



Sustainable
District
Energy
Conference
October 23-25, 2019, Iceland



Design of Geothermal District Heating in Iceland Exporting Lessons Learnt

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Topics

- Geothermal District Heating in Iceland
- Reykjavik Geothermal District Heating System
- Using the Experience from Reykjavik
 - Vestman Island Lava District Heating System
- Exporting Know-how to
 - China
 - Design and consultancy
 - Capacity Building
- Conclusion





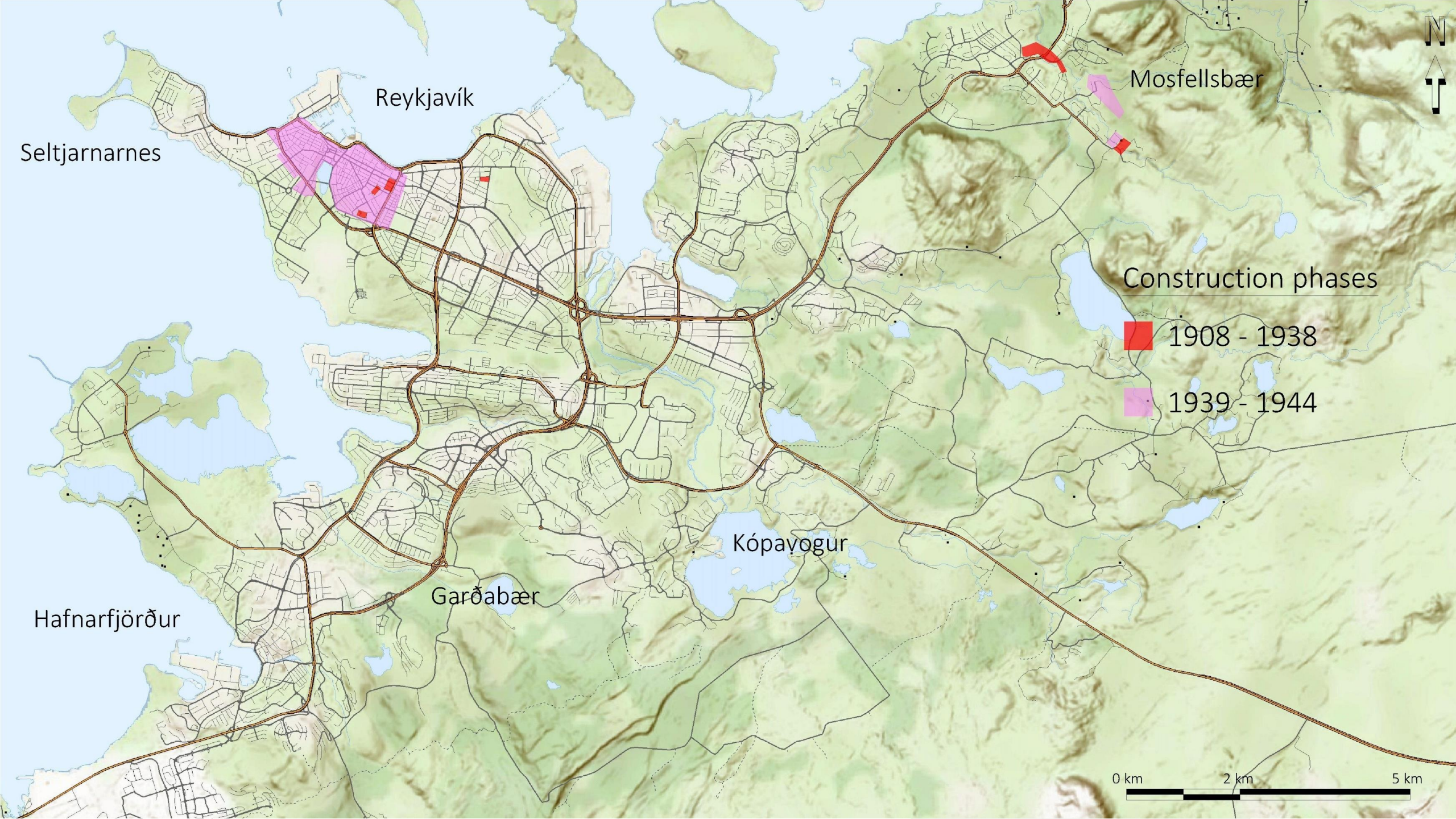
Our story – The Reykjavík District Heating





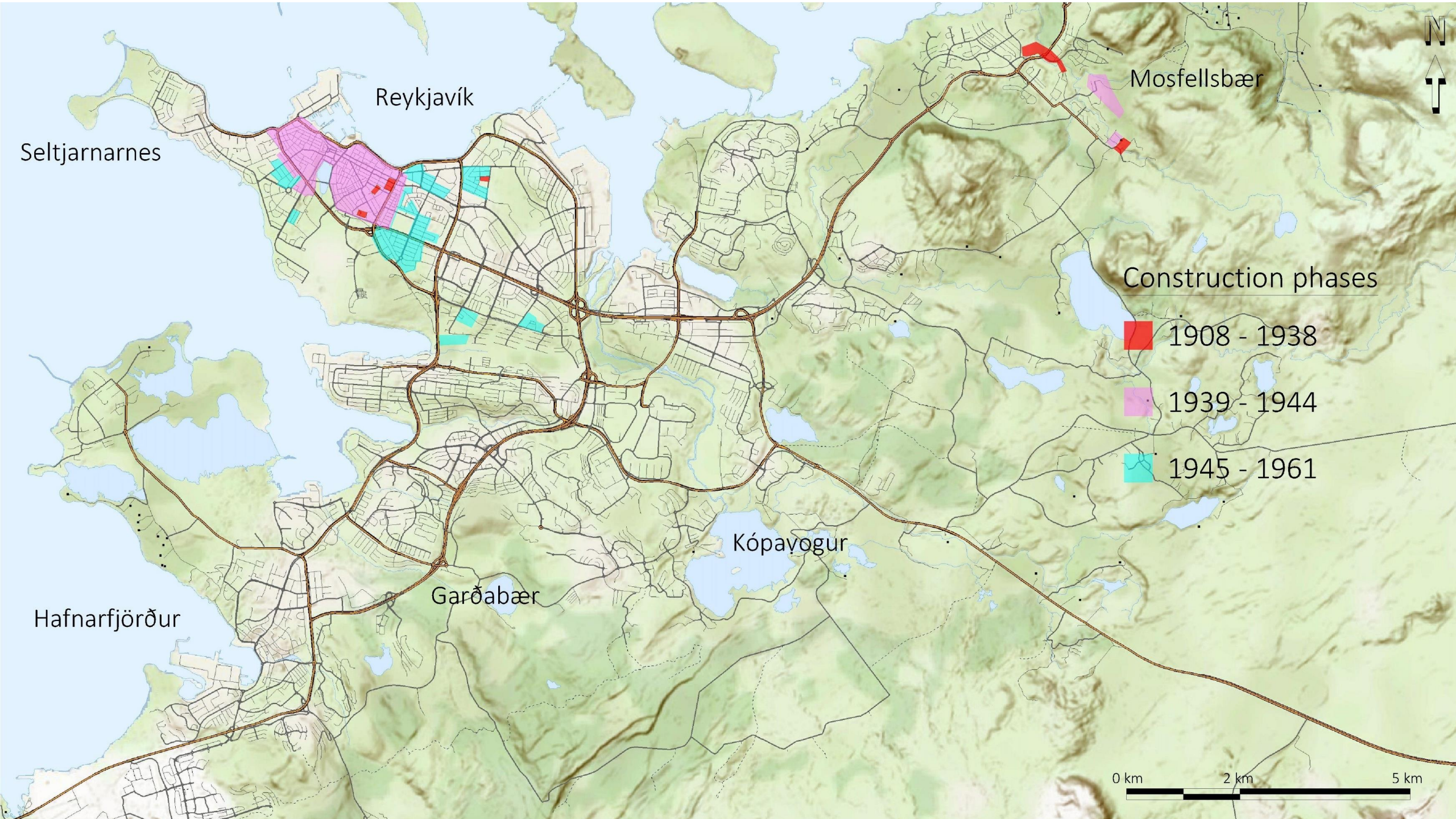
Ash cloud over Reykjavík

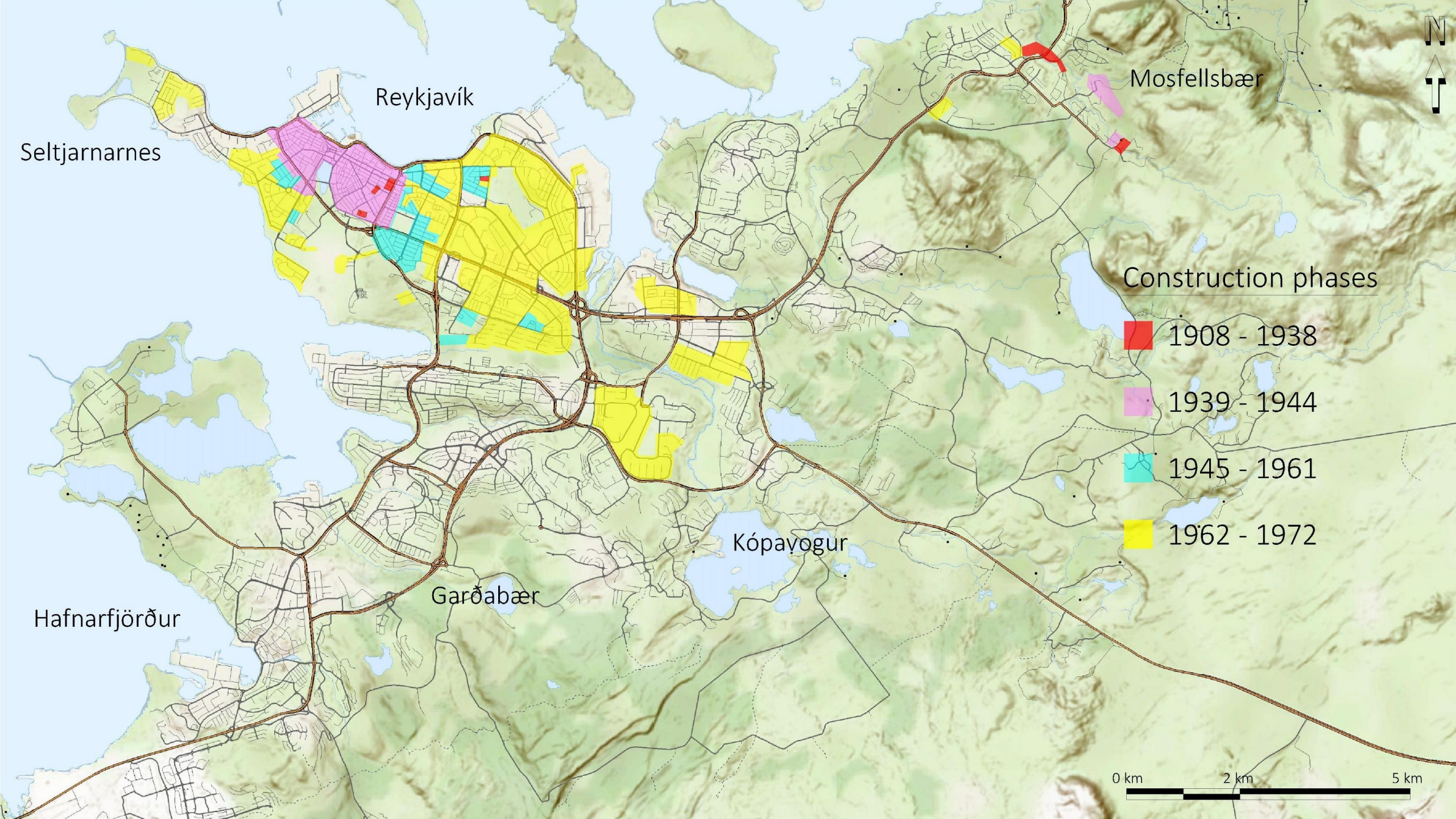


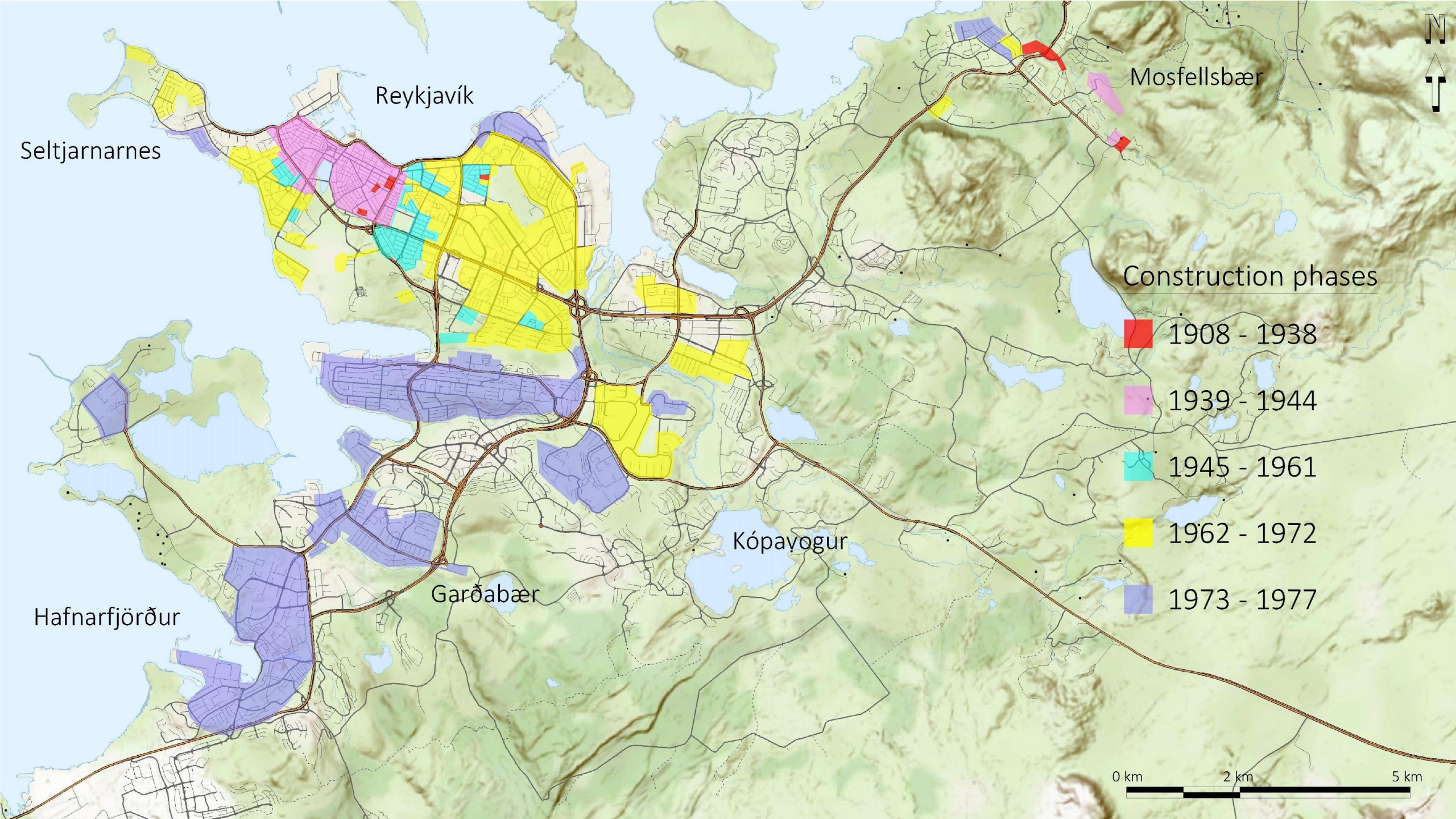


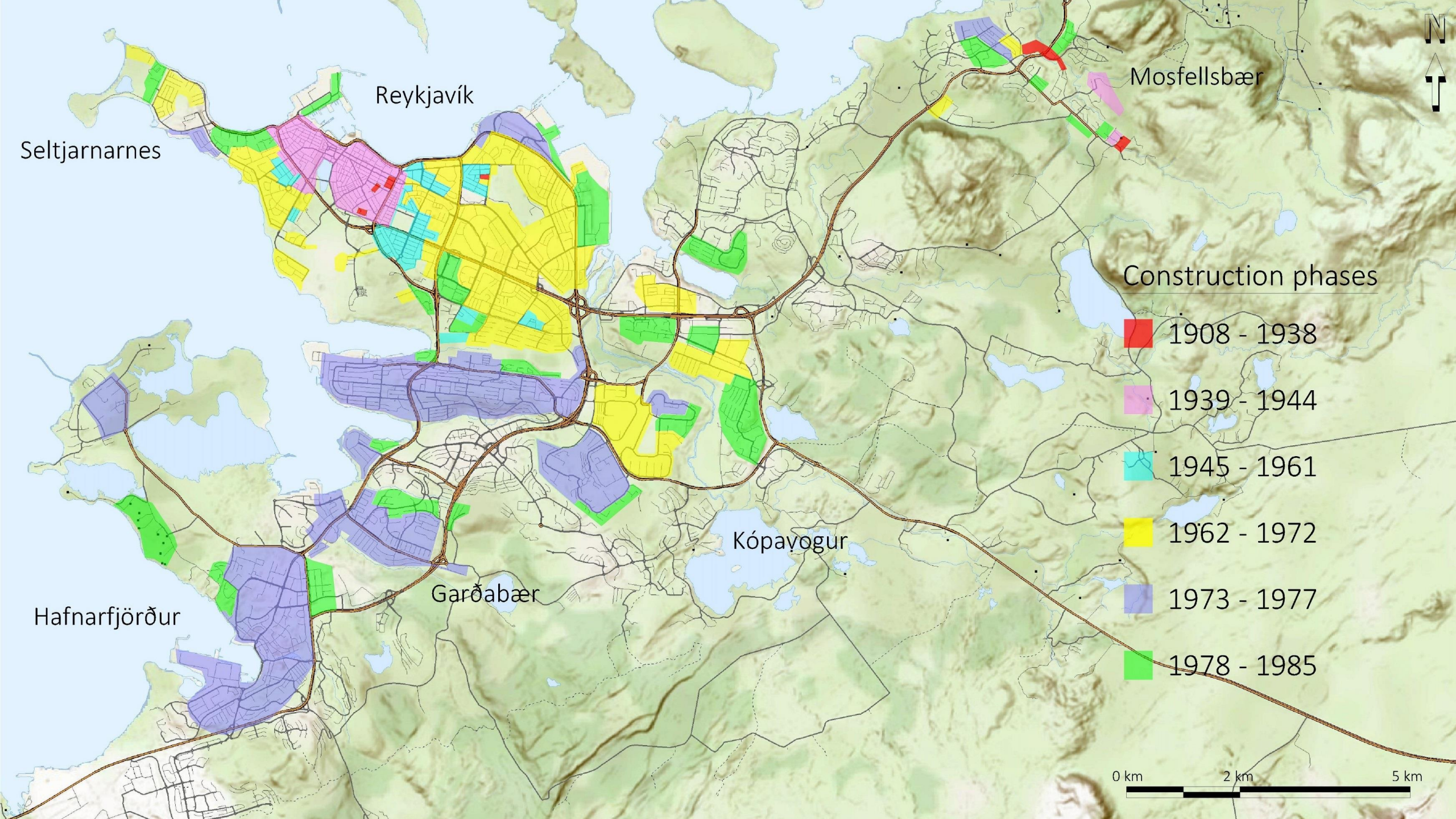


Pipe insulation with Icelandic turf









Seltjarnarnes

Reykjavík

Mosfellsbær

Construction phases

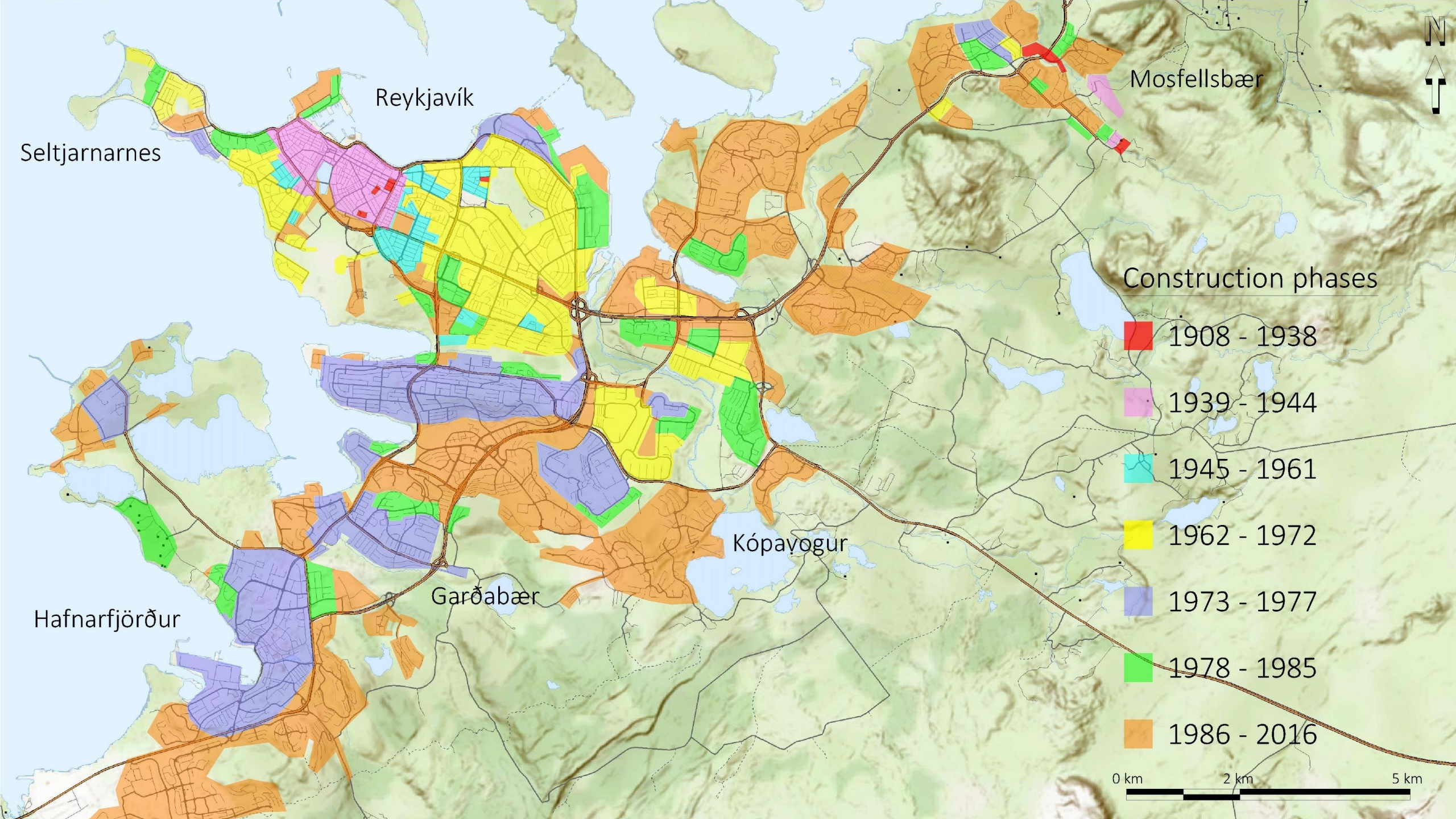
- 1908 - 1938
- 1939 - 1944
- 1945 - 1961
- 1962 - 1972
- 1973 - 1977
- 1978 - 1985

Hafnarfjörður

Garðabær

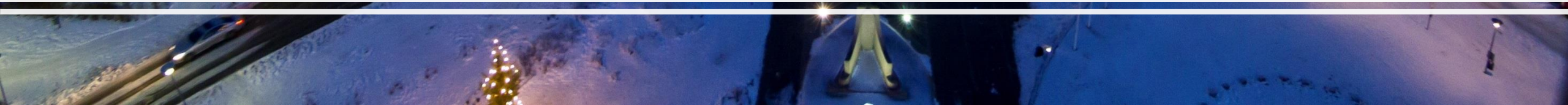
Kópavogur

0 km 2 km 5 km





Reykjavík, 100% heated with geothermal







Vestmann island – the Town





January 23rd 1973 - Eruption at Heimaey
1,5 km long volcanic fissure opened in the east part of the island

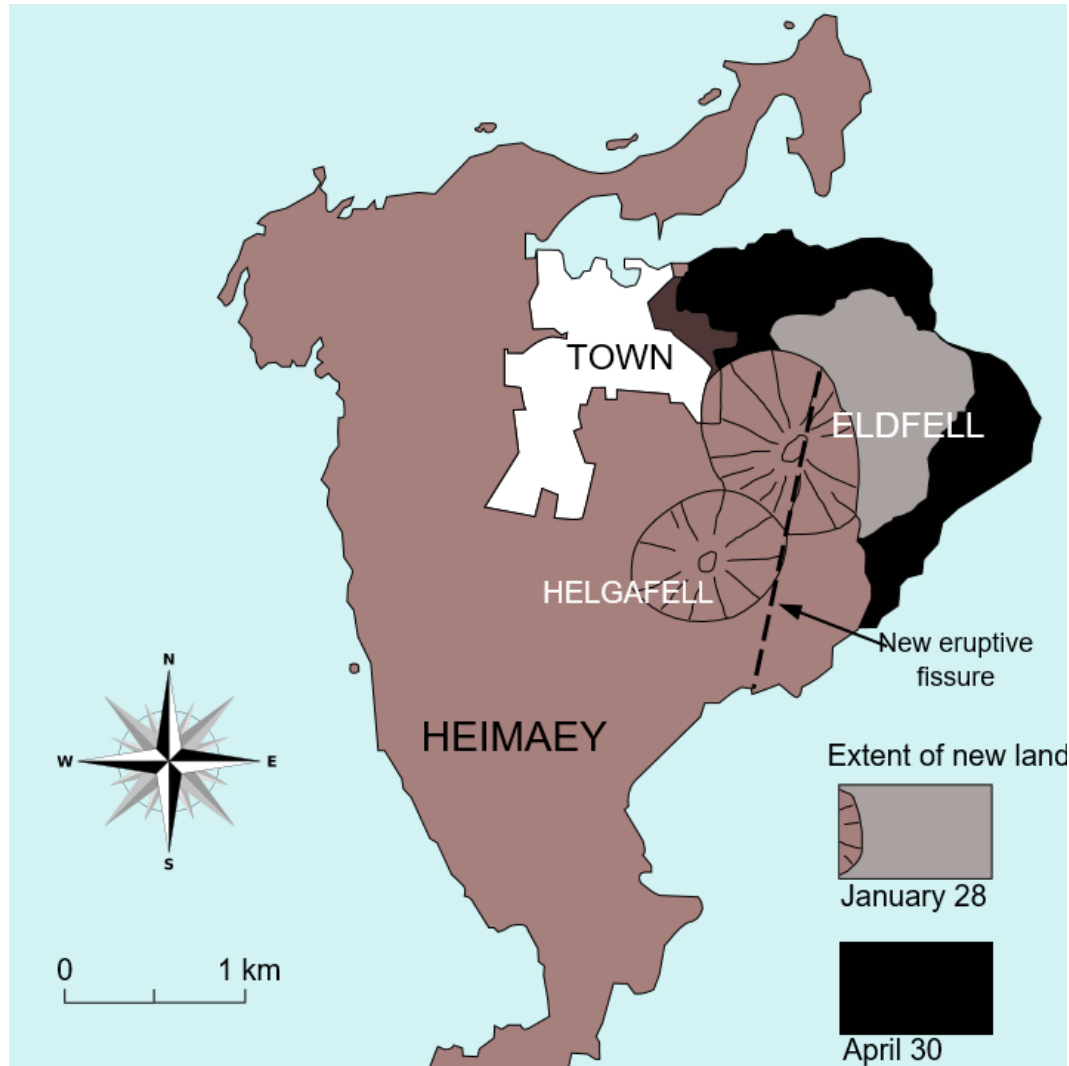






Ash clean-up

Heimaey - Westman islands



- 1973: 5.300 inhabitants
- Lava field:
 - 250 million cubic meters
 - Thickness 100-130 m
 - Estimated energy contained: 250 million megawatt hours
- Increased island area from 11,2 km² to 13,4 km²

The "wise guys"



Main system components:

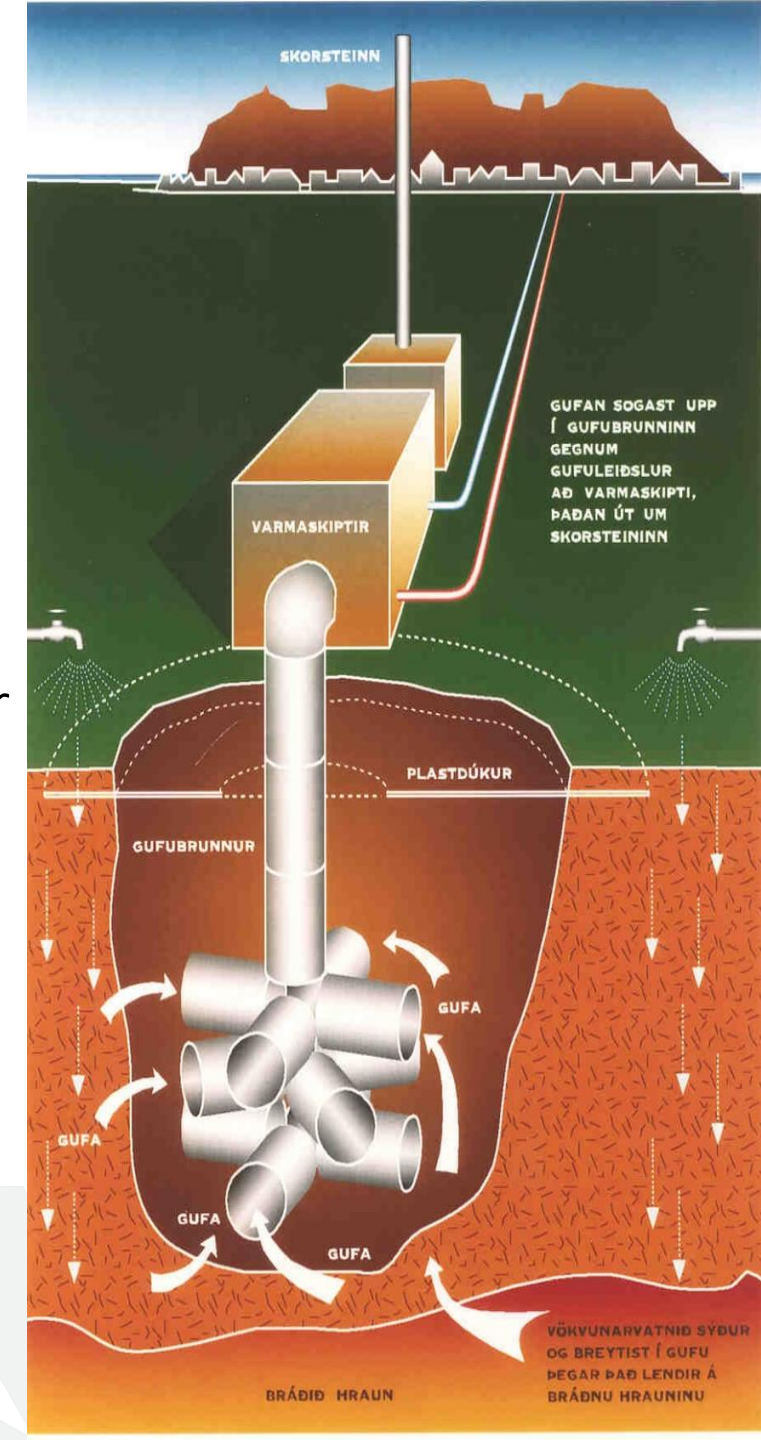
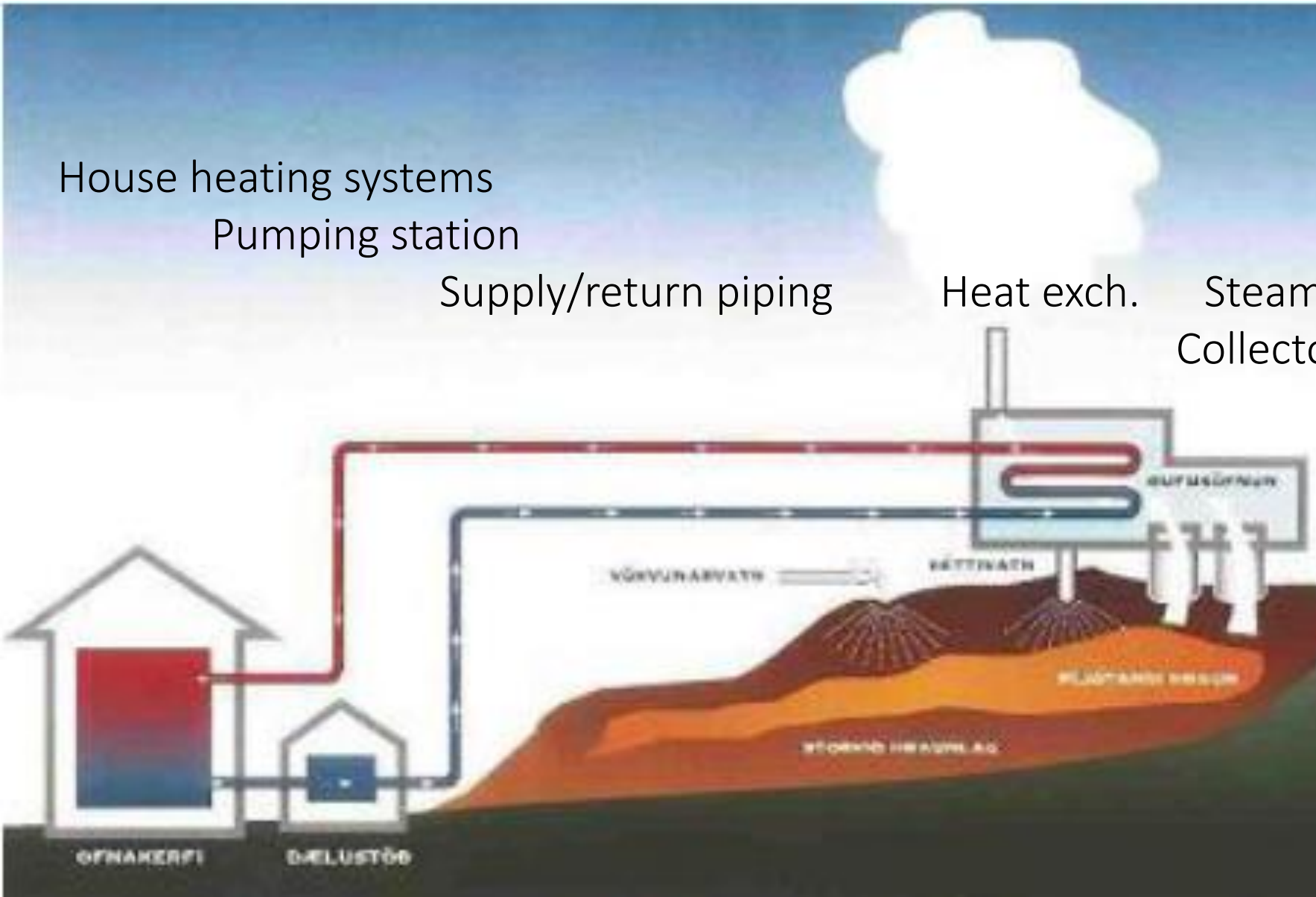
House heating systems

Pumping station

Supply/return piping

Heat exch.

Steam
Collector



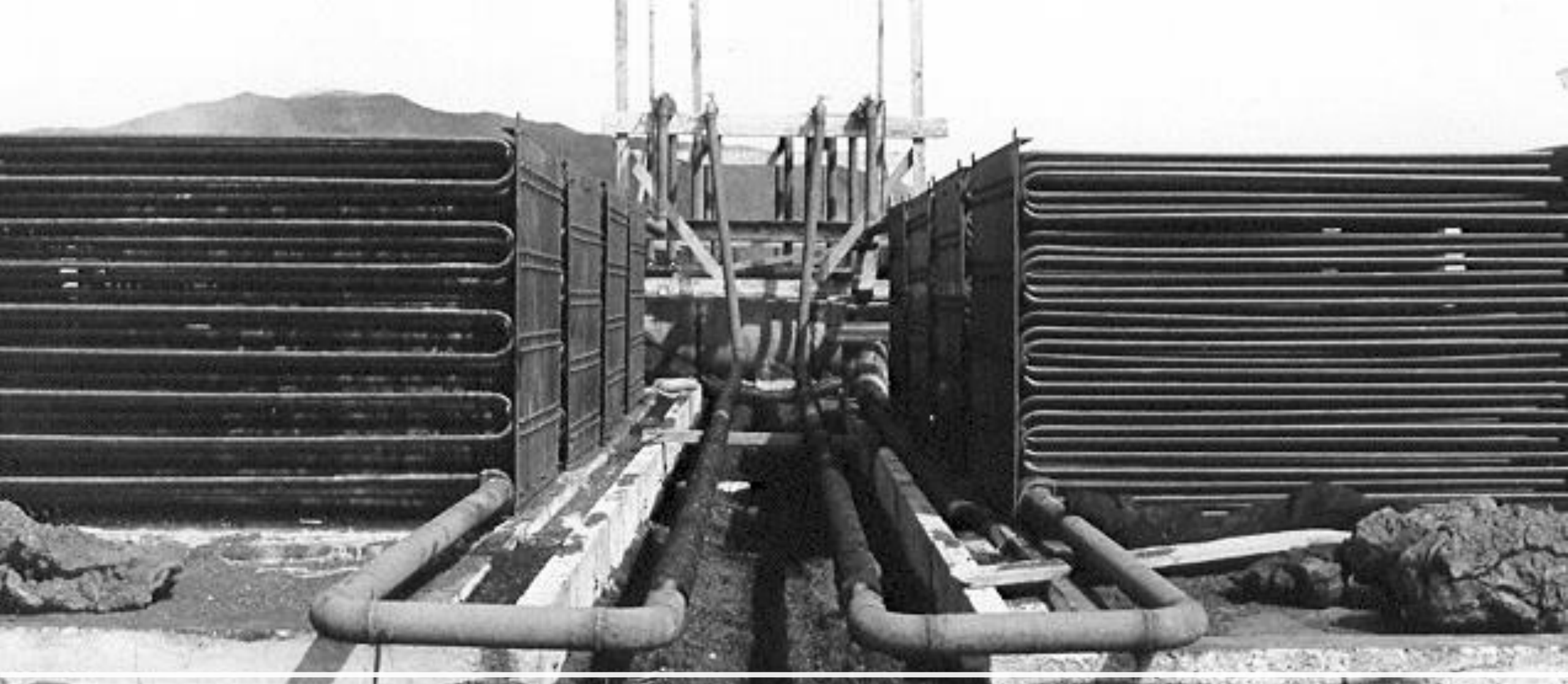
KORTMYND
 LOFTMYND
 KORT

Vatnsveita
 Hitaveita
 Rafveita
 Þjónusta-Afbreyting





Steam collector installation



“Concrete Cave and tube” heat exchanger bundles



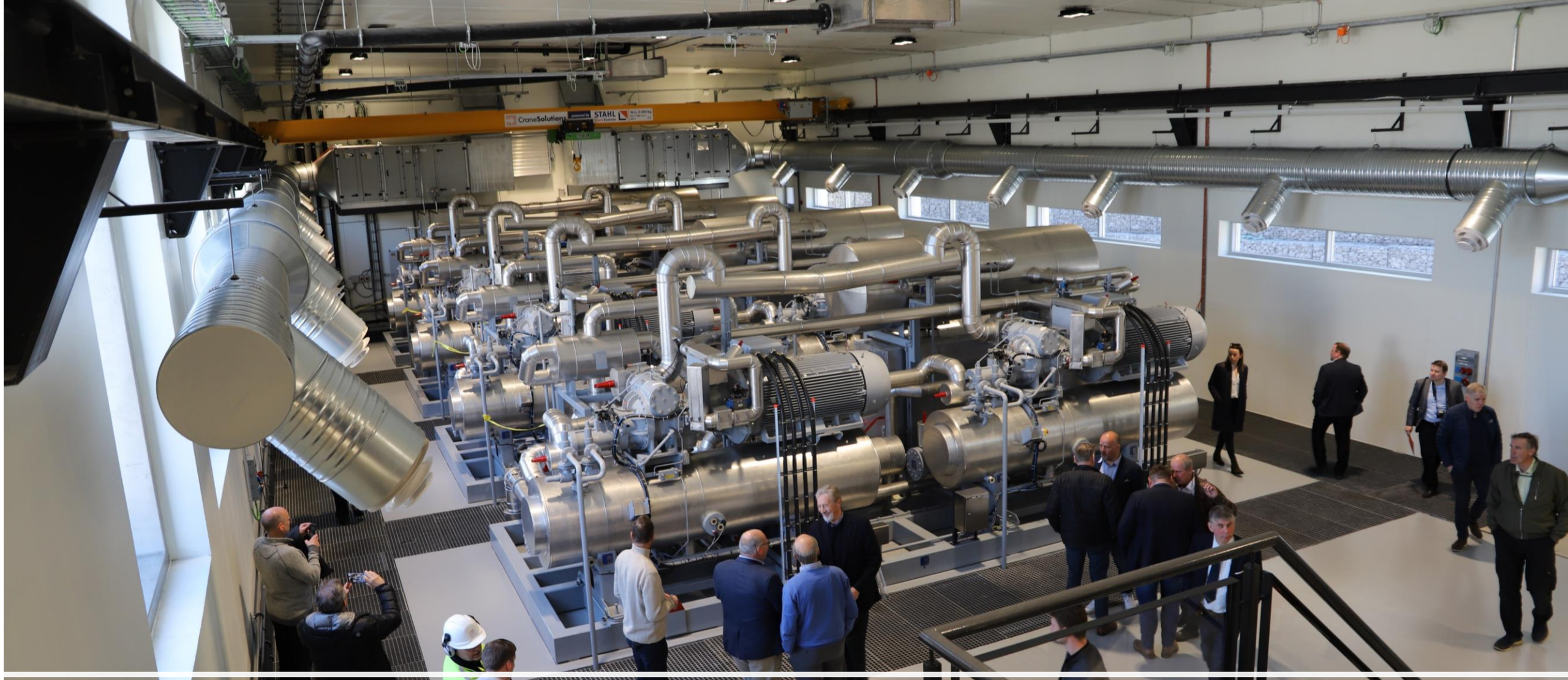
Concrete Cave cover over Heat Exchanger bundles



Steam collector covered with permeable rock/sand/plastic



Sea Water Heat Pump Station



Sea Water Heat Pump Station

The Development in Westman Islands

- 1973 Eruption in Heimaey
- 1977 Lava heating + 3 MW peak load oil boiler
- 1988 Electrical boiler 20 MW + 2 x 7 MW oil boilers as backup
- 1998 Heat from a garbage incineration plant
- 2000 Waste heat from fishing industry added
- 2016 Installed power: 20 MW for 5000 inhabitants
 - 4 kW pr. capita
 - Annual energy consumption: 70 GWh
 - 81% electricity, 9% from waste heat boilers, 6% fish processing factories and 4 % oil.
- 2018: 10,5 MW seawater heat pump (COP 3,5)

District Heating System will enhance harnessing low grade heating energy from natural or industrial re-sources



7 AFFORDABLE AND
CLEAN ENERGY



11 SUSTAINABLE CITIES
AND COMMUNITIES



ARCTICGREEN

District Heating In China – Sinopec Green Energy Project



SUNLIGHT SOAP

5 GENDER EQUALITY





Poor Quality Installations



中冰地热供暖技术研讨会

Sino-Iceland Forum on Technology of Geothermal Heating



Capacity building





HSE Issues



Poor Housing Conditions



Housing Development

- **Old Buildings**

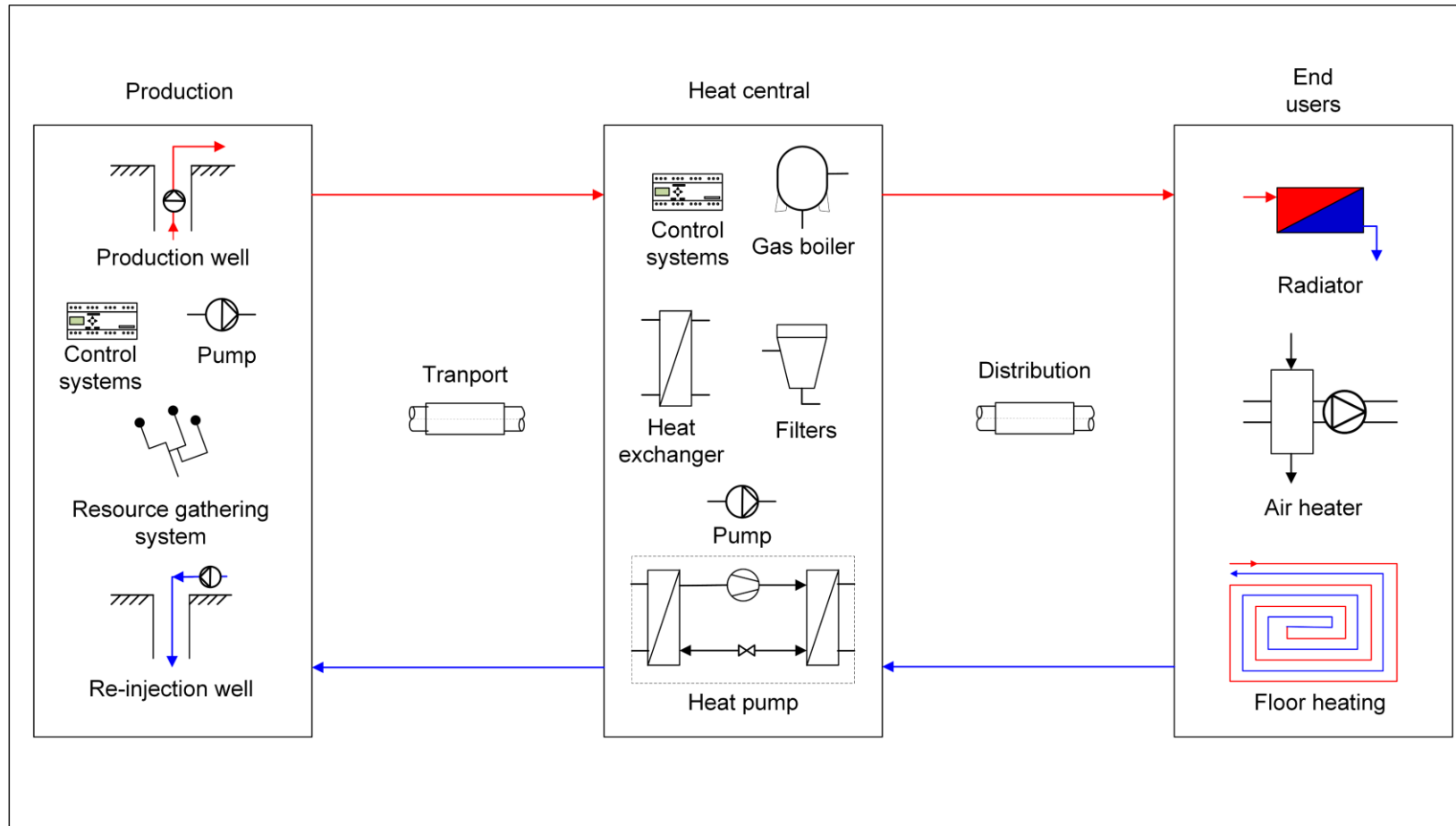
- Supply temperature: 90°C
- Return temperature: 70°C
- Radiator heating
- Heating power: 70 W/m²
- Annual heating: 180 kWh/m²

- **New Buildings served by SGE**

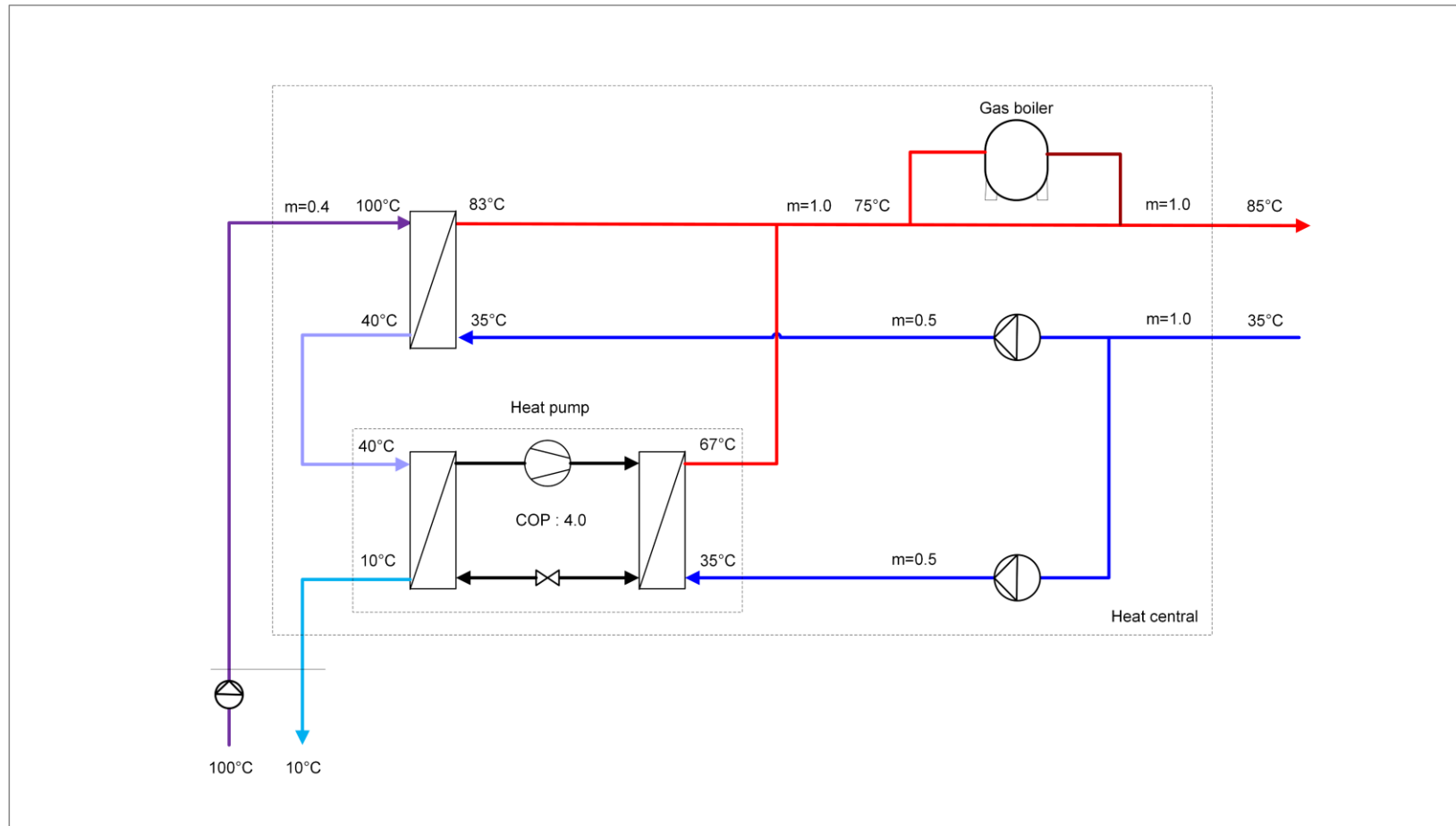
- Supply temperature: 45°C
- Return temperature: 35°C
- Floor heating
- Heating power: 43 W/m²
- Annual heating: 95 kWh/m²



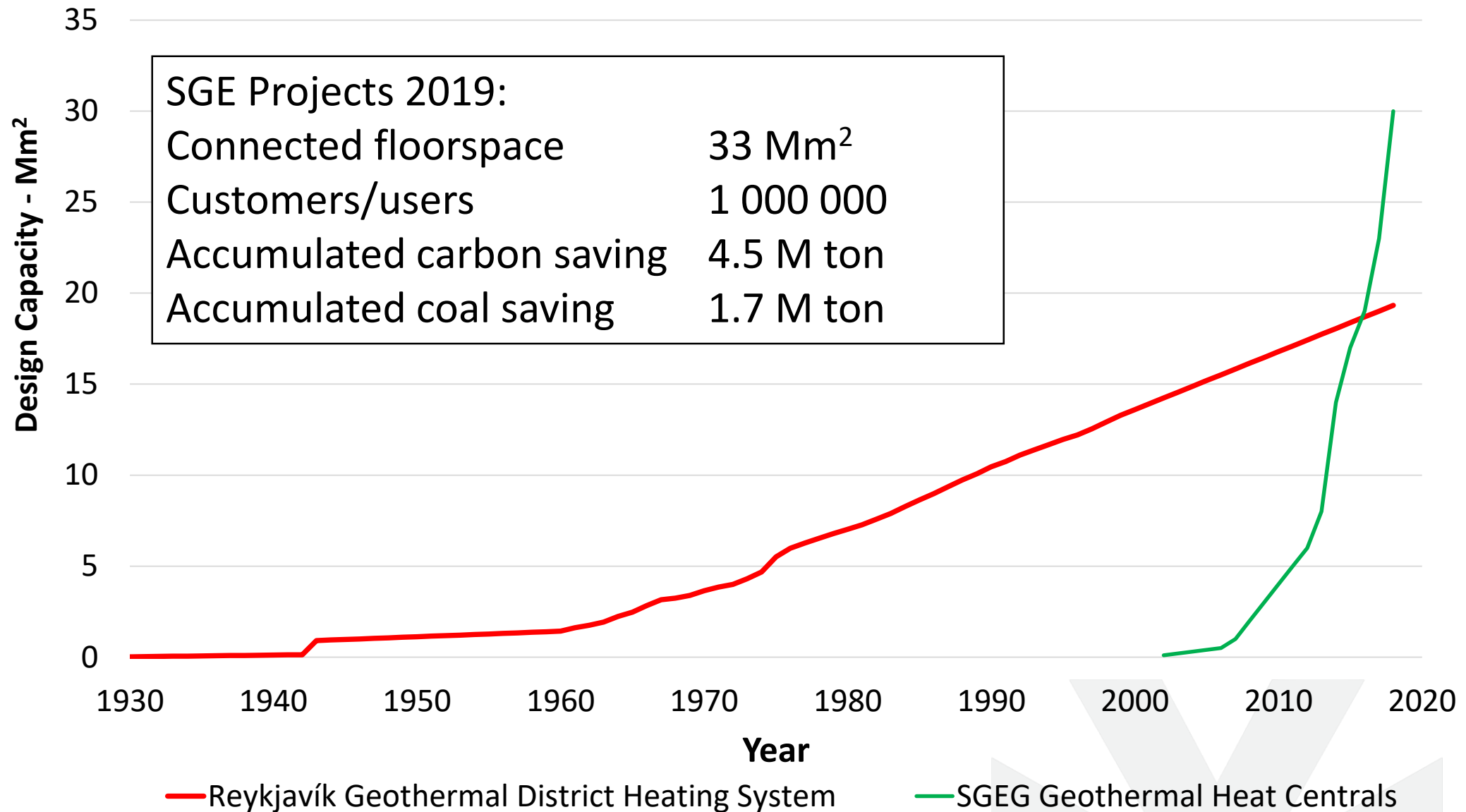
Overall System Design Consultancy



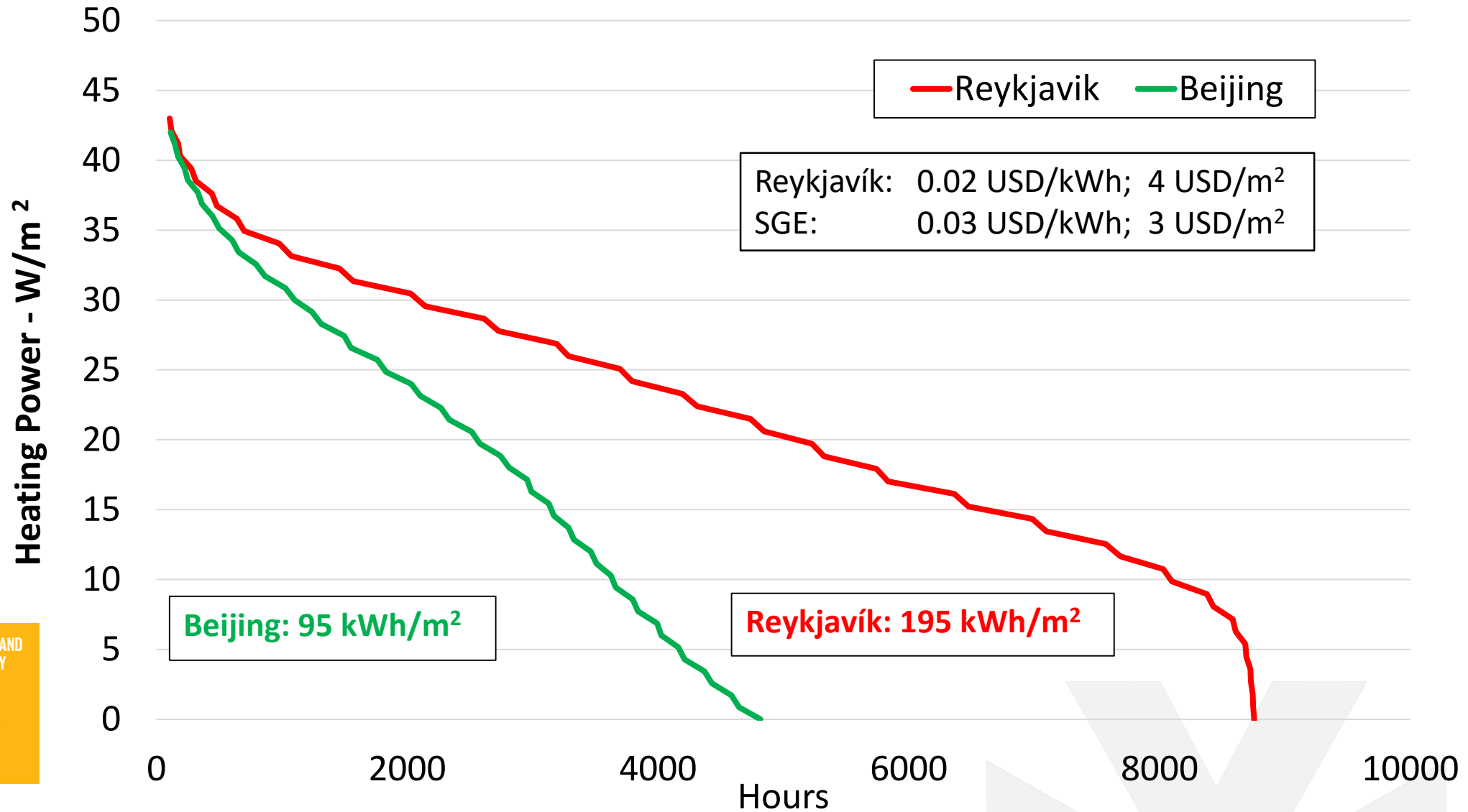
Heat Central system design consultancy



Heating development, Reykjavík and SGE projects

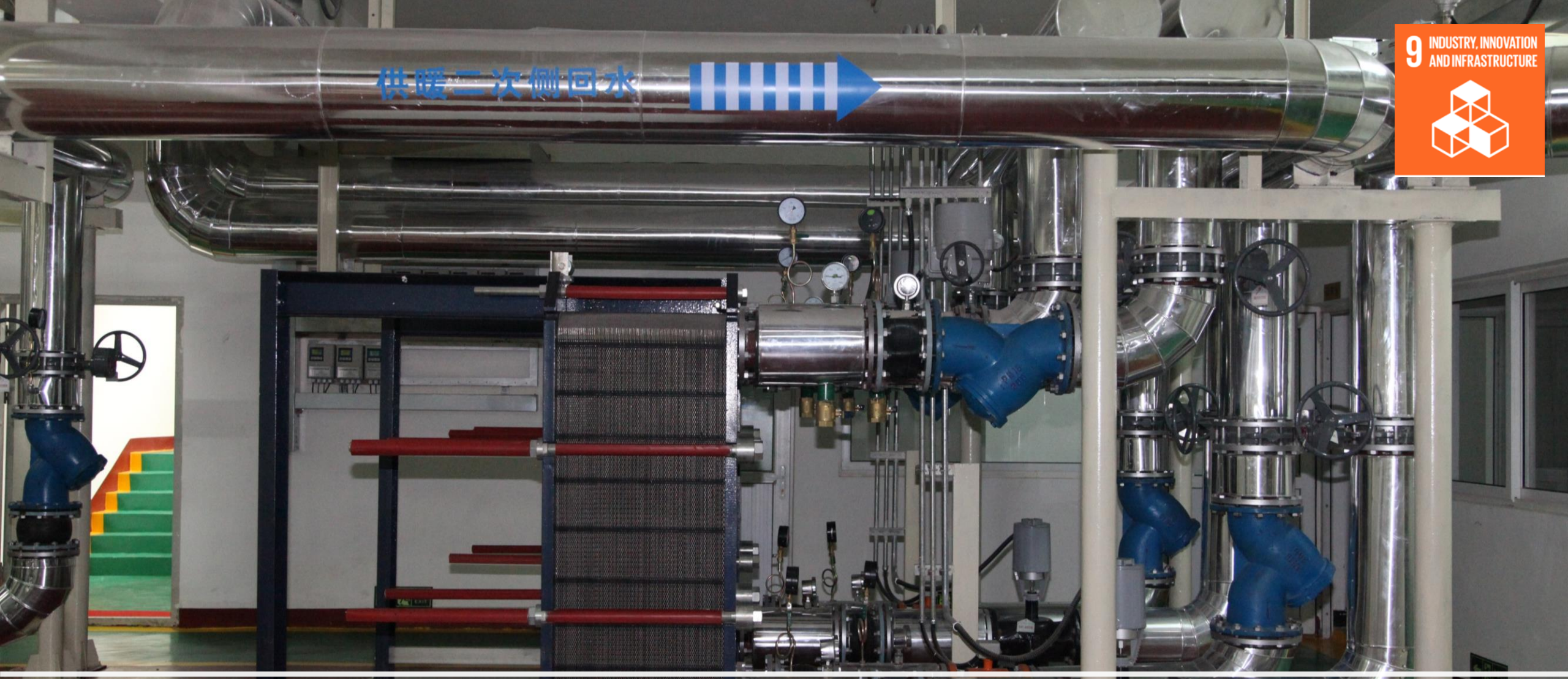


Heating Duration Curves





供暖二次侧回水



Heat Exchanger Stations Design Review



ARCTICGREEN



CTO of Arctic Green Energy corporation and SGEN



ARCTICGREEN



