

Monitoring concept for UTES

1. charging / discharging:

- ⇒ amount of heat charged / discharged
- ⇒ temperatures at charging / discharging
- ⇒ amount of water produced at charging / discharging (ATES)

- supply and return temperatures of the store (/of parts of the store; well-groups, ...)
- flow through the store (/parts of the store) at charging / discharging

minimum resolution for calculation of heat: 10 minutes

alternatively:

- two heat meters for charging / discharging with integration of flow
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2. ground conditions:

=> **temperatures in the ground**

- separate borehole / borehole from test drilling

resolution: one week / one month

=> **groundwater-level**

- borehole from test drilling ⇒ monitoring well

resolution: ??

=> **chemistry of groundwater**

- groundwater circuit

- monitoring well ?

resolution: ??

Monitoring of existing plants

considered plants:

ATES:	- Hooge Burch, Netherlands ??	IF Technology
	- Reichstag, Germany 8/2000	GTN / B. Sanner
	- Rostock, Germany 5/2000	ITW
BTES:	- Anneberg, Sweden 4/2002	G. Hellström
	- Neckarsulm, Germany 1/1999	ITW
	- Attenkirchen, Germany 1/2001 ??	ZAE

data:

- daily mean values of T_{in} and T_{out} (weighted by flow)
 - daily mean values of flow
 - heat charged / discharged (monthly / yearly)
 - temperatures in the ground (if available)
 - ATES: amount of water produced at charging / discharging (monthly / yearly)
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