# **De-Risking Dutch geothermal plays by acquiring** subsurface data:

## the SCAN borehole data-acquisition strategy

Adriaan Janszen, Marten ter Borgh, Henk van Lochem, Milan Brussée, Robin Gielisse, Abdul Hamid, Pieter Bruijnen, Marc Hettema, Johannes van den Akker, Edward Wiarda, Klaas Hartsema & Reinout Storm Contact: adriaan.janszen@ebn.nl

#### The SCAN Project

Large parts of the Dutch subsurface have been explored and mapped for the purpose of hydrocarbon extraction. These existing data is now re-used to determine the geothermal potential in these areas. We have less data in areas that were previously less explored. The objective of the SCAN programme is to fill in these 'blanks' ('white spots') and, by doing so, help accelerate the development of geothermal energy projects in the Netherlands.

### **1. Dutch geothermal landscape**

Heating equates to 41% of energy use in the Netherlands. Currently, only ~0.5% of that is generated by geothermal energy.

The programme encompasses three principal areas:

1) acquisition of regional 2D seismic data 2) reprocessing of existing 2D seismic data 3) drilling of approximately seven dataacquisition boreholes

Anticipated drilling of the data-acquisition boreholes in 2023-2025.

All research results are published on the open access website nlog.nl. Interested parties, such as geothermal-project developers or municipalities, can freely download and use these data.

Geothermal projects in the Netherlands produce from primary (non-fracture) permeability systems in sedimentary reservoirs using two or more wells (e.g. doublets). Production from 0.8-3.0km depth (low-enthalpy).

#### 2022:

- 26 geothermal projects, 36 doublets
- 6.8 PJ of heat generated (equivalent to 165.000 households)
- 24 projects in an advanced stage of preparation

#### May 2023:

- 96 exploration licenses
- The Dutch government announced an additional exploitation subsidy of €2 billion to fund 18 new projects

However, subsurface uncertainty remains a big hurdle to geothermal-project development, particularly in the "white spots" with limited subsurface data.



SCAN is a national programme made possible by the Ministry of Economic Affairs and Climate (EZK). SCAN is executed by EBN in collaboration with TNO.

For more on the SCAN project also visit: Johannes Rehling (EBN) Tuesday, Day 1 14:45 Hall 3 Marten ter Borgh (EBN) Wednesday, Day 2 14:40 Hall 1

Sources: energieinnederland.nl, Geothermie Nederland Production Numbers 2022 & NLOG

Geothermal production license Geothermal exploration license

### 2. SCAN borehole data-acquisition strategy

To define the data-acquisition strategy in SCAN wells, several questions were asked:

1) What do we want to know? What subsurface uncertainties need to be addressed to accelerate the development of geothermal energy in the Netherlands? • uncertainties in reservoir presence and quality to assess well injectivity/deliverability:

Lithology, porosity, sedimentological facies, thickness, NTG, horizontal and vertical permeability, transmissivity, presence of fractures and karst, mineralogy and diagenesis

• uncertainties related to fluid properties and temperature:

Fluid composition (dissolved gas (hydrocarbons, CO<sub>2</sub>, H<sub>2</sub>S, etc), salinity, corrosives, micro-biology, lithium content), temperature, thermal conductivity, formation pressure

• uncertainties in the "consequences of geothermal heat harvesting" (e.g. induced seismicity)

Geomechanical properties of seal, reservoir and overburden

2) What type of measurements/samples can address this need? What do we need to be able to extrapolate regionally and become predictive?

open-hole logging, coring, well testing, formation fluid sampling, formation-stress tests, temperature measurements, Vertical Seismic Profiles and mudlogging

3) Can we standardise the data acquisition so that it applies to all SCAN wells?







Ministerie van Economische Zaken en Klimaat