Heatcube®

Long Duration Thermal Energy Storage

Industrial heat without fossil fuel volatility.

Reliable industrial heat. Lower energy costs

For decades, industrial heat has depended on fossil fuels. Today, volatile gas markets, geopolitical uncertainty and decarbonization requirements are redefining the economics of industrial heat while making security of supply a strategic priority.

Manufacturers need a new approach that strengthens security of supply, reduces heat costs and accelerates the transition to low-carbon production.

The solution

Heatcube reduces your exposure to volatile fossil fuel markets.

By storing low-cost electricity when it is abundant and delivering reliable heat whenever production demands it, Heatcube strengthens security of supply, lowers and stabilizes heat costs, and significantly reduces CO_2 emissions—all without changing your production process.
Reliable heat starts with intelligent energy storage
As renewable electricity generation increases, electricity prices become more dynamic. Heatcube automatically charges when electricity is abundant and inexpensive, then delivers stable heat whenever your process requires it. By converting electricity price volatility into predictable heat production, Heatcube improves competitiveness while accelerating decarbonization.

Plug-and-play installation

Heatcube is factory-built, fully tested and delivered as modular units for rapid deployment. It integrates seamlessly with existing heat systems, minimizing site work, project risk and production disruption.

Compact footprint

With an energy density from 280 kWh/m², Heatcube delivers high storage capacity within a compact footprint. It fits into existing industrial facilities without requiring extensive new infrastructure.

1-20 MW charging capacity

Configured to match your site's available grid capacity and steam demand, with charging capacities from 1 MW to 20 MW.

Proven industrial execution

Heatcube is commercially deployed at industrial customer sites, demonstrating Kyoto's capability to execute complex industrial energy projects from design through commissioning.

Reliable steam. Lower steam costs

Reliable steam is essential for industrial production, while electricity prices fluctuate throughout the day. Heatcube decouples electricity procurement from steam production, allowing electricity to be purchased when prices are low while delivering reliable steam whenever your process requires it. The result is uninterrupted production, lower average heat costs and reduced exposure to energy price volatility.

Continuous charging and discharging

Heatcube continues delivering steam while charging whenever low-cost electricity is available. This unique capability enables your process to remain stable while Heatcube continuously optimizes when electricity is purchased.

Responds in less than 3 seconds

Electricity markets can change in seconds. Heatcube's fast charging response enables it to immediately utilize periods of low electricity prices, maximizing operational flexibility and reducing the cost of industrial steam.
Where electricity market conditions allow, the fast response time can also enable participation in flexibility markets.

An integrated thermal energy storage system

Heatcube combines an electric heater, molten-salt thermal storage, and a steam generator into a single integrated system. Electricity is converted into thermal energy and stored until needed, delivering reliable process steam independent of short-term fluctuations in the electricity supply.
Each component is based on proven industrial technology, providing dependable performance throughout the system's operating life.

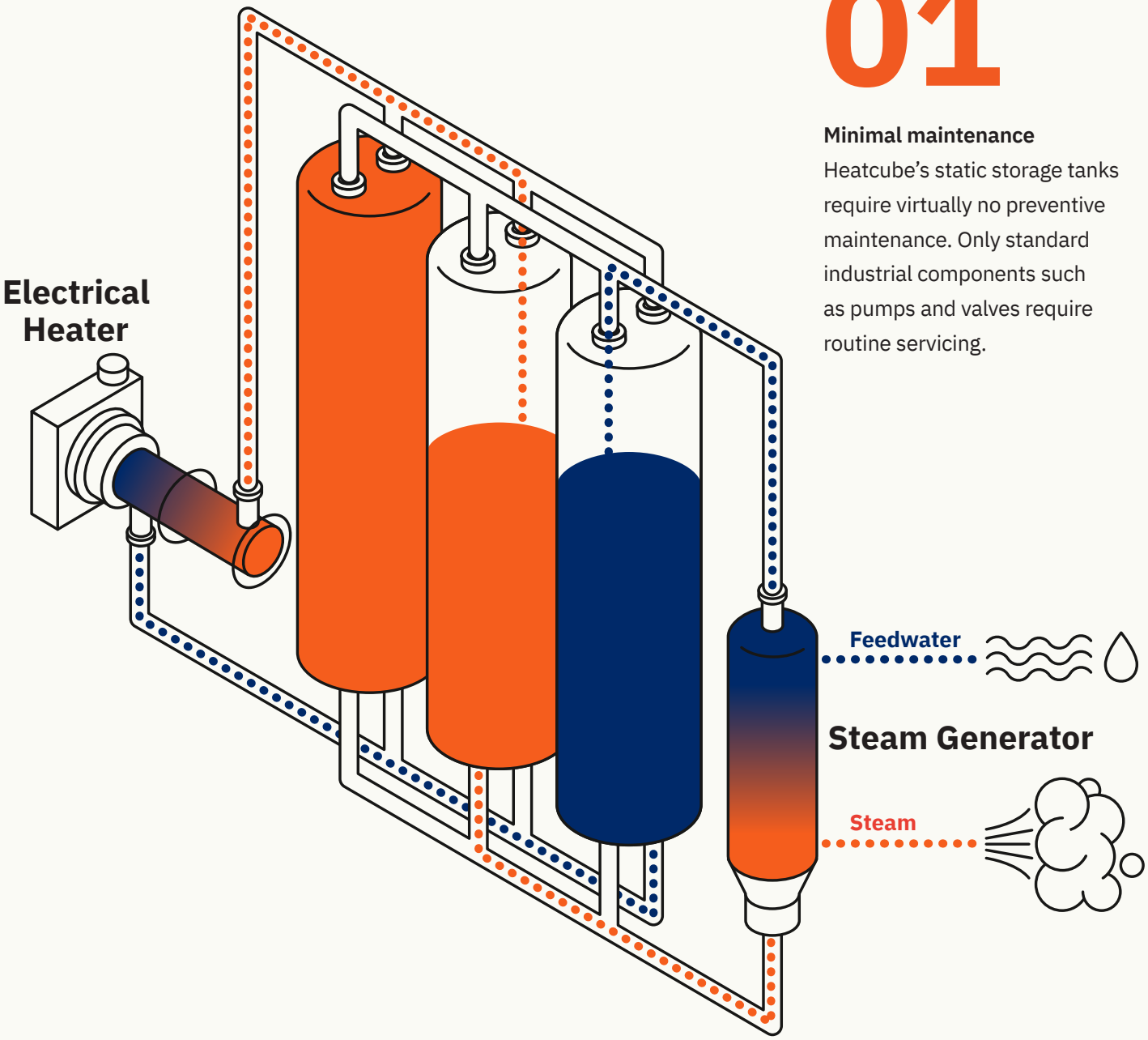
Heatcube is based on proven technology

Heatcube is based on molten salt thermal storage technology that has been successfully deployed in commercial Concentrated Solar Power (CSP) plants for more than two decades. Kyoto has adapted this proven technology for steam production.

Heatcube consists of steel, salt and steam

Heatcube is built around three simple, proven elements: steel tanks, molten salt and steam generation. The storage medium is non-flammable, recyclable and designed for decades of industrial operation. Combined with its modular architecture, this provides a robust thermal energy storage system with minimal maintenance requirements and high operational reliability.

Heatcube can be configured to deliver saturated or superheated steam between 150°C and 300°C, allowing the system to be tailored to a wide range of industrial process requirements.



01

Minimal maintenance
Heatcube's static storage tanks require virtually no preventive maintenance. Only standard industrial components such as pumps and valves require routine servicing.

02

Continuous steam production
Heatcube captures low-cost electricity and continuously delivers steam, reducing average heat costs without interrupting production.

03

Designed for safe operation
Heatcube uses non-flammable materials and does not require ATEX/IECEx certification, simplifying installation and operation.

One product range. Multiple applications.

Heatcube is available in a range of proven configurations that combine a repeatable design with the flexibility to meet different operating requirements. Charging capacity, storage capacity and steam output are configured to match your process while benefiting from a proven, industrialized design.

Mini: **Ideal for smaller heat demand or constrained grid capacity.**
Small: **For medium-scale industrial heat applications.**
Standard: **For most industrial heat applications.**
Large: **For energy-intensive industrial production.**

Technical specification

Heatcube's storage capacity can be configured from 4 MWh to 104 MWh, and with a discharge effect up to 14 MW. Its modular design allows us to meet your particular needs.

Heatcube product range

	Mini	Small	Standard	Large
Electrical charging effect (MW)	4	10	**15**	20
Storage capacity (MWh)	20	39	**52**	104
Thermal discharging effect (MW)	0.5 - 4	1.5 - 7	**1.5 - 14**	1.5 - 14
Annual heat production (GWh)	5 - 20	20 - 35	**30 - 45**	50 - 65
Annual CO2 reduction (Tons)	> 1.000	> 4.000	**> 7.000**	> 11.000

Technical specifications

Parameter	Value	Unit
Electrical Heater capacity	1 - 20	MWe
Thermal energy storage capacity	up to 104	MWh
Steam generator capacity (discharge)	up to 14	MWt
Steam temperature	150 - 300	°C
Steam pressure	3-20	Bar(a)
Charge response time (ramp up time)	< 3	sec
Discharge response time	< 300	sec
Round-trip Efficiency (RTE)	> 93	Percent (%)
Lifetime	25	Years

Choose the business model that fits your investment strategy

Heat-as-a-Service (HaaS)

Reliable process steam. No capital investment.

Kyoto owns, operates and maintains the Heatcube while you simply pay for the steam you consume.

- ✓ **No upfront investment**
- ✓ **Kyoto finances, owns and operates the system**
- ✓ **Pay only for the steam you use**
- ✓ **Performance, operation and maintenance managed by Kyoto**
- ✓ **Lowest implementation risk**

Heat-as-a-Product (HaaP)

Own the Heatcube. Control your investment.

Purchase a Heatcube as part of your energy infrastructure and benefit from the same proven technology.

- ✓ **Customer owns the Heatcube**
- ✓ **Integrated into your existing steam system**
- ✓ **Long-term asset ownership**
- ✓ **Full operational control**
- ✓ **Ideal for customers with established energy management capabilities**

Whether you prefer steam as a service or asset ownership, Kyoto offers a commercial model to match your investment strategy.

Heatcube FAQs

Can Heatcube be integrated into an existing steam system?
Yes. Heatcube is designed to seamlessly integrate with existing industrial steam systems while minimizing modifications to the production process.

How does Heatcube reduce heat costs?
Heatcube stores electricity when prices are low and delivers steam whenever it is needed. By decoupling electricity consumption from steam production, Heatcube enables manufacturers to benefit from electricity market fluctuations while reducing exposure to fossil fuel price volatility.

How is Heatcube operated?
Heatcube is supplied with an integrated control system that communicates with the site's Energy Management System using standard industrial interfaces. Storage tanks require virtually no preventive maintenance, while routine servicing is limited to standard industrial equipment such as pumps and valves.

What is Heatcube's round-trip efficiency?
Kyoto guarantees a minimum round-trip efficiency of 93%, measured from electrical energy supplied to thermal energy delivered as steam.

How does Heatcube participate in electricity flexibility markets?
Reliable steam production always takes priority. When charging capacity is available, Heatcube can temporarily adjust electricity consumption in response to grid or market signals, enabling participation in electricity flexibility markets without compromising production.

Do we need to refill salt?
No, the salt is stable under our process conditions.

Read more about Heatcube on our website.

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