Unlocking solar heat

28 february 2024

Theo Venema

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- Groningen
  - 240k inhabitants, 120k houses
  - Biggest European gasfield (1959)

- Local heat distribution company since 2014
  - Provide renewable and affordable (collective) heat
  - Municipality and Watercompany
  - 80 employees serving 8.000 households (2023)

- Ambition
  - 2030: 20.000 houses
  - 2035: 30.000 houses
  - 2050: 50.000 houses

Our customers

- Housing associations, homeowners, companies, schools, government etc.
- Construction period 65% before 1980
  - design heating temperature 90°C
- Our proposition
  - Collective renewable heat at 65°C
  - Comparable costs as natural gas heating

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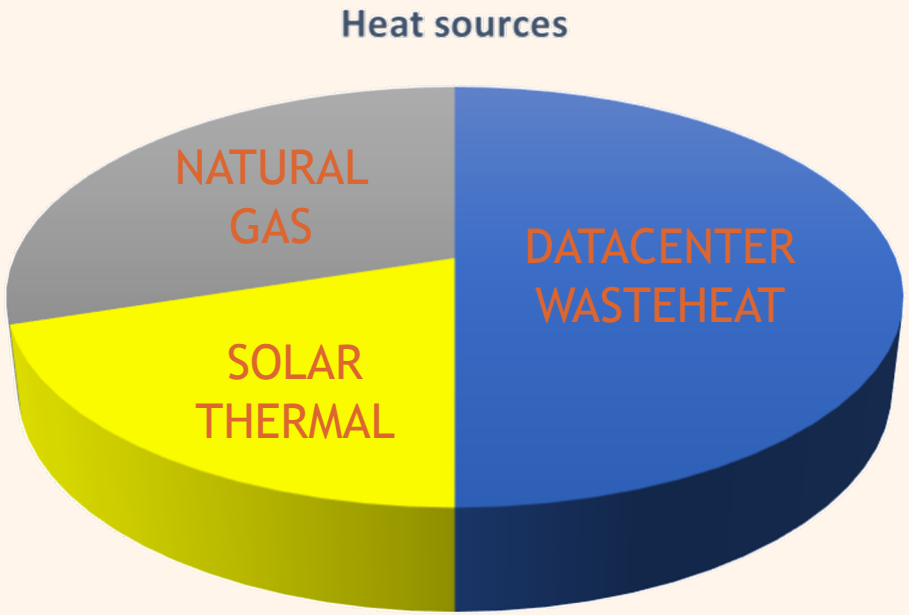
Our heat sources

- Delivery temperature >65°C
  - Waste heat datacenters (50%)
  - Solar Thermal (20%)
  - Natural gas (30%)
    - 2035: 0%
- Technology
  - Heatpumps
  - Combined heat and power
  - Gasfired boilers
  - Seasonal storage



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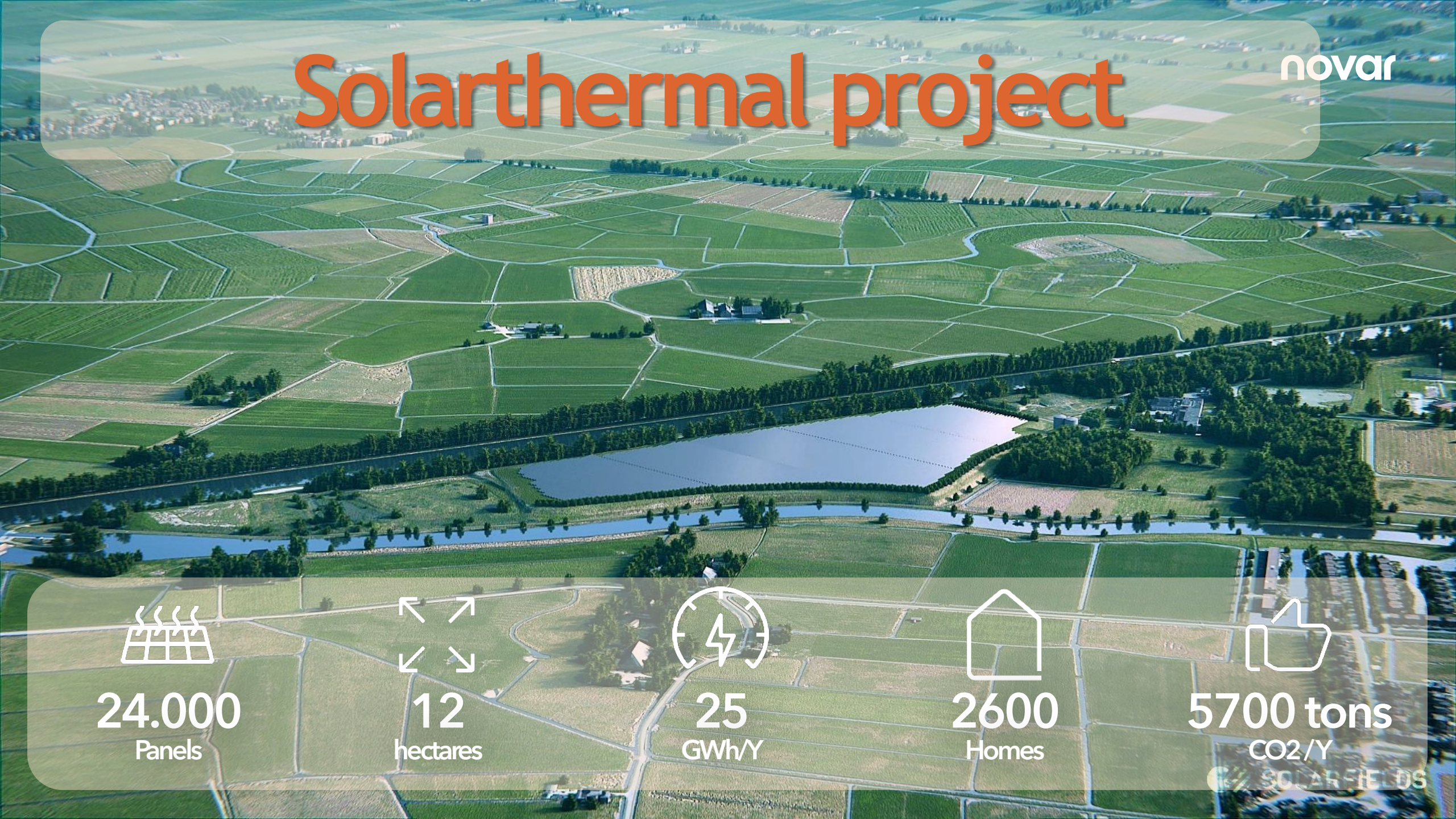
Data center: 200 meter
Wij houden je warm!

Solarthermal project

novar



24.000
Panels

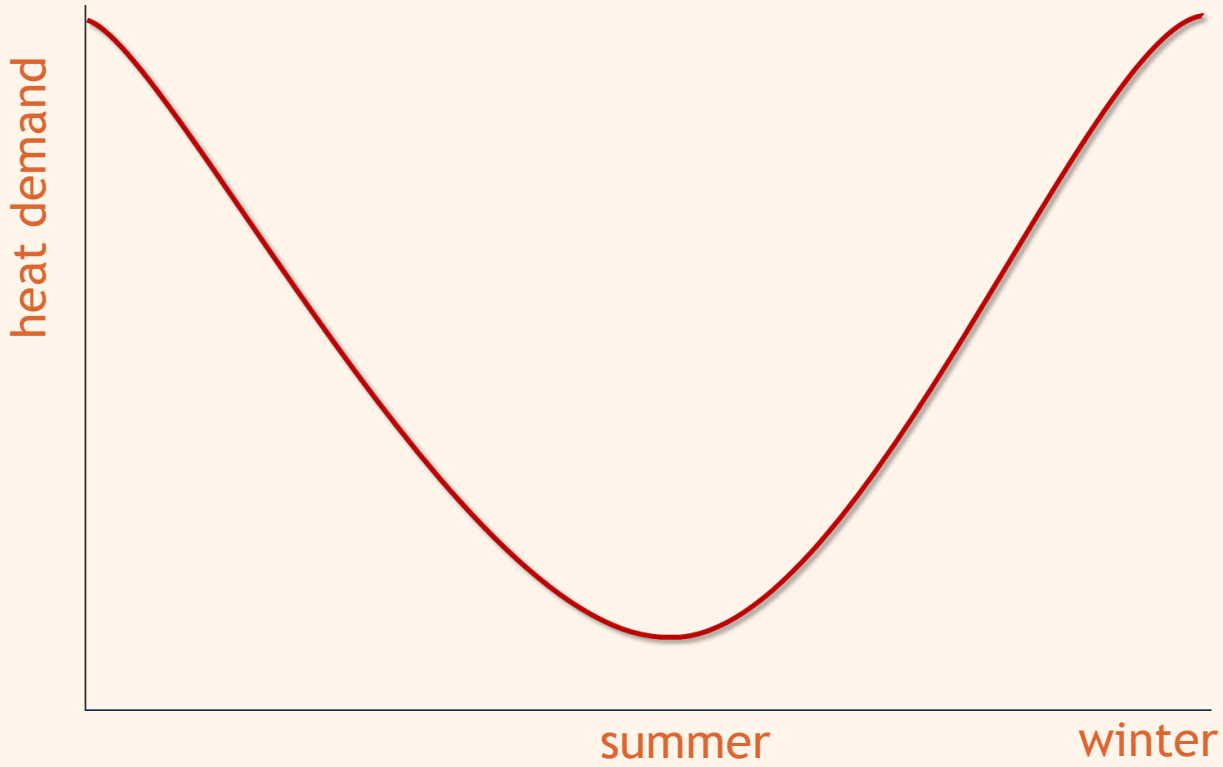
12
hectares

25
GWh/Y

2600
Homes

5700 tons
CO2/Y

The challenge: matching supply vs demand



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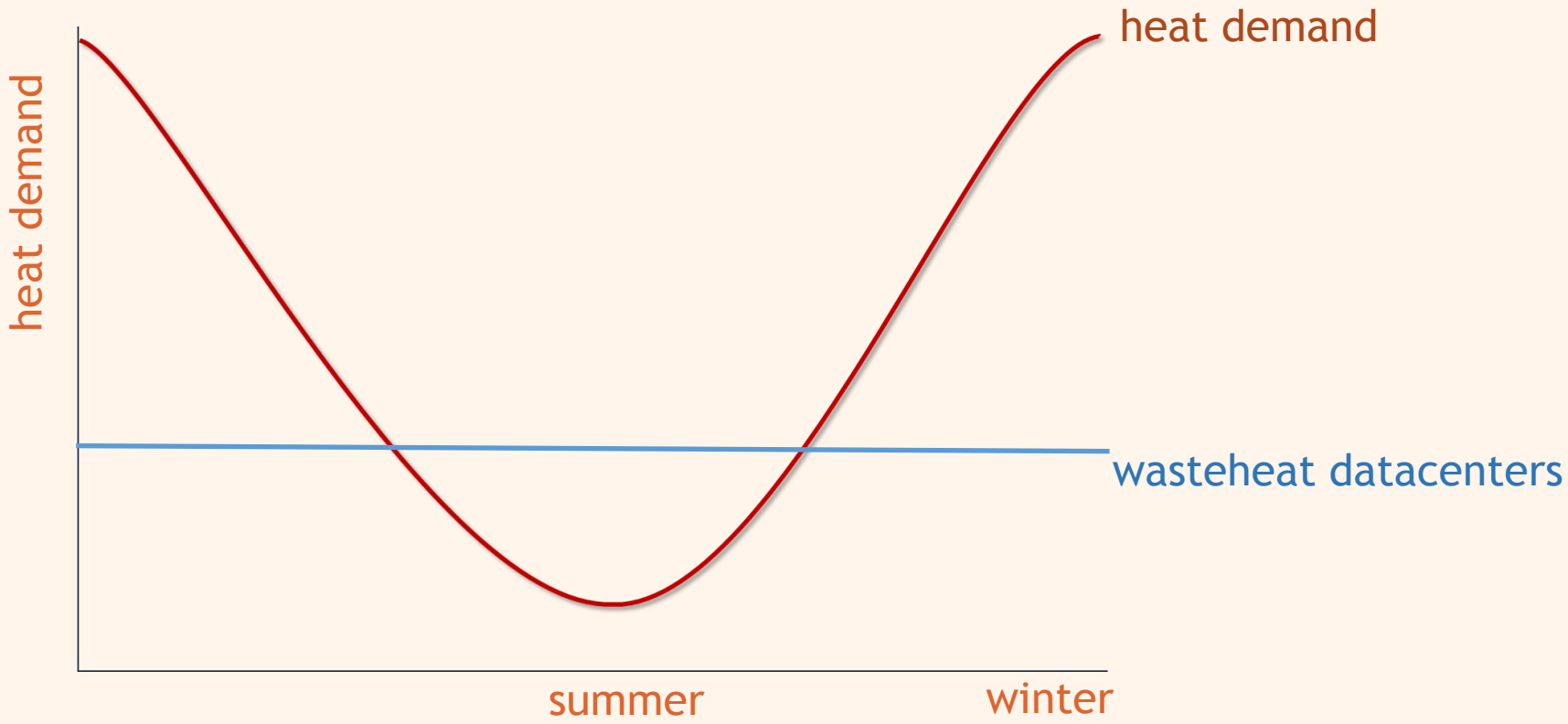
Demand vs production of wasteheat



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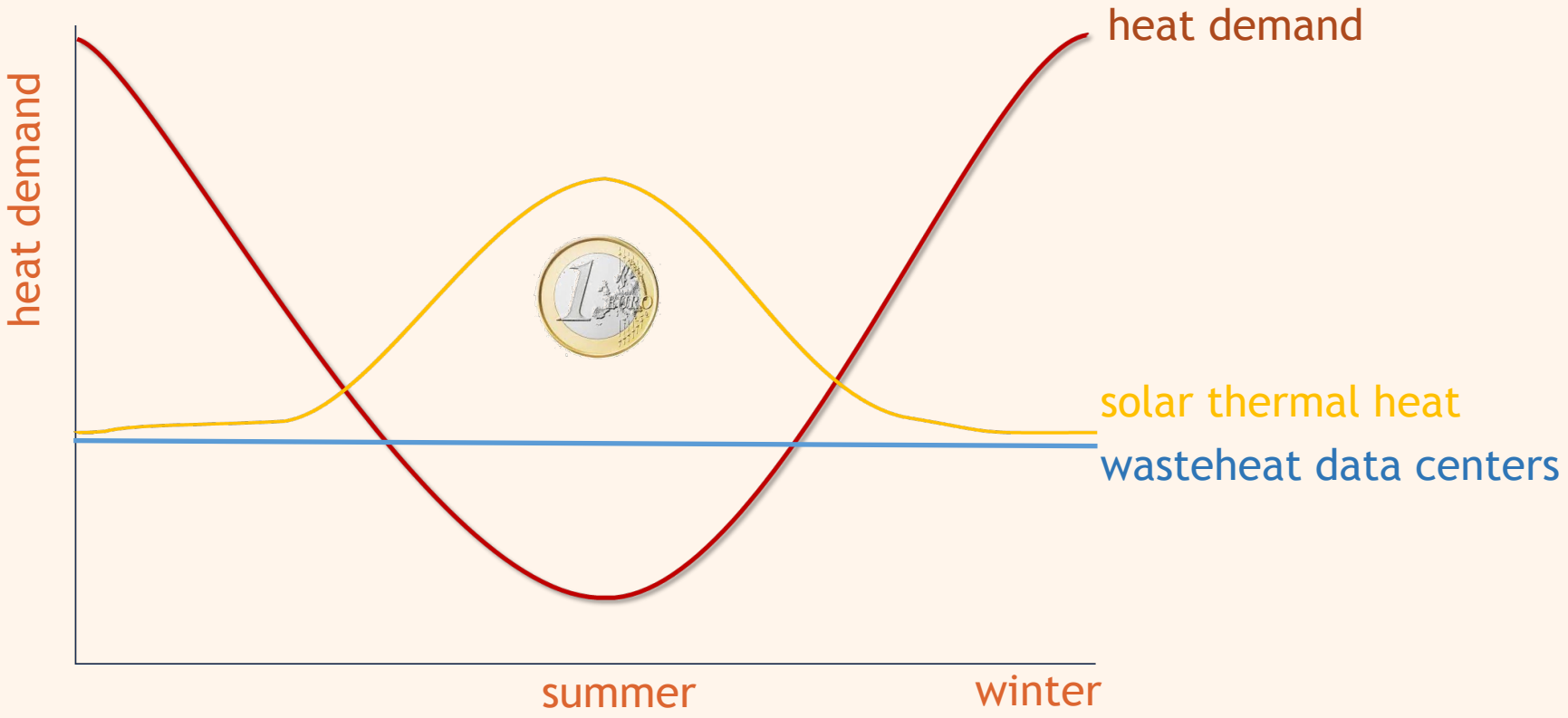
Demand vs production of wasteheat + solarheat



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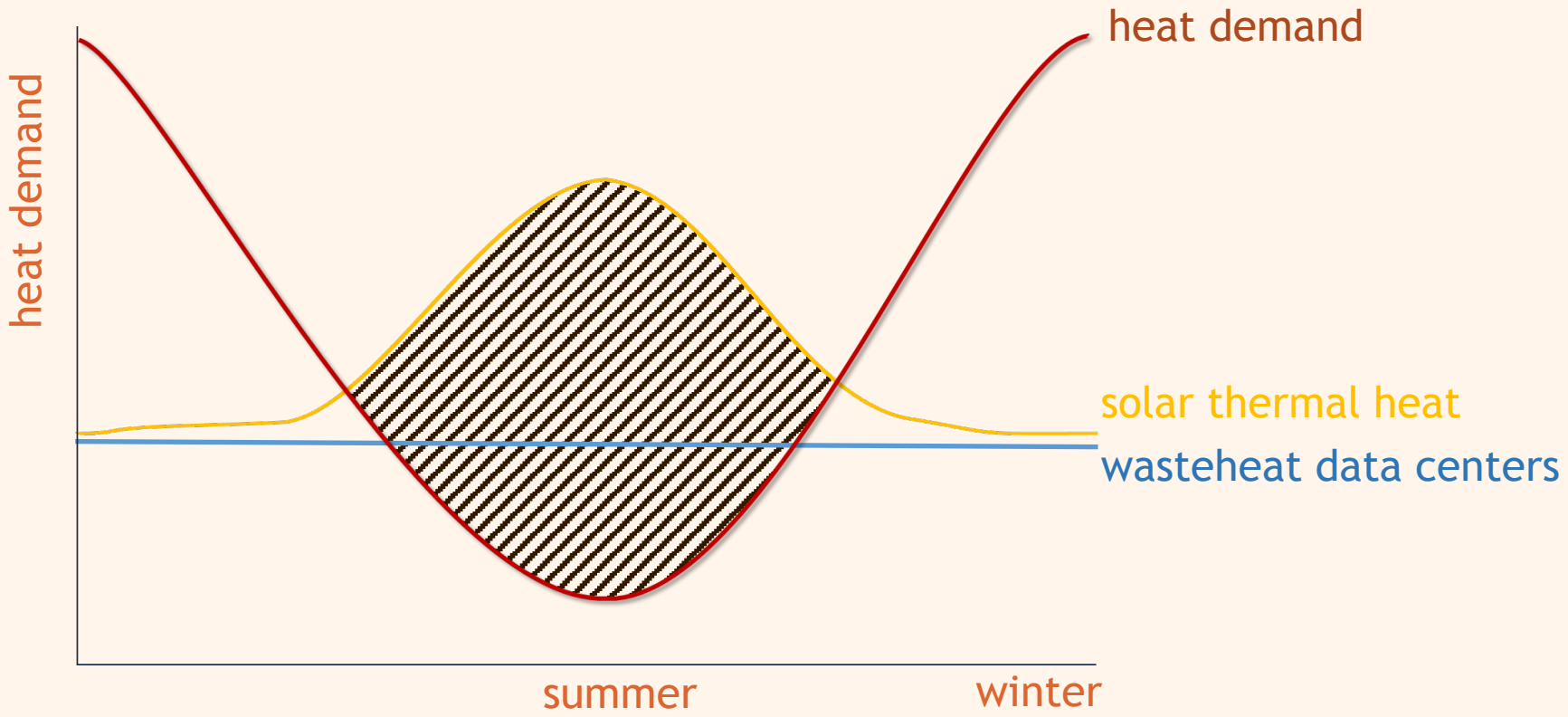
Summer surplus



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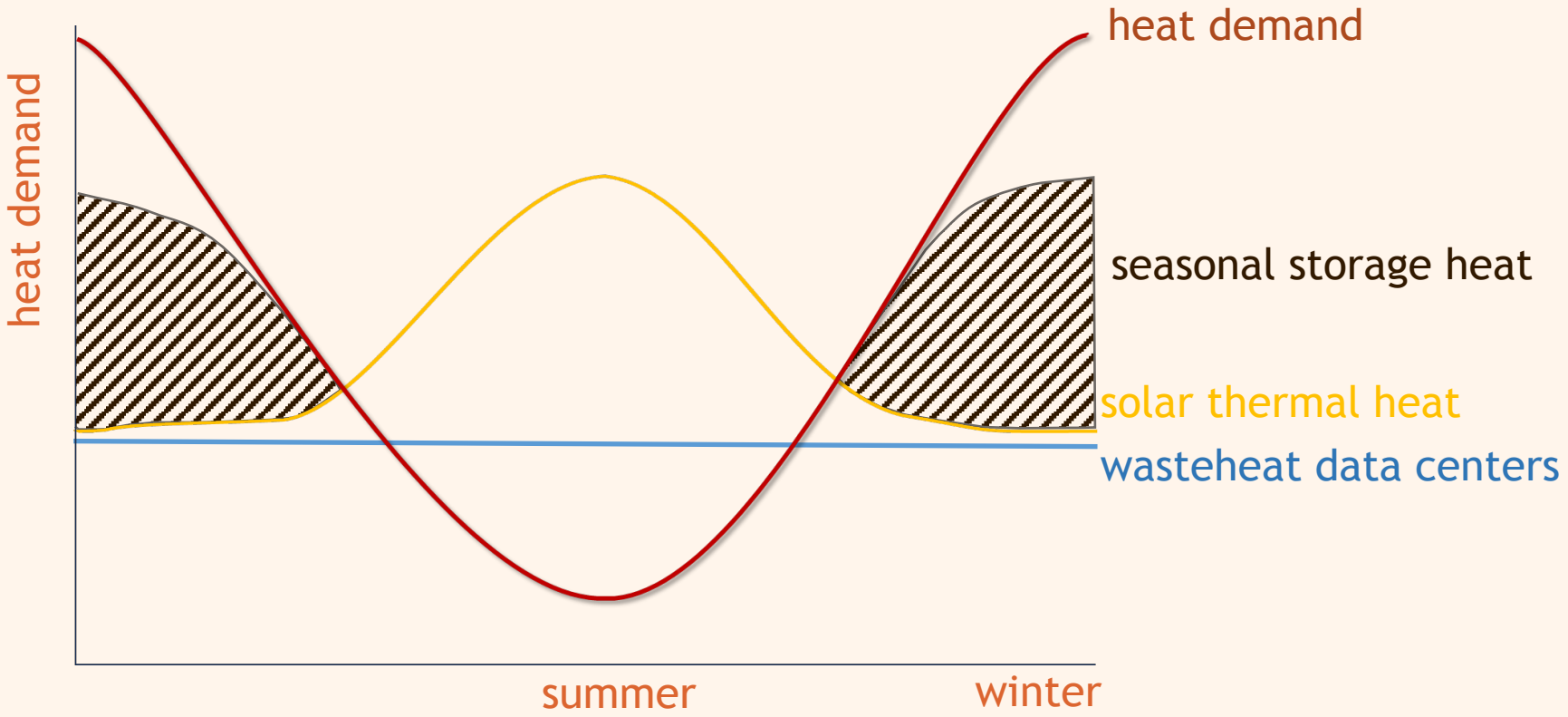
Summer surplus -> seasonal storage



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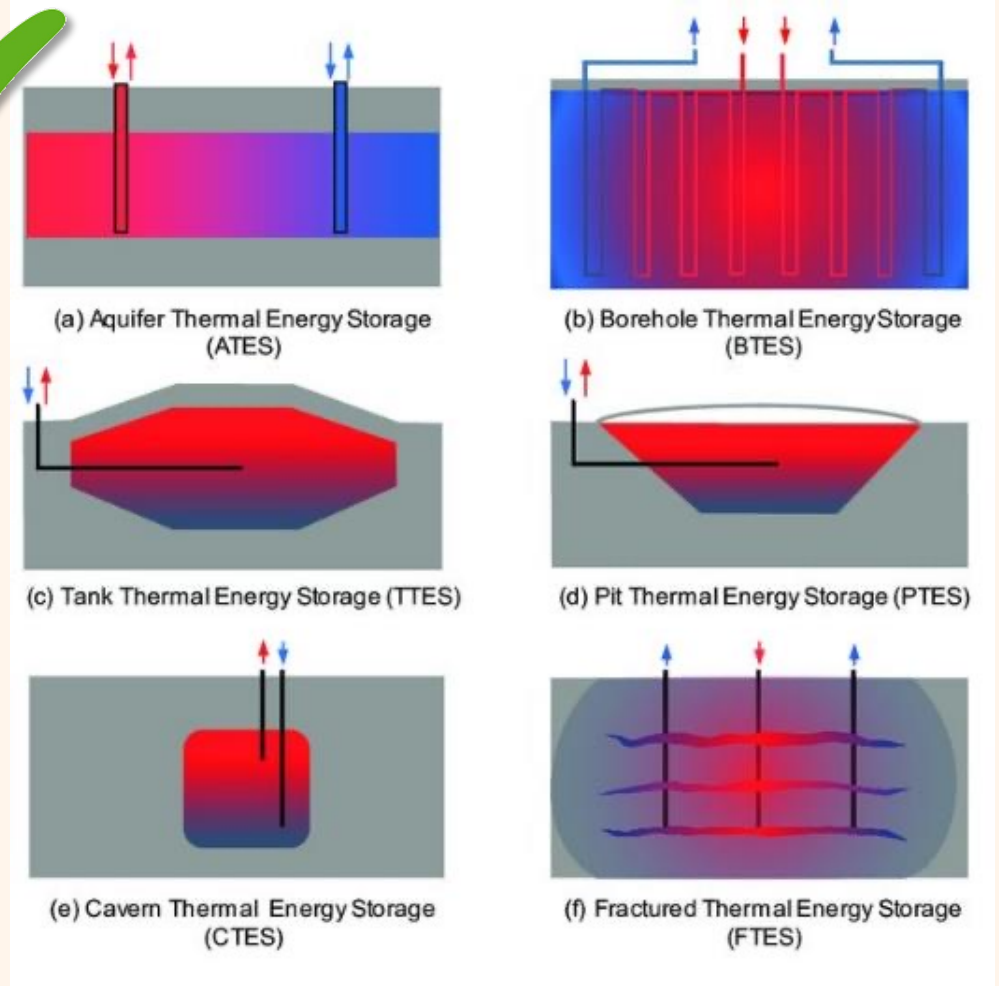
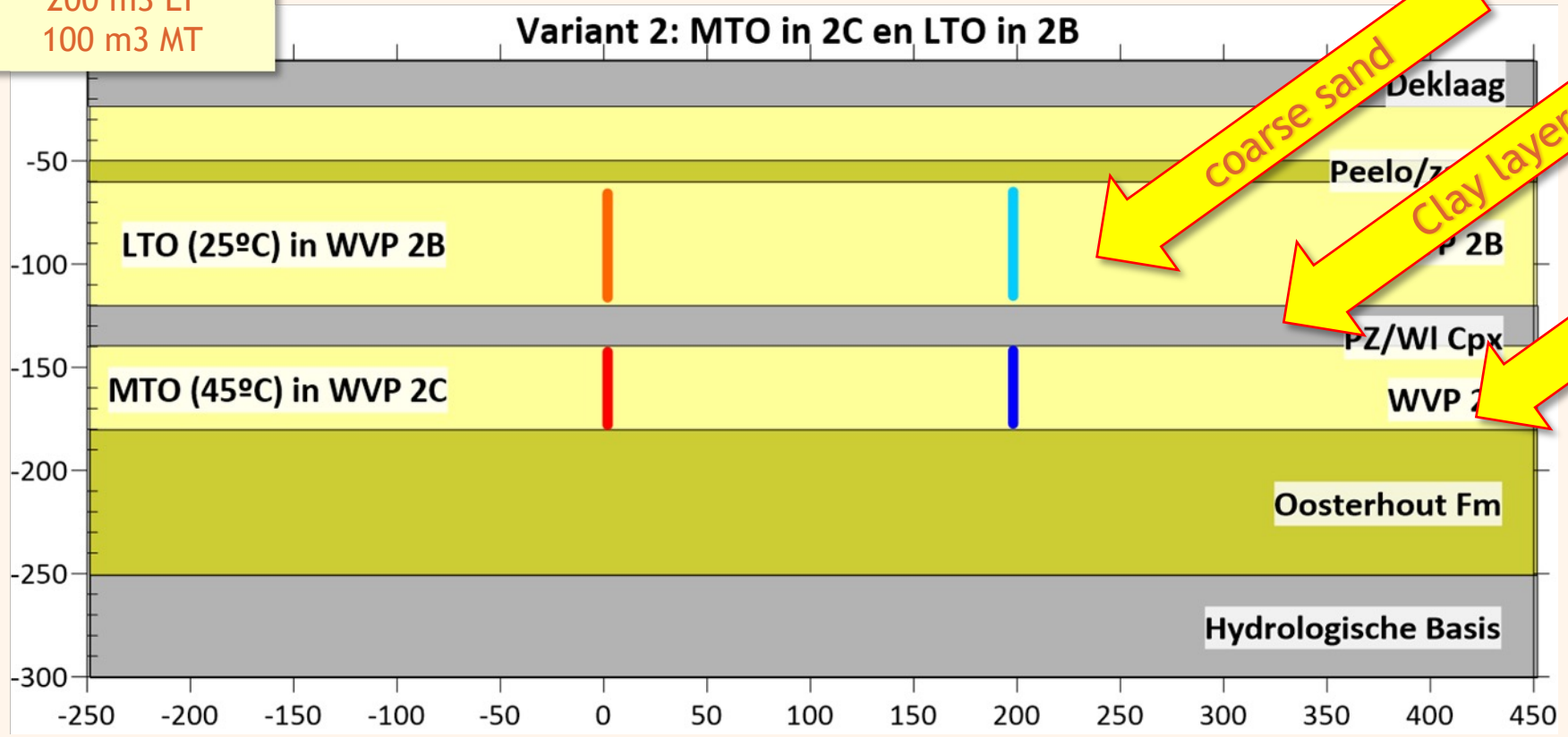
ATES

- Limited temperatures (wasteheat)
- Proven technoloy
- Standard materials
- Limited investments
- No surface area needed
- Allows for both MT as LT storage
- Huge capacity



Cross section of the ATES

Double system
200 m3 LT
100 m3 MT



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The construction of the seasonal heat storage started in the summer of 2023.

Charge dillema

- Waste heat = free, low temperature, easy to store
- Solar heat = buy AND use
  - Direct use in heatgrid
  - Day tankstorage
  - Seasonal storage -> heatpump -> extra electricity costs!

- Seasonal supply solar heat can vary
  - **Fill seasonal storage 100% with free waste heat -> no capacity for solar left**
  - **Leave storage space for solar -> less stored waste heat for use in winter time**
- Other questions (unloading profile, sizing, additional heatsources)

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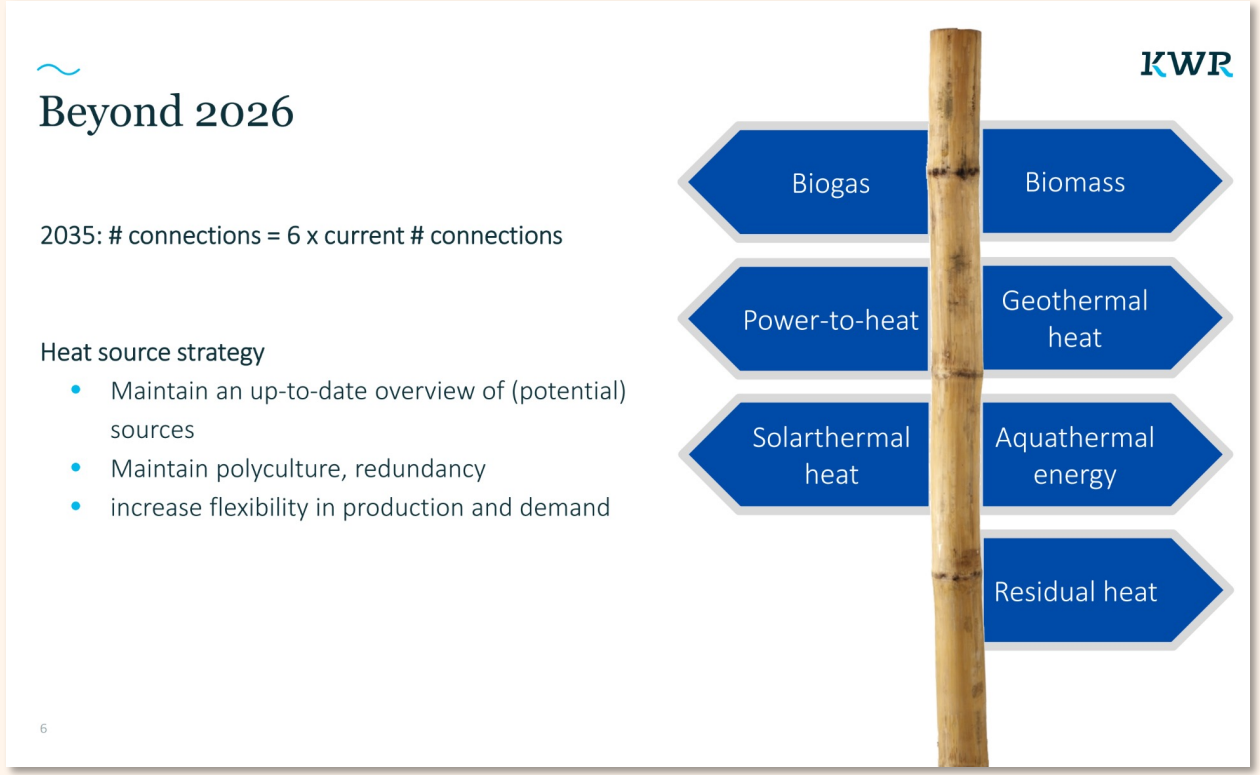
So many questions....

- Effect studies
  - New / other heat sources
  - More / less storage capacity
  - Growing heat demand
- Optimal loading strategy
  - PEF, CO_2, NO_X, €



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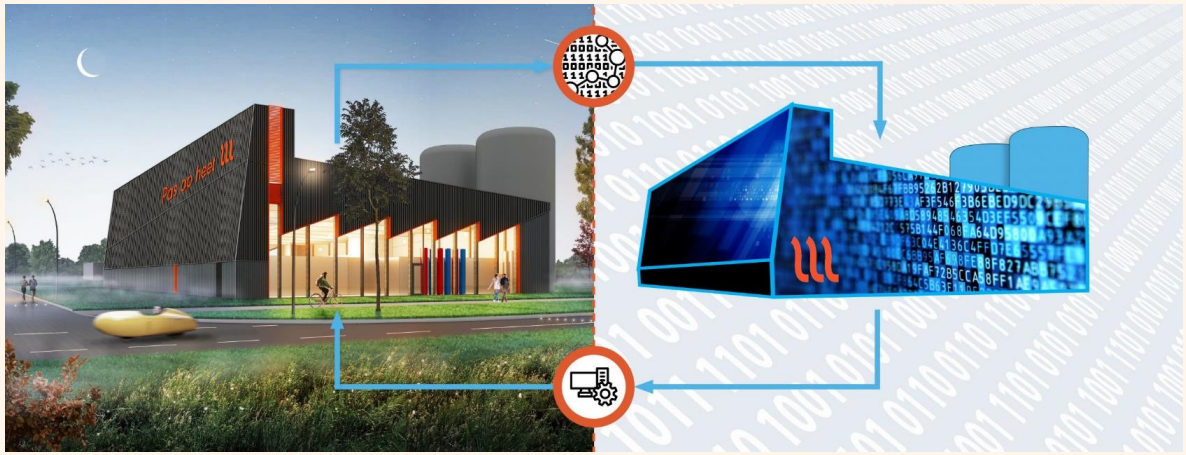
Research using a digital twin

Project and research supported with DEI+ subsidy from ‘Rijksdienst voor Ondernemend Nederland’



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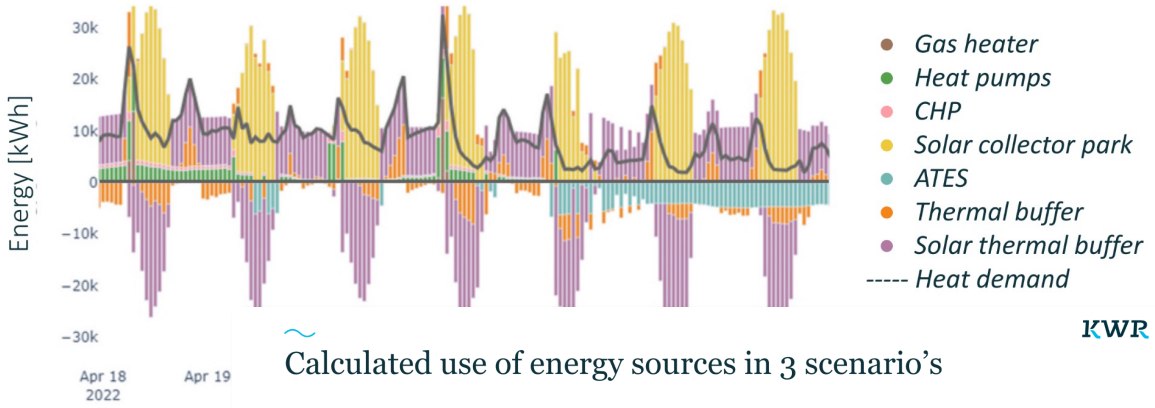
Simulations demonstrate full variety of heat supply options (scenario ATES)



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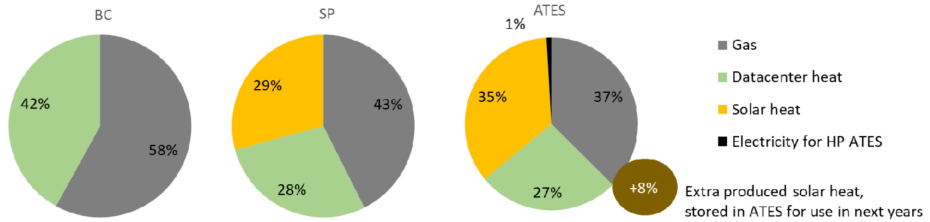
KWR

Calculated use of energy sources in 3 scenario’s



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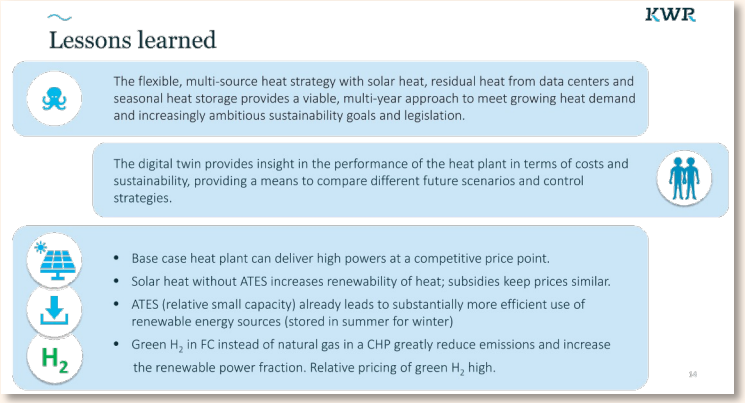
Results

- Seasonal heat storage
  - Enables combining competitive renewable heatsources
    - unlocks the use of solarheat !
    - Storing waste heat in summer for use in wintertime
  - Mitigates ‘take or pay’ risk solarheat
  - Substantially improvement of share of renewable heat in the heatgrid
  - Enabling a diversity of heatsources, making the total heatsystem more robust and less vulnerable for changes in demand or production



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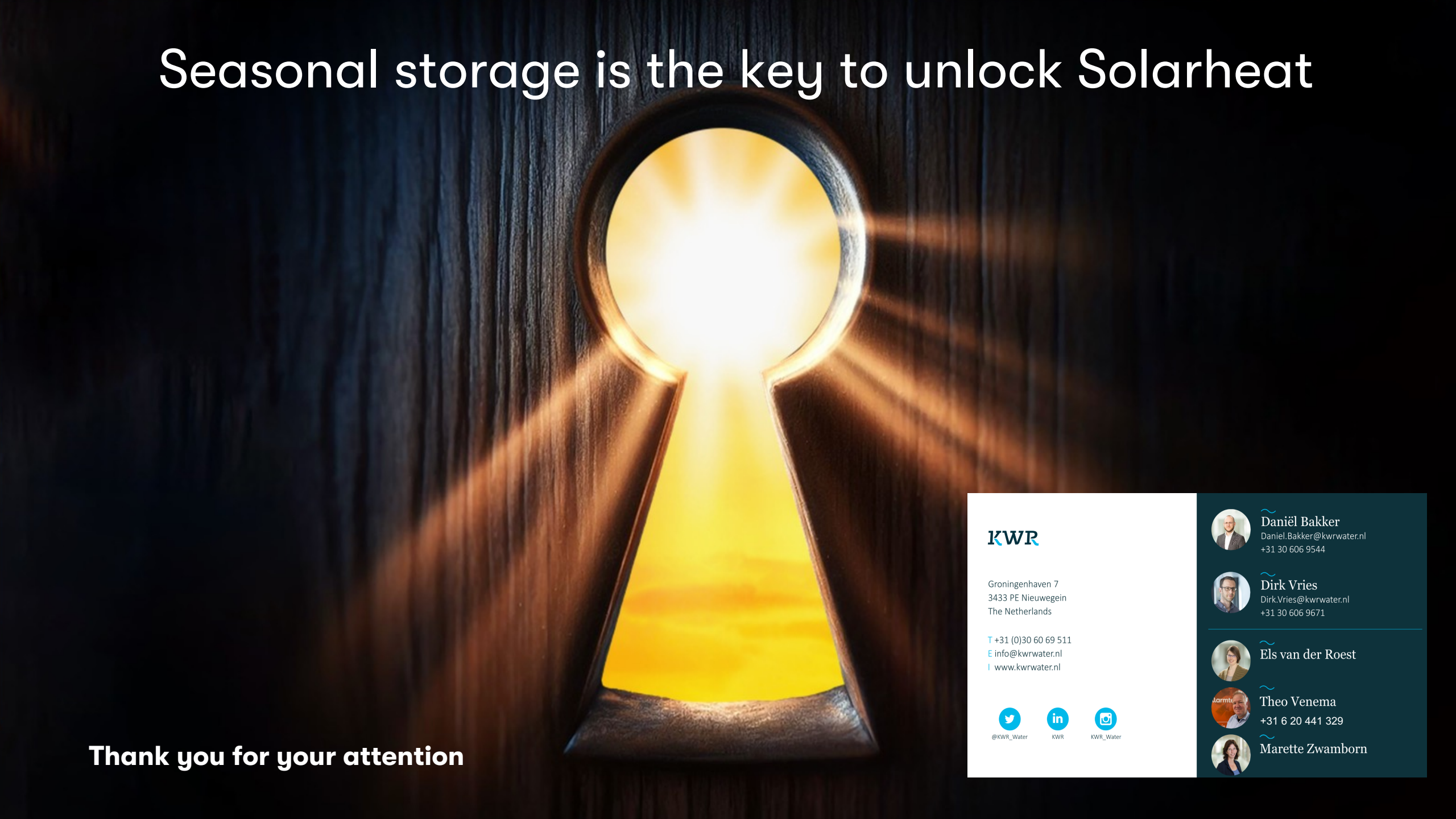
Seasonal storage is the key to unlock Solarheat



Thank you for your attention

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