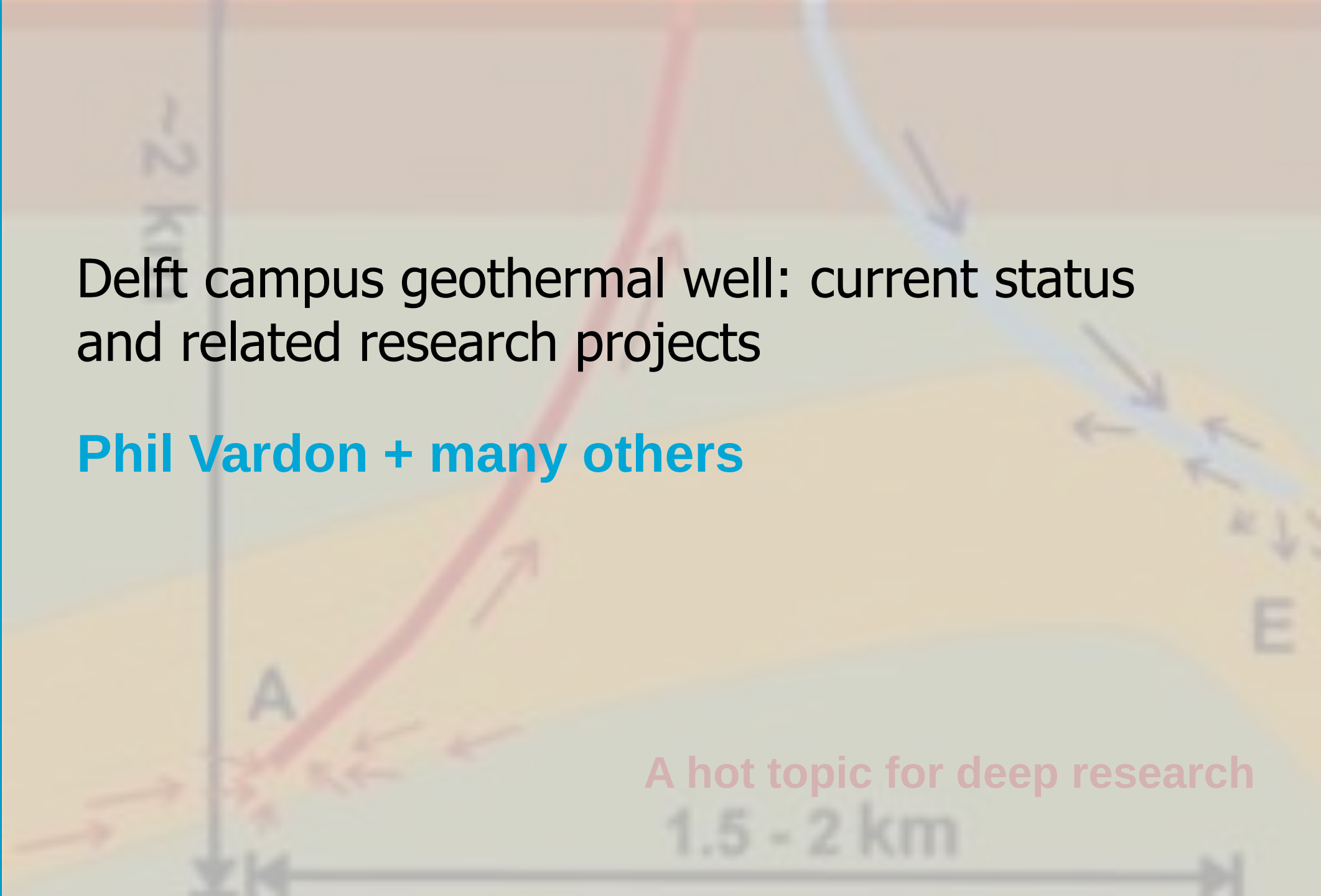
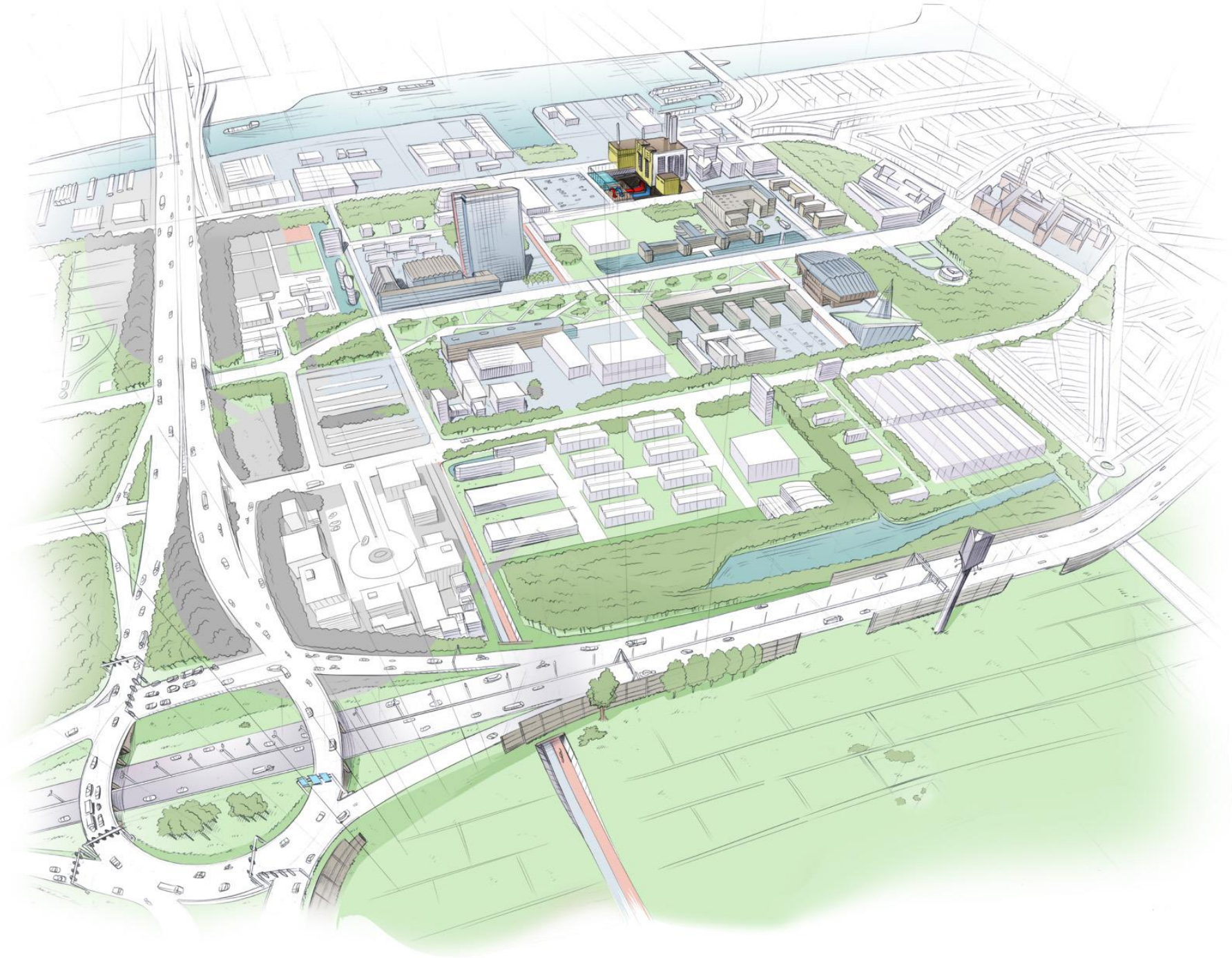
Delft campus geothermal well: current status and related research projects

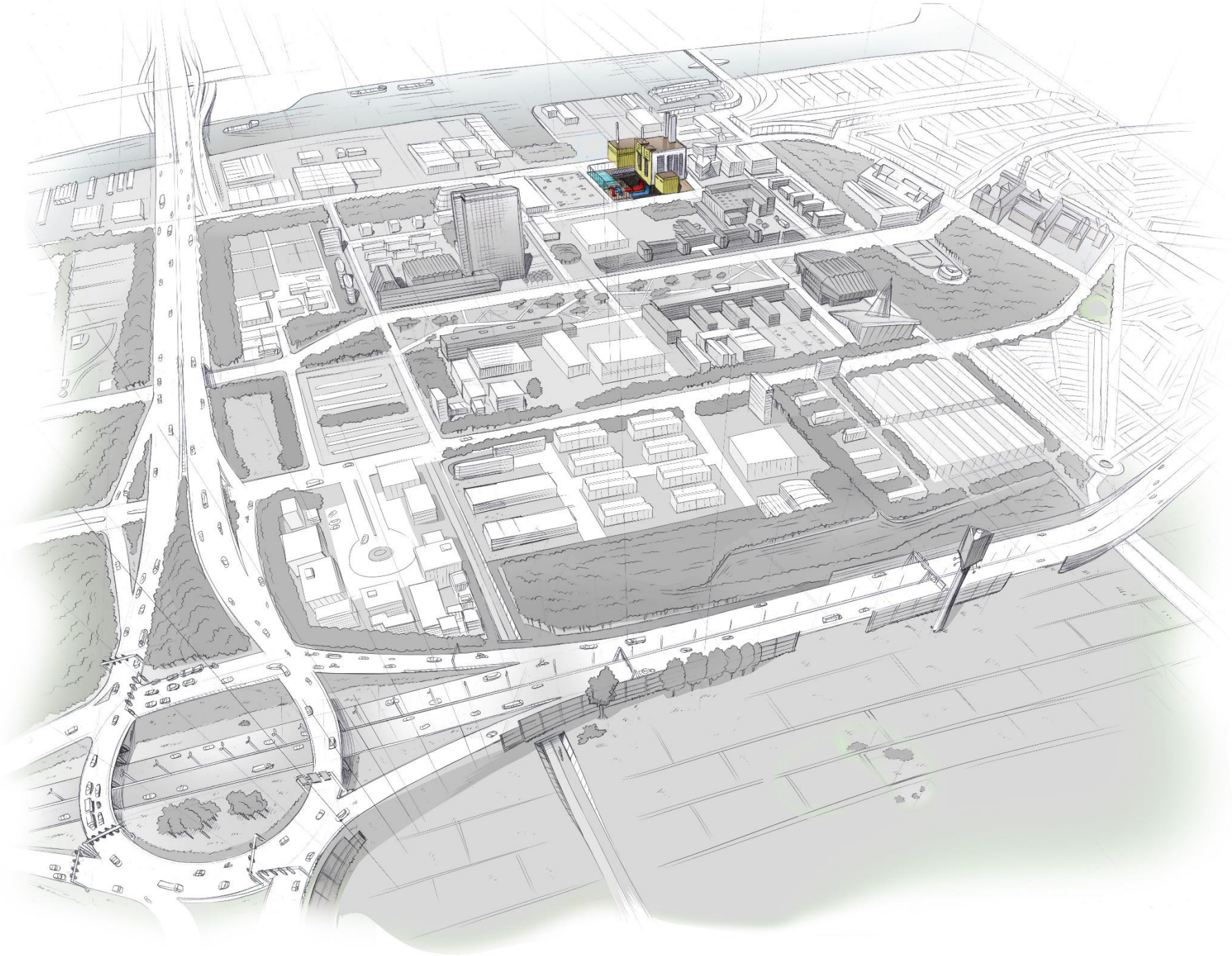
Phil Vardon + many others

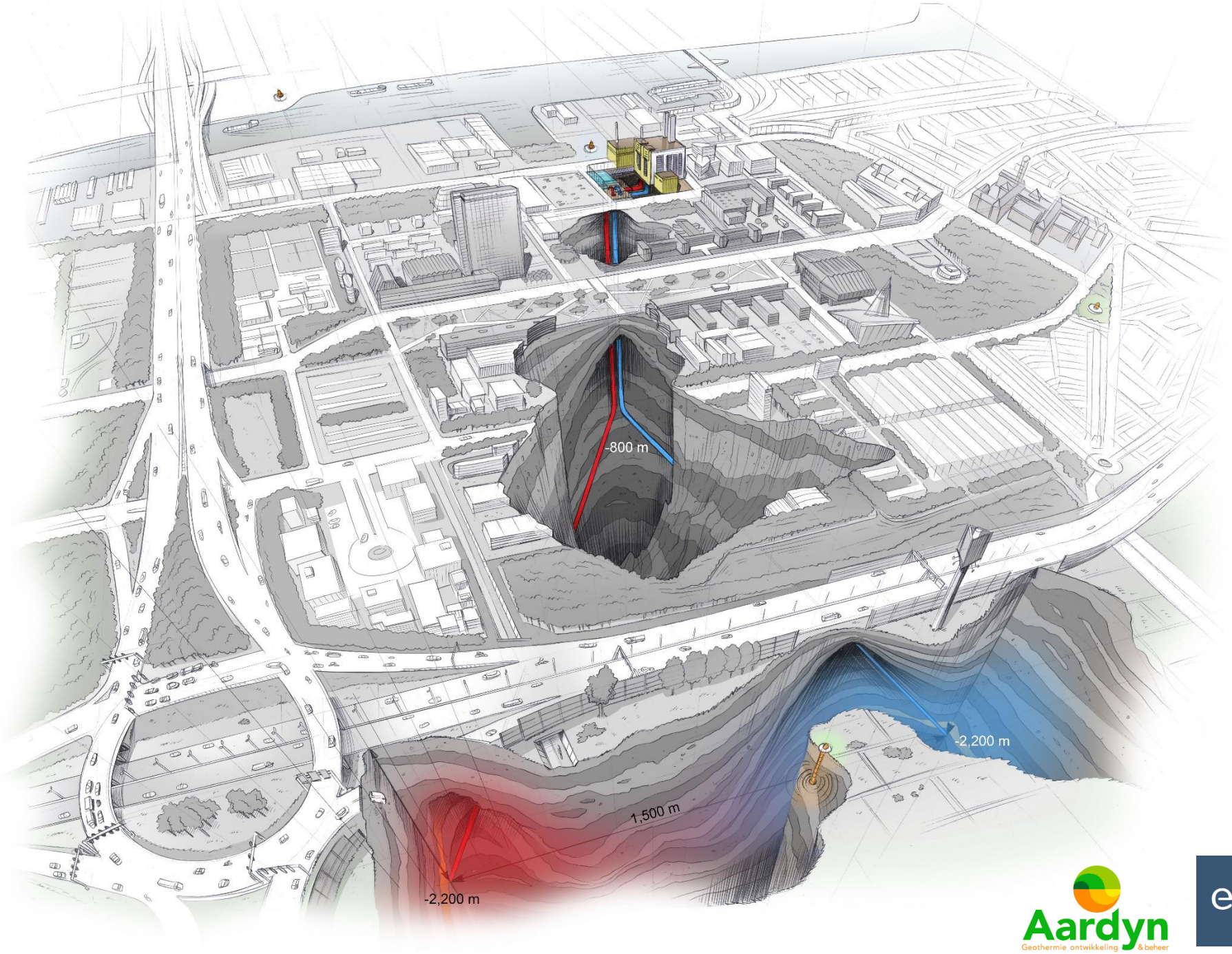


TU Delft



Stephan Timmers, Total Shot Productions





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Aardyn
Geothermie ontwikkeling & beheer

ebn

Progress and planning

2007

- Idea of geothermal project by students

2007-2010

- Exploration permit
- Greenhouse projects on permit area

2013

- TU Delft project cancelled after key investor puled out

2018

- New consortium made
- Research fund granted

2018-2022

- Design, financing, permits, contracts

The facility is being put in place

October 2021

- Signing of various contracts with partners
- Long lead items procurement begun

March 2022

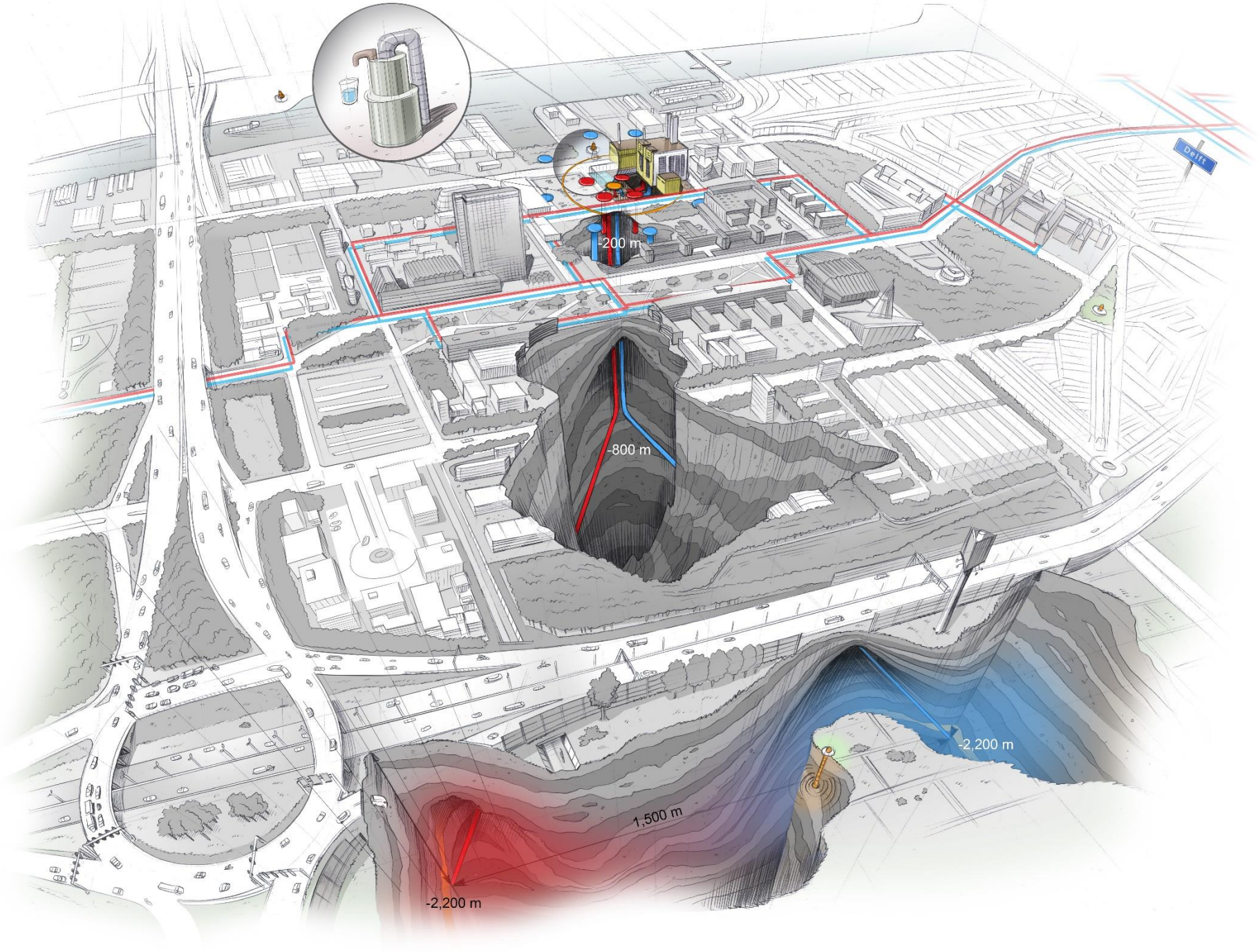
- SDE++ granted

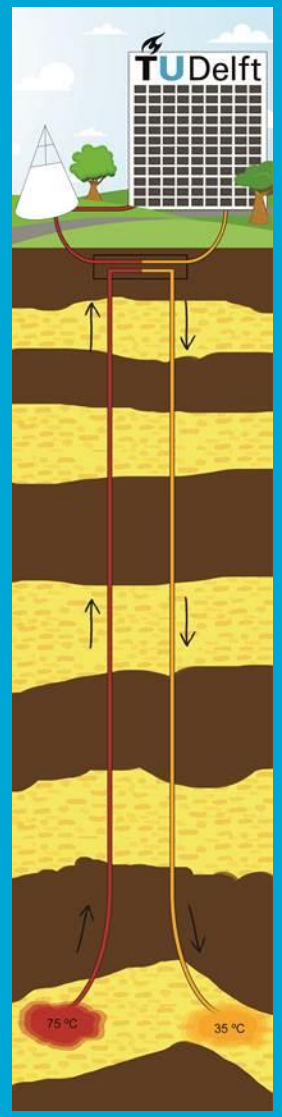
March to November 2022

- Installation of seismic stations
- Realisation of drilling location
- Detailed design complete
- Heat and gas delivery contracts updated
- Open Warmtenet Delft decision made
- Central heat pump centre decision made
- GTD final decision made

February 2023

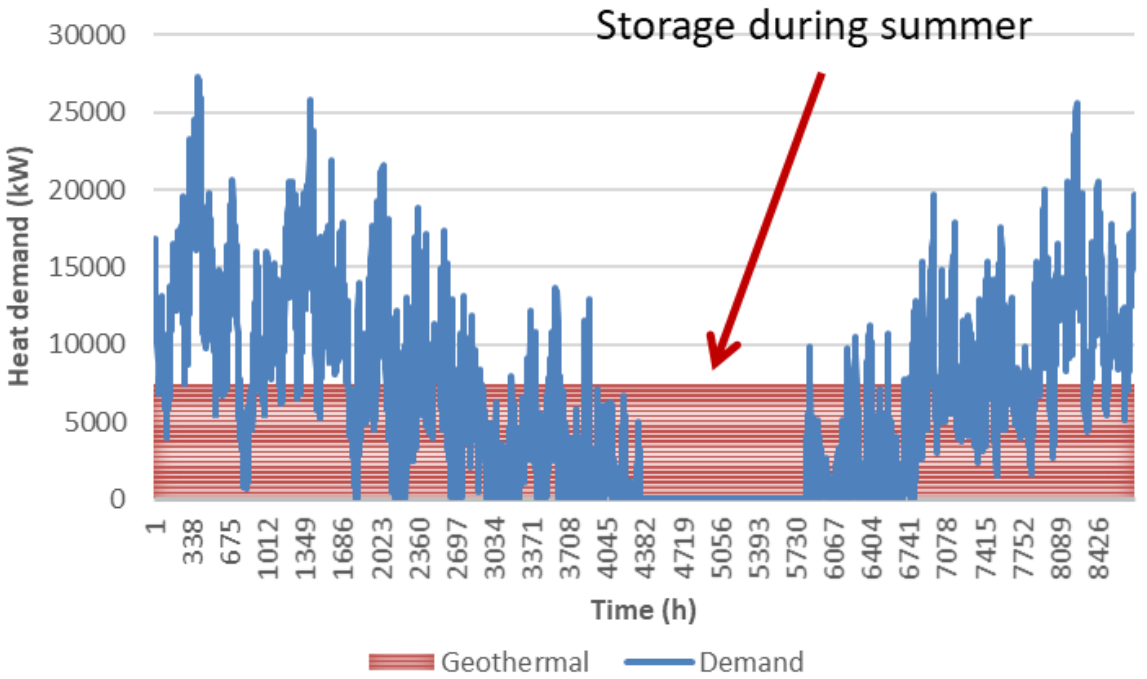
- Drilling first well

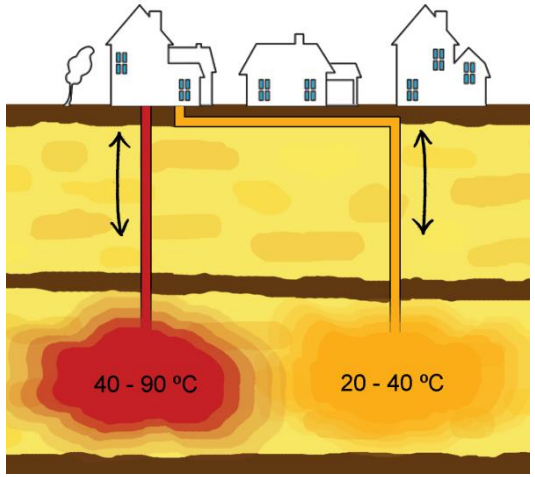

-200 m
-800 m
-2,200 m
1,500 m
-2,200 m
Delft



HT-ATES

WARMING UP

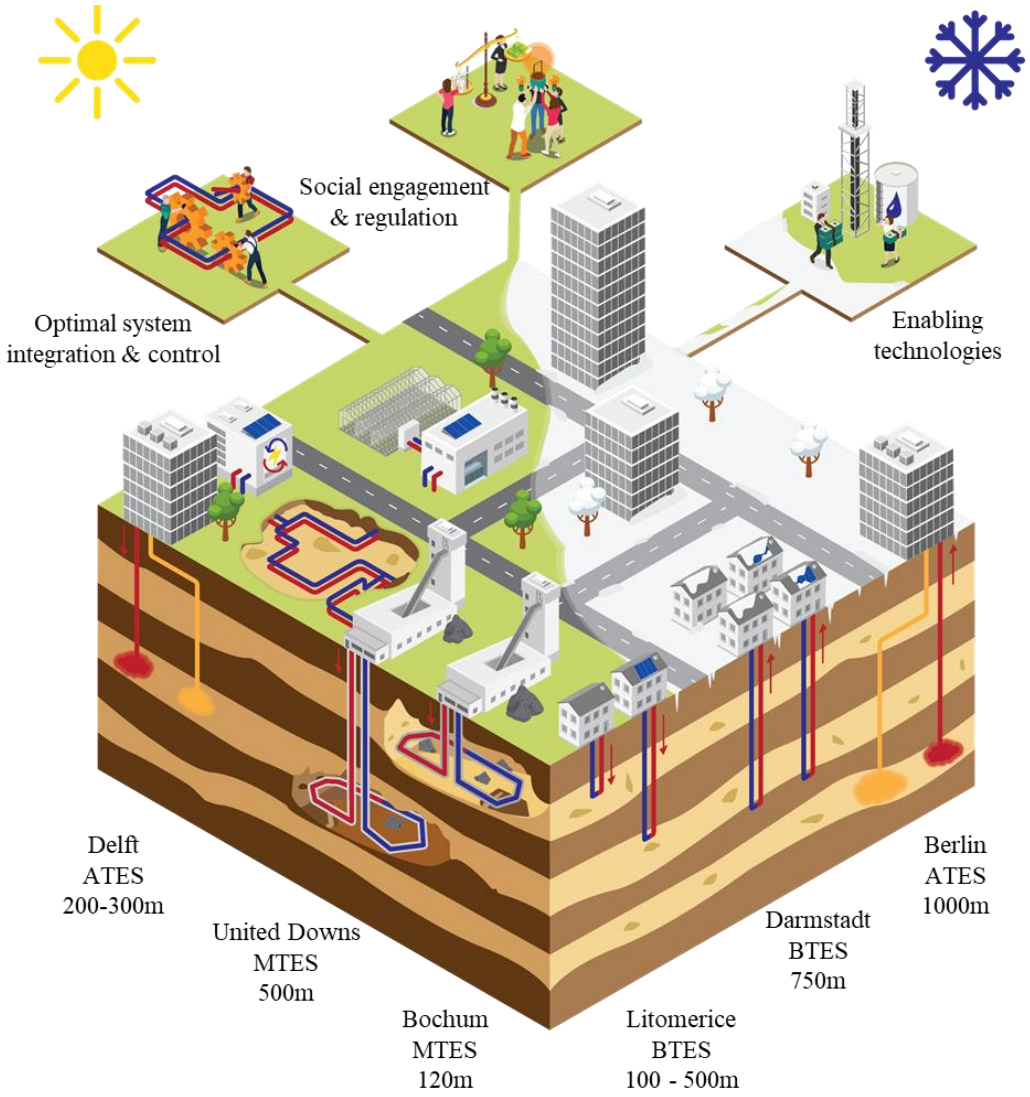




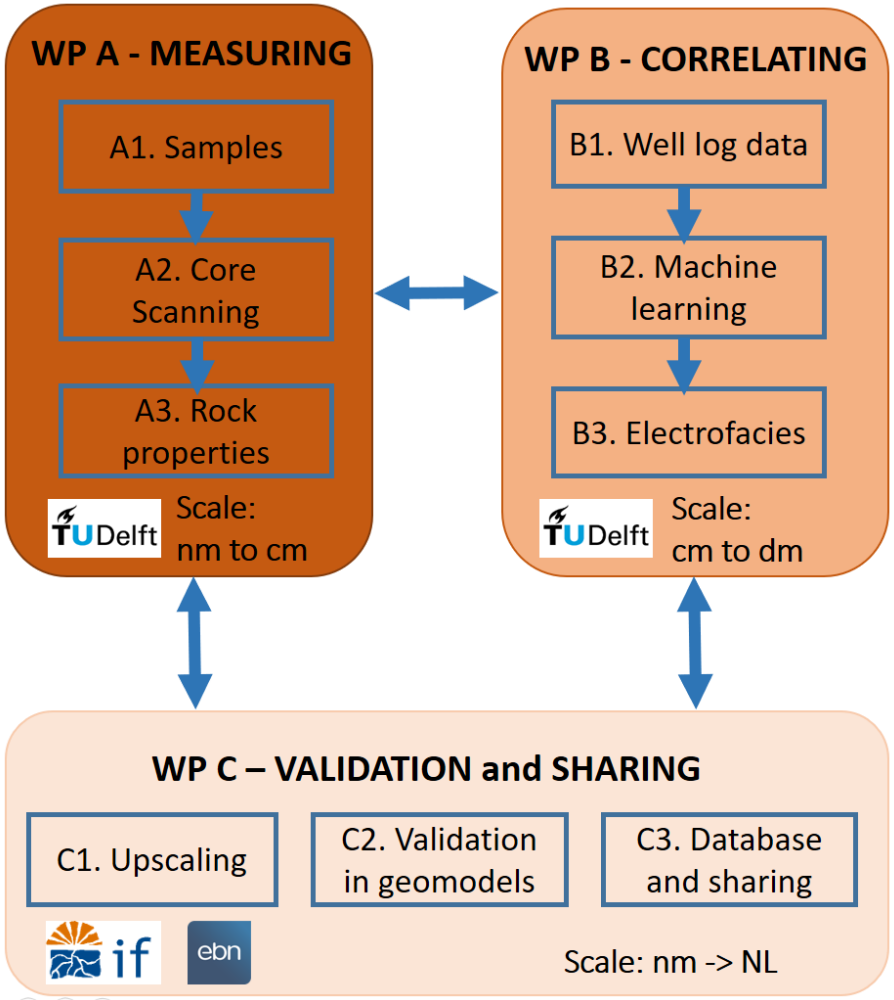
- Projections:
  - Geothermal well reduces heat CO_2 emissions by **~60%**
  - HT-ATES reduces CO_2 by **~30%**
  - Useful heat supply increased from project by up to **~70%**
- SDE++ ‘friendly’
- EU project PUSH-IT granted (2022) – install and operate HT-ATES.

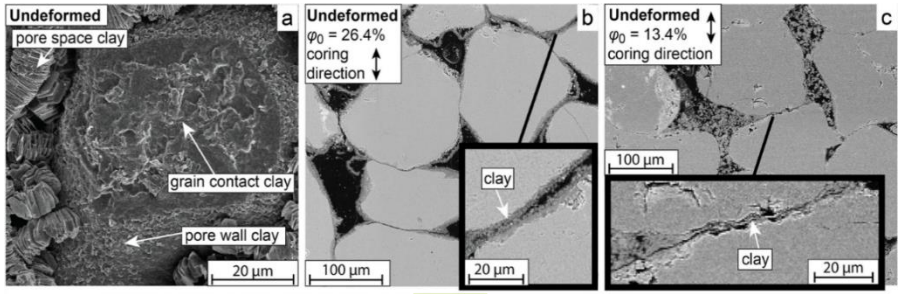
TUDelft

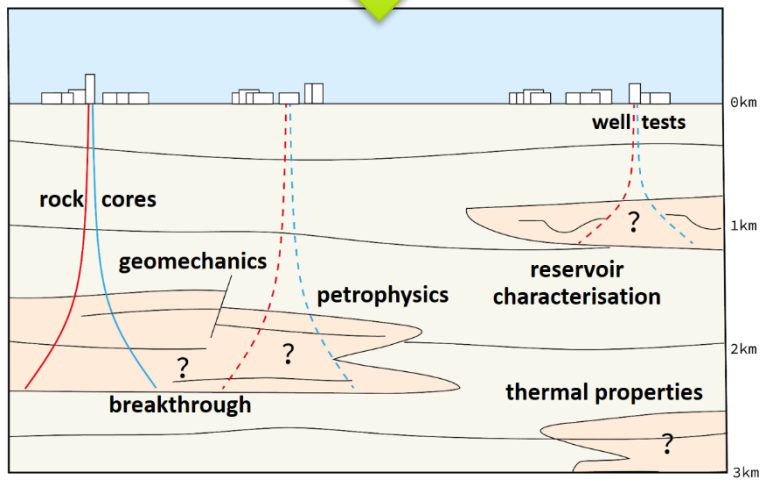
PUSH-IT


Social engagement
& regulation
Optimal system
integration & control
Enabling
technologies
Delft
ATES
200-300m
United Downs
MTES
500m
Bochum
MTES
120m
Litomerice
BTES
100 - 500m
Darmstadt
BTES
750m
Berlin
ATES
1000m

Properbase

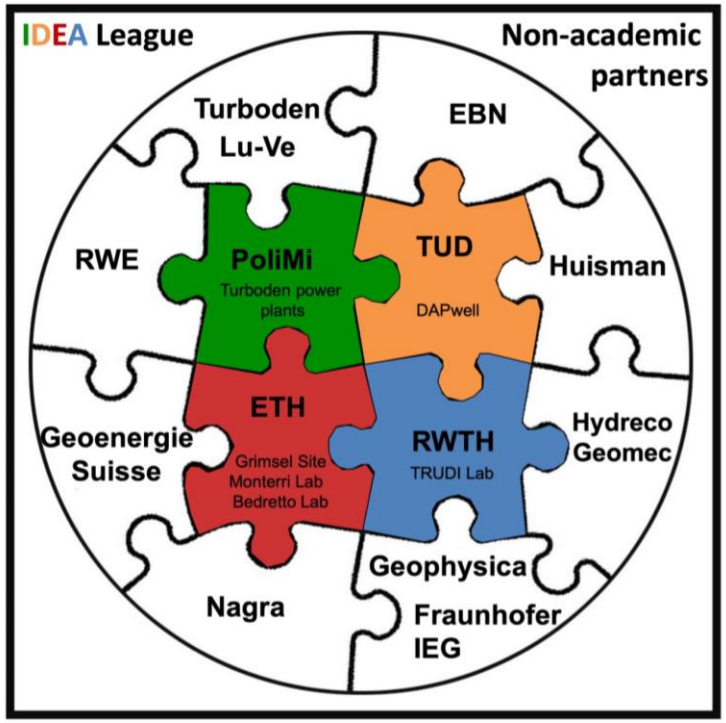

WP A - MEASURING
A1. Samples
A2. Core Scanning
A3. Rock properties
TUDelft
Scale: nm to cm
WP B - CORRELATING
B1. Well log data
B2. Machine learning
B3. Electrofacies
TUDelft
Scale: cm to dm
WP C – VALIDATION and SHARING
C1. Upscaling
C2. Validation in geomodels
C3. Database and sharing
if
ebn
Scale: nm -> NL

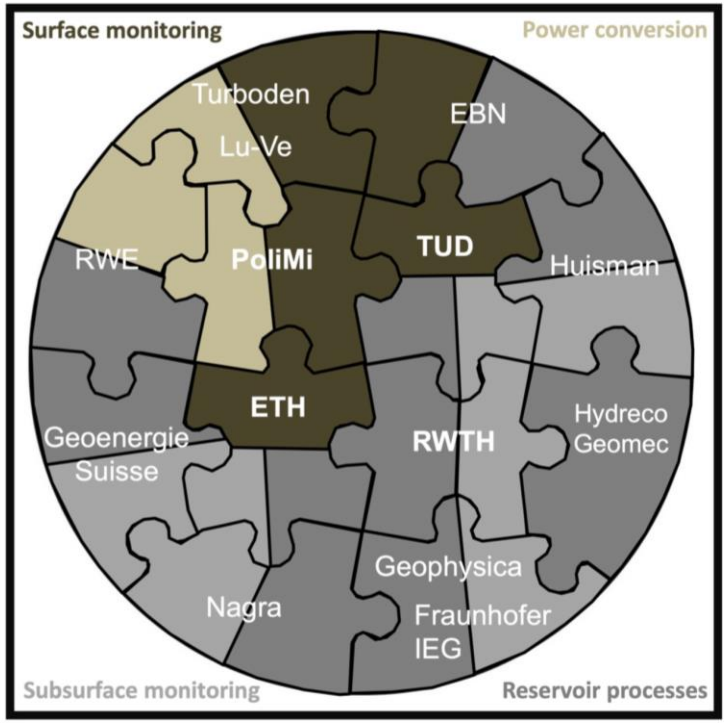

Undeformed
pore space clay
a
grain contact clay
pore wall clay
20 µm
Undeformed
φ_0 = 26.4%
coring direction
b
clay
100 µm
20 µm
Undeformed
φ_0 = 13.4%
coring direction
c
100 µm
clay
20 µm


0km
1km
2km
3km
well tests
rock cores
geomechanics
petrophysics
reservoir characterisation
breakthrough
thermal properties
?

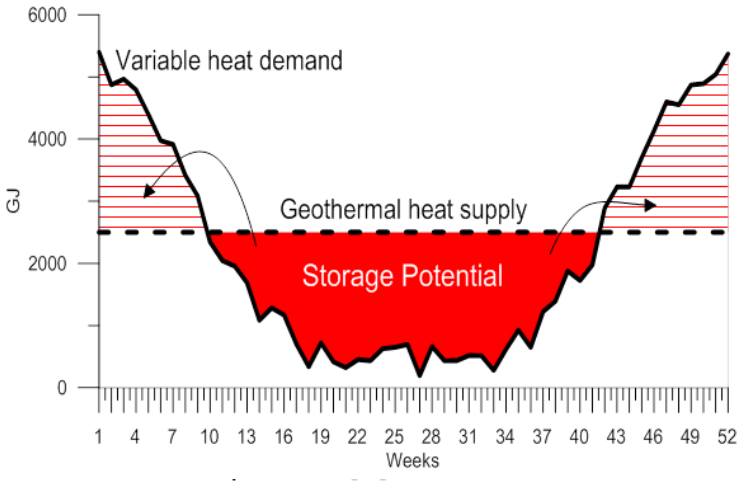
EASYGO

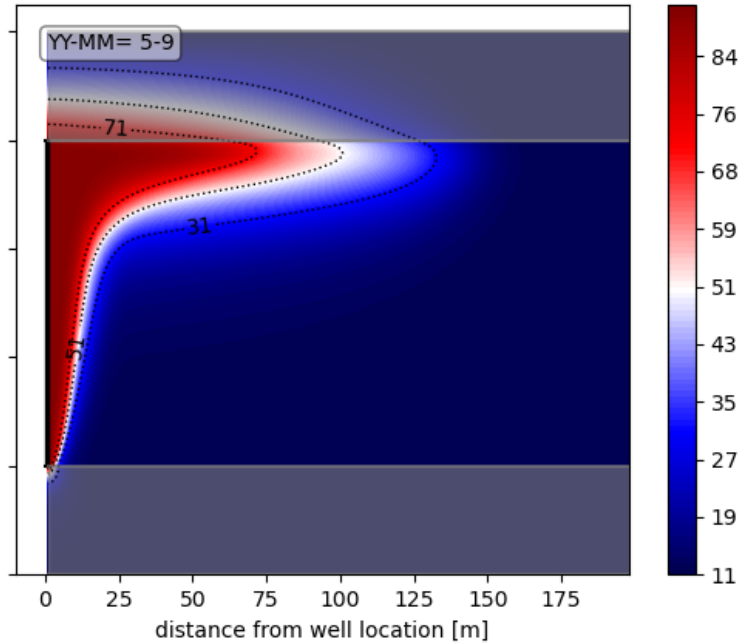
- Innovative Training Network
- European Joint Degrees (intended)
- 14 partners (4 academic +10 industry)
- 13 PhD-Projects
- University and industry secondments

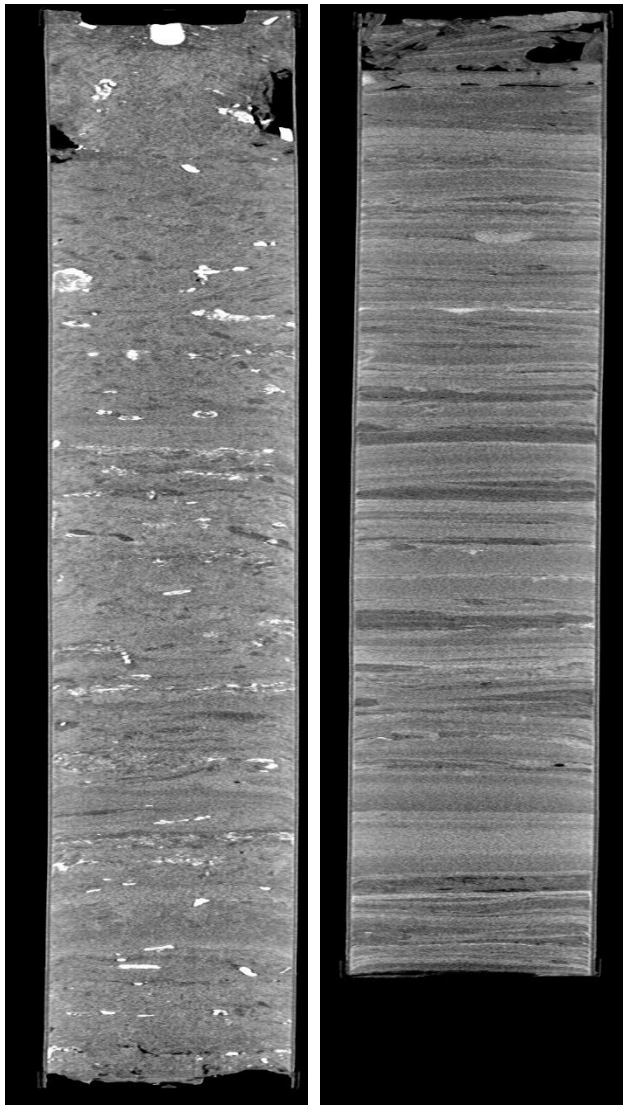




WarmingUP


6000
4000
2000
0
GJ
Variable heat demand
Geothermal heat supply
Storage Potential
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52
Weeks


YY-MM= 5-9
71
31
51
84
76
68
59
51
43
35
27
19
11
0 25 50 75 100 125 150 175
distance from well location [m]



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