

# THE FUTURE OF CLEAN HEAT

A low-carbon revolution  
for industry

JUNE 2023



SIBOX™ TECHNOLOGY



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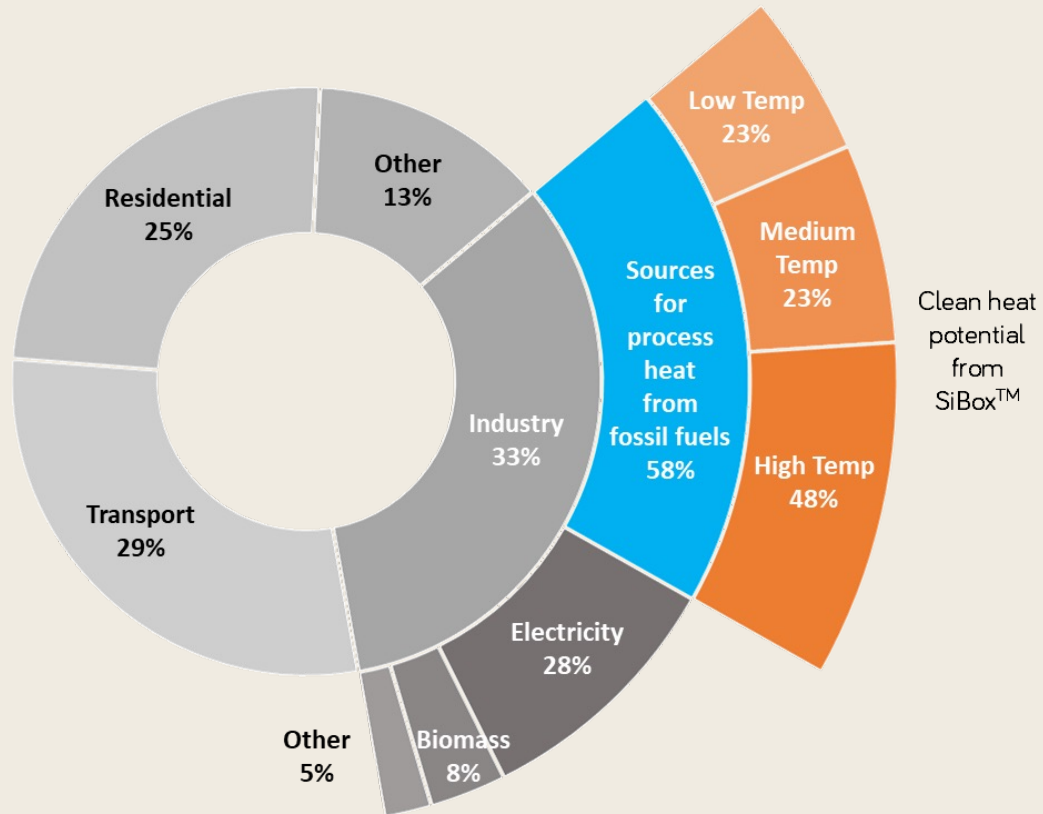
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- Gas replacement technology to electrify industrial processing
- Efficient **thermal energy storage** for reliable heat supply
- Multi-disciplinary team of technical specialists
- Listed on ASX in Sep 2018 (ASX:14D) >3500 shareholders
- Dedicated workshop for **silicon** storage media R&D backed by strategic industry and university collaborations to access specialised skills and experience
- Agreements with high calibre companies for the **commercialisation** and manufacture of SiBox® and SiBrick™
- Significant net revenue potential from proposed 140MW battery on 275kV transmission line at Aurora Energy Project from 2024
- Refreshed board of experienced invested directors:  
*Kevin Moriarty; Graham Dooley; Randolph Bowen*



# OUR MARKET IS HIGH TEMPERATURE INDUSTRIAL HEAT



Total global final energy consumption (~400 Exajoules)

- McKinsey & Company estimate **long duration energy storage**, including thermal, would produce energy savings of US\$540 billion per year
- High temperature industrial heat has **no commercial options** to stop the use of fossil fuels
- 14D's **silicon** technology is the most advanced storage technology able to replace fossil fuels at temperatures over 800°C

20% of global energy-related CO<sub>2</sub> emissions stem from industrial heat  
*i.e. excluding electricity*

[www.iea.org/reports/industry](http://www.iea.org/reports/industry)

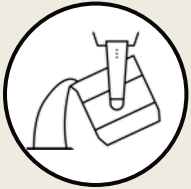


# DECARBONISING HIGH TEMPERATURE PROCESS HEAT



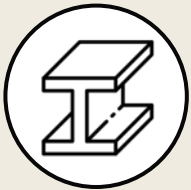
## Cement

- 4.1 Billion tonnes produced in 2022
- 4,300 TWh of energy required
- 27% of world's industrial CO<sub>2</sub> emissions
- \$160 billion annual energy costs



## Alumina

- 140 Million tonnes produced in 2022
- 440 TWh of energy required
- 0.2% of world's industrial CO<sub>2</sub> emissions
- \$15 billion annual energy costs



## Iron and Steel

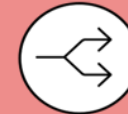
- 1.9 Billion tonnes produced in 2022
- 10,000 TWh of energy required
- 29% of world's industrial CO<sub>2</sub> emissions
- \$220 billion annual energy costs

**~\$400 billion annual energy costs in just these three industries**

## Criteria for clean INDUSTRIAL heat



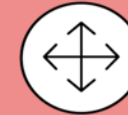
**Ultra-high temperature**



**Flexible operation  
Power, temperature**



**Robust 24/7 operation  
20+ years lifetime**



**Modular, scalable storage  
Suitable for GWh scale**



**Location independent  
Easy integration**

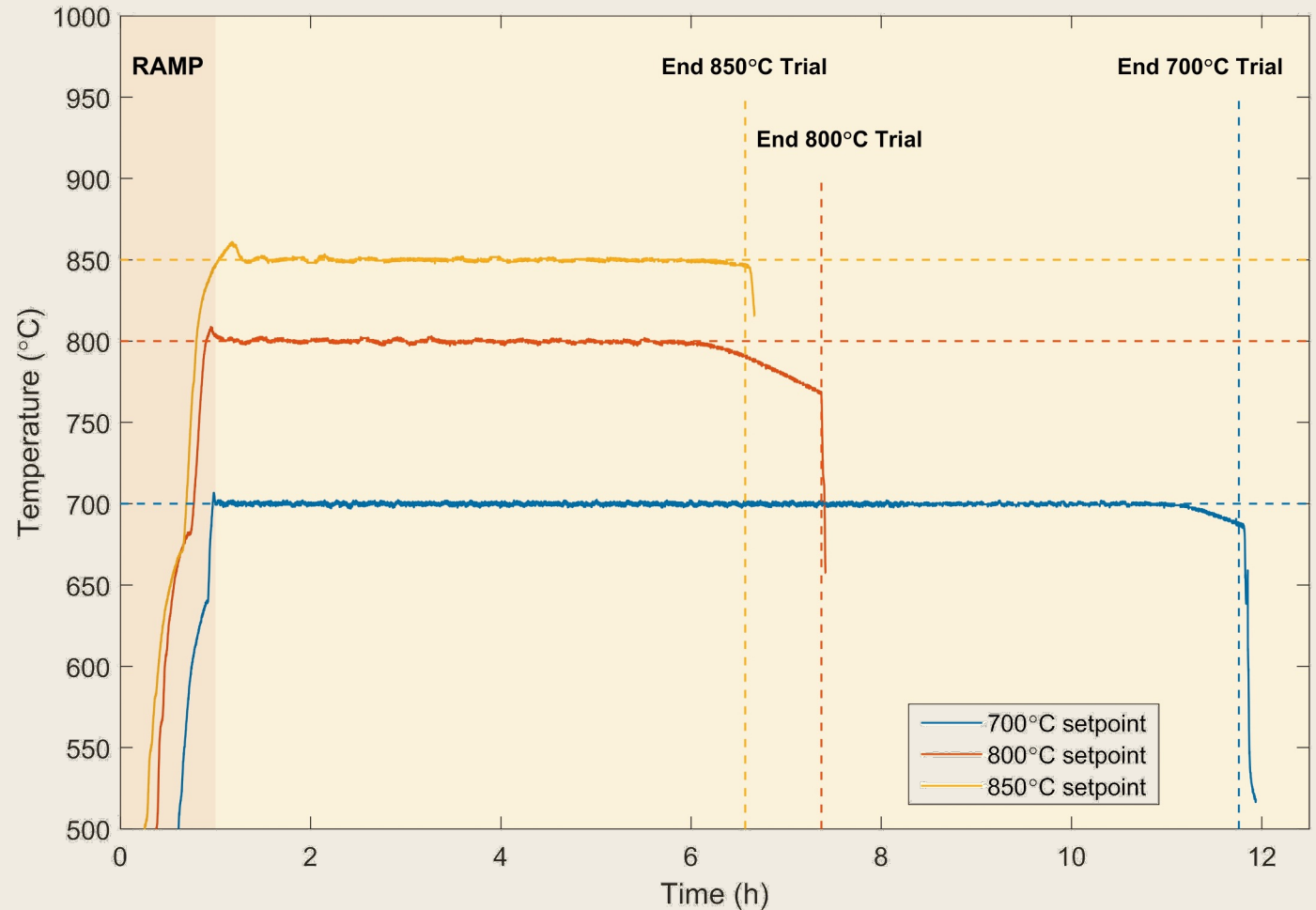


**High efficiency  
Low cost**

# PROVING PERFORMANCE WITH SIBOX DEMONSTRATION MODULE

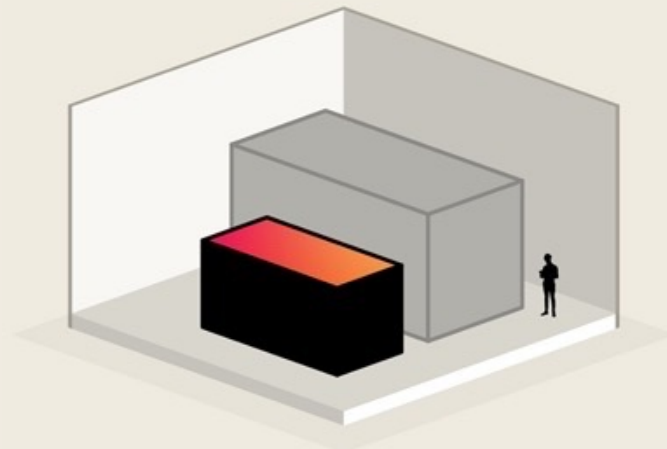
Compact storage delivers big result for industrial processing

- ✓ Trial runs used stored heat only
- ✓ Latent heat of silicon provided stable air output at 800°C for 5 hours without control system
- ✓ With control system:
  - ✓ 11 hours of very stable output at 700°C
  - ✓ >6 hours very stable output at 800°C
  - ✓ 6 Hrs at 850°C
- ✓ Scale up of storage will provide longer duration at higher temperatures

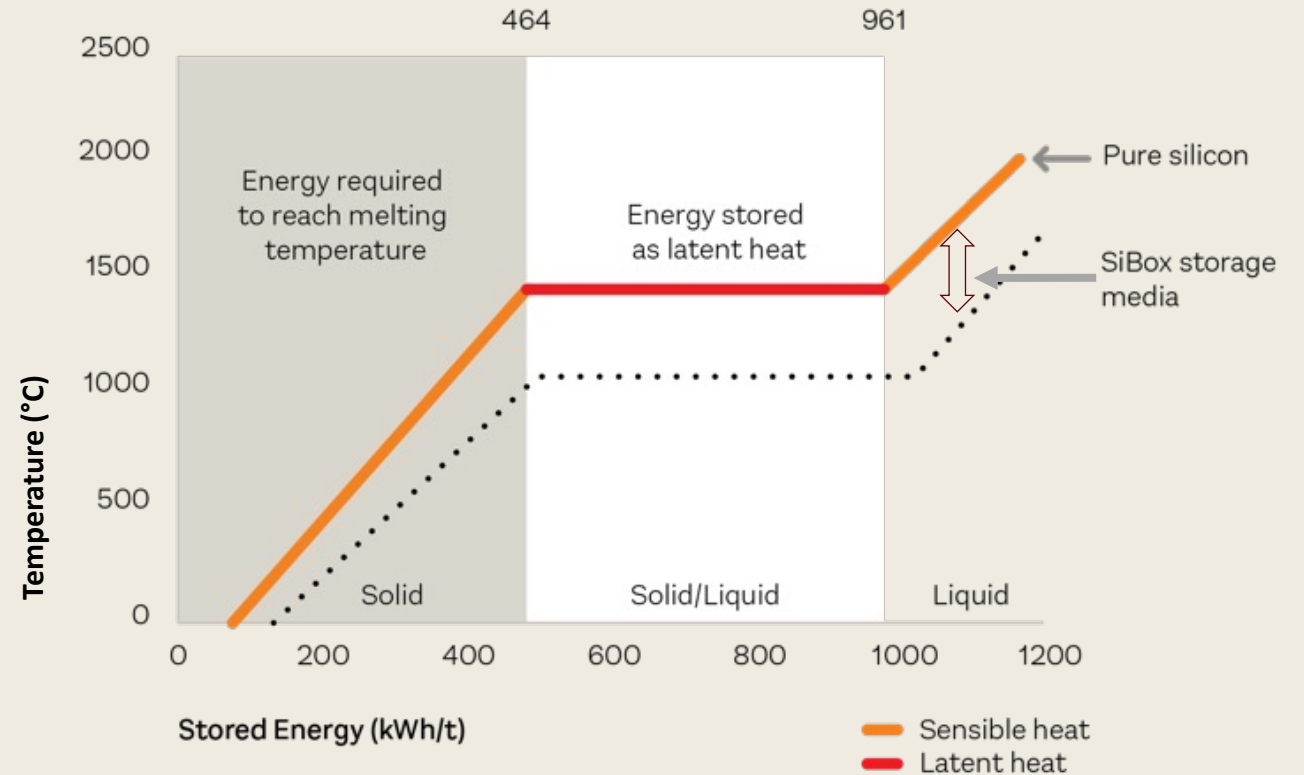


# THE SCIENCE OF SILICON

SiBrick™ harnesses the high temperature latent heat of silicon, to convert renewable electricity to zero-carbon heat for high temperature industries

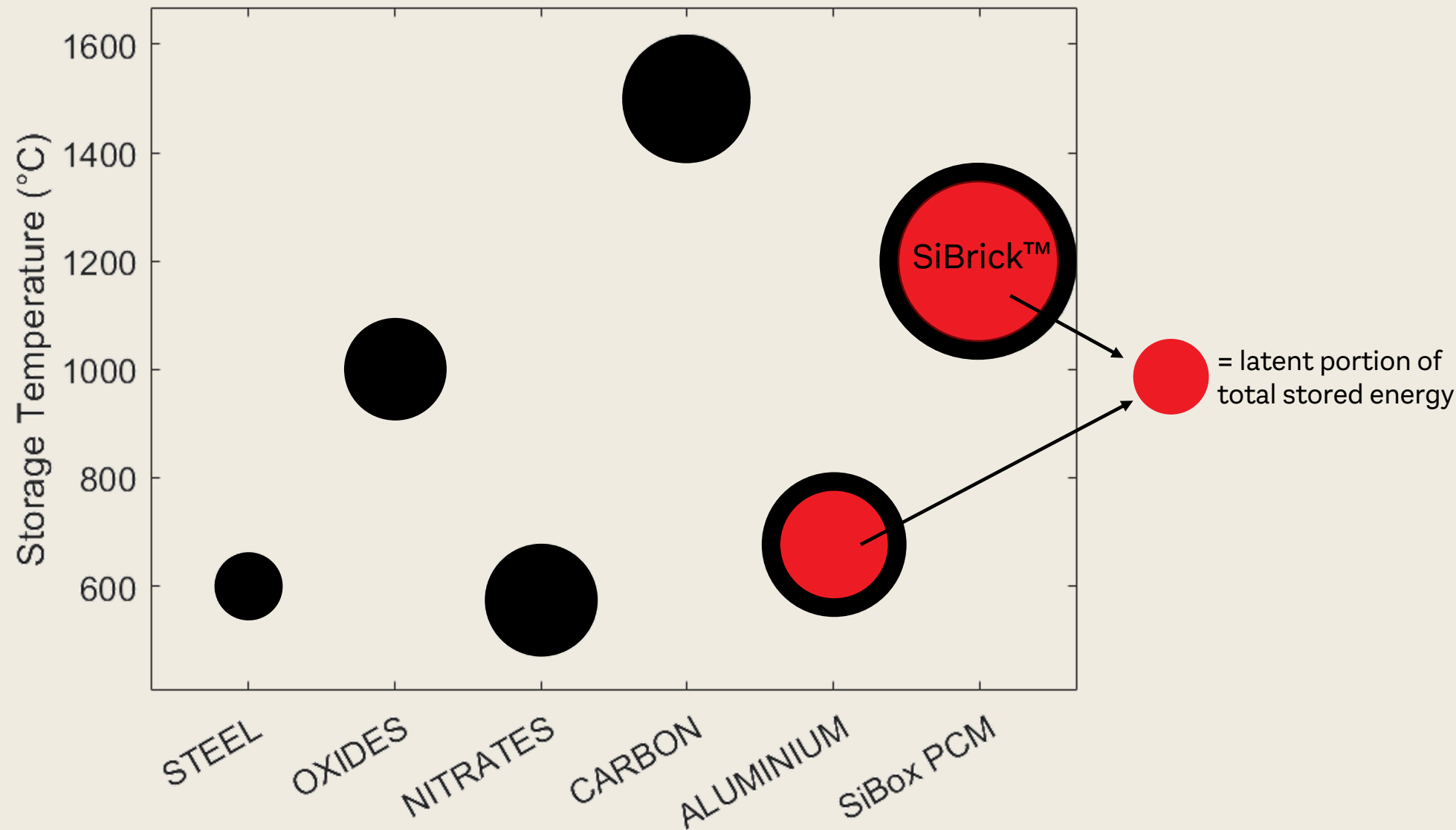


SiBox® energy storage vs sensible heat storage



Silicon's latent heat is key to stable high temperature heat supply and high density energy storage

# SIBRICK OUTPERFORMS FOR THERMAL STORAGE





# SIBOX IS COMPETITIVE WITH FOSSIL FUELS



## SiBox for gas replacement

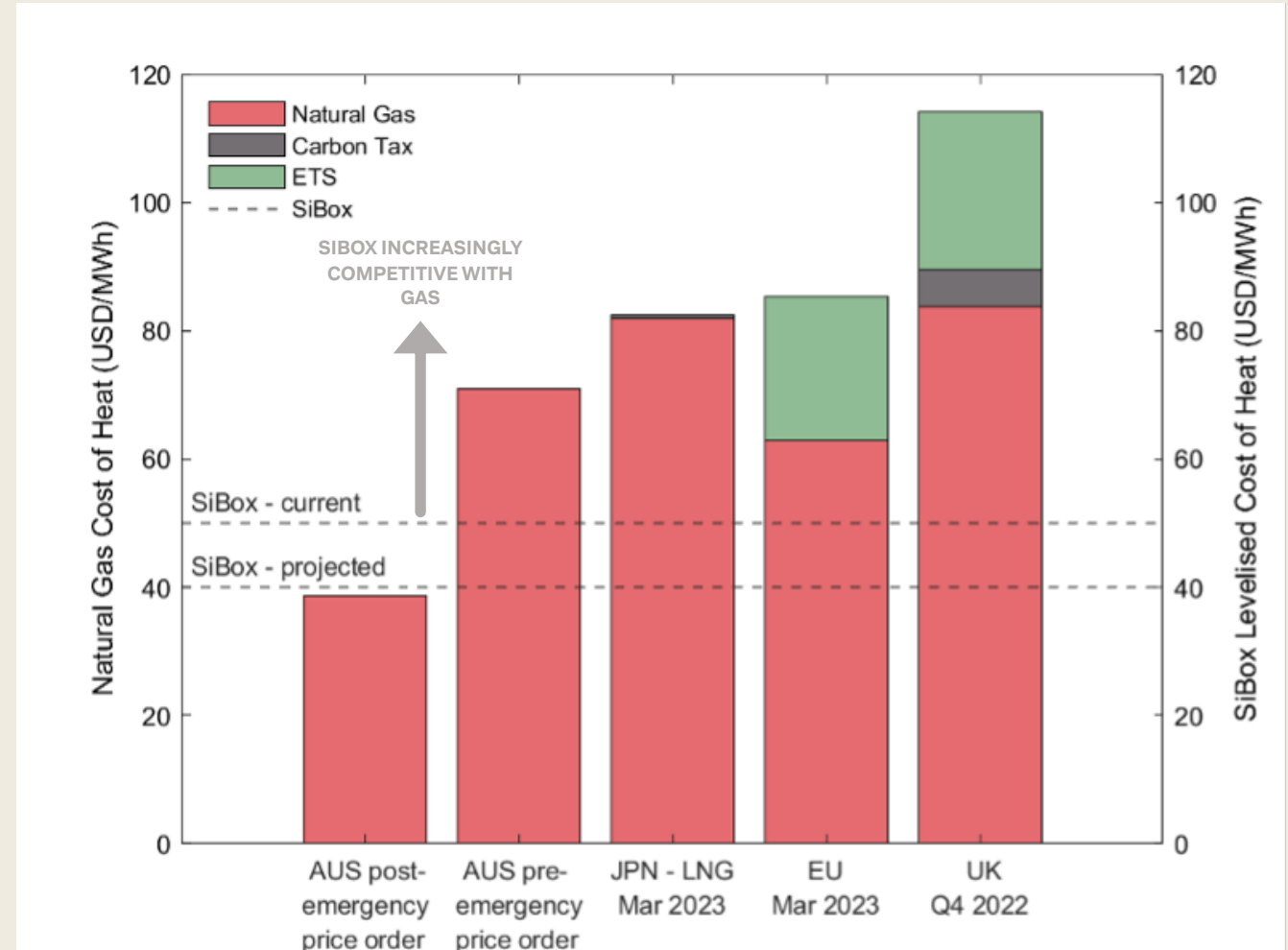
Stable high temperature air supply

Can charge and discharge simultaneously and independently

Can be programmed to charge from electricity when prices are low to reduce energy cost

Enables industries to maintain process function at lower cost

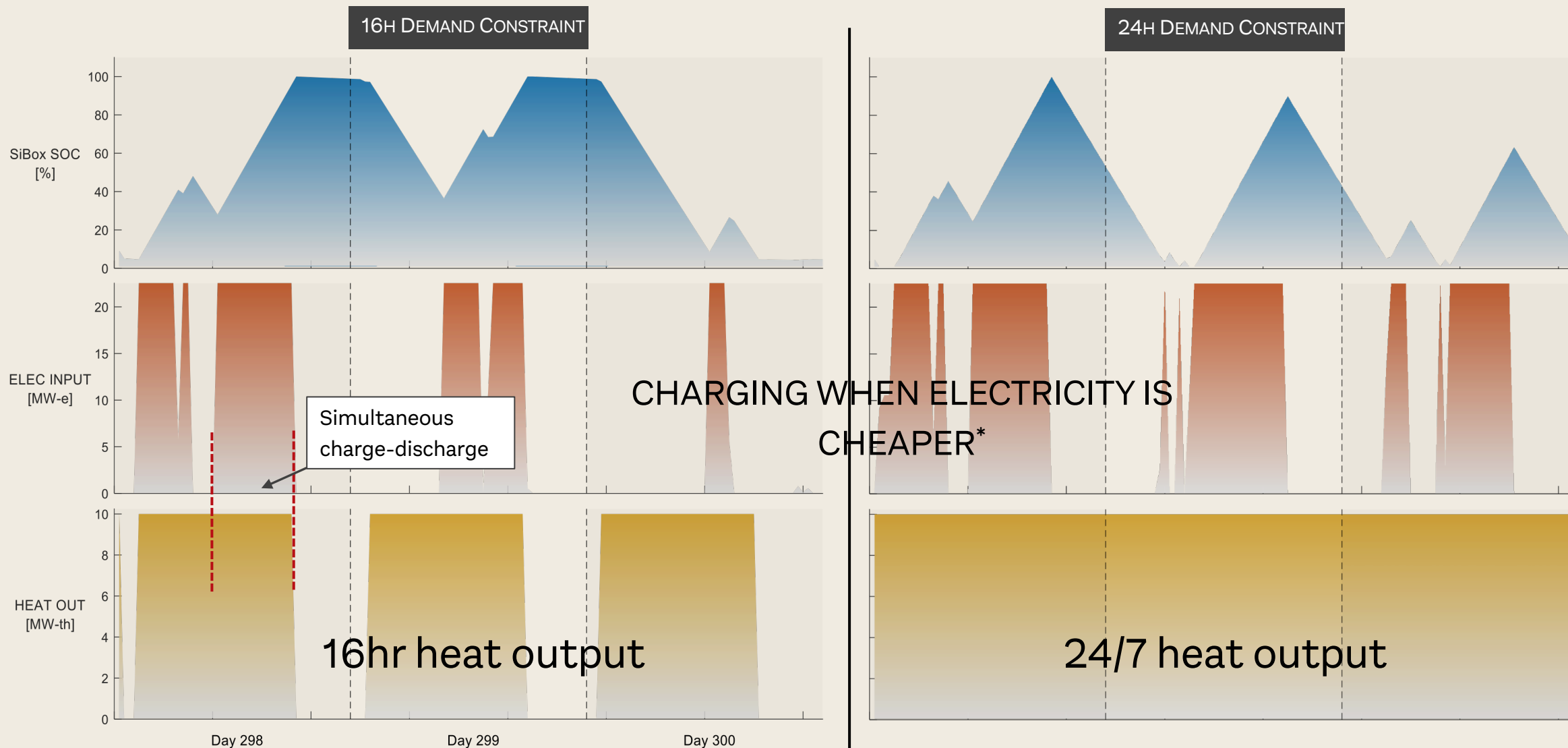
Cost competitive on the basis of gas price in EU & Japan, and will become more so in future as SiBrick™ technology advances



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.*



# SIBOX: DECOUPLED CHARGE-DISCHARGE GIVES FLEXIBILITY & COST CONTROL



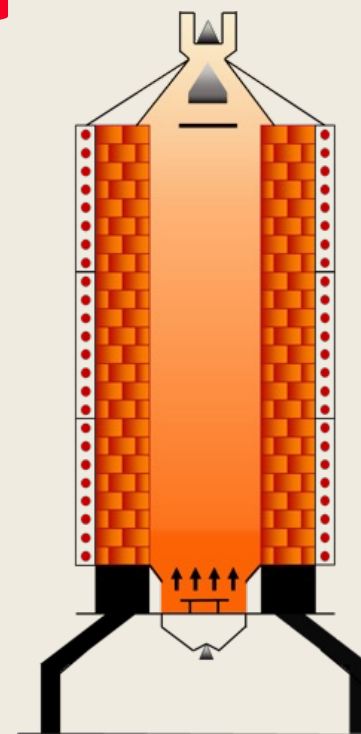
\*Example from Australian NEM



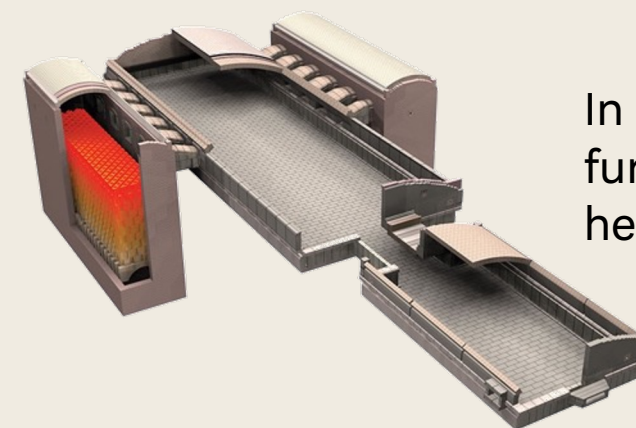
# USING SIBRICK TO ELECTRIFY INDUSTRIAL PROCESSING



In SiBox hot gas generator for industrial processes



In novel electric reactor lining with storage



In regenerative furnaces for heat recovery



# SIBOX DEMONSTRATION MODULE



- 1 MWh thermal storage device commissioned 2023
- Electric elements store heat in wall of bricks
- Delivers stable hot air supply at set temperatures ranging up to 900°C
- Design prioritises access to storage media bricks. Commercial scale >90% efficient
- Features a single SiBrick module. Can replicate horizontally for commercial scaleup to GWh

Demonstrating an operational device to industry



SIBOX™ TECHNOLOGY



# TECHNOLOGY COMMERCIALISATION PARTNERS

*Global refractory brick market of ~1.3 trillion bricks per year*

## TOP-TIER REFRACTORY MANUFACTURER

- Refractory manufacturer develops, manufactures, and installs high-grade refractories for high-temperature industrial processes
- Systems supplier offering customised and all-inclusive refractory solutions for all major industrial sectors
- Since 2019 has partnered with 1414 Degrees to develop and commercialise silicon storage media
- Has first rights to manufacture 1414 Degrees storage media
- Storage media IP owned by 1414 Degrees
- Manufacturing process IP owned by refractory maker

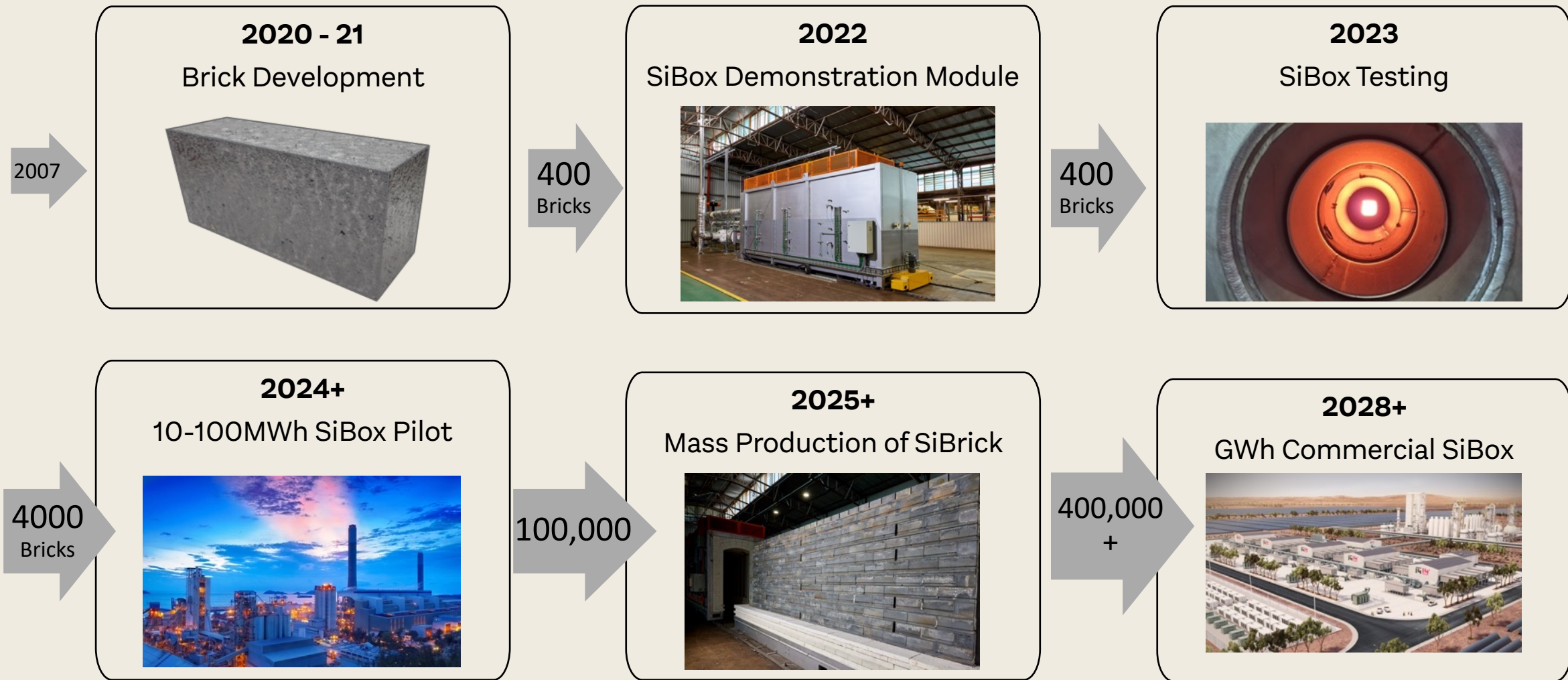
*Global market for high temperature heat energy is >\$400 billion in just three industries. Mostly supplied by fossil fuel.*

*Emissions reduction using SiBox long duration energy storage can be cost effective in supplanting fossil fuel*

## WOODSIDE ENERGY TECHNOLOGIES

- Woodside Energy Ltd is a global energy company aiming to provide low cost, lower carbon energy
- Since 2021 has partnered 1414 Degrees to develop and commercialise SiBox® technology
- Stage one: Woodside co-funding SiBox Demonstration Module with Australian Government -\$4.2m in grants
- Stage two: Woodside can earn up to 49% of IP by funding SiBox commercial scale pilot
- Silicon media IP to be in SPV with Woodside. 14D responsible for commercialisation but Woodside have preferential price

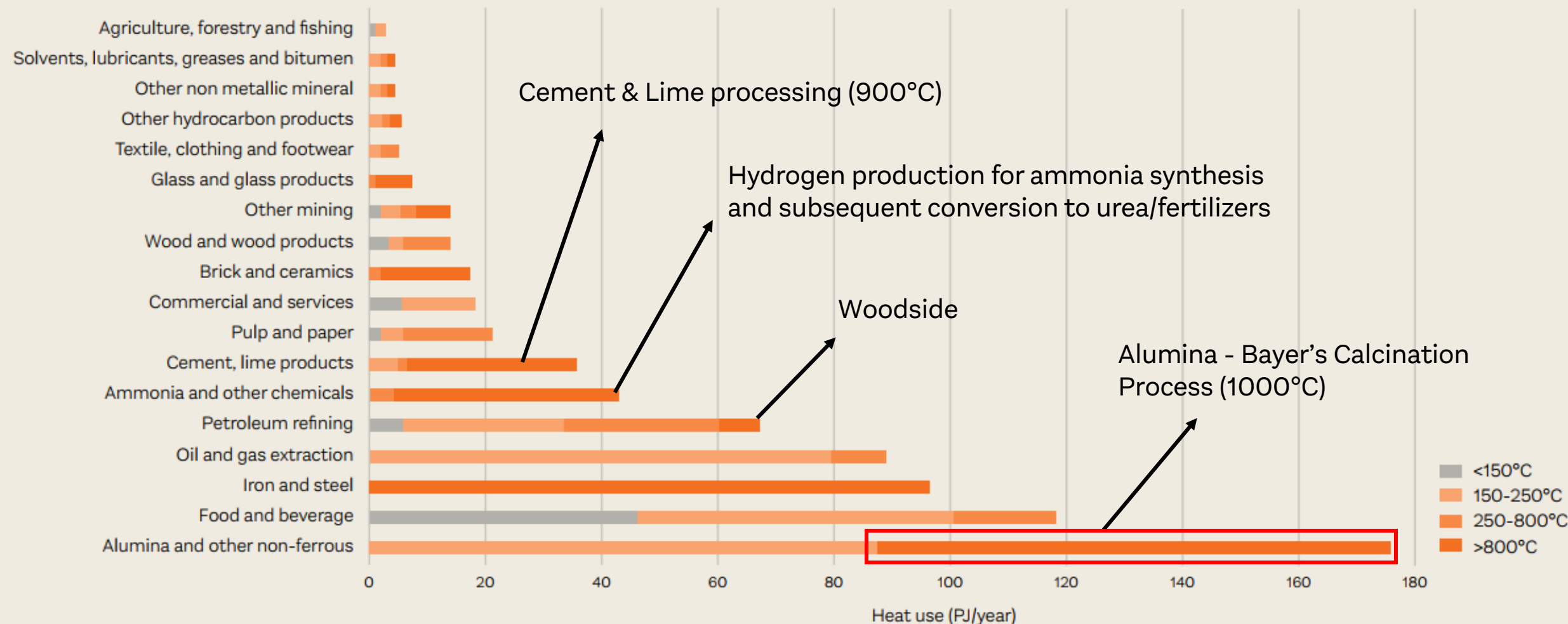
# PROJECTED TECHNOLOGY COMMERCIALISATION TIMELINE



# HIGH TEMPERATURE CLEAN HEAT APPLICATIONS ARE SIGNIFICANT



## High Temperature Applications [>800°C]





# A HUGE MARKET IS OPENING TO LONG DURATION ENERGY STORAGE

SiBox will initially target three industries with energy costs exceeding \$400 billion

SiBox can increase their production efficiency

SiBox can reduce emissions by displacing a share of fossil fuel use in existing plants

SiBox will make other energy transition technologies more feasible, technically and economically

SiBox can go to market in realistic but valuable steps

***SiBox efficiency gains and fuel displacement can save industries billions while achieving emission reduction targets***



SIBOX™ TECHNOLOGY



# AURORA ENERGY PROJECT

Near term cash  
flow potential



AURORA ENERGY PROJECT



# AURORA ENERGY PROJECT 140MW BESS

140MW battery system on 275kV transmission line connected to NEM

SA Crown land lease with approvals

Electranet own and operate the 275kV line

Requires BHP to agree to share and convert transmission line to dedicated network asset (DNA)

BESS timing dependent on DNA agreement

Generator Performance Study complete June 2023

Site works could commence early 2024

BESS commissioning could start late 2024

Vast share costs 50:50 and pay \$1.5m to 14D on transmission agreement





Regulatory approval for 70MW solar PV, grid scale SiBox pilot and CSP generation on site



AURORA ENERGY PROJECT



## STRONG PROJECT TEAM

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

\*Market confidentiality pending final award of contracts

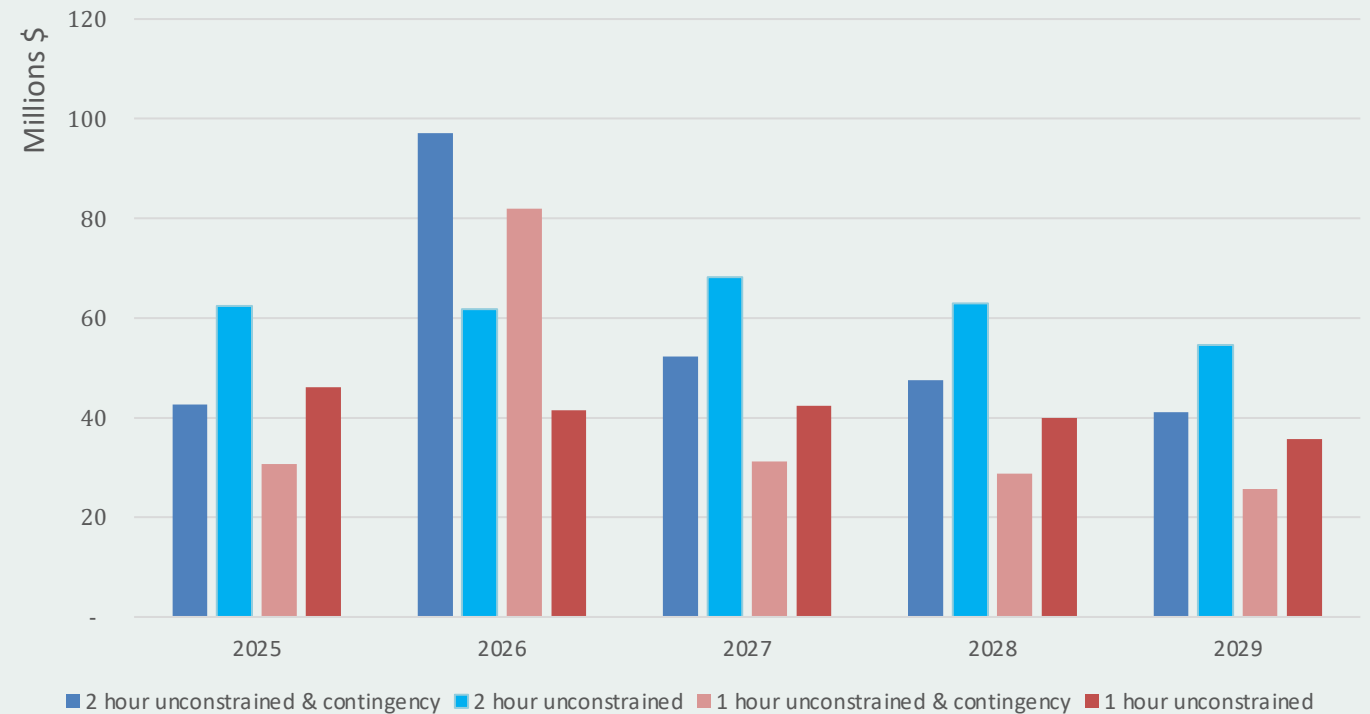


AURORA ENERGY PROJECT

## FAST PAYBACK PROJECTED

### Aurora 140MW BESS

Projected\* first 5 year net revenues for modelled scenarios  
1 and 2 hours of storage



\*Projections by Cornwall Insight in 2021. To be updated in 2023



# THE POWER OF CHANGE

1414 Degrees Ltd

ASX: 14D

Contact: [info@1414degrees.com.au](mailto:info@1414degrees.com.au)

+61 8 8357 8273

