



ATES

Data collection

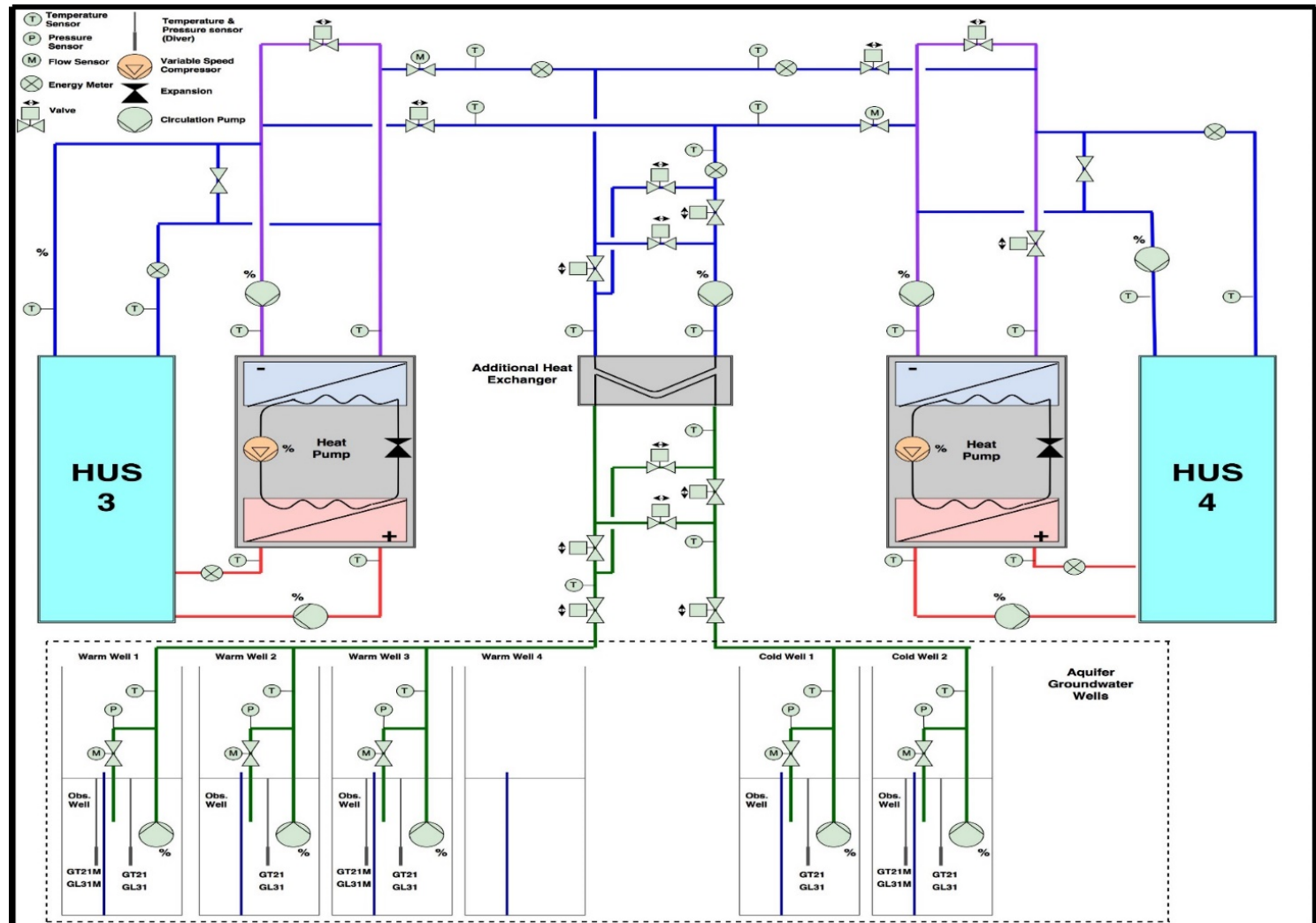
Temperatures

Water flow rates

Pressures

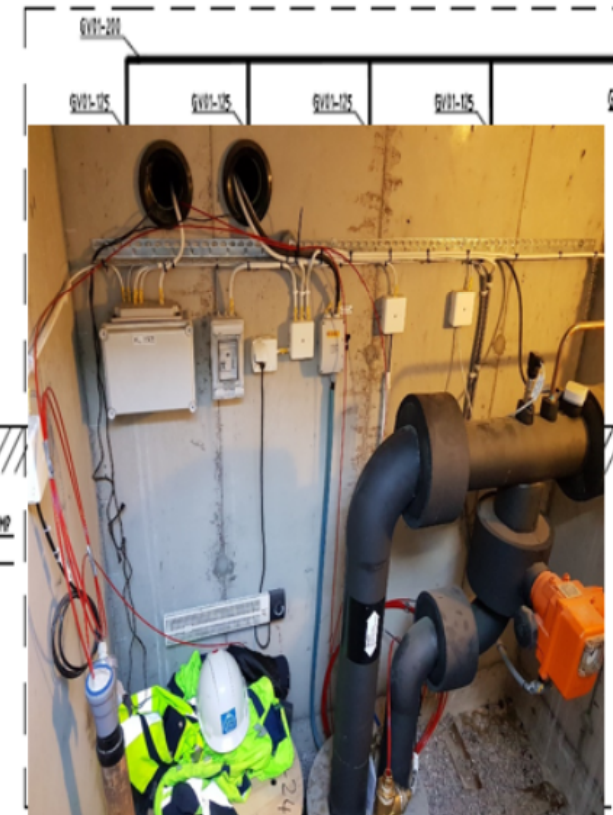
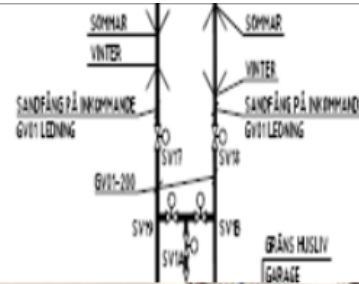
Water levels in
ATES

Heat Pump data





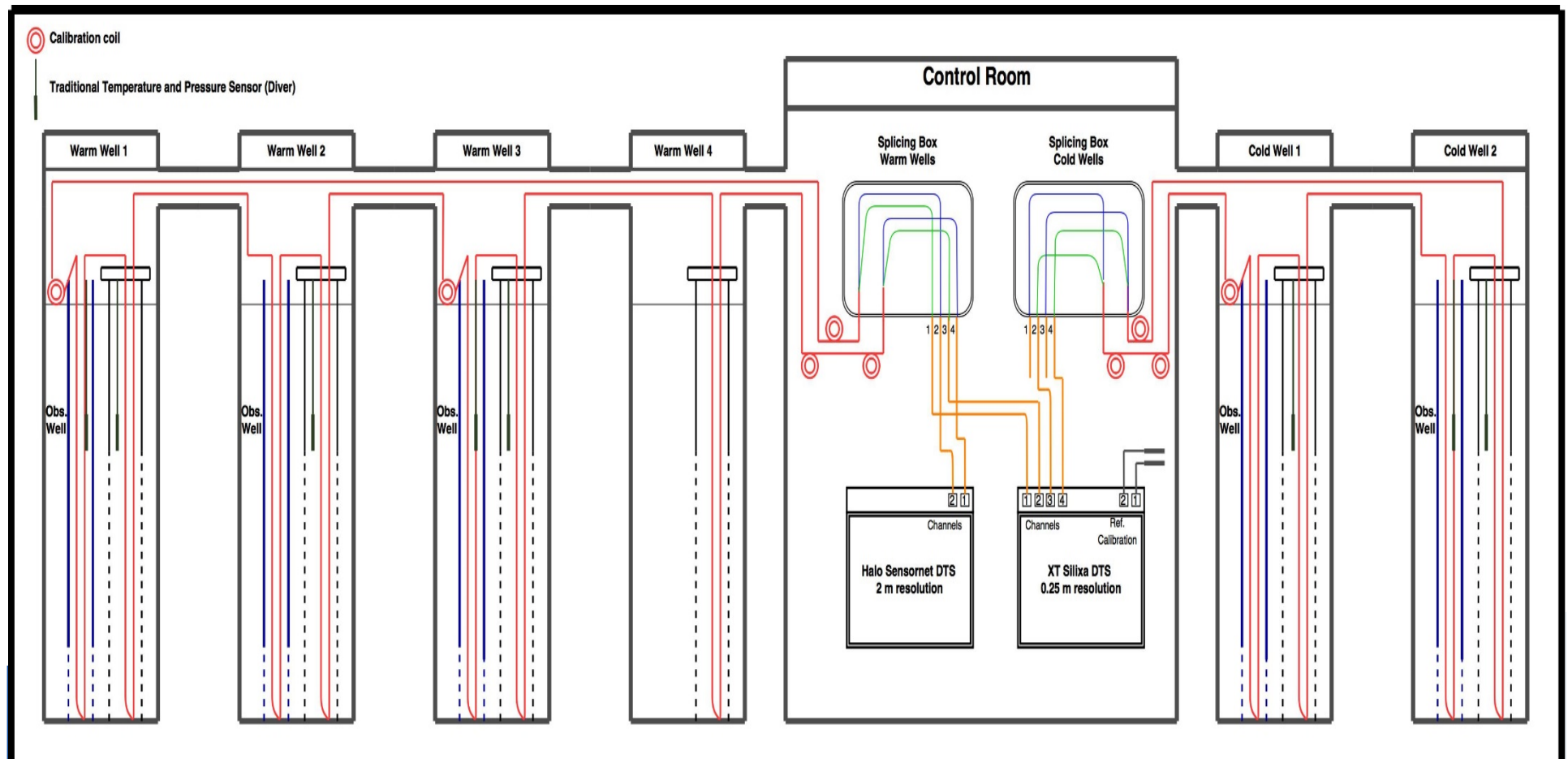
ATES - Rosenberg





DTS measurements in the ATES

- Continuous temperature measurements every 0.25 cm in the whole aquifer with a fiber optic cable in 6 pumping wells and 5 observation wells





Rosenborg – water chemistry monitoring

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Resurseffektiva kyl- och värmepumpssystem
samt kyl- och värmelager

Analyzed Elements

Redoxpotential	sulfat	Cd
Temperature	klorid	Co
SPC	Na	Cr
Ca	Cu	DO
Fe	Al	Hg
Mg	Mn	P
As	Ba	K
Sr	Mo	Ni
totalhårdhet	V	Pb
pH	Si	Zn

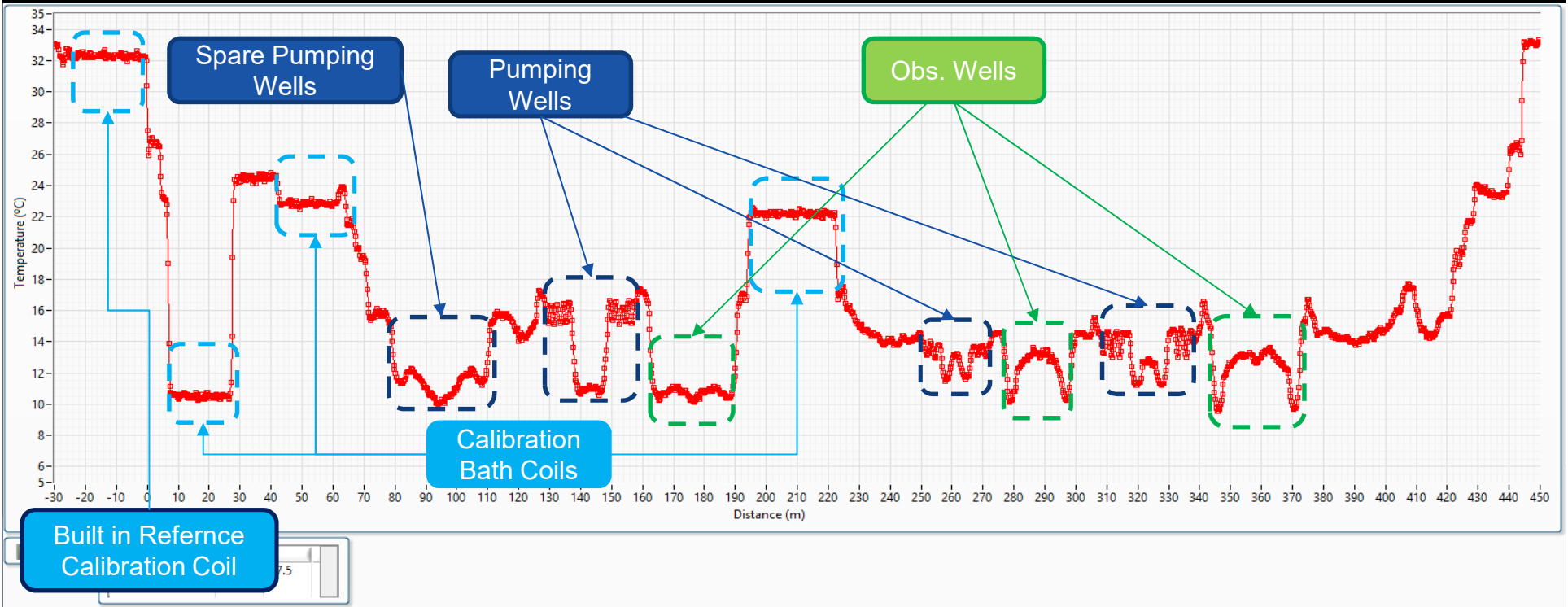
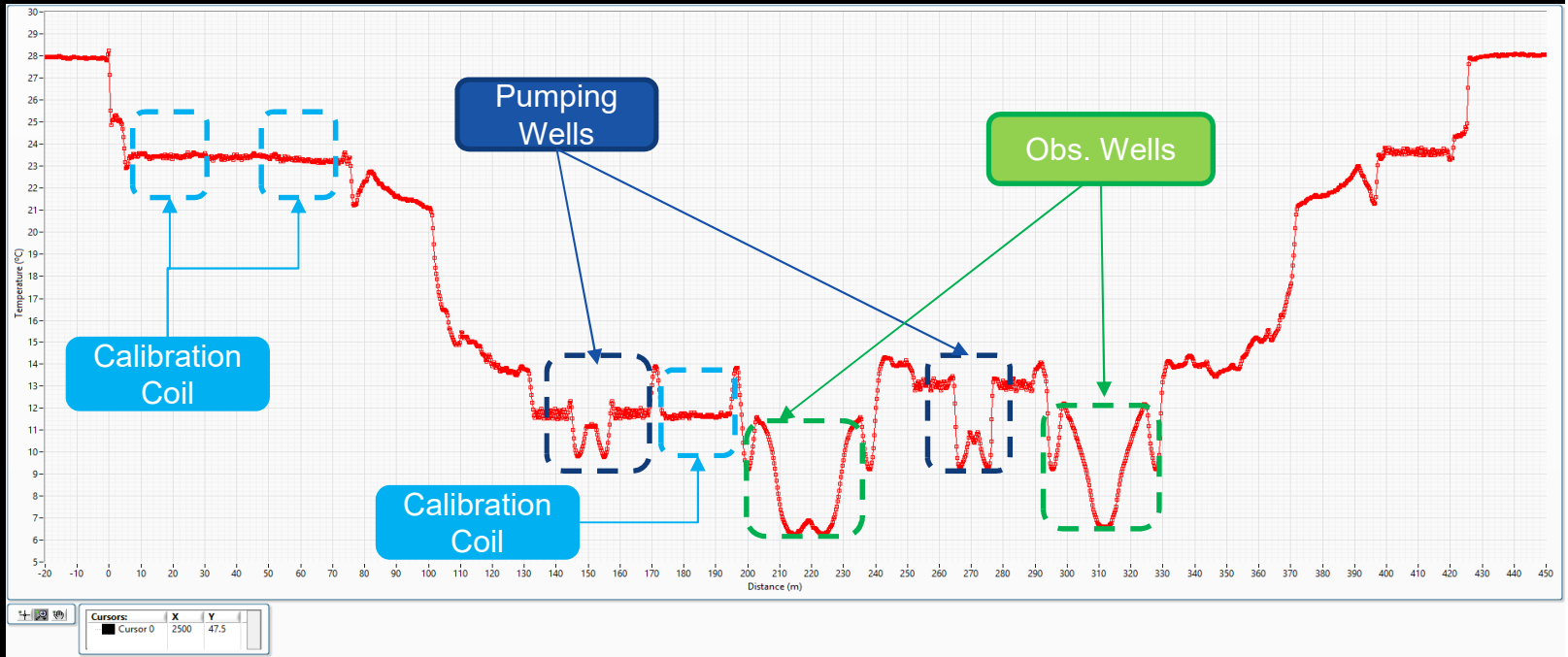




Example of measurement in:

Cold Wells →

Hot Wells ↓





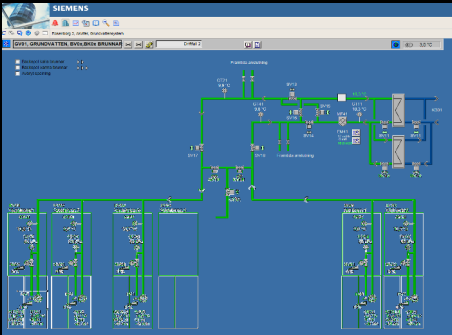
Ongoing Activities

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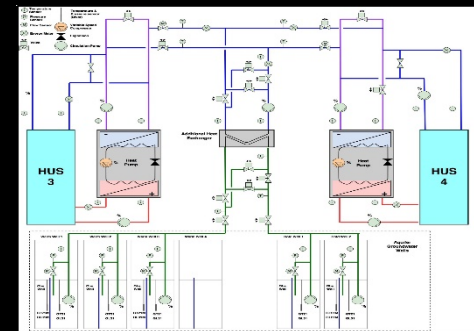
Resurseffektiva kyl- och värmepumpssystem
samt kyl- och värmelager

- Chemical sampling and analysis
- Building, ATEs and DTS data monitoring and measurement.
- Building and heat pump modeling and energy performance analysis.
- HTT field test development quantify groundwater flow and direction.
- Groundwater hydraulic and thermal numerical modelling and calibration.

Building Monitoring

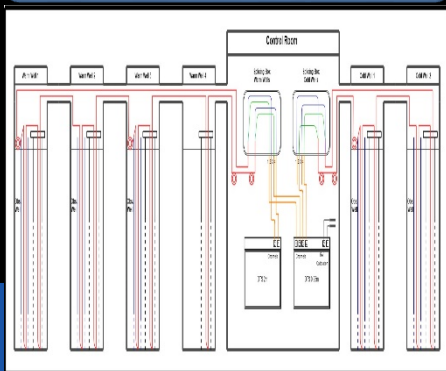


Building & HP Model

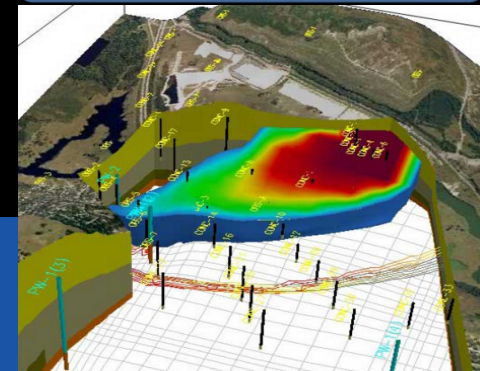


Modelling & Calibration

DTS-Measurements



Groundwater Model



**Performance Analysis
& Optimization for
sustainable design
and operation**