



25 January 2023

ASX:14D

December 2022 Quarterly Activity Report

Highlights:

- Management team restructured to deliver growth with reduced overhead costs
- SiBox operational scale module under commissioning. First performance results expected this quarter
- [McKinsey & Co](#) show \$540 billion annual cost savings from system wide long duration energy storage
- Economic case for Thermal Energy Storage to accelerate renewables for [net-zero heat by 2040](#)
- Substantially higher revenue estimated for a large Li-ion Aurora battery
- Aurora approvals and studies on track to commence site works in late 2023

Chairman's Letter

During 2023 your Company will demonstrate its potential to play a significant part in the decarbonisation of global energy while securing independent cash flows from energy storage at Aurora. Our SiBox Demonstration Module will significantly advance the commercial readiness of our technology. There is no other company with a thermal energy storage product at this stage of readiness and with the ability to provide constant heat flow up to 1000°C. The unique capability of our silicon-based SiBox attracted Woodside Energy to invest at least \$2m to build the demonstration module but Woodside's ultimate interest, like ours, is in the commercial future for SiBox. Commercial success requires a storage product that meets the competitive demands of high-temperature industries and 1414 Degrees (14D) is committed to constant innovation to create even more efficient and cost-effective SiBox products.

Heat represents ~45% of energy related emissions. McKinsey & Company [estimated](#) that meeting the climate targets of industry could mean up to US\$3.6 trillion of investment in long duration energy storage including thermal, pumped hydro, compressed air and others would produce energy savings of US\$540 billion per year. The future will favour the most efficient and financially effective technologies to capture those savings. Our technology is well positioned to capture a share of this market.

High temperature thermal energy storage technologies are novel and need to be in action for a lengthy period to attain wide acceptance. But these new technologies must be implemented to decarbonise and your Company is well positioned as a first mover with an advanced product that has been tested in multiple cycles. Experience with our TESS-IND and GAS-TESS has equipped us to move forward much more confidently and rigorously with SiBox. The trillion dollar capital investment and cost saving estimates in the [McKinsey & Co](#) report make clear that SiBox could capture a market share of very substantial value over the coming decades. We are defining an appropriate business model to capture this opportunity, for example by licensing our technology to existing providers that service industry.

We continue to work closely with Woodside Energy Technologies to deliver the commercialisation program for the SiBox technology. The demonstration module is being commissioned and expected to deliver first results later in the quarter. The next stage allows Woodside to elect to increase their share of SiBox IP by funding a commercial sized SiBox pilot of up to 70 MWh energy capacity. Our team is actively assessing applications in industries such as alumina and cement production where SiBox could contribute to decarbonisation while reducing production costs.

Long duration storage enables an accelerated build-out of renewables and greater optimisation of grid utilisation. As shareholders are aware, 14D is participating in this major realignment with battery storage at the Aurora Energy Project.

The plan and approvals for our Aurora Energy Project provide for several solar capture and storage technologies including a SiBox that would power an electricity generator. However, the heat efficiency and temperature advantages of SiBox could be better demonstrated by a pilot in an industrial plant. Your board will assess the most appropriate use of cash flow from Aurora to advance capital growth depending on the timeline for SiBox to reach profitability.

Our SiliconAurora joint venture to construct and operate a large Li-ion battery north of Port Augusta continues to gain momentum with the various government, environmental and statutory approvals underway with all stakeholders. During the quarter we [announced](#) modelling that showed a significantly higher revenue outlook for the battery on the project. We expect to commission new modelling in the current quarter to prepare the business case for financing the battery project. Revenue from the battery project would drive major growth of our Company.

I look forward to reporting significant progress in this quarter.

Dr Kevin Moriarty



SiBox Demonstration Module on track

Read on for Project and Corporate updates...

Project and Corporate Updates

Corporate Structure

Your Company has instituted a dynamic management structure more suited to its current aims and financial resources. Chief Technology Officer, Mahesh Venkataraman leads our key mission to prove the SiBox technology for commercial use and develop the next generation of efficient silicon energy storage. General Manager-Aurora, Tom Thwaites leads our other priority mission to realise cashflow from a large battery connected to the NEM at the Aurora Energy Project. They form our management group with Lead Product Development Engineer, Josh Zowtyj and Communications and Engagement Lead, Maretta Layton, who will boost market recognition of our technology and cash flow potential.

This group will jointly manage our Company using their complementary skills and experience with engineering, research and development, marketing, and finance to secure a profitable future for your Company. The restructure has severely reduced overhead costs so we can focus the majority of our resources on delivering results from our two key projects within 12 months. We will be reviewing the leadership according to the performance of the management group. Meanwhile, the board has approved me as Executive Chairman to lead the Company on a salary of \$120,000 p.a.

The corporate structure has also been simplified, with the regulatory compliance and reporting outsourced to our company secretary Katelyn Adams of HLB Mann Judd. She has joined a trimmed down board of three experienced directors whose focus is supporting the management team to achieve shareholder value. Ms Adams will also oversee our accounting and payroll to ensure our Company has continuity of support from their experienced team.

This structure is expected to reduce management overheads by some \$500,000 p.a. compared to the previous year and will be reviewed by your board according to results.

Finance

Your Company ended the quarter with \$1.01 million in cash. The R&D refund of \$1.27 million was received in January resulting in a current cash balance of \$2.06 million. The Company's cash balance has been adversely affected by a \$1.2m cost escalation for the SiBox demonstration module (SDM), which resulted in your Company funding a much higher proportion than envisaged. We expect to reach agreement on further funding that will allow us to complete the SDM test program. Currently the undrawn balance of grants to completion of the project is \$1.6m.

The cash position is also being addressed through the trimming of the top heavy corporate overhead. We are preparing forecasts to take our Company through to realising cash flows and commercial success within two years. As required by ASX Listing Rule 4.7C3, the Company notes that \$60,000 was paid to related parties during the quarter. These payments were Directors Fees.

Aurora Energy Project

The SiliconAurora joint venture (50% 14D) with Vast Solar continues to gain momentum with the various government, environmental and statutory approvals underway with all stakeholders. Negotiations with OZ Minerals continue to progress well toward to an agreement to connect to the 275 kW transmission line.

Consultants Emanden and AECOM have been undertaking the connection studies which will lead to a GPS application with Electranet to participate in the National Electricity Market. During the quarter we [announced](#) modelling that showed a substantially higher revenue outlook for the battery on the project. Further modelling will be conducted this quarter to update the business case for financing. It is anticipated that site works will commence in the later part of 2023 and construction of the battery will follow. Future stages allow

Vast Solar and 1414 Degrees to construct and connect their respective solar capture and storage technologies to the NEM.

SiBox Technical Development

Construction of the SiBox Demonstration Module has been completed. Commissioning activities are in progress to validate the SiBox operation to the design specification and expected to deliver first results later in the quarter. Subsequently, the team will carry out a 12 month test campaign to validate the SiBox system and thermal storage media performance. We are working with our current industry partners and potential end-users to optimise the SiBox solution for their applications.

The SiBox Demonstration Module is designed to capture all the features and information needed to physically validate engineering design tools, minimise risk and increase technical confidence in the SiBox technology to ready it for commercial use. The SiBox Demonstration Module consists of storage media supported by a heating system, furnace insulation design, and energy recovery system designed to replicate commercial applications. The equipment specifications and designs for the demonstration module can be scaled to build long duration thermal storage solutions for industry.

The SiBox Demonstration Module is a culmination of the development of our core intellectual property in silicon-based thermal storage media and the expertise gained from earlier projects, all of which enables us to deliver a robust thermal storage technology for future low-carbon high temperature industries. Thermal processes are simple in principle but can be complex in execution, especially at ultra-high temperatures due to the intricate materials challenges involved. Our team has developed the expertise needed to engineer flexible solutions for our industry partners with the ability to retrofit existing plants and processes with minimal modifications.

Commercialisation

Thermal energy storage can enable cost-efficient electrification and decarbonisation of the most widely used heat applications (namely, steam and hot air). A very substantial value market is developing for thermal energy storage as part of a global push towards long duration energy storage (e.g. thermal storage; compressed air storage; pumped hydro) to meet decarbonising targets. 1414 Degrees is contributing to the global effort to decarbonise and is a member of the Long Duration Energy Storage ([LDES](#)) Council that recently [found](#) firming heat can be cost-efficient when the final demand is heat, which is our main target for the SiBox technology. The question for 1414 Degrees is how to get payback and profit from its technology. A large proportion of the global high temperature heat demand is at temperatures >800°C, and SiBox is uniquely placed in this market segment. 1414 Degrees has also independently engaged with Logic Figures Pty Ltd to quantify the benefits of SiBox's unique capabilities while targeting specific applications above 800°C. The aim is to deliver a "go-to-market" strategy focussing on capturing early market share of this significant cashflow potential from the global energy transition and decarbonisation push.

The \$5.4 million project to test and prove the commercial potential of SiBox storage at scale is well advanced with the demonstration module undergoing commissioning at the date of this report. The remaining \$1.6 million in grants from our funding partners, Woodside Energy Technologies and the Australian Government will be applied to complete the program over the next 17 months with a design for a commercial-ready scaled up SiBox. We are working with high temperature industries engaged in alumina and cement production, in Australia and globally, to identify parts of their processing that would benefit from the addition of our SiBox to reduce emissions and make cost savings. These industries would be an excellent site for the large scale SiBox pilot.

Research and development

Your Company has focussed its research and development efforts on refining the preferred molten silicon thermal storage media for SiBox. Long term testing and thermal cycling of different configurations in our test

furnaces continues to demonstrate the robustness of our selected materials and optimised design for the SiBox Demonstration Module. Samples have now completed close to ten months of rigorous testing under anticipated real-life conditions. Your Company has also engaged in continual improvement through complementary R&D activities on new storage media concepts to further improve the cost and performance of SiBox. A patent application was filed in November 2022, further highlighting our focus on research and innovation.



Our SiBox technology incorporates the latest version of our silicon-based storage media with the knowledge gained from previous demonstration devices. The GAS-TESS, in a world's first, demonstrated an integrated system which could time-shift the value of biogas energy to on-demand dispatchable electricity but was uneconomic. Despite the technological challenges, which are expected with such first-of-a-kind integration, the innovation and engineering expertise gained through operating GAS-TESS has led to even greater advances as is evident in the SiBox technology. The SDM will further drive confidence in our engineering ability to install large-scale industrial SiBox that reduce emissions and production costs.

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ABOUT 1414 DEGREES LIMITED

1414 Degrees is developing and commercialising its silicon-based thermal energy storage technology, SiBox™, to help high-temperature, high-energy consumption industries decarbonise quickly, efficiently and cost effectively by taking advantage of abundant renewable energy sources. SiBox will harness the extremely high latent heat capacity of silicon in its proprietary storage system and provide flexible, ultra-high temperature heat 24/7 for large industrial applications and to deliver reliable heat and power supply when required. It is envisaged that the flexibility of the SiBox modular development concept will also provide energy customers with the ability to optimise their energy systems in a way that maximises their utilisation of cheaper renewable power and simplifies their purchasing from wholesale energy suppliers.

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The Company is commissioning a demonstration module of the SiBox technology in 2023 which will accelerate the commercialisation of SiBox as a competitive clean energy product. The Company has previously implemented pilots which have led to the refinement and evolution of its technology.

In 2019 the Company made the strategic purchase of the Aurora Energy Project (AEP) located near Port Augusta, South Australia. The focus of the project is to develop a long-term renewable energy project delivering reliable electricity to the region and NEM. Once ready for commercialisation, the AEP site will also allow 14D to pilot and demonstrate a large commercial scale version of the SiBox technology.

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

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