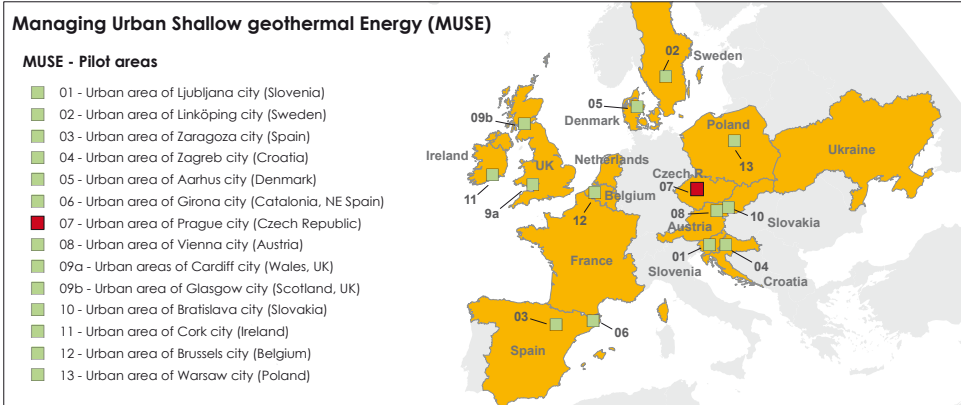


Pilot area information



The urban area of Prague acts as a model for urban areas of medium-developed SGE market. The topographical level varies from 177 to 399 m a.s.l. Temperature ranges from 1 °C (-3 °C at night) in winter to 24 °C (13 °C at night) in summer, with a mean value of 8.5 °C. Relative humidity is 65 to 90%.

Shallow geothermal for heating and market is slightly increasing in Czech Republic, although the exact data are not freely available. In the specific case of Prague city, the number of SGE installations and projects have increased largely recently due to higher interest of public and business sector. Several projects of multi-borehole heat exchanger arrays are under construction currently.

Pilot Area	Prague
Task (MUSE)	T-4.8
Country	Czech Republic
Area (km ²)	496km ²
Total number of inhabitants (date)	1,294,513 (2018)
Inhabitants per km ²	610
Level of urbanization	100%
Elevation range (m a.s.l.)	177 - 399

Climatological settings

HDD/CDD data according to EUROSTAT method	
Heating degree days (HDD); [baseline reference values]; (period for data calculations)	2985 [15/18] (2017)
Cooling degree days (CDD); [baseline reference values]; (period for data calculations)	53 [21/24] (2017)
Length of the heating season (days)	232 (period 2007-2017)
Length of the cooling season (days)	Unknown

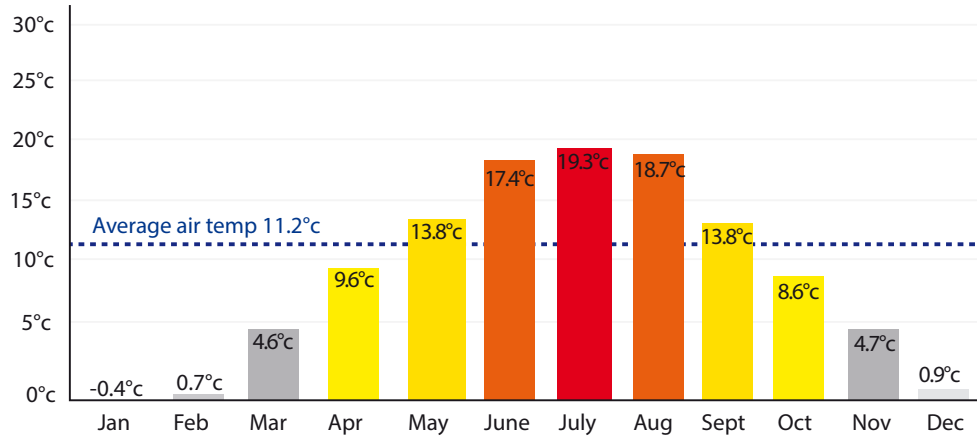
Source of data: Eurostat. <https://ec.europa.eu/eurostat/data/database>



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Average monthly and annual air temperature



Market situation

Number of SGE installations in pilot area	OLS V-CLS H-CLS	Unknown 40 (EST) 0 (EST)
Current growth rate	No. of Installations	10
Estimated share of open loop systems		10%
Estimated share of closed loop systems		90%
Estimated total share of shallow geothermal methods in the heating market	V-CLS	1%
Other SGE technologies: Eg. Inter-seasonal heat storage schemes or energy piles	Unknown	
Estimated total share of RES in the heating energy market (%) (specify local or national values)		10.5% (national)

Economic boundary conditions

Estimated average installation costs for shallow geothermal systems (€/kW output) ¹	
Open loop systems	Unknown
Closed loop systems	1700
Estimated average heating costs (€/kWh)	
Open loop systems	Unknown
Closed loop systems	0.06
Drilling cost range per meter (€/m) for Open Loop	Unknown
Drilling cost range per meter (€/m) for Borehole Closed Loop	35 - 40

Regional geological and hydrogeological characteristics

Pilot area: Prague

Bedrock Age: Neoproterozoic-Paleozoic (folded)

Bedrock Depositional Environment: Marine

Bedrock lithologies: Greywacke, sandstone, interlayered shales and sandstones, limestones

Platform sediments: Cretaceous marlstones to sandstones

Quaternary: River terrace sands and gravels, loesses, anthropogenic deposits. Include typical thickness of superficial overburden.

Karst is developed in Silurian and Devonian limestones, possibly also in cretaceous marlstones.

Hydrogeology

Target aquifer unit(s):

A) Proterozoic to Ordovician fractured sedimentary rock aquifer

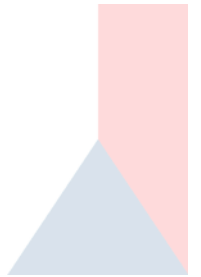
B) Highly permeable lowest river terrace (sand and gravel, average aquifer thickness 3-5 m, $K_f = 1 \cdot 10^{-1} \text{ m.s}^{-1}$), water level connected with river.

Hydrochemistry:

A) Fractured rock aquifer - 400 – 1500 mg/l, Ca-SO₄ type

B) River terrace aquifer – lower mineralization due to mixing with river water

Pump tests data are available, TRT test data can be acquired from geothermal exploration companies.



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Summary of works and timeline

Main Objectives	
	Evaluation and characterization of geology/ hydrogeology / thermal conditions
	SGE assessment resources (for OCS and/or CLS) / and evaluation of UTES-BTES)
✓	Study of conflicts of use (OLS / GWL - OLS/CLS). Hazards/interferences, effects on sub-surface
✓	Strategies and actions for management and local energy plans
Relation of foreseen tasks	
	Data collection (TRT, DTRT, rock samples, GWL, T-profile's etc)
	New field works (TRT/geophysics /new samples and lab etc)
✓	Monitoring existing SGE/GWL/T etc)
	Mapping (in general terms)
	2D/3D Modelling (in general terms)

Detailed summary of works at the Pilot Areas and brief timeline

March 2019 – March 2020 MUSE monitoring period.

Communication with stakeholders (Czech heat pump association etc.) and mapping installed systems and potential conflicts of use.

Analysis of local legal framework. Evaluating currently existing regulation measures for SGE in Europe with focus on the addressed pilot areas. Cooperation with municipality organs in order to identify challenging issues and propose scientific-based solutions. Development of plans and measures for integrating SGE use in urban energy supply strategies and action plans (WP3).

Cooperation with real-estate developers using geothermal energy resources, mapping of SGE use in Prague focused on the good and bad practices. (WP4)

Contact

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Project number GeoE.171.006

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