G E U S

Geologisk screening af områder til varmelagring

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De Nationale Geologiske Undersøgelser for Danmark og Grønland
Energi-, Forsynings- og Klimaministeriet

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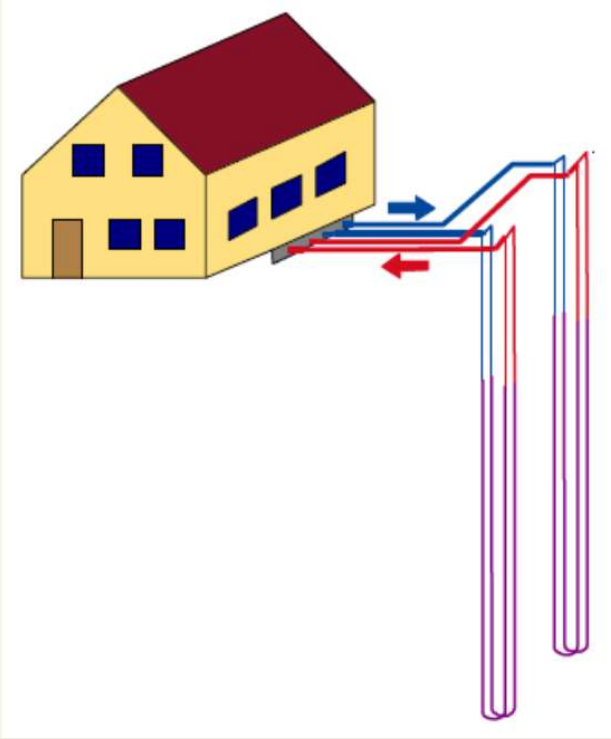
Energiteknologisk udvikling og demonstration

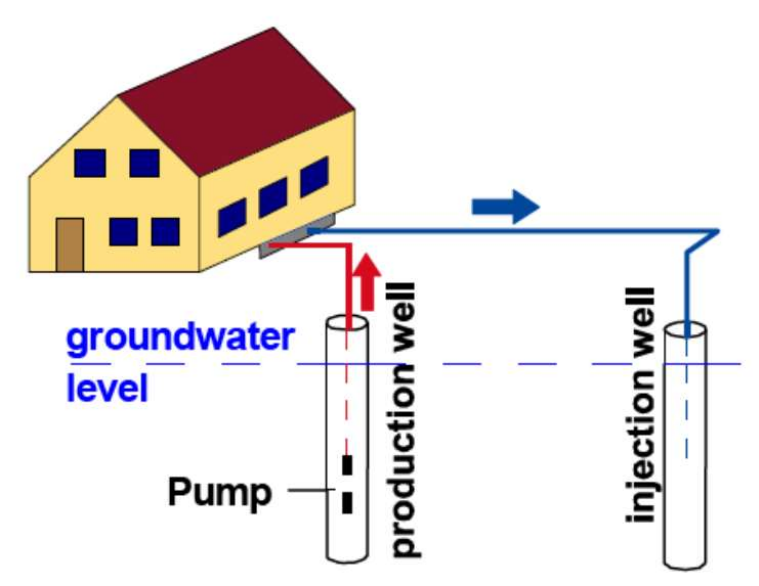
Overordnede principper

Lukkede boringer



BTES
(borehole thermal energy storage)

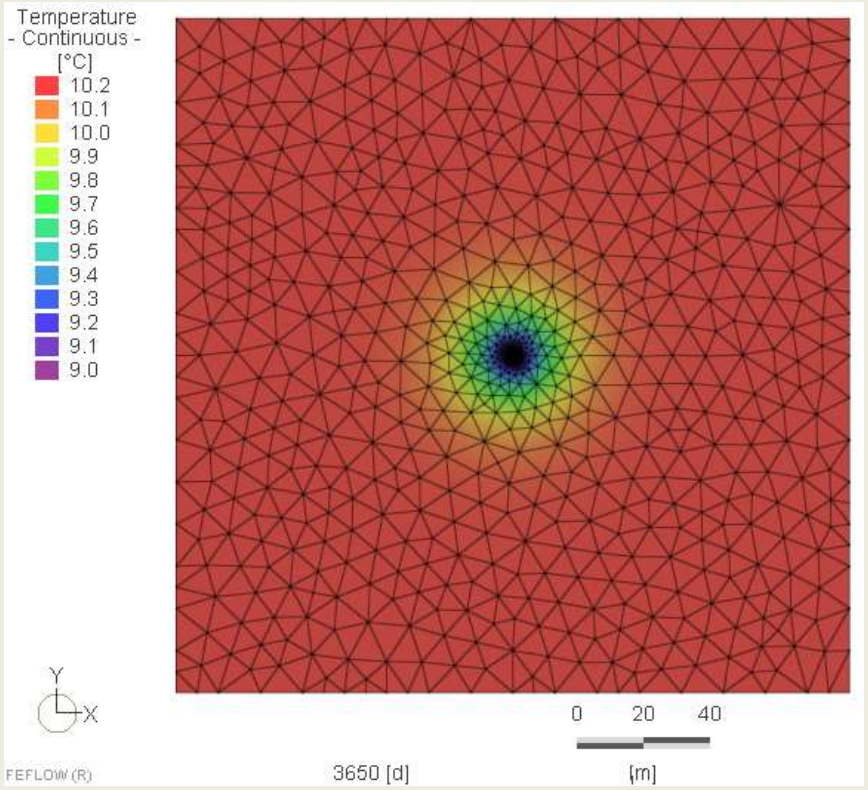
Åbne boringer



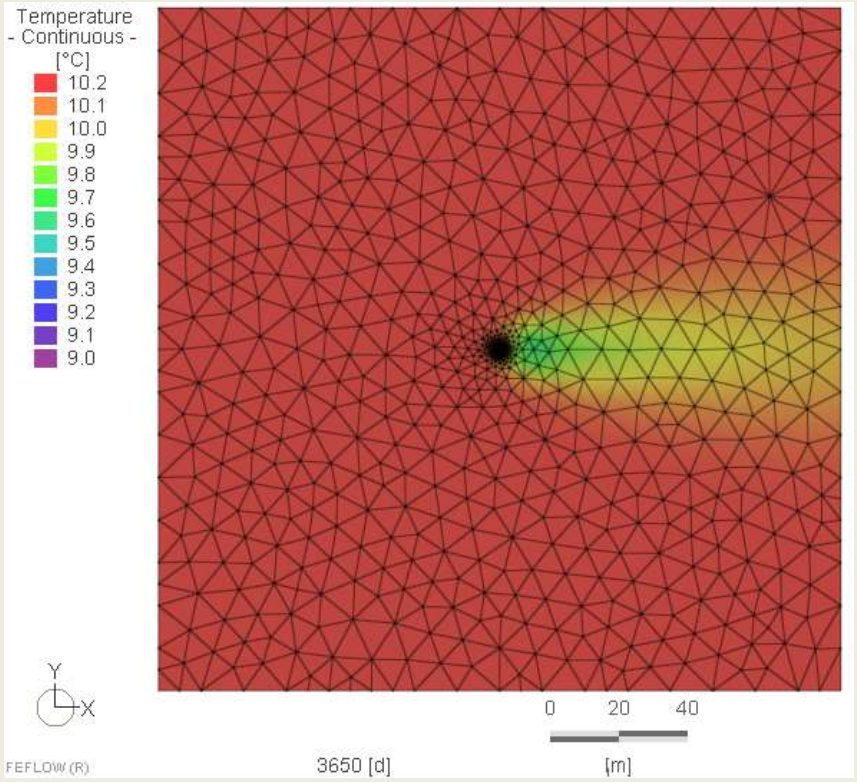
ATES
(aquifer thermal energy storage)

Udbredelse af varme og kulde

Ingen grundvandsstrømning



Med grundvandsstrømning



Ved grundvandsstrømning tilføres boringen konstant grundvand med baggrundstemperaturen og den injicerede energi føres med grundvandet

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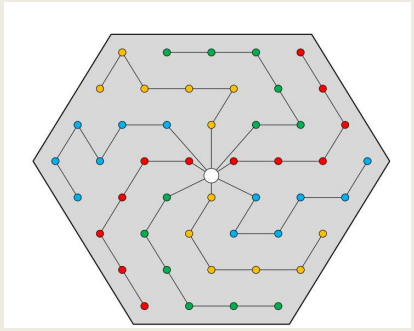
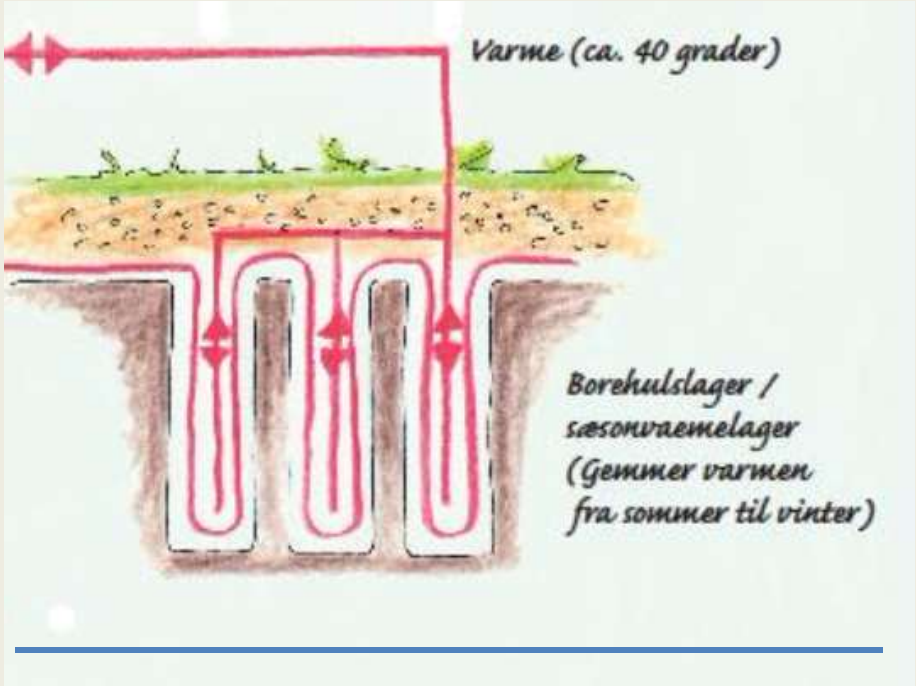
Varmelagring i lukket borehulslager (BTES)

Energiteknologisk udvikling og demonstration





Vandrette boringer –ny mulighed til borehulslagre

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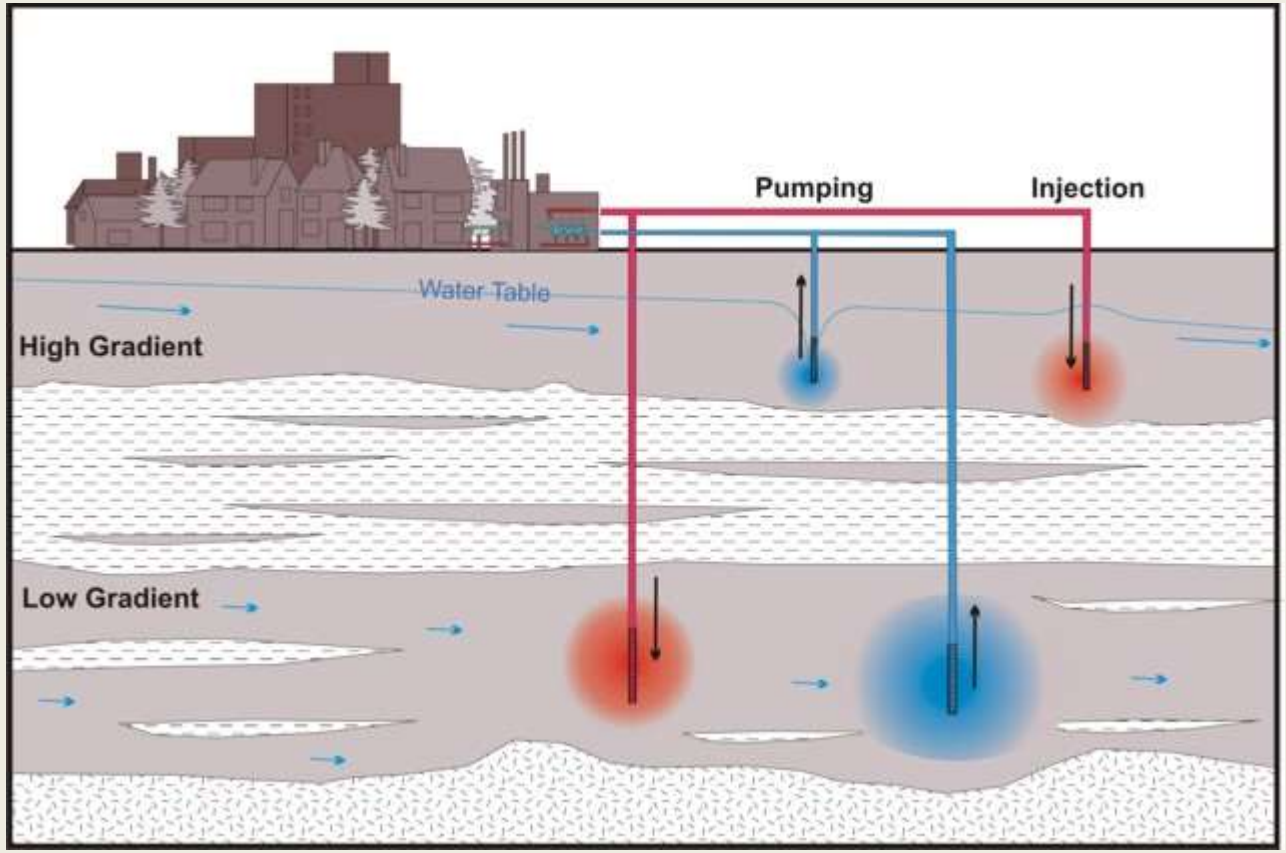
Varmelagring i vandførende lag (ATES)



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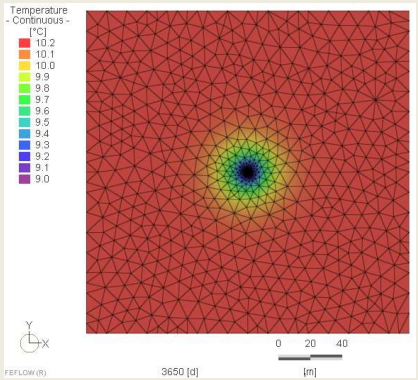
Overordnede geologiske betingelser for varmelagring

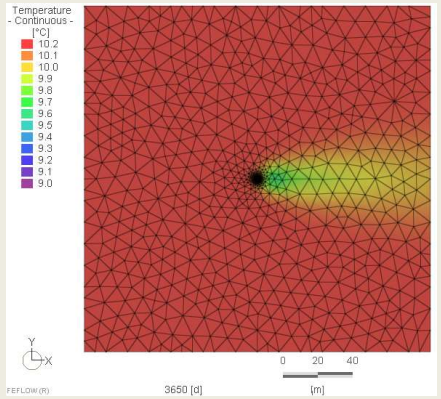
I borehulslager (BTES)

Ringe grundvandsstrømning
Lokalt ingen grundvandsinteresser



I vandførende lag (ATES)

Velkendt lagfølge og grundvandsstrøming
Ingen grundvandsintereser (nedstrøms)



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WP1 : Sceening af områder egnet til varmelagring

På baggrund af

eksisterende geologiske undersøgelser, kort og data

sammenholdt med

andre relevante kort-temaet, arealanvendelse etc.

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F.eks. beliggenhed af fjernvarmeværker og udstrækning af forsyningsnet m.m.

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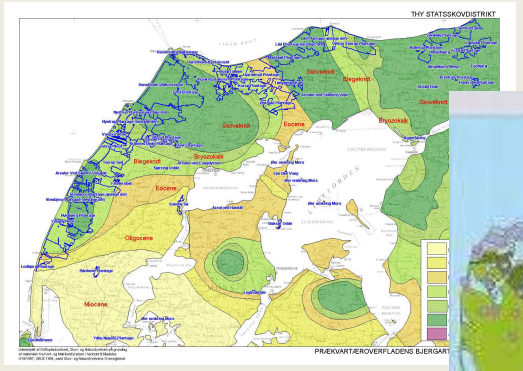
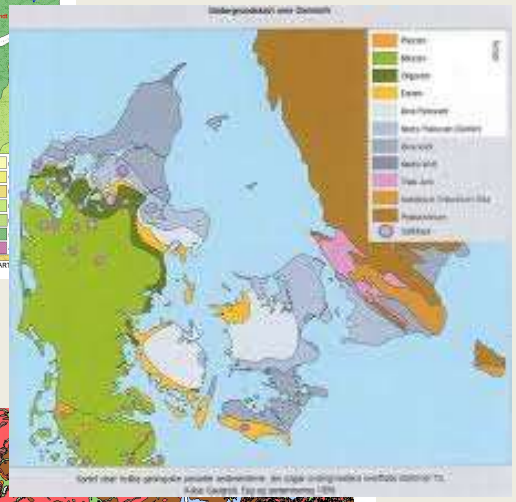
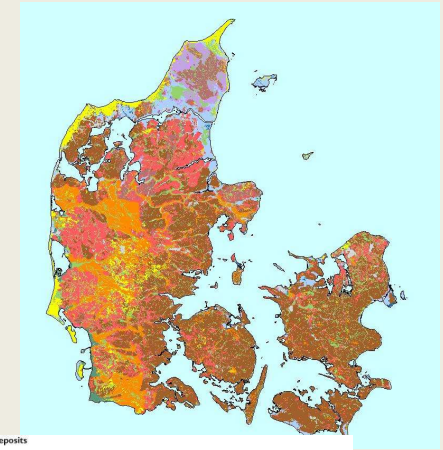
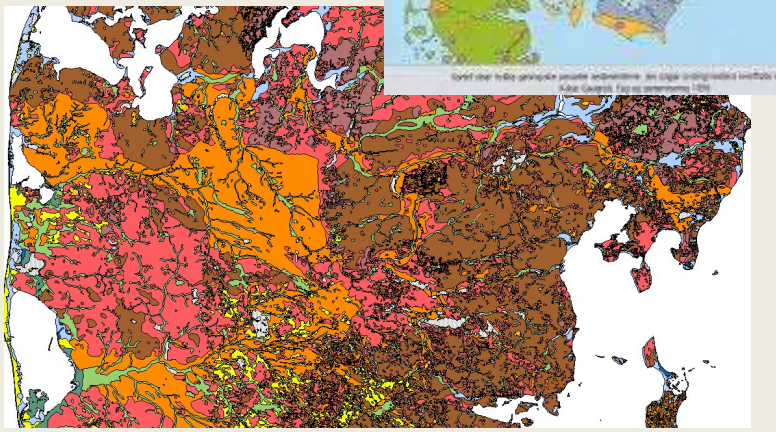
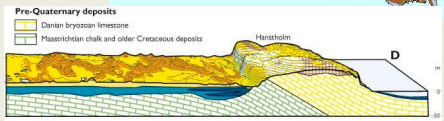
Eksisterende geologiske kort og undersøgelser

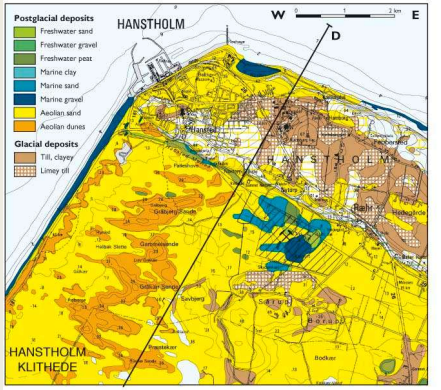












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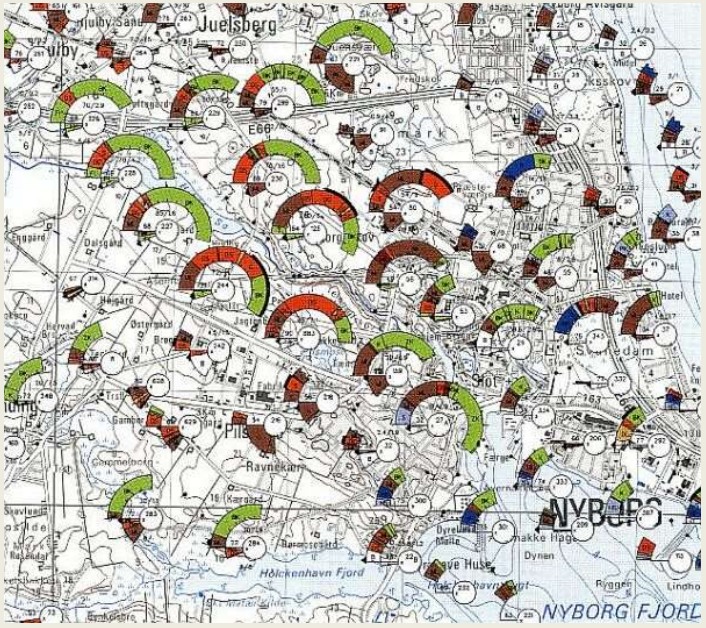
Den fælles offentlige boringsdatabase JUPITER

Arkivet har eksisteret siden Lov om Vandforsyning i 1926

>270.000 boringer
på nettet => 6 boringer/km^2



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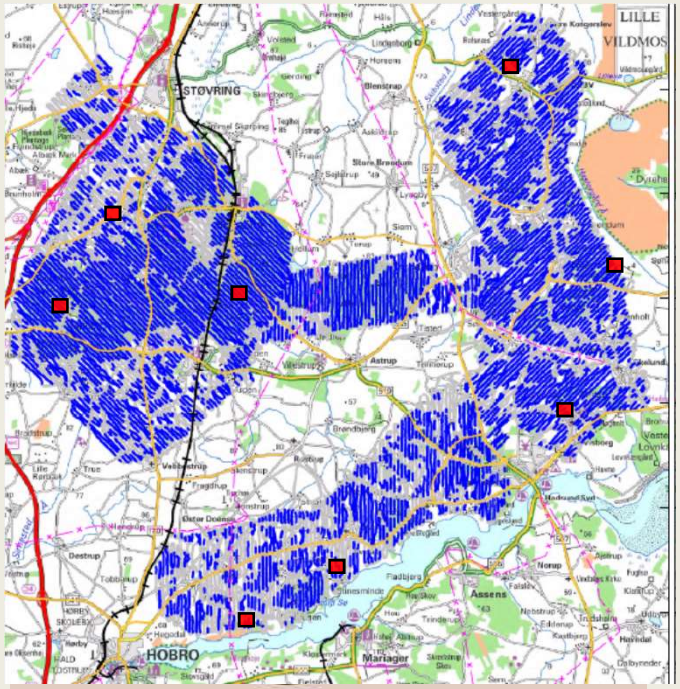
Den nationale grundvandskortlægning



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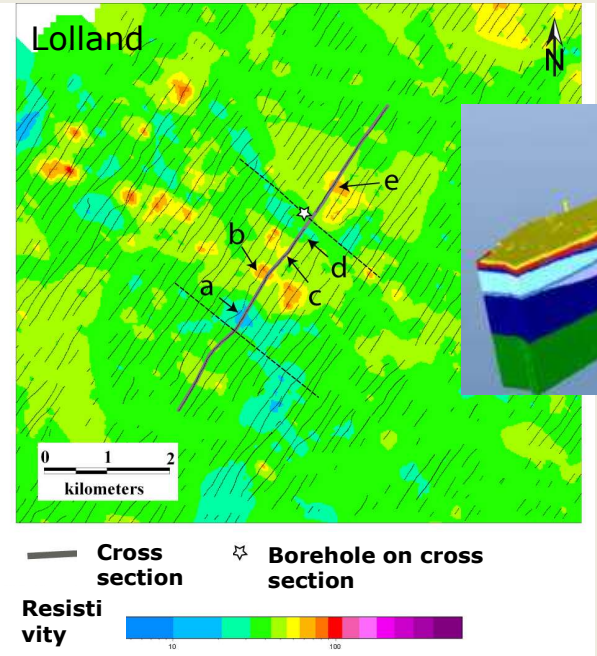
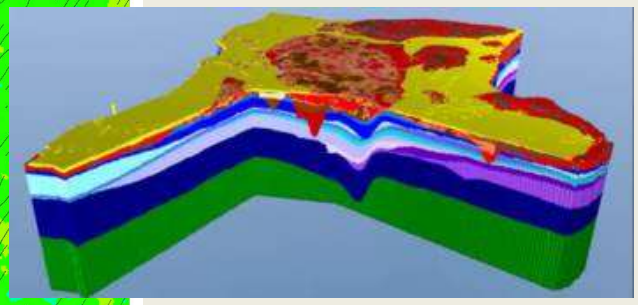
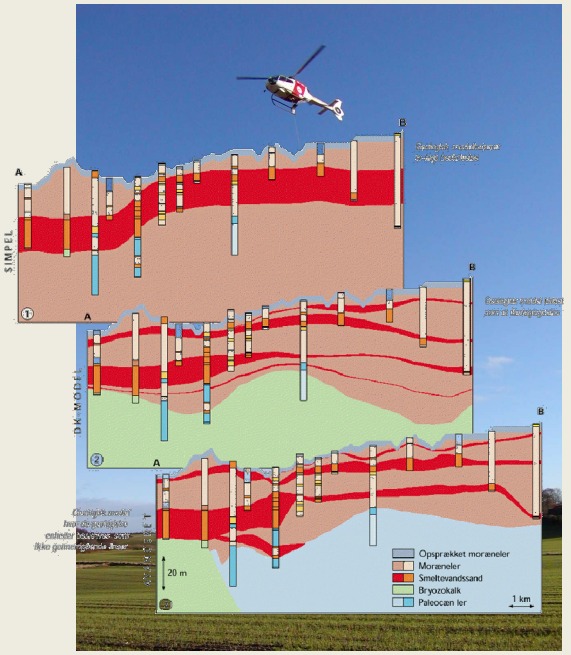
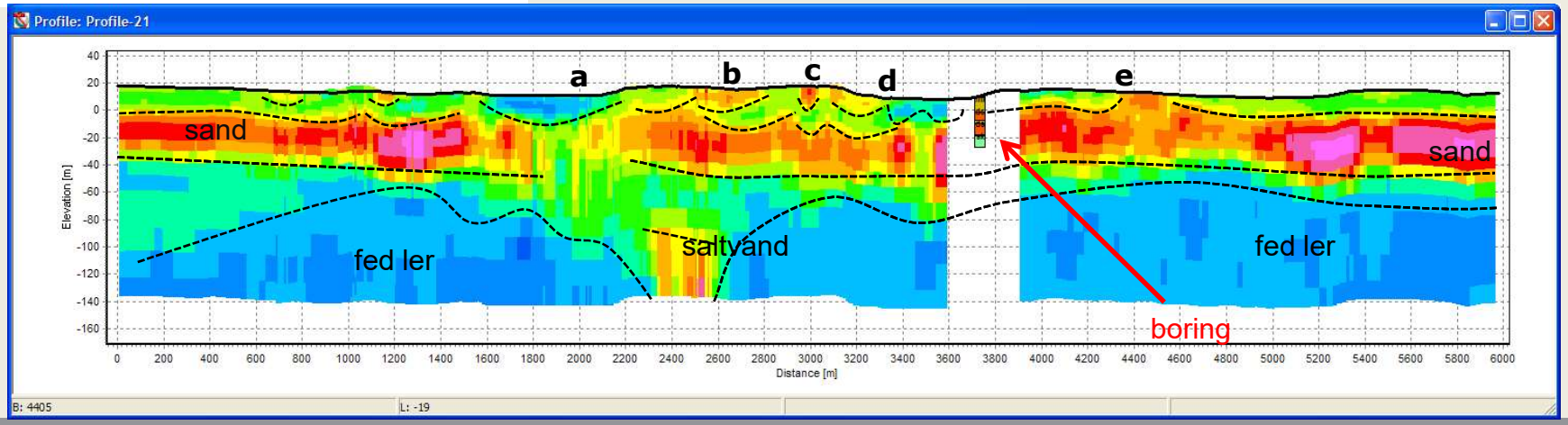
3D geologisk modeller





Geologisk tolkning af elektriske modstande 2 – 300 m's dybde





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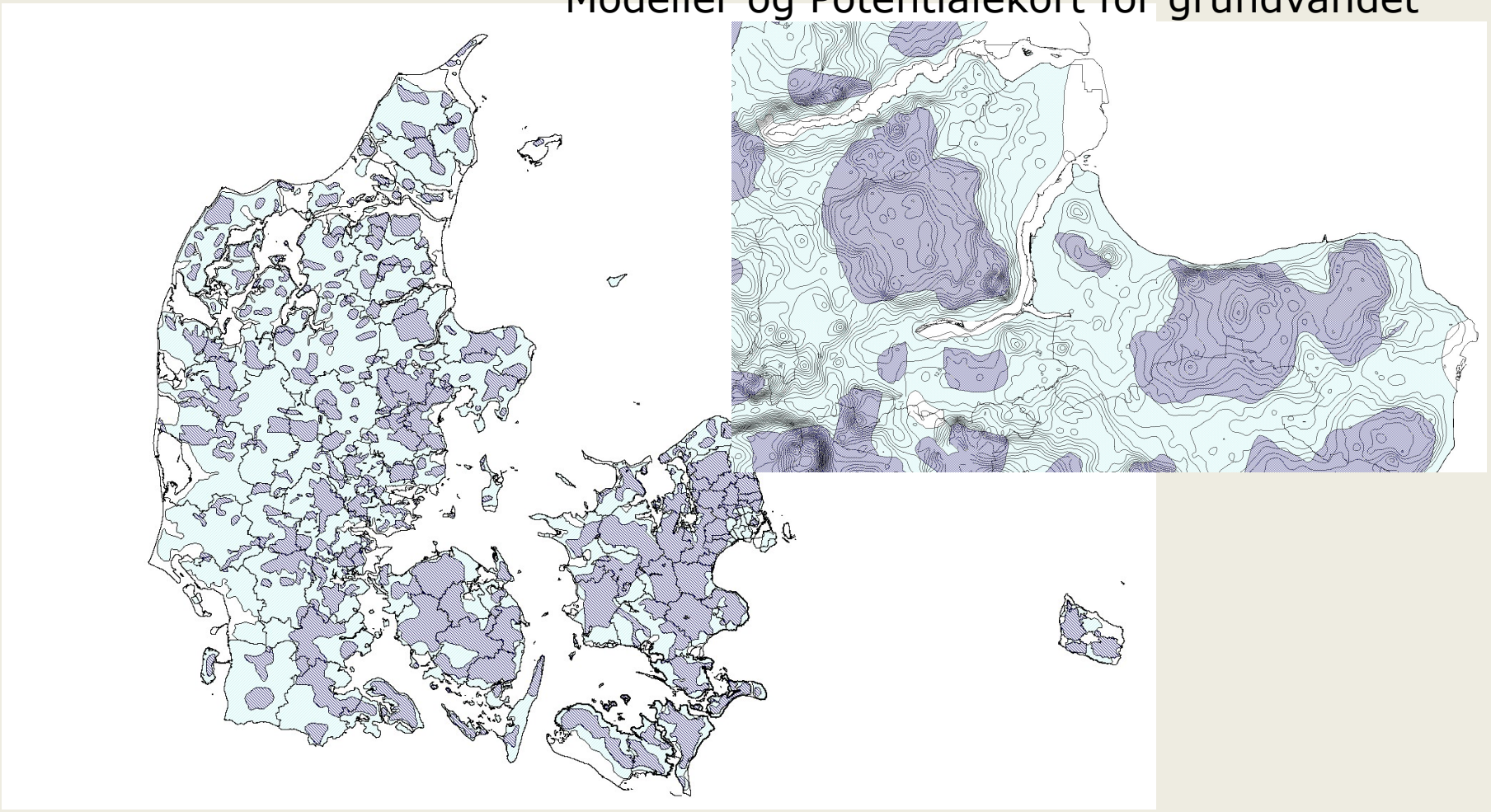
Områder med drikkevandsinteresser

Modeller og Potentialekort for grundvandet



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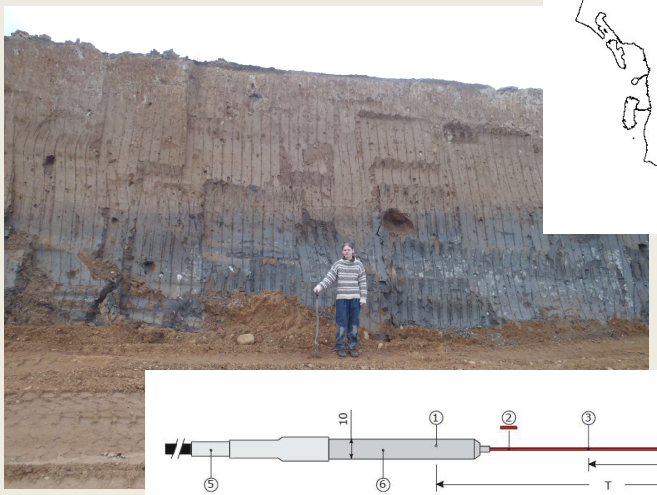
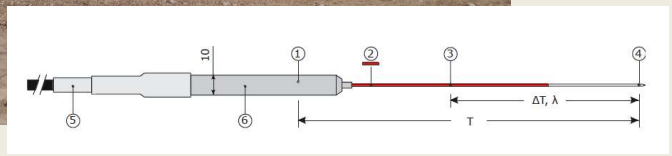
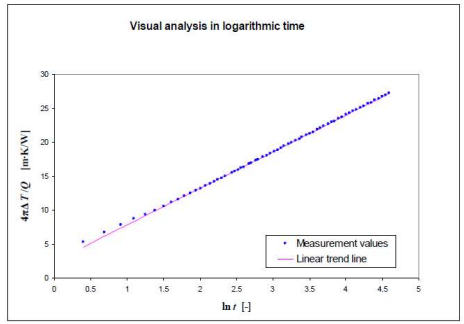
Undersøgelser af jordarters termiske egenskaber







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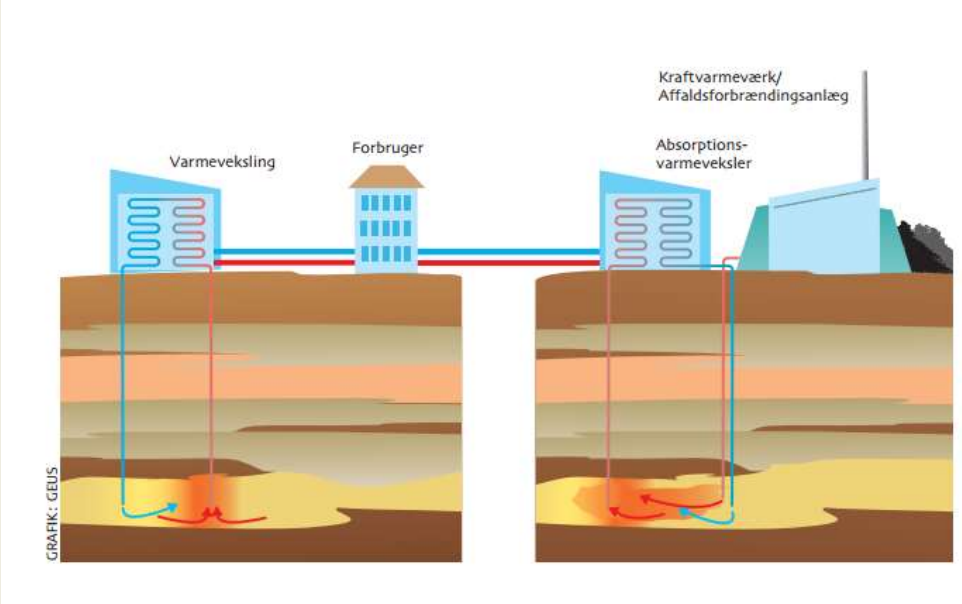
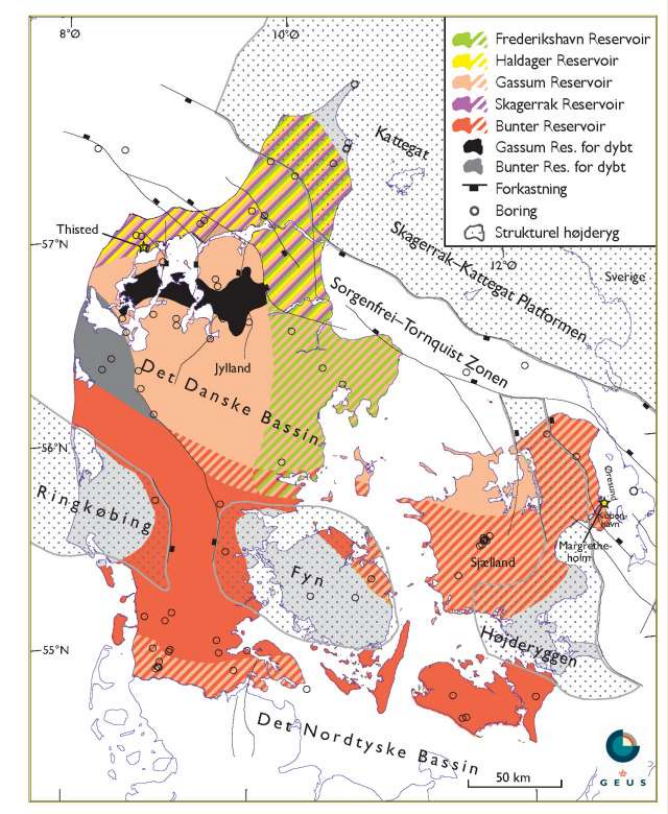
Kortlægningen af det geotermiske potentiale i Danmarks undergrund





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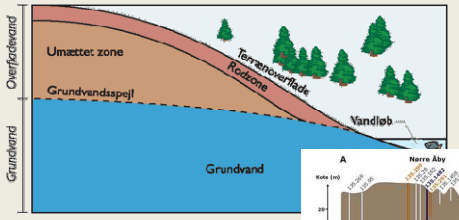
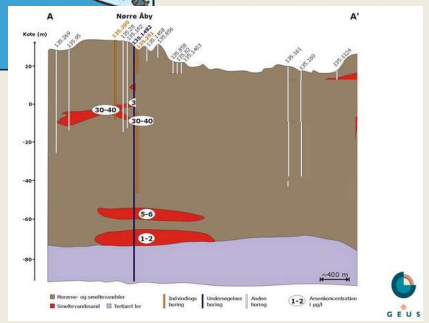
Områder potentielt egnet til BTES:

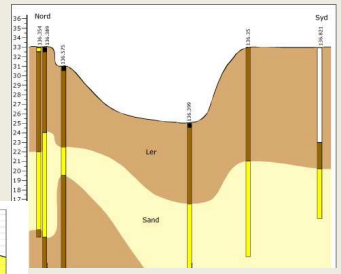
1. Områder med langt til grundvandsspejlet



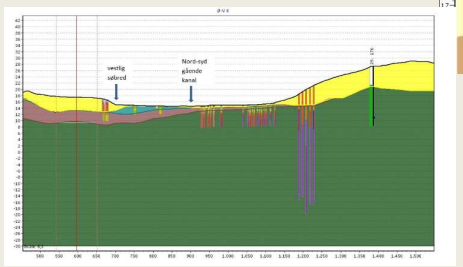


2. Områder domineret af ler-aflejringer i de øverste 100 m

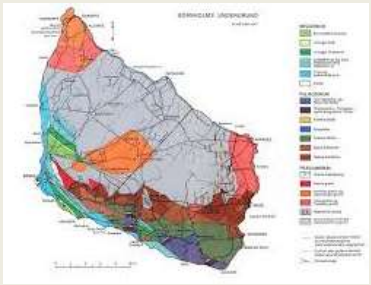
3. Områder domineret af ler i de øverste 40-80 m og grundvandsinteresser herunder



4. Områder med tæt kalk i de øverste 100 m og begrænsede grundvandsinteresser



5. Områder med grundfjeld



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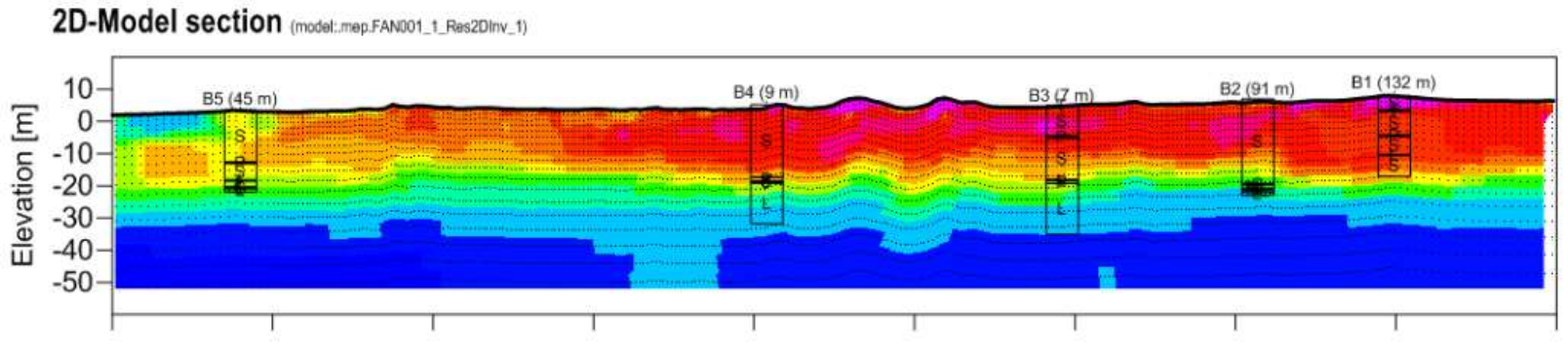
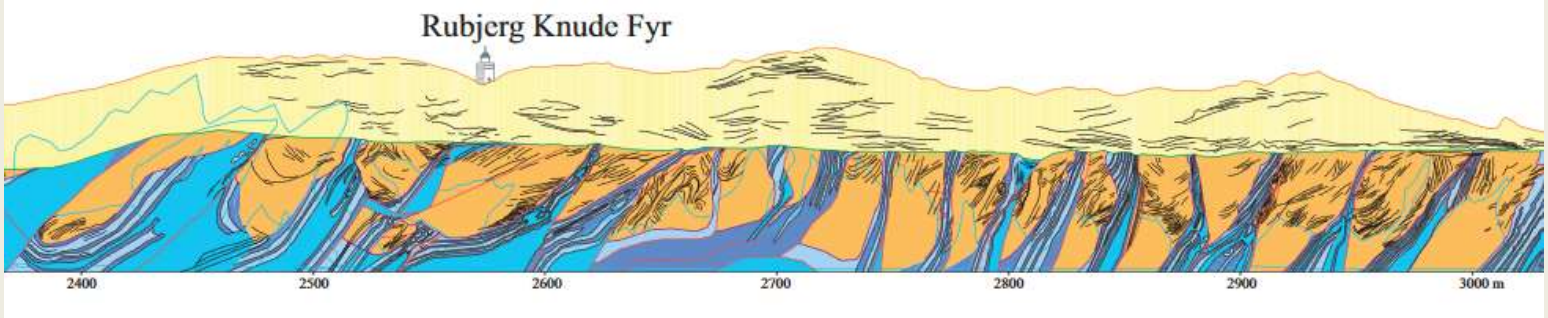
Områder potentielt egnet til ATES:

1. Områder med sammenhængende vandførende sandaflejringer og begrænsede grundvandsinteresser indenfor de øverste 100 m





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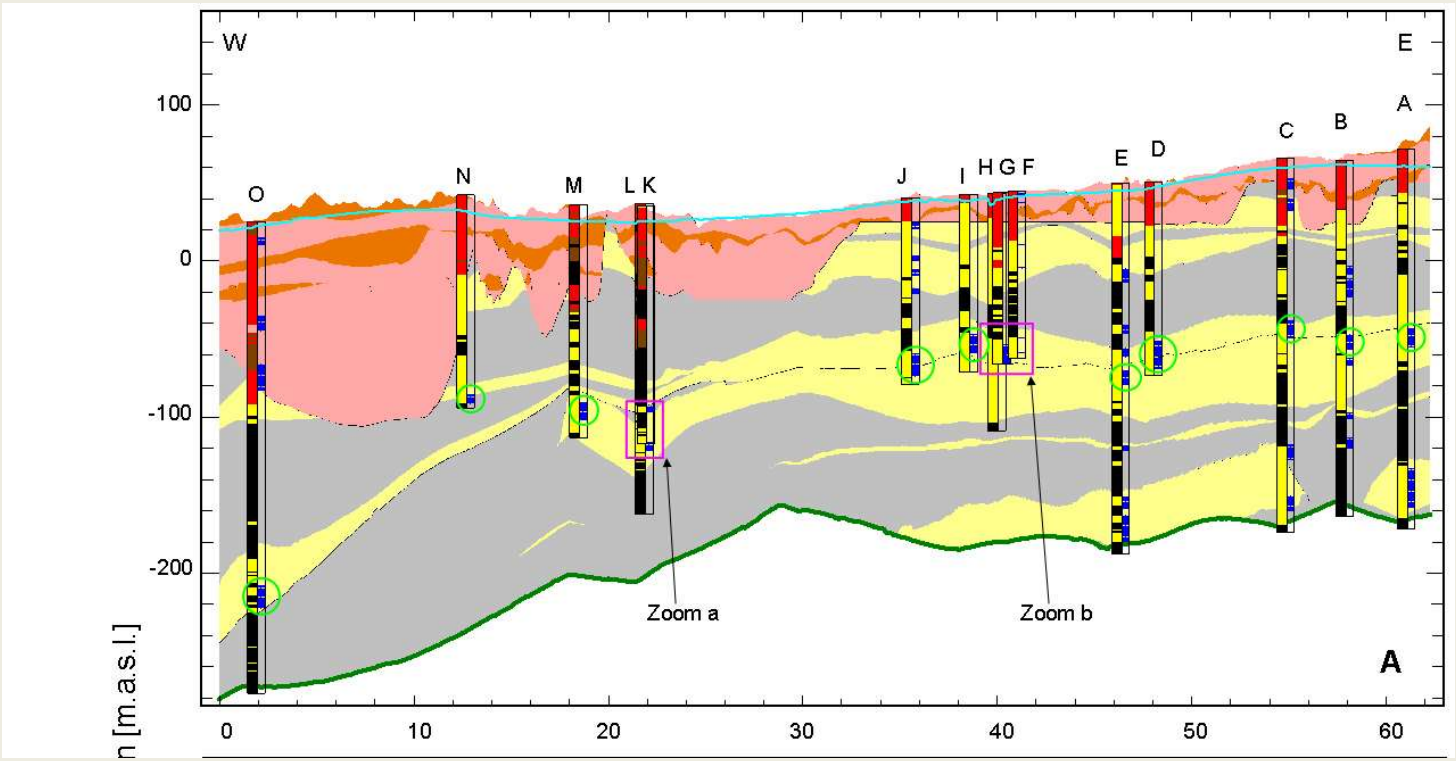
Områder potentielt egnet til ATES:

2) Områder med sammenhængende vandførende sandaflejringer dybere end 100 m



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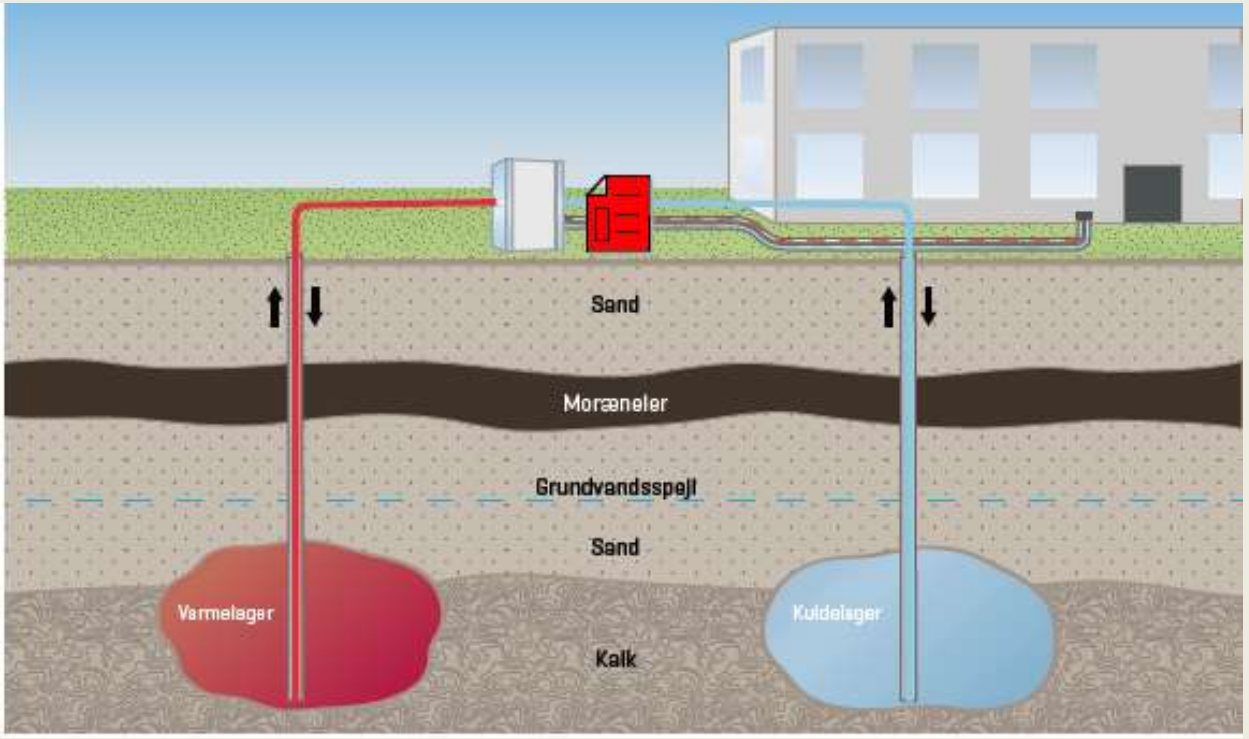
Områder potentielt egnet til ATES:

3) Områder med sprækket vandførende kalk og begrænsede grundvandsinteresser



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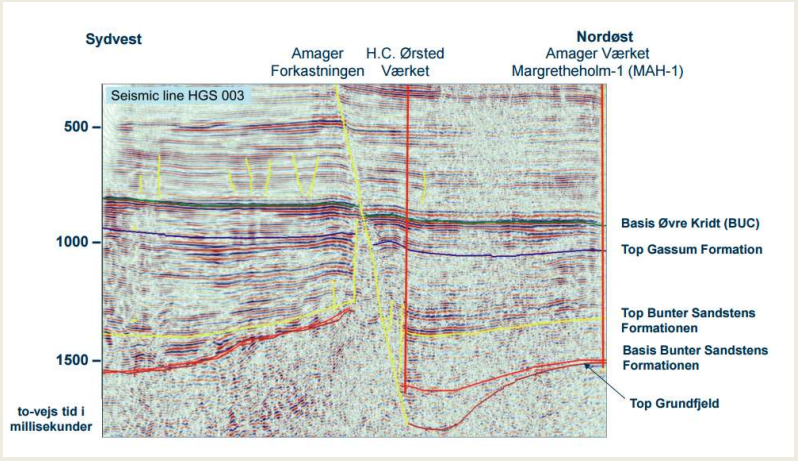
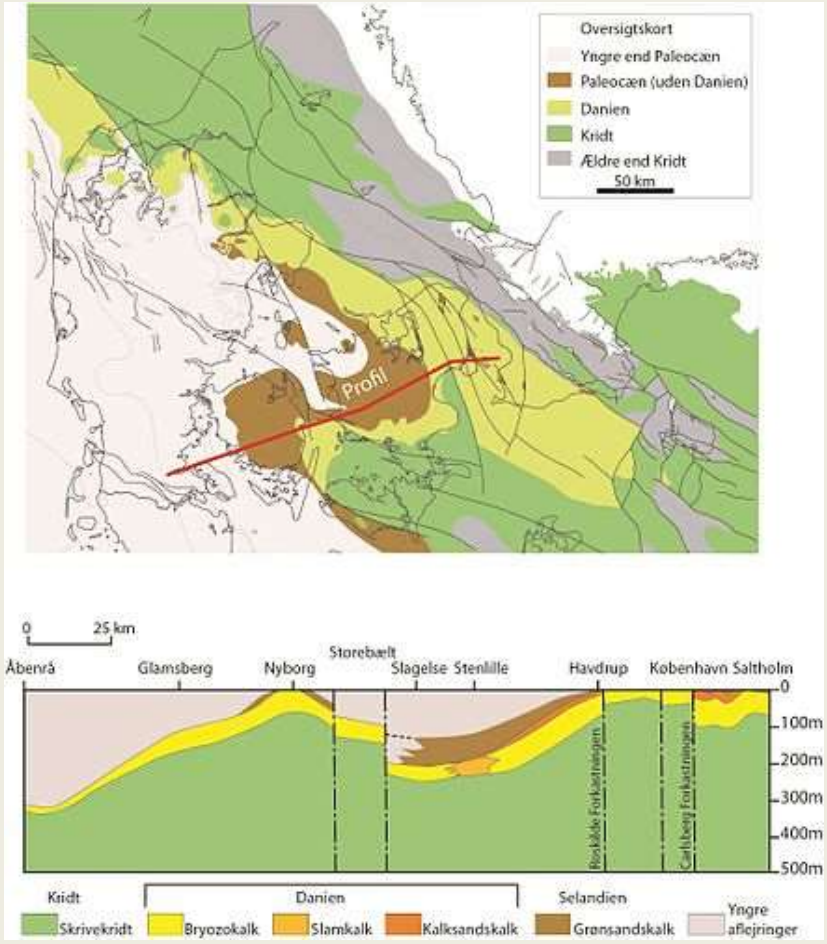
Områder potentielt egnet til ATES:

4) Områder med dybere sandstenslag internt i kalken





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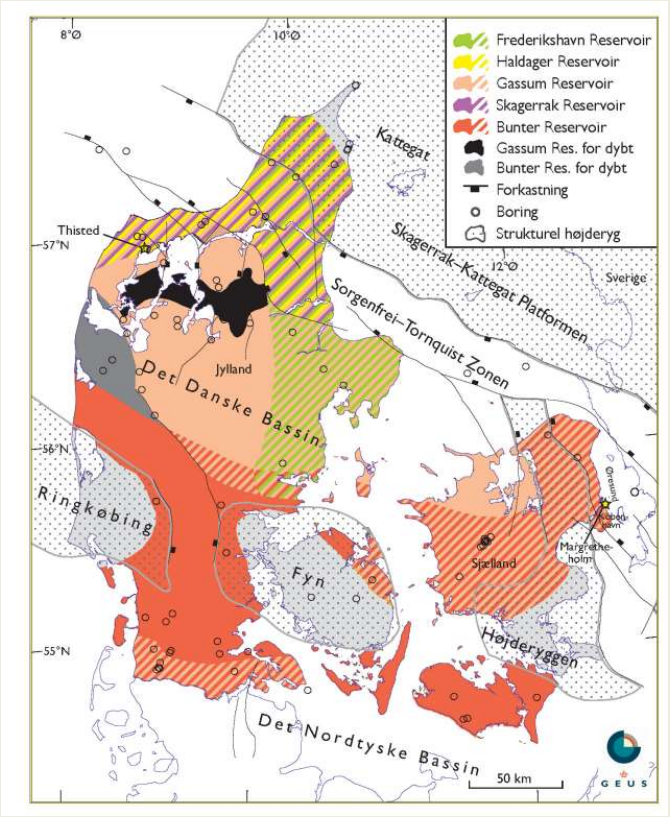
Områder potentielt egnet til ATES:

5) Specifikt sandstensreservoir under kalken ved Aalborg



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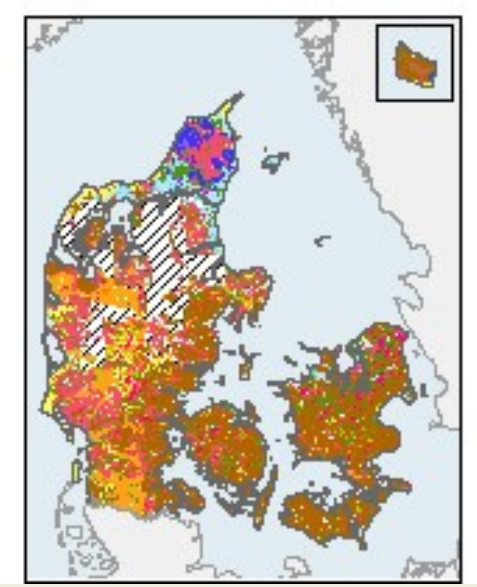
Leverancer fra WP1

- Temakort tilgængelig på Web GIS for de beskrevne geologiske miljøer



samt

- Evaluering af områder med interne sandstenslag i Kalken ved København
- Evaluering af mulighederne fro varmelagring i specifikt sandstens reservoir under Aalborg

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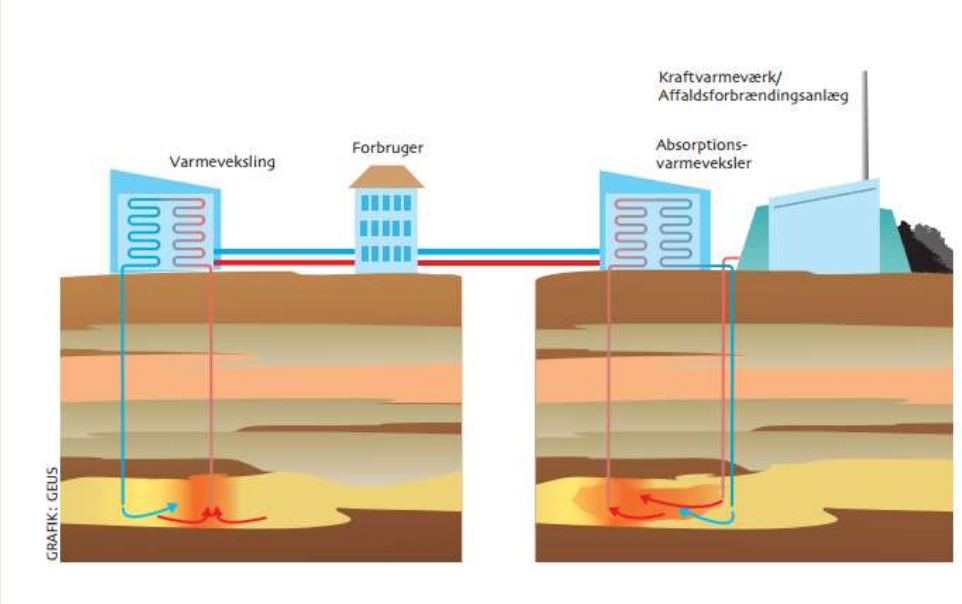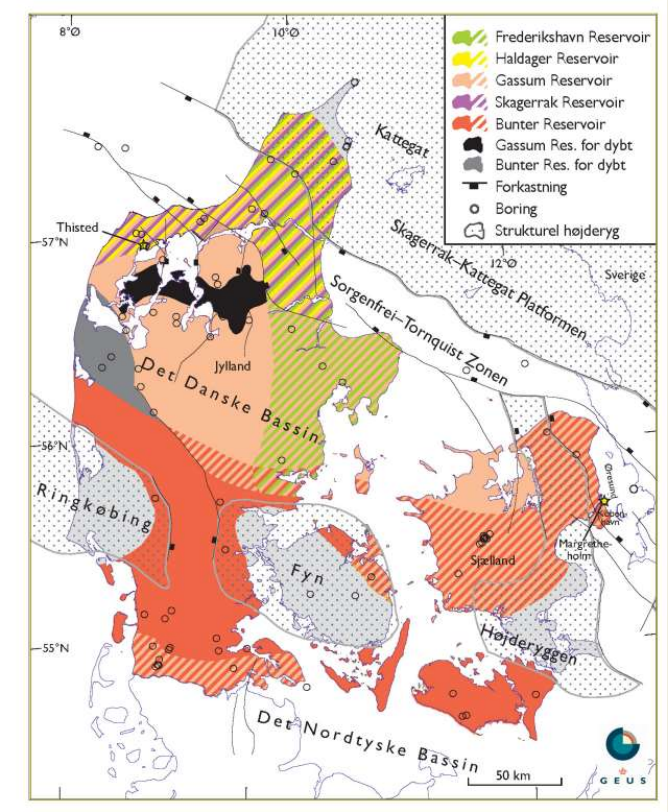
Tak for opmærksomheden