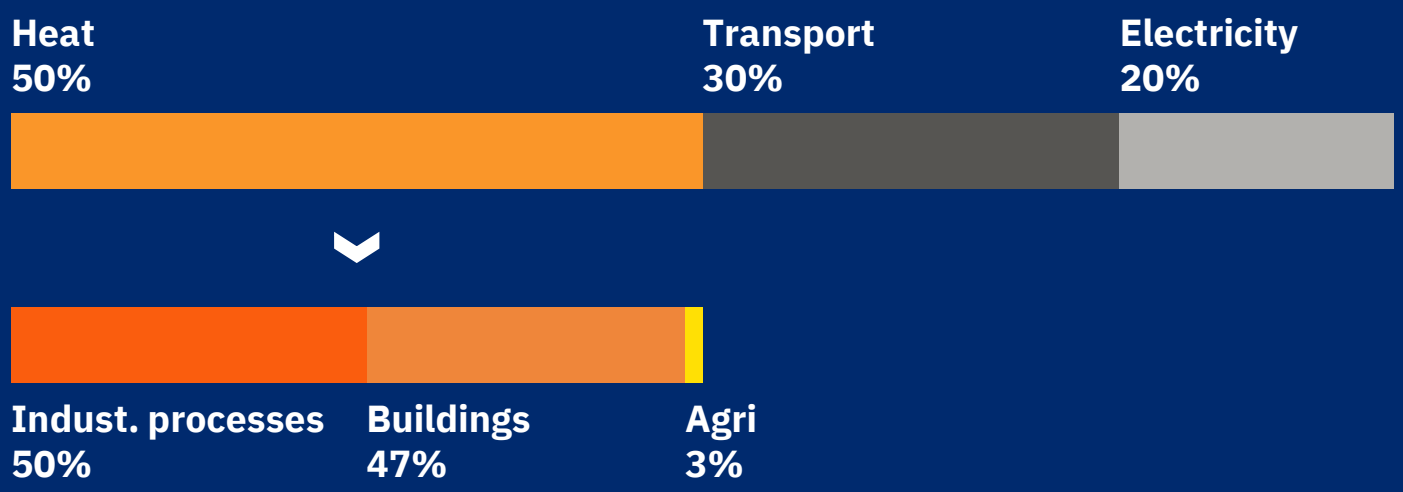
Thermal Energy Storage

Electrification of industrial heat

10/09/2024

Heat accounts for half of global energy consumption

Global energy demand



https://iea.org/reports/renewables-2020/renewable-heat

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Heat generation today

89 %

non-renewable heat production

40 %

global CO_2 emissions

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THE BIG FUEL SWITCH IN GLOBAL HEAT PRODUCTION

Direct Electrification

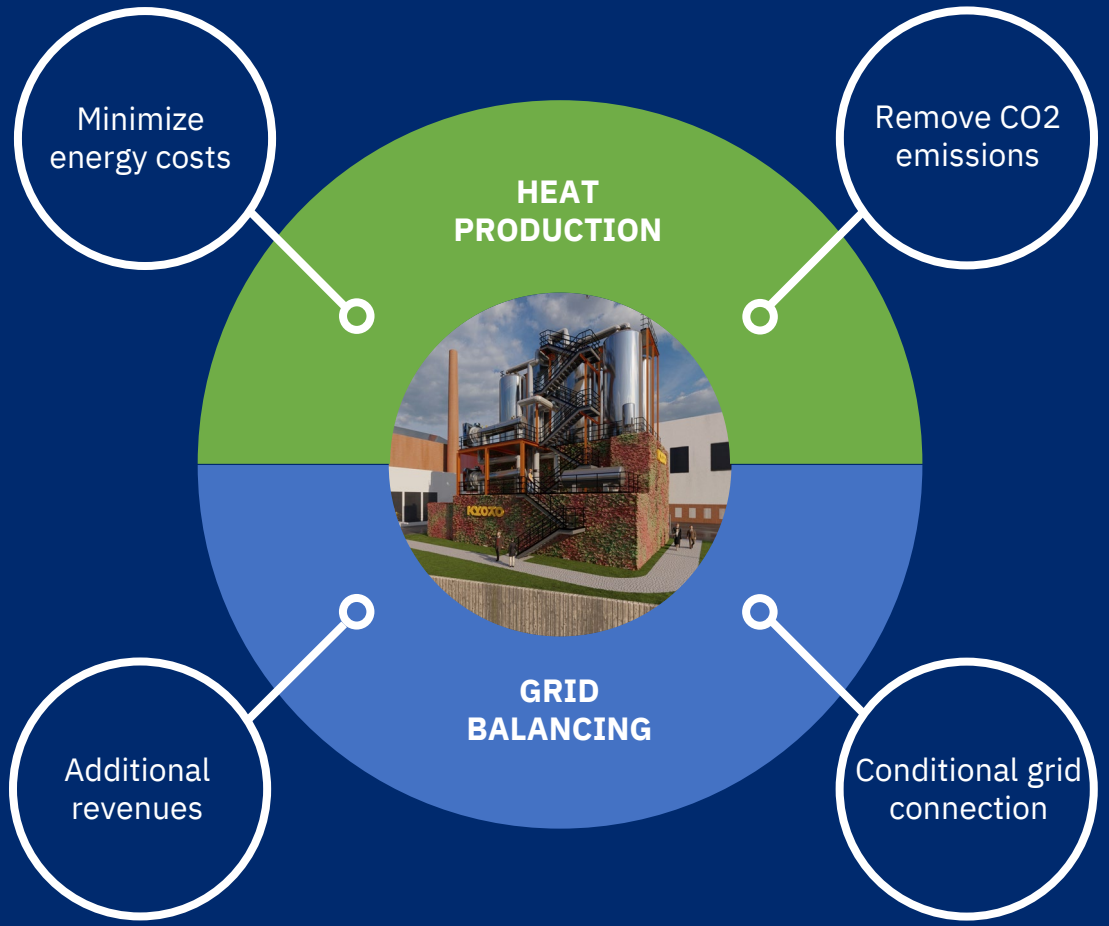
1. Residential heating
2. Low/mid temp industrial heat

Thermal Energy Storage (TES)

Hydrogen/Ammonia

3. High temp industrial heat

Heatcube – Power to Heat with Thermal Energy Storage

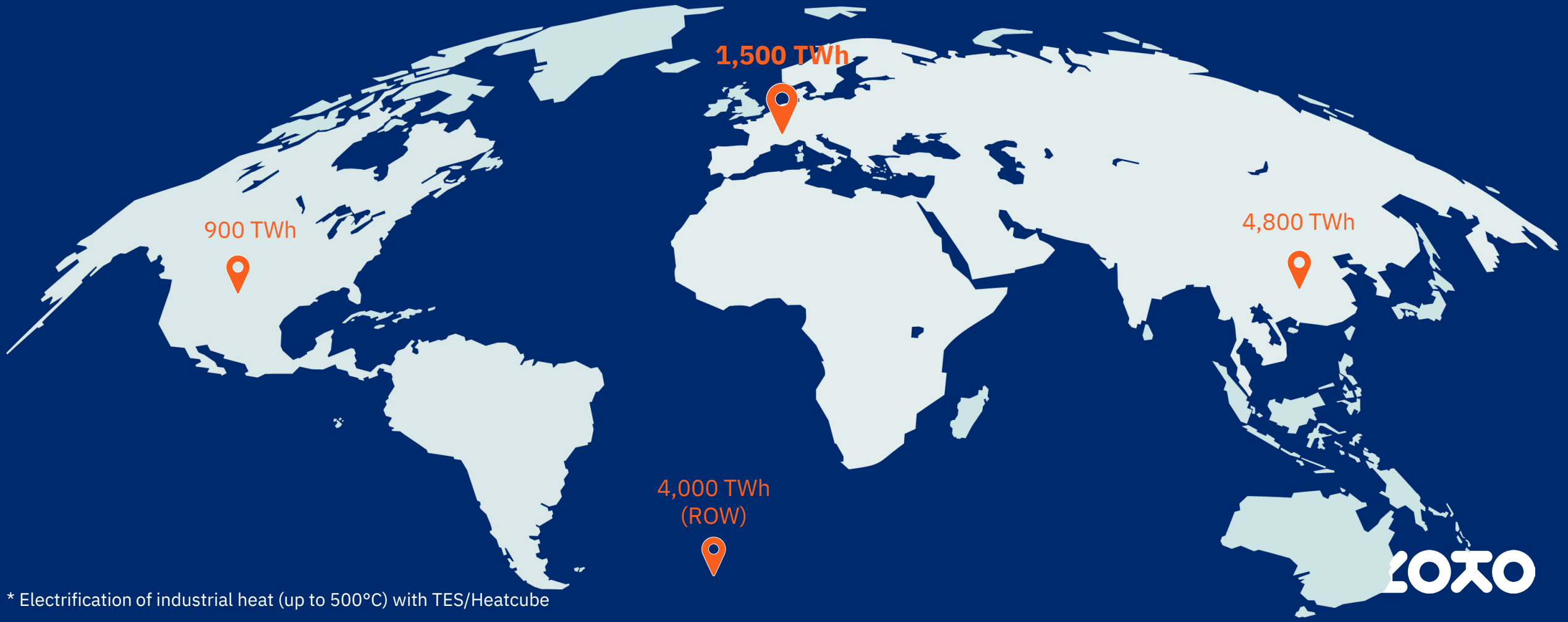


Addressing two main challenges in the green transition

- Decarbonization of industrial heat
- Flexibility in the energy system

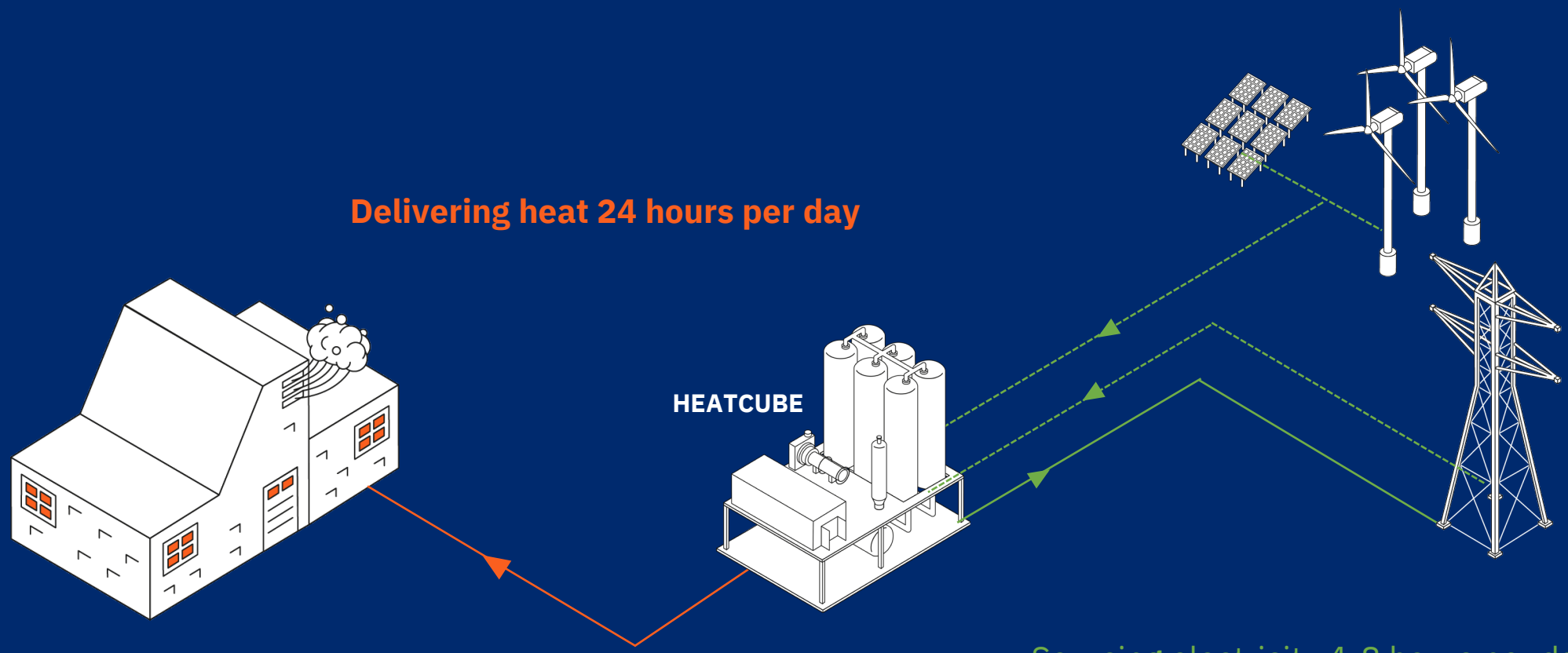
Mid-temp heat market potential of **11,200 TWh**

Representing **3,700 GW** new flexible power demand*



* Electrification of industrial heat (up to 500°C) with TES/Heatcube

Electrifying industrial heat with Thermal Energy Storage



- Sourcing electricity 4-8 hours per day
- **Providing ancillary services 16-24 hours per day**

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Maximize value across all power markets with TES

- *Day Ahead auction*
- *Intraday auction*

- *Intraday continuous*
- *Secondary/tertiary energy*

- *FCR, aFRR and mFRR capacity markets*

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Heatcube in Germany

Live simulation with enspired trading

Heatcube at industrial site in Germany

- Delivering steam 24/7
- Sourcing electricity 8 hours per day
- Power Market cross optimization
  - Day Ahead
  - Intraday continuous
  - aFRR energy
  - aFRR capacity

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Heatcube in Germany August 2024

Live simulation with enspired trading

August 2024

Delivering heat 24/7 – sourcing electricity
8 hours per day

- **Power price in Day Ahead**: 35 €/MWh
  (Base price €82)

- **Cross market optimization**: -15 €/MWh

Thank you for the attention!

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