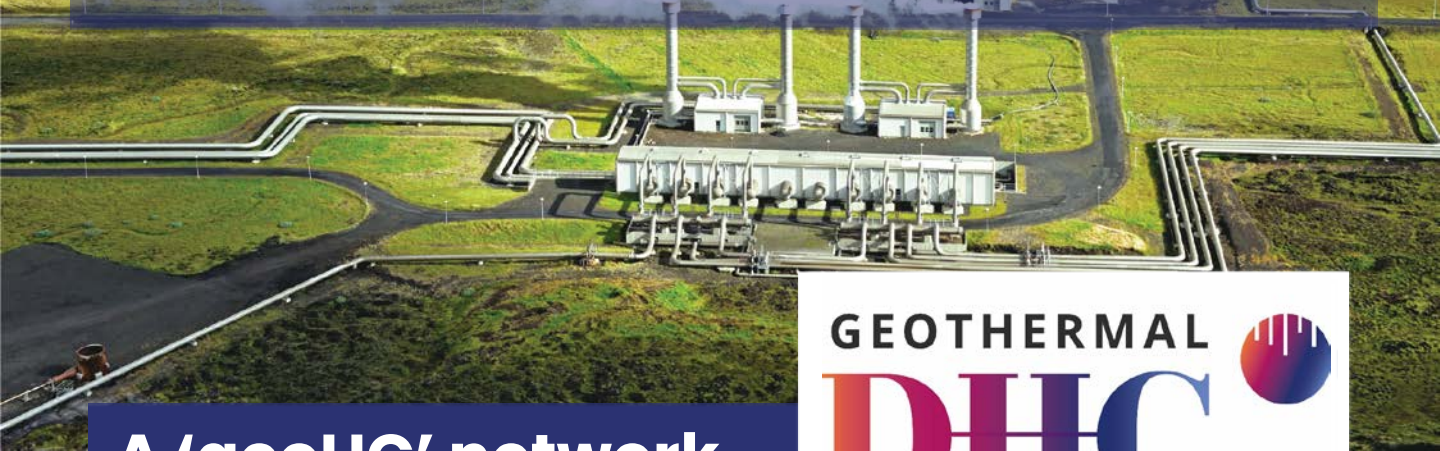
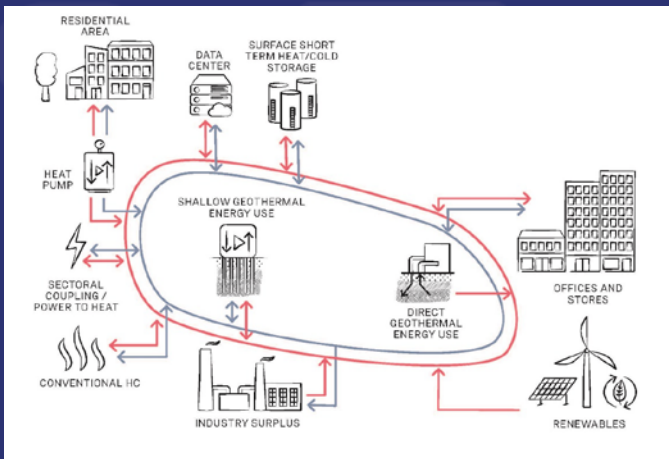


Opportunities, challenges and pathways for replacing fossil fuels by geothermal district heating and cooling systems – the CA18219 position paper

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A 'geoHC' network in a nutshell



GEO THERMAL
DHHC

Towards Decarbonized Heating and Cooling!

www.geothermal-dhc.eu

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- Multivalent DHC networks supported by heat pumps
- Geothermal technologies provides baseload & seasonal storage
- Grid capacities $<0.5 \text{ kW}_{\text{th}}$ to tens of MW_{th}
- Grid temperatures 5degC to 120degC

The Geothermal-DHC vision for renewable heating and cooling in Europe

- **2020:** $<2\%$ of renewable heat provided by geothermal DHC systems ('geoHC') in Europe
- **2030:** $>5\%$
- **2040:** $>15\%$
- **2050:** $>30\%$



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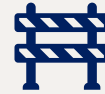
May 2024

The CA18219 Geothermal-DHC position paper



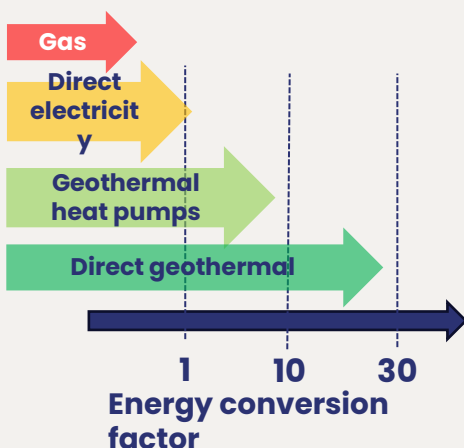
Why choosing geothermal energy district heating and cooling?

- No emissions, low space consumption
- Primary energy saving & reduced energy imports
- Wide range of market ready and market close solutions
- Baseload supply and seasonal storage to capitalize fluctuating renewables and residual heat
- Low exploitation level – >90% of known geothermal resources still untapped



Hurdles to remove

- Significant financial gap between upfront (CAPEX) and operational (OPEX) costs
- Lack of investors and financial incentives
- Lack of knowledge and access to data on geothermal resources
- Unfit legal framework to consider geothermal as an important source of energy
- Lack of service providers and specialist to roll-out the technology



Geothermal district heating and cooling in Europe – still a niche in 2022

- **Direct use:** 395 geoHC systems in operation @5.6 GWth capacity¹
- **Geothermal heat pumps:** 2.19 million heat pumps installed¹
- **5G networks:** approx. 200 to 300 systems

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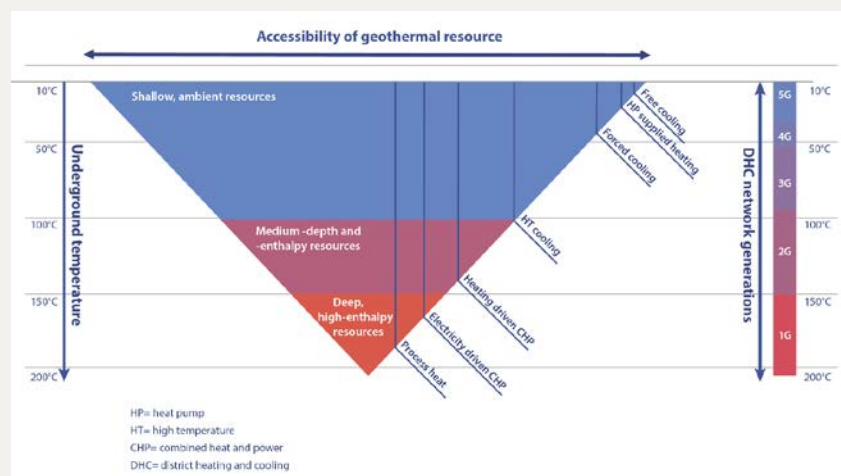
Pathways towards more 'geoHC' networks in Europe

- Low temperature (4G&5G) networks for climate-fit heating and cooling
 - Temperature reduction in existing district heating networks
 - Advanced engineered solution in geothermal
 - Supportive business models
 - Public incentives
 - Human resources to enable the rollout
- **Low temperature (4G to 5G) networks** provide efficient & climate change fit solutions for the urban built environment [heating & cooling]
 - **Refurbishment of existing district heating networks** by reducing grid temperature is key for the integration of geothermal energy – the accessibility of geothermal significantly increases at grid temperatures below 100°C

- **Technological developments** towards engineered geothermal solutions (e.g., deep loops) will reduce dependency on hydrogeological settings and unleash the true geothermal potential

General scheme on the matching between geothermal energy and district heating²

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CA18219 Geothermal-DHC Fact Sheet No.13

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Towards Decarbonized
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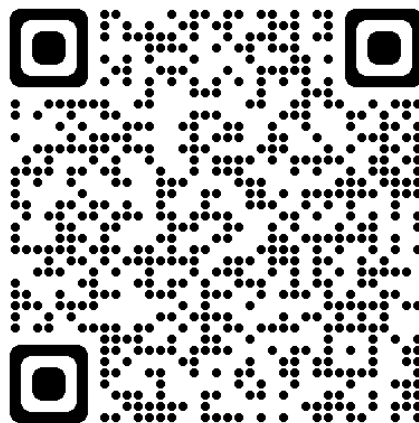
¹EGEC Geothermal market report 2022 (www.egec.org)

²Goetzl et al. (2023), EFGJ, Volume 54

²Goetzl et al. (2020), Proceedings of the World Geothermal Congress

³Goetzl et al. (2023), EFGJ, Volume 54

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