ESNL

Molten salt heat batteries for the affordable decarbonisation of industrial heat

DRIVING THE FUTURE OF RENEWABLE INDUSTRIAL HEAT

INTRO

Driving the future of renewable industrial heat

Over the last decade we developed our propietary molten salt technology and converted this into the ThermalPod®: a market-ready product to decarbonize heat generation, making use of low cost (renewable) electricity.

Track Record

Saltes is a cleantech company located at the high-tech campus in Eindhoven. Using molten salt for heat storage has been proven since the 1990's. We stood at the cradle of developing an innovative molten salt technology, based on a new salt composition, to drive decarbonization of industrial heat.

Product

Our patented ThermalPod® delivers on-demand steam using low-cost renewable electricity. The thermal battery is connected to existing steam grids, safe to implement and built up modularly according to your specifications.

Mission

We aim to accelerate the transition towards renewable industrial heat. Our aim is to deliver turn-key solutions to our industrial customers that enable them to decarbonize with local renewable energy while reducing their operational costs.

Process Heat Is Fossil

20%
of all energy is used for industrial heat

80%
of industrial heat is generated with fossil sources*

"Industrial heat is one of the largest contributors to global CO2 emissions and very little decarbonisation has taken place so far."*

* Heat electrification to decarbonize industry | McKinsey

* Industrial heatemissions | Vox

*“Industry is actively looking for ways to decarbonize operations while simultaneously reducing production costs. Electrification of heat achieves this but (the intermittent) supply of renewables and heat (steam) demand do not match.”**

* Heat electrification to decarbonize industry | McKinsey, 2025

SOLUTION

ThermalPod® heat battery: low-cost renewable heat

A ThermalPod® heat battery converts renewable electricity to heat in steam, thermal oil or air. It stores renewable electricity to use as heat. Our system can be connected to an existing steam grid and operates together with other assets, ensuring the lowest cost of heat for a production process.

ThermalPod®

TEMPORARY STORAGE OF HEAT

HYBRID ENERGY USE WITH CURRENT ASSETS (GAS BOILER)

EASILY COUPLED TO EXISTING HEAT INFRASTRUCTURE

STORE ELECTRICITY WHEN IT IS AFFORDABLE AND USE STEAM WHEN NEEDED

PRODUCT

The ThermalPod®: An adaptable and flexible system design

We configure a ThermalPod® using our modular and expandable building blocks based on a client's heat profile. Separate charging and discharging loops maximize use of available grid capacity and we can follow the varying heat demand of customers 24/7 while ensuring an optimal heat price.

Adaptable design

MODULAR BUILD FOR YOUR PROCESS

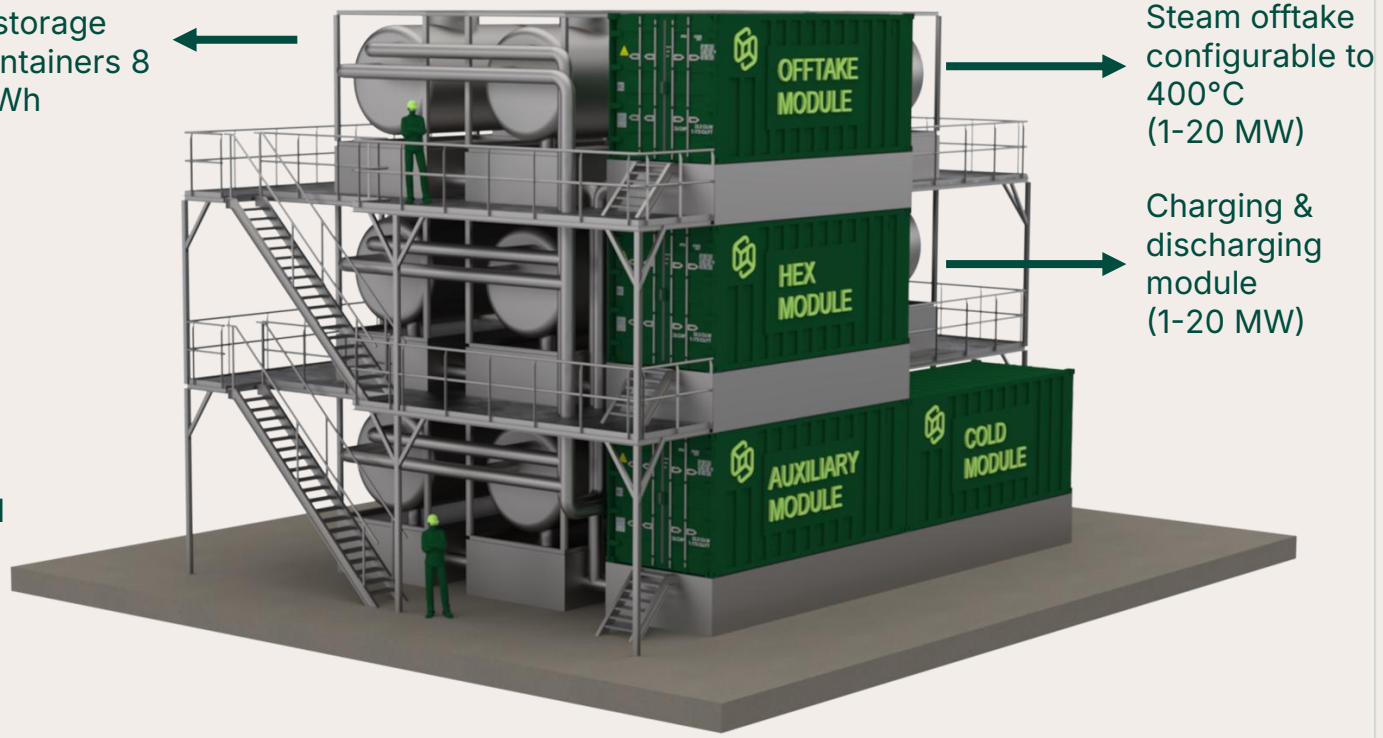
EXPANDABLE WITH YOUR FACILITIES

Flexibility in operation

MAXIMAL USE OF GRID CAPACITY

DELIVER AFFORDABLE STEAM 24/7

Stackable 40 ft storage containers 8 MWh



Steam offtake configurable to 400°C (1-20 MW)

Charging & discharging module (1-20 MW)

TECHNOLOGY

Patented and multi-purpose technology for heat delivery

The combination of our product design in combination with a new salt makes our system flexible to use. In our patented system molten salt is charged using a (electric) heat source, stored in insulated tanks and discharged using a heat exchanger in the required form (e.g steam or air).

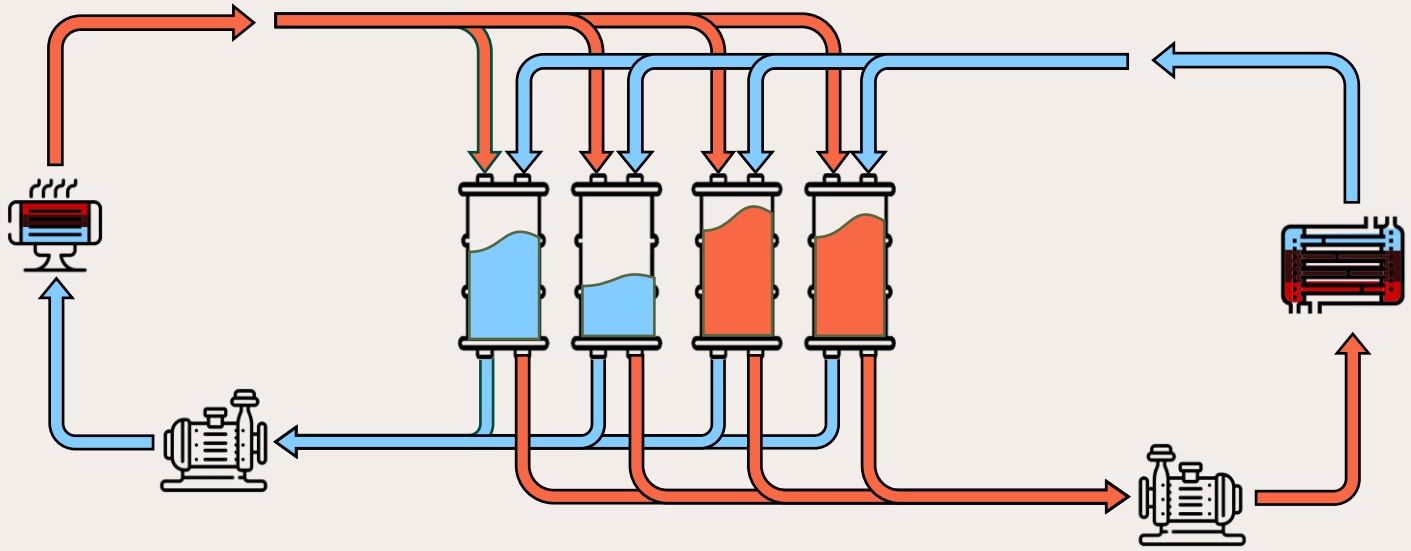
TEMPERATURE RANGE OPTIMALLY SUITED FOR 100 - 400 °C HEAT

LIQUID MEDIA RESULTS IN QUICK HEAT TRANSFER PROPERTIES

NO SAFETY OR REGULATORY CONSTRAINTS FOR STORAGE

BIOLOGICALLY DEGRADABLE & NON PRESSURIZED OPERATION

CONTROLLED BY PROPIETARY BATTERY MANAGEMENT SOFTWARE



CHARGE

ELECTRIC RESISTANCE HEATING
OPTION TO INTEGRATE WASTE HEAT

HEAT STORAGE

INSULATED STORAGE TANKS FILLED WITH MOLTEN SALT

DISCHARGE

HEAT EXCHANGER CONNECTED TO SITE HEAT INFRASTRUCTURE

COMPETITION

Technologies for the flexible electrification of heat

Thermal storage is best in class for decarbonization and deep electrification of heat. Alternative means of electric process heating cannot fully electrify with low-cost renewables because they lack buffer capacity. Other energy storage technologies are more expensive over the lifetime and rely on scarce earth metals.

+	Better
=	Similar
-	Worse

ALTERNATIVE ELECTRIFICATION TECHNOLOGIES

Criteria	Thermal Storage	Heat pump	E-boiler	E-heater
LCOH for deep electrification	Maximally leverage cheap hours to realise up to 90% electrification	-	-	-
Operational flexibility	Able to respond to changes in heat demand and electricity markets	-	-	-
CAPEX investment	High initial investment	=	+	+
Efficiency	93%	+	=	=

Industrial_heat_pumps_time_to_go_electric.pdf
High-Temperature Heat Pumps for Industrial Use - Bever - 2024 - Chemie Ingenieur Technik - Wiley Online Library
Achtergrondinformatie e-boilers.pdf

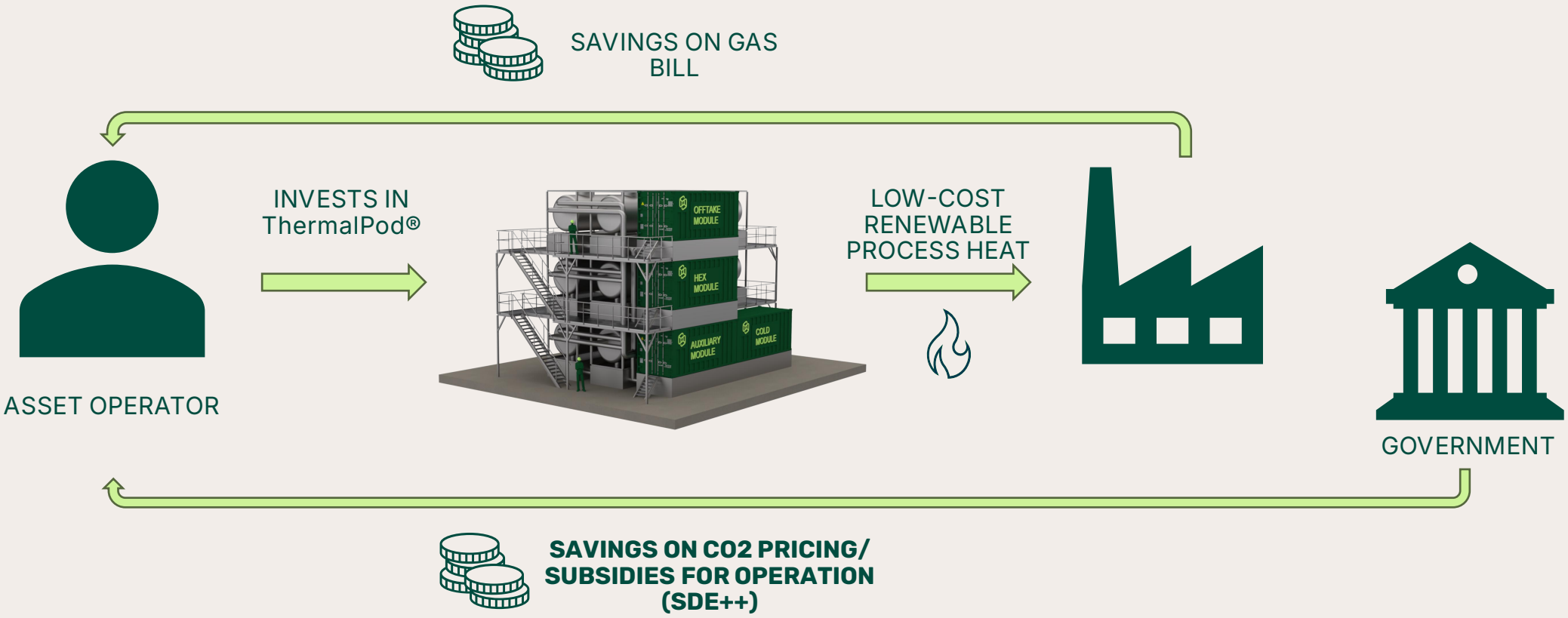
ALTERNATIVE ENERGY STORAGE TECHNOLOGIES APPLIED TO HEAT

Criteria	Thermal Storage	Lithium ion	H2	Redox flow
Cost of storage	Cheap and abundant materials very long lifetime 25 years	-	--	-
System built to deliver heat	Includes equipment to deliver heat not only store energy	-	=	-
Safety	Low risk in usage no restrictions on storage	-	-	-
Efficiency P2H	98%	--	--	-

An Evaluation of Energy Storage Cost and Performance Characteristics
The problem with hydrogen | Global Witness

Showing a positive business case for our target customers

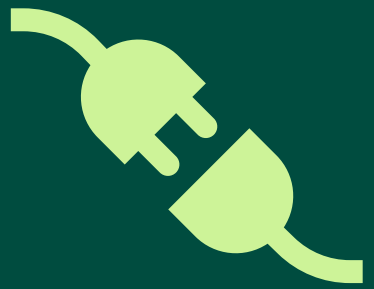
Our analysis shows a system has a payback time between 4-8 years depending on usage profile. We are currently developing ThermalPod projects with positive business cases for multiple sites in the EU.



PAYBACK TIMES OF 4-8 YEARS CAN BE ACHIEVED RIGHT NOW

Reducing the operational costs for the use of heat

The ThermalPod® reduces costs for the heat per kWh delivered compared to fossil heat. This cost reduction takes place through three mechanisms (1) electricity purchasing, (2) emission avoidance and (3) earning income by providing services to the grid.

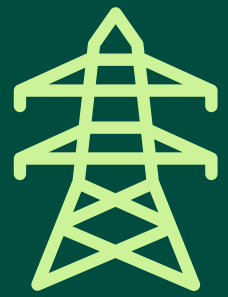


Electricity purchasing

Buy electric heat when cheaper as gas. (EPEX day ahead/ intraday)

Emission avoidance

Avoid the payment of CO2 rights by using renewable energy.

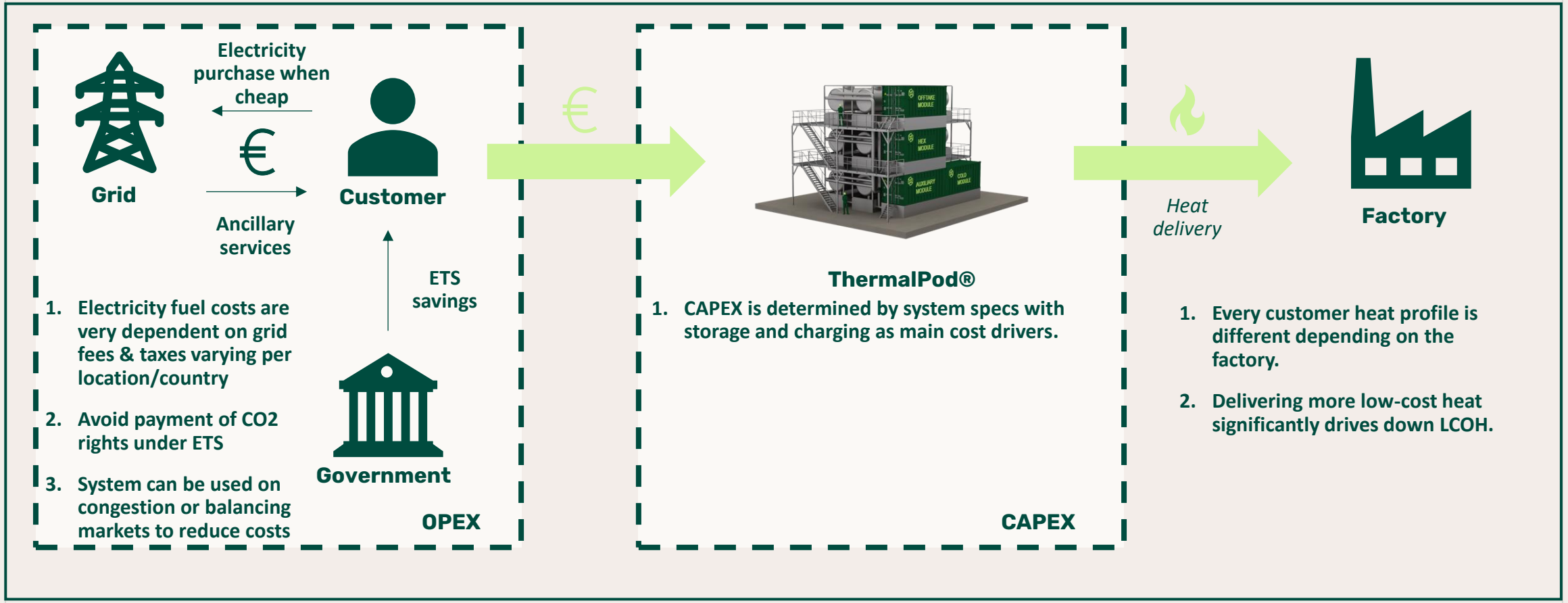


Provision of ancillary services

Offer congestion or balancing services to the grid. (AFRR/GOPACS)

LCOH determines the business case for the ThermalPod®

Levelized Cost Of Heat (LCOH) of the ThermalPod® is low due to the flexible offtake of low-cost electricity, provision of ancillary services, reduction on ETS costs and its ability to deliver large amounts of heat.



LCOH IS DETERMINED BASED ON GEOGRAPHICAL POSITION, ENERGY PRICES, SYSTEM SIZE AND SYSTEM USE.

TECHNOLOGY DEVELOPMENT STATUS

Our product is ready for commercial rollout

We have derisked the core functionality and proven our design in pilots. Our last system operated for 1.5 years in an operational factory in South Africa. We are now working towards the final investment decision for a 26 MWh system, which will initiate our commercial rollout.

2014-2017 Molten Salt development & lab analysis

Salt stability and characteristics tested and verified

2017-2019 Molten salt biomass steam generator 250 kW

Steam production for 3200 hours with molten salt with biomass heat

2020 - 2021 Molten salt production unit for CSP plant

Molten salt production and operation in CSP for steam verified

2021-2022 Molten salt heat exchange tank cycling loop

Molten salt storage, charging and discharging cycling verified

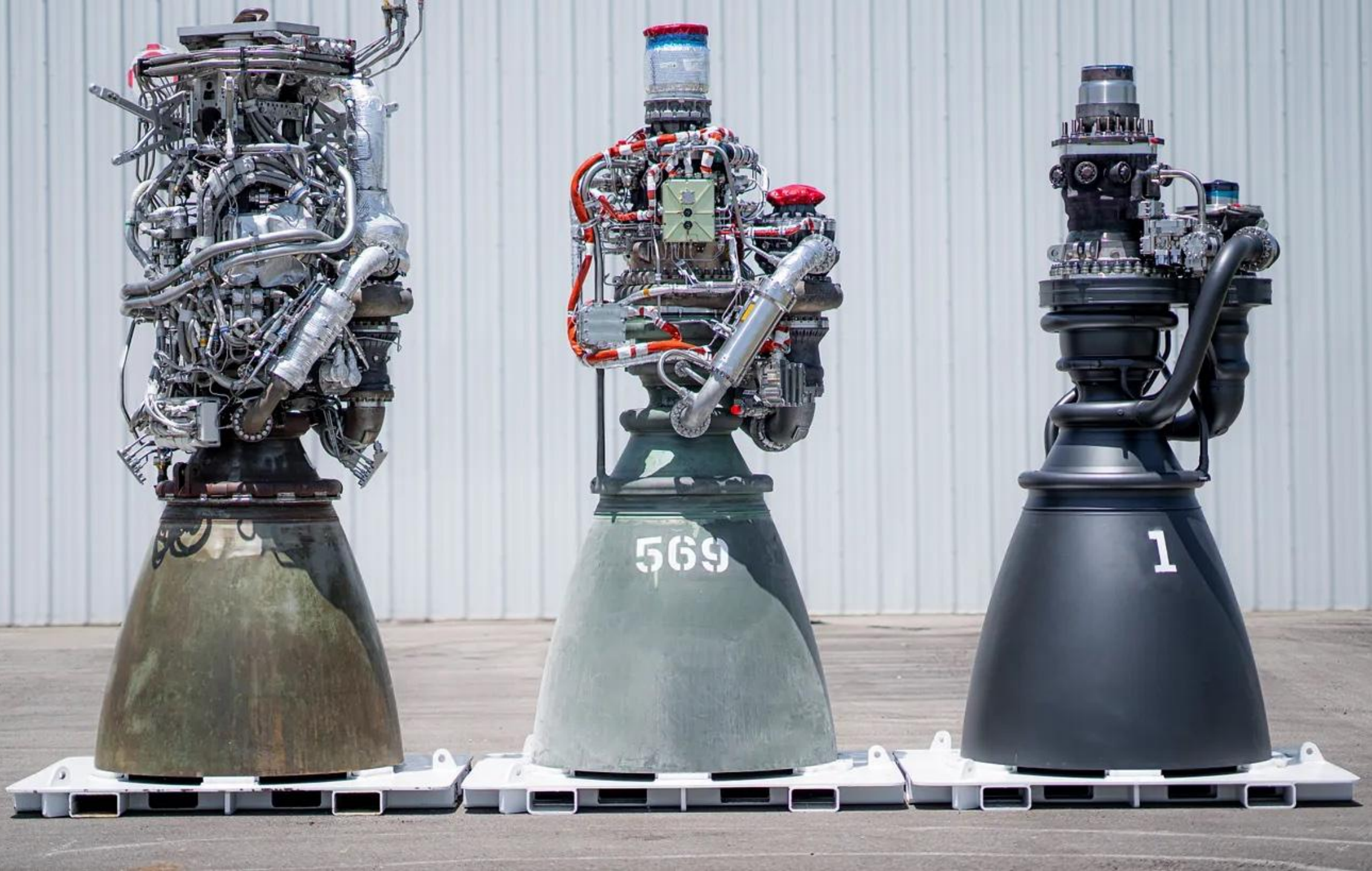
2022-2023 ThermalPod® electric system

Electric heating of operational process proven for 1.5 years

2023-2024 Development ThermalPod® Heat Battery

Product design for scalability finished with experienced partners

RESULTS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5 YEAR PLAN

Preparing for mass market in the coming 5 years

Saltes will become one of market leaders for thermal storage systems. During the next 5 years we will develop our product and organisation for mass production in 2030, when the TES market will be mature.

2025 LAUNCH	2026 DEMO	2027 IMPROVE	2028 PREPARE	2029 EXPAND
❖ Prepare & sell demo ❖ Increase traction	❖ Build & operate demo ❖ Sell & finance FOAKs	❖ Improve to FOAKs ❖ Increase sales & partners	❖ Prepare for mass production ❖ Improve & sell NOAK design	❖ Expand to worldwide market ❖ Expand product range
	ThermalPod® Demo (1.0): Validate specifications in operation	ThermalPod® FOAK (2.0): New functionalities and improved response times		ThermalPod® NOAK (3.0): Mass produceable system design


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