



BRABETECH

Heat transfer & storage solutions

**MOLTEN SALT SYSTEMS FOR THE INDUSTRIAL
HEAT TRANSITION**

About Brabetech

Brabetech accelerates the industrial heat transition by building molten salt systems for industrial heat. We are located at the high-tech campus in Eindhoven.

A SELECTION OF REFERENCES

TNO innovation
for life



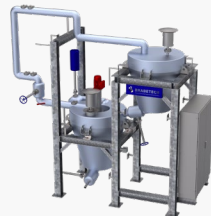
alucha
RESOURCES THROUGH INNOVATION



2019
Molten Salt Waste
Heat System



2020
Molten salt heat
exchanger loop



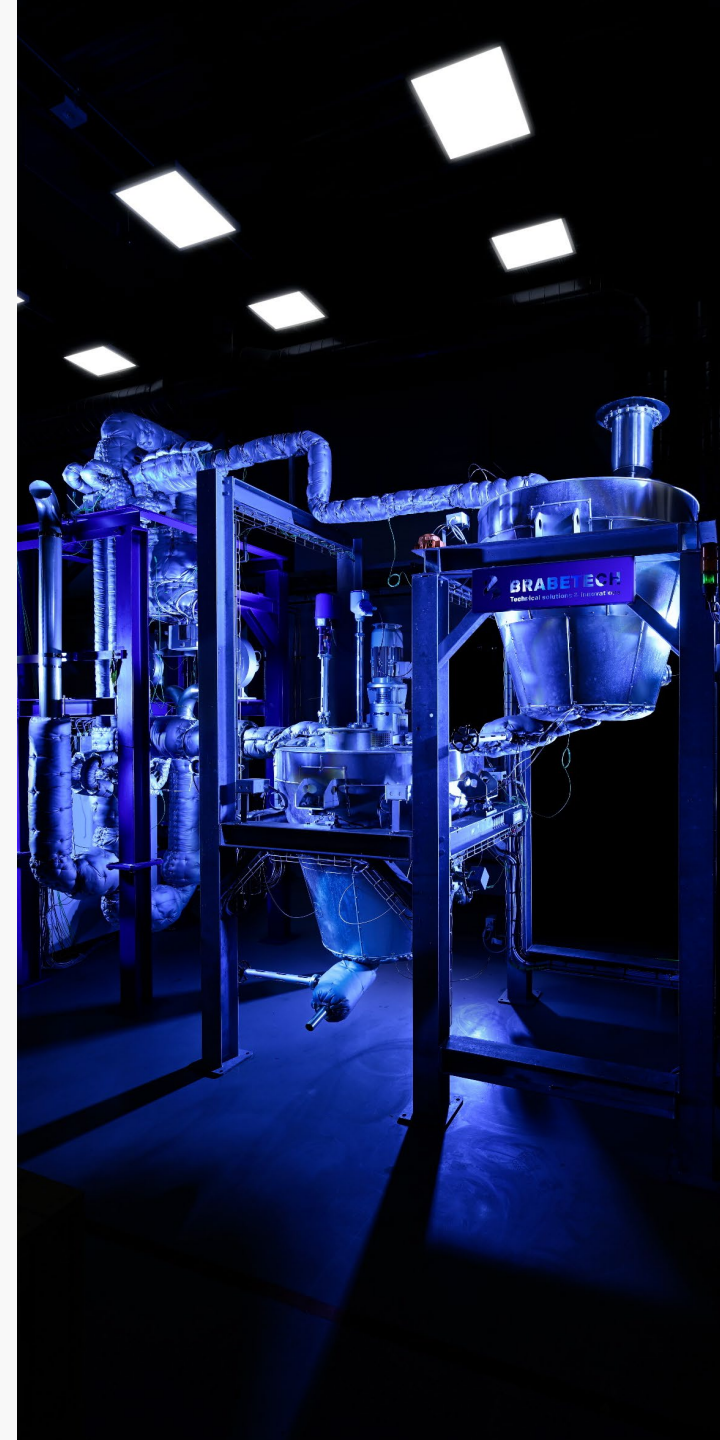
2021
Molten salt
production unit



2022
Heat Transfer
system recycling



2023
ThermalPod Heat
Battery



86%

of industrial heat
is generated with
fossil sources

10%

of global
emissions come
from high
temperature
industrial heating

20%

of all energy is
used for industrial
heat

The Problem

“Industrial heat is currently generated using gas systems that heat thermal oil or steam. Reduction of CO2 emissions requires a change of heating technologies.”

Electric Industrial Heating

Industrial heat can be electrified using available technologies:

- Heat pumps
- Direct electric heating
- E-boilers

Electricity is not affordable and or available when needed as heat.

Flexible Electric Heat: ThermalPod Heat Battery

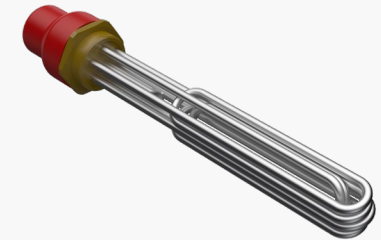
The ThermalPod heat battery stores & converts electricity to process heat between 100 and 400 degrees using molten salts. Our modular system design is adjusted to the energy profile of the customer.



STORE HEAT WHEN IT IS CHEAP AND USE IT WHEN NEEDED.

CHARGING

ELECTRIC CHARGING UP TO 20 MW
< 15 SECONDS RAMP UP TIME



STORAGE

20/40 FT STORAGE CONTAINERS
4.75 MWh / 9.5 MWh STORAGE CAPACITY PER UNIT



DISCHARGING

DISCHARGE HEAT IN THE FORM OF STEAM THERMAL OIL OR AIR
INTEGRATED INTO NETWORK ON SITE



SCALABLE FROM 5 MW

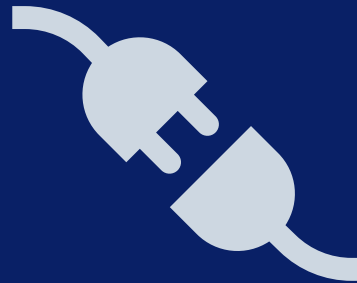
Business Case

The ThermalPod reduces costs for electric heat, reduces CO2 emissions and earn revenues by trading on the energy reserve markets. We offer a reduced LCOH compared to gas for some cases.



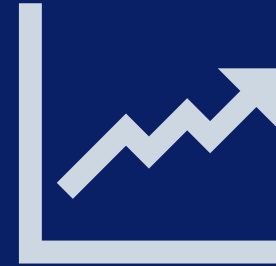
Savings on heat

Buy & store heat during solar peaks when available and cheap



Electric heat

Reduce CO2 emissions by electrification of heat which creates value under ETS



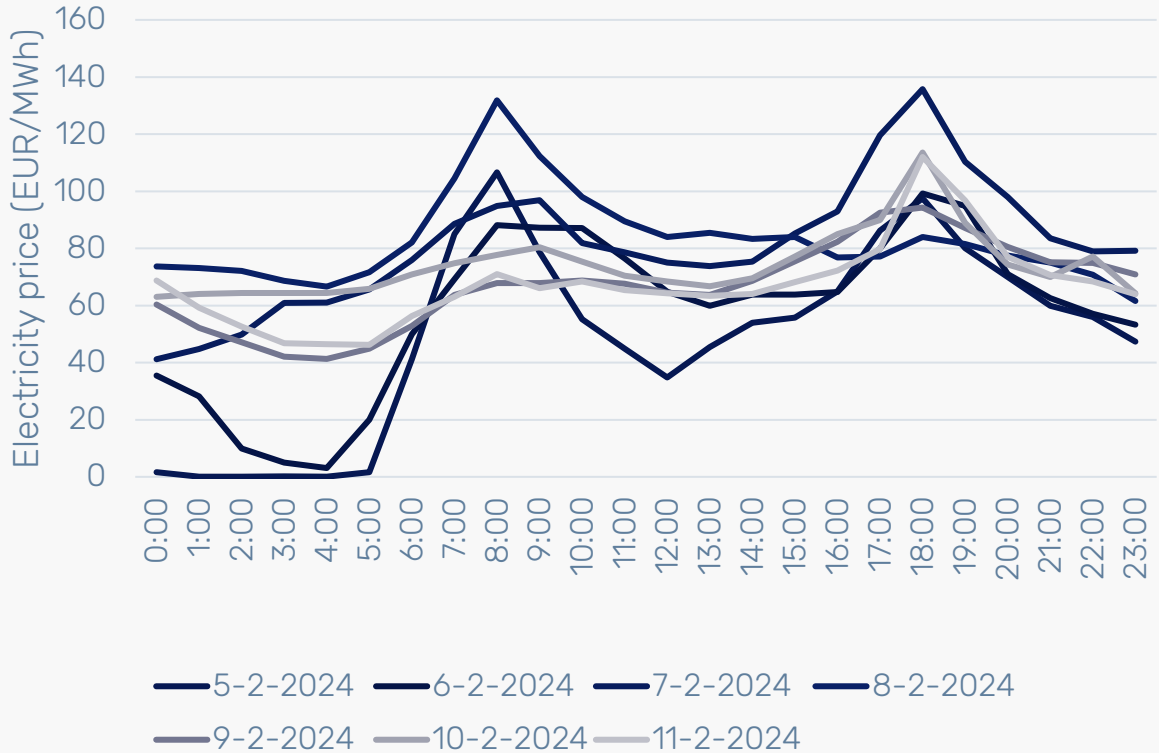
Trade flexibility

Use the system on the reserve market to earn additional revenues

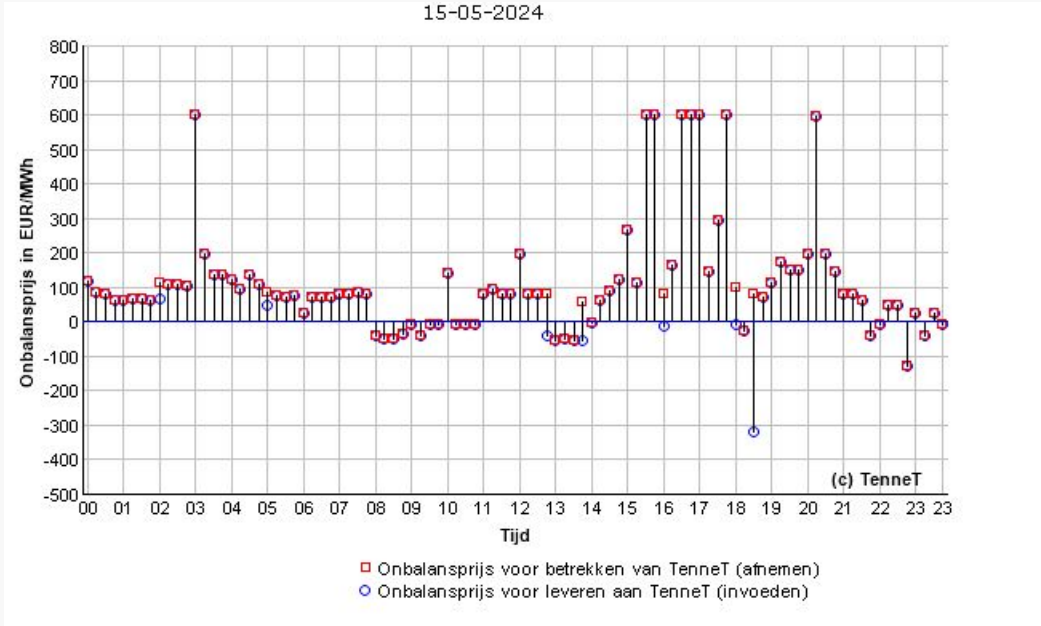
Low cost electrical heat

There are different methods for buying cheap electricity and utilizing the flexibility of our asset. There is also the potential for SDE++ and investment subsidies available for realizing a system.

Electricity prices EUR/MWh (EPEX SPOT)



EPEX spot



Onbalans

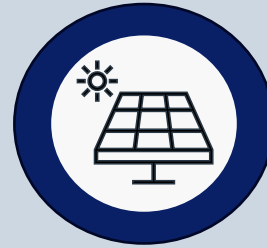
Renewable heat

Electric heat offers direct opportunities for reduction of CO2 emissions in three main ways.



POWER PURCHASE AGREEMENTS

- ❖ Power purchase agreements for renewable power ensure no CO2 emissions of electricity offtake
- ❖ Stimulate local PV parks or wind farms



LOCAL RENEWABLES

- ❖ Use on site wind or solar directly to heat your process
- ❖ Integration of thermal energy generation with concentrated solar power



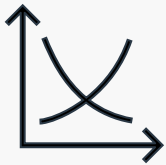
GUARANTEES OF ORIGIN

- ❖ Guarantees of origin can be used to ensure that energy is deemed clean
- ❖ Mainly an administrative tool for ensuring clean power

Trading on the energy markets

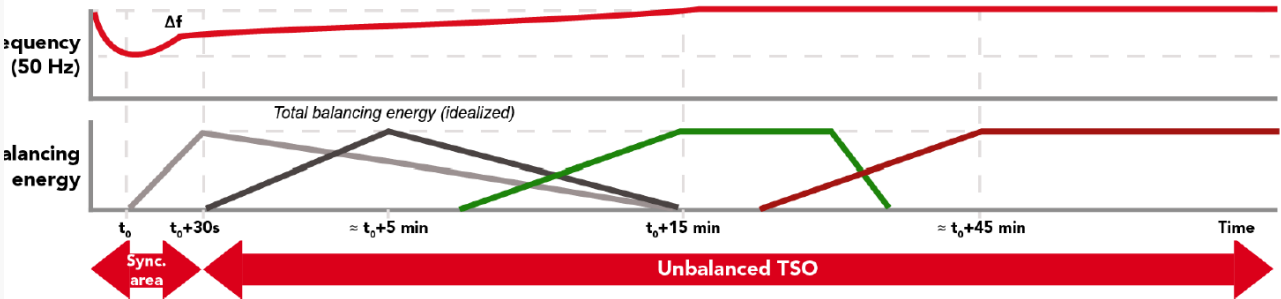
The ThermalPod can trade on the Onbalans FCR and AFRR energy markets as additional revenue. No delivery of electricity back to the grid and heat consumption is always leading.

Market	FCR	aFRR	mFRR	RR
Auction	Daily	Daily	Daily	Italy and Spain only
Block size	4-hour	24-hour (4-hour)*	24-hour	
Price	Capacity	Capacity & activation	Capacity & activation	
Data	4 sec (1 sec)*	4 sec (1 sec)*	5 min	
Direction	Synch. = up & down	Asynch. = up or down	Asynch. = up or down	
Activation	Auto frequency	Auto activation	Semi-Auto activation	
Response	First 2s / full 30s	First 30s / full 5min	10m down 15m up	



Charging capacity can be used for trading purposes on multiple markets (FCR, onbalans, AFRR)

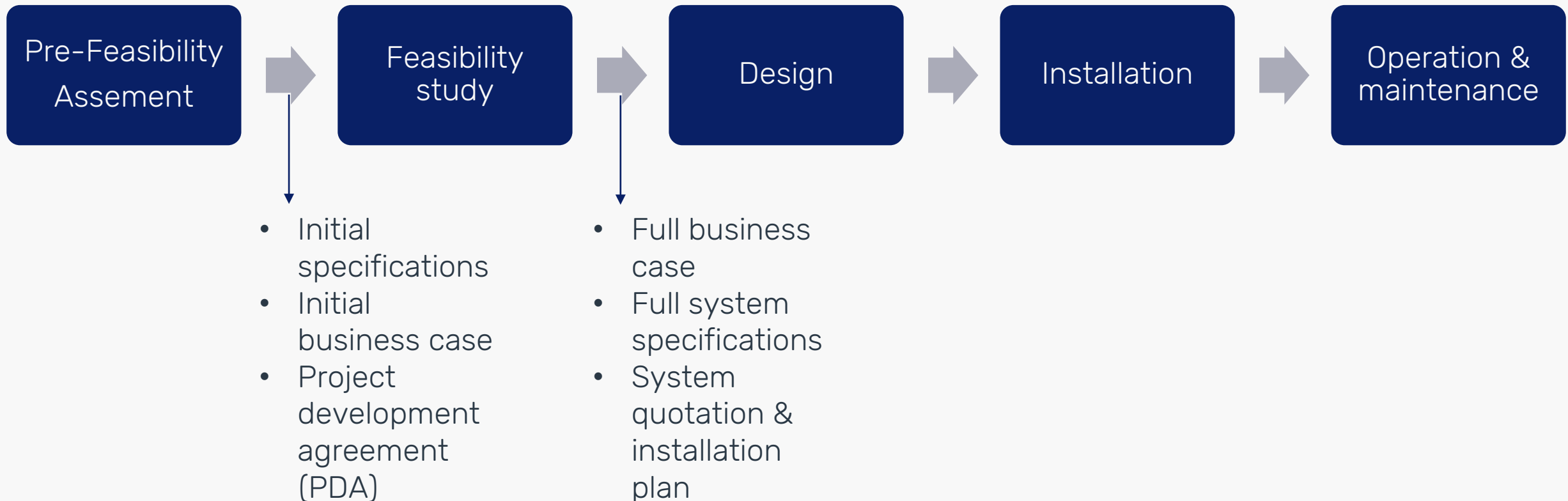
FCR	aFRR (+IN)	mFRR	RR
<ul style="list-style-type: none"> Automatic activation Max 30s 	<ul style="list-style-type: none"> Automatic activation 30s to 15 min 	<ul style="list-style-type: none"> Semi-automatic or manual activation Max 15 min 	<ul style="list-style-type: none"> Semi-automatic or manual activation Min 15 min



Heat use is always leading over trading to ensure heat supply

Development process

We have a standardized process for the realisation of a ThermalPod system at your location. We start with a pre-feasibility where we identify opportunities for electrification of process heat.





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Thomas Stroes
Commercial Director



+31 6 13 245 377



thomas.stroes@brabetech.nl