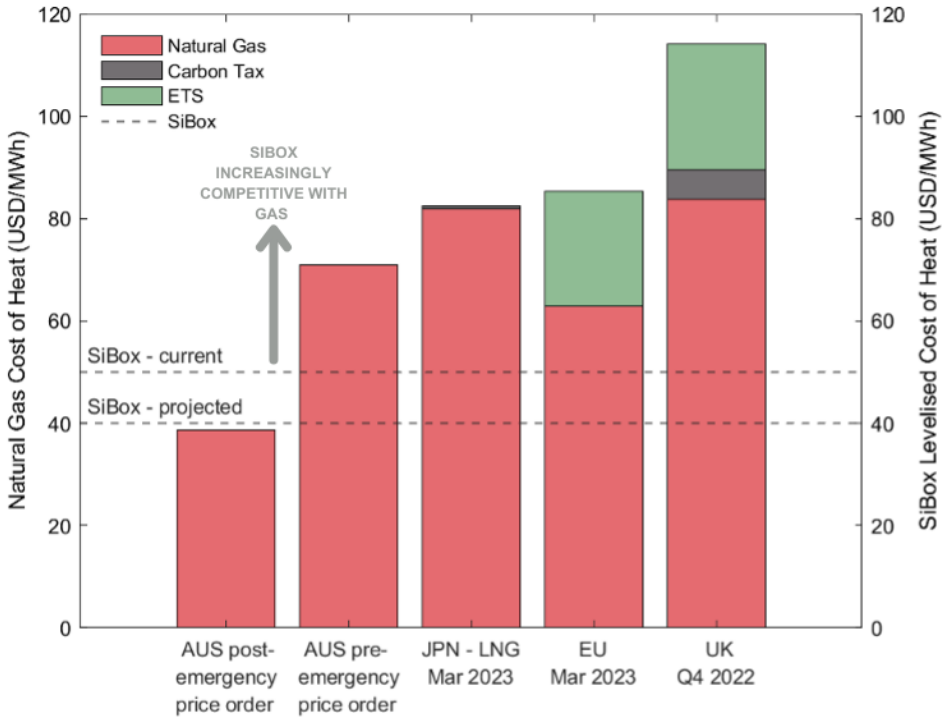
CLEAN SCALABLE ENERGY STORAGE™

27 April 2023 ASX:14D

SiBox™ is competitive with fossil fuel

1414 Degrees Limited ("1414 Degrees" the "Company") has estimated its renewable-powered SiBox™ thermal energy storage system has the potential to replace a significant amount of fossil fuel consumed by global heat-related industries as they shift to electric heating. These industries contribute approximately 60%[1] of worldwide industrial CO_2-emissions through their dependence on fossil fuels for heat generation. Decarbonising high temperature processes that rely on gas presents a significant challenge. SiBox™ technology is specifically designed for this very high temperature market.

Recent analysis by 1414 Degrees, based on proprietary process data supplied by various industries, has revealed a significant finding: the SiBox™ technology will be competitive as a substitute for gas much earlier than anticipated due to a combination of higher gas pricing and carbon pricing as shown in the chart below.



SiBox levelised cost of heat (LCOH) versus costs of natural gas (including efficiency losses). Note: gas operating overheads (Opex) and gas Capex are not included in gas cost whereas Opex and Capex are factored into SiBox LCOH.

Industries could replace gas with clean hot air up to ~1000°C by retrofitting a renewable-powered SiBox™. SiBox™ uniquely leverages the latent heat of silicon to deliver constant process temperature on-demand – a critical requirement for many industries.

Not only is SiBox™ cost competitive, but it may provide a much higher value proposition than gas as it can provide grid stability services with process control. SiBox™ may also reduce energy costs by charging when electricity costs are lower, such as during periods of high solar or wind power generation. Additionally, SiBox™ can be charged and discharged simultaneously, making it an even more advantageous solution for 24/7 high-temperature industrial processing.

1414 Degrees initially mapped out a 5-year path to commercial viability of SiBox™ but increasing coal and gas prices have driven up costs for heat supply in industries globally. As a result, SiBox™'s very hot air output will be competitive earlier than anticipated. Cost is just one incentive to reduce gas use - gas supply constraints are likely to continue into the foreseeable future, and emissions reduction is driving change.

"This is good news for our Company and those committed to achieving global net-zero emissions targets," said Dr. Kevin Moriarty, Executive Chairman. "Whereas previously our path to revenue was through less efficient electricity generation, now we have a direct route through decarbonising industrial heat. SiBox™ heat is expected to deliver over 90% efficiency."

SiBox™ is powered by 1414 Degrees silicon Brick, which is on a cost-reduction path to mass production. This cost reduction will make the SiBox and silicon Brick even more competitive in reducing both cost and emissions in high temperature industries.

AUTHORISED BY:

Dr Kevin Moriarty, Executive Chairman on behalf of the Board of Directors

For investor enquiries or further information, please contact:
info@1414degrees.com.au or +61 8 8357 8273

ABOUT 1414 DEGREES LIMITED

1414 Degrees is commercialising its proprietary silicon-based thermal energy storage brick. The brick is used in its SiBox™ thermal energy storage technology. SiBox™ allows renewable electricity to provide high temperature carbon free heat for large industrial applications by using the latent heat characteristics of silicon-based alloys to deliver constant heat on-demand – a critical requirement for industries. The Company is commissioning a demonstration module of the SiBox™ technology which is accelerating the commercialisation of SiBox™ as a competitive clean energy product. The Company is also developing the Aurora Energy Project (AEP), located near Port Augusta, South Australia, a long-term renewable energy project delivering reliable electricity to the region.

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

Supporting documentation

1414 Degrees analysed natural gas prices and carbon pricing from various regions and compared them to the SiBox levelized cost of heat (LCOH). Half-hourly price data from National Electricity Market (NEM) over several years and synthetic future price curves were used in annualised simulations to evaluate the performance of SiBox as a natural gas replacement under several scenarios. Natural gas is widely used within industries requiring heating above 800°C, a key target market for SiBox. If SiBox can produce heat at a lower cost than natural gas it can achieve commercial feasibility more quickly. It should be noted that the SiBox LCOH metric includes the CAPEX and OPEX costs of producing heat whereas the natural gas has been based on the fuel price, combustion efficiency and carbon penalty (if applicable).

Methodology

Figure 1 displays a comparison between the SiBox LCOH and natural gas costs. The SiBox LCOH was generated using 1414 Degrees' in-house models, including the Heat Transfer Design Tool and Dispatch Engine. The natural gas costs were calculated from the natural gas and carbon penalty prices, and account for the efficiency losses.

The data for the natural gas price is split into 3 categories. The cost of fuel (Table 1), carbon tax price (Table 2), and emissions trading scheme rates (Table 3). The currency exchange rates, and system parameters are outlined in Table 4 and Table 5 respectively.

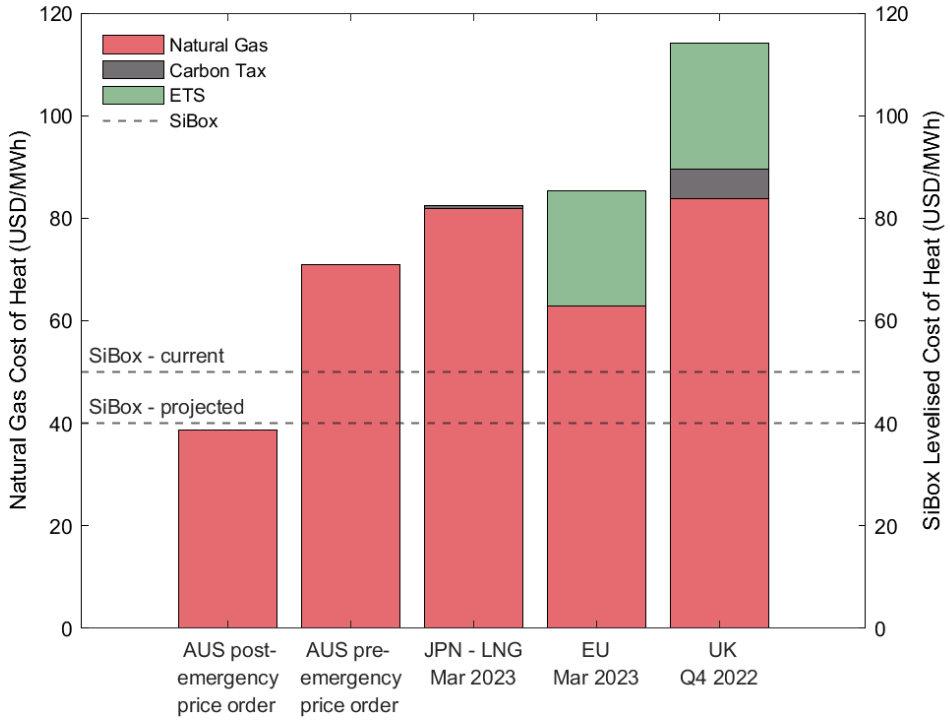


Figure 1: SiBox LCOH versus costs of natural gas (including efficiency losses)

All Data sources current as of 20/04/2023. Web resources date accessed: 20/04/2023.

Table 1: Natural Gas Fuel Prices

Region	Value	Unit	Source
Australia	12.00	AUD / GJ	https://treasury.gov.au/sites/default/files/2022-12/c2022-343998-instrument.pdf
Australia	22.00	AUD / GJ	https://www.aer.gov.au/wholesale-markets/wholesale-statistics/gas-market-prices
UK	5.09	GBP / kWh	https://www.data.gov.uk/dataset/4aa3c13f-5bd7-4619-ad04-44f1cd296ac1/quarterly-energy-prices
EU	13.81	USD / MMBTU	https://www.worldbank.org/en/research/commodity-markets
Japan	18.00	USD / MMBTU	https://www.worldbank.org/en/research/commodity-markets

Table 2: Carbon Tax

Region	Value	Unit	Source
Australia	0	-	https://carbonpricingdashboard.worldbank.org/map_data
UK	18	GBP / t-CO_2	https://carbonpricingdashboard.worldbank.org/map_data
EU	0	-	https://carbonpricingdashboard.worldbank.org/map_data
Japan	2	USD / t-CO_2	https://carbonpricingdashboard.worldbank.org/map_data

Table 3: Emissions Trading Scheme (ETS)

Region	Value	Units	Source
Australia	0	-	https://carbonpricingdashboard.worldbank.org/map_data
UK	75	GBP / t-CO_2	https://carbonpricingdashboard.worldbank.org/map_data
EU	78	EUR / t-CO_2	https://carbonpricingdashboard.worldbank.org/map_data
Japan	0	-	https://carbonpricingdashboard.worldbank.org/map_data

Table 4: Assumed Currency Exchange Rates

1 USD =	1.00 USD
1 AUD =	1.49 USD
1 EUR =	0.91 USD
1 GBP =	0.81 USD

Table 5: Natural Gas Assumptions

	Value	Unit
Natural gas combustion efficiency	75	%
Natural gas specific CO_2 emissions	0.1977	t-CO_2 / MWh

[1]Industrial emissions data sourced from International Energy Agency and Long Duration Energy Storage Council