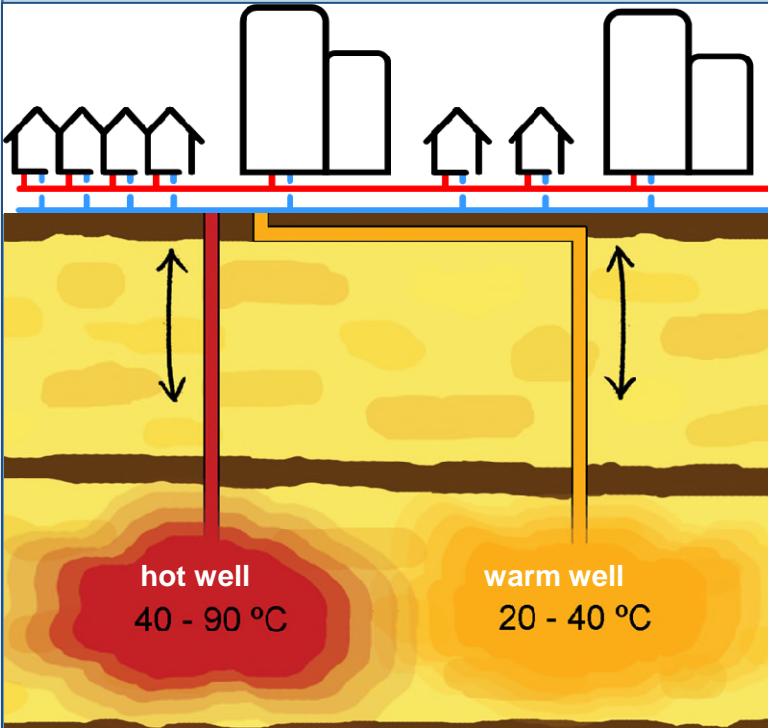


The impact of storage conditions on heat losses of HT-ATES systems

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1 HT-ATES High Temperature Aquifer Thermal Energy Storage

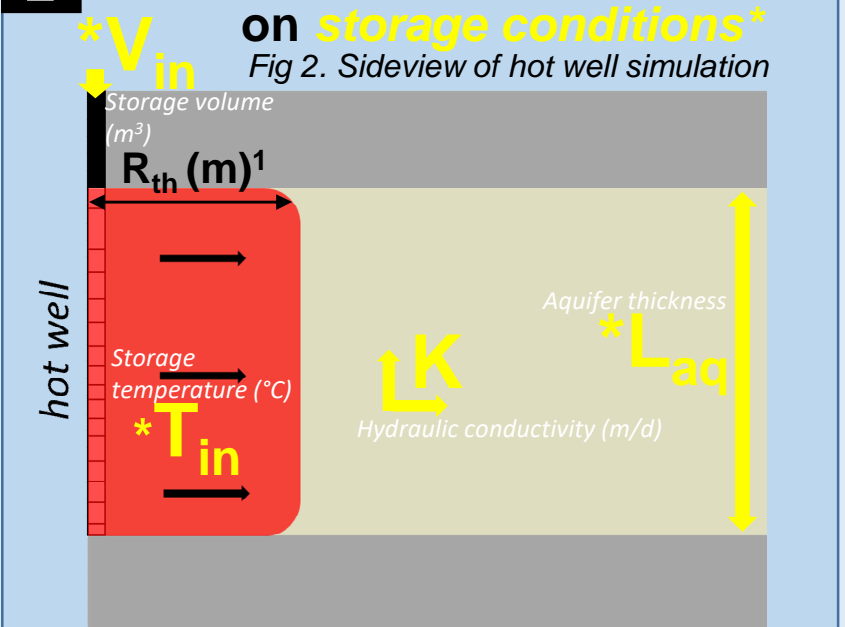
Fig 1. Schematic of HT-ATES with hot and warm well



Problem
Hard to estimate/predict energy losses

Research Question:
How do **conduction & buoyancy** flow processes lead to energy losses under varying storage conditions?

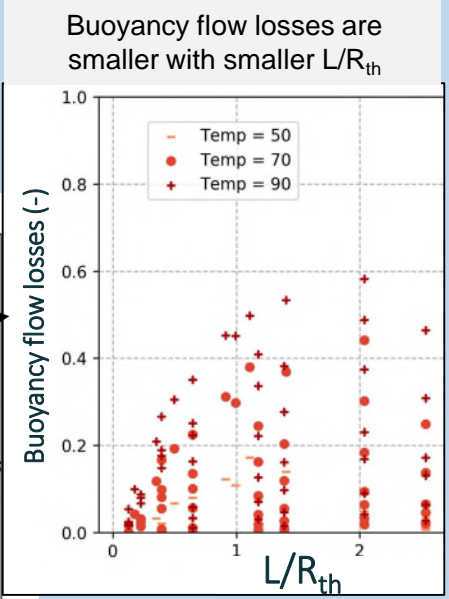
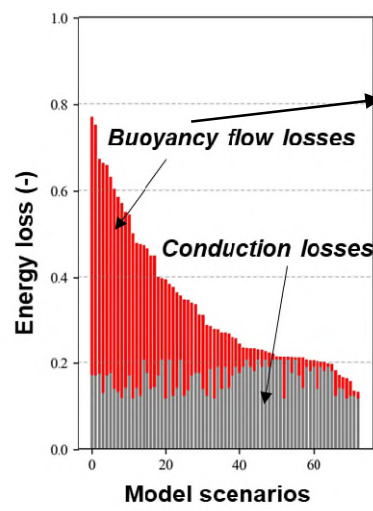
2 METHOD: sensitivity analysis on storage conditions*



¹ R_{th} = Thermal radius (m)

3 Results

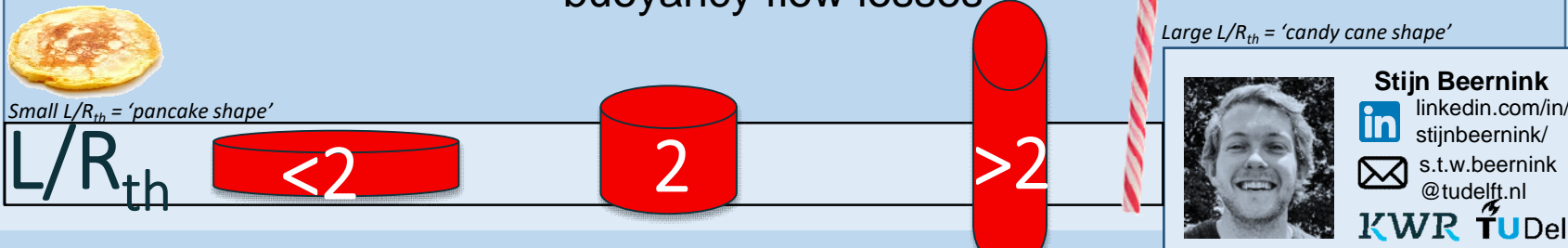
Separate Conduction & Buoyancy losses



Explanation
Buoyancy flow (free convection) is initiated by temperature difference (hence density difference), the hydraulic conductivity determines the speed of upward flow, the geometry ($L_{aq} + V_{in}$) together determine the losses.

Take away message

The geometry (L/R_{th}) of the stored volume is important and determines the buoyancy flow losses



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