

THE POWER OF CHANGE

1414 Degrees Ltd

JULY 2022 OVERVIEW

ASX: 14D

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OVERVIEW

- Focussed small cap company with 100% renewable energy focus and strong plan for growth
- Our vision is to commercialise the technology to decarbonise the world's energy supply
- Strategic focus:
 - **SiBox:** thermal energy storage technology
 - **Aurora:** renewable energy project
- 202m million shares on issue
 - ~3,500 shareholders
 - Market cap \$15.1M
- \$3.6M cash at end June, no debt
- \$9.3M tax losses carried forward
- R&D tax claims c \$1M p.a.



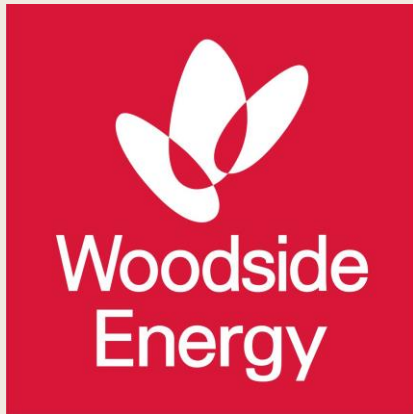
SIBOX™ TECHNOLOGY
Clean heat technology



AURORA ENERGY PROJECT
Clean energy generation

A STRONG IN-HOUSE TEAM BACKED BY EXTERNAL COLLABORATORS

- Multi-disciplinary team of technical specialists
- Dedicated workshop for SiBox research and development, backed by strategic industry and University collaborators to access specialised skills and experience
- Agreements with high calibre companies for the commercialisation and development of SiBox and Aurora



SIBOX™ TECHNOLOGY



AURORA ENERGY PROJECT



THE FUTURE OF CLEAN HEAT

A low-carbon revolution
for industry

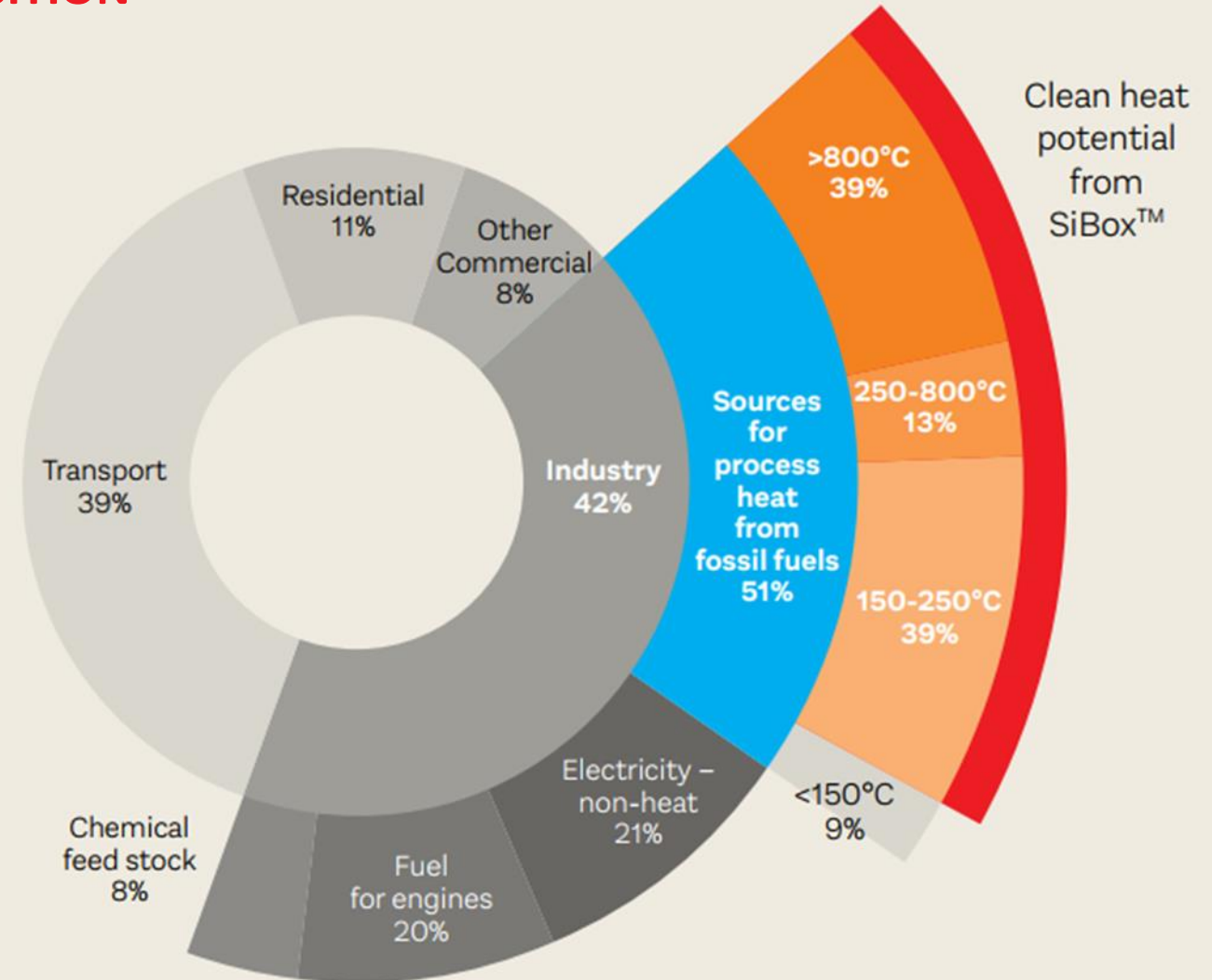


SIBOX™ TECHNOLOGY



CLEAN HEAT IS NEEDED FOR THE ENERGY TRANSITION

- Energy transition requires more than decarbonisation of just electricity and transport: heat is ~50% of total global energy demand
- ~50% of energy used by industry is for process heat
- The demand from industry, investors and the public for clean energy solutions means there is a huge market gap and potential for clean heat
- There are currently no commercial long duration renewable energy storage solutions for high temperature process heat



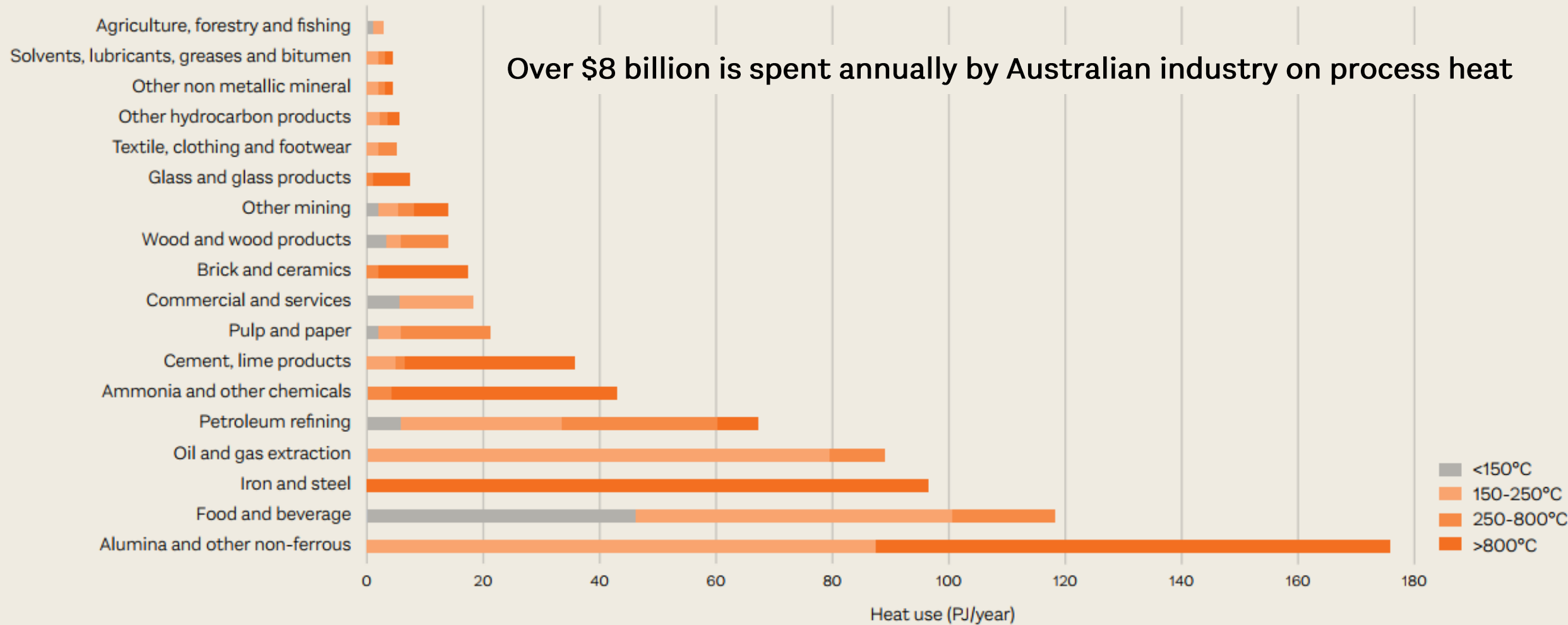
Total final energy consumption in Australia



SIBOX™ TECHNOLOGY

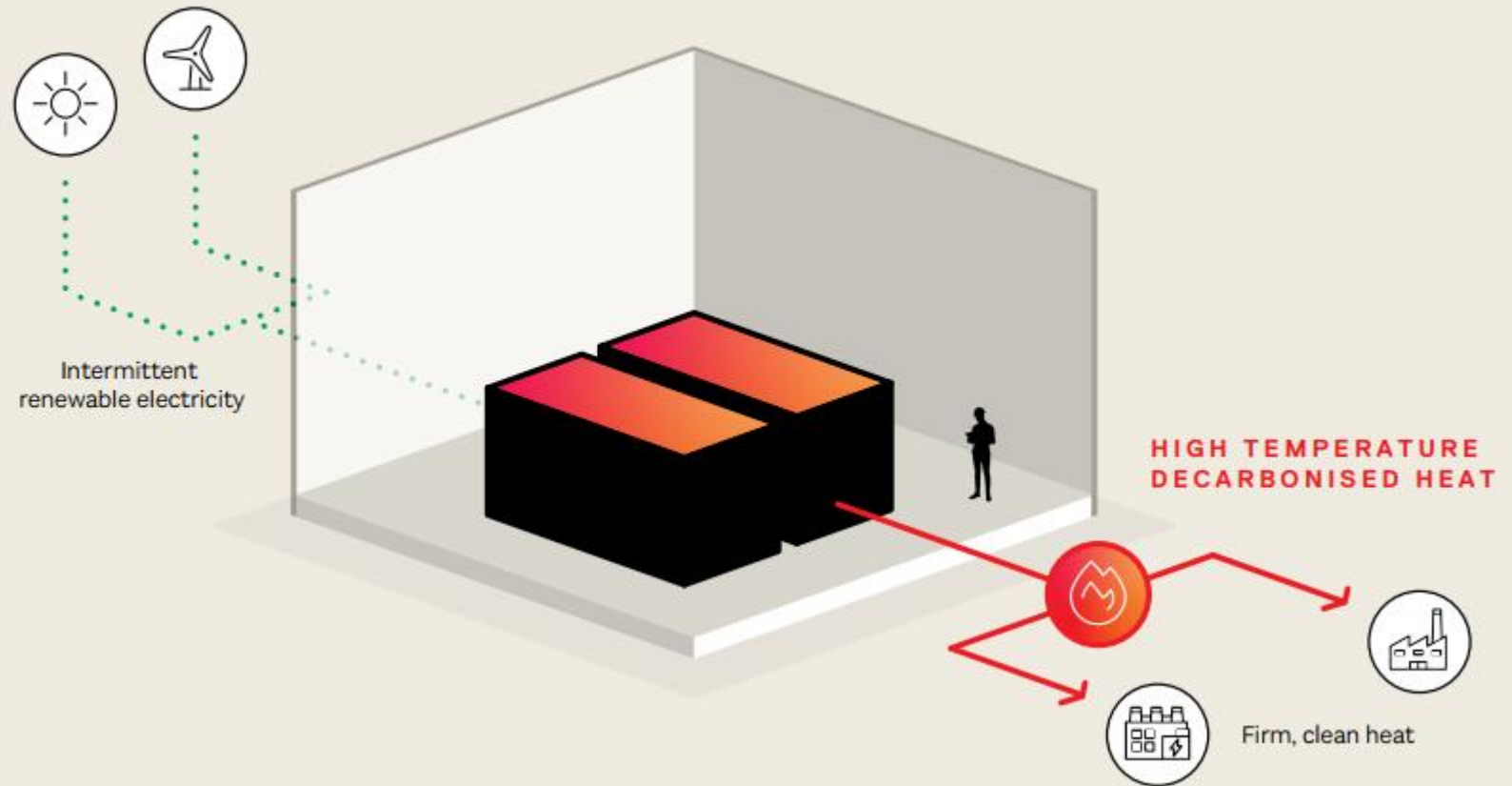
Source: ITP Renewable Energy Options for Industrial Process Heat, November 2019

HIGH TEMPERATURE CLEAN HEAT APPLICATIONS ARE SIGNIFICANT



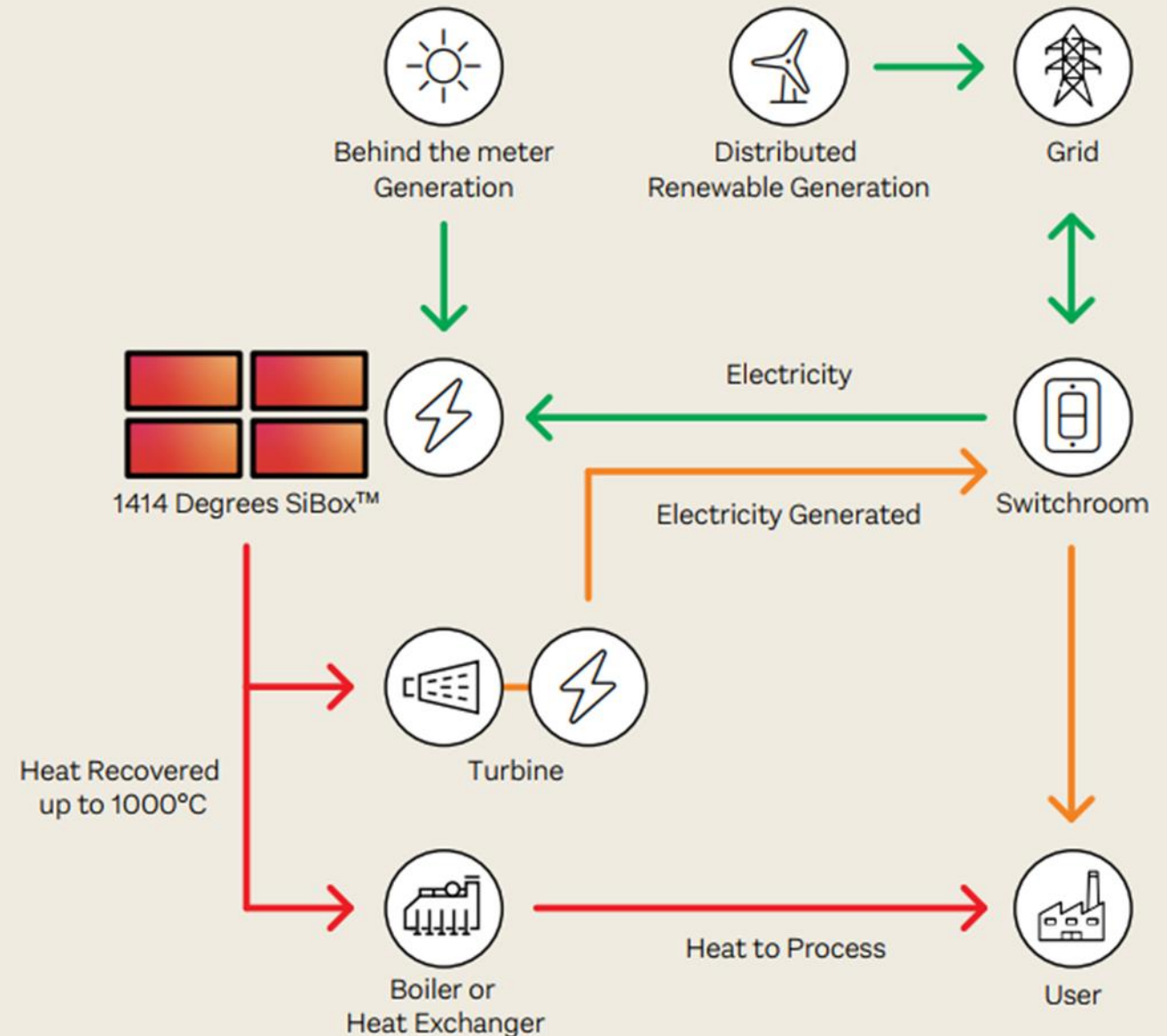
SIBOX ENABLES CLEAN HEAT AT HIGH TEMPERATURE

- Displaces fossil fuels as the energy source by using renewable electricity
- Generates reliable high temperature heat by using heating elements and the thermal energy storage properties of Silicon
- Enables integration into existing infrastructure by its firm, clean heat output

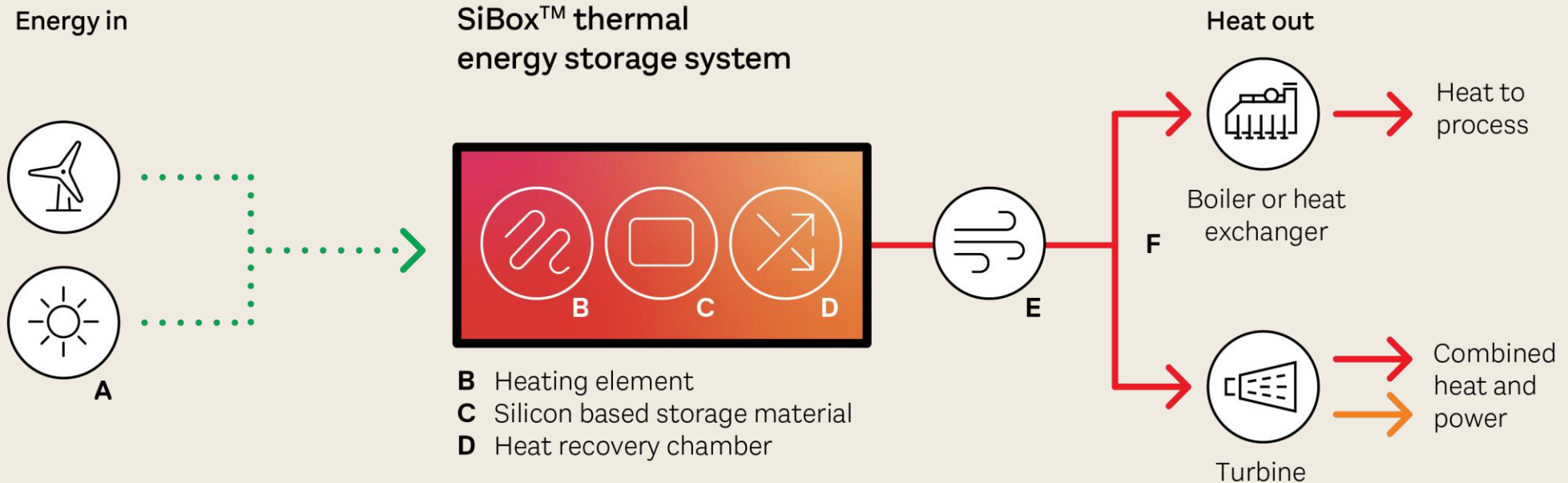


HOW THE SIBOX SOLUTION CAN WORK FOR INDUSTRIAL HEAT USERS

- Absorbs low-cost renewable power from the grid – can be located away from the renewable energy source, directly coupled to the application
- High temperature air output up to 1000°C coupled to the process via energy recovery system
- Output can be used for heat only (e.g. air or steam) or combined heat and power solution
- Modular design facilitates lower-risk integration and scaling up



HOW SIBOX CREATES CLEAN HEAT FROM RENEWABLES



Energy in:

- A) Renewable electricity (solar/wind) power source
- B) Heat generated via radiative heating elements

SiBox:

- C) Heat is stored in silicon-based storage material
- D) Heat transferred to air in an internal heat recovery chamber
- * SiBox well insulated to minimise thermal losses

Heat out:

- E) Heat extracted as high temperature (~1000°C), low pressure air
- F) Heat integrated via energy recovery system, configured as required for the application



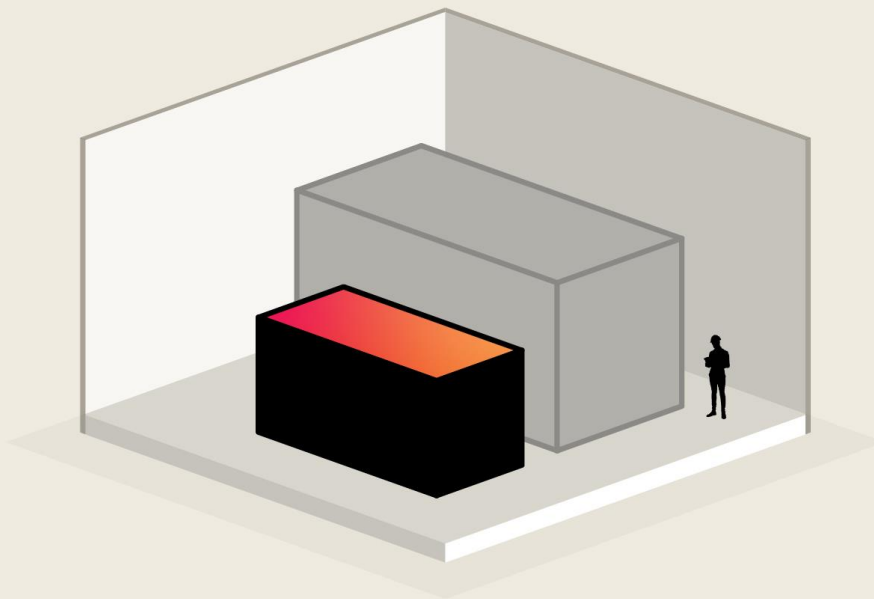
SIBOX™ TECHNOLOGY

SIBOX HARNESSSES THE ADVANTAGES OF SILICON FOR THERMAL ENERGY STORAGE

- High energy density, pure Si = 500 kWh/t
- High melting (operating) temperature

GIVES

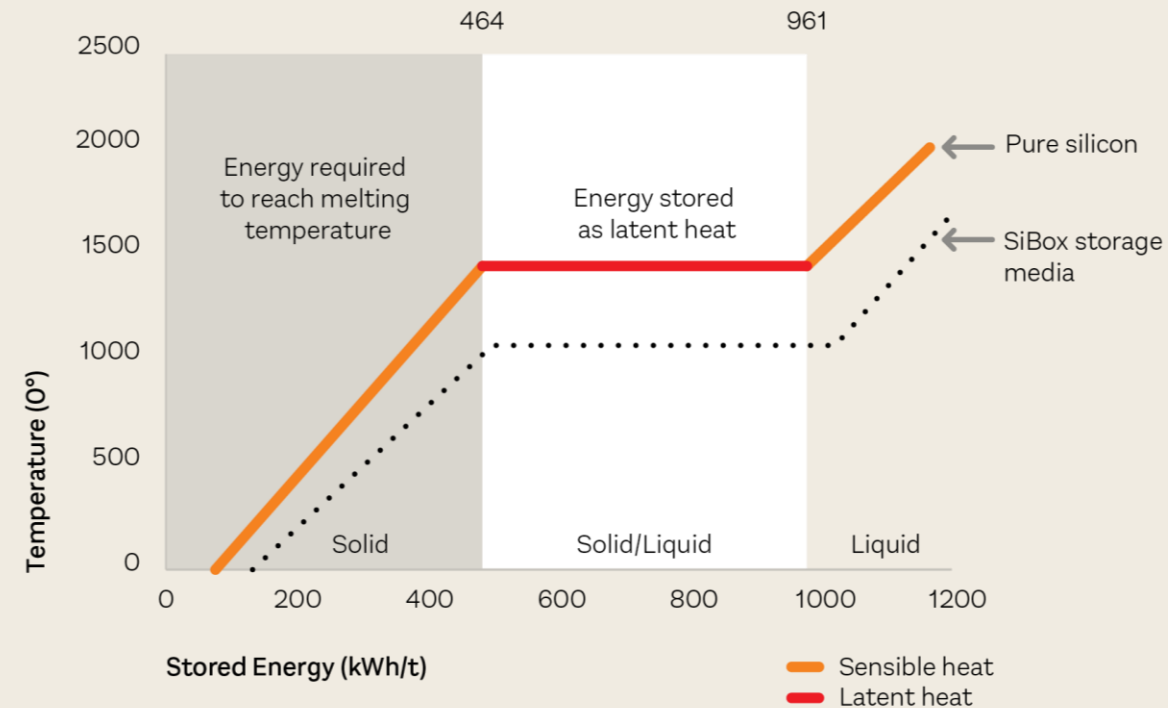
- High energy storage density
- Efficient energy storage
- Consistent, high temperature (highly usable) energy output



Equivalent size: SiBox vs sensible storage



SIBOX™ TECHNOLOGY

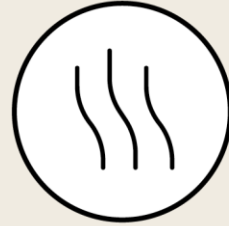


Silicon is the building block – alloying elements added to adjust and optimise SiBox storage media properties and cost

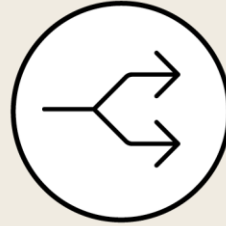
ADVANTAGES OF SIBOX



High temperature heat
Operating temperature far exceeds the capabilities of current commercial alternatives



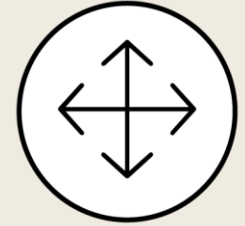
Efficient
Thermal efficiency is greater than 90%, based on one cycle per day



Flexible energy output
Can be flexibly configured to suit a wide variety of applications



Flexible location
Can be located where heat is required, does not need to be co-located with a renewable energy source



Scalable
Modular design can be scaled to meet customer requirements and integrate into their facilities



SIBOX ECONOMICS: CONVERSION OF RENEWABLE ELECTRICITY TO CLEAN HEAT

Our target is to produce SiBox so it can cost competitively provide clean heat compared with fossil fuels. This depends on:

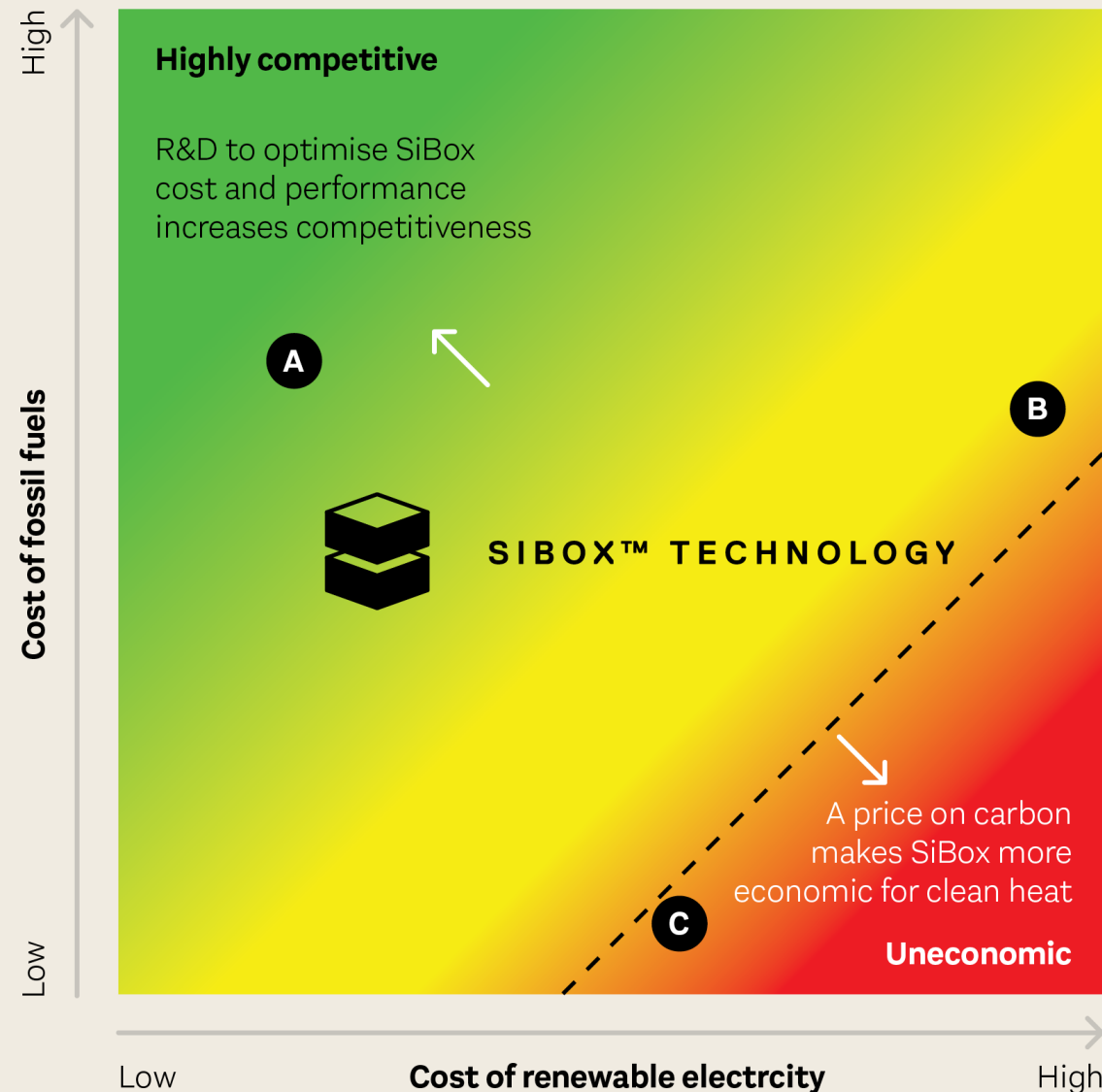
- Low-cost renewable electricity input
- SiBox design (size, operation etc)
- R&D to optimise SiBox cost and performance
- Costing in carbon emissions

Scenario	Market example
A	EU, Aus fringe/off-grid
B	Japan
C	USA



SIBOX™ TECHNOLOGY

Value map of SiBox for clean heat



SIBOX VALUE PROPOSITION COMPARED WITH OTHER CLEAN HEAT OPTIONS

SiBox can compete with fossil fuels and other clean heat technologies

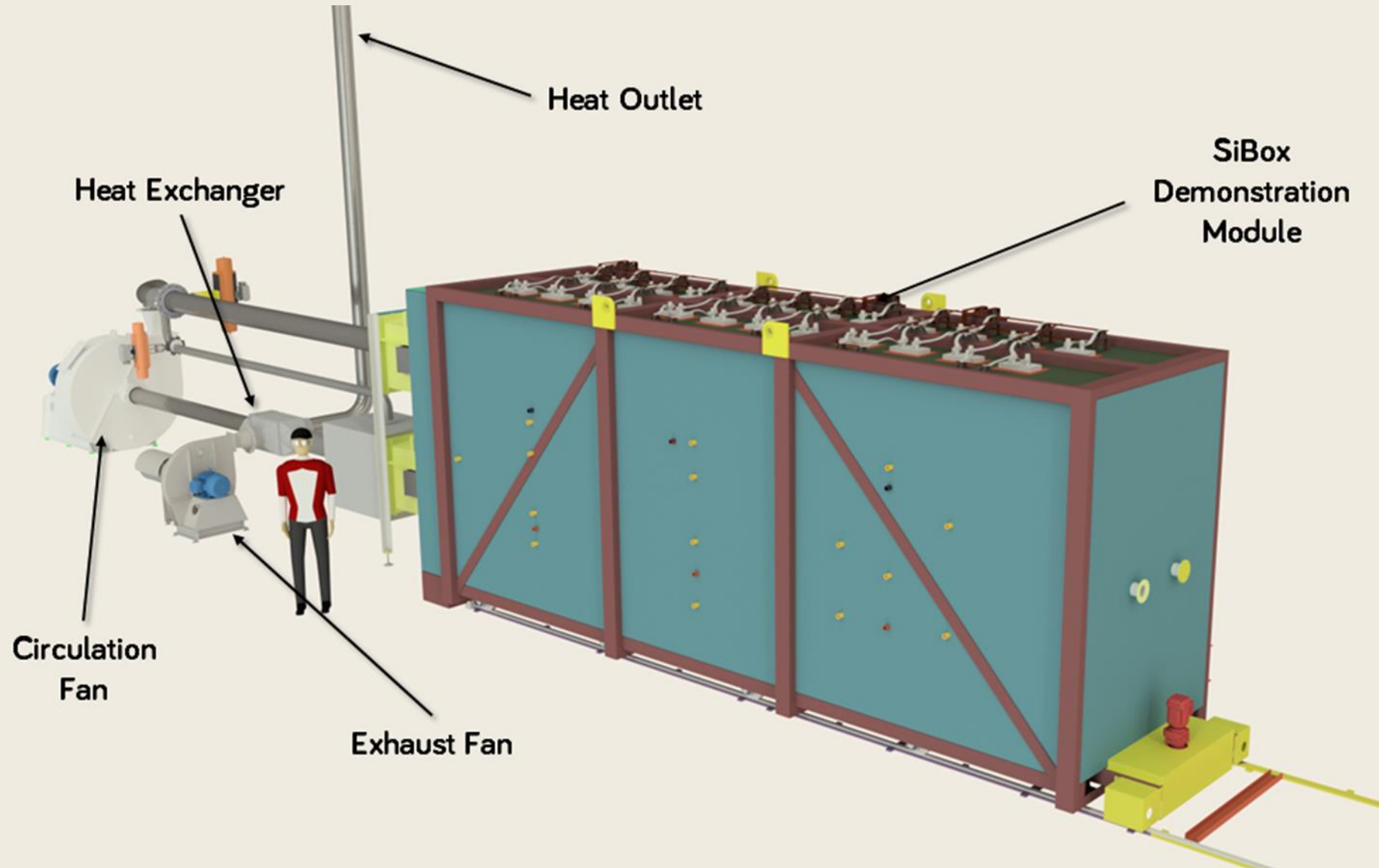
Clean heat alternative	SiBox key advantages		
Sensible solid storage (e.g. concrete)	 Higher efficiency	 Smaller footprint	
Molten salts (e.g. nitrates)	 Higher temperatures	 Higher efficiency	 Smaller footprint
Electric heater + electricity storage (e.g. battery, pumped hydro)	 Lower cost	 Higher efficiency	 Smaller footprint
Hydrogen*	 Lower cost	 Higher efficiency	

*SiBox can also integrate with novel hydrogen production methods



CURRENT TECHNOLOGY FOCUS – DEMONSTRATION MODULE PROJECT

- 1 MWh thermal storage device currently being built in 14D workshop
- Will prove the performance of the SiBox technology at a complete 1 module scale
- Testing and experimental data will validate engineering design models for scaling up SiBox to multi-module pilot units
- Project is on schedule and on-budget



SIBOX™ TECHNOLOGY

CURRENT COMMERCIALISATION FOCUS

- The SiBox Demonstration Module has attracted significant commercialisation support:
 - Up to \$2M agreement with Woodside Energy Technology Pty Ltd, a subsidiary of Woodside Energy Group Ltd, to support further development and a potential partnership in the future commercialisation of the SiBox technology – [announcement 13/10/21](#)
 - \$2.2M Australian Federal Government Grant (Modern Manufacturing Initiative) – [announcement 18/11/21](#)
- To engage with prospective customers and promote SiBox benefits, 1414 Degrees is a partner/member of:
 - Heavy Industry low-Carbon Technology Co-operative Research Centre
 - Long Duration Energy Storage Council (membership pending)
- Other commercialisation activities including market research and technoeconomic evaluation of SiBox case study opportunities are in progress.



SIBOX™ TECHNOLOGY

Commercialisation
support



Australian Government

Partner/member
organisation



SIBOX DEMONSTRATION MODULE PROJECT TIMELINE

CAL 2021

2022

2023

2024

2025 +

Demonstration Module Project (Woodside + Fed Govt)

Module Construction

Performance test and validation



You are here

Pilot case studies



Woodside SPV partnership decision

Multi module pilots at end users

Cost optimisation (R&D and supply chain optimisation)

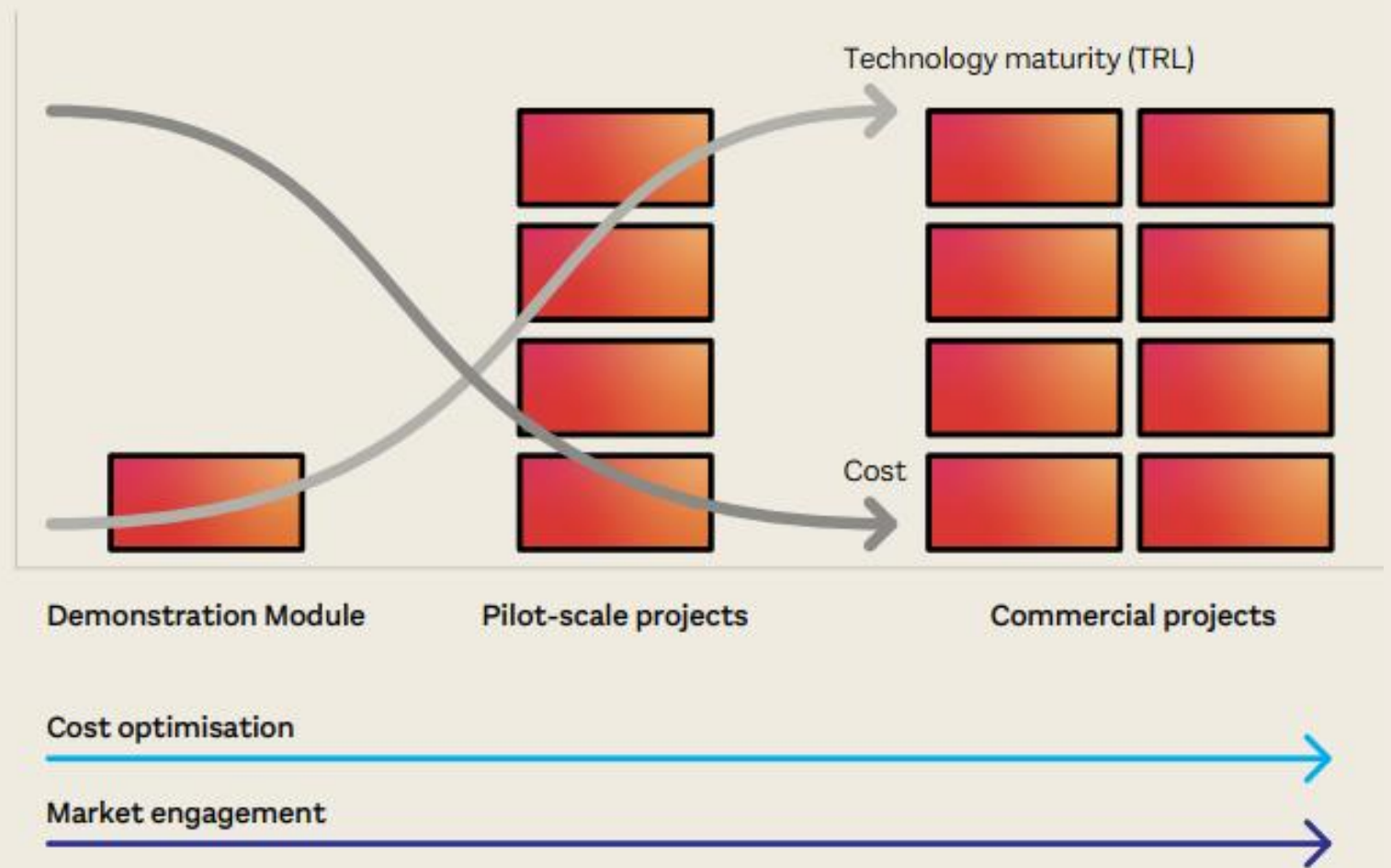
Market engagement and commercialisation



SIBOX™ TECHNOLOGY

SIBOX STRATEGY: TECHNICAL AND COMMERCIAL PATHWAY

1. Demonstration Module Project: prove the technology at 1 module scale
2. Pilot-scale projects: coupled to validate the technology a heat application and multi-modules (<10 modules)
3. Commercial projects
4. Cost optimisation: research and development and supply chain optimisation
5. Market engagement



NOTHING BUT BLUE SKY

Low-cost, reliable,
clean energy



AURORA ENERGY PROJECT



RELIABLE, CLEAN ELECTRICITY IS NEEDED

As Australia transitions to a low-carbon electricity system, the grid requires additional reliable, renewable electricity supply:

- Coal fired generators are retiring or unavailable
- Energy prices are going up
- National energy supply is susceptible to external world events
- Renewable projects are growing but are intermittent and often curtailed
- Australia's energy market operator points to a Step Change requirement for more firmer, reliable decarbonised electricity

The Aurora Energy Project is positioned to meet this requirement



AURORA ENERGY PROJECT

FEDERAL ELECTION 2022 - AUSTRALIA VOTES

Labor, Greens look set to push businesses to adopt tougher emission targets

The Business / By business reporters Nassim K

Posted Wed 25 May 2022 at 5:04am, updated Fr



2022 Integrated System Plan

June 2022



The staggering cost of Australia's fossil fuel energy crisis

Giles Parkinson 27 June 2022

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AURORA ENERGY PROJECT OVERVIEW

- The Aurora Energy Project is a planned hybrid renewable power plant, up to 360MW, with staged implementation to capture revenue opportunities in line with market dynamics and reduce financial risk
- Stage 1: Up to 140MW/280MWhr battery (BESS)
- Future planned stages:
 - Up to 150MW Concentrated Solar Power (CSP)
 - 70MW solar PV generation
 - Thermal energy storage demonstration



A WORLD-CLASS RENEWABLE ENERGY SITE

Aurora is located approximately 30km North of Port Augusta, South Australia

Excellent renewable energy credentials

- High solar insolation with very high annual solar electricity generation potential
- 1000 hectare site with excellent topology and land agreements for 40 years
- Connection options to NEM including adjacent 275kV transmission line
- Only fully permitted Concentrated Solar Power site with long term solar data in Australia

Close to major infrastructure

- Experienced workforce and infrastructure in Pt Augusta
- Proximate to long term mining loads with announced energy decarbonisation strategies
- Transmission access to renewable energy growth region, being positioned as a low-emissions industrial leader



KEY PROJECT PARTNERS

The Aurora Energy Project is being jointly developed by 1414 Degrees and Vast Solar

- 50-50 joint venture to develop and operate Aurora – [see full announcement 16/6/22](#)
- Brings together two leading Australian energy innovators
- Complementary resources and experience in developing renewable energy projects and technology



And a shared commitment to:

- Deliver Stage 1 BESS to Final Investment Decision, co-funding development costs, as governed by Shareholders Agreement
- Further develop Aurora as a long-term renewable energy project in Port Augusta including Vast Solar's CSP technology and 14D's SiBox technology
- Engage and work with stakeholders at local, state and national level



AURORA ENERGY PROJECT

STRONG PROJECT TEAM

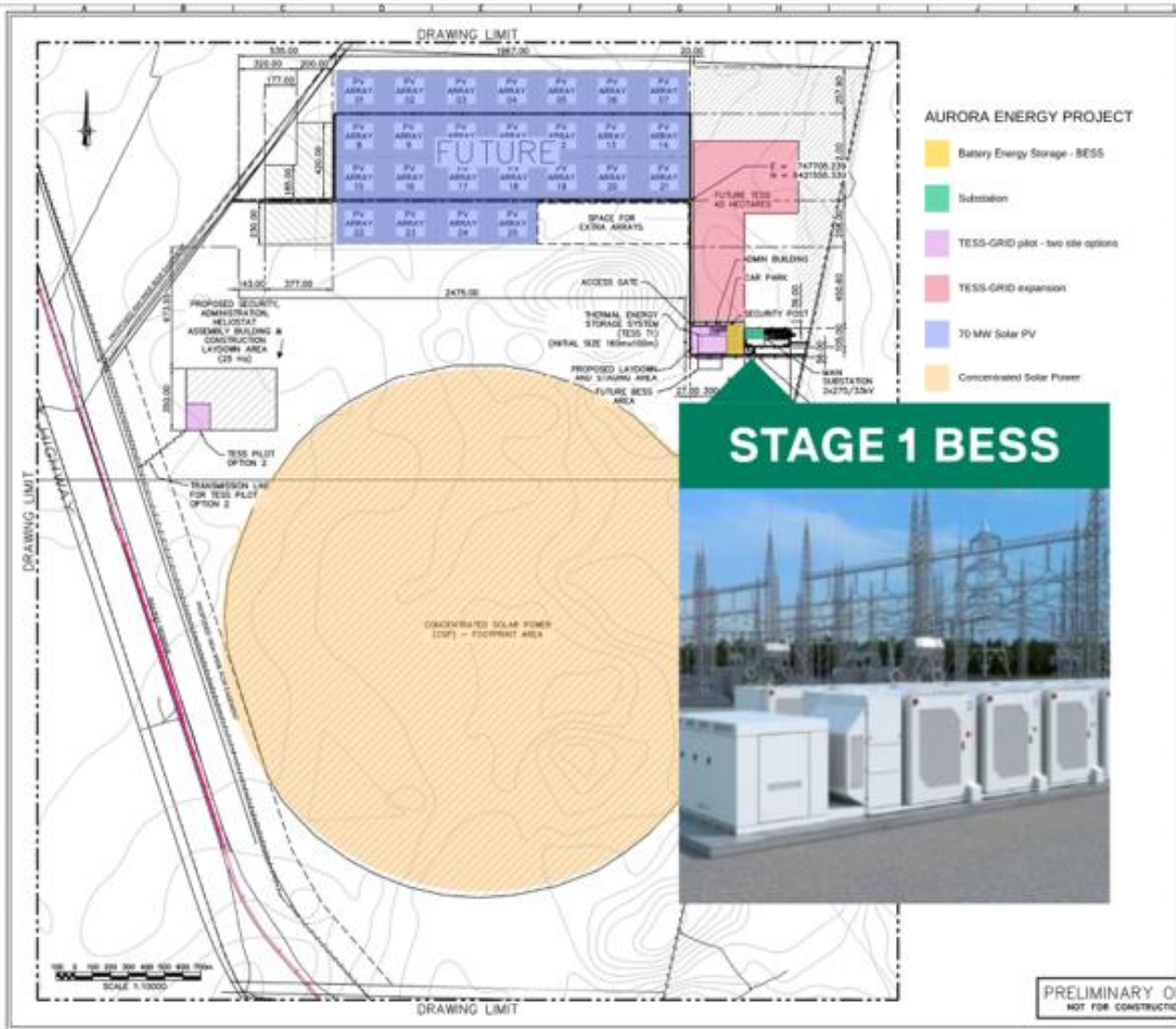
The Aurora Stage 1 BESS is being developed through to the Final Investment Decision by a strong team with a focus on reducing risk and a best for project philosophy

BESS	Tier One Provider *
Owner's Engineer	 Emanden Technical Solutions
GPS consultant	
Transmission Network Service Provider	
Integration	Vice Engineering
Legal Advisor (Approvals, Aboriginal Heritage)	

*Market confidentiality pending final award of contracts



AURORA ENERGY PROJECT



DEVELOPMENT OF STAGE 1 BESS CONTINUES TO MAKE PROGRESS IN KEY AREAS



Government approvals in place	✓ Development approval for Staged implementation of up to: – 140MW / 280 MWh BESS (Stage One) – 70MW Solar PV Generation – 150MW Concentrated Solar Power – Thermal Energy Storage Demonstration	Procurement in progress	✓ Tier One BESS provider selected
	✓ Land agreement executed and valid under tripartite agreement between the SA Government and Pastoralist		✓ Inverters selected
	✓ Office of Technical Regulator Certificate granted		– Balance of plant and EPC to be selected
	✓ Heritage agreement executed and valid for managing areas of Aboriginal significance		
	– Native vegetation clearance permit update in progress	Grid connection in progress	– Transmission Connection Application engineering studies commenced
			– 275kV transmission line access negotiations in progress
		Financial modelling complete	✓ Independent modelling of revenue by Cornwall Insights completed
			✓ CAPEX envelope defined
		New partnership in place	✓ 1414D and Vast Solar joint venture to accelerate delivery of Stage 1 BESS

AURORA STRATEGY: TECHNICAL AND COMMERCIAL PATHWAY

Looking ahead we continue to focus on progressing the Stage 1 BESS towards the Final Investment Decision:

- Completing the Transmission Connection Application and 275kV transmission line access negotiations
- Market engagement to attract off-takers and operations partners
- Negotiating procurement packages ready for execution: BESS and EPC vendors
- Securing final CAPEX investment

The opportunity to invest in and benefit from delivering this world-class renewable energy project remains open to interested parties

Project timeline

2022



Transmission Connection Application

Market engagement

2023



Final Investment Decision

Procurement

Construction

2024



Stage 1 BESS Operational



AURORA ENERGY PROJECT

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1414 Degrees Ltd



CLEAR STRATEGIC FOCUS GOING FORWARD



SIBOX™ TECHNOLOGY

- Work with our collaborator – Woodside Energy Technology
- Deliver the Demonstration Module
- Progress commercialisation by securing pilot-scale project sites and funding
- Continue R&D to improve performance and reduce costs



AURORA ENERGY PROJECT

- Work with our joint venture partner – Vast Solar
- Complete Stage 1 BESS transmission connection application and line access negotiations
- Select EPC vendor
- Secure funding for Final Investment Decision

