GEUS

EUDP
Energiteknologisk udvikling og demonstration

Shallow geological heat storage

a tool for screening potential sites for ATES and BTES

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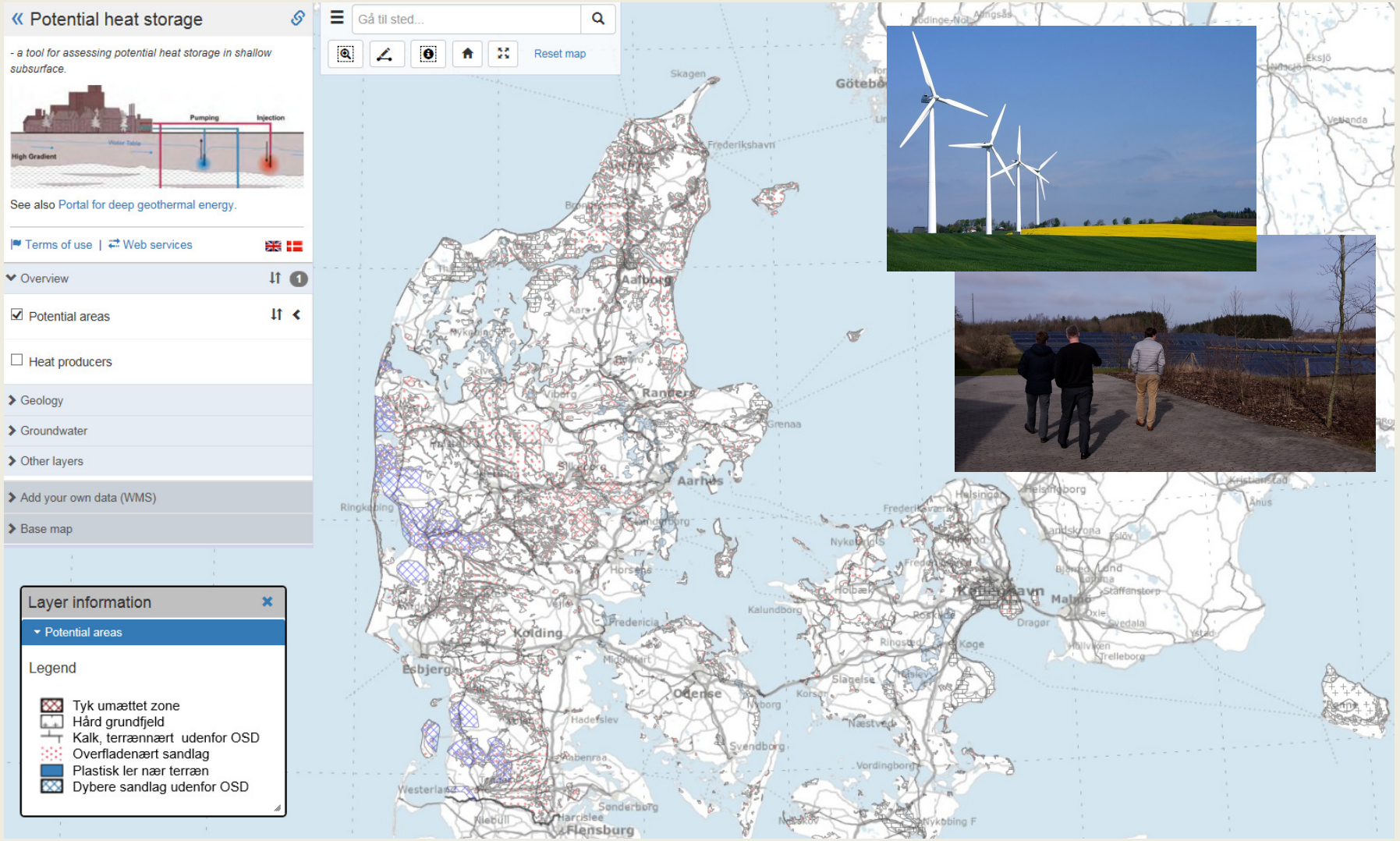
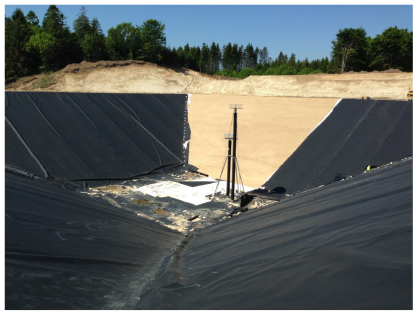
Web application for screening local conditions suited for geological heat storage



Why heat storrage?



Status and recommendations for RD&D on energy storage technologies in a Danish context

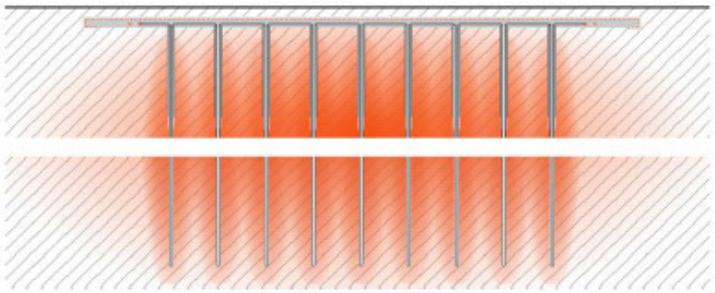
February 2014

31-01-2014

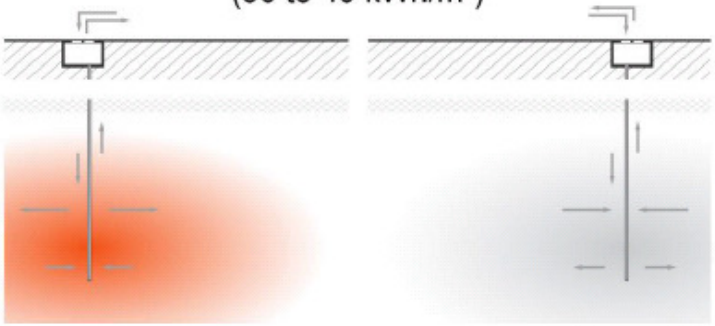
1

Main storage types

Borehole thermal energy storage
(BTES)
(15 to 30 kWh/m³)

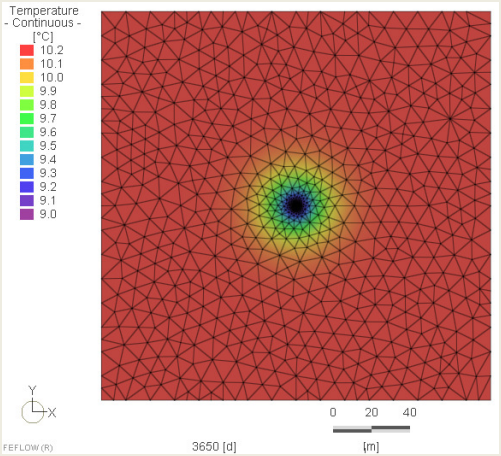


Aquifer thermal energy storage
(ATES)
(30 to 40 kWh/m³)

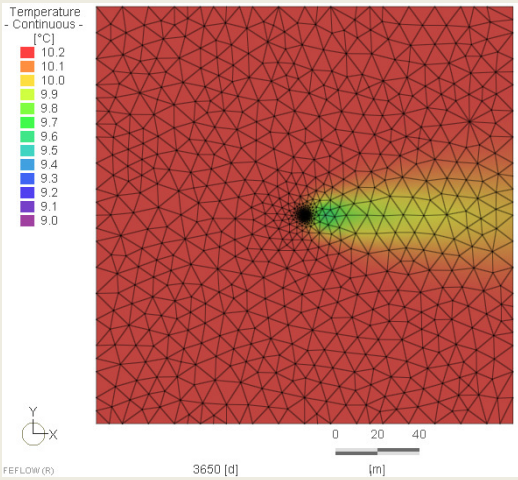


From: www.solites.de

Limited groundwater flow



Well known groundwater flow

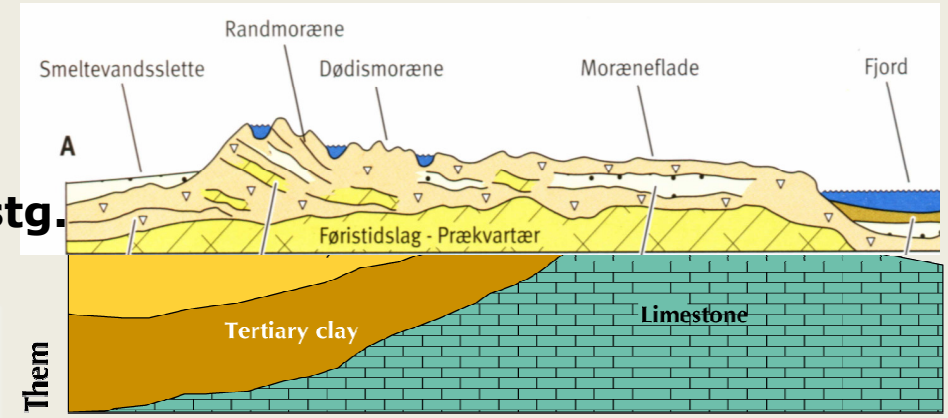


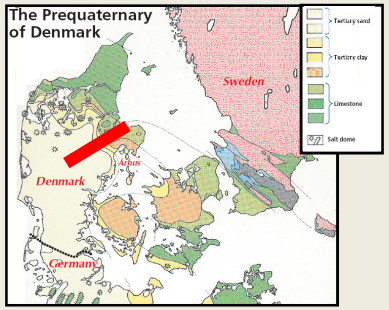
Heat storage in a Danish geological context

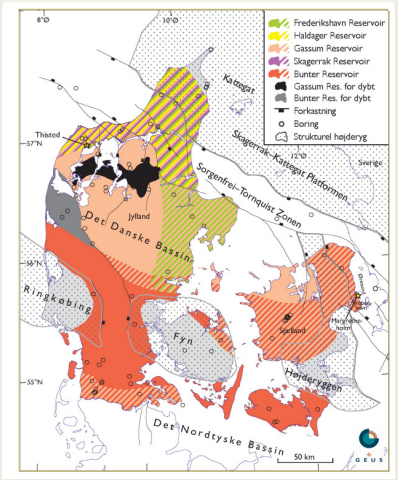
Glacial and postg.

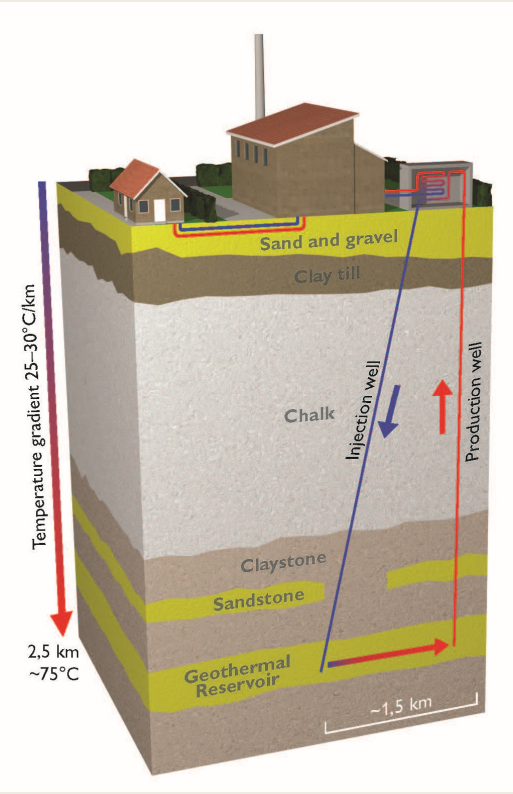
The shallow underground

The deep undergrund



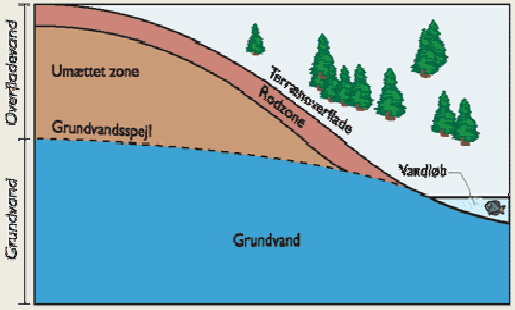




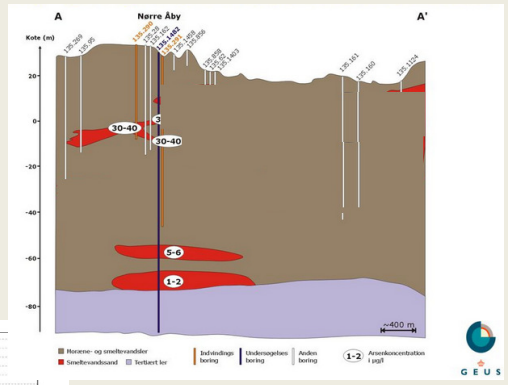


Sites suited for BTES:

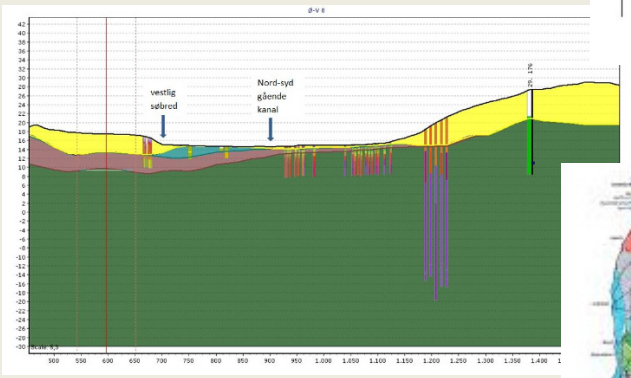
1. Areas with a thick unsaturated zone



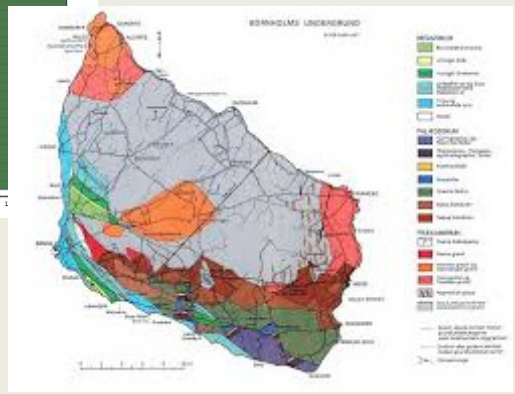
2. Areas with homogenious clay deposits



3. Formations of impermeable limestones

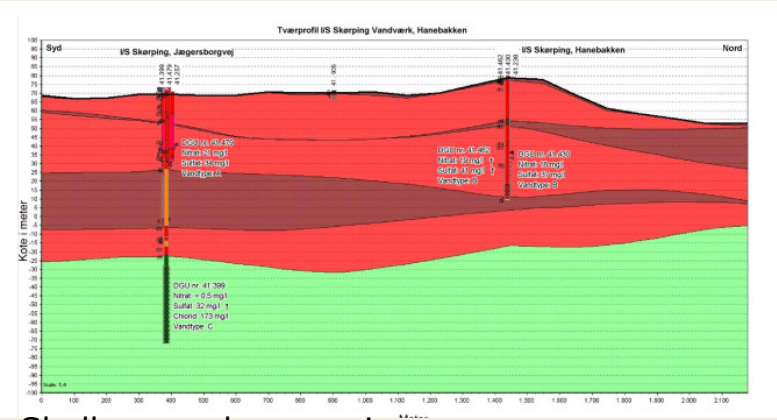


4. Impermeable bedrock

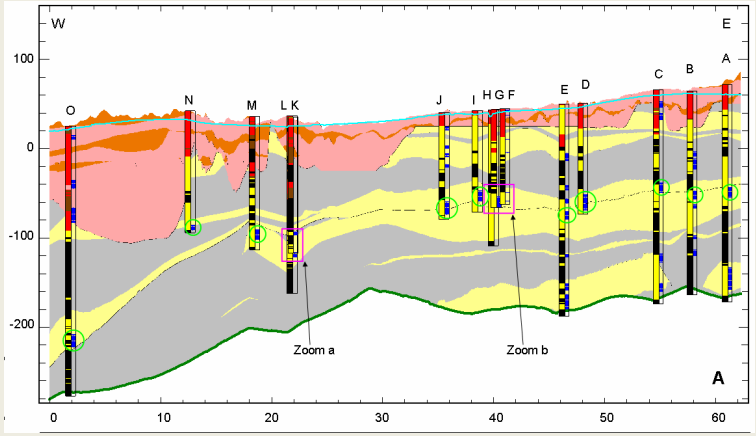


Sites potentially suited for ATES

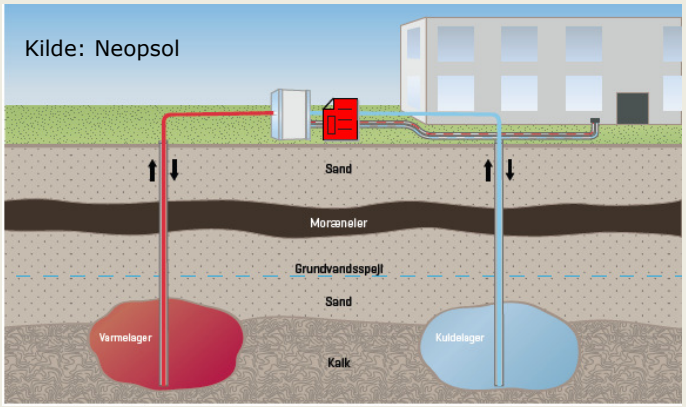
Areas with coherent groundwater bodies



Shallow sand reservoirs

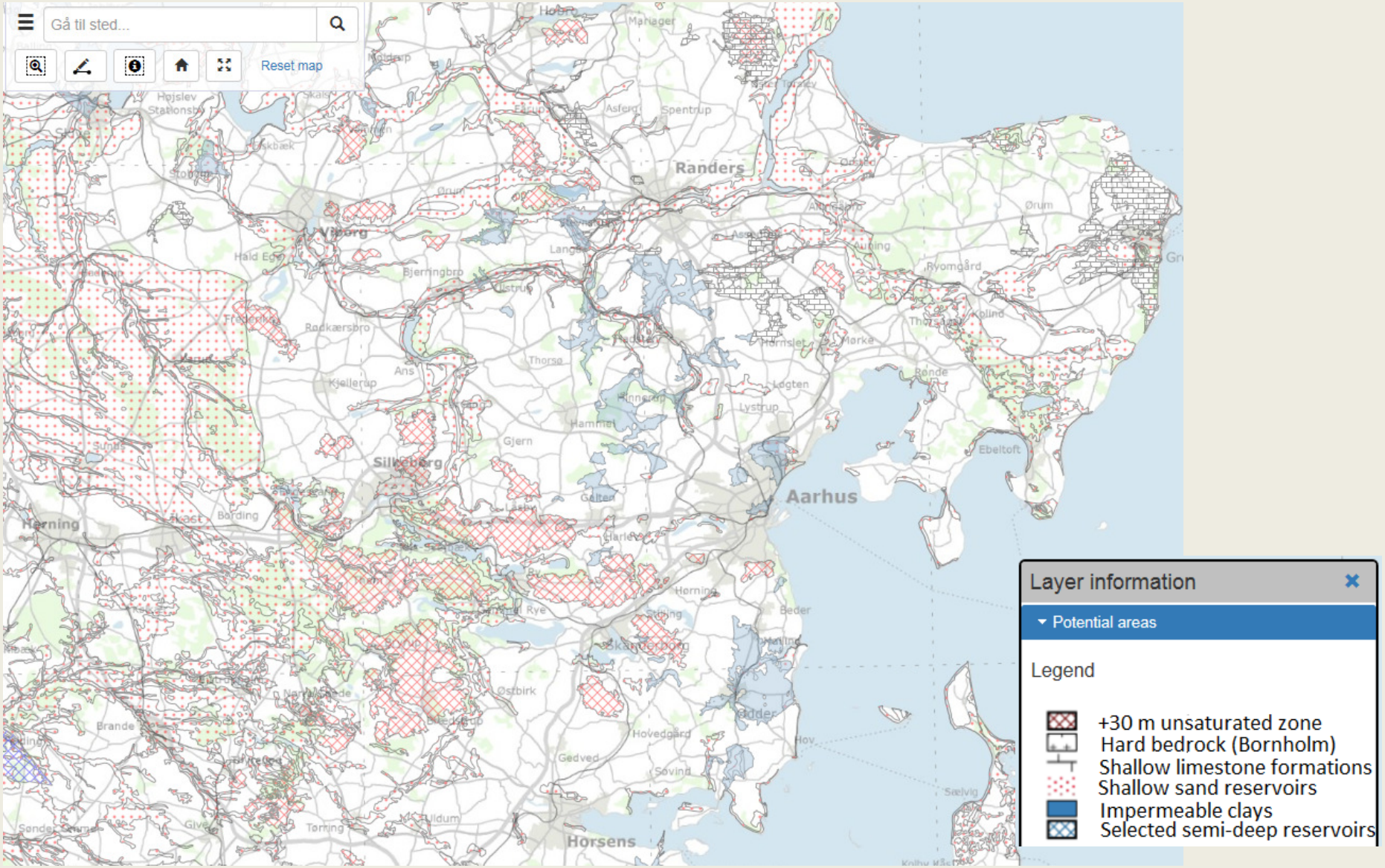


Deepere sand reservoirs



Fractured limestones

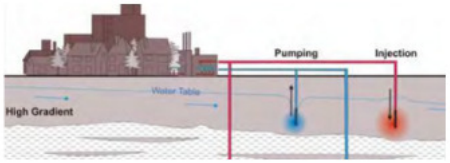
Potential areas



Location of heat producing plants

« Potential heat storage

- a tool for assessing potential heat storage in shallow subsurface.



See also Portal for deep geothermal energy.

Terms of use | Web services

Overview 2

Potential areas

Heat producers

Layer Extent

Varmeproducenter 2016, iflg. Dansk Fjernvarme

Data visible upon zoom-in to local region.

Geology

Groundwater

Other layers

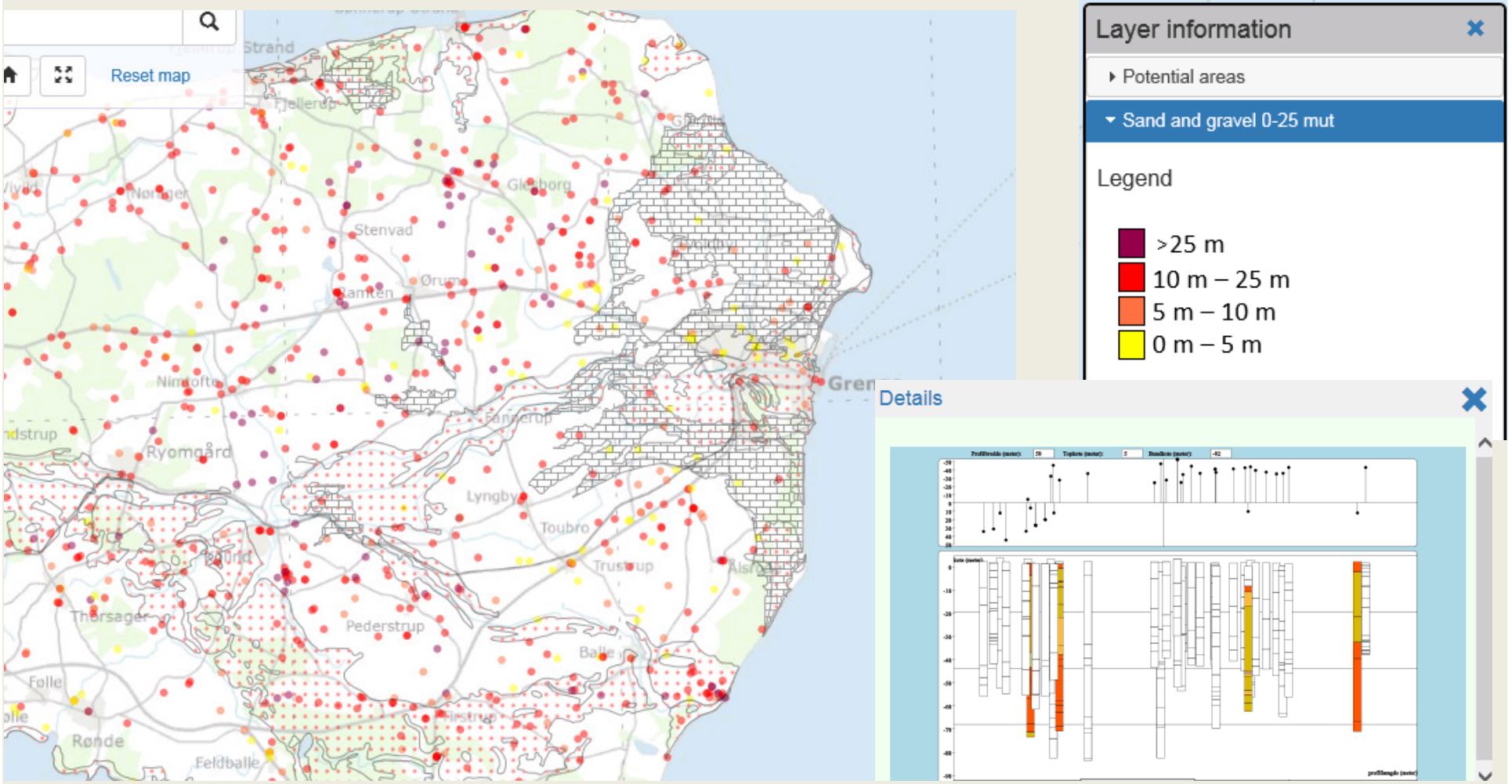
Add your own data (WMS)

Base map

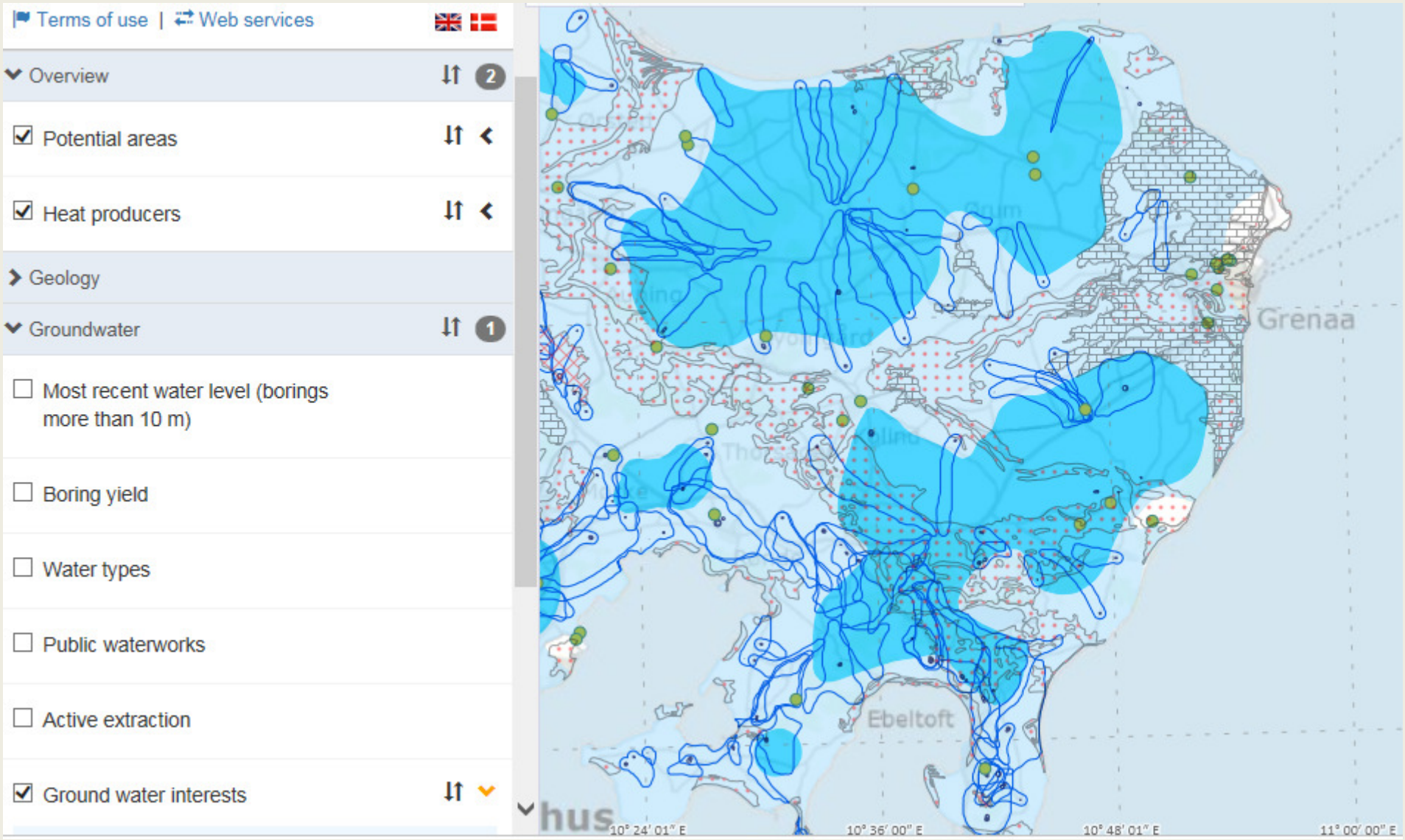
Gå til sted...

Reset map

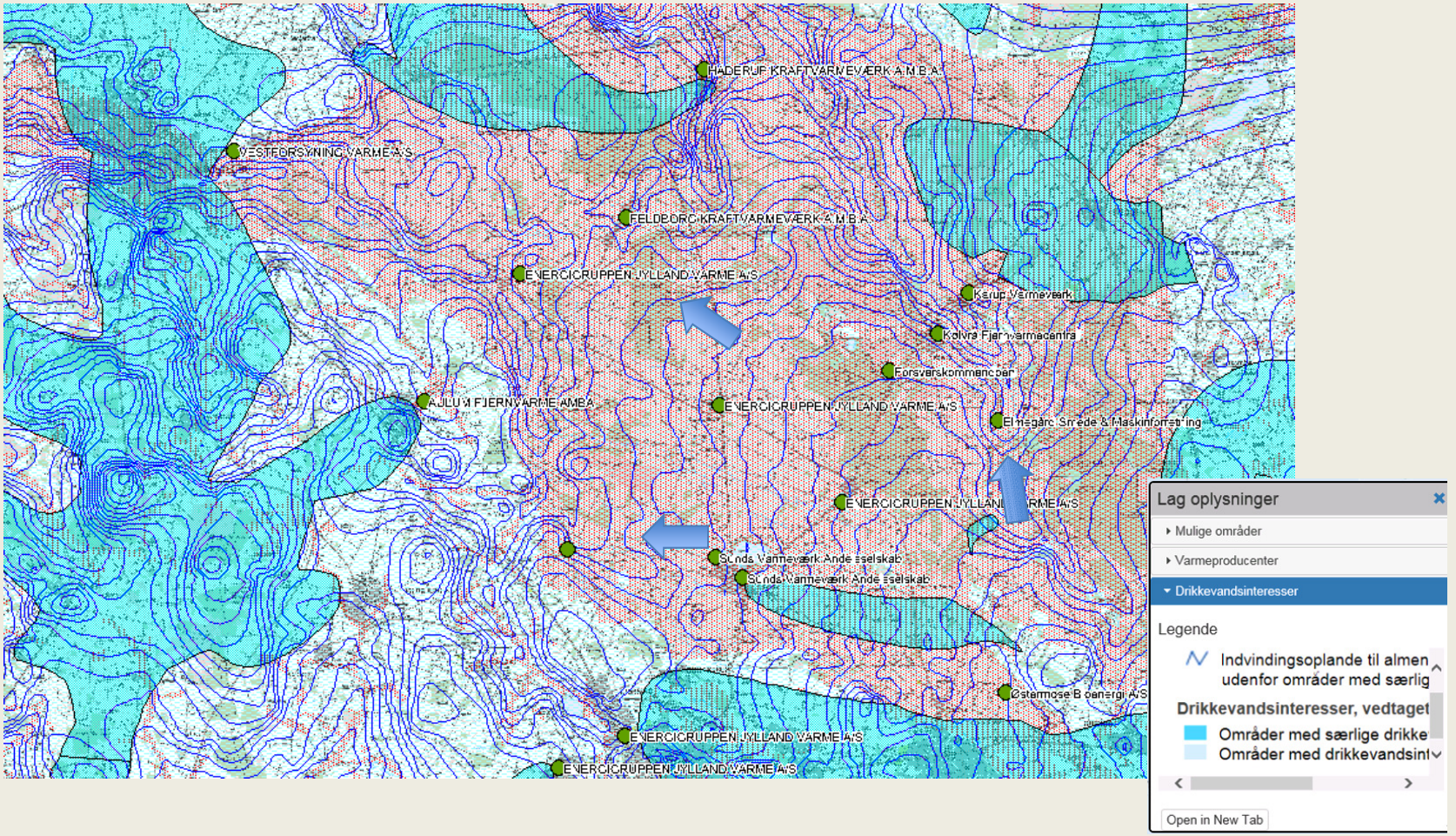
Online information from the national borehole database



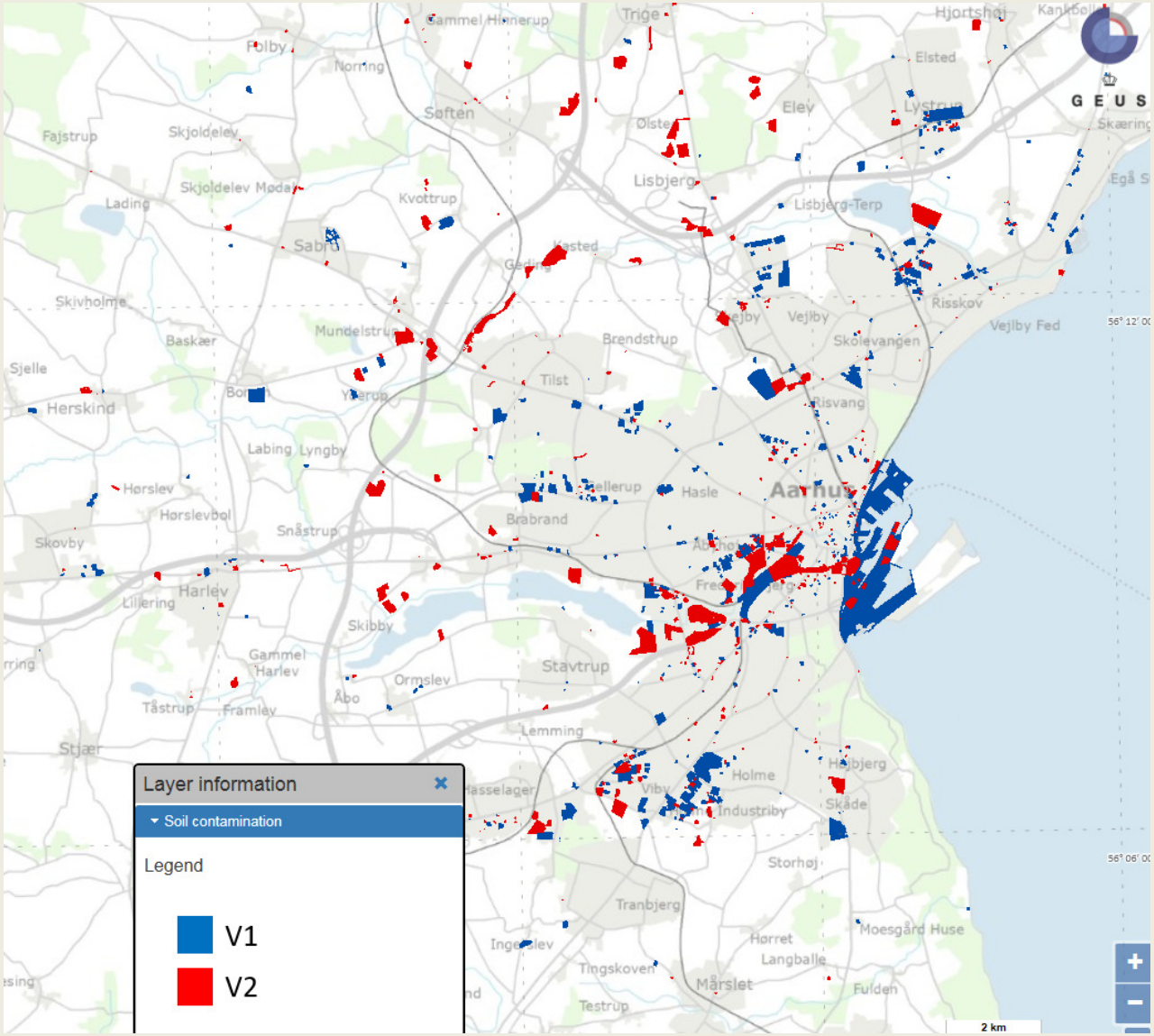
Catchment and groundwater protection areas



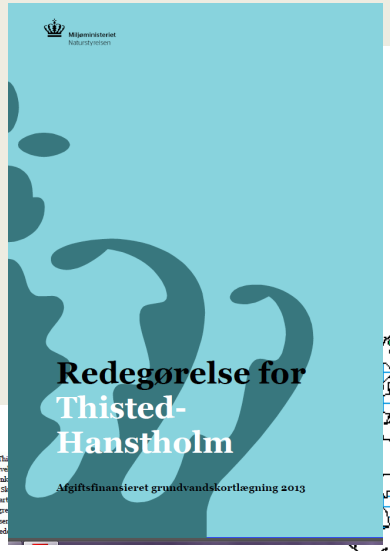
Maps of hydraulic head

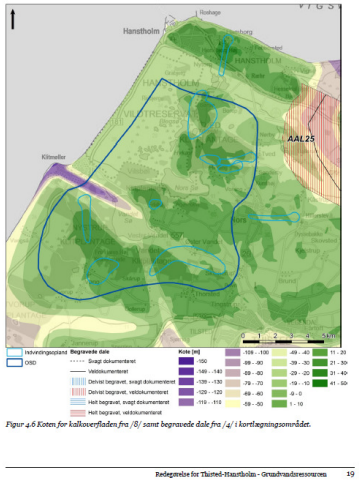


Areas with contaminated soils



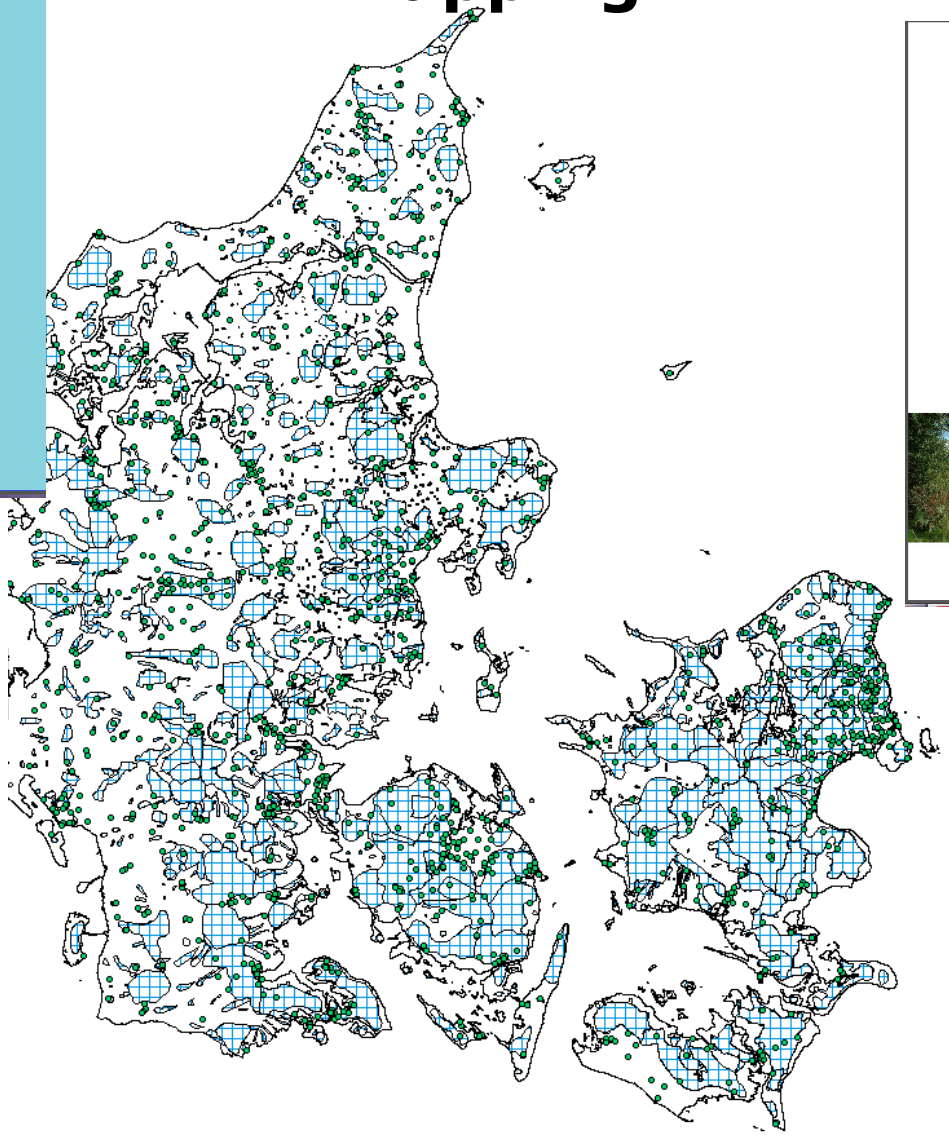
Results from the national groundwater mapping

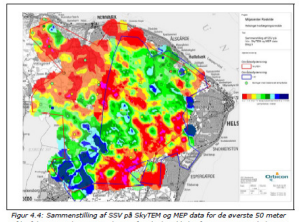




Figur 4.6 Koten for kalkoverfladen fra /8/ samt begravede dale fra /4/ i kortlægningsområdet.

Redegørelse for Thisted-Hanstholm - Grundvandsressourcen 19





Figur 4.4: Sammenstilling af SSV på SkyTEM og MEP data for de øverste 50 meter af lagfølgen. Resultatet viser den geofysiske lertykkelse fra terræn og ned til ca. 50 meters dybde /4/

Alle oplysninger fra boringer og de udførte geofysiske målinger er i foråret 2009 indarbejdet i en digital geologisk model i programmet GeoScene3D. Med dette program kan man populært sagt gøre det som Google Earth ikke kan, nemlig gå på opdagelse nede i jorden. Det er med dette 3D-værktøj blevet meget nemmere at kvalitetssikre kortlægningen af grundvandet, når vi sammen med kommunerne kan sidde og se på det i 3 dimensioner.

På skærmen kan man med sine piletaster passere jordoverfladen uden problemer. Som i et computerspil kan man indlede en undersøgelse med flyvetur mellem vandboringer, der står som stribede sugerør ned fra jordoverfladen. Farverne på boringerne viser, om det er ler eller sand der er fundet i boringerne, og faktisk kan man også se grundvandsspejlets beliggenhed, som en markering på boringen. Tætte lerlag er vigtige, da de kan hindre nitrat og anden forurening i at trænge dybt ned til grundvandet.

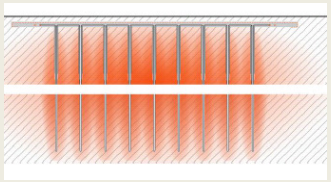
Undersøgelserne vest for Helsingør har vist, at man kan komme rigtig langt med at kombinere forskellige geofysiske metoder og udføre SSV beregninger på data efterfølgende. Hvis det hele bliver samlet i en digital geologisk model, er det efterfølgende lettere at få opstillet en troværdig grundvandsmodel for

Screening of sites suited for shallow geological heat storage

As part of a national project to map the potential for geological heat storage in Denmark an interactive web tool has been developed.

The tool utilizes relevant data from the Danish Geological Survey (GEUS) and other public databases.

It focuses on finding areas with particular geological settings suited for either BTES or ATES plants and limited conflicting interests.



http://data.geus.dk/geusmap/?mapname=varmelagring

The application has been developed for Danish users and full translation to English has not been implemented yet

Thank you for your attention

The application has been developed for Danish users and full translation to English has not been implemented yet