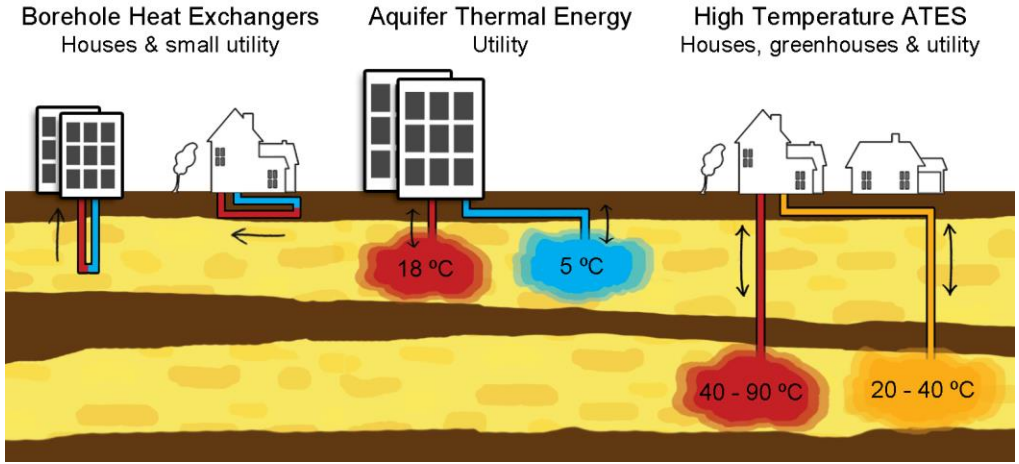
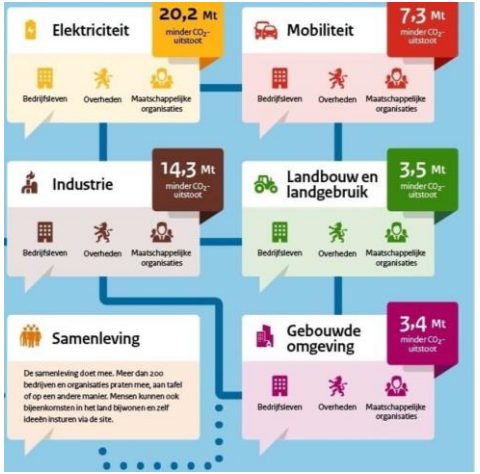
# The role of UTES in the energy transition in the Netherlands:
## Market and innovation developments




dr. Martin Bloemendal,
Norddeutsche Geothermietagung Hannover, May 5th 2021

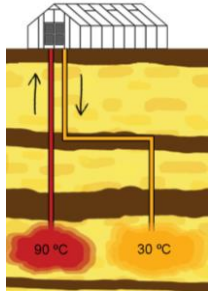
# Dutch (lack of) plan for energy transition

- Climate court case
- Until 2016 focus on electricity and mobility
- Climate agreements 2013 and 2020
- Biomass key role ☹

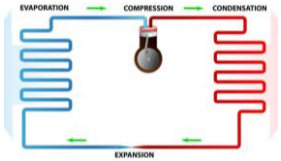


# Heat transition

- Industry
  (~20% of total energy use)
  - Hydrogen & Green gas
- Built environment: 8 000 000 buildings
  (~25% of total energy use)
  - District heating networks




  - Individual solutions



# Heat transition in NL
# = growth of ATES & BHE

Individual solutions for houses and utility

- ~6,500,000 houses
- ~1,500,000 utility buildings
- ~10,000 ha greenhouses

- Currently: ~1% have ATES/BHE
- In 2050: ~25%

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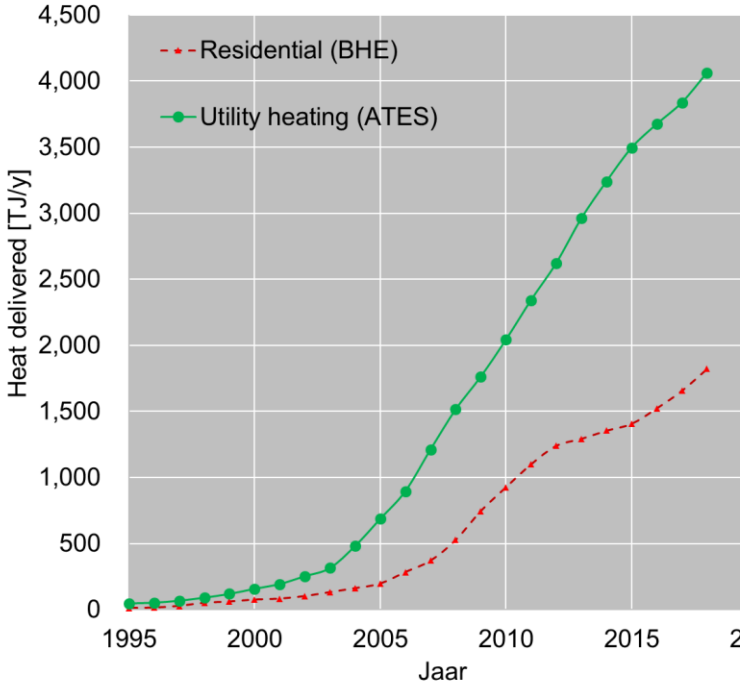
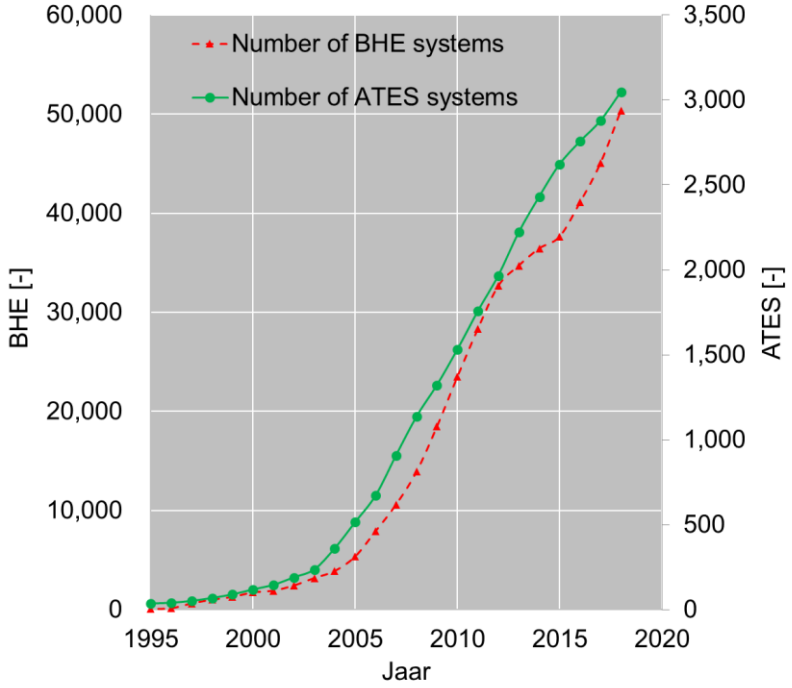
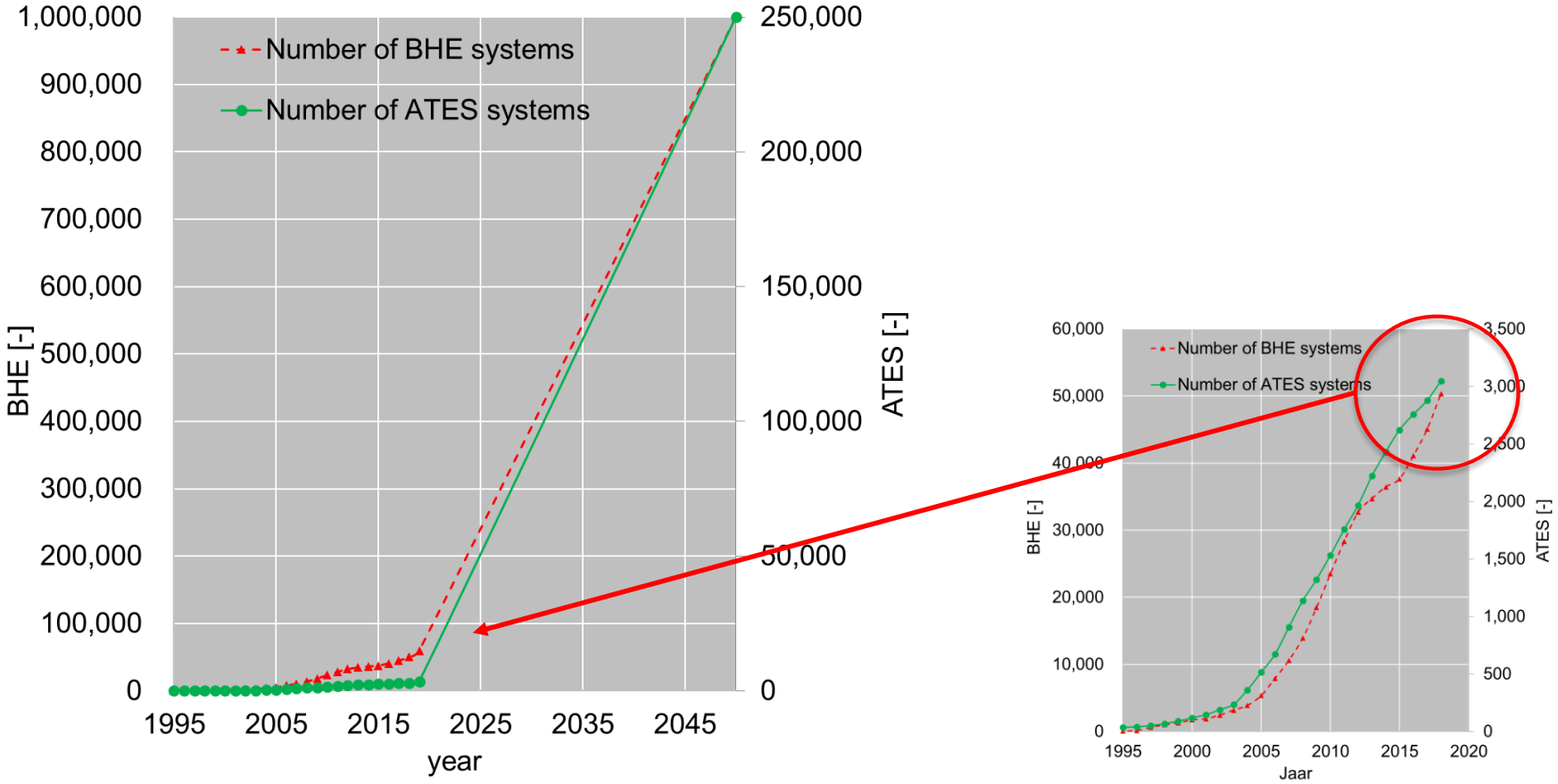
# BHE & ATES


Residential (BHE)
Utility heating (ATES)
Heat delivered [TJ/y]
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1995
2000
2005
2010
2015
Jaar

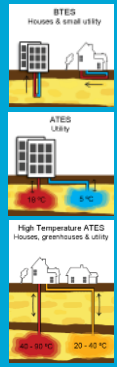

Number of BHE systems
Number of ATES systems
BHE [-]
ATES [-]
60,000
50,000
40,000
30,000
20,000
10,000
0
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1995
2000
2005
2010
2015
2020
Jaar


Number of BHE systems
Number of ATES systems
BHE [-]
ATES [-]
year
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
250,000
200,000
150,000
100,000
50,000
0
1995
2005
2015
2025
2035
2045
Number of BHE systems
Number of ATES systems
BHE [-]
ATES [-]
Jaar
60,000
50,000
40,000
30,000
20,000
10,000
0
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1995
2000
2005
2010
2015
2020

- We do our best ☺
- But we have long way to go!

- What is our approach?

# Legislation situation: permitting




- Reporting obligation
- 6 wk permit procedure
- HT-ATES Pilots allowed

- In busy areas: possibility to plan
- Reporting of performance

# Legislation situation: certification

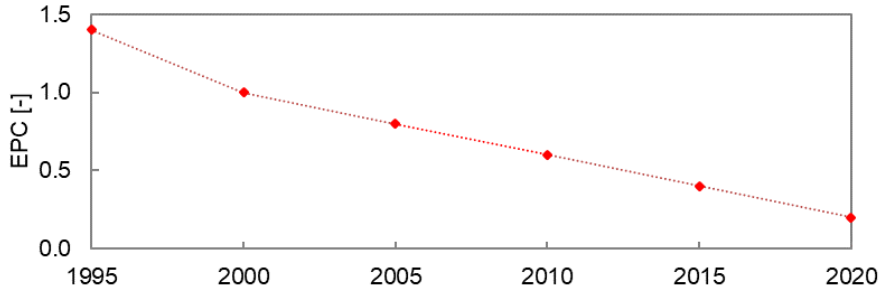
| | Design | Build | Operate |
|---|---|---|---|
| Wells/boreholes |  | | |
| Climate installation |  | | |

# Legislation situation: certification

| | Design | Build | Operate |
|---|---|---|---|
| Wells/boreholes |  |  |  |
| Climate installation | | | |

# Energy efficiency standard

- New buildings




- Sooner or later also existing buildings

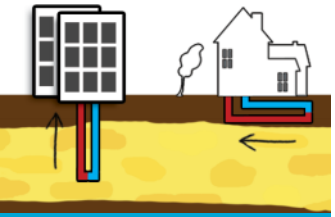
# Take home message 1:

- Adoption rates are high
  → EPC standard / uniform legislation
- Quality standard for UTES is high
  → Certification
- Real GHG emission go down
  → control on performance via legislation

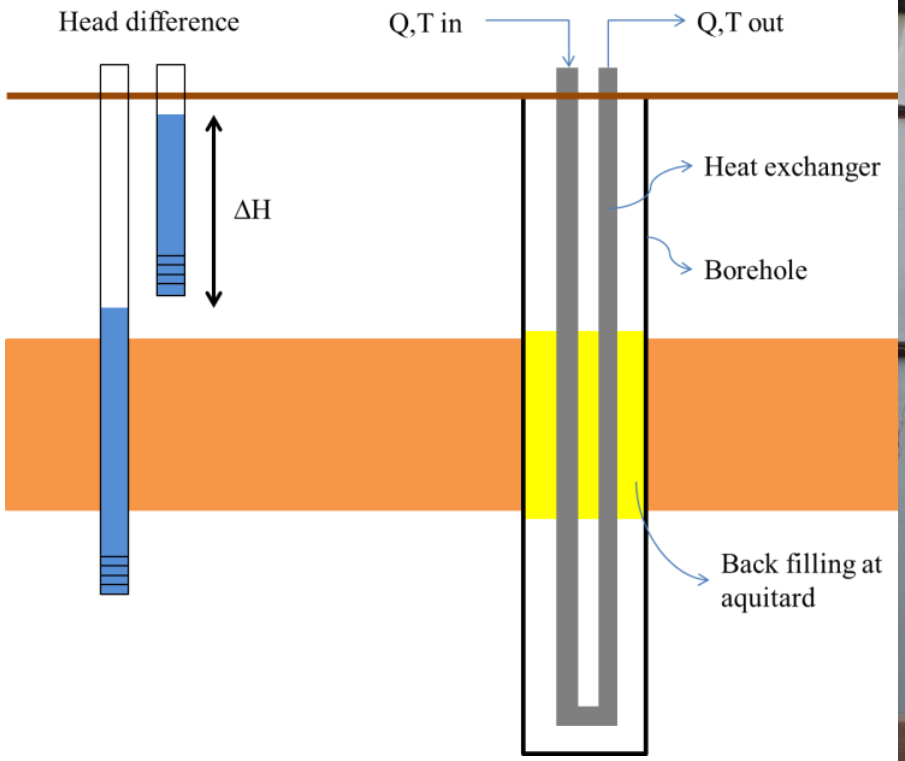
- All is settled then?

….no! Many developments going on

BTES
Houses & small utility



# BHE borehole completion

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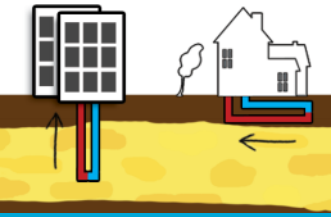
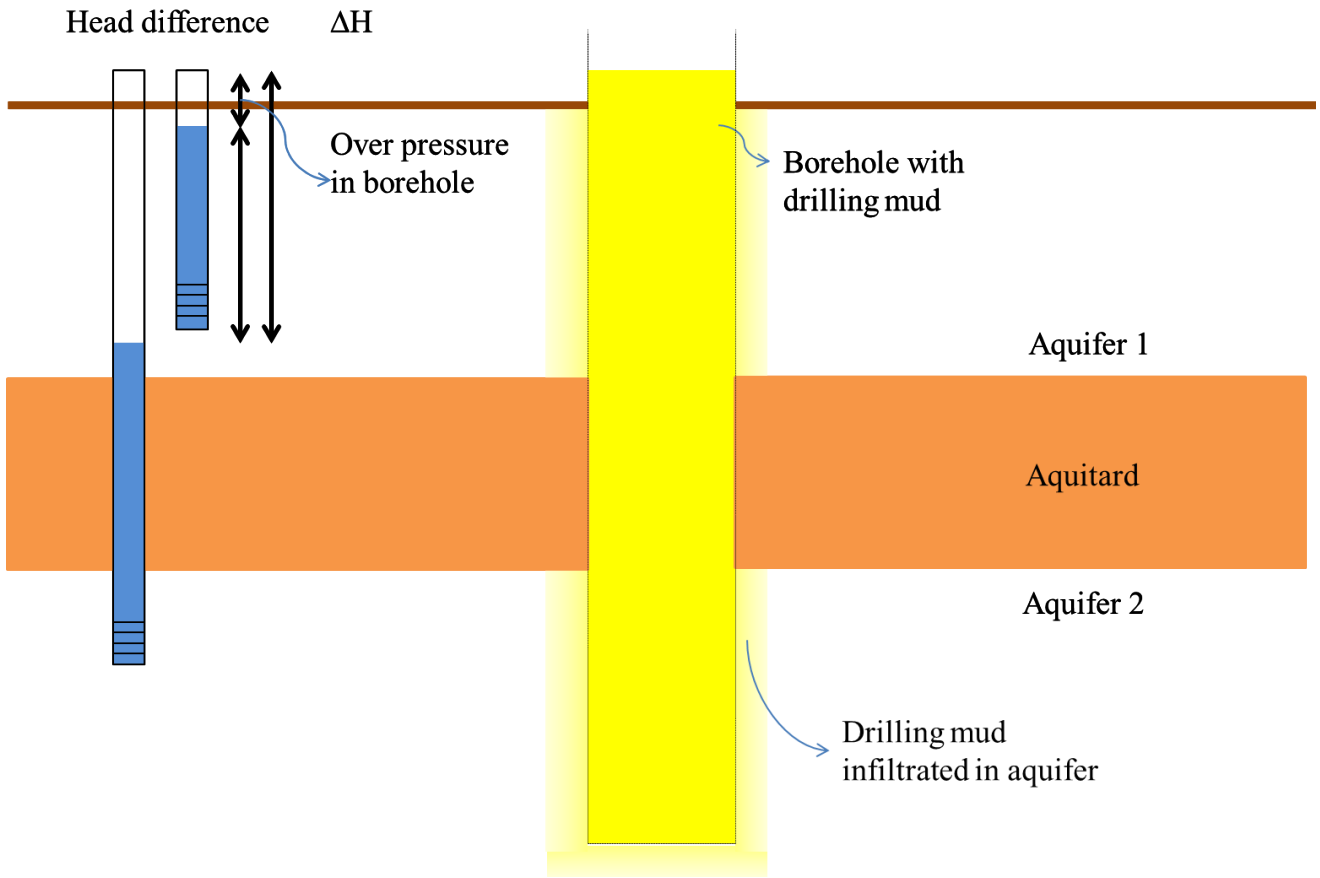


# BHE borehole completion

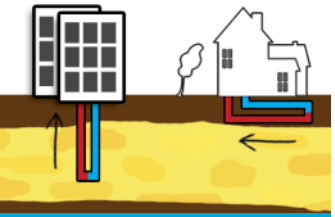
- Clay/bentonite
- Cementing


- Verification techniques

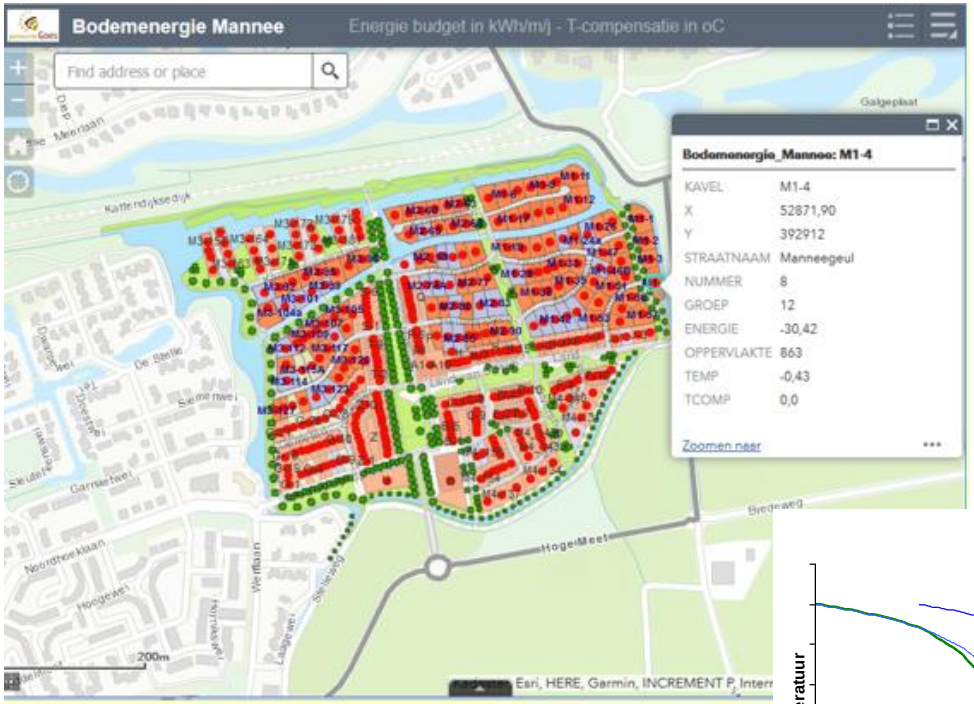


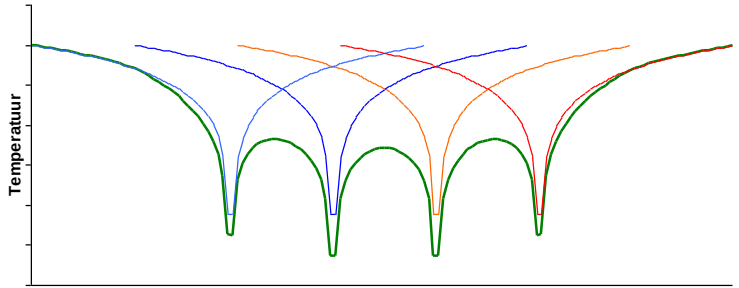

Rein Nijhof, Jan van Lopik, and Martin Bloemendal, EGU 2021

BTES
Houses & small utility



# High density use of BHE

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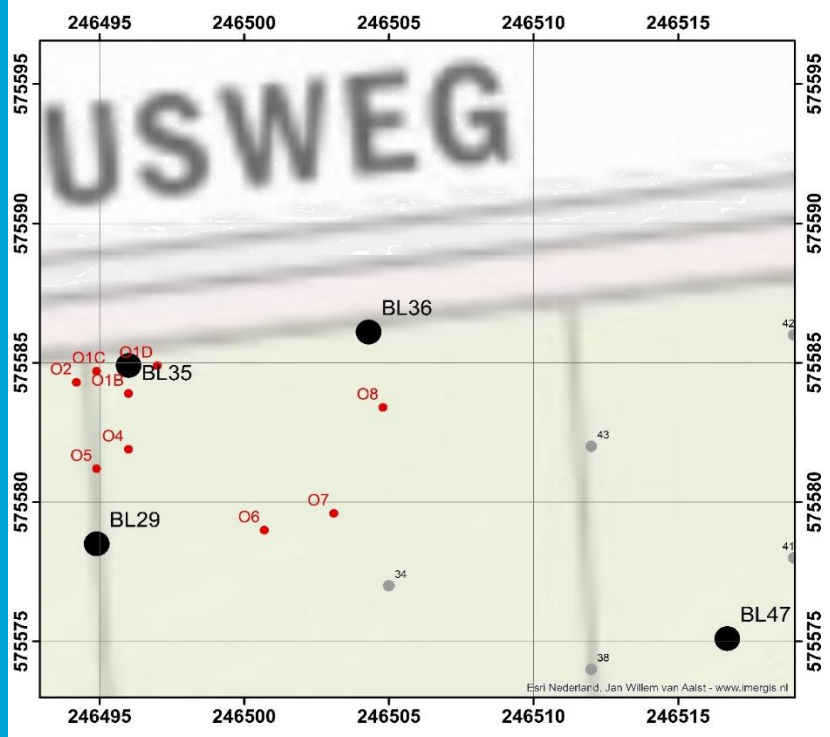
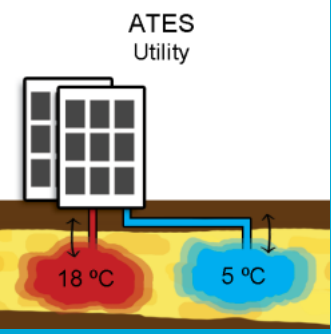
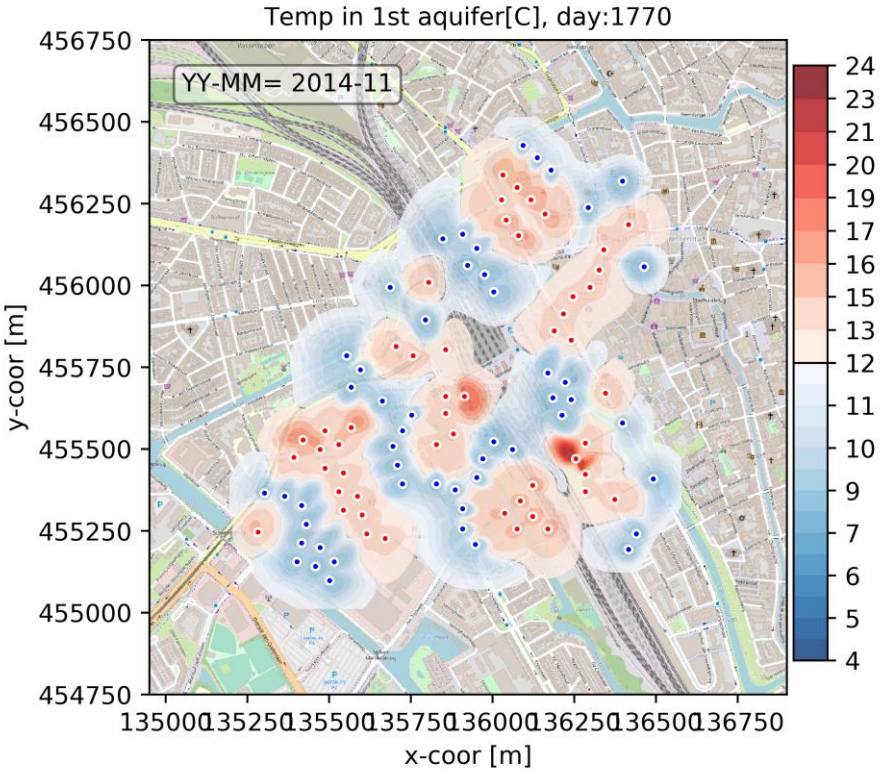
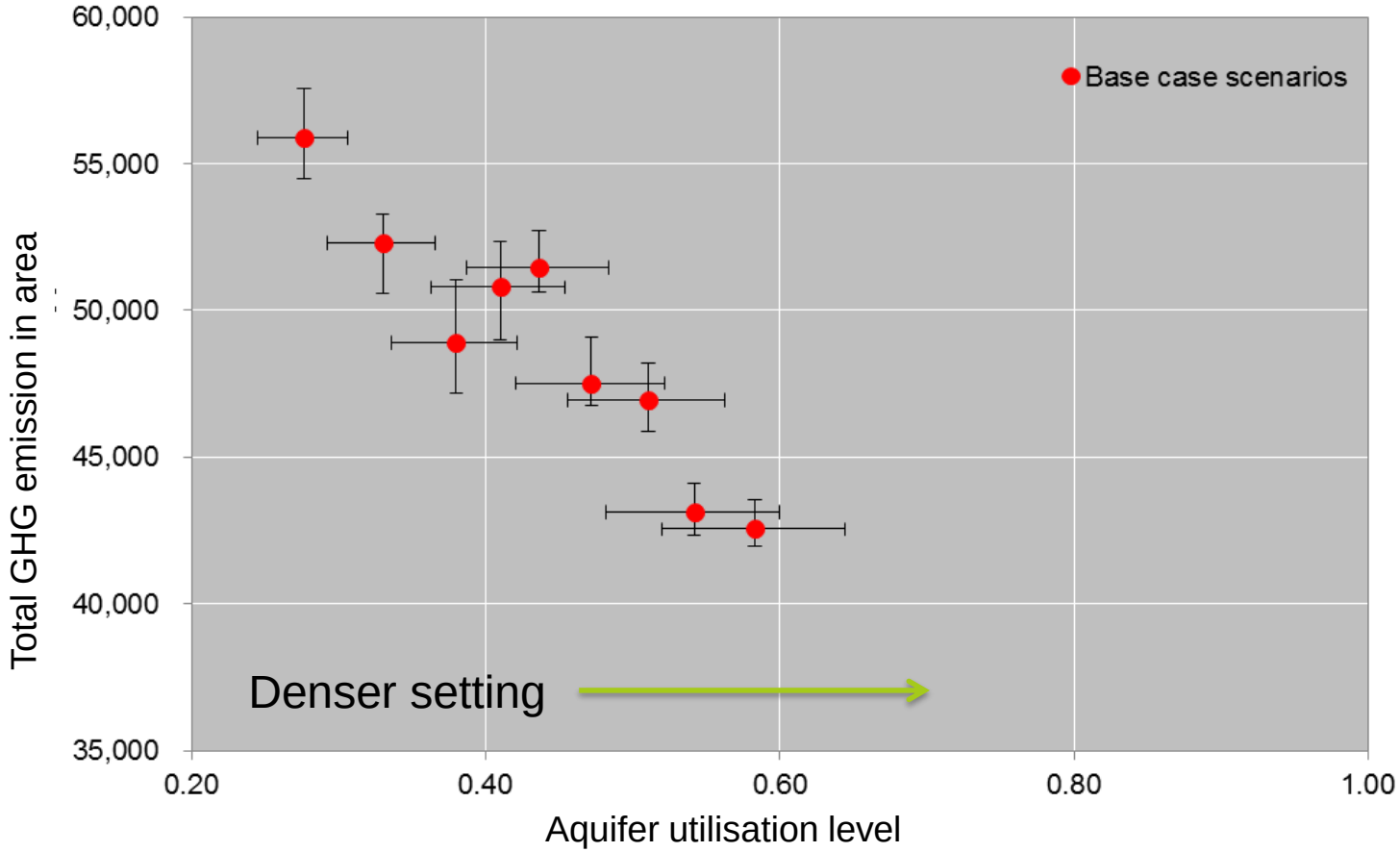



# High density use of ATES



# High density use of ATES




Bloemendal et al. 2020

https://library.kwrwater.nl/publication/61821618/

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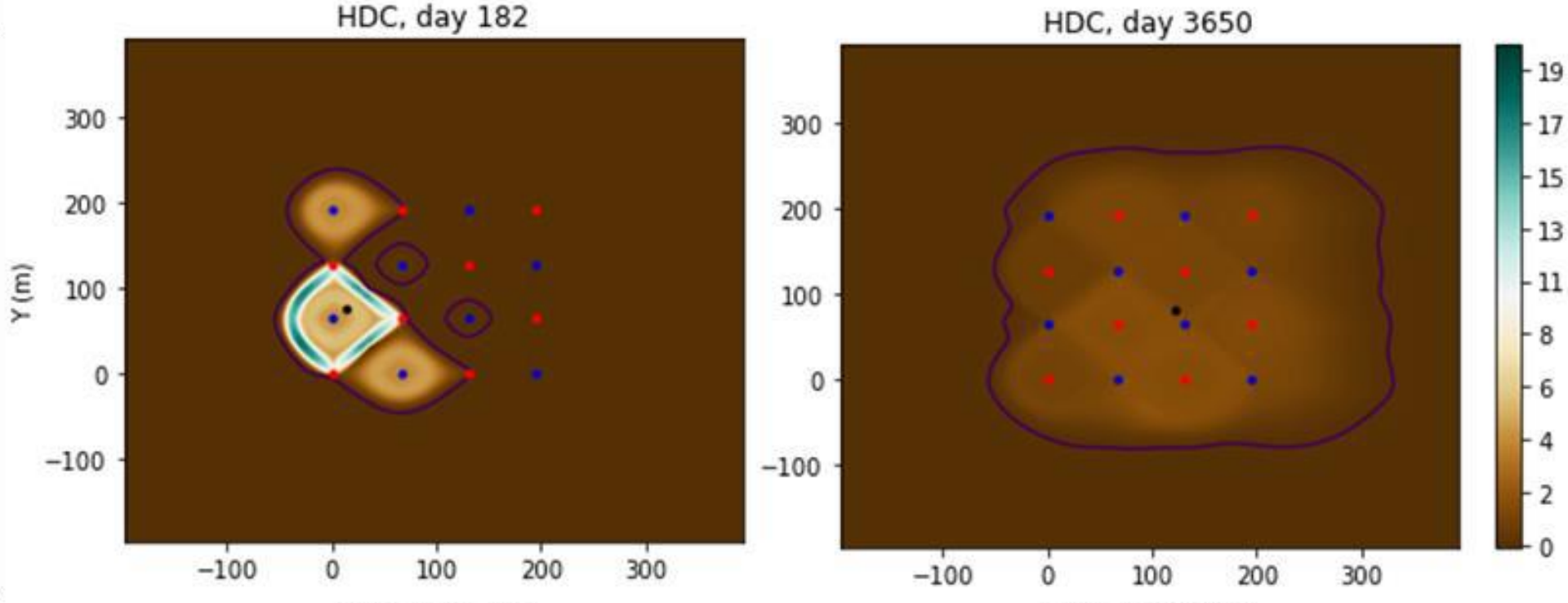
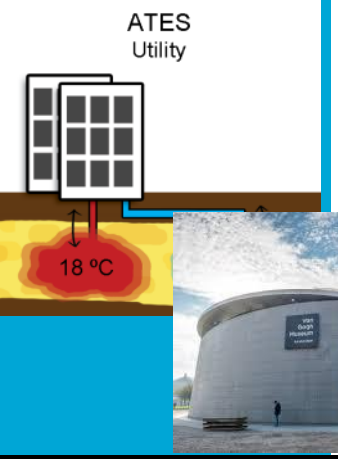
# High density use of ATES

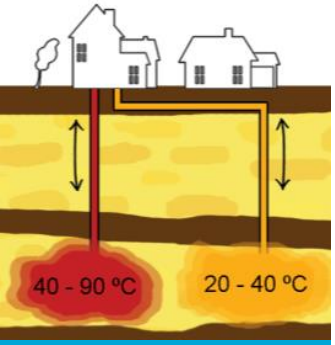


# Subsurface heat transport

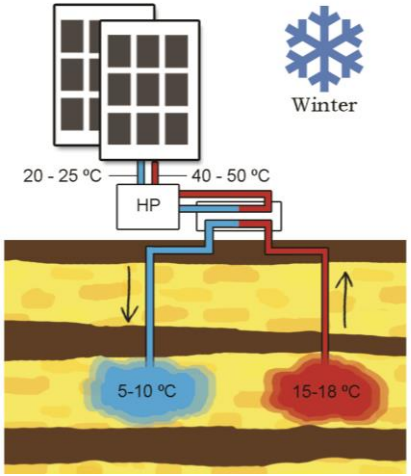




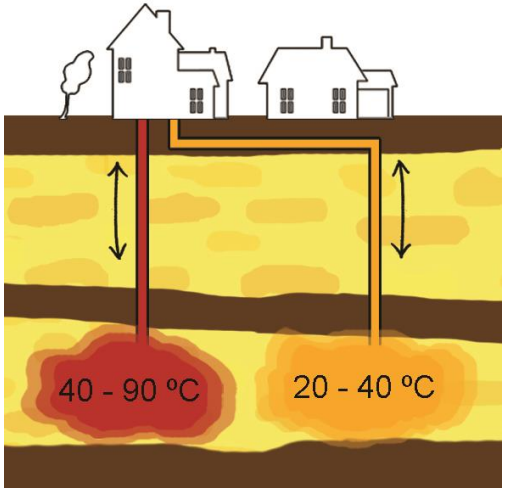

High Temperature ATES
Houses, greenhouses & utility




# HT-ATES




High Temperature ATES
Houses, greenhouses & utility

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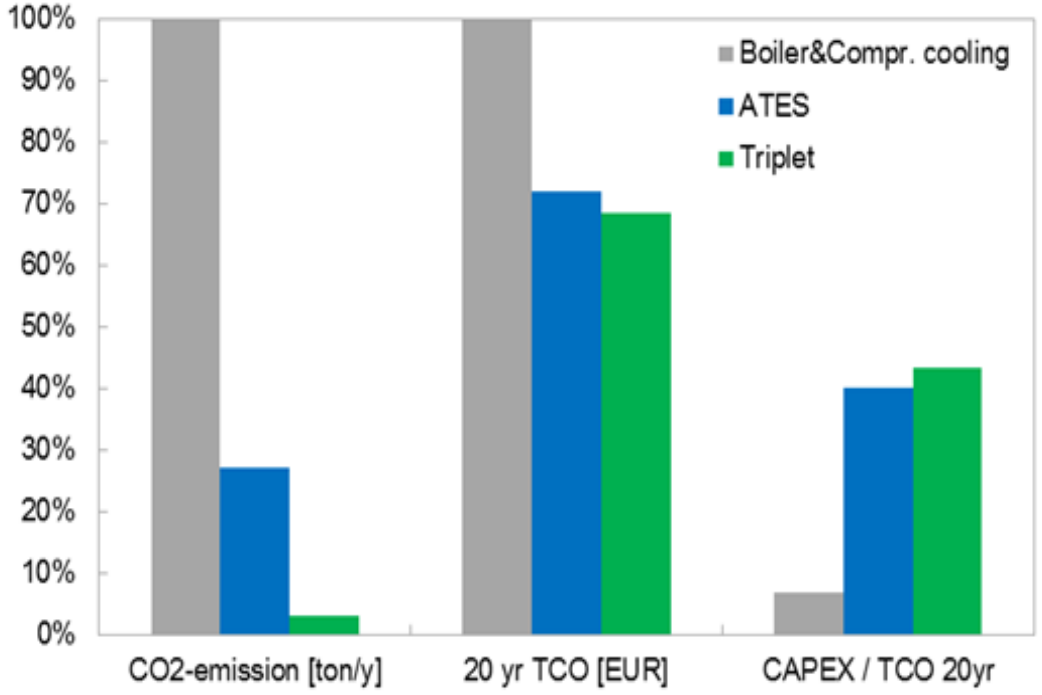
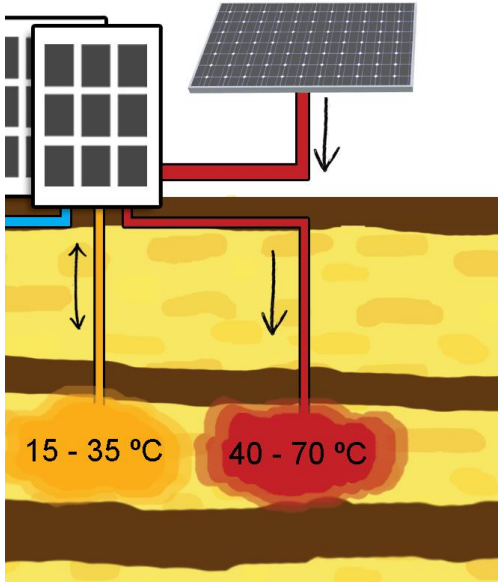
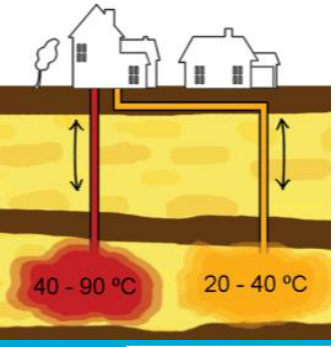
# L&HT-ATES → Triplet

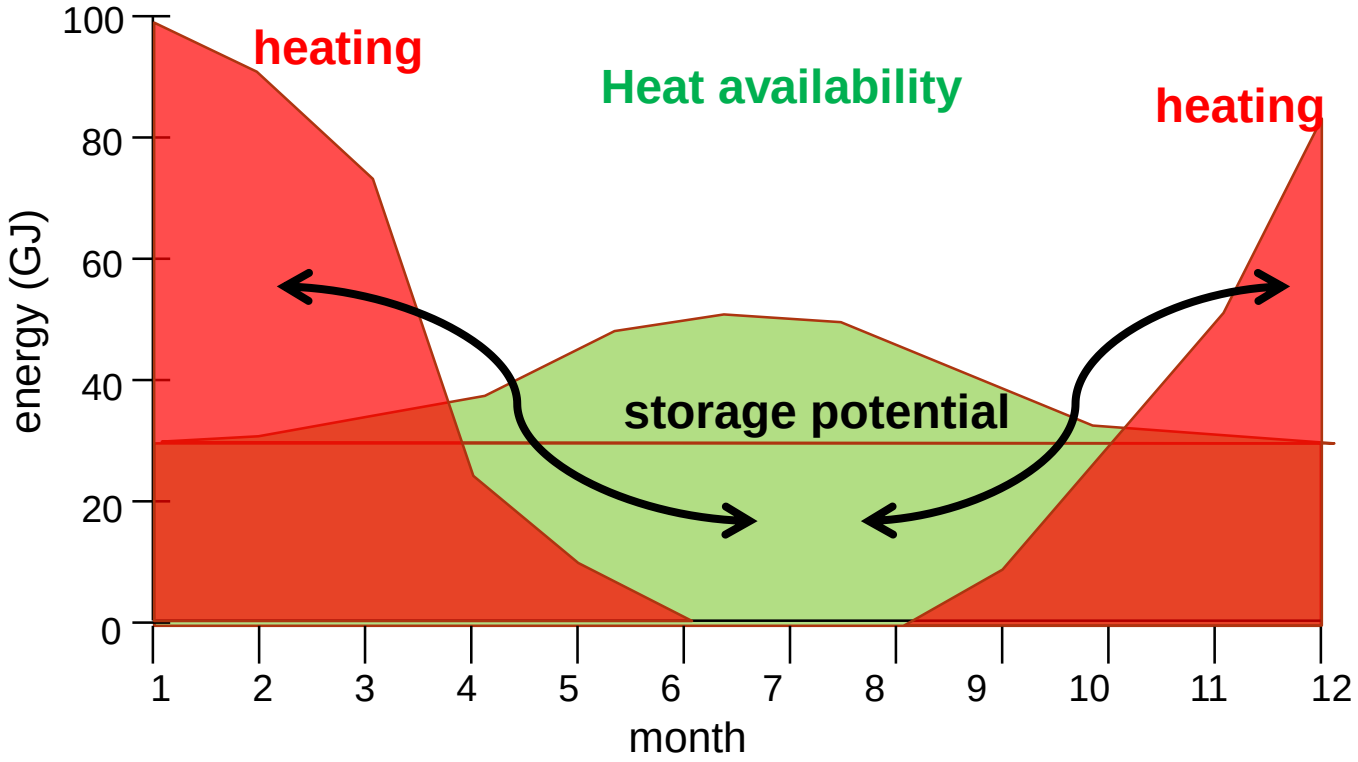


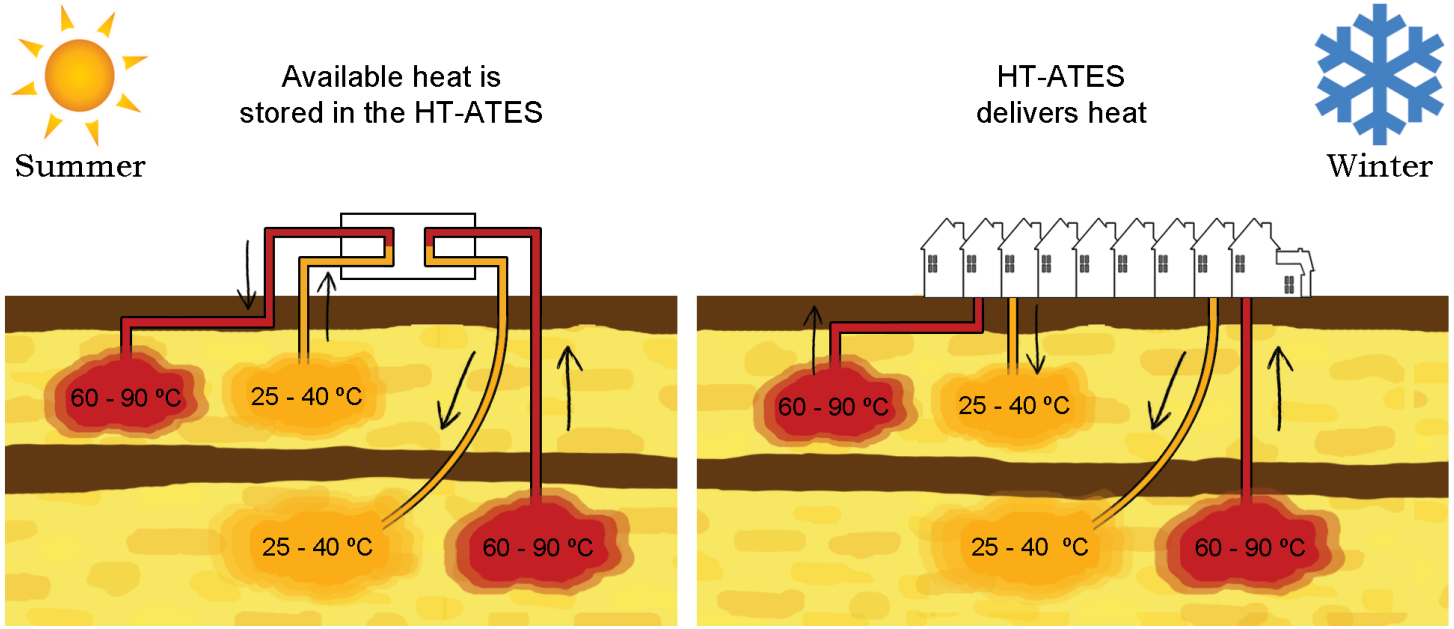

Bloemendal, v. Wijk, Hartog, Pape (H2O-online, 2017).




# Mismatch availability of heat



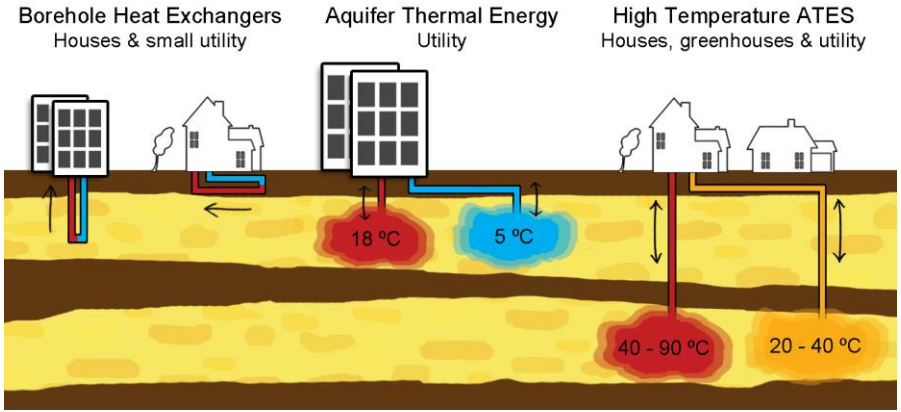
# Geothermal & HT-ATES



# Take home message 2:

- Upscaling while ensuring sustainable use of subsurface
- High density use, optimal utilisation of subsurface resources
- Accommodate higher temperatures

# The role of UTES in the energy transition in the Netherlands:
## Market and innovation developments

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Norddeutsche Geothermietagung Hannover, May 5th 2021

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## Assistant professor UTES

- MSc Civil engineering
- >10 years experience in UTES practice
- >10 years ATES research
- PhD in ATES
  thesis


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