Solar heat and seasonal storage

8 may 2024

Theo Venema

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- Local heat distribution company since 2014
  - City of Groningen : 240k inhabitants, 120k houses
  - Provide renewable and affordable (collective) heat
    - Heatgrid
    - Collective hot cold storage system
  - Municipality and Watercompany
  - 80 employees serving 8.000 households

- Timeline
  - 2018 : start construction heat grid
  - 2024: 6.000 houses
  - 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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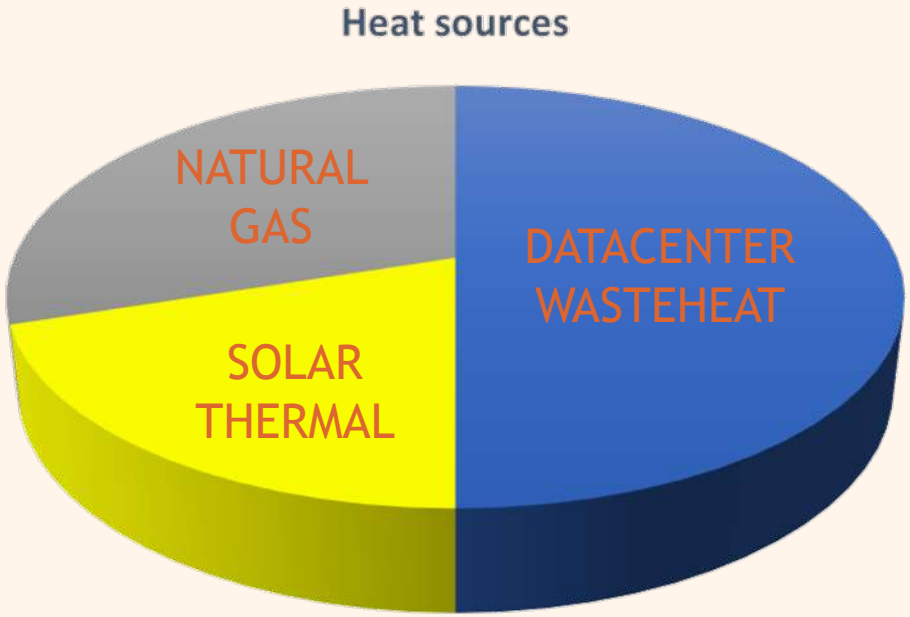
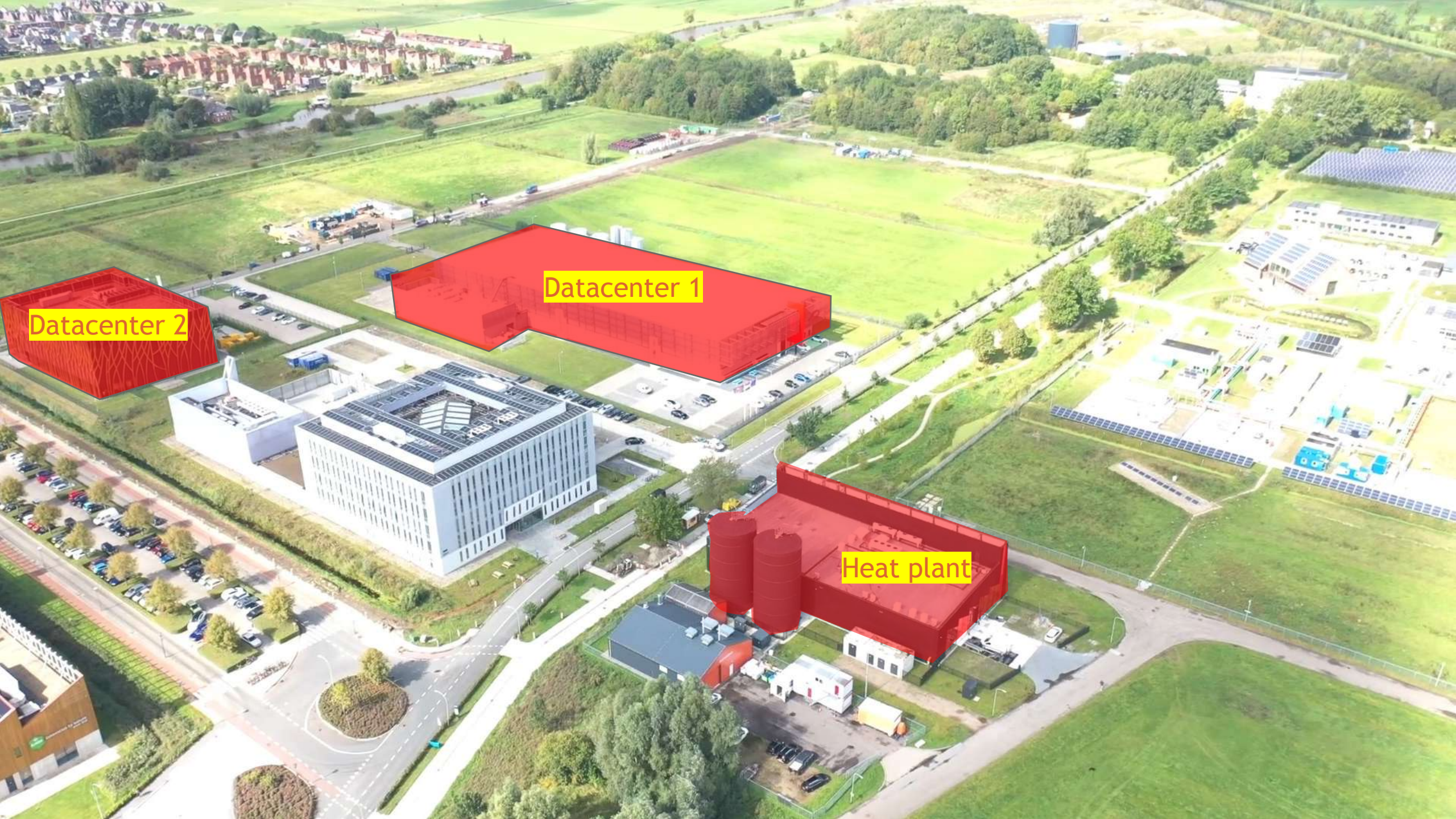
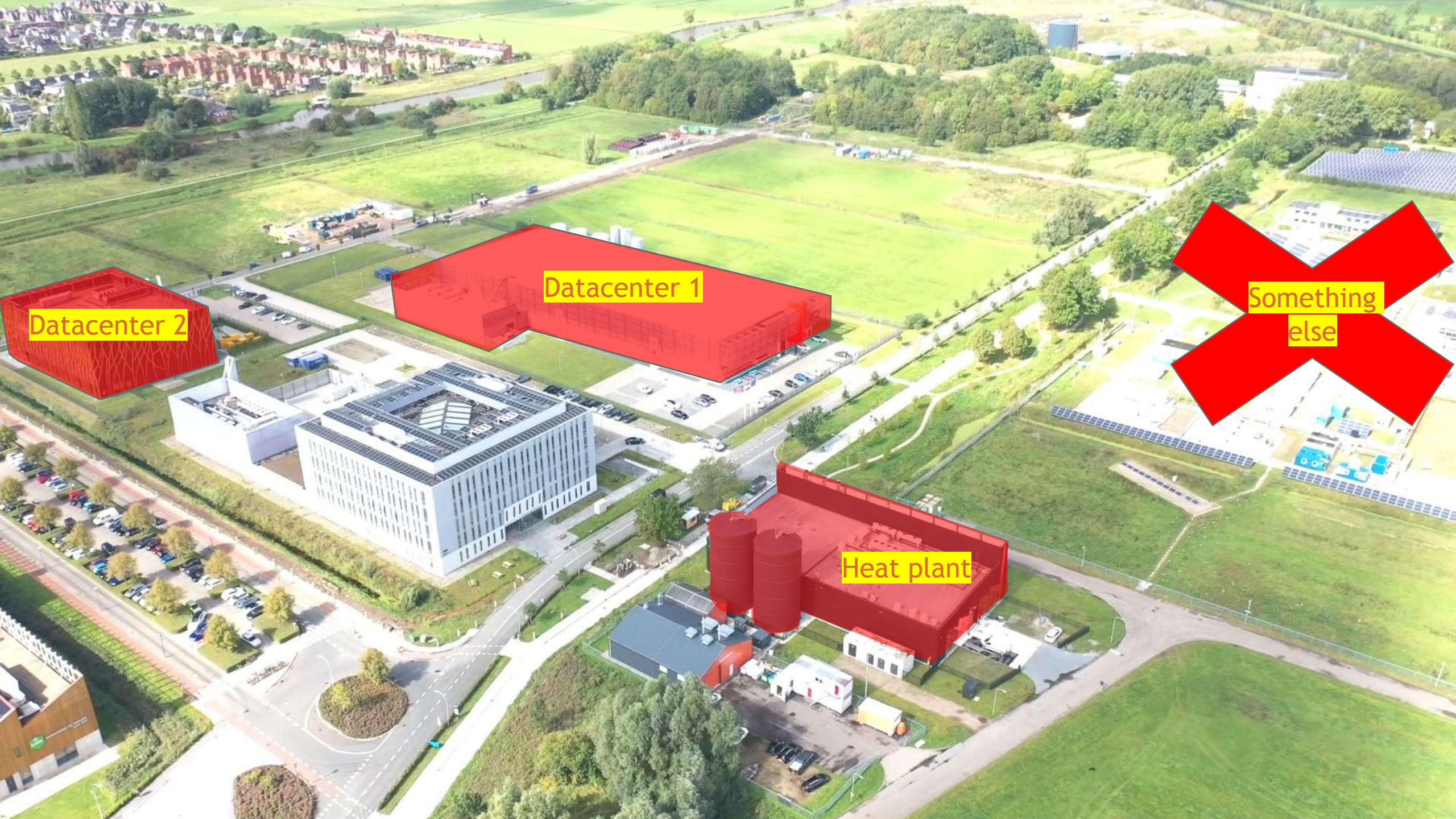
Our heat sources

- Sources
  - Waste heat datacenters (50%)
  - Solar Thermal (20%)
  - Natural gas (30%)
    - 2035: 0%
- Technology
  - Heatpumps
  - Combined heat and power
  - Gasfired boilers
  - Seasonal storage




Datacenter 2
Datacenter 1
Heat plant

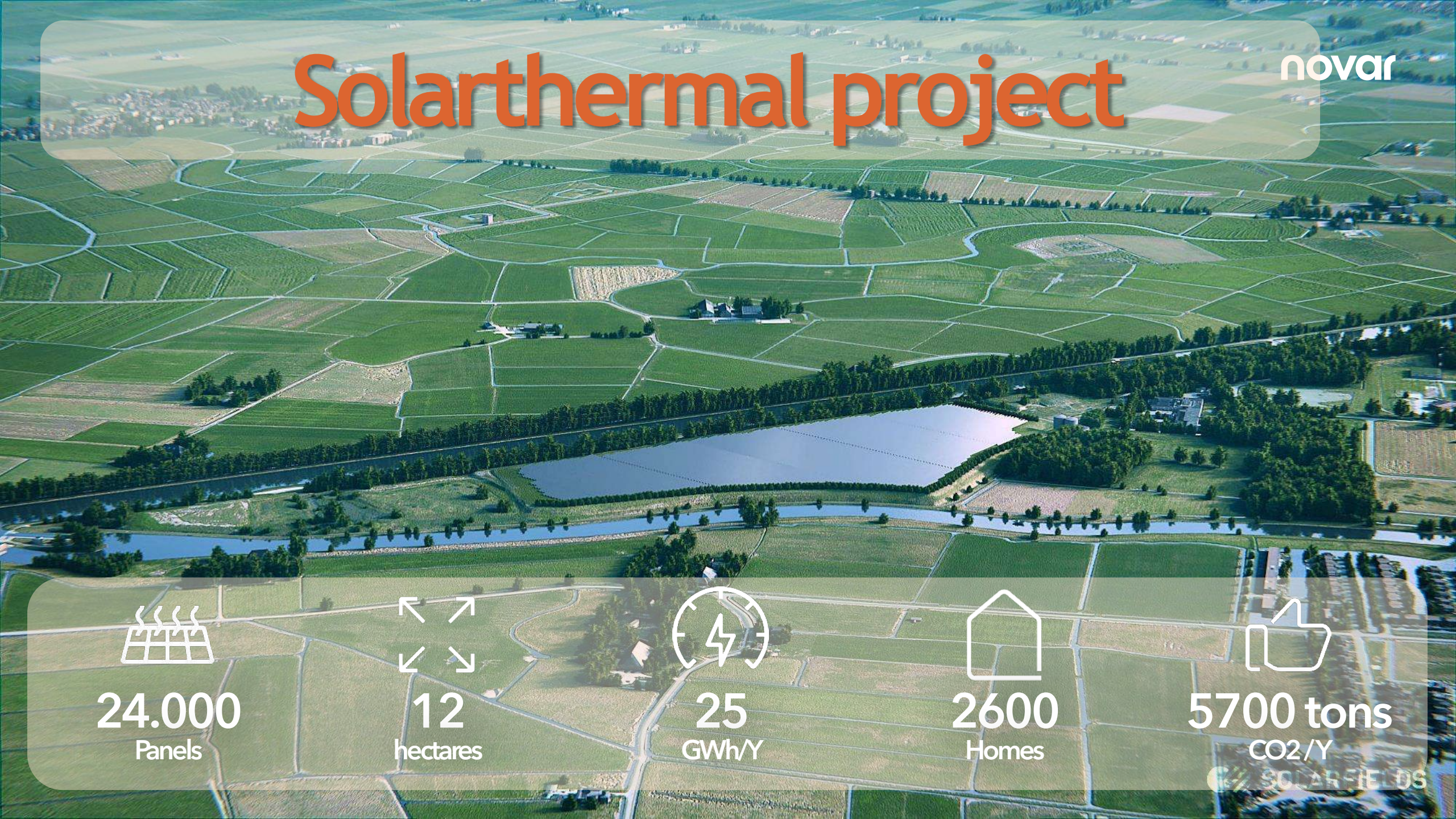

Datacenter 2
Datacenter 1
Something else
Heat plant

novar WarmteStad

Solarthermal project Dorkwerd

Solarthermal project

novar



24.000
Panels

12
hectares

25
GWh/Y

2600
Homes

5700 tons
CO2/Y

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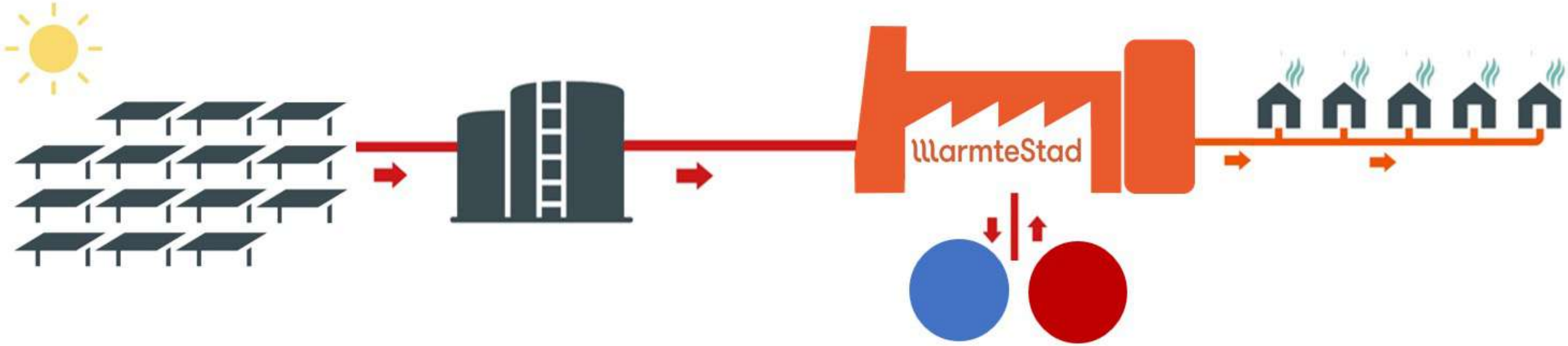
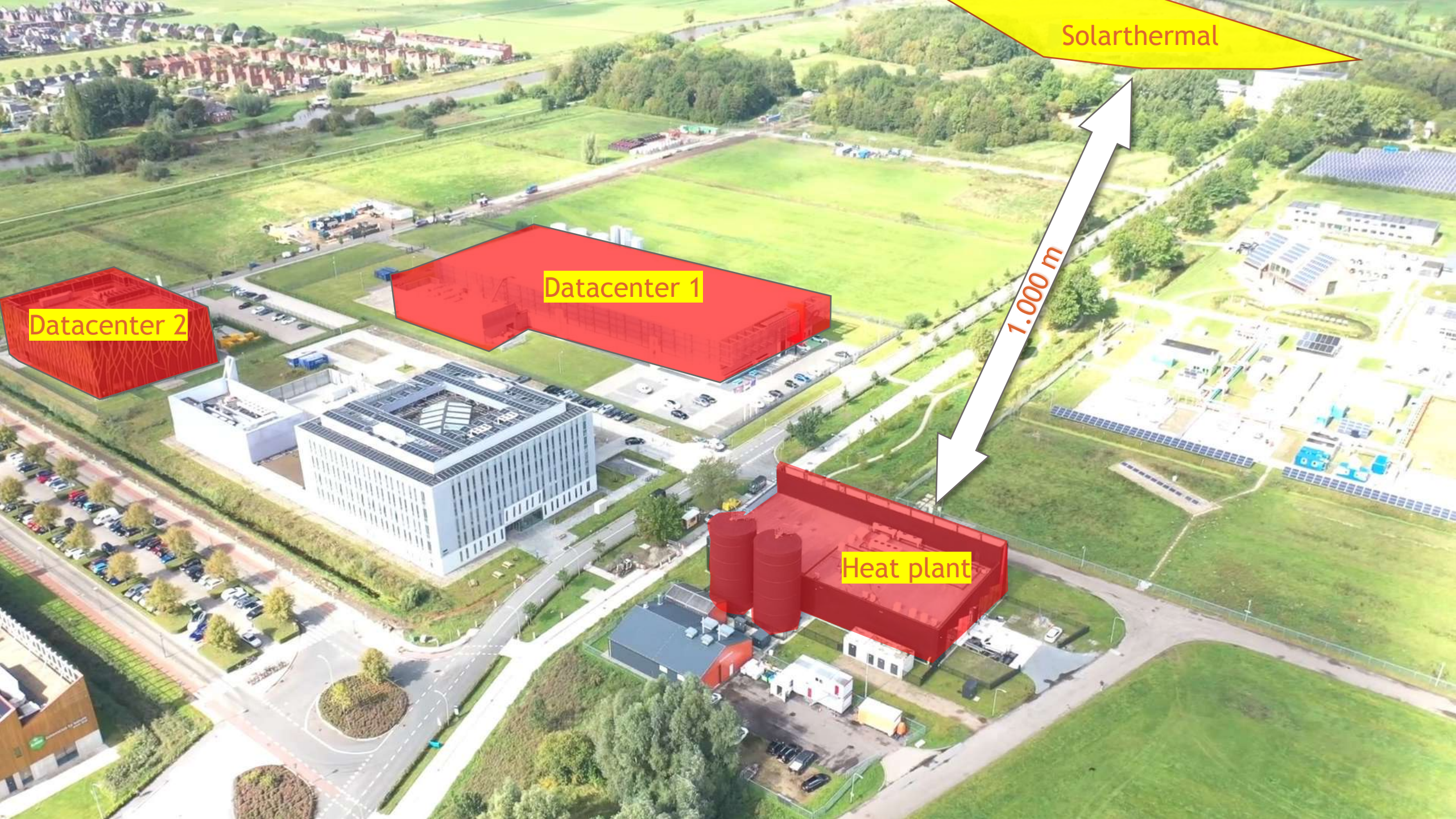
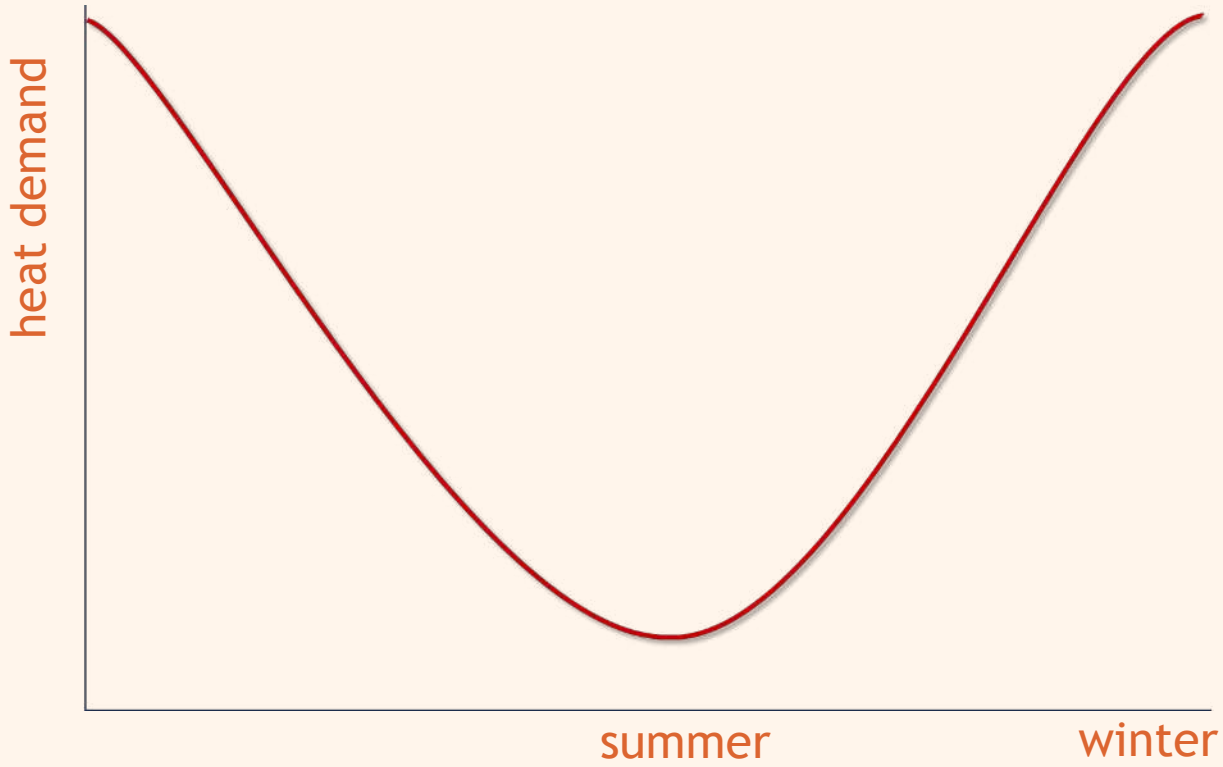


1. 24.000 solarpanels
2. Day storage 6.000 m³
3. Heat plant with Seasonal storage
4. Heat grid


Solarthermal
Datacenter 1
Datacenter 2
1.000 m
Heat plant

The challenge: matching supply vs demand



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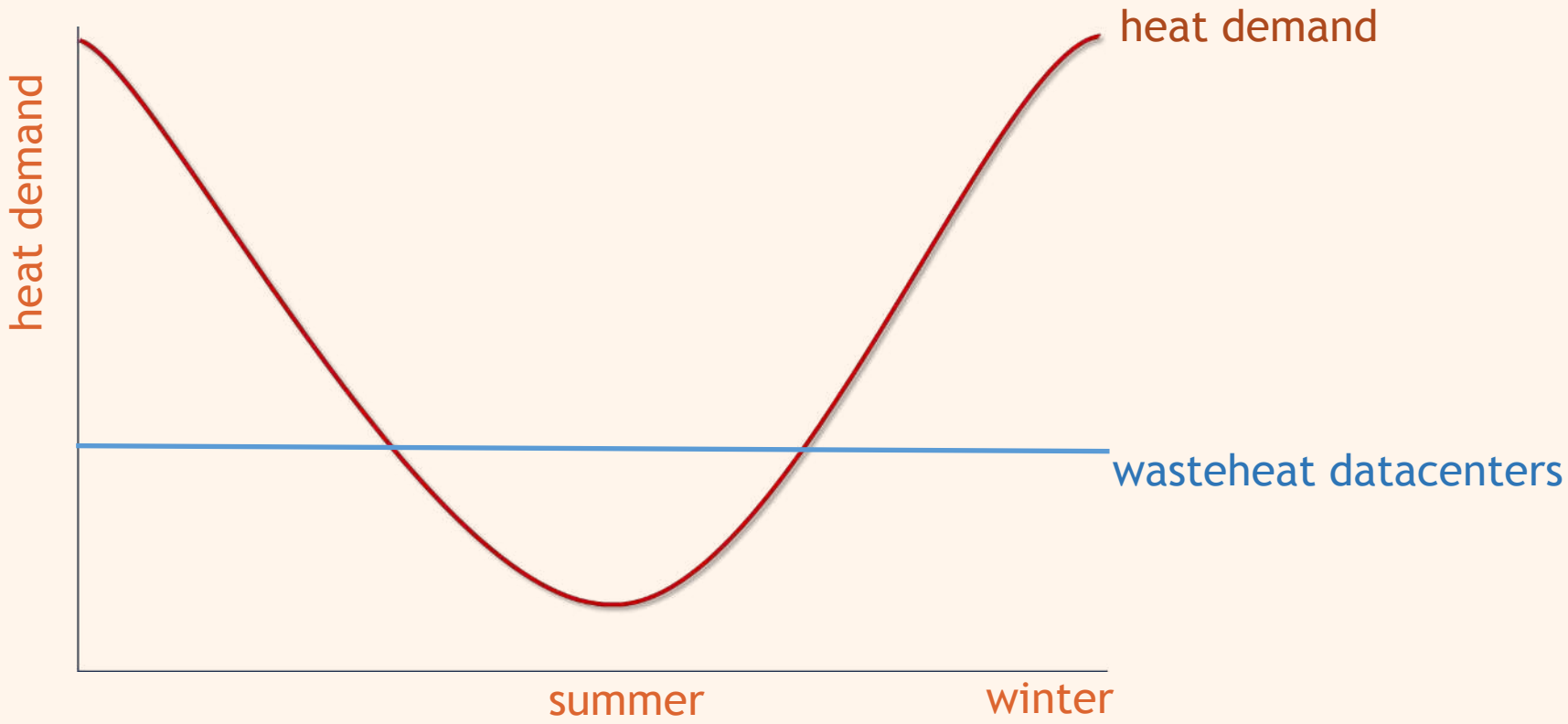
Demand vs production of wasteheat



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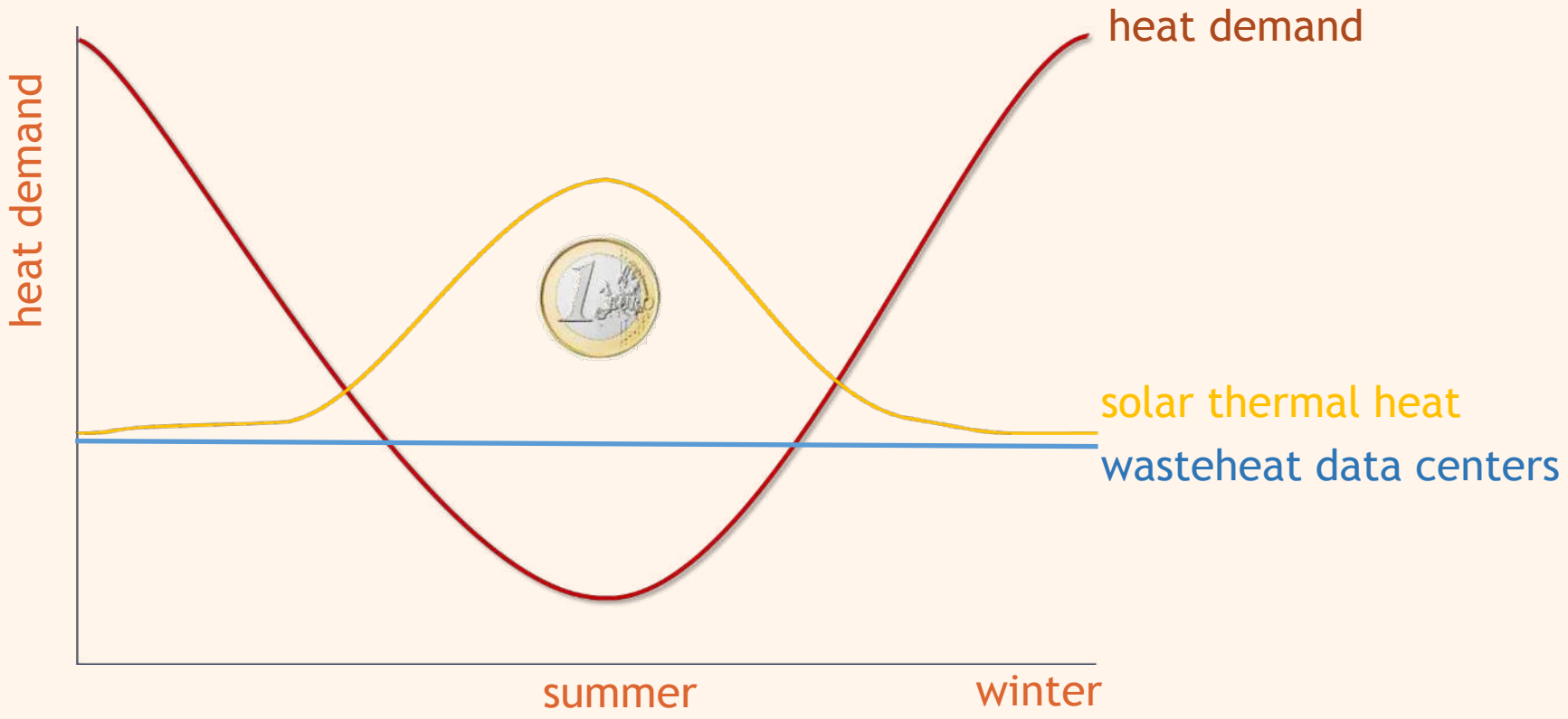
Demand vs production of wasteheat + solarheat



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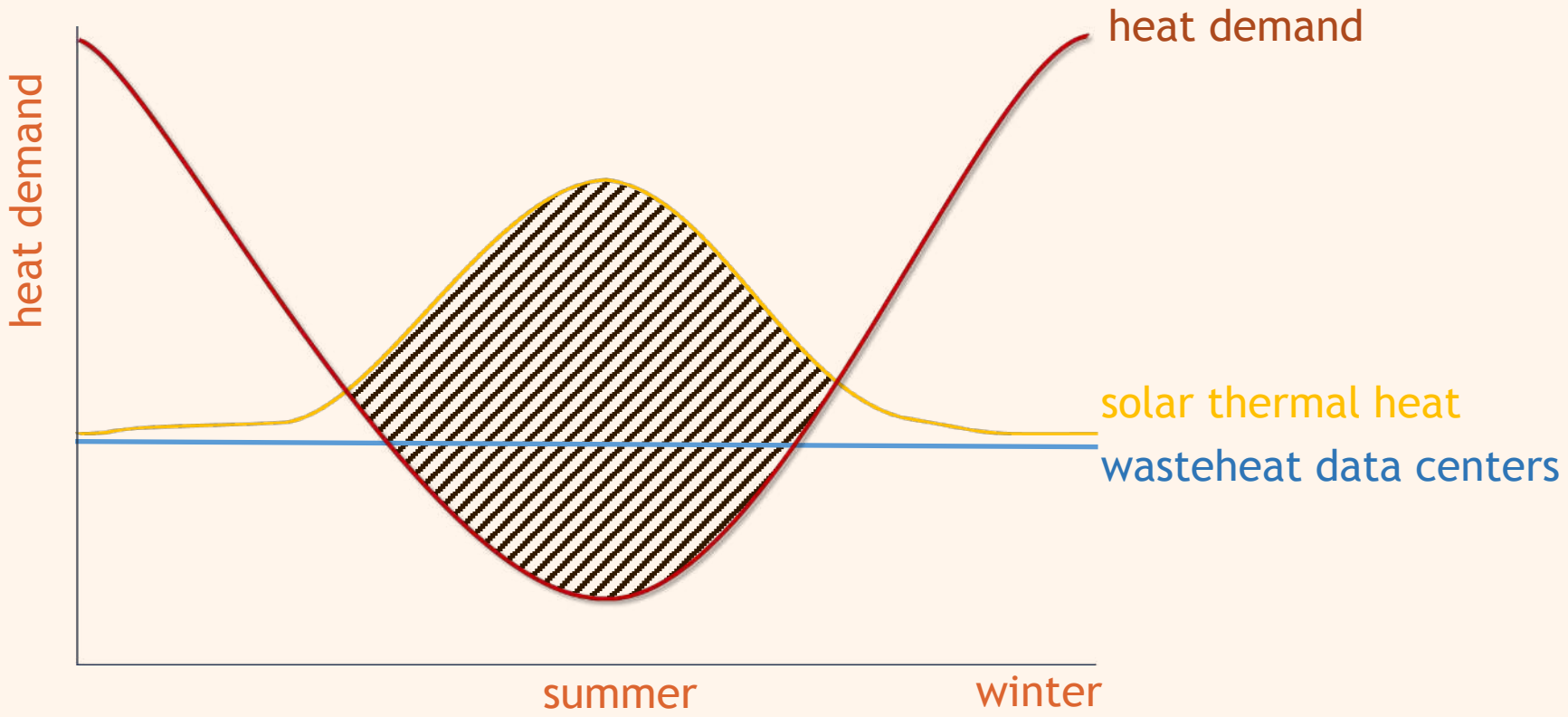
Summer surplus



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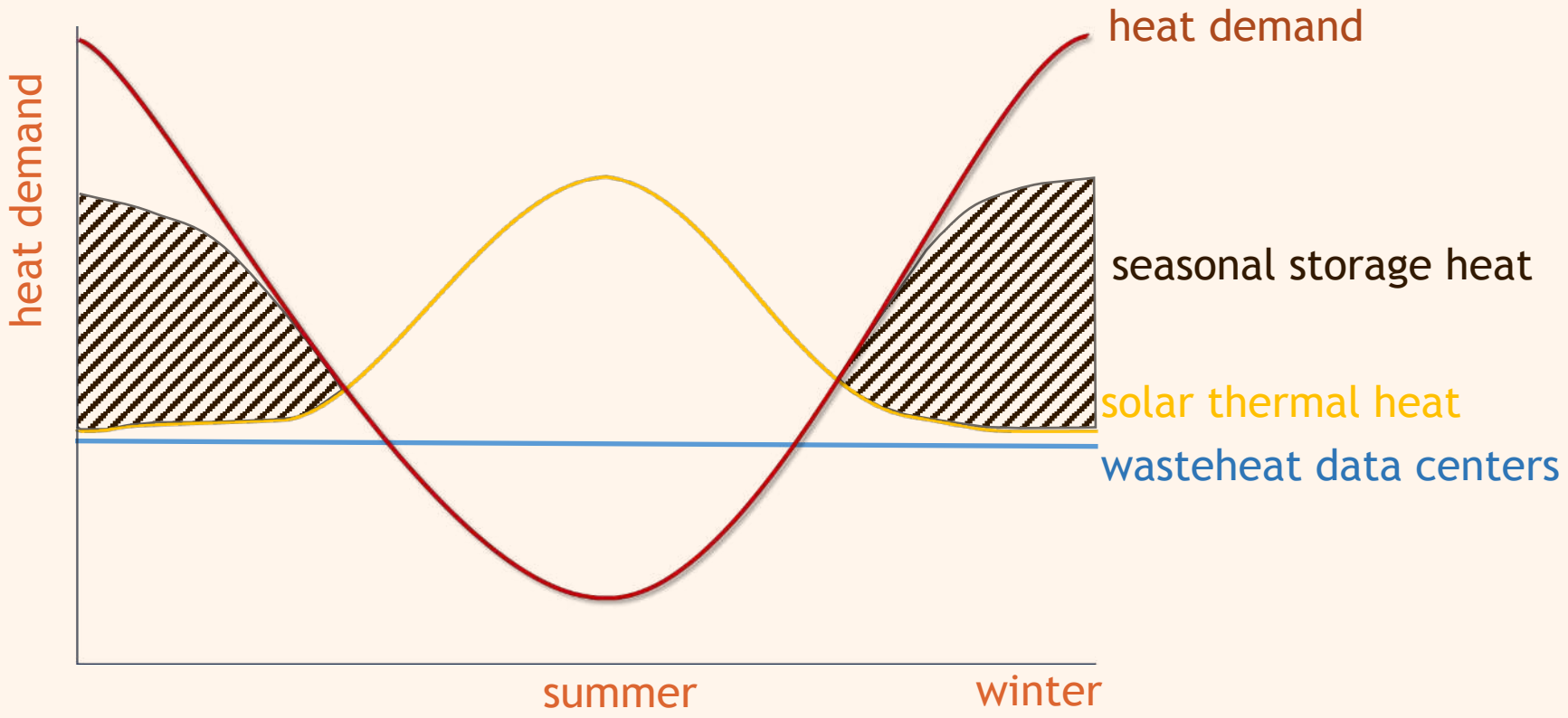
Summer surplus -> seasonal storage



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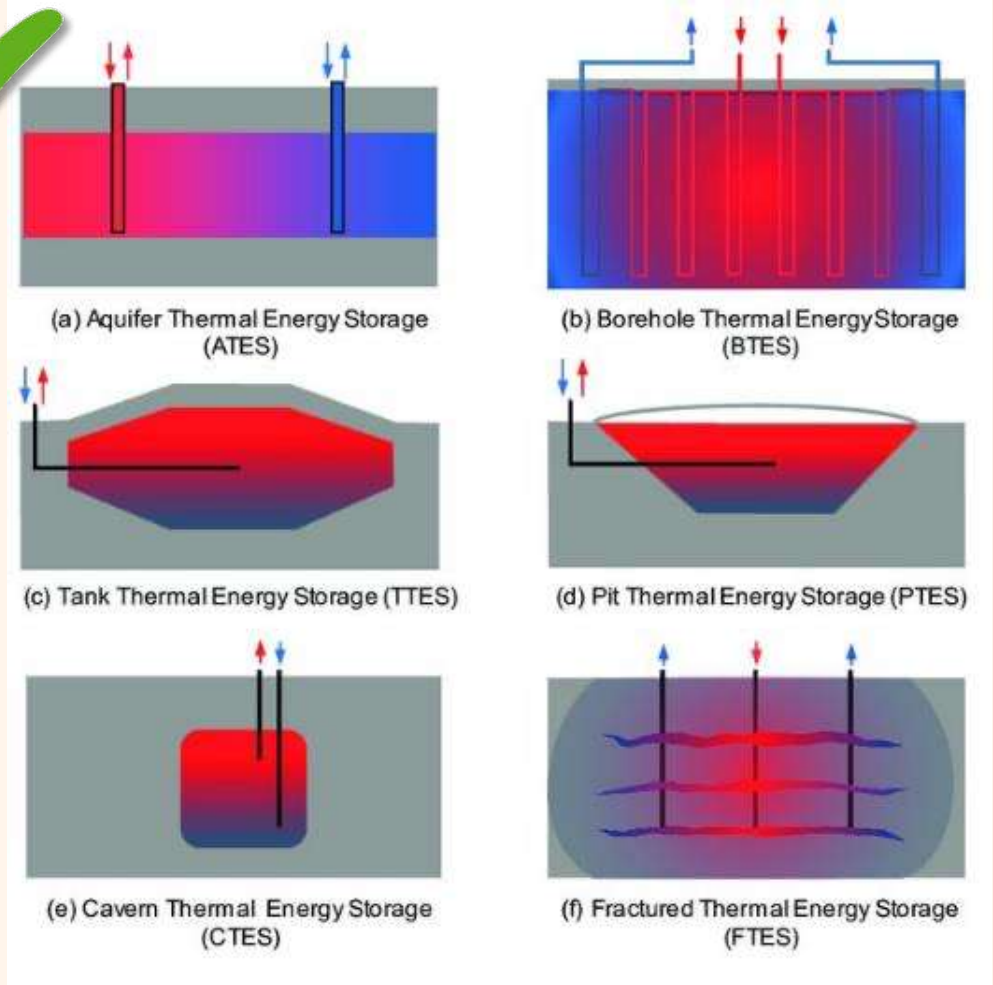
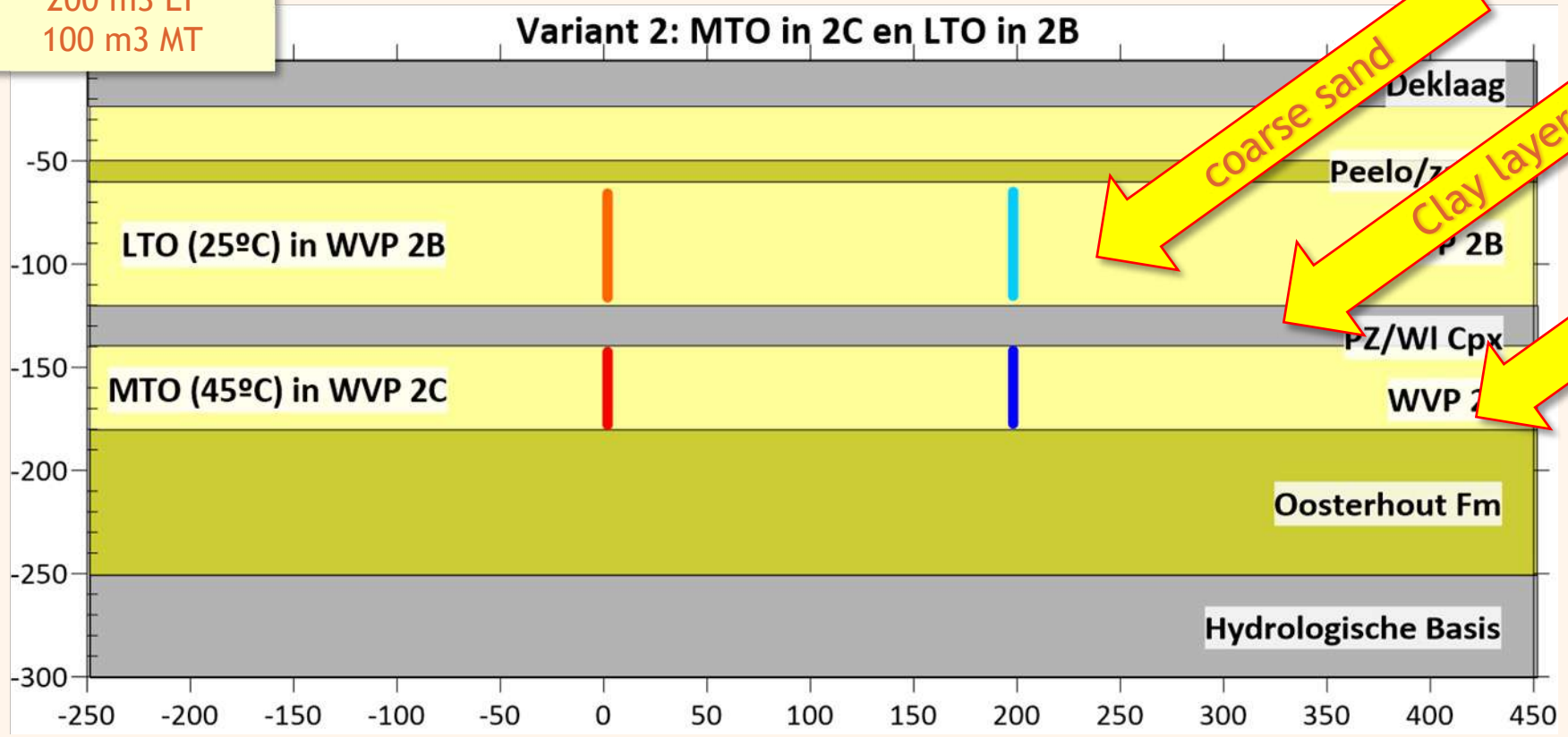
Seasonal storage: ATES

- 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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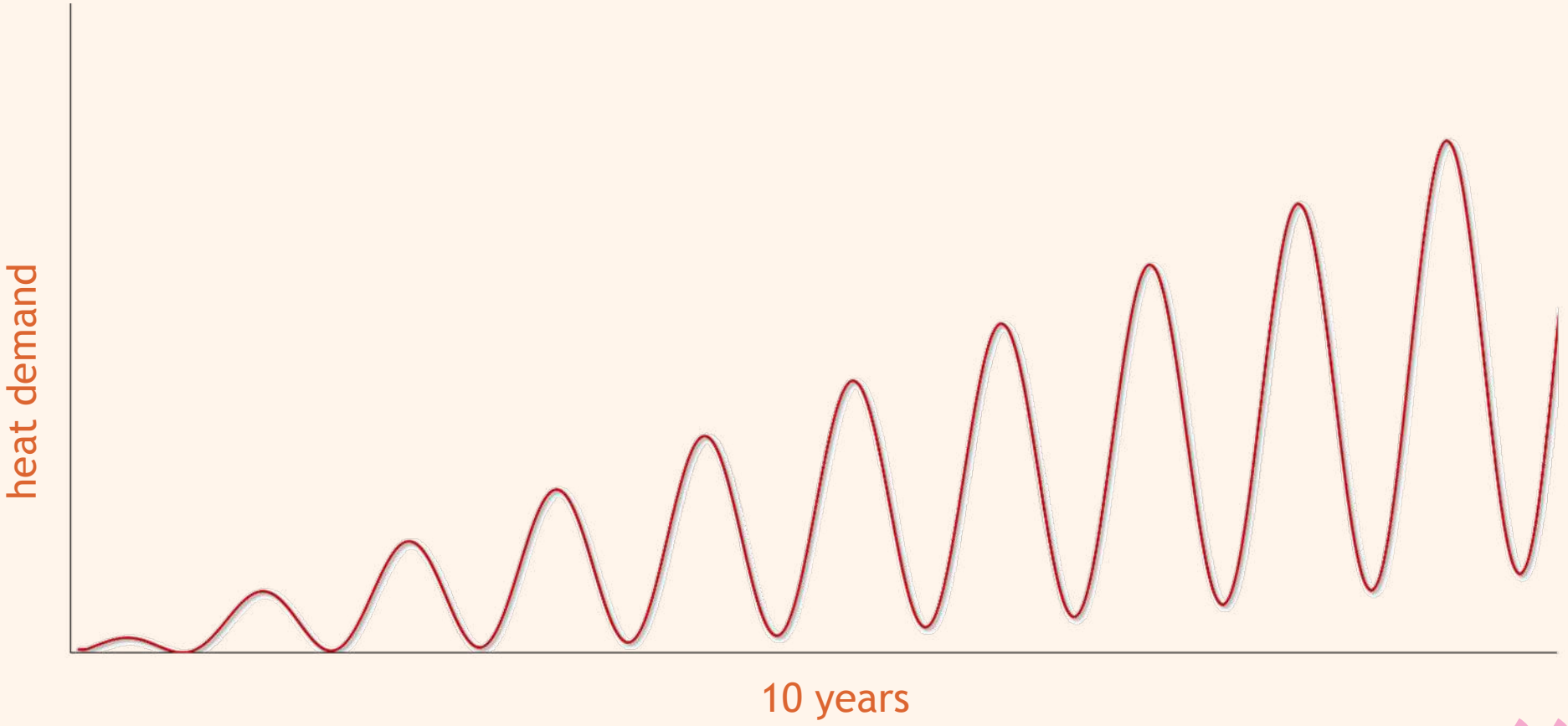
Bonus challenge:
Heat demand is developing



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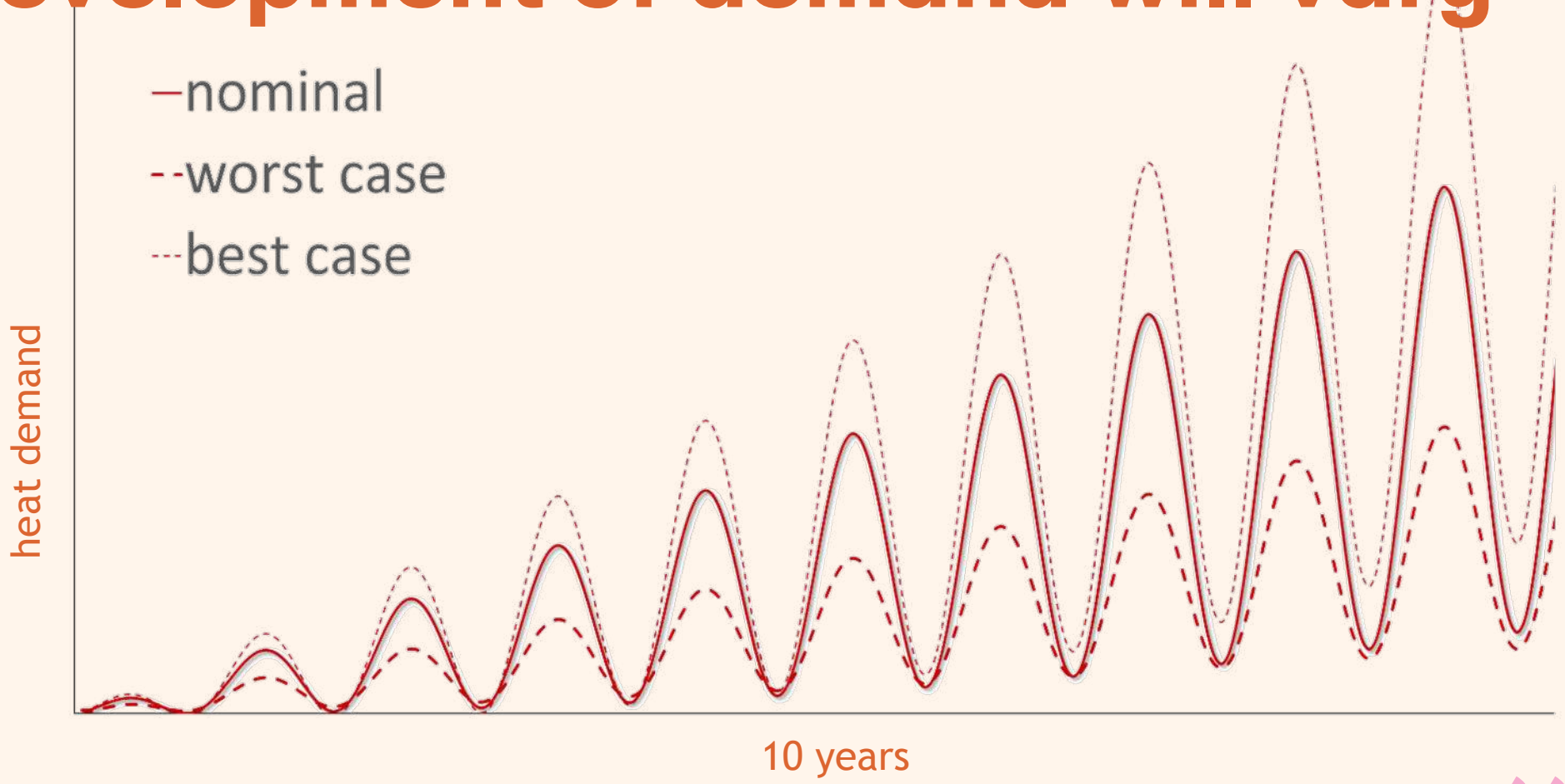
Extra bonus challenge: Development of demand will vary



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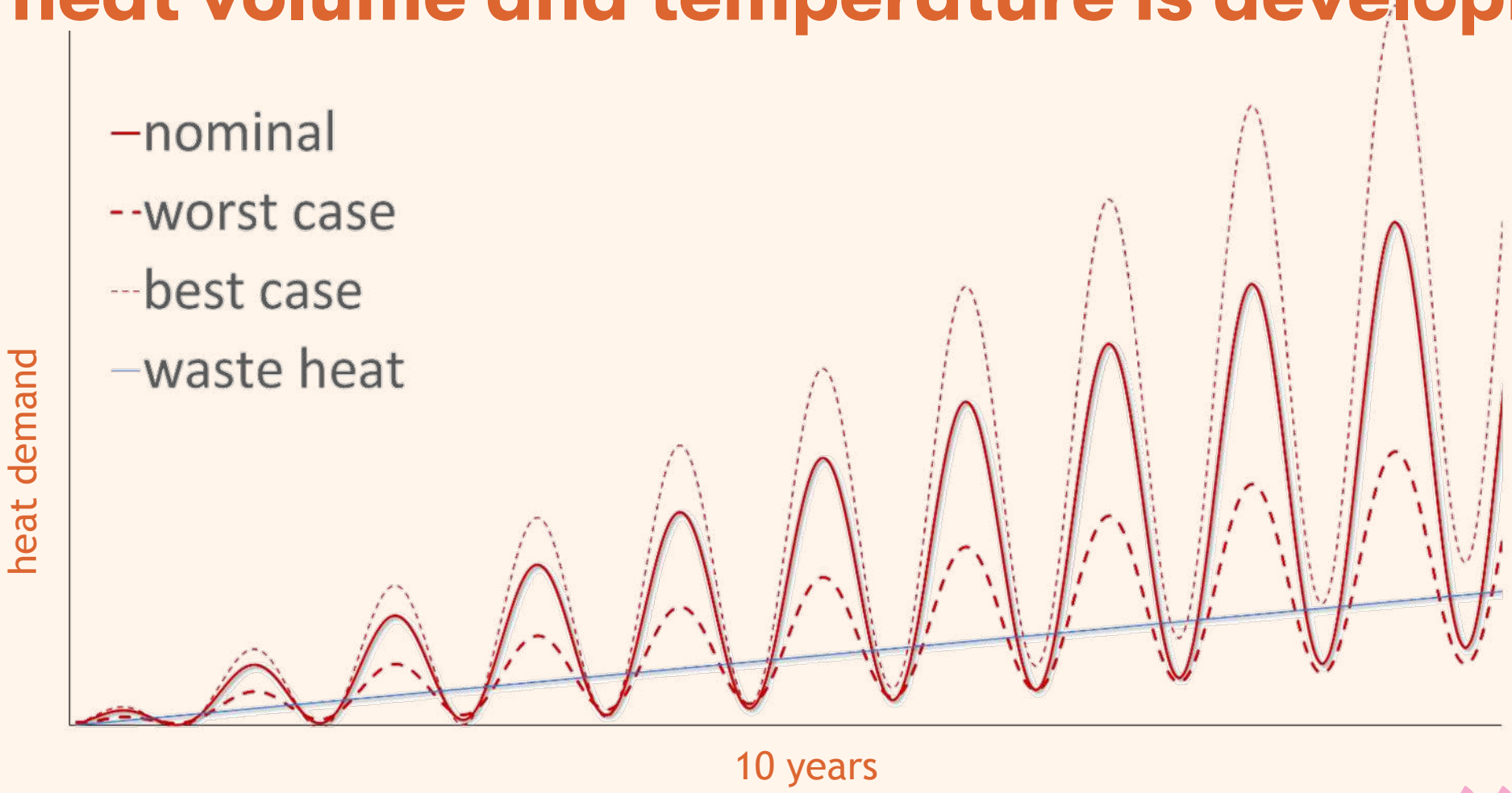
Super Extra Bonus Challenge

Waste heat volume and temperature is developing



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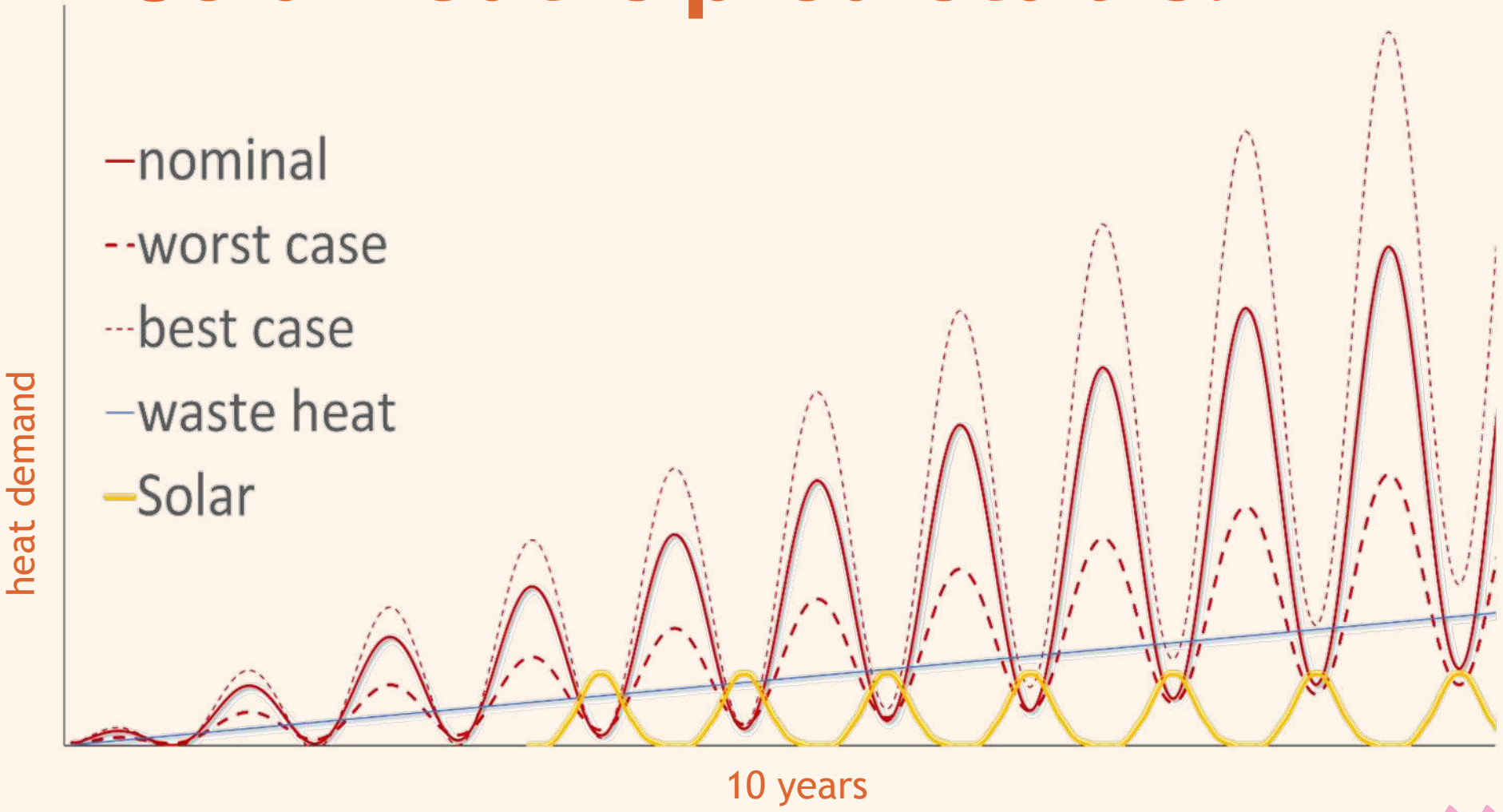
Solarheat is predictable!



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Findings Seasonal heat storage

- Enables combining competitive renewable heatsources
  - Storing waste heat in summer for use in wintertime
- Mitigates ‘take or pay’ risk of solarheat in developing heatgrid
- 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

Seasonal storage: the key to unlock Solarheat

Thank you for your atttention