

PANTOKRATOR

A better way

Unlocking the power of
Thermal Energy Storage

Industry Update

January 2025

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PANTOKRATOR

A better way

Pantokrator is a leading advisory firm based in London focused on helping climate tech companies raise capital to scale to provide *a better way*



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Pantokrator Storage Content

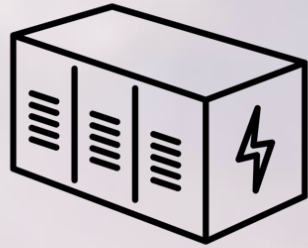
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Check out our **podcast series** with leaders in the space!

Hosted **TES webinar** with 200+ attendees and top players!



2024: Retrospective



Market is recognizing need for TES

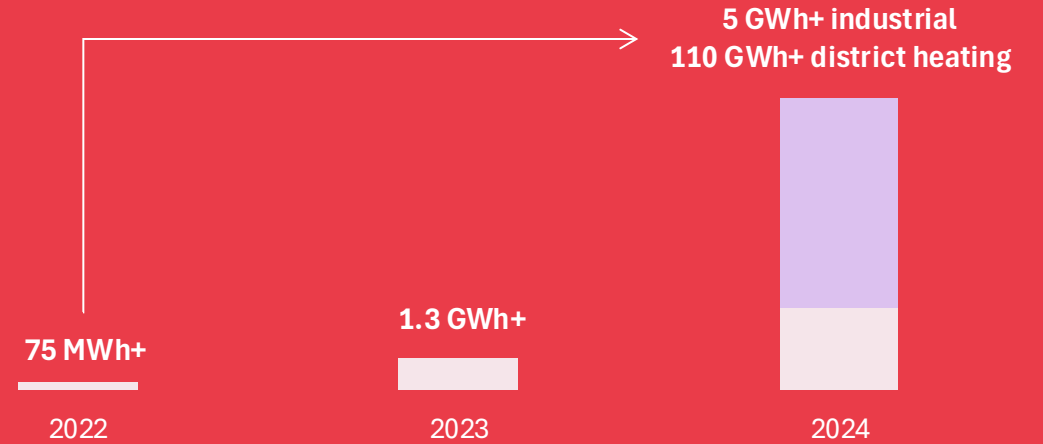
Heat-as-a-service, grid services optionality

Funding gaining momentum (\$m)



Announced projects accelerating (MWh)

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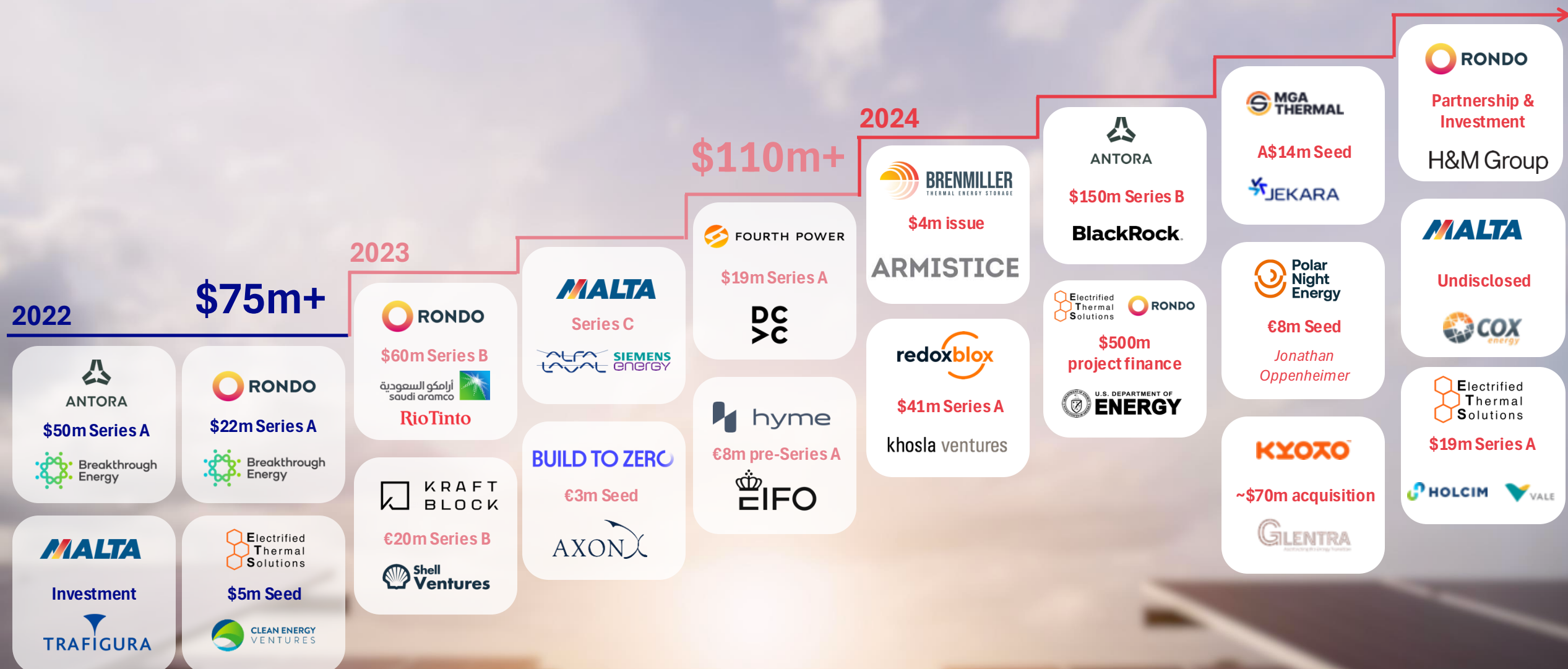
Strategics selecting partnerships

BREMILLER THERMAL ENERGY STORAGE	hyme	KRAFT BLOCK	MALTA	RONDO
Entelios we are moving energy	ALFA LAVAT	enervigo	ALFA LAVAT	edp
green enesys	PECC2	MITSUBISHI POWER	COX energy	H&M Group
VIRIDI	SEMCO maritime	SIEMENS	SIEMENS energy	أرامكو السعودية saudi aramco

Investment in TES is picking up

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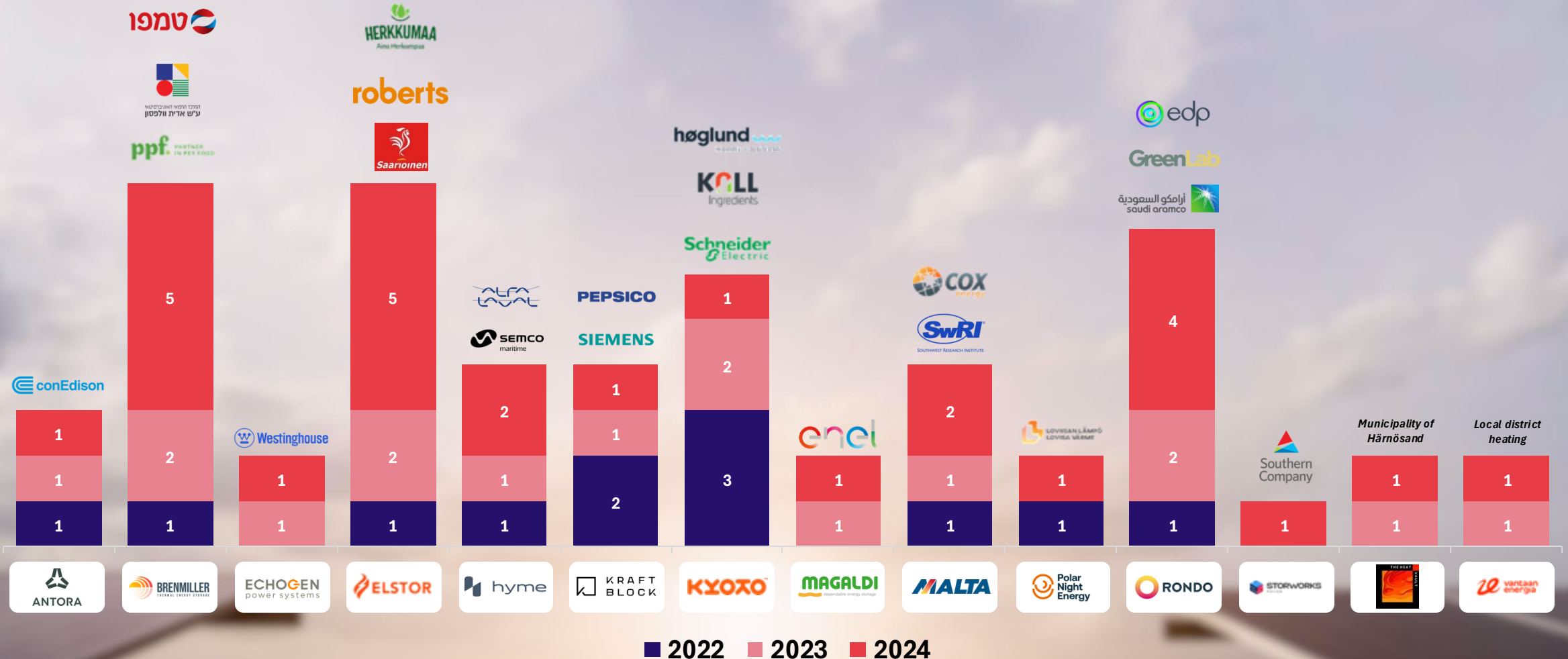
\$800m+



Commercialisation in TES accelerating

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Commercialisation 2022-2024



Commercialisation in TES deep-dive

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Partnership

Production capacity

Power

Low temperature heat

High temperature heat

2022

MALTA

Pilot



SwRI
SOUTHWEST RESEARCH INSTITUTE

KRAFT BLOCK

70 MWh



PEPSICO

ELSTOR

10 MWh



HERKKUMAA
Herkkumaa Energy

BRENMILLER
THERMAL ENERGY STORAGE

4 MWh



FORTLEV

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2023

MAGALDI
dependable energy storage

13 MWh



enel

BRENMILLER
THERMAL ENERGY STORAGE



4 GWh factory operational

RONDO

2 MWh



CALGREN

RONDO



90 GWh factory construction



ANTORA



50k sqft factory construction

ECHOGEN
power systems

1.2 GWh



Westinghouse

BRENMILLER
THERMAL ENERGY STORAGE

32 MWh



טמרה

KYOTO

56 MWh



KOLL
Ingredients

2024

Polar Night Energy

100 MWh



LOVIISAN LÄMPÖ
LOVISA VÄRME

hyme

20 MWh



ALFA LOMBA **SEMCO**
maritime

BRENMILLER
THERMAL ENERGY STORAGE

12 MWh



מפעל תרמו-אנרגיה
המתוכנן

RONDO

GWh partner



أرامكو السعودية
saudi aramco

RONDO

2 GWh partner



edp

BRENMILLER
THERMAL ENERGY STORAGE

Europe JV



green enesys

VIRIDI

STORWORKS
POWER

10 MWh



Southern Company

vantaan energia

90 GWh



Local district heating

RONDO

100 MWh



GreenLab

BRENMILLER
THERMAL ENERGY STORAGE

30 MWh



ppf PARTNER
IN PET FOOD



20 GWh



Municipality of
Härnösand

KRAFT BLOCK

Strategic partner



SIEMENS

ELSTOR

20 MWh



Saarioinen

2025: Notable Projects Coming

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X



9 MWh



Announced Mar 2023



X



32 MWh



Announced Oct 2023



X



56 MWh



Announced Nov 2023



X



100 MWh



Announced Mar 2024



X



100 MWh



Announced Jun 2024



X



20 MWh



Announced Aug 2024

HaaS: Potential For Higher Profitability

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30+ Companies Across Multiple Use-Cases

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POWER


 
 










50° C - 600° C


600° C - 1000° C


1000° C+

2025 Outlook

- **Heat-as-a-service model** will gain momentum
- Complexity will drive need for **hybrid technologies**
- Grid services will boost project economics
- Market too large for competition, many will thrive

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“We will not achieve our decarbonisation targets without LDES. By providing flexible and reliable services LDES technologies are critical enablers to decarbonise power and heat systems.”



Julia Souder

CEO, LDES Council



“There are so many ‘wins’ when it comes to thermal battery technology. ... thermal batteries offer compelling deployment opportunities now.”



Blaine Collison

Executive Director, RTC

- Market turning away from ESG, **projects will need to stand on their own merits**
- Initial pilots will face commercialization challenges, **sector will need to mature ahead of larger installations**
- Companies facing funding gap between venture and infrastructure, **combined TopCo and project financing needed**