redoxblox

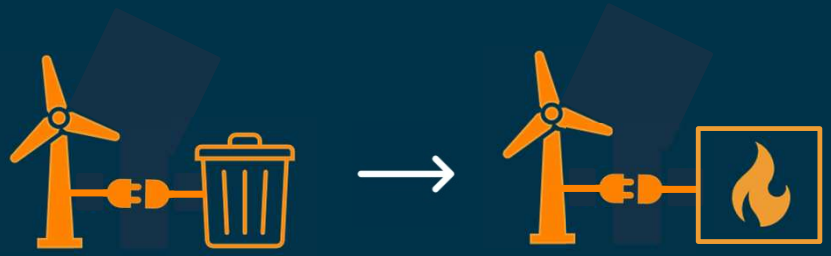
Reliable, Cost-Competitive Electrification of Industrial Heat

2025 San Diego, USA Dornbirn, Austria

Electrified Industrial Heat Represents a World-Changing Opportunity

Reduce energy costs

Provide more predictable and reliable energy



Balance the grid by utilizing overgeneration

Reduce or eliminate fossil fuel consumption

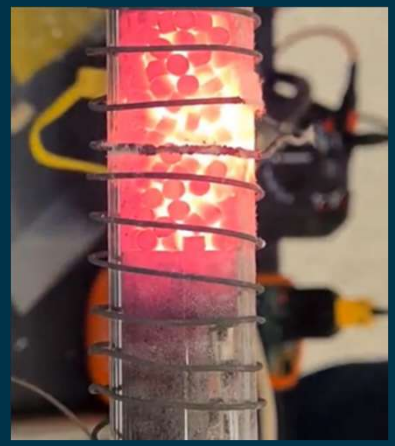
Problem

Problem

- Industrial heat accounts for 30% of global emissions
- Gas is cheap because chemical bonds store a lot of energy. Thus, fossil fuels are a highly energy dense and inexpensive heat source.

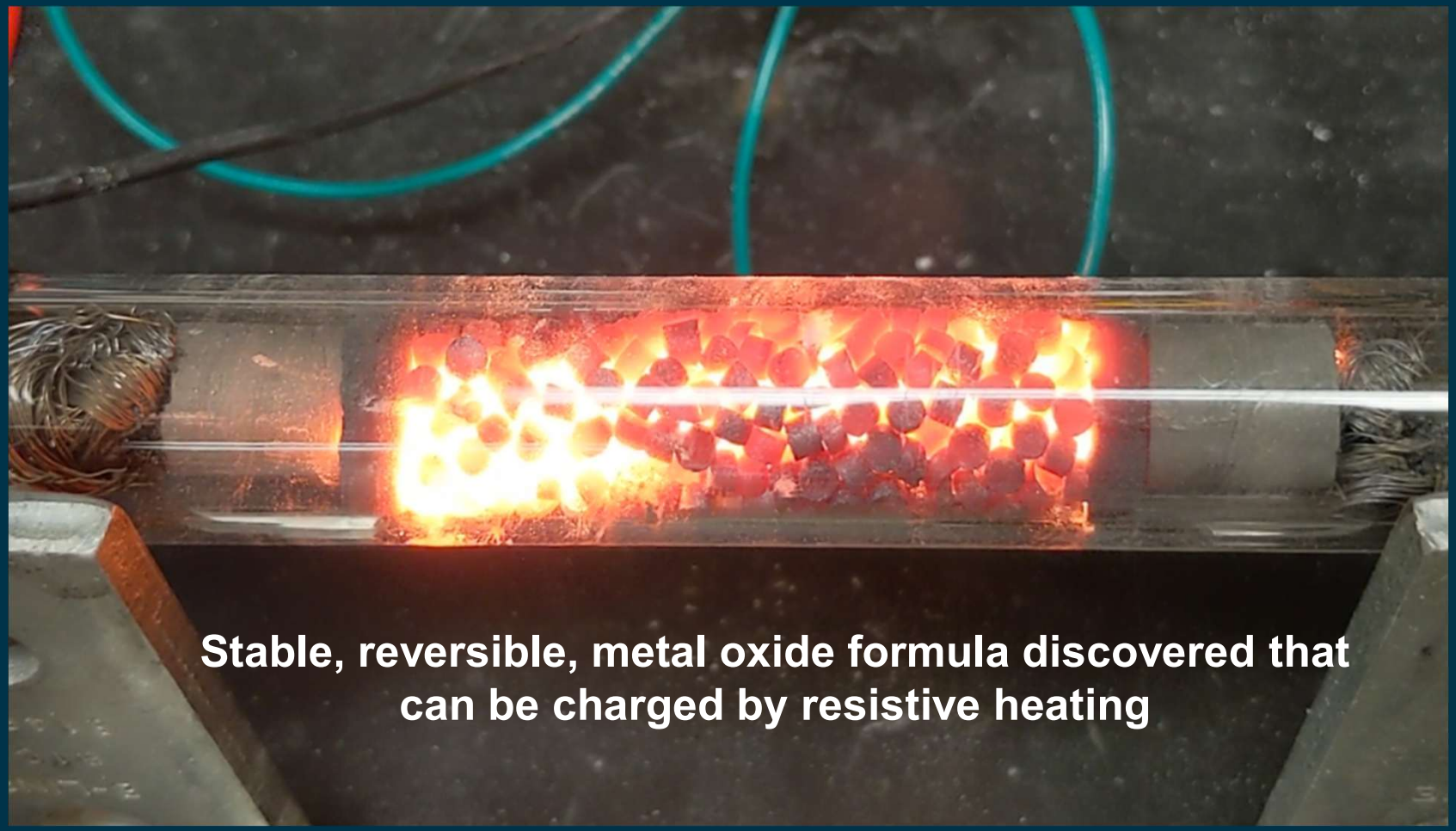
Solution

- Redoxblox uses the same principle – chemical reactions to store and deliver energy, but without emissions.

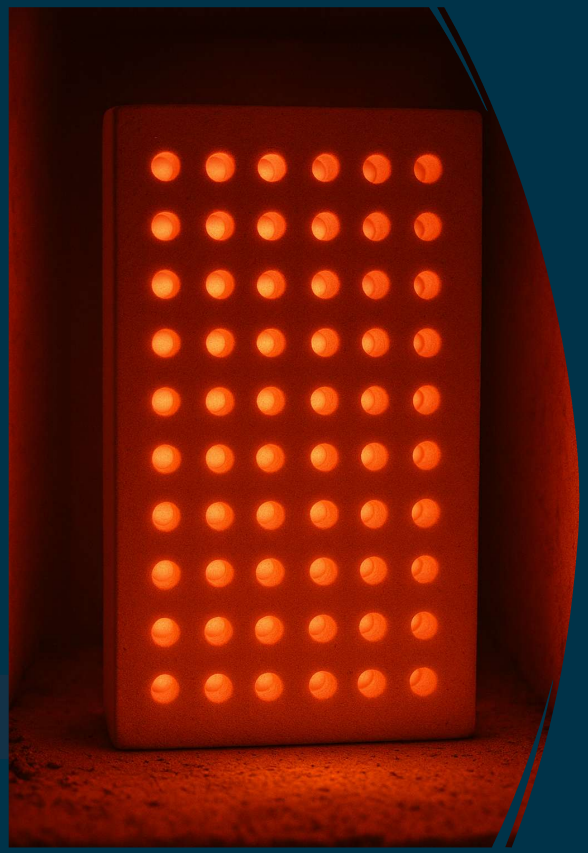


Redoxblox Technology

2015: Thermochemical energy storage material breakthrough

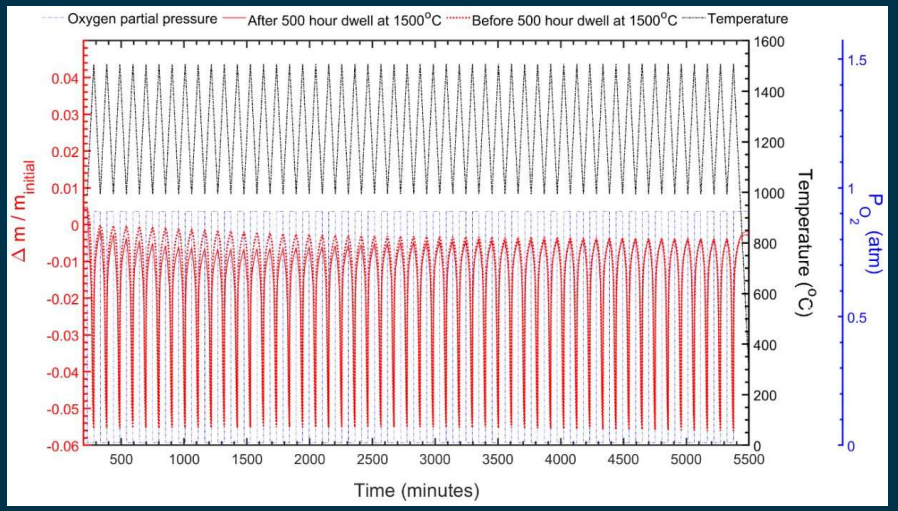


Thermochemically Active Storage Material



Key innovation: Discovery of a stable mixed metal oxide material that can cycle without sintering (no degradation), and stores sensible *and* thermochemical heat

1000+ cycles (3 years daily cycling) with no measurable degradation

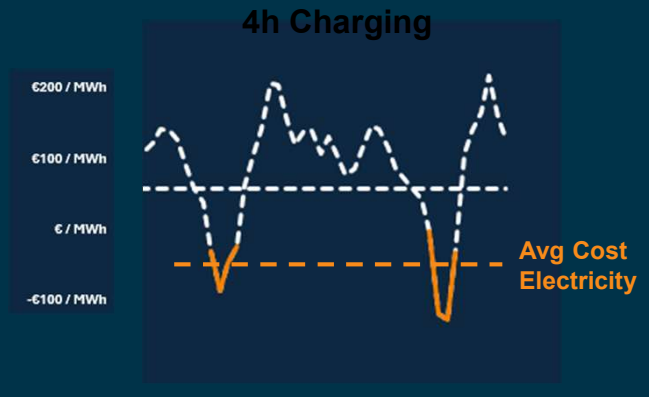


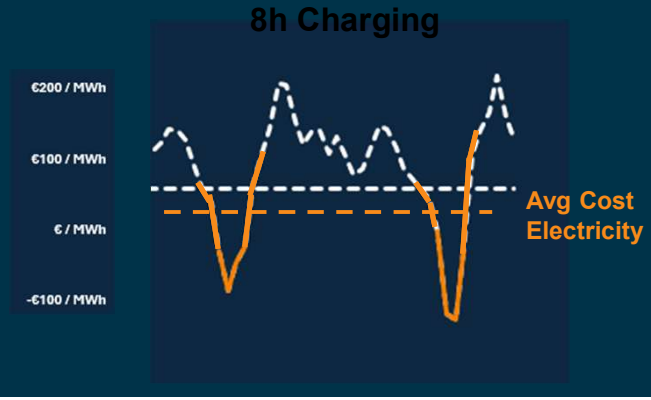
Volumetric Charging

Volumetric heating, or heating a material through joule effect from the inside, is the most effective method to charge the thermal battery because:

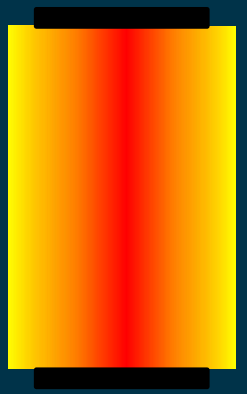
- Heating elements are brittle, unreliable, and slow. We have removed them from the system
- Volumetric heating is faster, more reliable, and more uniform

Charging quickly is key to allow capture of the cheapest electricity on the market

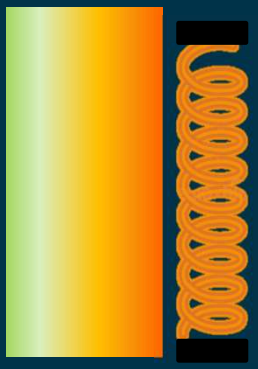




Volumetric Heating: uniform and fast



Resistive Coil Heater: slow, creates temperature gradients

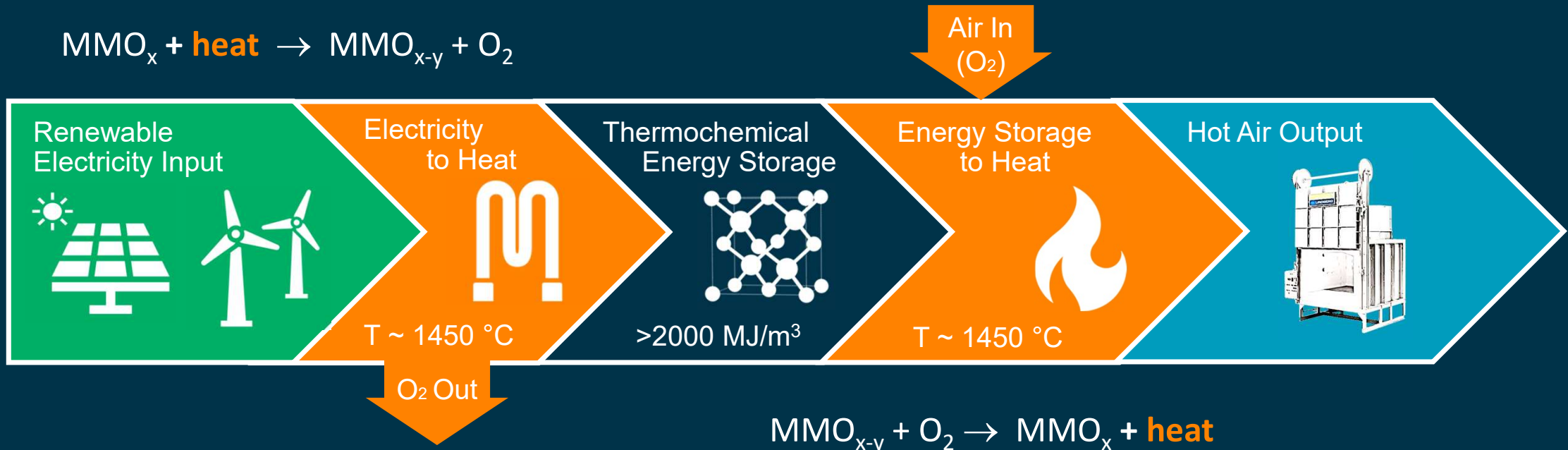


Thermochemically Active Storage Material

Key ***Reversible*** Redox Process: $MMO + \textbf{heat} \leftrightarrow MMO_{(1-\delta)} + \frac{1}{2}O_2$

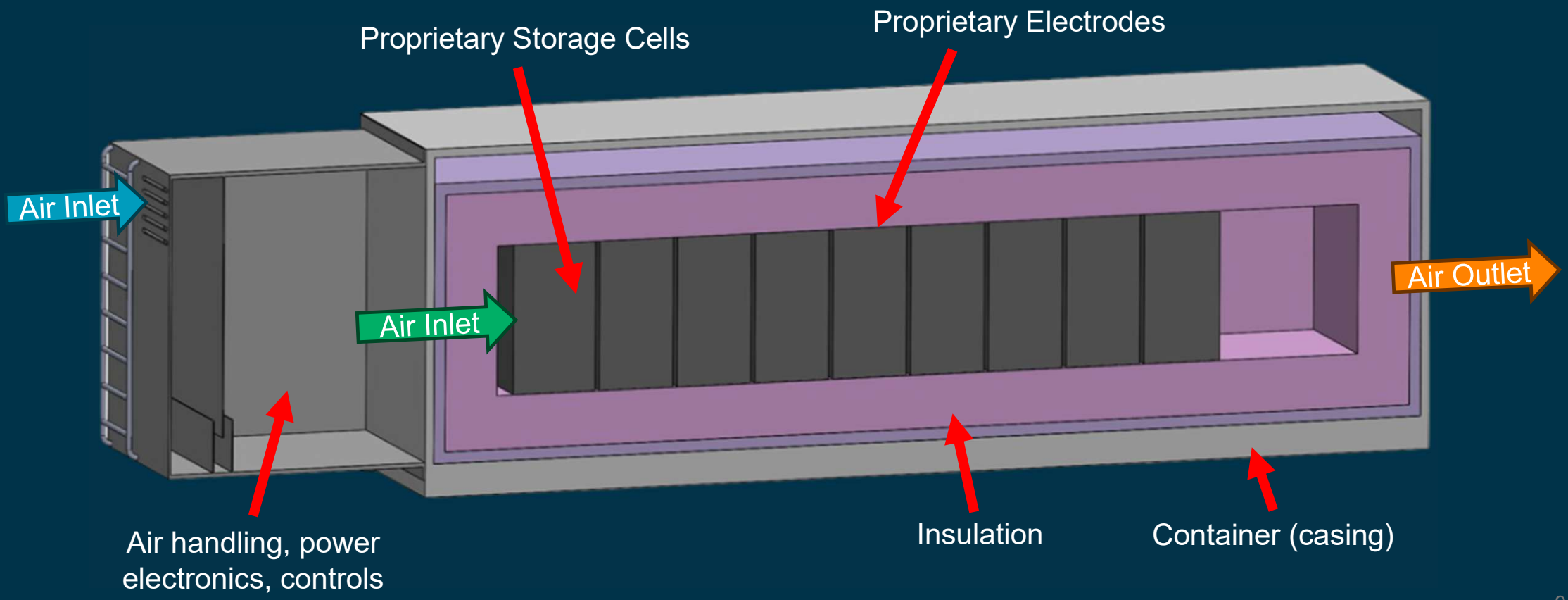
MMO = Mixed Metal Oxide (formulation varies)

$MMO_x + \textbf{heat} \rightarrow MMO_{x-y} + O_2$



$MMO_{x-y} + O_2 \rightarrow MMO_x + \textbf{heat}$

Redoxblox Systems are Simple, Reliable, and Cost Effective



Technology Development History:
From Materials Breakthrough to Industrial Scale

Redoxblox is the First and Only Company to Demonstrate that this is Possible

Hotter – 1200°C delivered

Serving industries where electrified heat has never been possible before

Faster – 4-hr charge

Enabling customers to seize low-cost electricity

Most cost-effective

Simple off-site construction and modular installation keep costs down

Modular Product with Minimal On-Site Construction: Cheaper, Faster, and More Scalable

One Module

2.5 MWh
~25 m2

Two Modules

5 MWh
~25 m2.

Small Array

45 MWh
~180 m2

Large Array

120 MWh
~220 m2

Sistemas Realizados y Planeados

2025

Piloto en operación de 200 kWh

2026

Estudios de integración con 10+ empresas de los sectores de cemento, minerales, papel, y metales

2027

- *Primer despliegue de un producto de "acceso temprano"*
- *~25 unidades instaladas*

Generación de Vapor Industrial – Dow Chemical

2028+

Entrega primeros sistemas comerciales

Integración de una microturbina en San Diego con CEC (California Energy Commision)

Hybrid Operation

Optionally Burn Gas, or Use Stored Electricity

~30% of annual heat load provided by gas*

RedoxBlox units can burn gas as a backup during periods of high electricity prices

Heat is automatically provided by the lowest cost option based on daily markets

=

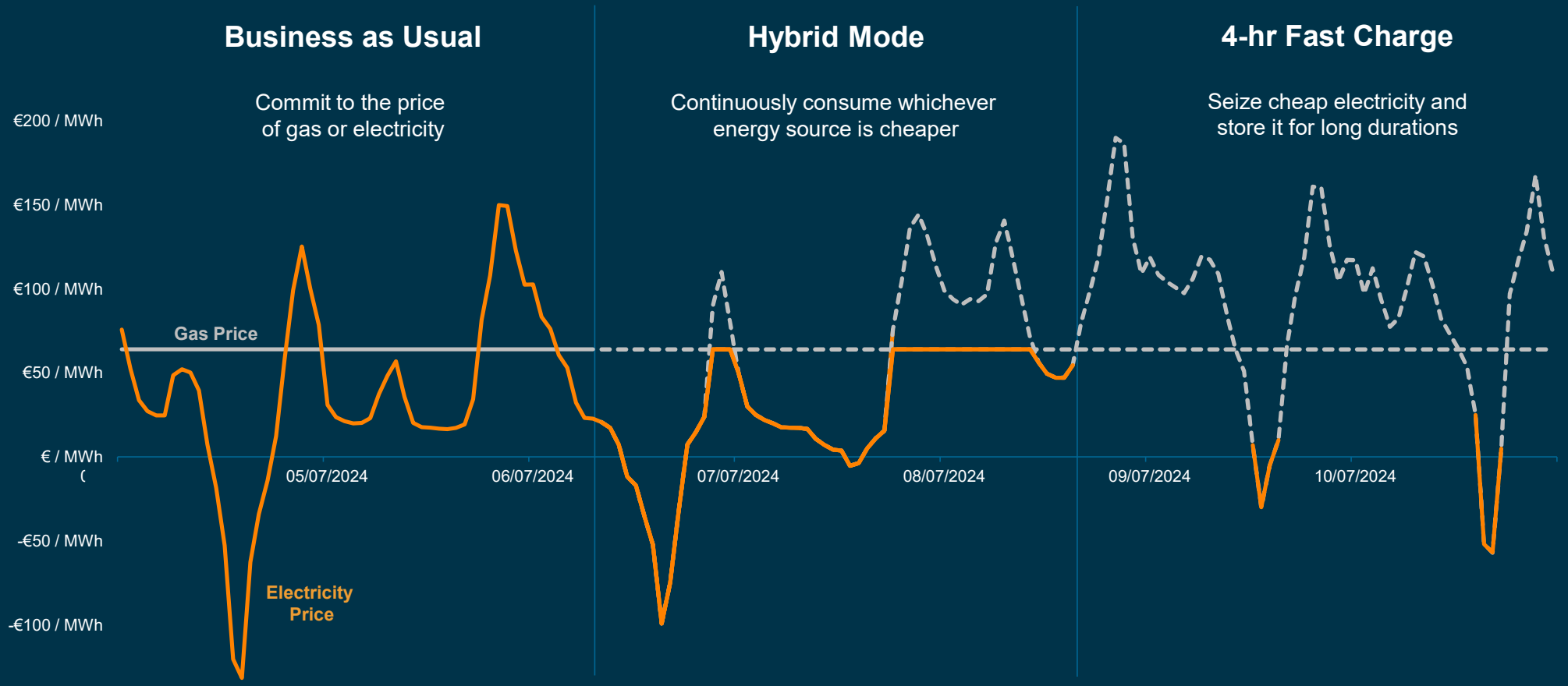
Lowest possible cost of heat and maximum carbon reduction

+

~70% of annual heat load provided by stored renewables*

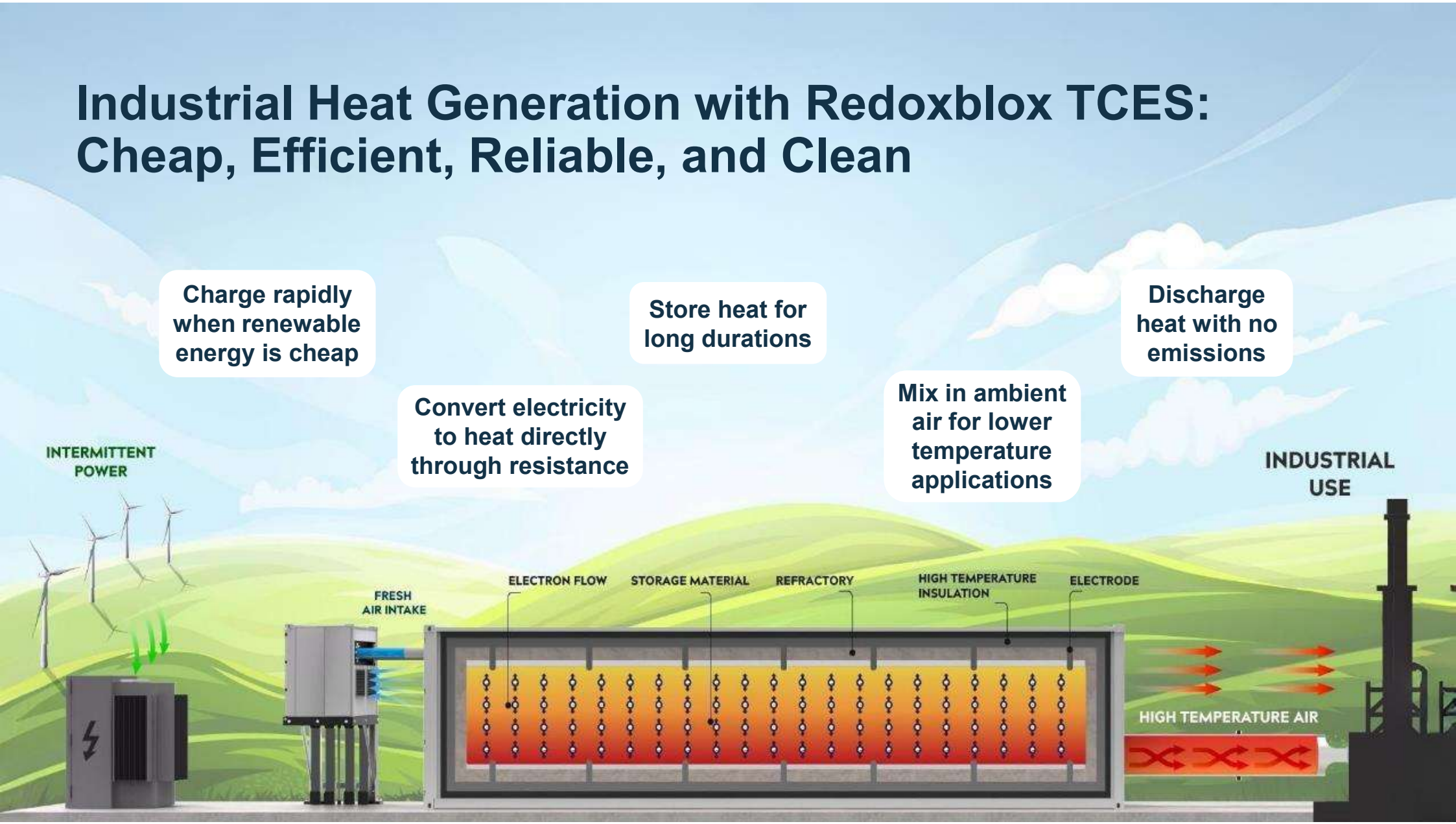
*actual percentages vary by market, heat demand profile, and end use application

Hybrid Mode + Fast Charge + Long Duration Storage: Cheapest Energy Cost with 100% Reliability



Next Steps

Industrial Heat Generation with Redoxblox TCES: Cheap, Efficient, Reliable, and Clean



Thank You

Contact:

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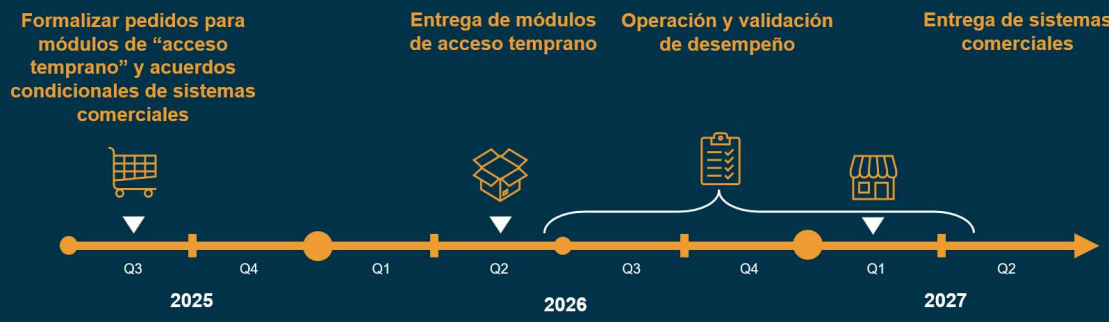
Próximos Pasos

1. Estudio de viabilidad y análisis de valor detallado para demostrar la utilidad de la tecnología Redoxblox

- Necesidades de calor que definirán potencia (MW) y capacidad (MWh) de la batería
- Costos de electricidad y combustible para diferentes escenarios
- integración con el equipo final (caldera, horno, calcinador)
- Análisis de valor para cuantificar ahorros
- Cuantificación de reducción de CO_2

2. Unidad modular de "acceso temprano"

- Entrega de los primeros sistemas para Q4 2026



3. Sistemas comerciales

- Entrega 2027+
- Tamaño y entrega varían según caso de uso y capacidad requerida
- Área del sistema: 3.5 GWh / hectárea

Características de la tecnología de RedoxBlox

La batería RedoxBlox combina tecnología termoquímica con un diseño modular optimizado para ofrecer:

- calor despachable en un amplio rango de temperaturas
- instalación sencilla y rápida
- rendimiento energético constante en su vida útil para descarbonizar procesos industriales

Flexibilidad en temperaturas de operación:

- Máxima temperatura de almacenamiento: 1450 °C
- Descarga ajustable a temperatura constante hasta 1200 °C
- Permite descarbonizar la mayoría de los procesos industriales

Carga rápida

- Alcanzando el100% SOC en 4 horas
- Carga y descarga simultánea (suministro de calor 24/7)

Diseño modular:

- Fácil logística e instalación in situ
- Unidades apilables para aumentar la densidad energética y ocupar el mínimo espacio.
- Permite un amplio rango de tamaños de proyecto, de 2.5 MWh_{th} a >>100 MWh_{th}

Alto perfil de seguridad

- Sin materiales tóxicos o inflamables

Operación híbrida

- El sistema puede quemar gas: en modo híbrido, como reserva, o cuando los costes de la electricidad son elevados
- Maximiza la fiabilidad y minimiza los costes de calefacción