

25<sup>th</sup> April 2024

# Kyoto Business Update

- EXPONENTIAL TIMES
- MARKET BREAKTHROUGH 2024
- HEATCUBE NEWS
- FINANCIALS & OUTLOOK



**I am Steam**

[Stream video here](#)

**KYOTO**

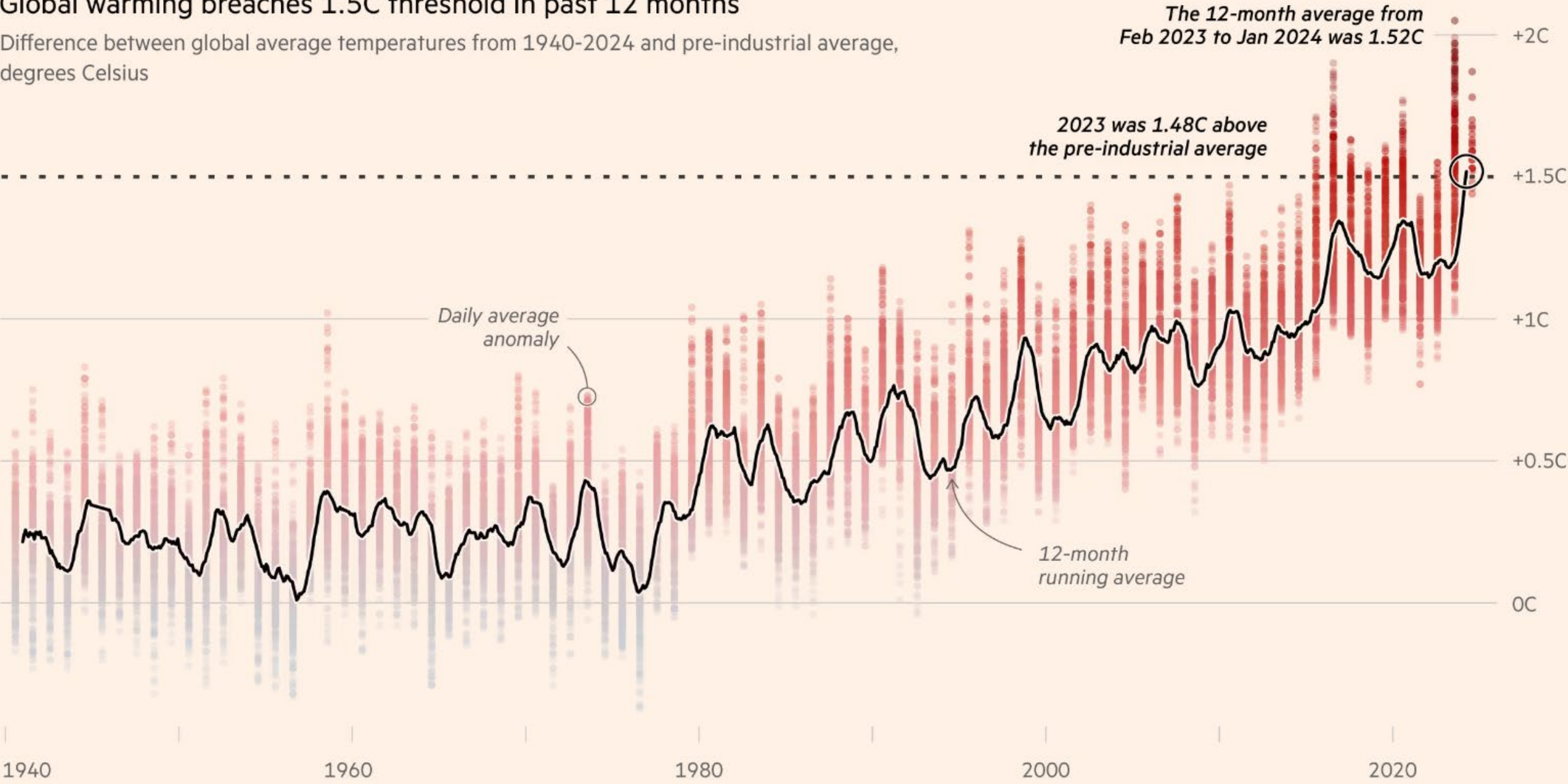
# EXPONENTIAL TIMES



KYOTO

# Global warming breaches 1.5C threshold in past 12 months

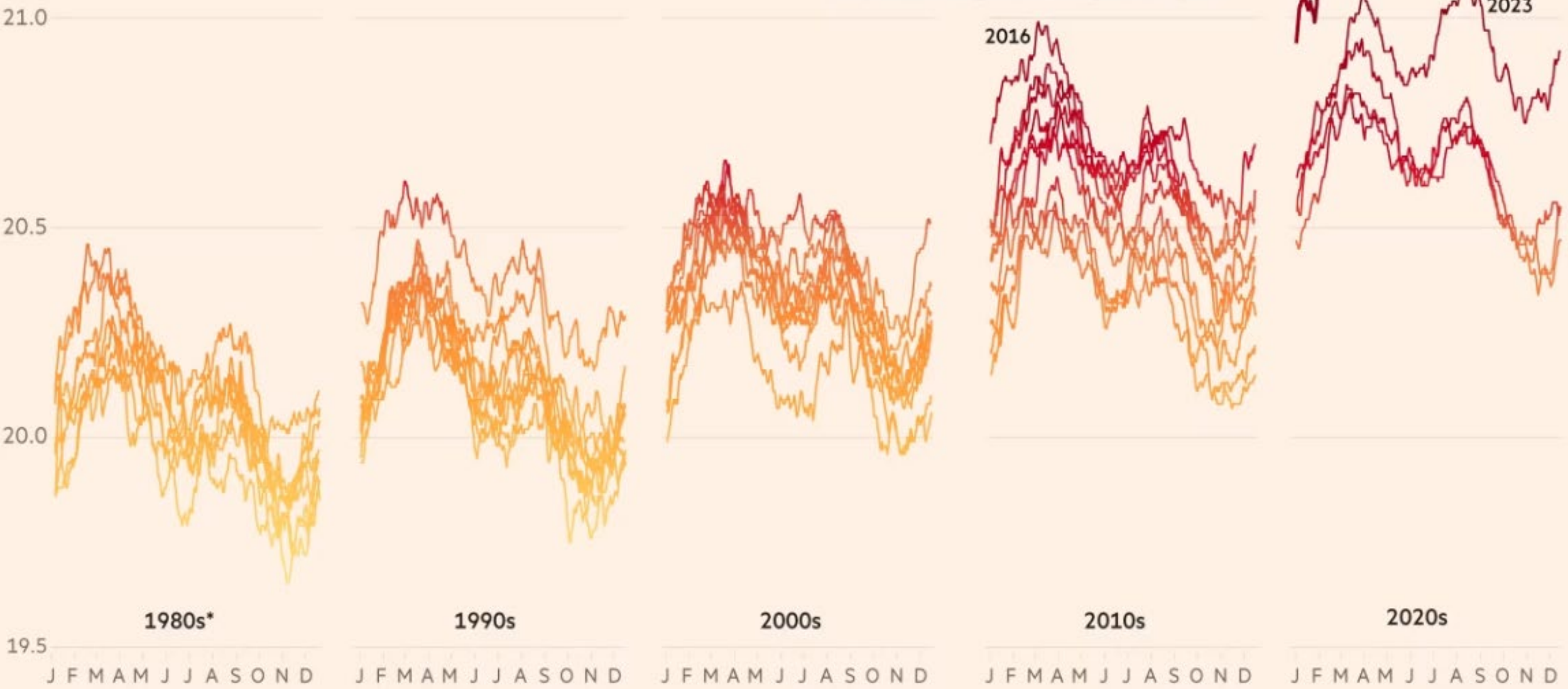
Difference between global average temperatures from 1940-2024 and pre-industrial average, degrees Celsius



\*Pre-industrial period 1850-1900. Sources: ERA5, C3S/ECMWF  
© FT

# Sea surface temperatures start **2024** at record highs

Annual sea surface temperature (SST) 60°S to 60°N, by decade (C)



Source: Climate Reanalyzer

© FT

\*excludes 1980



*“Humanity has opened the  
gates of hell”*

António Guterres,  
UN Secretary General

**KYOTO**

# Radical actions ongoing to change CO<sub>2</sub> trajectory

Clean-tech investments need to triple. Now. And is being fueled by critical legislation.



## New electricity market design



- Provisional Agreement Dec 14<sup>th</sup> 2023
- Renewable PPAs + storage
- Peak-shaving & capacity products
- Energy storage and demand response
  - National objectives mandatory

## Accelerating clean technologies



- Provisional Agreement STEP Regulation Feb 7<sup>th</sup> 2023
- Energy storage included as strategic clean technology



# 74%

OF NEW CAPACITY INSTALLED  
IS SOLAR & WIND (2023)



# BUT THE PAIN OF CURTAILMENT!



- **1.2 TWh** produced and not used, only in Spain 2023
- **18x more** than in 2021
- At the cost of **EUR 2.1 billion**

# THE BIG FUEL SWITCH...



## Electricity

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

**KYOTO™**

## Hydrogen/Ammonia

4. High temp industrial heat
5. Heavy long distance transportation

*If only we double down on electrifying the industry, electricity curtailment will be history and we would sooner be on the other side of the energy transition!*

PERFECT STORM - PERFECT SOLUTION

**Heatcube** electrifies process heat  
for the industry by also  
storing / balancing / load shifting

- Cost competitive
- Stable high-quality steam,  
at precise temperature
- Maximum flexibility –  
charge & discharge simultaneously  
(decoupled)
- Approved by energy authorities  
as flexible asset for grid
- Standardized modules,  
sizable to customer demands
- Strong European supply chain,  
positioned to scale



**KYOTO**

Heatcube #1  
operational



Spirax Group  
largest owner



Nordic  
Green Bank



Heatcube #2  
ordered



4x  
discharge capacity



Iberdrola 2nd  
largest owner



AI powered Heatcube +  
RTE 93% +  
qualified for grid balancing



Heatcube #3  
term sheet



2023



# POSITIONED TO SCALE

With world leading partners



steinmüller  
engineering

spirax  
sarco

Schneider  
Electric

KYOTHERM

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# MARKET BREAKTHROUGH 2024



CCO Tim de Haas



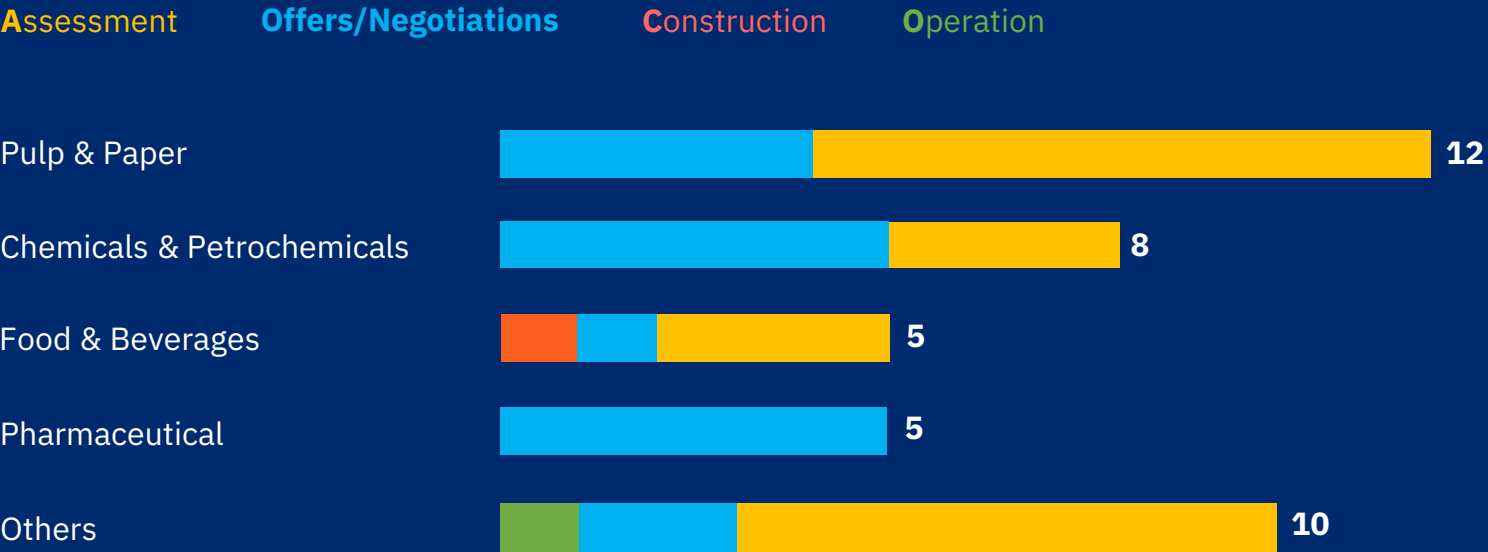


# Industries with significant low/medium heat demand

- Pulp & Paper
- Chemicals & Petrochemical
- Food & Beverages
- Pharmaceutical
- Others
  - Mining
  - Sustainable Aviation Fuel
  - Tyres
  - Non-metallic minerals
  - Non-ferrous metals
  - Iron and steel
  - District Heating



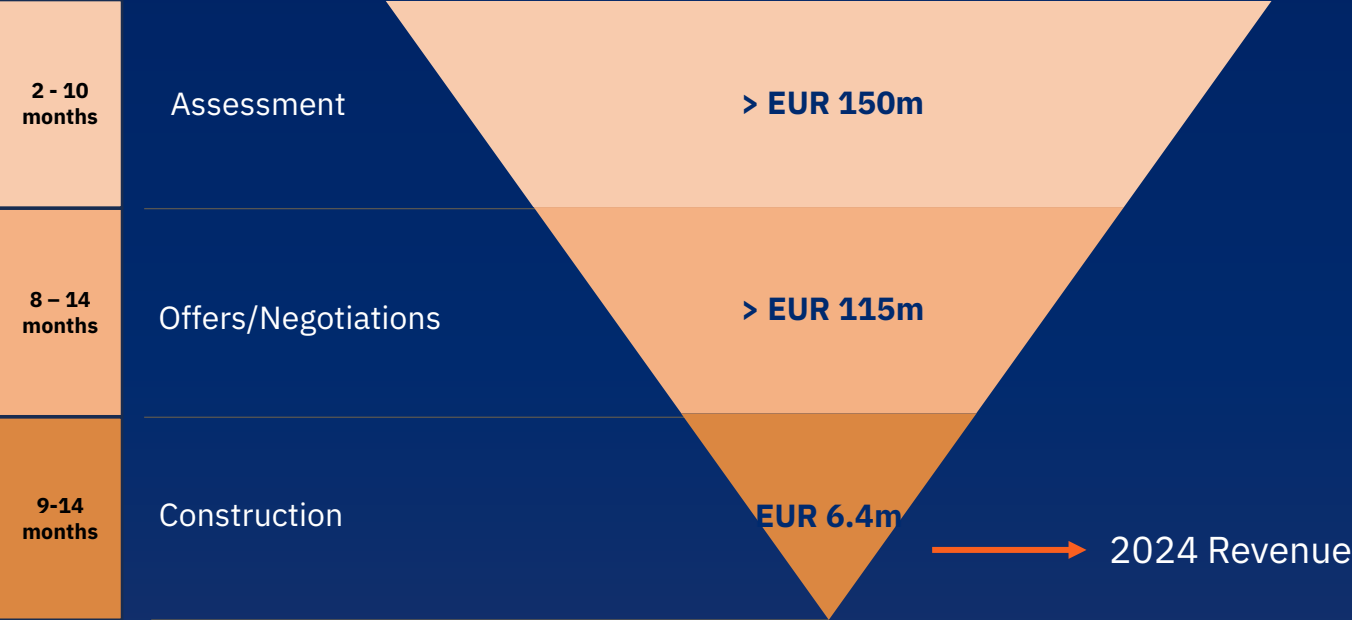
# Market breakthrough on strong pipeline



*Note: not all projects from the pipeline are represented here  
Locations are indicative*

# Total market value exceeding **EUR 280 million**

## Unweighted value per stage:



# Deep dive into 5 pioneering Heatcube projects

Heatcube #2  
Under construction



KALL  
Food & Pharma

#3  
Site engineering



KLINGELE  
Paper packaging

#4  
Site engineering



GLOBAL LEADER  
Industrial park  
steam supply

#5  
Site engineering



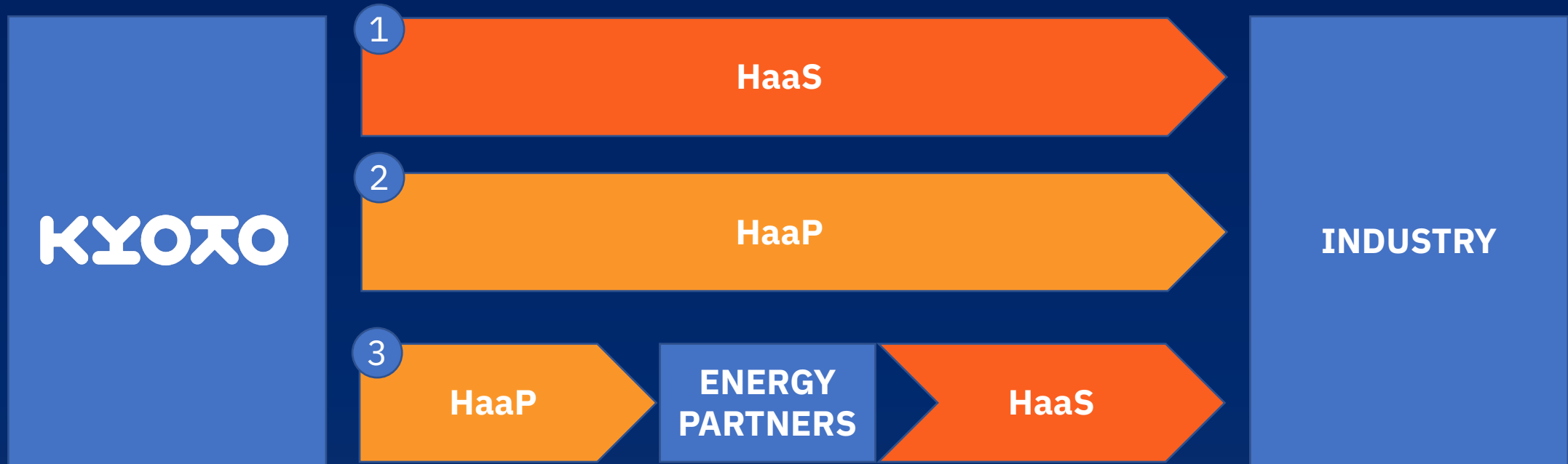
GLOBAL LEADER  
Consumer goods

#6  
Site engineering



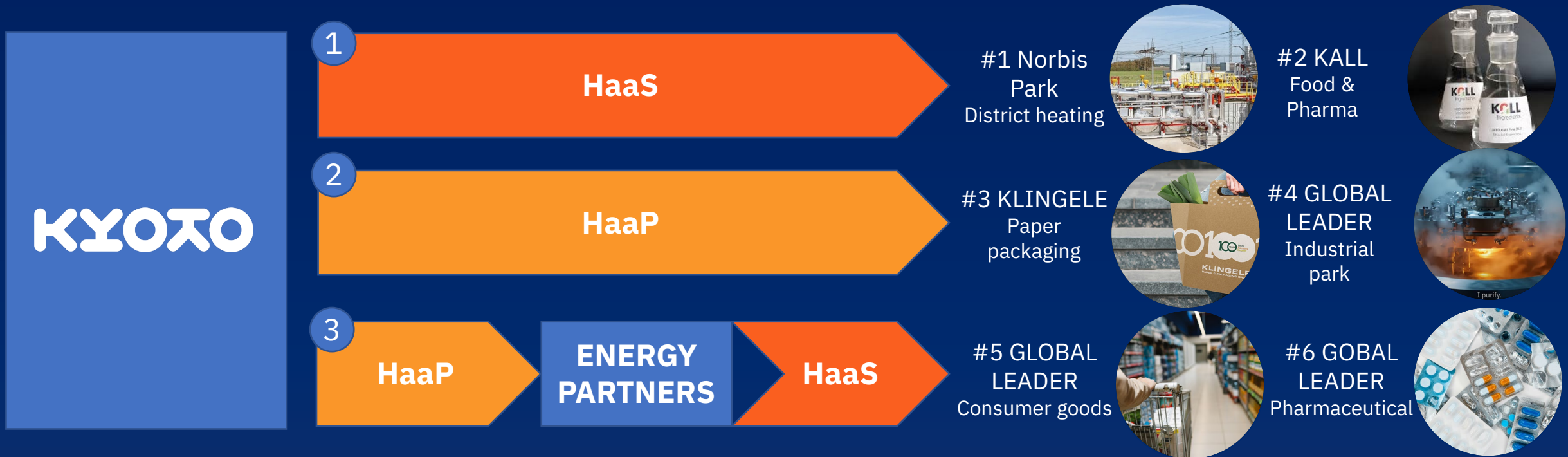
GLOBAL LEADER  
Pharma

# Kyoto's three commercial offerings towards industrial customers.



HaaP: Heat-as-a-Product  
HaaS: Heat-as-a-Service

# IN ACTION: Kyoto's three commercial offerings towards industrial customers.



HaaP: Heat-as-a-Product  
HaaS: Heat-as-a-Service

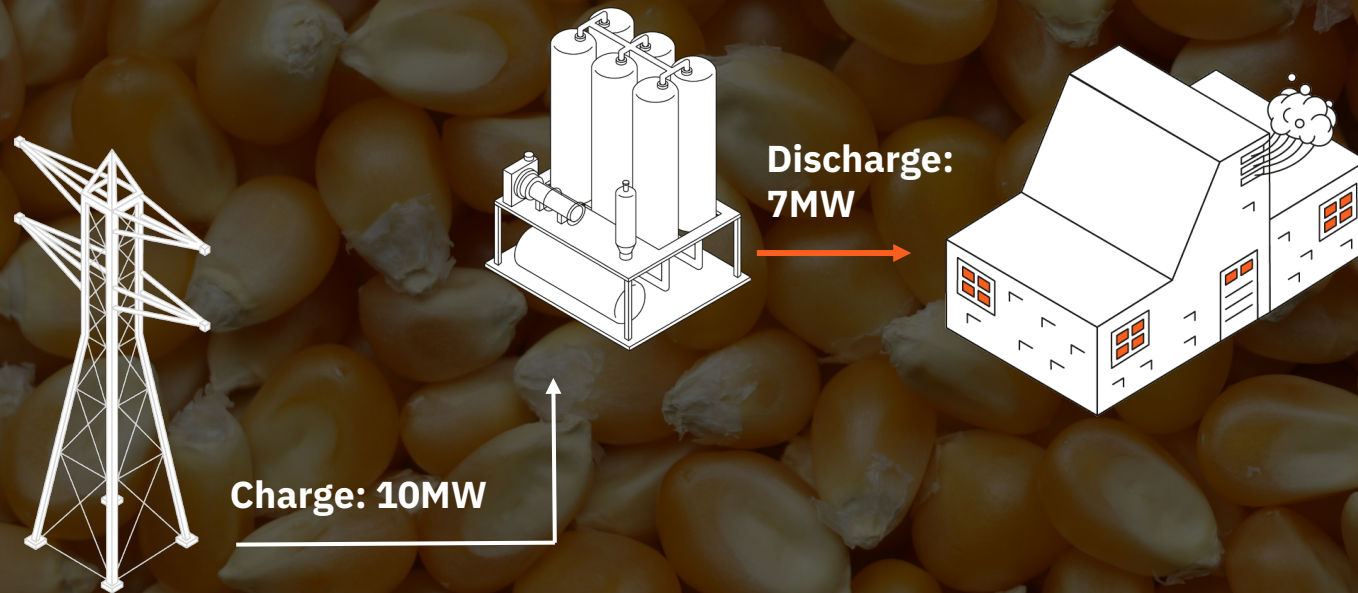
# Supplying Heat-as-a-Service to corn processing plant

#2  
Construction



KALL  
Food & Pharma

**Heatcube<sup>®</sup>**  
Storage: 56MWh



- Client: KALL Ingredients - one of Europe's newest corn-processing plant
- Partnered with financing partner, Kyotherm, and Hungarian energy trading partner, Energiabörze
- 15-year Heat-as-a-Service contract

# Project on track with solid KALL Ingredients partnership

#2  
Construction



**Kyoto Group AS**  
6,565 followers  
2mo • 🌐

[#HeatcubeTisza](#) update: The KALL project reached a milestone as the projects strategic Tech director, project manager, and engineers recently gathered on-site at **KALL Ingredients Ltd.** in Hungary for a comprehensive engineering and 3D model review. The collaboration was nothing short of impressive, with a laser focus on ensuring a seamless project delivery.

The collaboration was outstanding, highlighting the strength of our working relationship. The atmosphere was constructive, filled with confidence, and the team's dedication left no room for unforeseen obstacles.

Exciting times ahead as we continue to pave the way for decarbonizing process heat for KALL Ingredients and the first Heatcube in Hungary.

[#thermalenergy](#) [#thermalbattery](#) [#fuelswitch](#) [#industrialdecarbonization](#)



👤 with Agnieszka Sledz and 2 others

👤👤👤👤👤 Lars Martinussen and 83 others  
5 comments · 2 reposts

👤 Like Comment Repost Send



Project milestones are on track



Strong collaboration with KALL Ingredients



Necessary permits in place and foundation building about to start

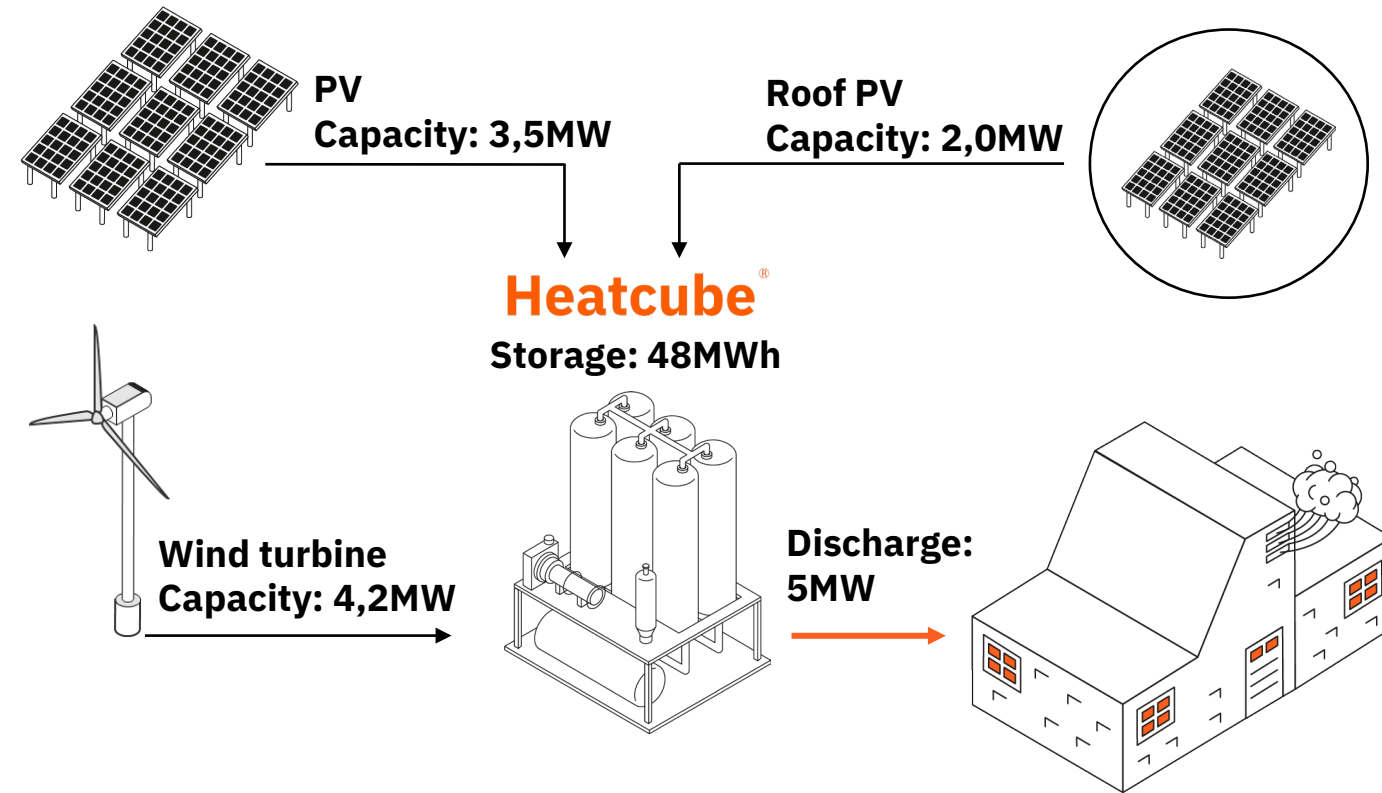
# Off-grid renewables for green corrugated cardboards

Paid site engineering ongoing

#3  
Site engineering



**KLINGELE**  
Paper packaging





# Reserve market to accelerate electrification of steam production

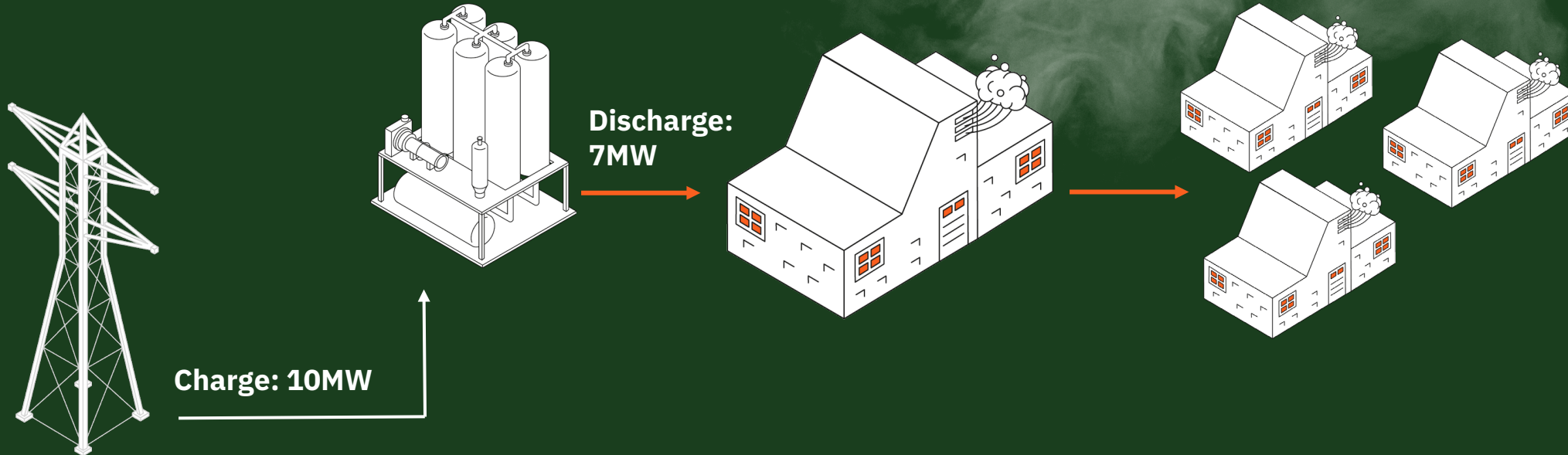
Paid site engineering ongoing

#4  
Site engineering



GLOBAL LEADER  
Industrial park  
steam supply

**Heatcube<sup>®</sup>**  
Storage: 48MWh



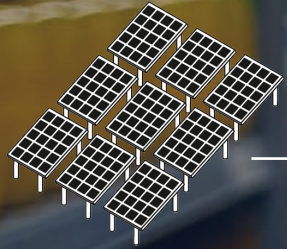
# Heatcube to deliver green steam to consumer goods manufacturer

Site engineering ongoing

#5  
Site engineering

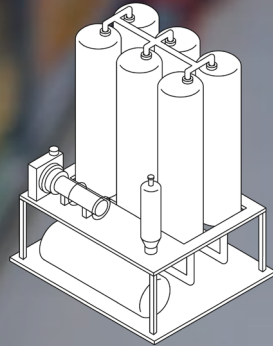


GLOBAL LEADER  
Consumer goods

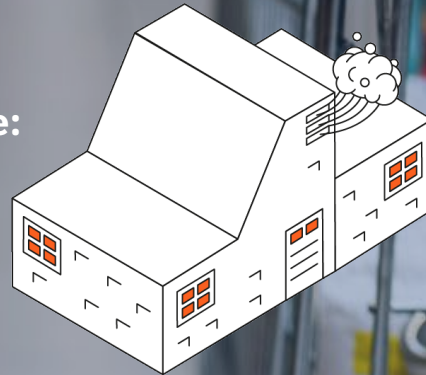


PV  
Capacity: 25MW

**Heatcube**  
Storage: 48MWh



Discharge:  
14MW



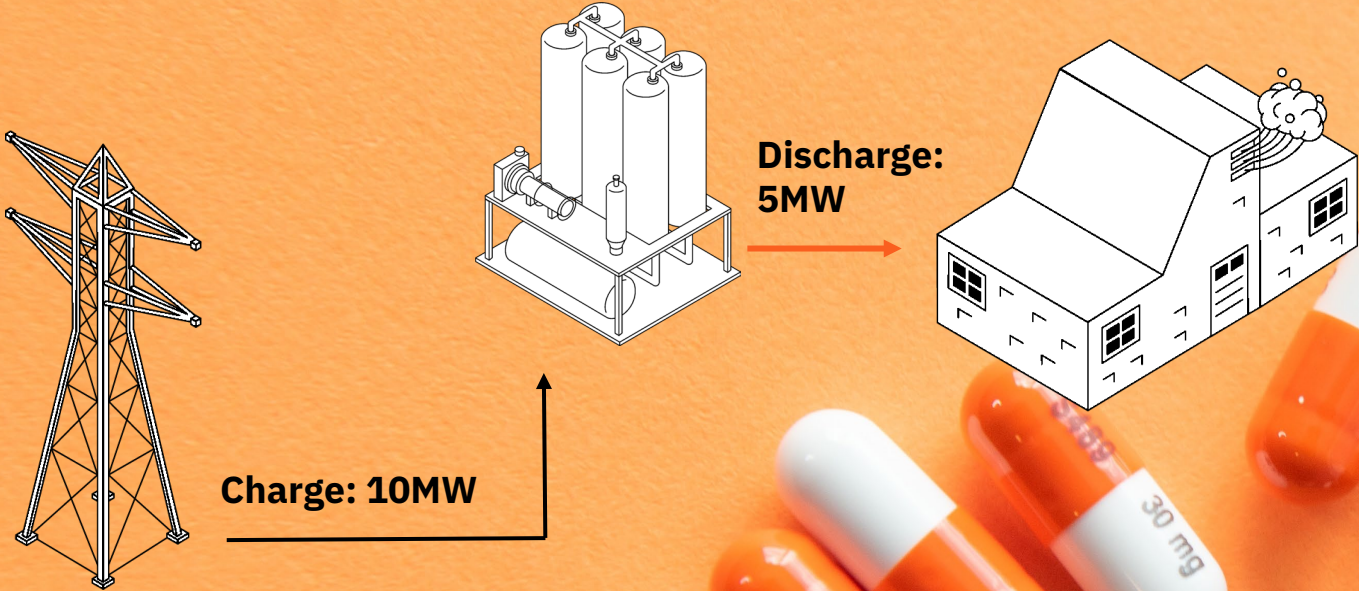
# Heatcube to decarbonize steam required in pharmaceutical production

#6  
Site engineering



GLOBAL LEADER  
Pharmaceutical

**Heatcube<sup>®</sup>**  
Storage: 32MWh



# Our partners are pioneers in our targeted industries...



> 90 agro-industrial factories in Europe



> 600 corrugated cardboard factories

> 30 sites within the organization



> 60 chemical parks in key European markets



> 200 Pharmaceutical sites in Europe

... and creating flagship projects within their own operations

The market value of the presented 6 Heatcubes is > EUR 40 million

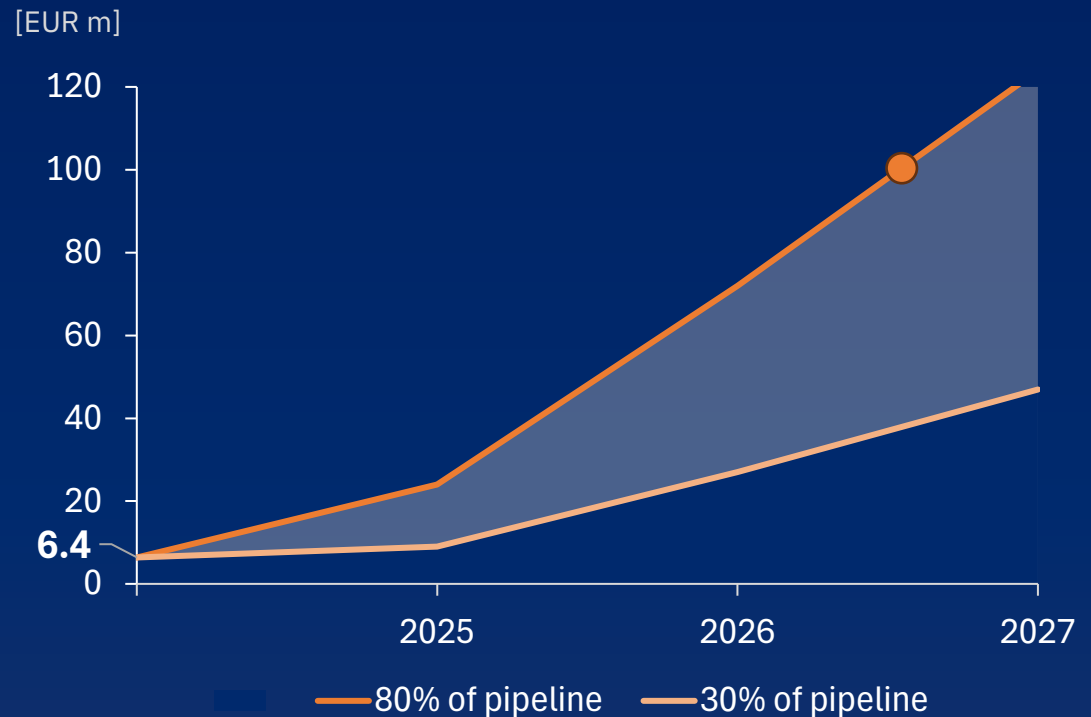


Total **STORAGE CAPACITY**: 250 MWh

Total **MARKET VALUE**: > EUR 40m

# By realizing 80% of today's pipeline Kyoto would reach **EUR 100 million revenue**

- KALL revenues of EUR 6.4m foreseen in 2024
- Scenarios only consider sites included in today's pipeline



Scenarios outcomes dependent among others on: decision making processes, final grid allocations, public funding and permit processes

# HEATCUBE NEWS



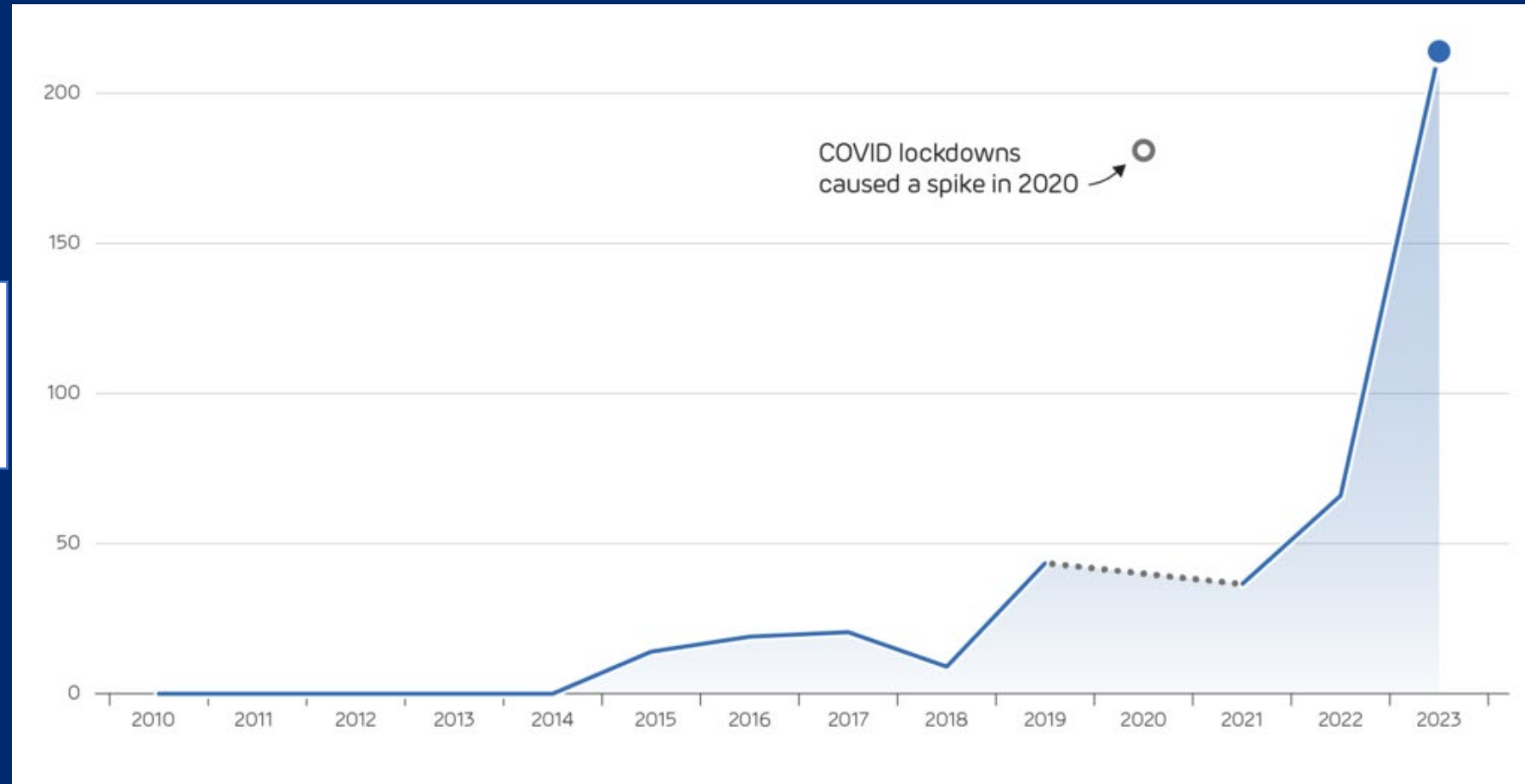
CTO Bjarke Buchbjerg



# Increasing demand and flexibility to eliminate energy curtailment

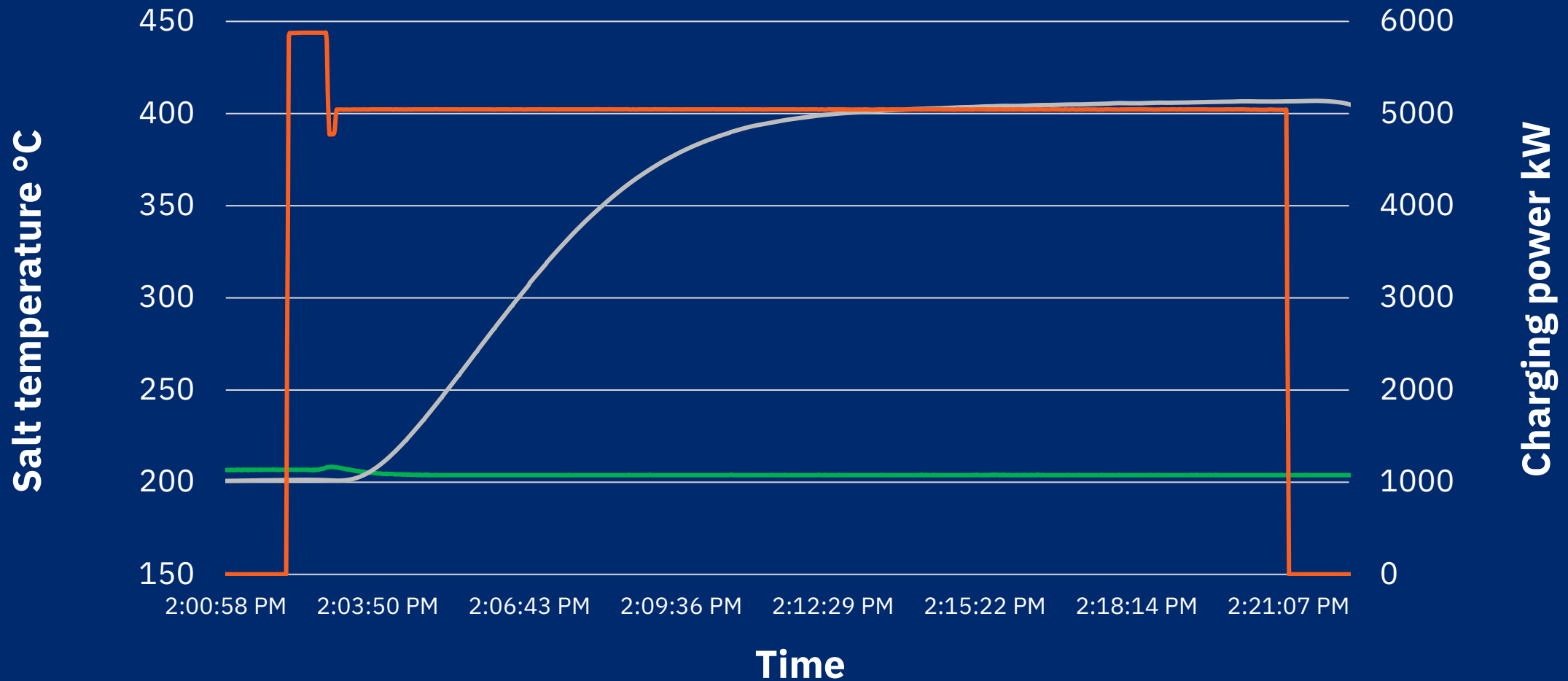
British wind lost 5% of the total energy production to curtailment in 2023

HOURS



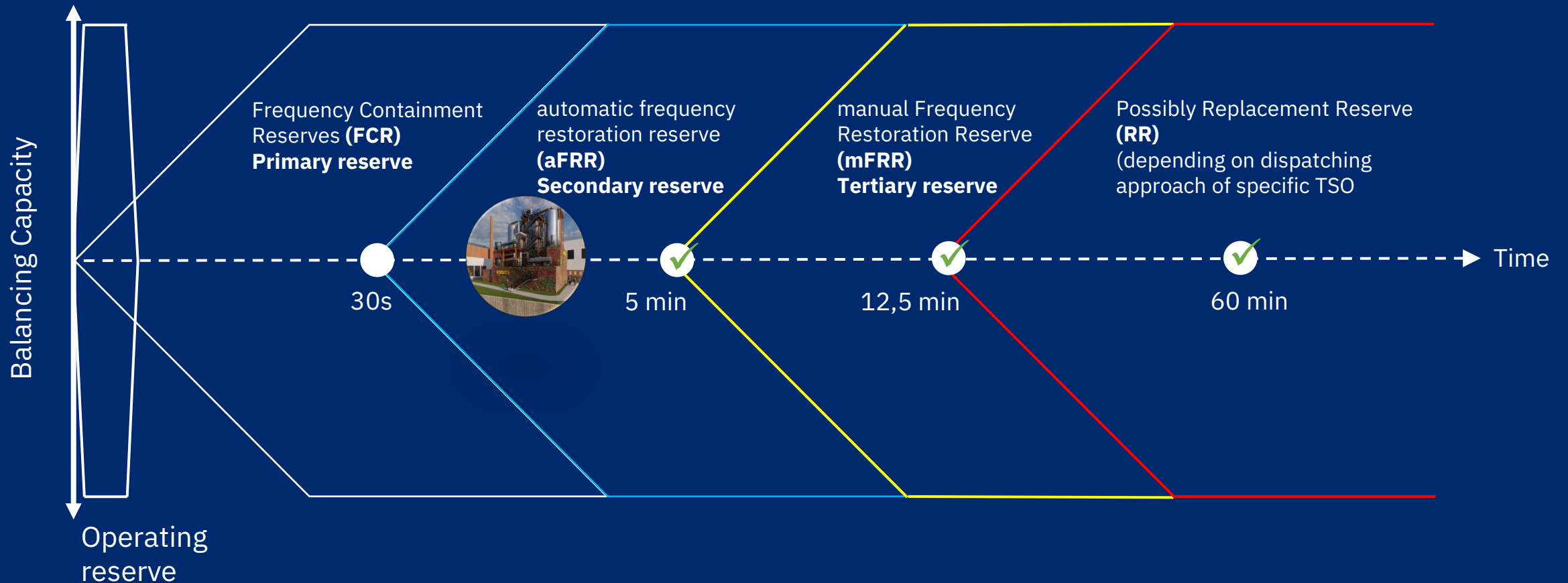


# Heatcube ready to serve ALL flexibility markets

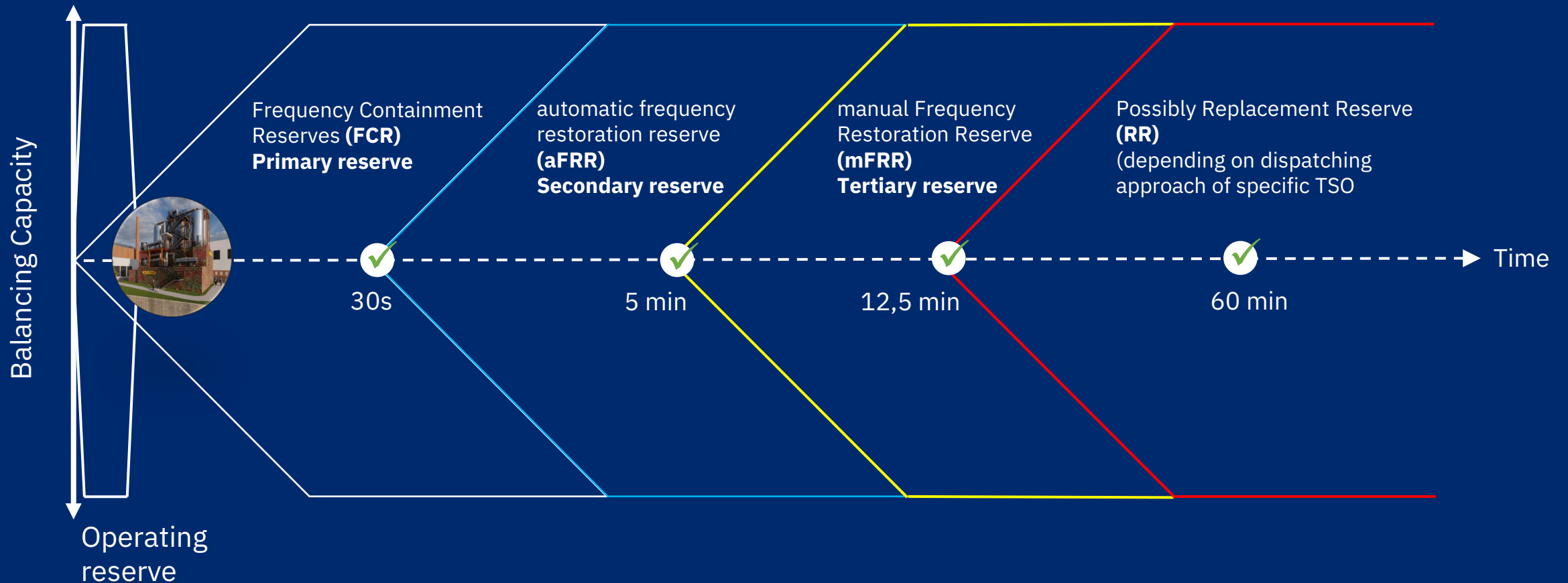


— Molten salt inlet temperature    — Molten salt outlet temperature    — Power to Heater

# Heatcube ready to serve ALL flexibility markets



# Heatcube ready to serve ALL flexibility markets



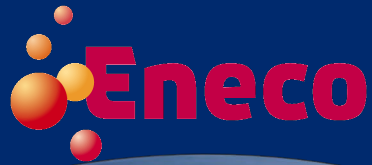
# How does Heatcube compare to Battery Energy Storage Systems (BESS)?



VS.



# Presented 6 Heatcube projects match Europe's largest BESS construction



VS.

6 x



Total charge capacity: 50 MW<sub>e</sub>  
Total storage capacity: 200MWh

Total charge capacity: 50 MW<sub>e</sub>  
Total storage capacity: 250MWh

# Heatcube's Levelized Cost of Storage **80% lower** than **BESS**



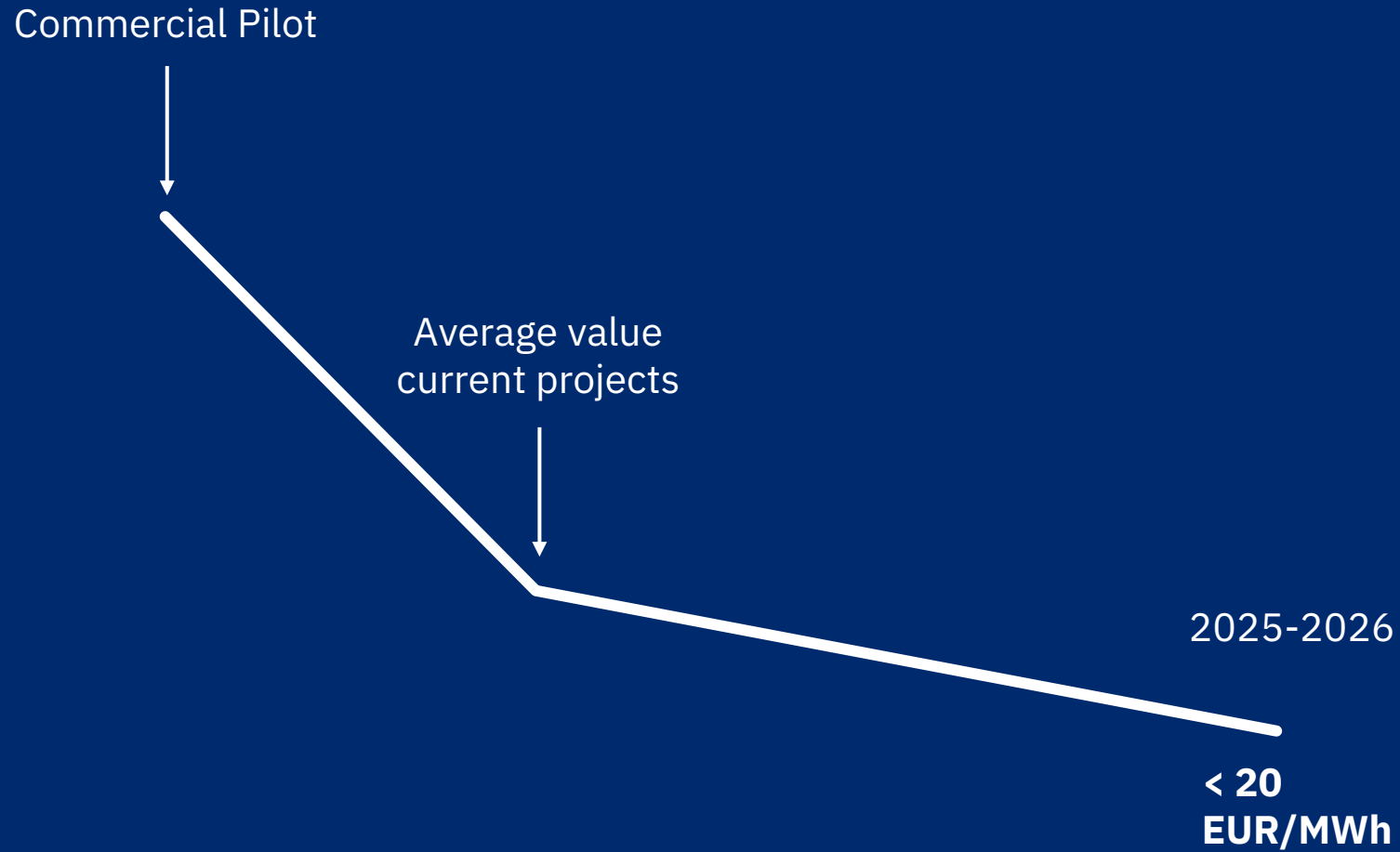
VS.

6 x



LCOS: 150-200  
EUR/MWh

# LCOS of Heatcube will keep decreasing



*Assumptions: based on 25 years and typical utilization of Heatcube and INCLUDING O&M*

TOMORROW  
FLEXIBILITY WILL BE  
DRIVEN BY DIGITAL  
TOOLS AND AI

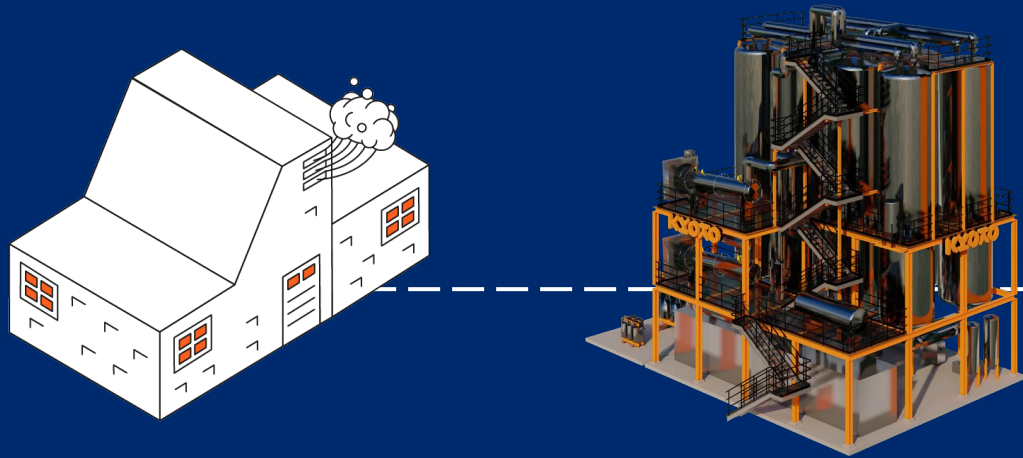


**KYOTO**



Kyotos digital universe

# Kyotopia<sup>®</sup>



KYOTO

# FINANCIALS AND OUTLOOK



CFO Håvard Haukdal



# Kyoto ready to scale up on last year's solid foundation

## Key financial highlights 2023

Acc. Heatcubes &  
tech investments

**EUR 12.1m**  
(EUR 8.4m)

- Heatcube at Norbis Park operational, commercial demo and testing capabilities
- Investments in development of next generation Heatcubes

Profit/loss (-)

**EUR -7.3m**  
(EUR -7.2m)

- Scaling capacity through European supplier eco system
- ..and select internal growth, in Seville, Spain
- The average monthly burn-rate maintained at EUR 0.6m\* as last year

Net Cash flow from  
financing activities

**EUR 11.9m**  
(EUR -0,2m)

- Successful equity raises of EUR 12.2 m during the year
- Strong alliances with shareholders Spirax Group, Iberdrola and Klaveness Marine beyond figures

\* Numbers in ( ) refer to full-year 2022

\*\* The monthly average based on the Net loss for the period less depreciation

What does a global market potential of **11,200 TWh** mean?

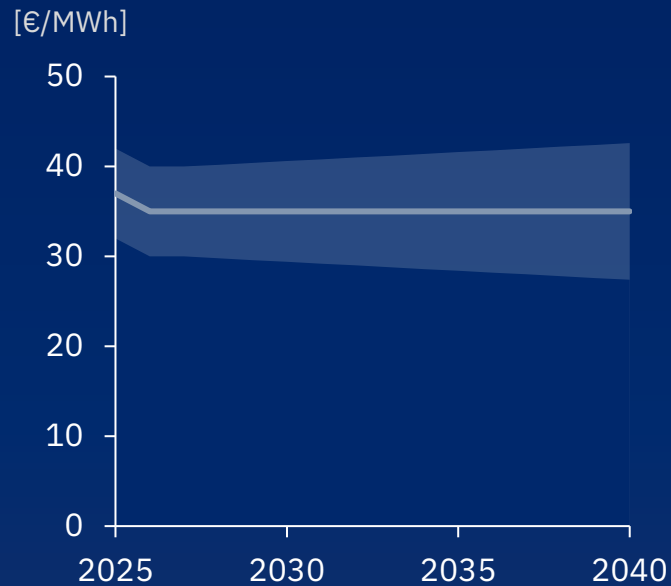
**A global market of 370,000 installations similar to Heatcube**



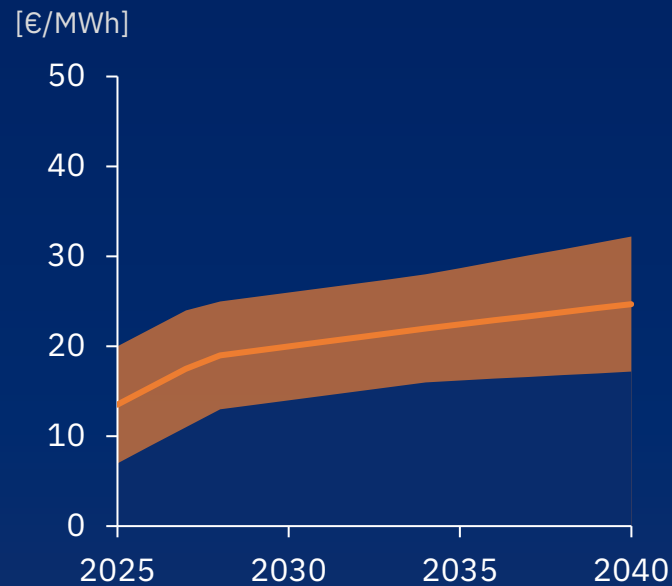
\* Serviceable addressable segment (SAS)

# Costs of using Natural Gas continuously rising...

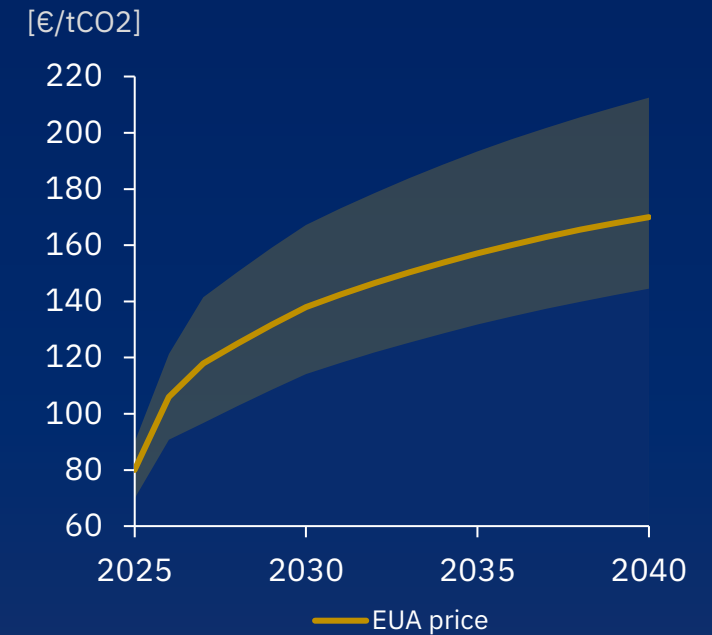
## Gas prices developing flat



## ... but higher environmental levies



## ... and increasing CO2 price



# ... imposing high **heat costs** on the industry

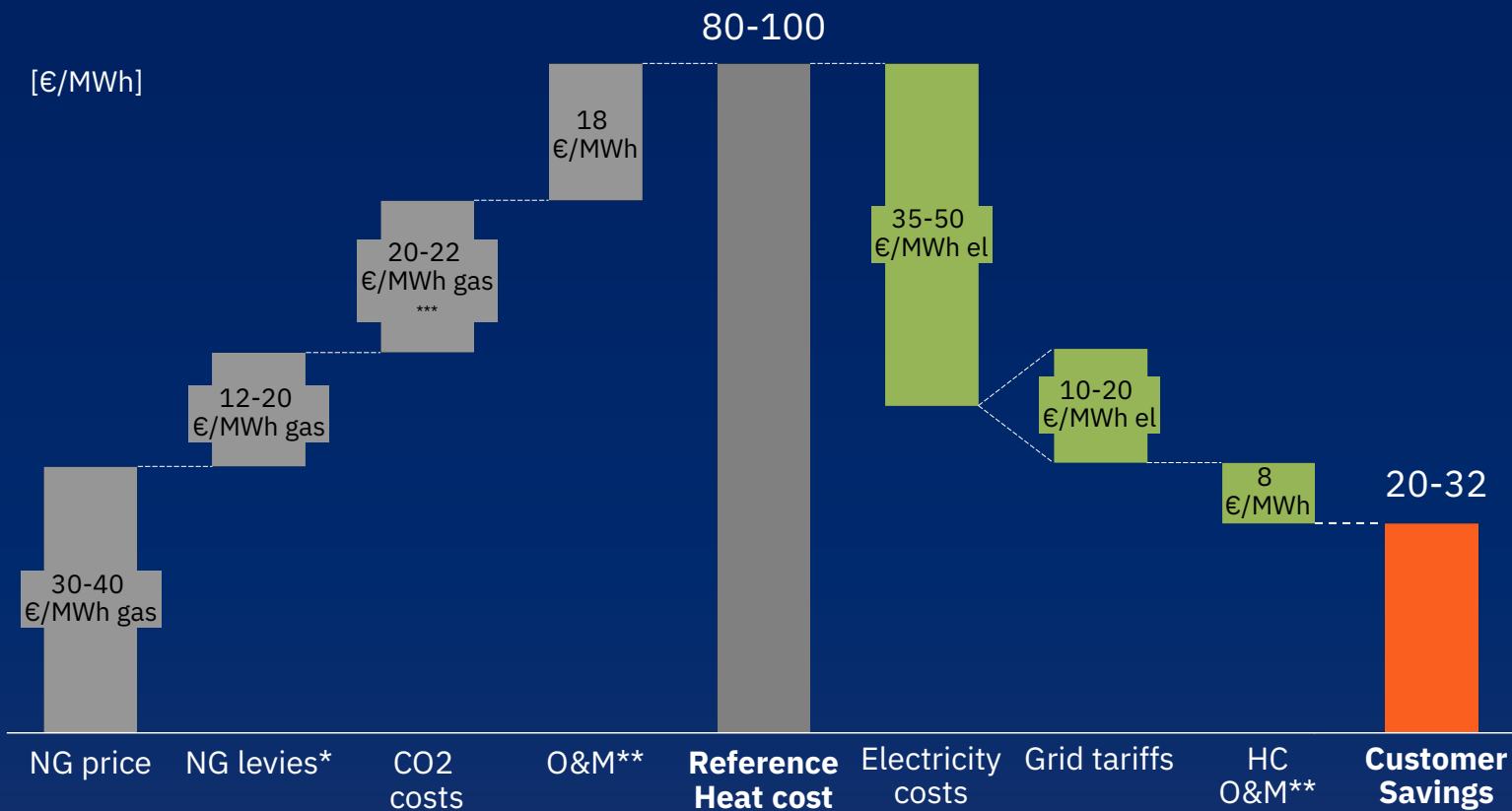
## Heat cost sensitivity\* [€/MWh]

		CO2 price [€/tCO2]			
		70	100	130	160
NG price [€/MWh <sub>NG</sub> ]	30	72	79	86	93
	35	79	<b>85</b>	92	99
	40	85	92	98	105
	45	91	98	105	112

The **heat costs near-term** is in the range **80-100 €/MWh** with varying levies cross target markets

Looking **towards 2030** the heat costs are expected to increase to the range **85-110 €/MWh**

# ... and Heatcube delivers substantial customer savings



- **Charging Heatcube** with electricity and providing balancing services
- **Customer savings** in range of 10-17% unlevered IRR, real before tax
- **Payback time** typically of 6-10 years

Reference case: Customer with heat demand of 30,000 MWh/year in target markets

Prices in real 2024 terms

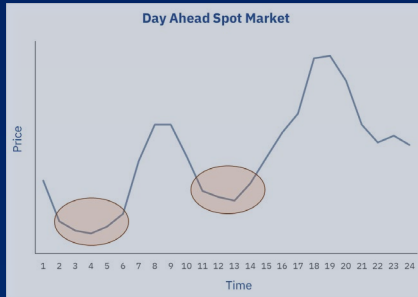
\*Total NG levies incl. distribution costs

\*\*O&M incl. Heat losses

\*\*\* 110-120 €/tCO2

# ... enabled by achieving **30% lower net electricity prices**

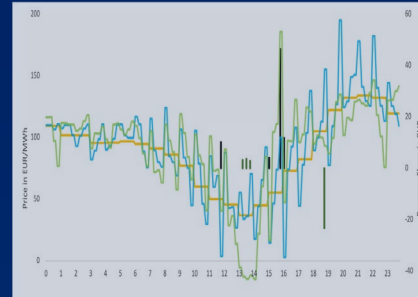
## Sourcing power in the **Day-Ahead Power Market**



*Sourcing cheapest hours of day*



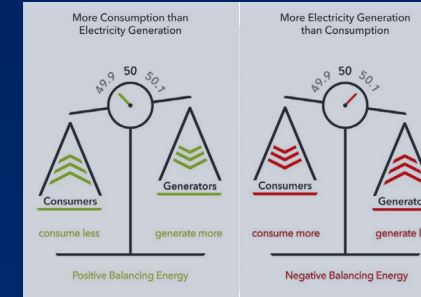
## Optimizing cost in the **Intraday Power Market**



*Further reducing the cost with 15% by continuous trading*



## Additional revenues in the **Balancing Power Markets**

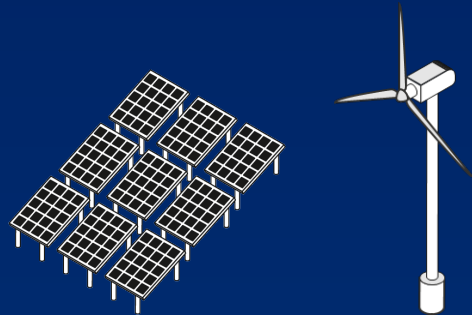


*Revenues from balancing services, getting paid i.e., 10 EUR/MW/h*



... the best cases are with off-grid Solar PV / Wind

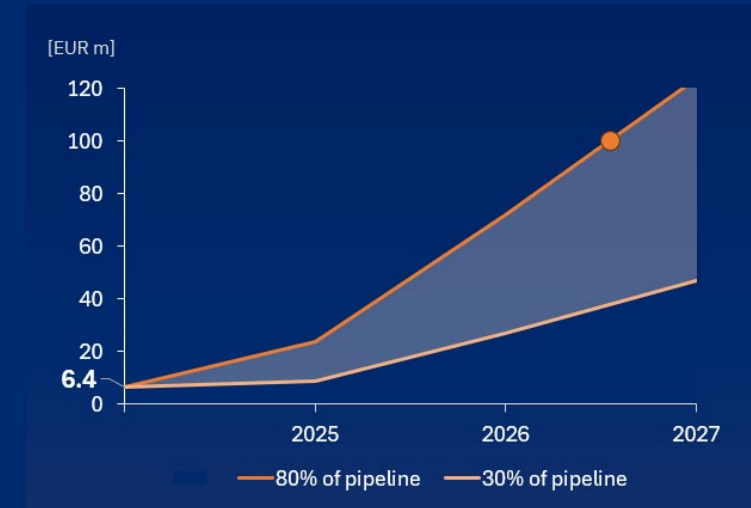
Sourcing power from  
**On-site Solar PV/Wind power**



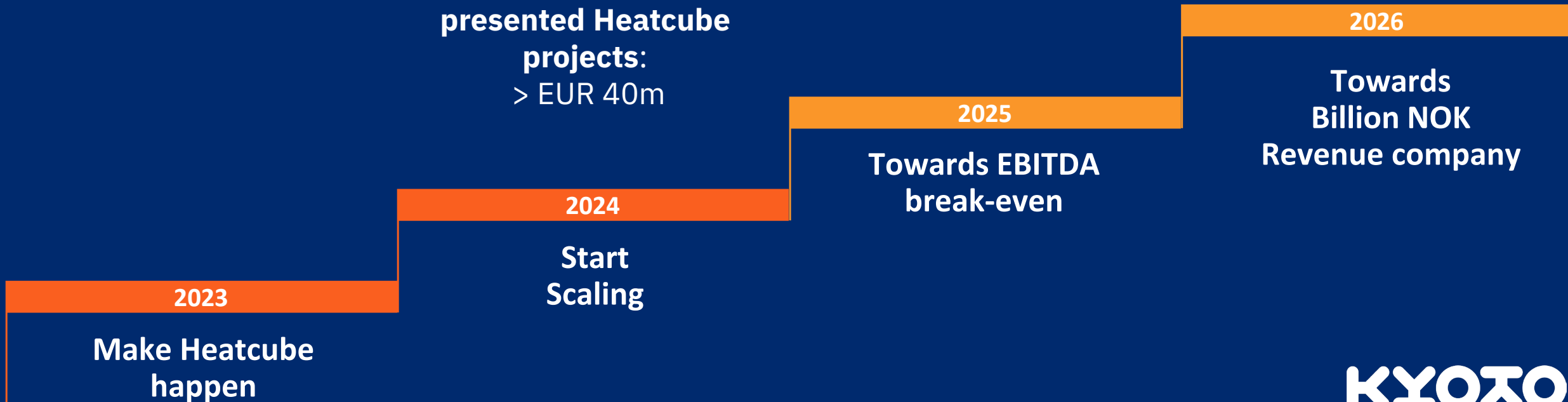
*Electricity largely from  
Solar PV*

*We could see electricity  
price down to 40 - 45  
€/MWh*

# Well positioned to scale



**MARKET VALUE** of the  
presented Heatcube  
projects:  
> EUR 40m



# Long-term funding roadmap to support growth ambitions



- Aiming to secure additional funding towards EBITDA break-even, supporting the growth ambitions
- Iberdrola and Spirax Group – acknowledging the strong strategic alliance beyond investment figures
- Nordic and EU public funding options being explored
- Working capital – exploring the wide range of alternatives
- Continuously evaluating the funding options incl both equity and corporate debt to maximize shareholder value

# That concludes Kyoto Group's Business Update

For further question or inquiries, do get in touch:



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# Heatcube the most mature and cost competitive technology

McKinsey  
& Company

Levelized cost of heat for selected technologies<sup>1</sup>, \$/MWh

