GEOTHERMAL HEAT STORAGE >

OFTRINGEN

Philip Klingler

erdwärmeoftringen

gruner >

Designing our habitat

gruner >

COMPETENCES

- > ENERGY
- > BUILDING TECHNOLOGIES
- > GENERAL PLANNING
- > CIVIL ENGINEERING
- > CONSTRUCTION
- > SAFETY
- > ENVIRONMENT

22
Companies

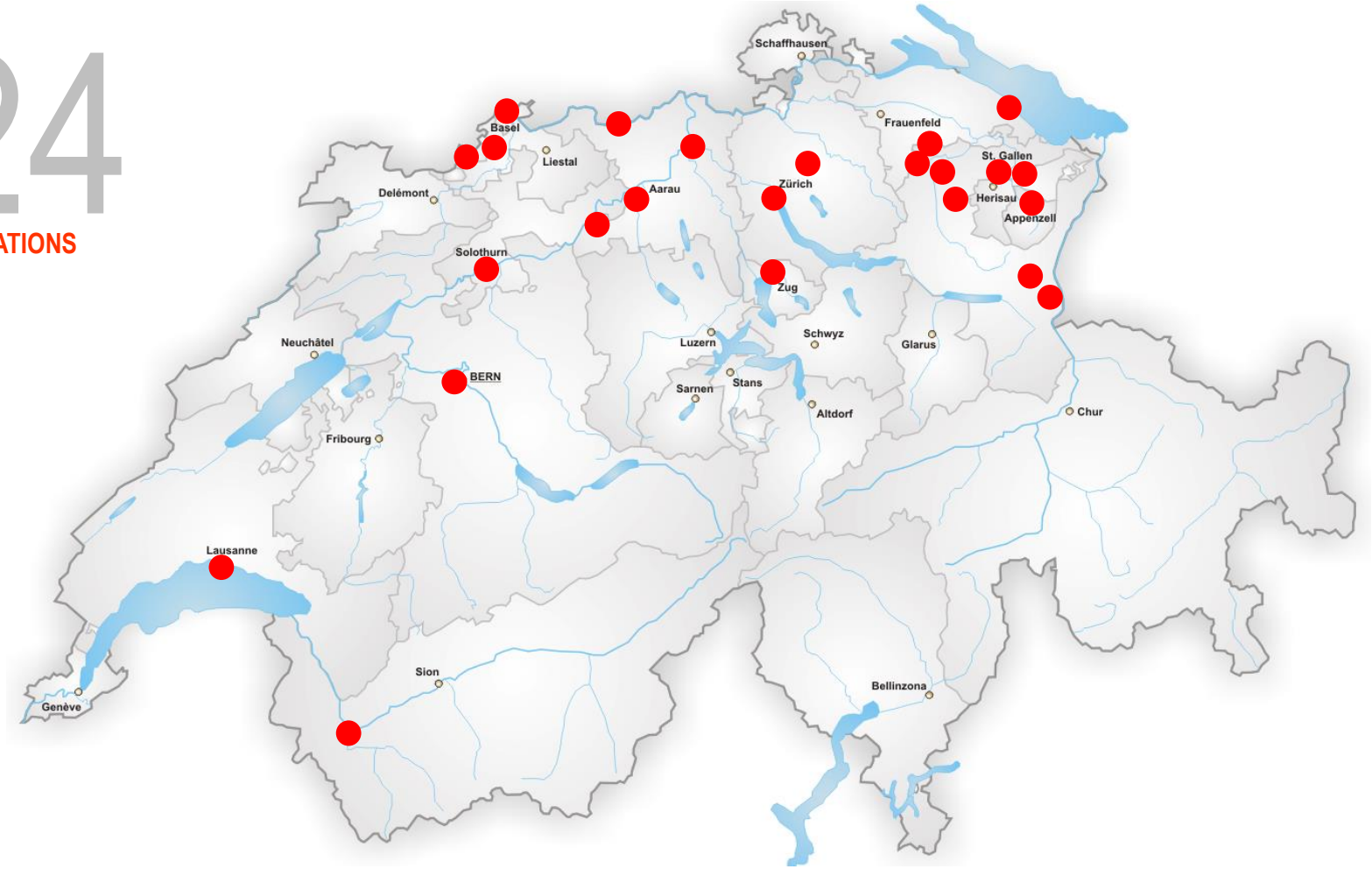
1057
Employees

since 1862

LOCATIONS IN SWITZERLAND

24

LOCATIONS



erdwärmeoftringen

gruner

LOCATIONS WORLDWIDE

10
LOCATIONS

Gruner GmbH, Köln
Gruner GmbH, Stuttgart
Gruner GmbH, Leipzig
Gruner GmbH, Wien

Stucky Balkans d.o.o., Belgrad
Stucky Caucasus Ltd, Tbilisi
Stucky Teknik Ltd, Ankara

Stucky Asia, Bangkok

Gruner Peru S.A.C, Lima

ENERGY FOCUS

- Geothermal energy
- District heating
- Hydro power
- Energy plants
- Power transmission

ENERGY REFERENCES

Hydro dam Muttsee, Glarner Alps

for:

Axpo Power AG

Geothermal district heating Riehen

for:

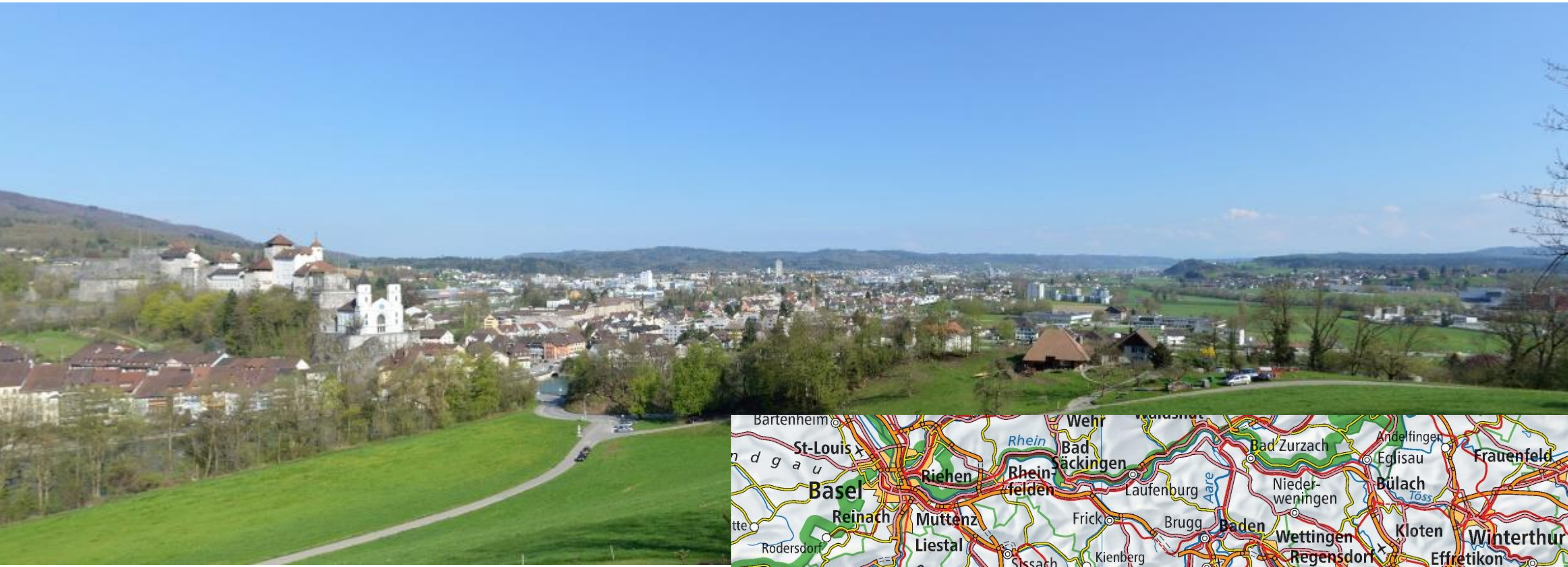
Erdwärmeriehen AG

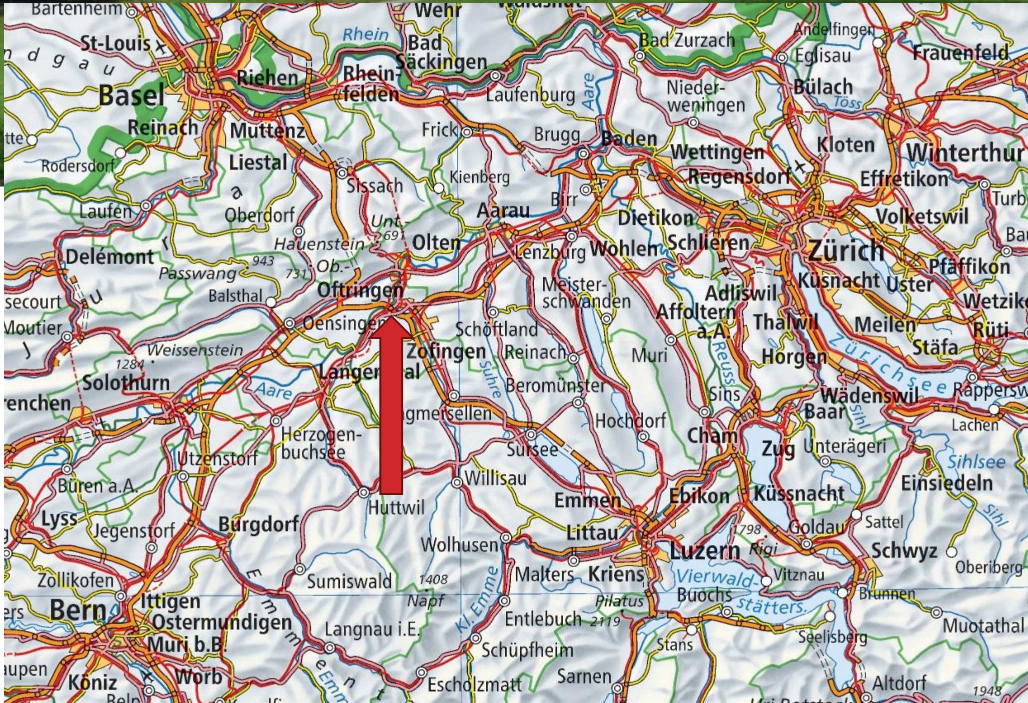
ETDE, Mosambik

for:

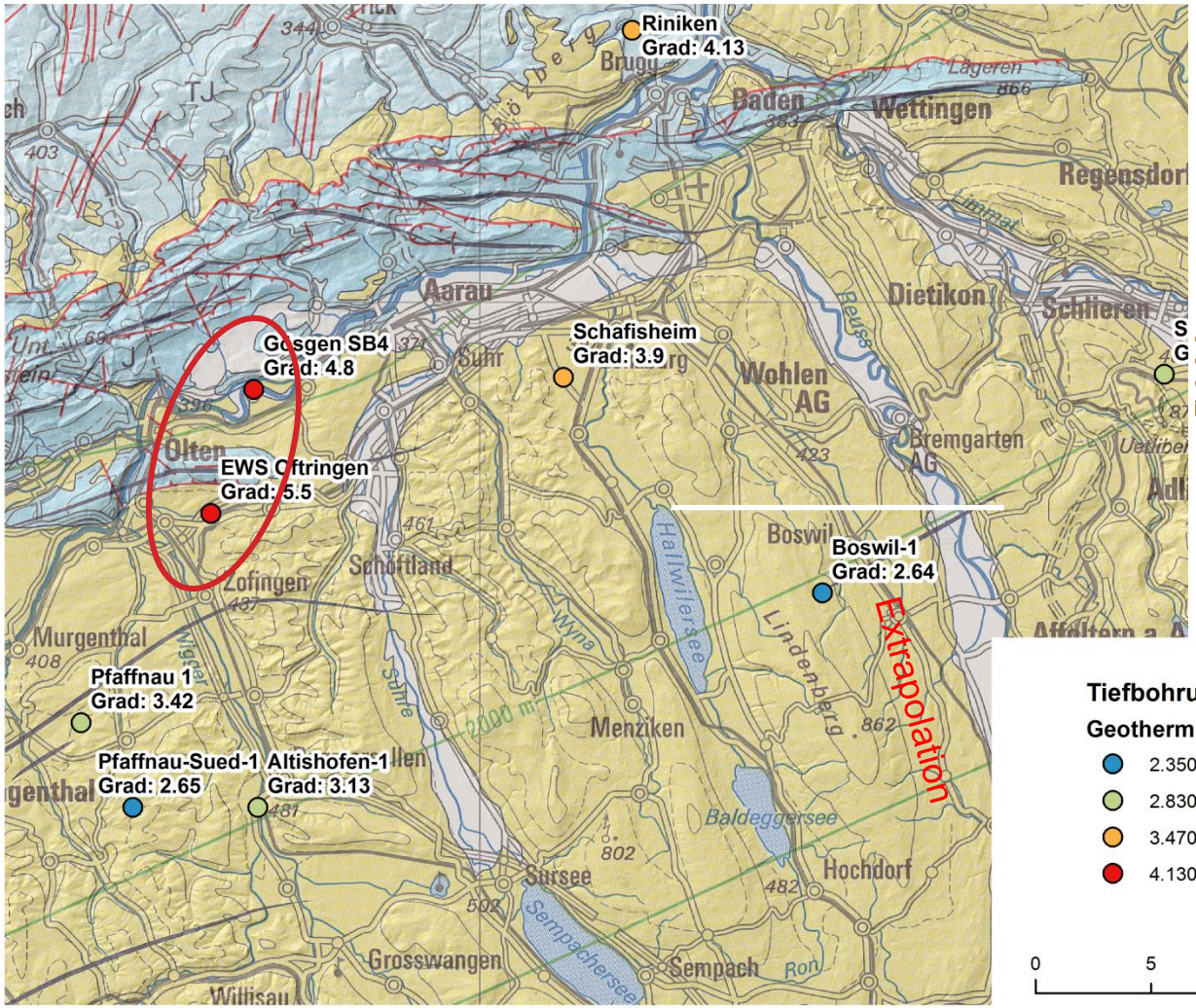
ETDE France

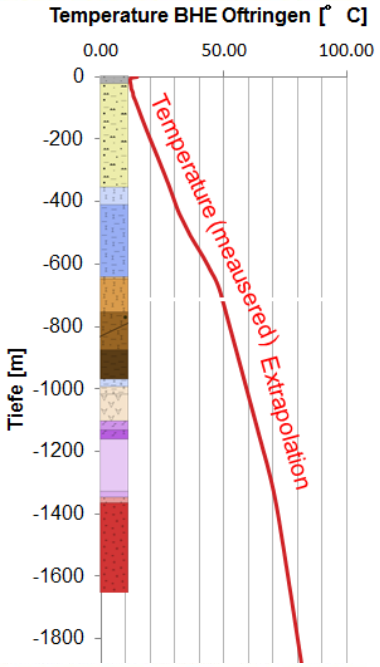
Now back to Oftringen…





Increased geothermal gradient





Tiefbohrungen

Geotherm. Gradient [K/100m]

- 2.350000 - 2.830000
- 2.830001 - 3.470000
- 3.470001 - 4.130000
- 4.130001 - 5.500000

N

0 5 10 20 km

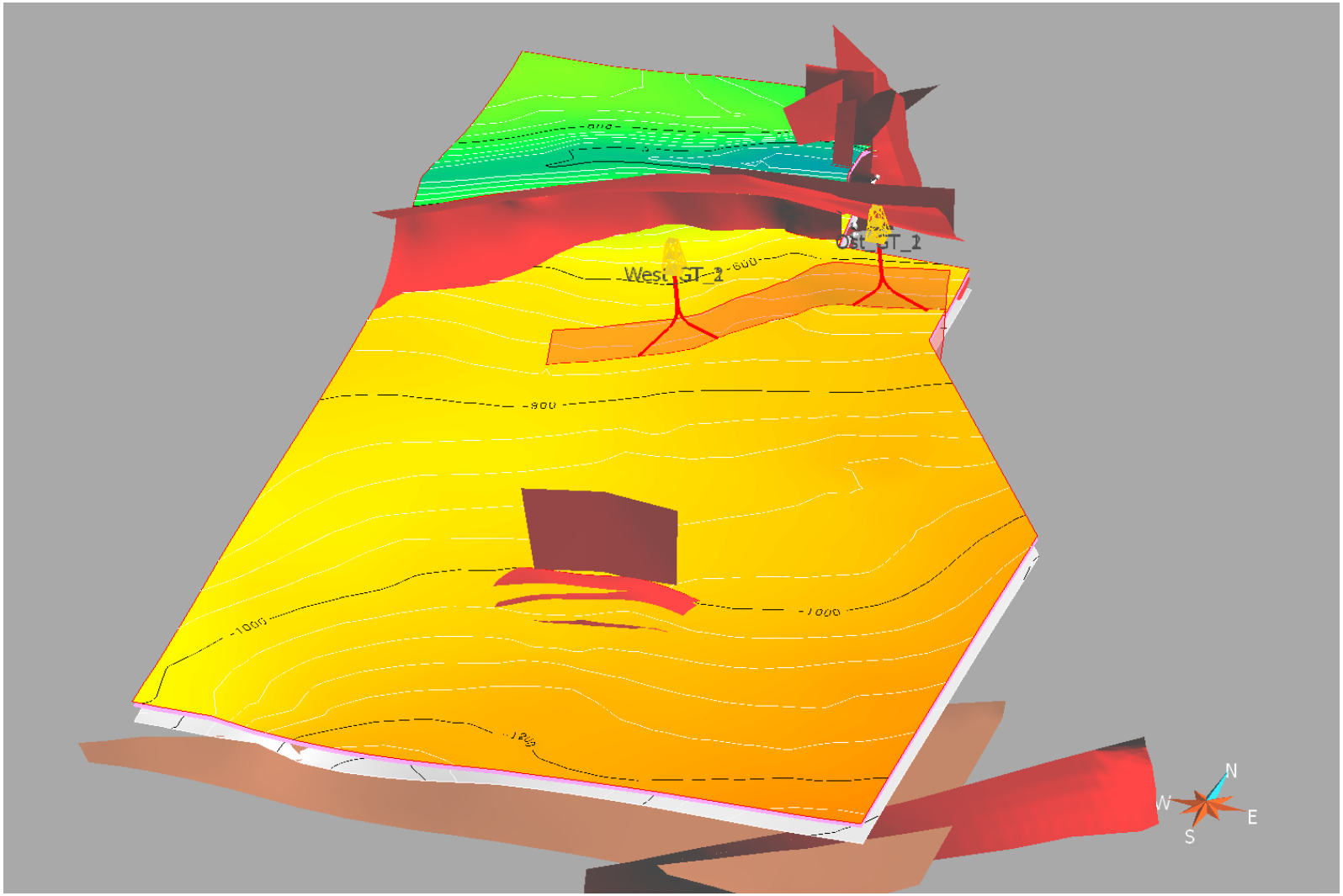
erdwärmeoftringen

gruner

Geothermal Timeline of Oftringen

- 2007 Deep BHE reveals a high geothermal gradient
- 2012 Study on the potential of deep geothermal energy
- 2013 Conclusion preliminary design study
- Nov. 2013 Incorporation of Erdwärme Oftringen AG
- 2014 Deep exploration well (swissnuclear) reveals high geothermal gradient too
- 2014/2015 roundup of of private and public investors
- May 2015 Exploration licence approved
- 2015 … just a minute…

Preliminary design study: Geological Model



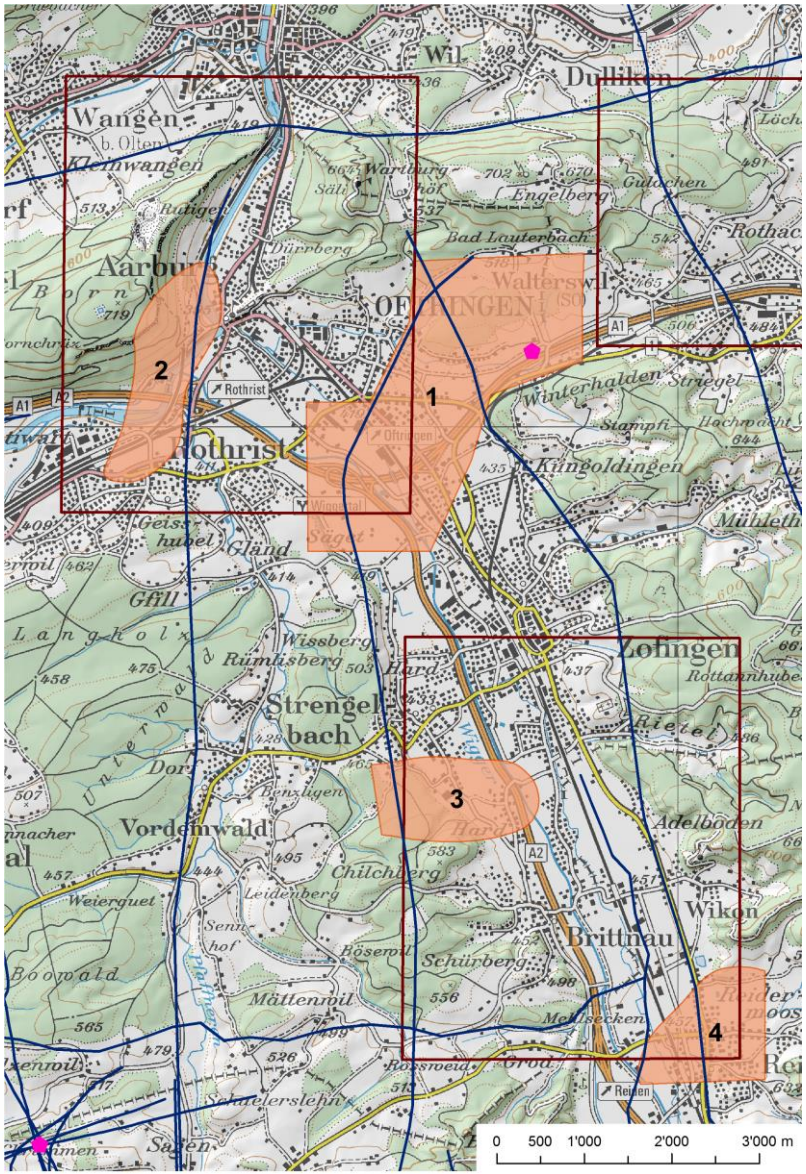
erdwärmeoftringen

gruner

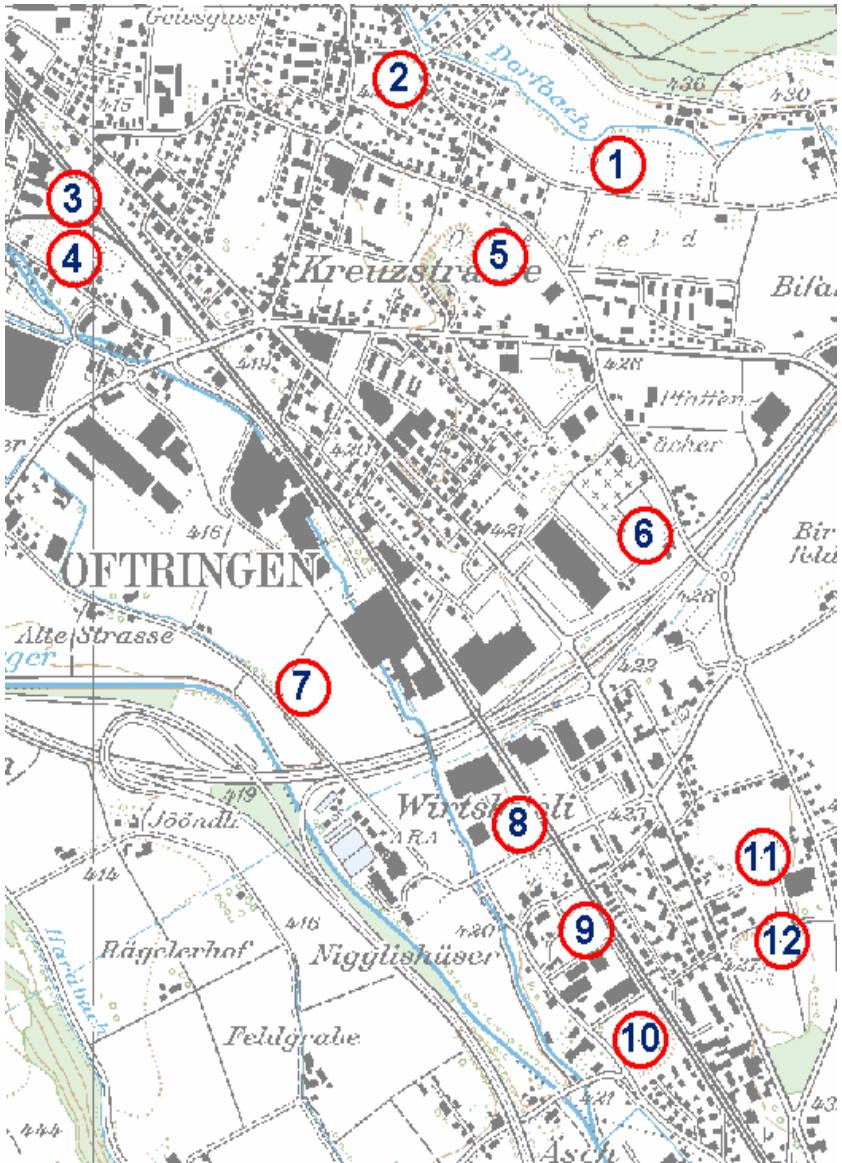
Preliminary design study

On the basis of a thorough geological analysis four potential areas of interest were defined

→ Section1 was chosen



Preliminary design study: site evaluation



	Geology	Building stability	Noise	Access	Polluted site	Natural hazards	Gas	District heating	TOTAL
1									**
2									
3									
4									
5									
6									*
7									***
8									*
9									
10									
11									
12									

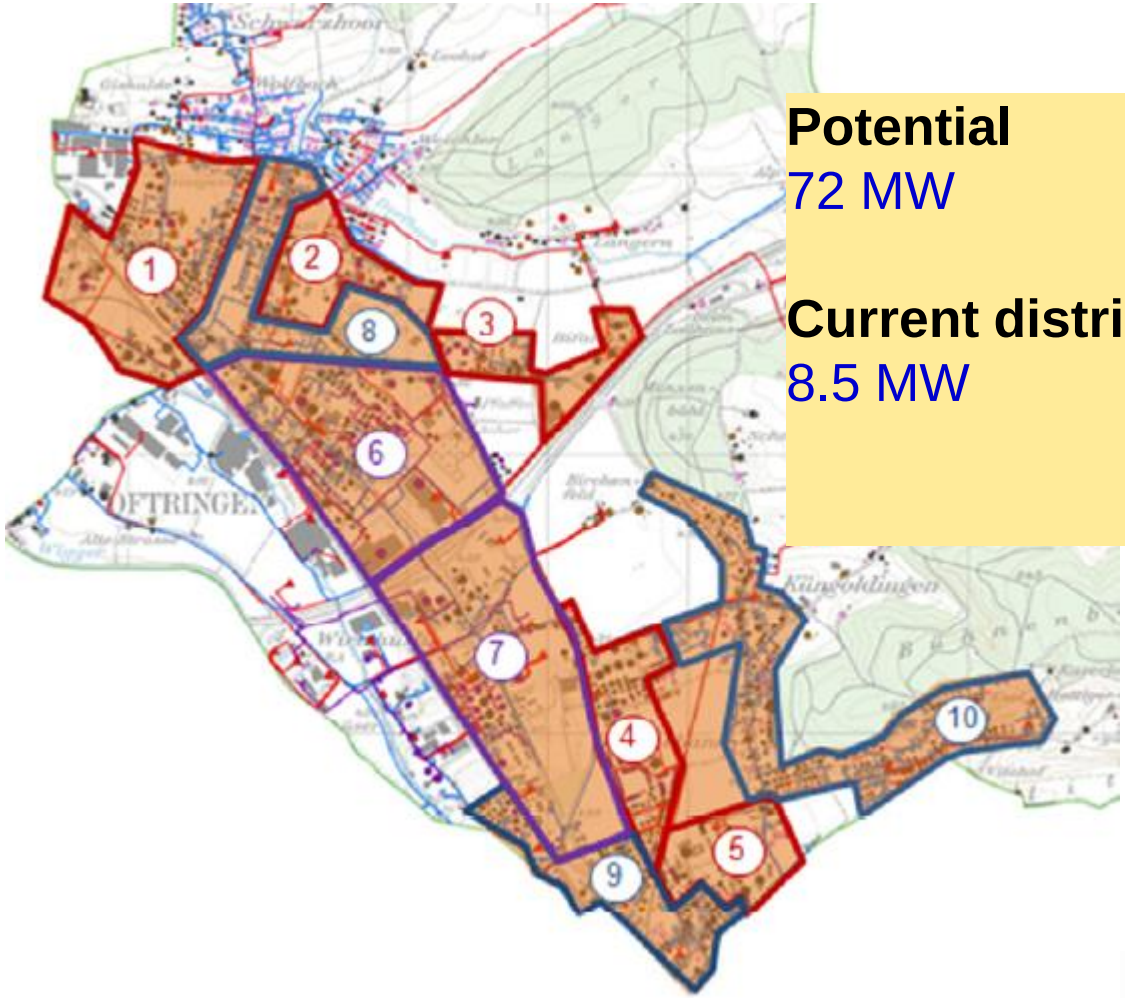
District heating sales potential study

- Goals
  - Verification of expected district heating sales potential
  - Pathways for district heating network
  - Cost evaluation
  - Basis for economic evaluation

- Results
  - Connection Power: 21-40 MW (theoretical 71 MW)
  - Heat sales potential: 49-93 GWh (theoretical 166 GWh)

District heating sales potential study

Potential for district heating in Oftringen



Potential (Study "nova")

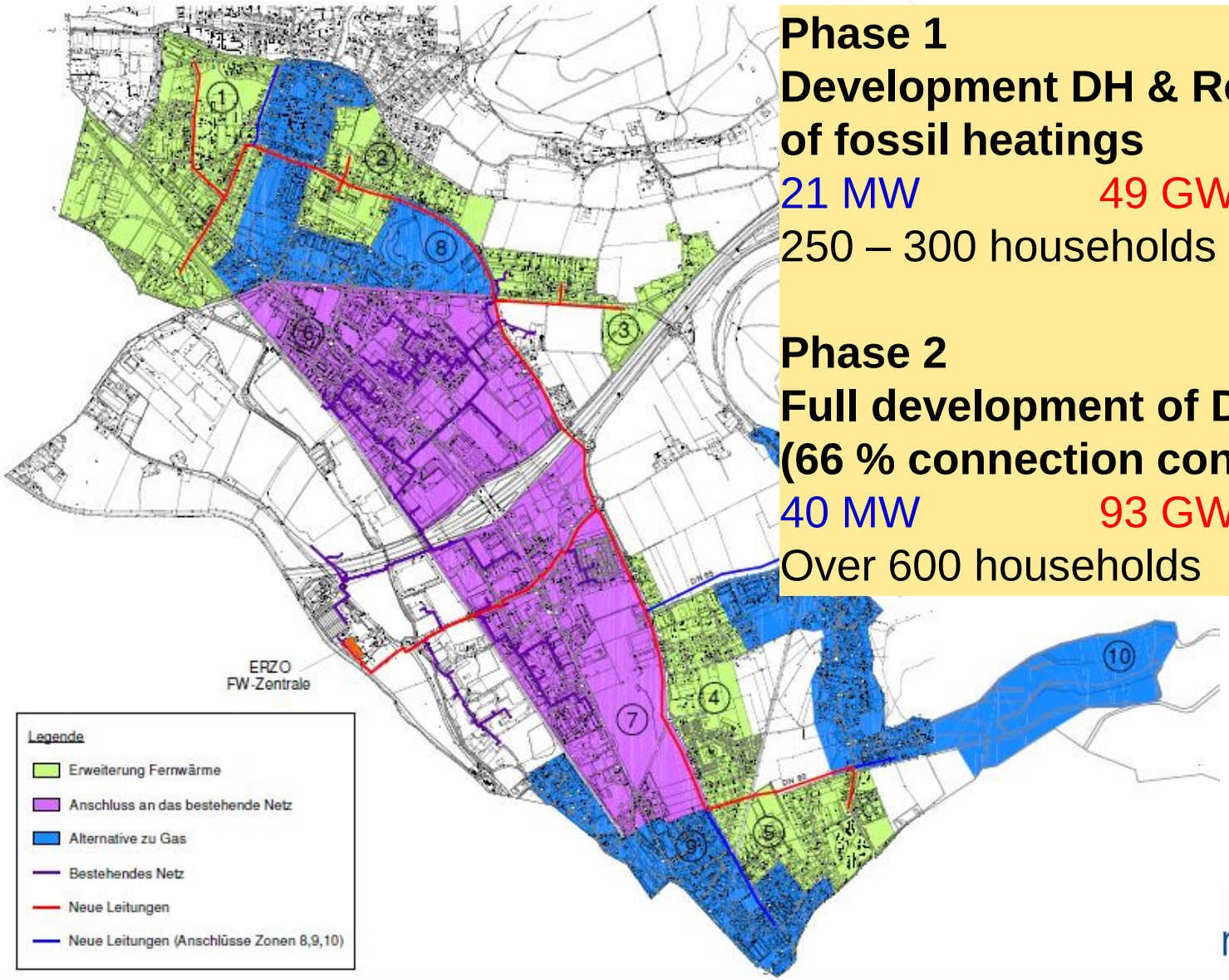
72 MW 166 GWh/a

Current district heating (ebm)

8.5 MW 20 GWh/a

meoftringen gruner

District heating development Oftringen



Phase 1
Development DH & Replacement of fossil heatings
21 MW 49 GWh/a
250 – 300 households

Phase 2
Full development of DH (66 % connection concentration)
40 MW 93 GWh/a
Over 600 households

Project idea

How can we optimize costs of peak load plant?

How can we reduce risks of not insufficient geothermal reservoir properties?

Project idea

Geothermal energy - seasonal heat storage - incineration erzo

Function in winter

erdwärmeoftringen

gruner

Function in summer

District heating Oftringen

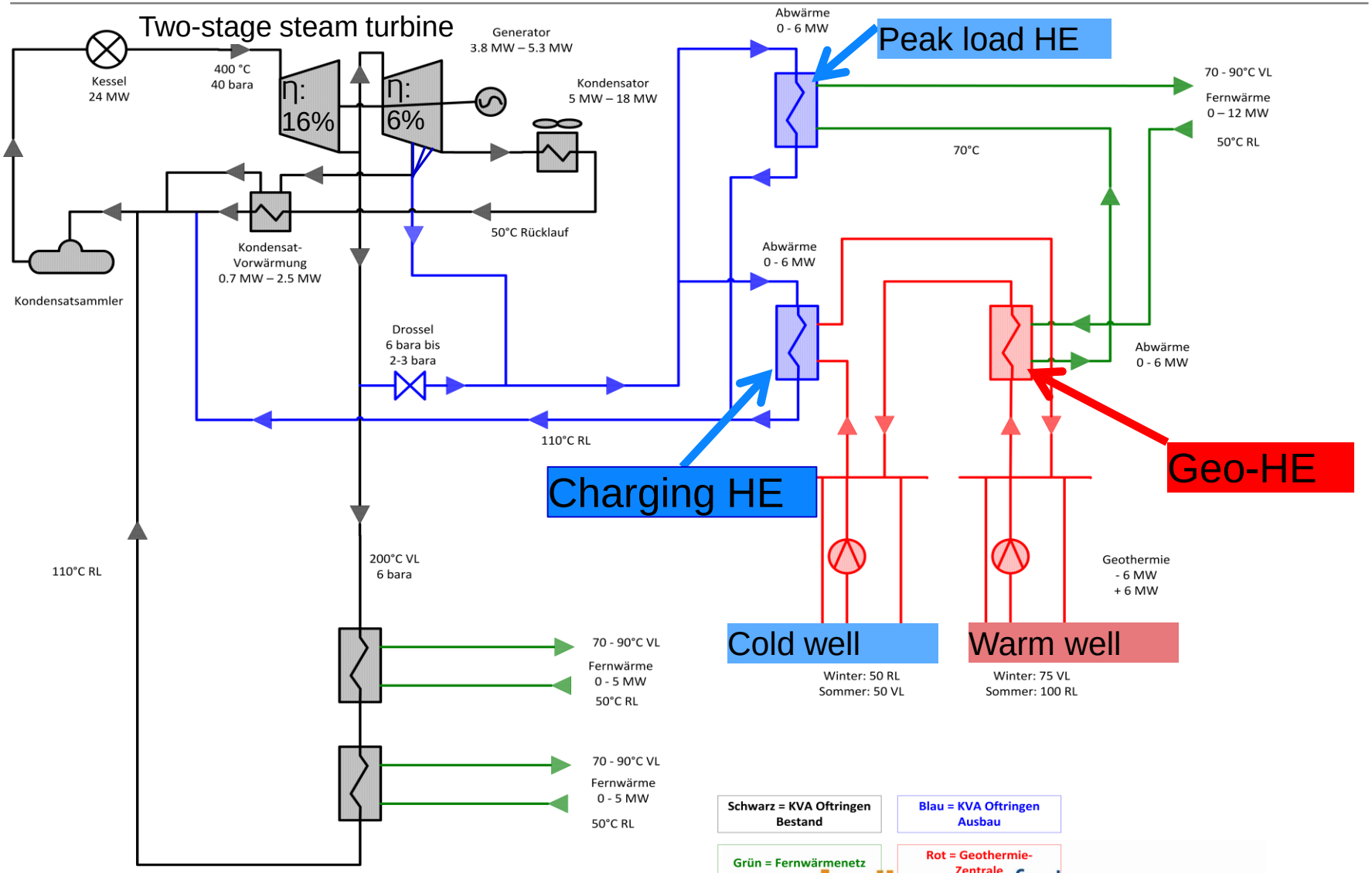
Heat pump possible

Cold well

Warm well

Discharging heat storage

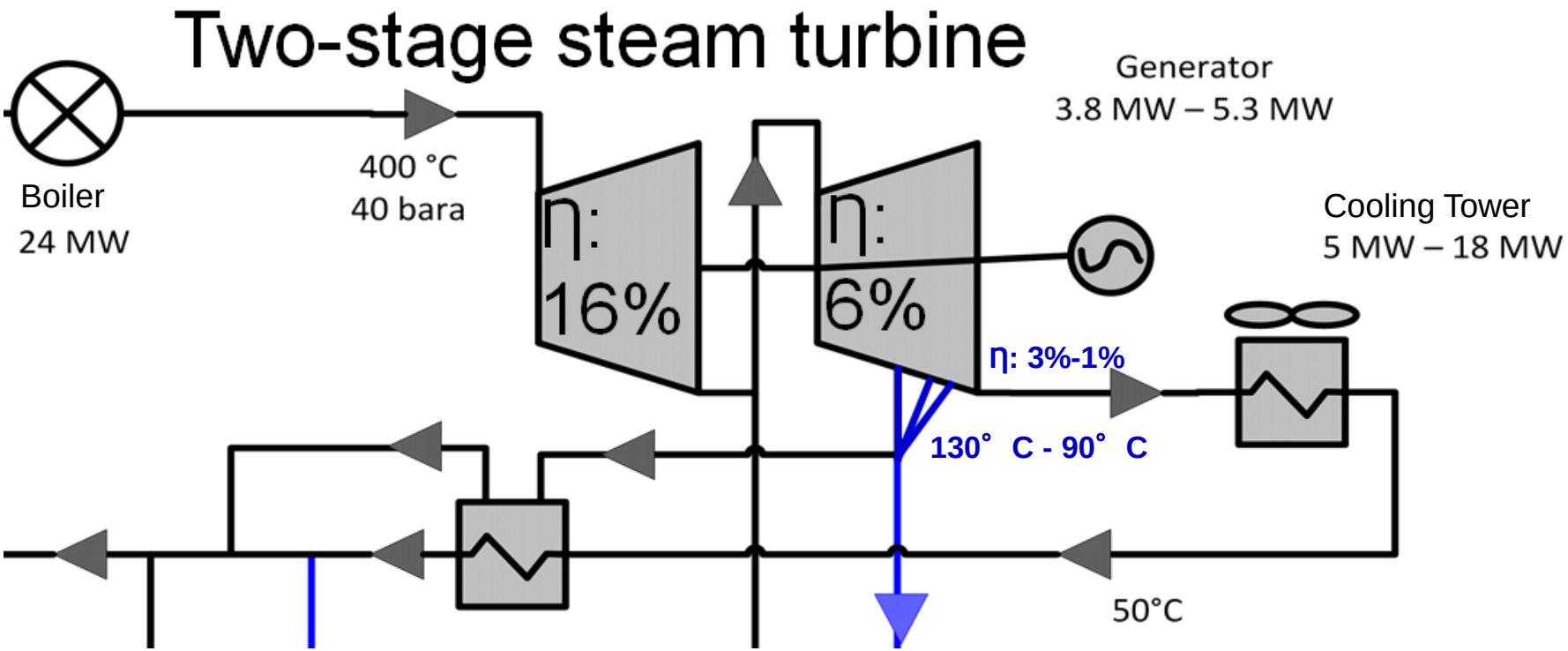
Kopplung erzo / Geothermie Oftringen



erdwärmeoftringen

gruner

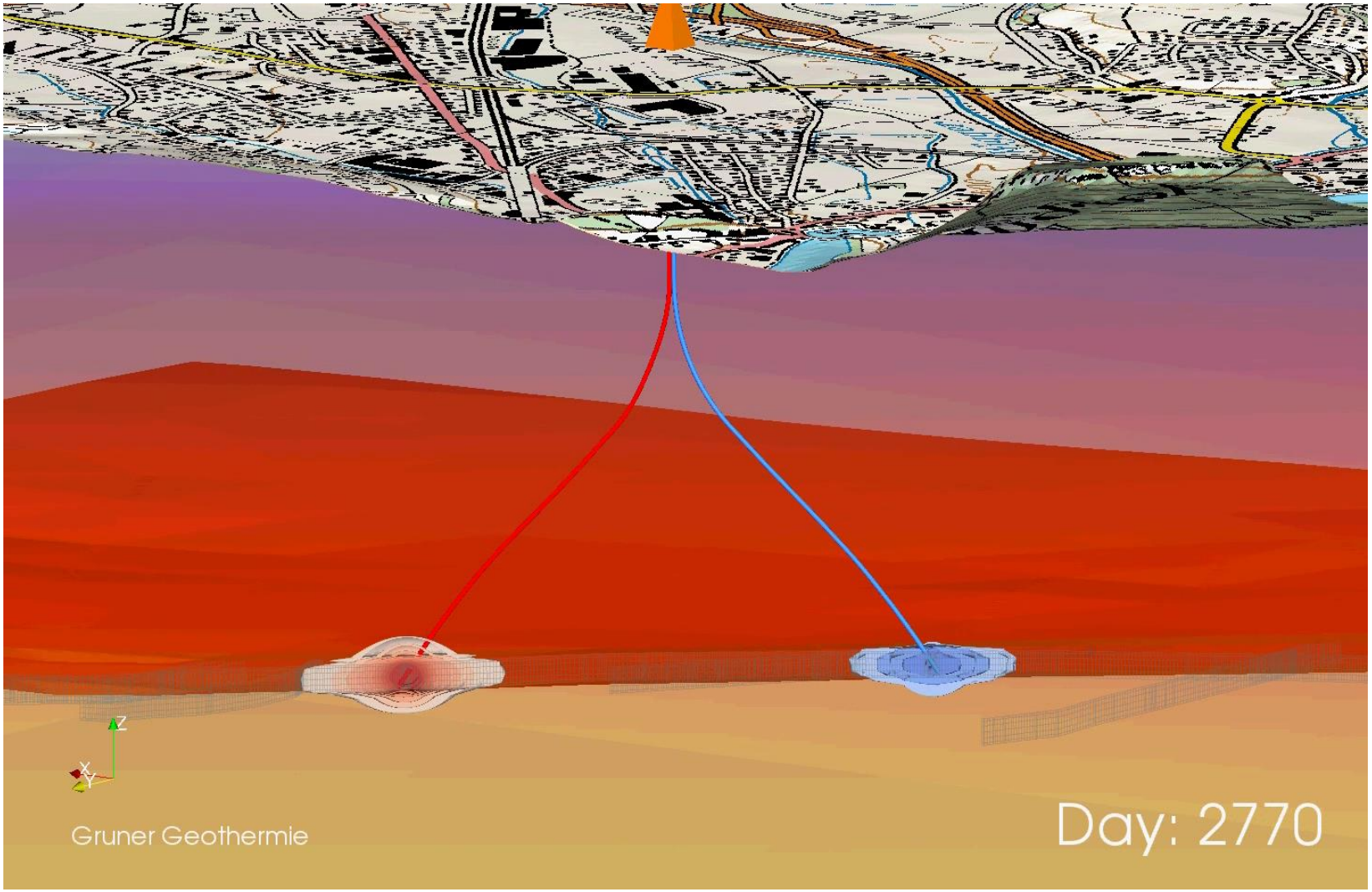
Steam extraction of low pressure steam



Modelling

- Validation of the idea
- Determination of energetic parameters for an economic evaluation

Hydrogeological reservoir model



erdwärmeoftringen

gruner

Reducing Risks

Temperature:

- Increasing temperature for direct use through heat storage

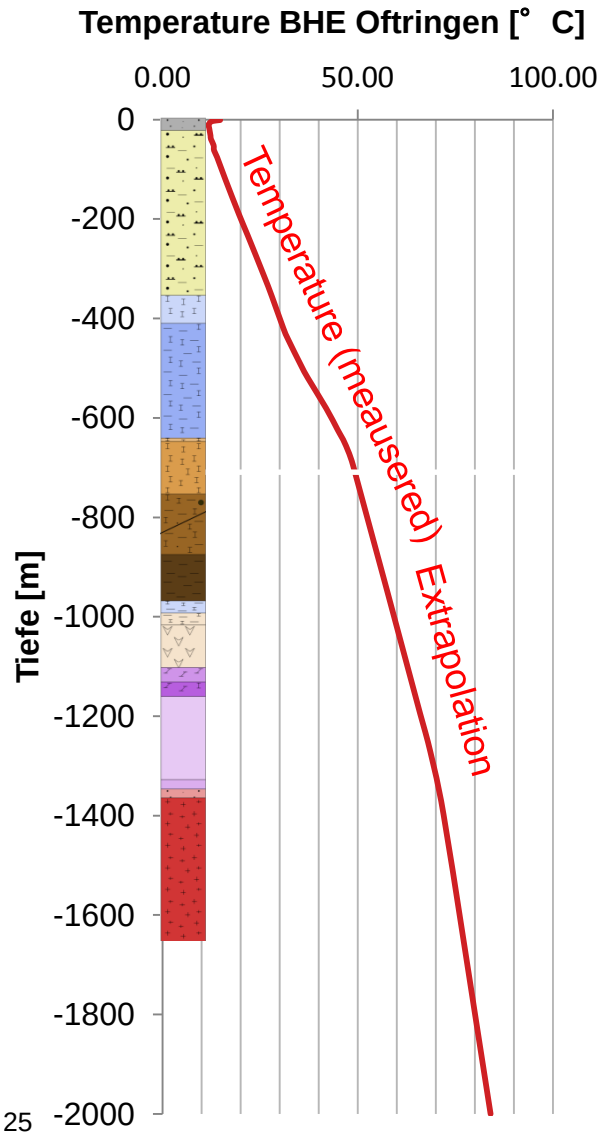
Hydraulic short cut:

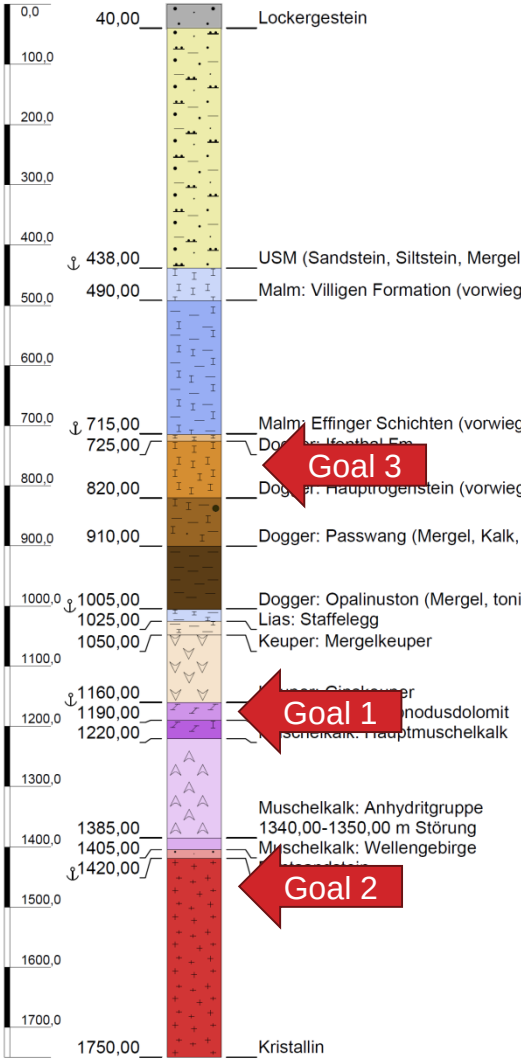
- Reversing flow directions eliminate the risk of a hydraulic short cut.
- No permanent reservoir cooling

Multi-reservoir strategy

- More independence of reservoir temperature

Multi-Reservoir-Strategy





- Primary Reservoir: Muschelkalk (triassic)
- Alternative Reservoirs:
  - Top cristalline basement
  - Mesozoic limestones

erdwärme oftringen

gruner

Projekt status

> Preliminary design study concluded

> Heat consumption potential study concluded

> Licence for seismic exploration approved

> Letters of intent of private investors

> Government subsidies pending

Next steps

2015

> Concluding process for public subsidies

> Incorporation of a supply and maintenance/running company

2016

> Stakeholder orientated marketing and communication

> Seismic exploration study

> First investments for district heating extension

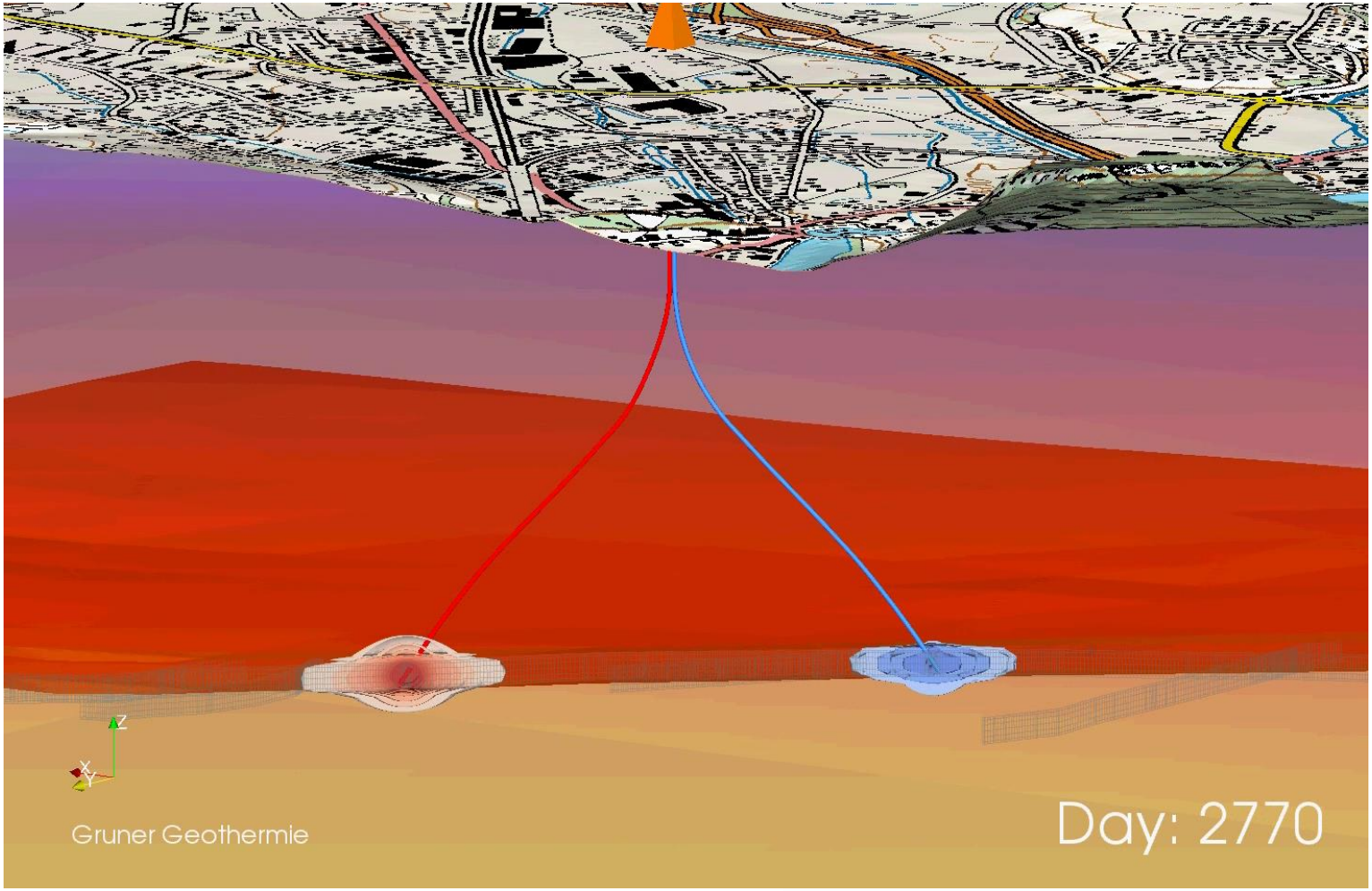
2017

> Geological & technical planning for geothermal wells & reservoir management

Conclusion

- Synergies of incineration(erzo) – geothermal energy (ewo) and district heating
- Use of excess heat (erzo) in summer due to innovative heat storage system
- Reduction of project risks
- Site is geologically representative for other sites in Switzerland (and Europe) and has a high copy potential
- Optimizing investment costs for geothermal energy and district heating
- Building on existing structures
- High Standard for supply guarantee with low costs through integration of "erzo"

Thank you for your attention!



erdwärmeoftringen

gruner