Freitag, 25. Juni 2021
Kongress 2 - Oberflächennahe Geothermie
10.30-11.00 Uhr

Sustainability of geothermal systems in the built environment

Pejman Shoeibi Omrani, TNO

As part of the energy transition, the Netherlands is transitioning from a gas-based heat supply to more sustainable heat sources (it is expected to have more than 60% of the heat demand of households in the Netherlands by 2050 to be supplied by heat networks). Several sources could provide sustainable heat to these heat networks such as geothermal doublets, biomass, heat pumps, waste heat, etc. Geothermal energy has the potential to become a dominant source of sustainable heat in the built environment. But the key question is; how sustainable is the production of geothermal energy?

The main sources of $CO_{2(eq)}$ emissions in a geothermal system are the required power for the operation of the plant but more importantly the CO_2 emissions related to the by-produced hydrocarbons. The greenhouse gas emission resulting from the production of geothermal energy challenges the sector to find alternative design solutions and technologies to mitigate or control the emissions. This presentation focusses on demonstrating the emission factors as well as the level of these emissions for the operation of low-enthalpy geothermal systems under different scenarios:

- Impact of future electricity mix, moving towards green electricity production as a feed to the geothermal systems
- Variation in the produced formation gas and different methods to handle it

For each of the scenarios the CO_2-eq emission is calculated and the critical components in the geothermal production systems in view of emission are identified. Additionally, the analysis was performed for several low-enthalpy geothermal systems in Europe to benchmark the emission factors of different formations and production system designs. Finally, a view is given of the necessary actions to realize a CO_2-neutral collective heat network with a geothermal source.

Co-Autoren: H. Dijkstra, D. Dinkelman (TNO, The Netherlands)