

geosfer AG / H. Naef, 2014

City of St.Gallen, 2012

# Geothermal Drilling St. Gallen: Experiences and Findings

connect4geothermal, Basel, Oct. 4th, 2023

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# Geothermal Project City of St.Gallen (see also [project web site](#))

## + Initial situation

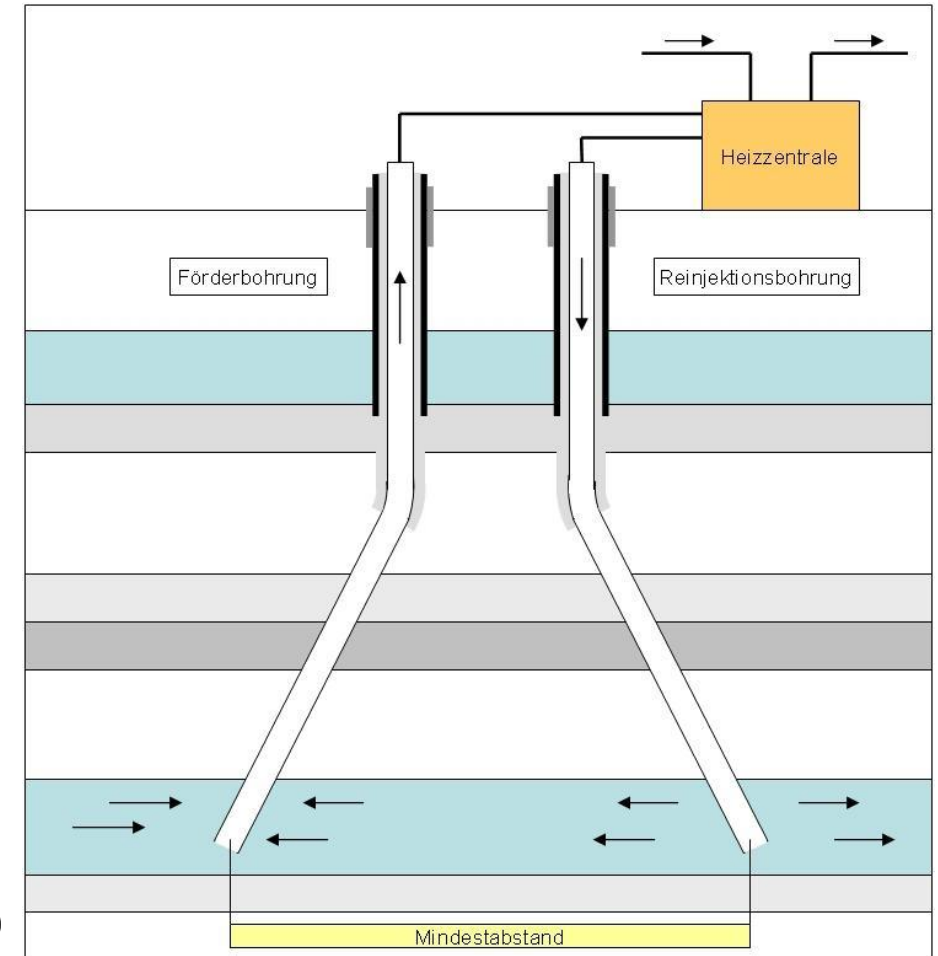
- Need for clean, renewable heat at high T ( $>120^{\circ}\text{C}$ )
- Geology favourable (aquifers & structures assumed)
- Strong backing of local public and politics

## + Main goals

- Geothermal for district heating and electricity
- Concept: «hydrothermal doublette»

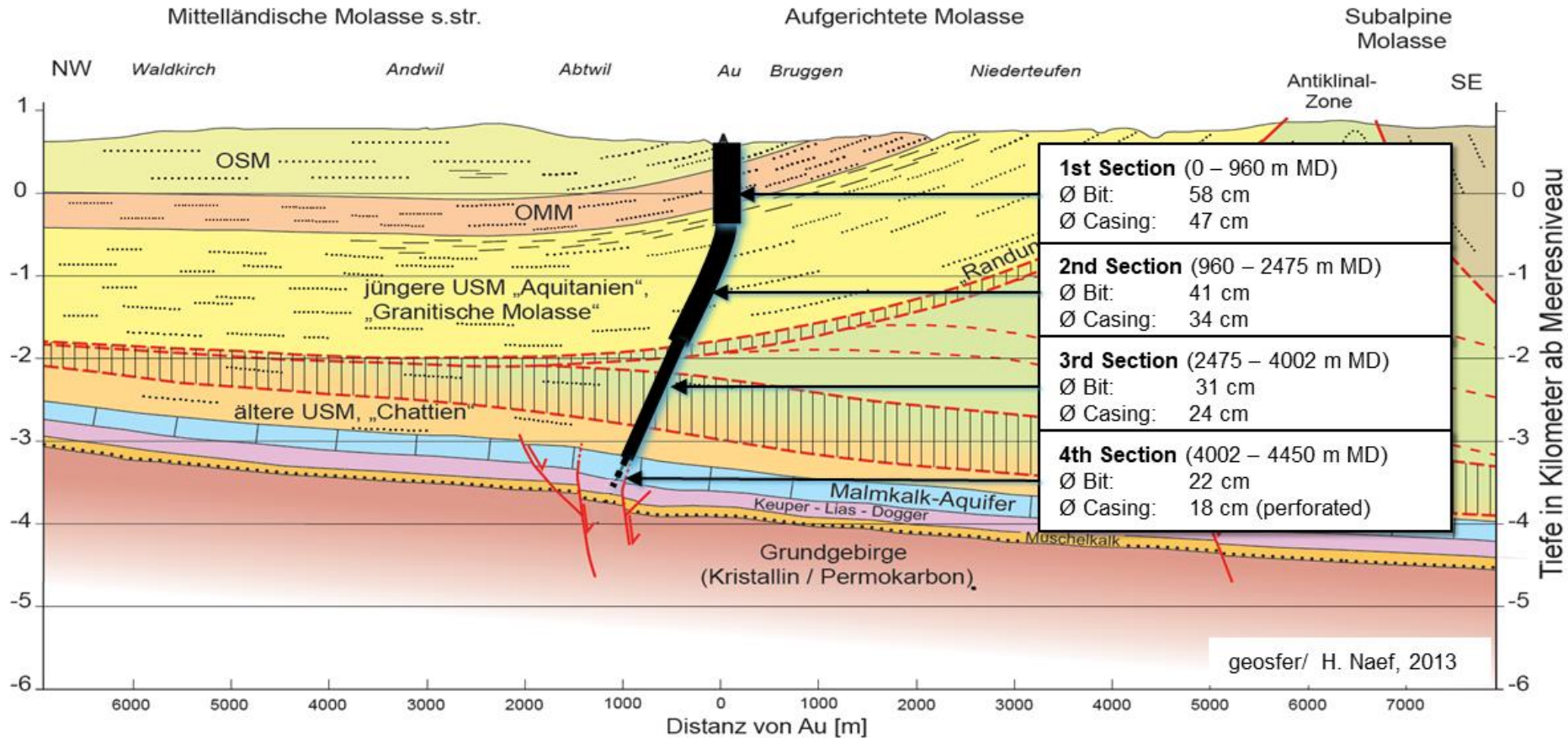
## + Measures

- Feasibility study (2009)
- 270km<sup>2</sup> 3D-Seismic (2010-2011)
- Construction drill pad and well planning (2011-2012)
- «St.Gallen GT-1» well (2013)

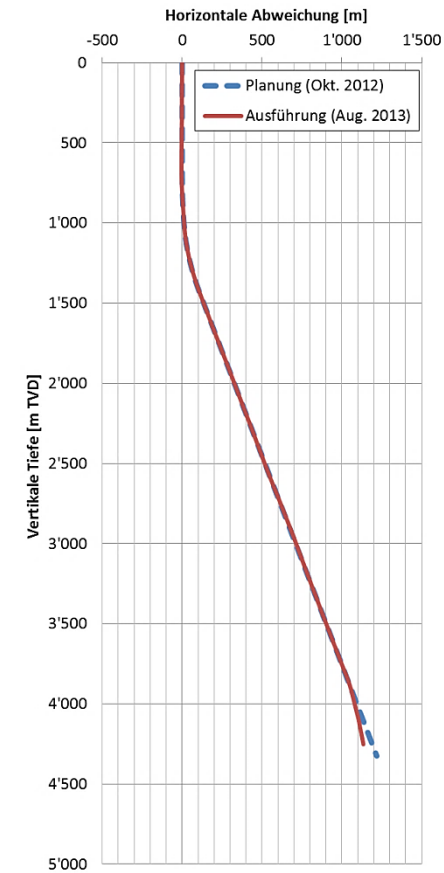
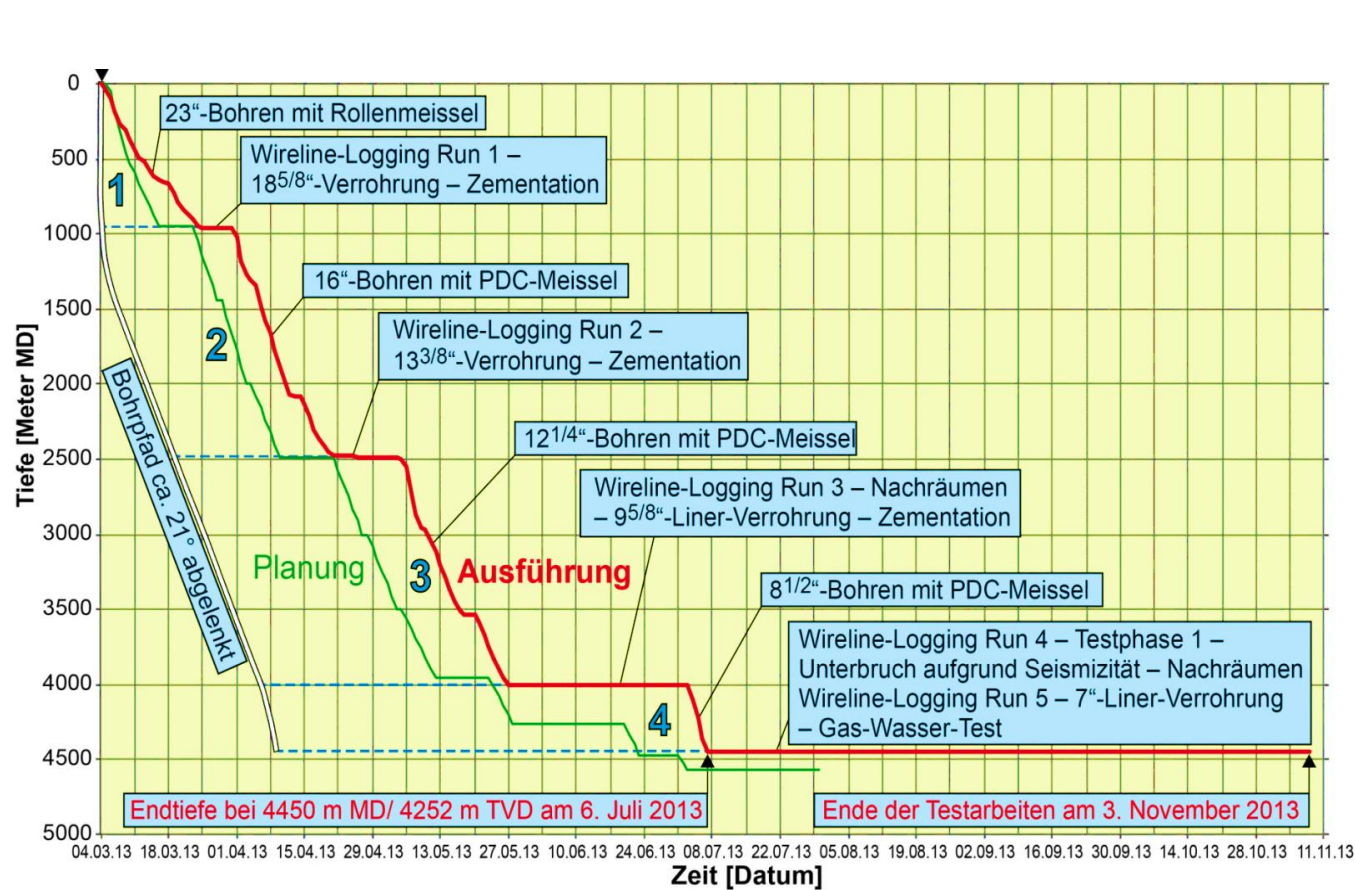


Grafikquelle: [LfU, Bayern \(2016\)](#)

# Planning Phase: Details Geology & Well «St.Gallen GT-1»

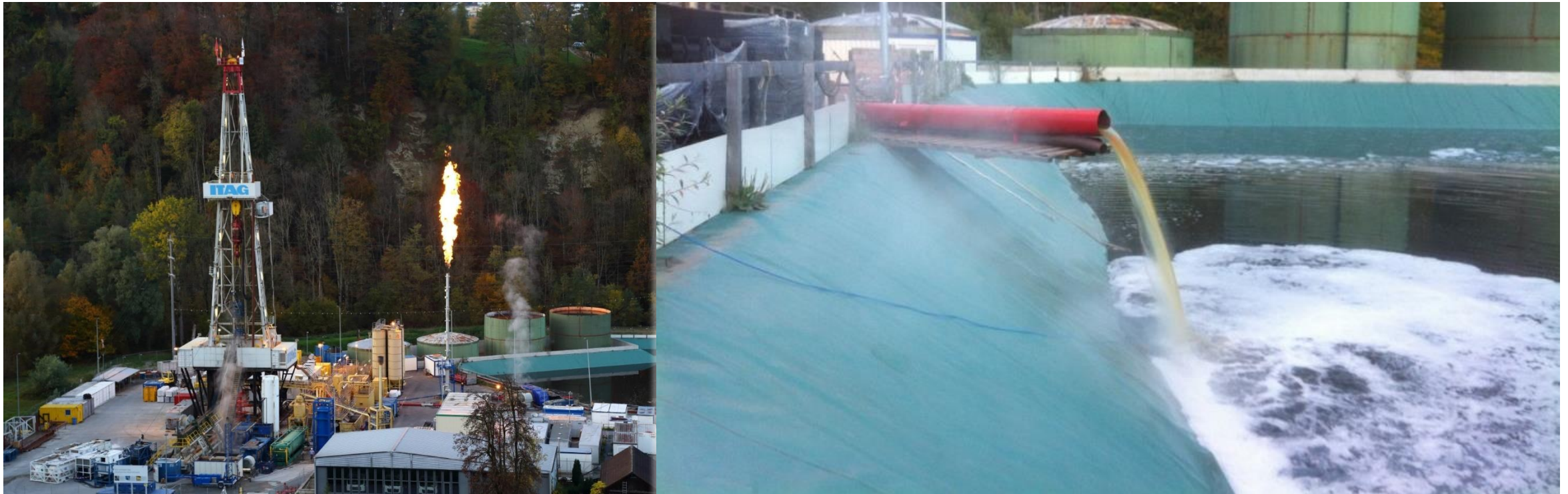


# Drilling Phase: Planning vs. Realisation



City of St.Gallen, St.Galler Stadtwerke, 2013

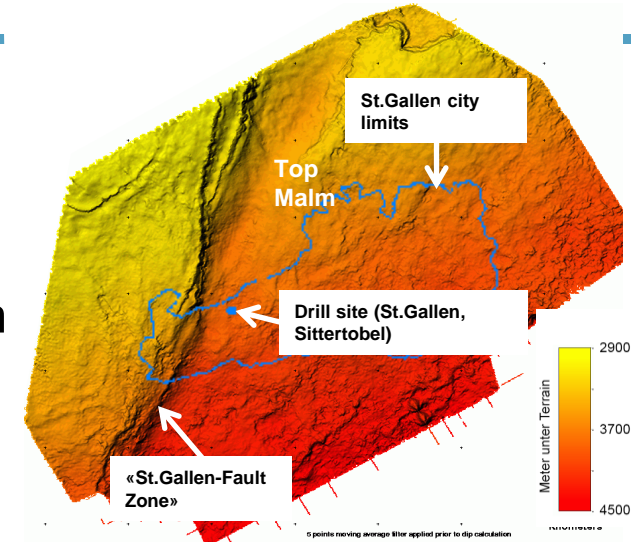
# Testing Phase: Impressions



City of St.Gallen, St.Galler Stadtwerke, 2013

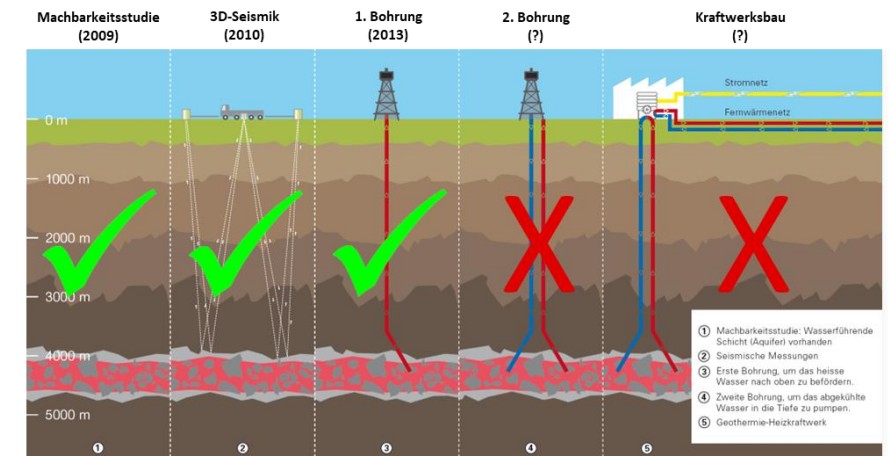
# Findings

- + 3D-Seismic proved complex deep structures
- + First well drilled successfully and partially logged
- + Gas-kick & felt induced seismicity during/after acidization
- + First well completed, tested & temporary sealed
- + Main results:
  - Lithology / stratigraphy, water chemistry (~16 g/l TDS) confirmed
  - Thermal water: max. 145°C at 4'252 mTVD, minor productivity
  - Natural gas: high productivity, high quality (94% CH<sub>4</sub>, 5% CO<sub>2</sub>)
  - Formations non-permeable, inflow mostly through faults / joints
  - Risk of induced seismicity remaining (e.g. during injection)
- + Project stopped in 2014 / start of search for alternative use of geothermal well
  - Feasibility gas production (2015)
  - Feasibility deep borehole heat exchanger (2018-2019)



Left: 3D-Seismic St.Gallen, first interpretation, City of St.Gallen / St.Galler Stadtwerke, 2011

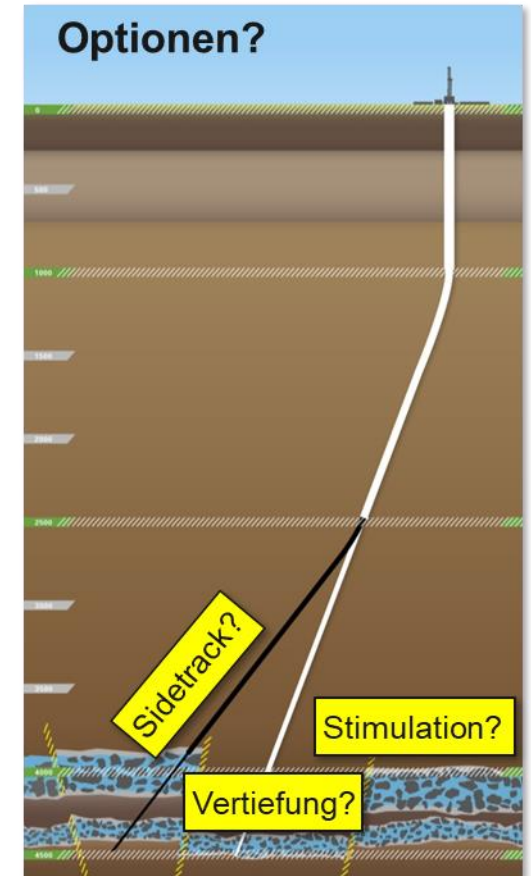
Below: City of St.Gallen, St.Galler Stadtwerke, 2014



# Lessons Learnt

- + **Timeline:** Long and intense project preparation and duration
- + **Organisation:** empowerment of project team and insourcing of PM positive
- + **Communication:** Key to realisation; involve people surrounding drill site
- + **PM/RM:** Many disciplines / experts involved; identify risks and mitigate early
- + **Drill site:** Sometimes dirty, noisy, smelly and always lightend up
- + **Drilling:** Security first; prioritise drilling target higher than surface site; include options
- + **Logging:** Define Must-have vs. Nice-to-have
- + **Testing:** Never tease a «wildcat» well with an airlift test (especially in CH)
- + **Seismology:** never underestimate known, existing structures
- + **Geology:** Good data & experienced experts lead to solid subsurface models
- + **Hydrogeology:** Not favourable in St.Gallen; biggest project risk materialised

**Conclusion: Hydrothermal did not work in St.Gallen but surely does work in other locations! Also in Switzerland!!**



City of St.Gallen, St.Galler Stadtwerke, 2015

# My Contact Details

