce emissions.

We will be working closely with Enova across the coming weeks to model the financials and structure a business plan for the JV. The model could be extended to other energy networks to deliver lower cost heat and electricity solutions that leverage the benefits from combining electrified heat for industry and household electricity supply.

## Agribusiness ventures

Your Company has been progressing a greenhouse development arising from the SmartFarm study by ARUP. During the quarter, electrical contractor Ampcontrol SWG Pty Ltd and financier BE Power Solutions Pty Ltd executed an MoU with 1414 Degrees to investigate integrating TESS into the energy supply and finance solutions for SmartFarms.

The project partnership has resulted in an additional MoU with Nectar Farms Management Limited (Nectar Farms) to undertake feasibility for a protected cropping farm on the Northern Adelaide Plains. Nectar Farms is currently developing an \$80 million SmartFarm near Stawell in Western Victoria with product offtake to Costa Group. Its protected cropping farms will use a controlled atmosphere and grow lamps to achieve higher production and low water usage. The first site proposed for the study with 1414 Degrees is located in the Northern Adelaide Plains on a high voltage network and adjacent to an SA Water embedded generator on the NEM. The feasibility study would look at a similar development to the Stawell project, with the addition of heat from a 40MWh TESS module as the first stage to a grid scale TESS-GRID.

## Recurrent revenue modelling

Our business development team has been modelling the revenues to be expected from operating the TESS-IND and TESS-GRID on the NEM in conjunction with heat offtake to the SmartFarm or other industries, including the brewery, packaging plant or poultry processor as previously proposed. Scenarios for energy trading range from those based on contracts for supply from an aggregator to direct exposure to wholesale pricing, and combinations of both. We are being assisted by specialist energy trading and renewable energy aggregator companies. Other revenue sources, such as those from Frequency Control Ancillary Services (FCAS) on the NEM may not be significant at the 10MWh scale but would apply to larger devices. We expect to be able to report the results of this financial modelling within the current quarter.

## To market

The business development team attended the Australian Energy Storage conference in Sydney in June, where Chief Operating Officer Dr Jordan Parham presented on our technology. The team was engaged by a range of potential clients and investors across the two days of the conference. Concurrently, senior executives had a full schedule of briefings with investors and potential strategic partners at an investor conference in Hong Kong. There was strong interest in co-investing in our energy solutions strategy.

I look forward to reporting further progress on our path to revenues in the coming months.

Dr Kevin Moriarty  
Executive Chairman

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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](http://www.1414degrees.com.au)

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