



# ThermoCube

Storage Systems

Smart Solutions for the  
Heat Transition

- Vision – Problem to be solved
- Solution ThermoCube
- Low material-costs strategy
- About ThermoCube

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- Features
- State of Development
- Price-driven Storage Mode

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- Mission
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CHANCE

## Conventional Heat Tanks:

- High hydrostatic forces require strong walls for the tank
  - High material-, assembly- and transport- costs of  $> 14 \text{ € / kWh}$



Die Entwicklung des neuen Energiestandorts Süd | SWM Magazin

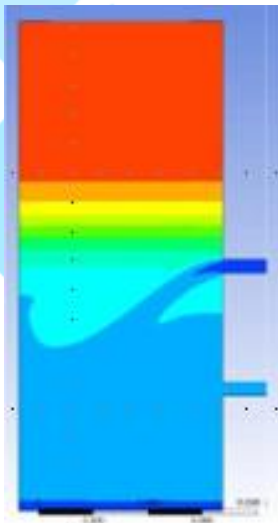
- Temperature losses due to mixture of different levels

→ Efficiency (= energy) losses

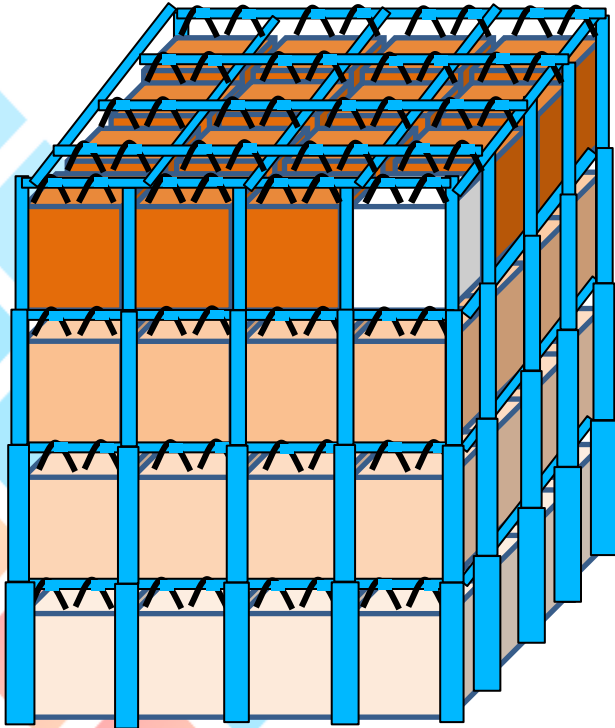
Conventional heat tanks are only profitable in applications with

- a high temperature ( $>90^\circ \text{ C}$ ) and
- a high number of refills each year ( $> 30$ )

**But this is not the case in most of the potential heat transition applications**



Source: (Haller et al. 2014, 10.18086/eurosun.2014.10.13 [1])



## Improvements:

- Dividing the storage into small (almost) pressure-less plastic cells
- The cells (big bags) are hung up on simple metal-carrier
- An empty cell for transfilling

## Selling Points:

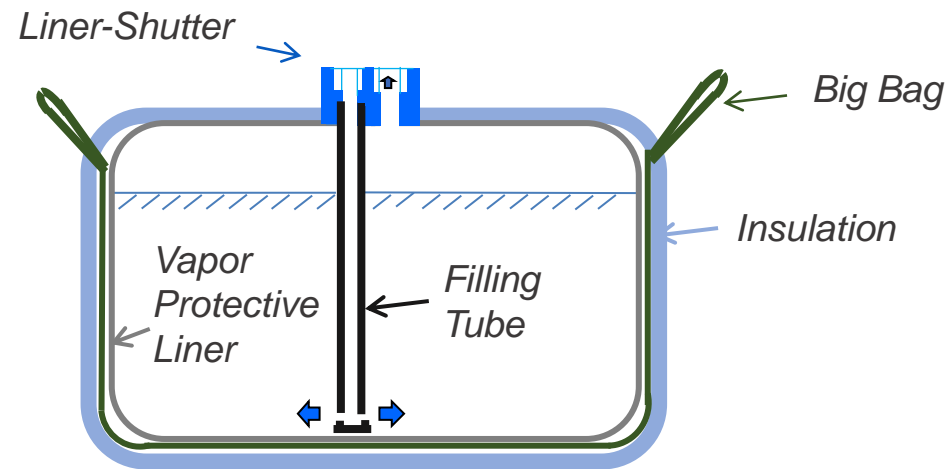
- Planned market entry price is **< 50%** of conventional tanks
- Minimized costs for transport and assembly
- No temperature losses due to water mixture
- Controlled handling of fluctuating temperature levels



**A smart price-driven THERMO-BATTERY is profitable, in which the tank-costs shall be amortized by powering a heat pump only, when the electricity-costs are low**

Low cost = Components-from-the-shelf which can easily be modified (for ThermoCube functions)

## ■ Low-cost plastic components



## ■ Low-cost metal carrier components



Standard (high volume) heavy weight shelf-stand can be used

- ThermoCube is a start-up company that has invented a low-cost storage for thermal energy and is situated in the Munich area in Germany
- The management consists of the two founder, which have long experience in automotive serial product development and sales and in the leading of start-up companies



CEO:

*Gerhard Schilling, Dipl. Ing. (FH)*



Inventor:

*Roland Kuffer, Dipl. Ing. (FH)*

## ■ Team Members

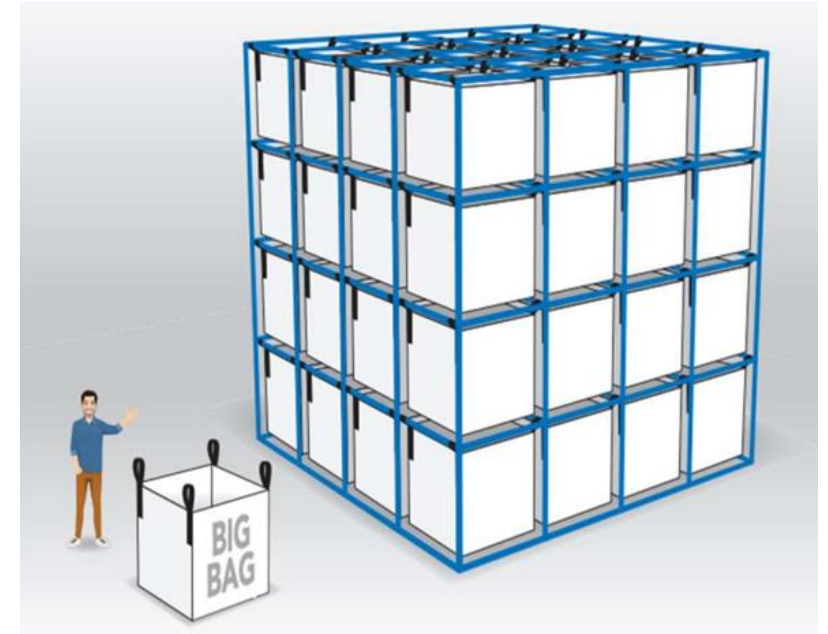


*Thomas Dick*  
*BS renewable energy*  
*Marketing*



*Egon Linscheid*  
*Business Economist*  
*Sales*

- Two temperature-variants are planned:
  - ThermoCube70 ° C
  - ThermoCube90° C
- Scalable volume ranges from 26 to 144 m<sup>3</sup>
  - Heat capacity ranges from 2 to 10 MWh
- Durability is expected to be higher than 1.000 refills
- Less than 0.5° C of temperature loss per day (at 0° C environment)
- The filling and emptying time is less than 8 hours
- Control unit with implemented heat- and price-driven THERMO-BATTERY operation



## The Proof-of-Concept is brought for:

### ■ Each component:

To match to overall quality and economical requirements, each component has been analyzed

→ Mostly fitting **components-from-the-shelf** are identified

→ Few components must be **modified**

→ For the 70 ° C variant: **Each component fulfills the quality and economical requirements**

→ For the 90 ° C variant: **A plastic-material analyses must be performed first to ensure its quality**

### ■ For the THERMO-BATTERY usage

A heat-pump/air condition **profit-simulation** was performed:

*For a supermarket with the real temperatures and the electricity-prices from Germany in 2023*

→ **Result: Profit = ~60 € per year/m<sup>3</sup> → Amortization after 8.5 years, inclusive funding after 5 years**

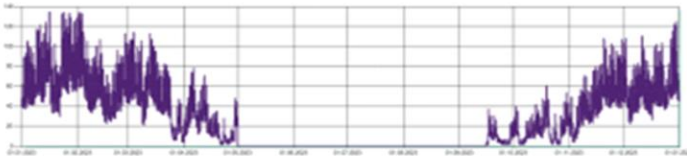
**Trend: As the el. price-fluctuation will increase in the future, the profit will definitely be even higher!**



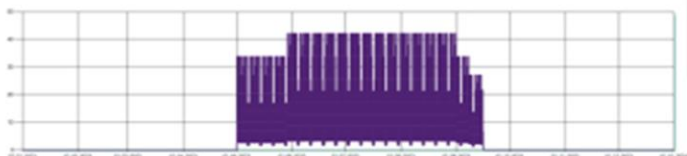
## Input:

Supermarket 2500 m<sup>2</sup>

### Heat demand 2023:



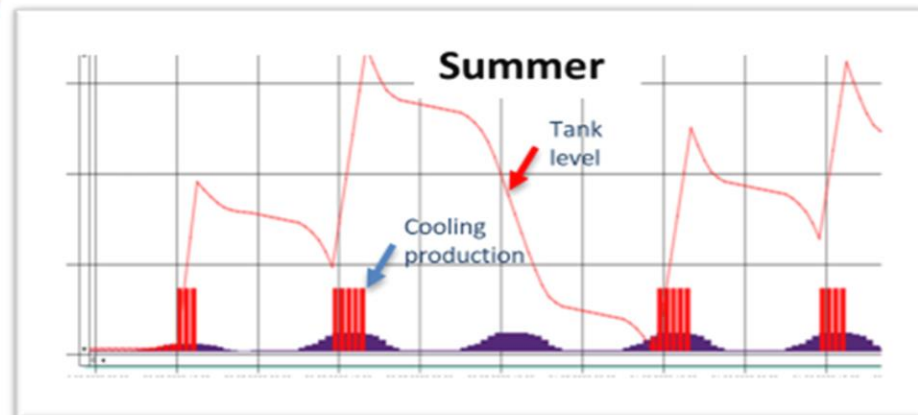
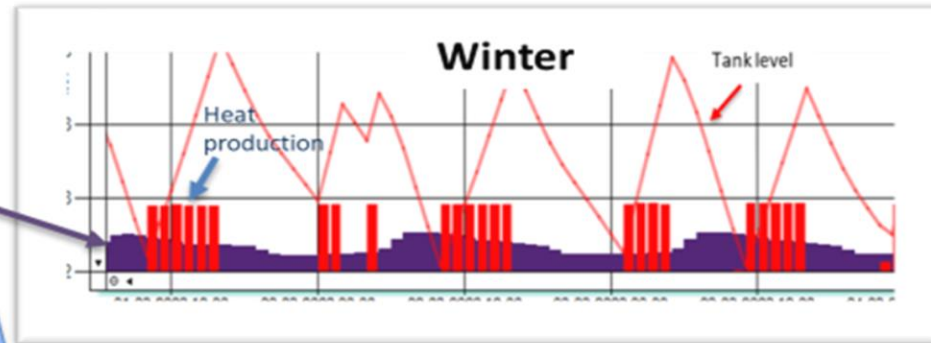
### Cooling demand 2023:



### Electricity price 2023:



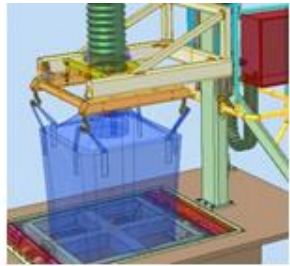
## Simulated price-driven Mode:



## Resulting Profit:

Heat pump 200 kW	Tank 35m <sup>3</sup>	Tank 60m <sup>3</sup>
Heating	1.232 €	1.815 €
Air Condition	817 €	1.117€
<b>Sum Profit</b>	<b>2.049 €</b>	<b>2.932 €</b>
<b>Profit per m<sup>3</sup></b>	<b>59 €</b>	<b>40 €</b>

■ ThermoCube has strong component-development and production-partner:



*Specialist for metal-carriers*



*Price-driven storage mode*



**kunststoffcampus bayern**

*Analyse of plastics components*

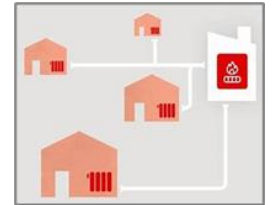
■ Milestones for the planned pilots: ThermoCube 70° C / 90° C

Name	2024		Half 2, 2024					Half 1, 2025					Half 2, 2025					Half 1, 2026										
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
☐ 1. Part: ThermoCube70°C Project	[Gantt bar spanning from start of 2024 to end of 2025]																											
☐ AP1: System Design	[Gantt bar from start of 2024 to end of 2024]																											
☐ AP2: Component Production for Integration Test Bench1	[Gantt bar from start of 2024 to end of 2024]																											
☐ AP3: Assembly of ITB1	[Gantt bar from start of 2024 to end of 2024]																											
☐ AP4: Reduced Lifecycle-Test at ITB1	[Gantt bar from start of 2024 to end of 2024]																											
☐ AP5: Production and Test of Pilot-Tank	[Gantt bar from start of 2024 to end of 2024]																											
☐ 2. Part: ThermoCube90°C Project	[Gantt bar spanning from start of 2024 to end of 2026]																											
☐ AP6: System Design	[Gantt bar from start of 2024 to end of 2024]																											
☐ AP7: Component Production for ITB2	[Gantt bar from start of 2024 to end of 2024]																											
☐ AP8: AP3: Assembly of ITB2	[Gantt bar from start of 2024 to end of 2024]																											
☐ Reduced Lifecycle-Test at ITB1	[Gantt bar from start of 2024 to end of 2024]																											
☐ AP5: Production and Test of Pilot-Tank	[Gantt bar from start of 2024 to end of 2024]																											

## ThermoCube intends to boost the oncoming heat transition:

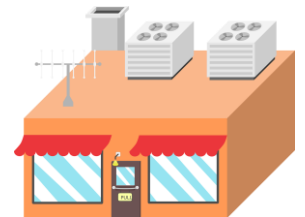
- By providing a low-cost heat tank, that makes **more heat-storage applications profitable**, which only have low-temperature or a few refills. The target therefore is the conventional heat market:

-> *Heat Grids, Industrial-, Process- or Solar-Heat Applications, CHPPs,...*



- By offering a profitable THERMO-BATTERY, which can reduce the electricity-costs of any **combination** of a **heat pump/air condition** (> 100 kW) in **buildings**:

-> *Supermarkets, Offices, Hotels, Hospitals, Farmings, Breweries,..* → **Giant new market**



**Note:** By powering a heat pump only, when the electricity-costs are low

→ The el. grid is stabilized in the same as an el. battery does, but with < 5% costs

# What we are searching for

### Smart People who support our mission



- Joining our team
- Networking
- Pilot-Projects

CHALL-  
ANGE

**Contact:** [info@thermocube.de](mailto:info@thermocube.de)  
[www.thermocube.de](http://www.thermocube.de)  
[ThermoCube | LinkedIn](#)

### Investors for our 2.5 Mio € investment round



- Venture Capitalists
- Business Angels
- Strategic Investors

OPPOR-  
TUNITY

### Innovative Partner



- Creative Solutions
- Component-Integration
- Sales

BUSI-  
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