Geothermal Utilization in Iceland

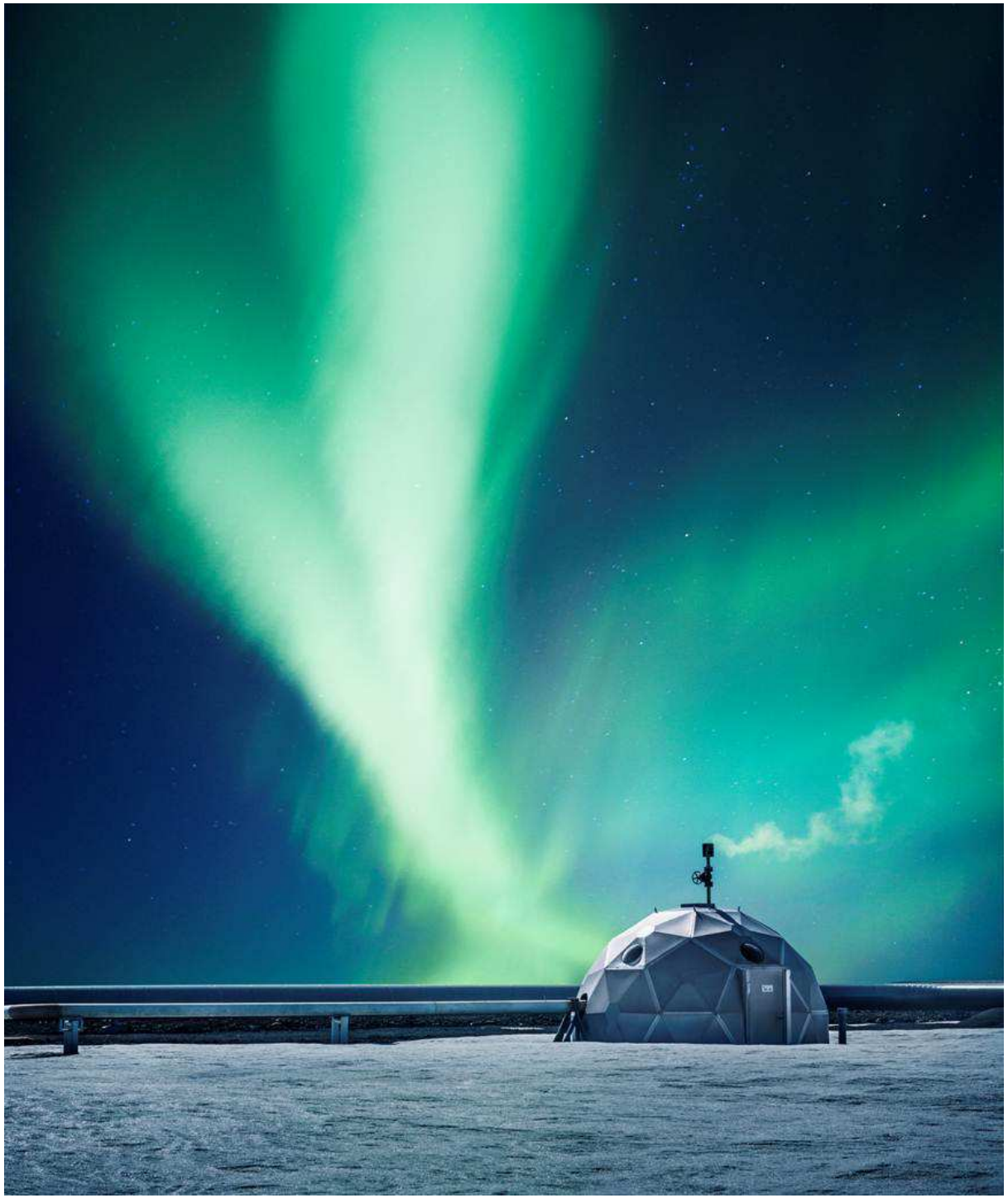
85 Years of Experience

Mayors' Geothermal Club Conference

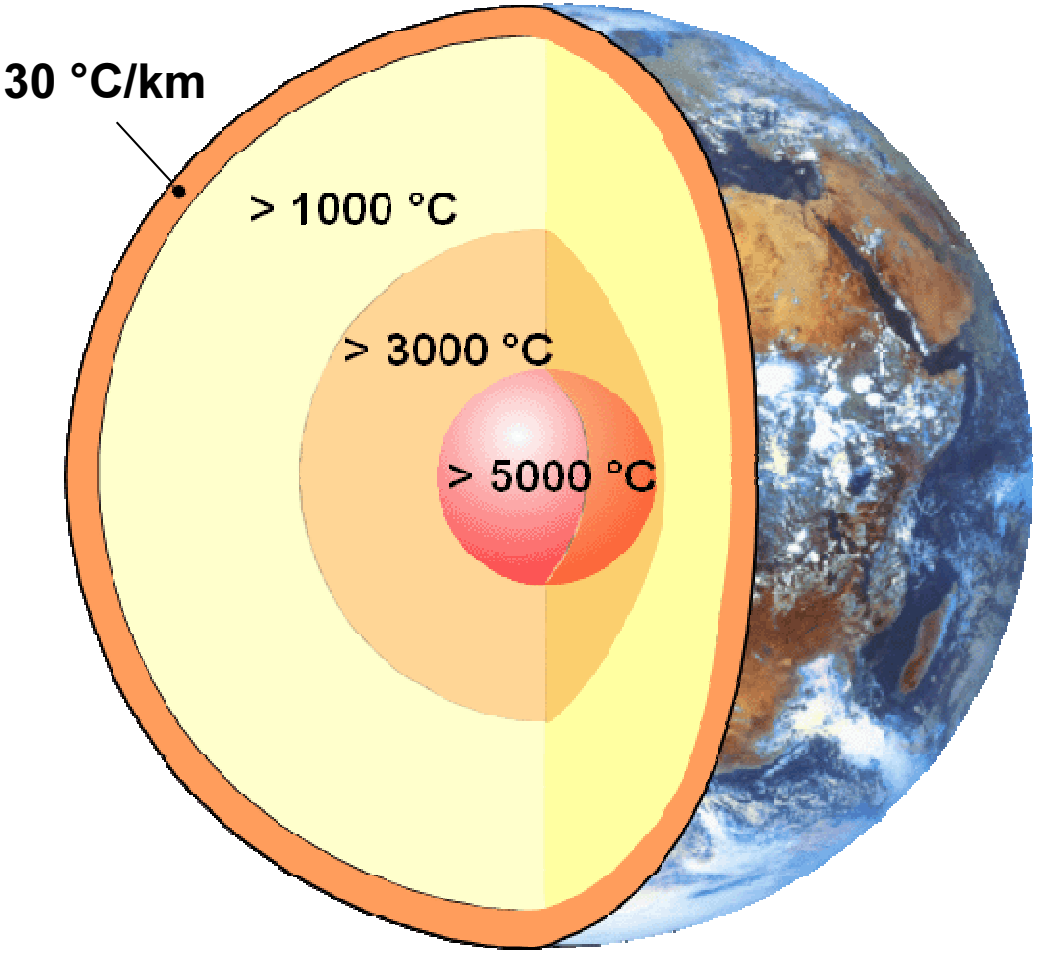
Budapest, Hungary
October 8th 2015

Bjarni Bjarnason
CEO

Reykjavik Energy



The Geothermal Resource

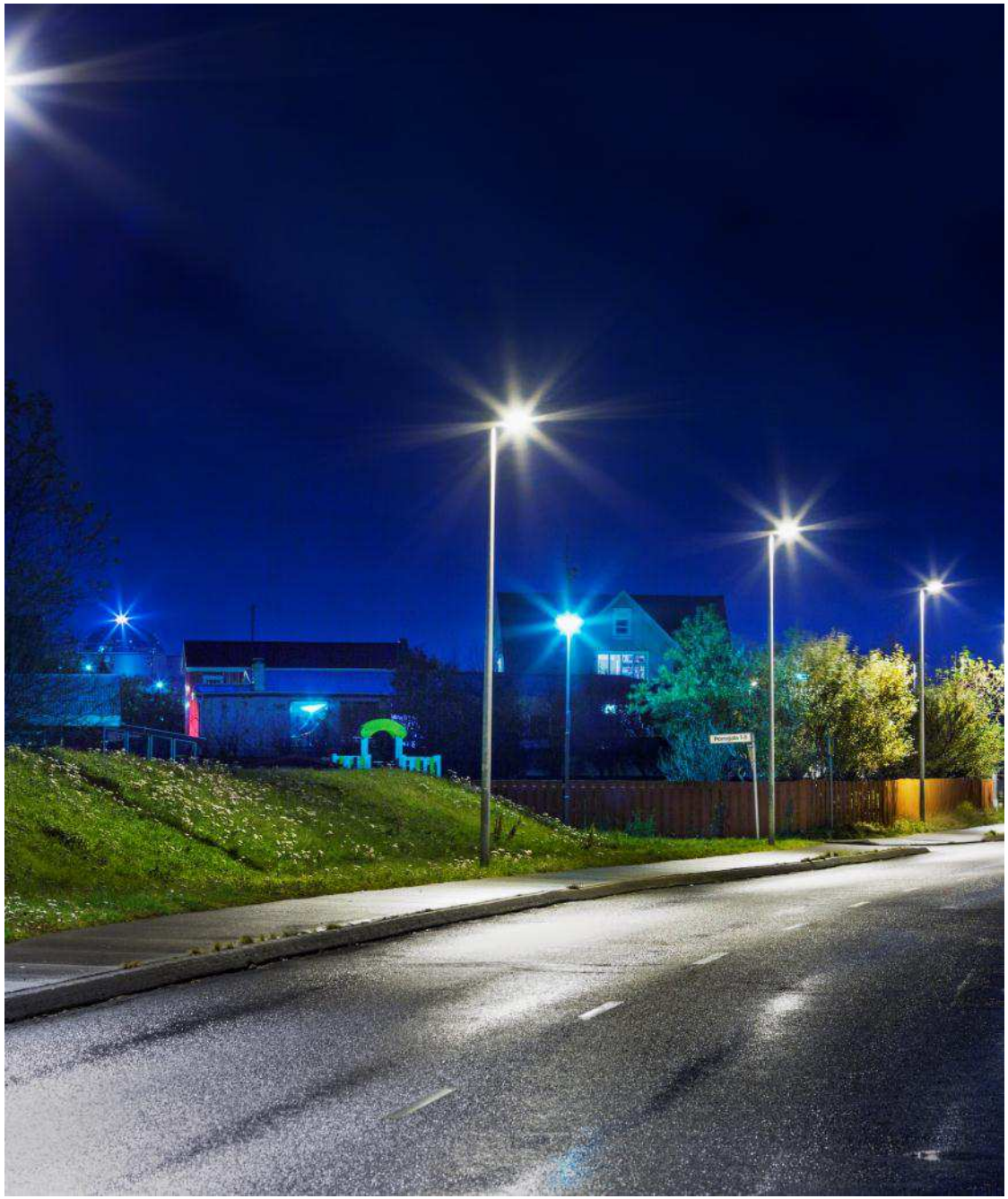


The total amount of heat stored in the crust is of the order of 5 billion EJ.

Mankind uses 400 EJ annually for all energy needs.

0.1% of the stored heat would satisfy the global energy consumption for 10,000 years.

Source: Flóvenz; 2008



Where does geothermal fit in?

Direct Use

- Space heating
- Greenhouses
- Fish farming
- Industry
- Snow melting
- Swimming pools

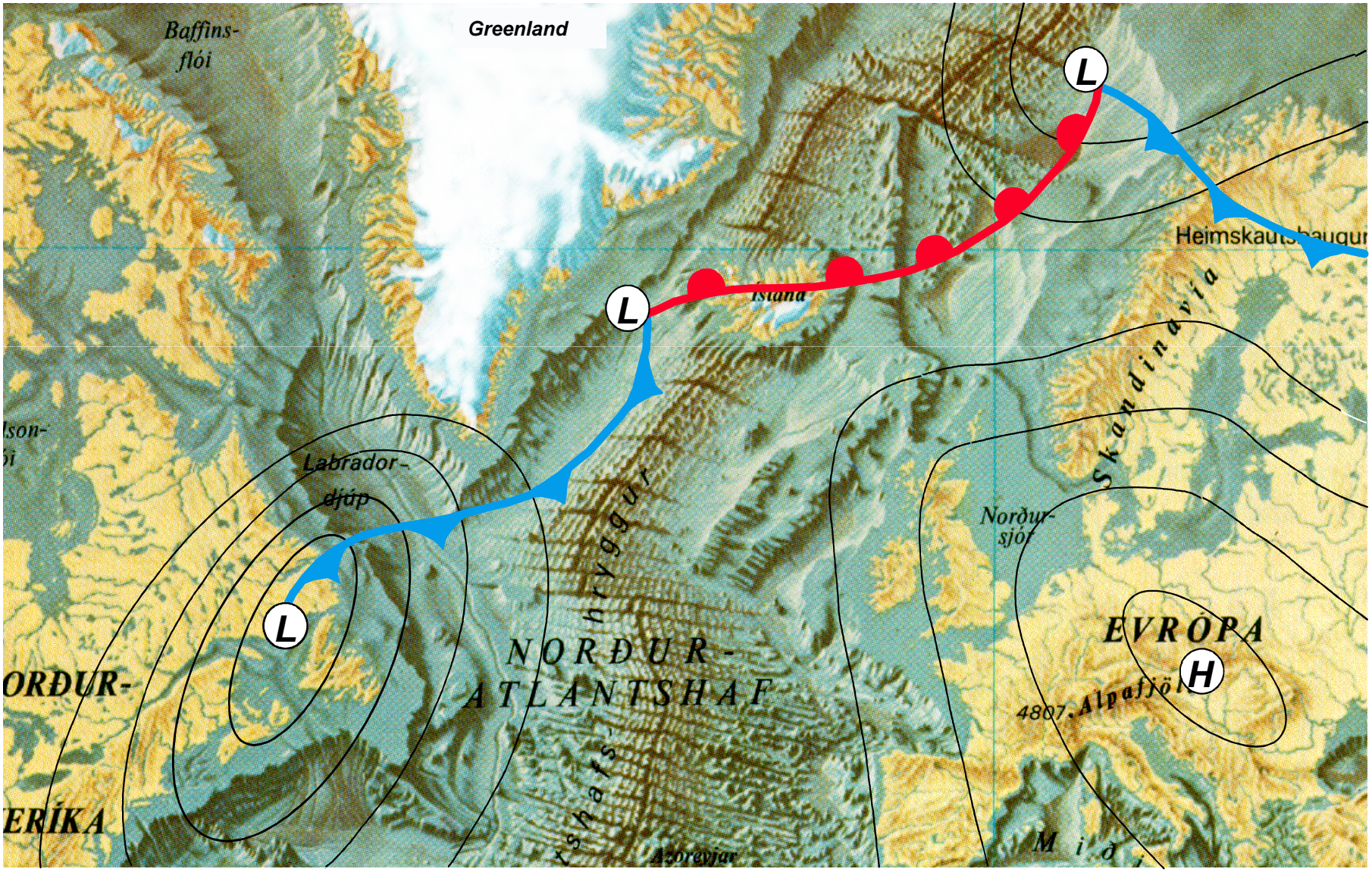
Electricity

- Baseload
- Over 90% availability

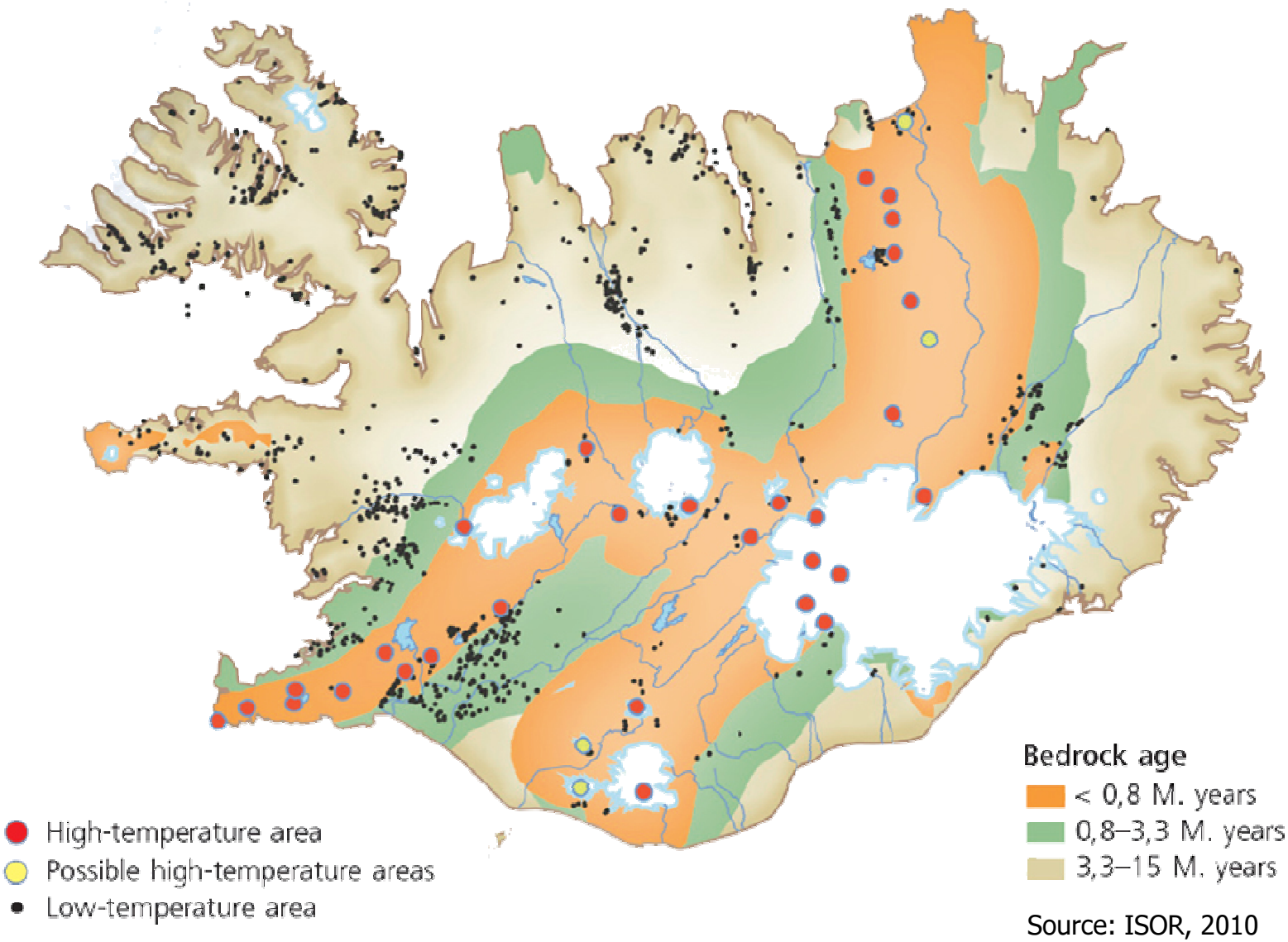
Reykjavik Energy

Iceland

Located on the Mid Atlantic Ridge



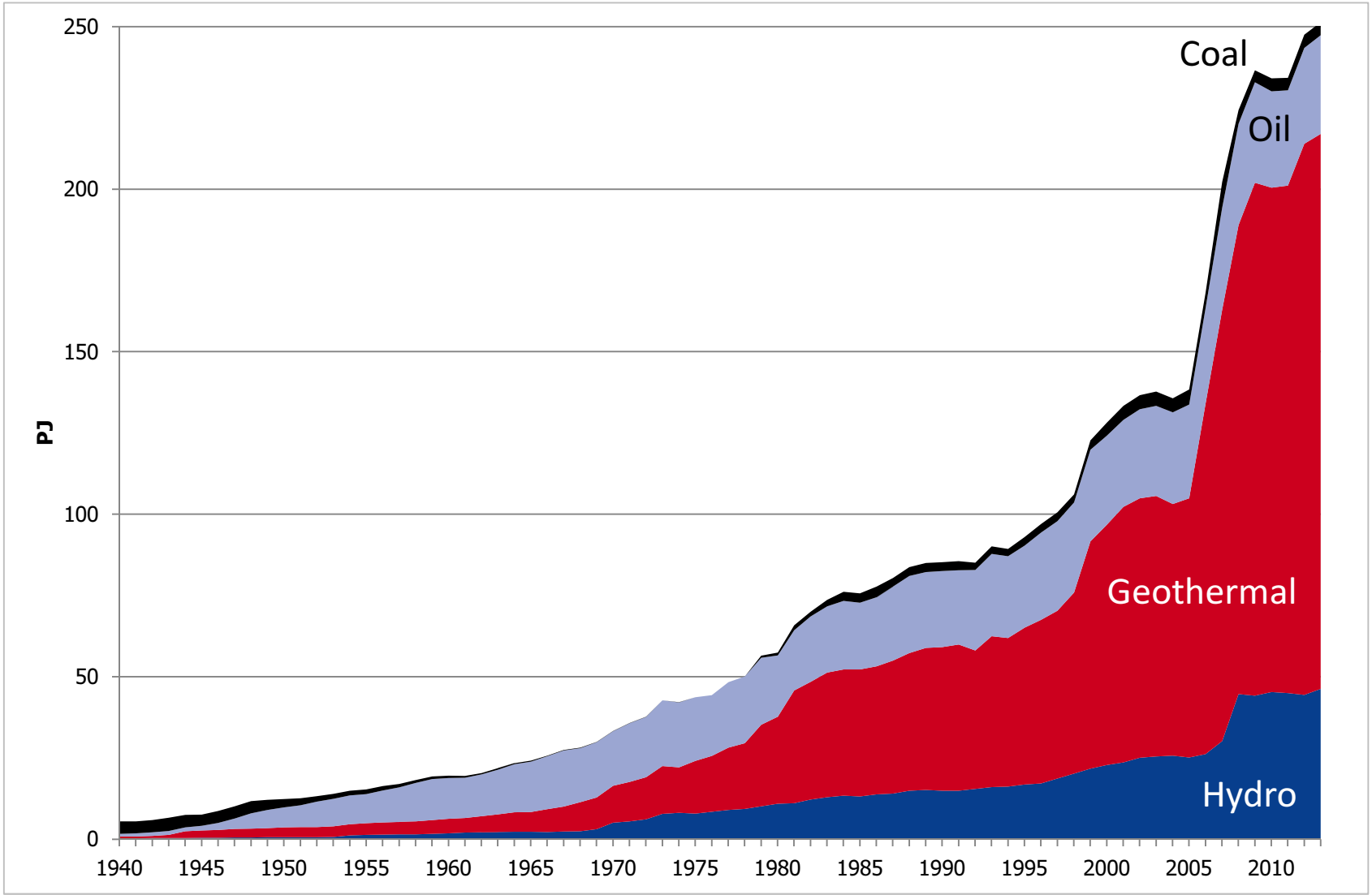
Geothermal fields in Iceland



Source: ISOR, 2010

Primary Energy Use in Iceland 1940-2013

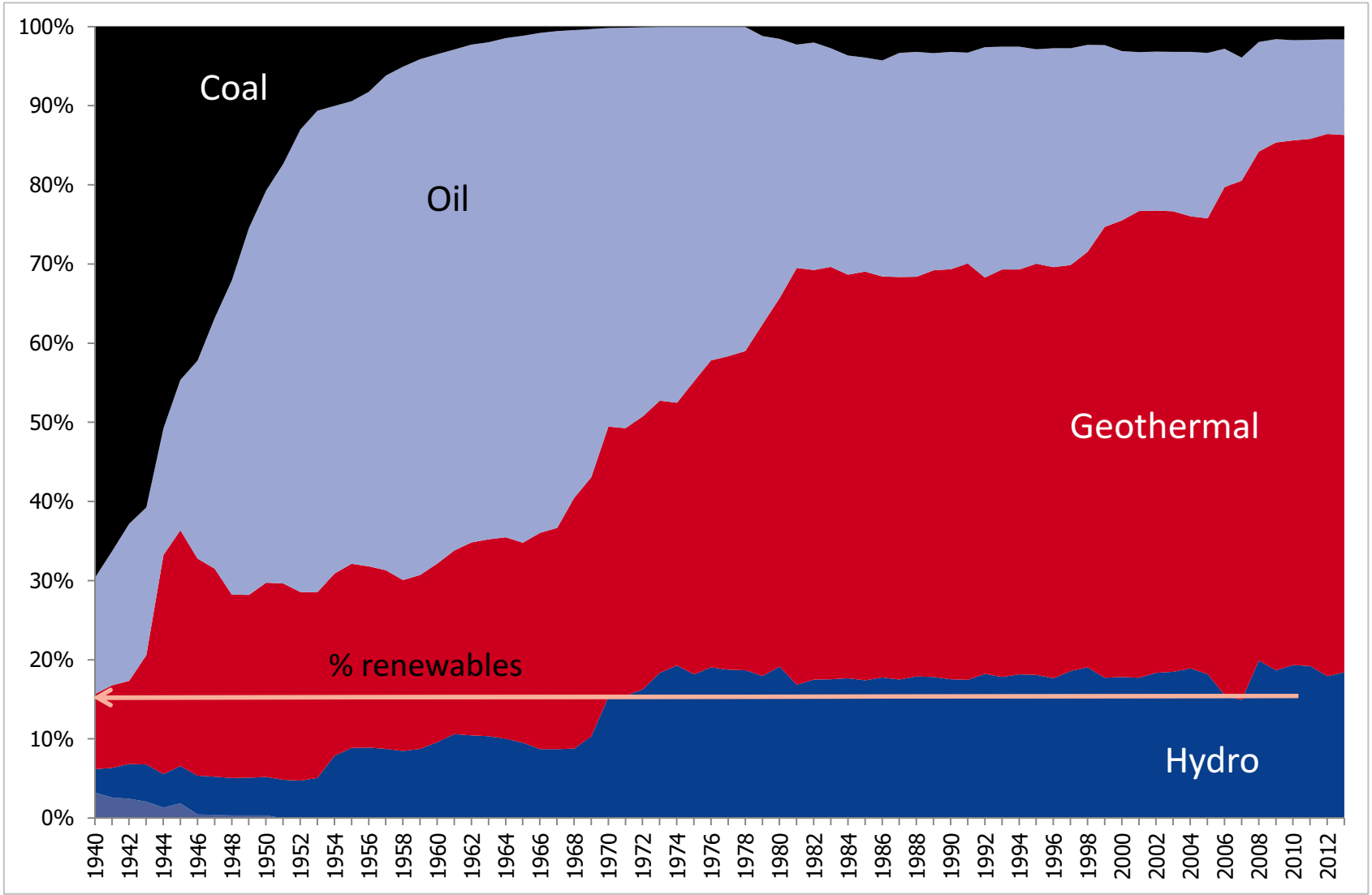
Geothermal was a critical game changer



Source: NEA, 2014

Primary Energy Use in Iceland 1940-2013

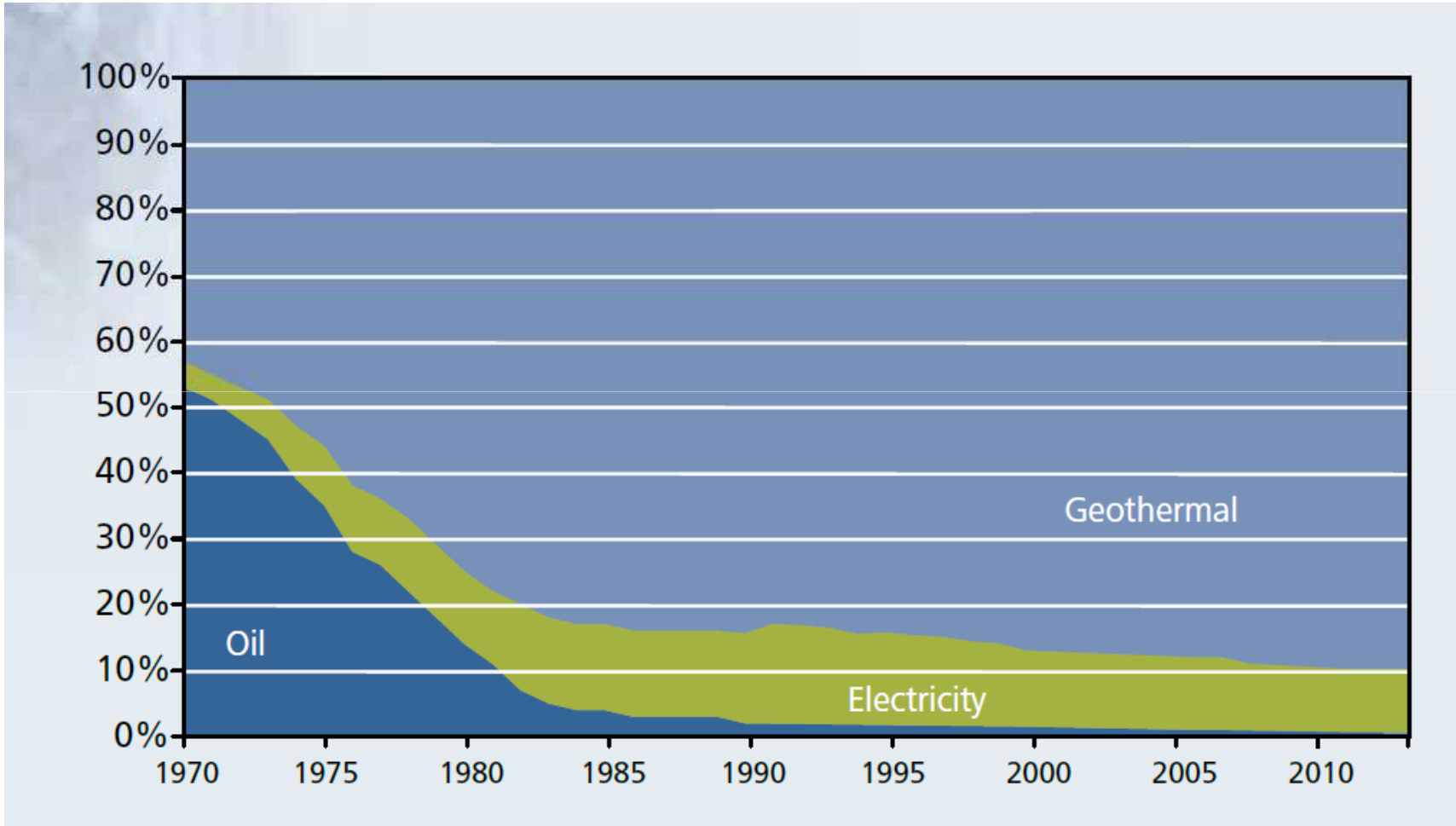
Geothermal is Iceland's single largest source of energy today



Source: NEA, 2014

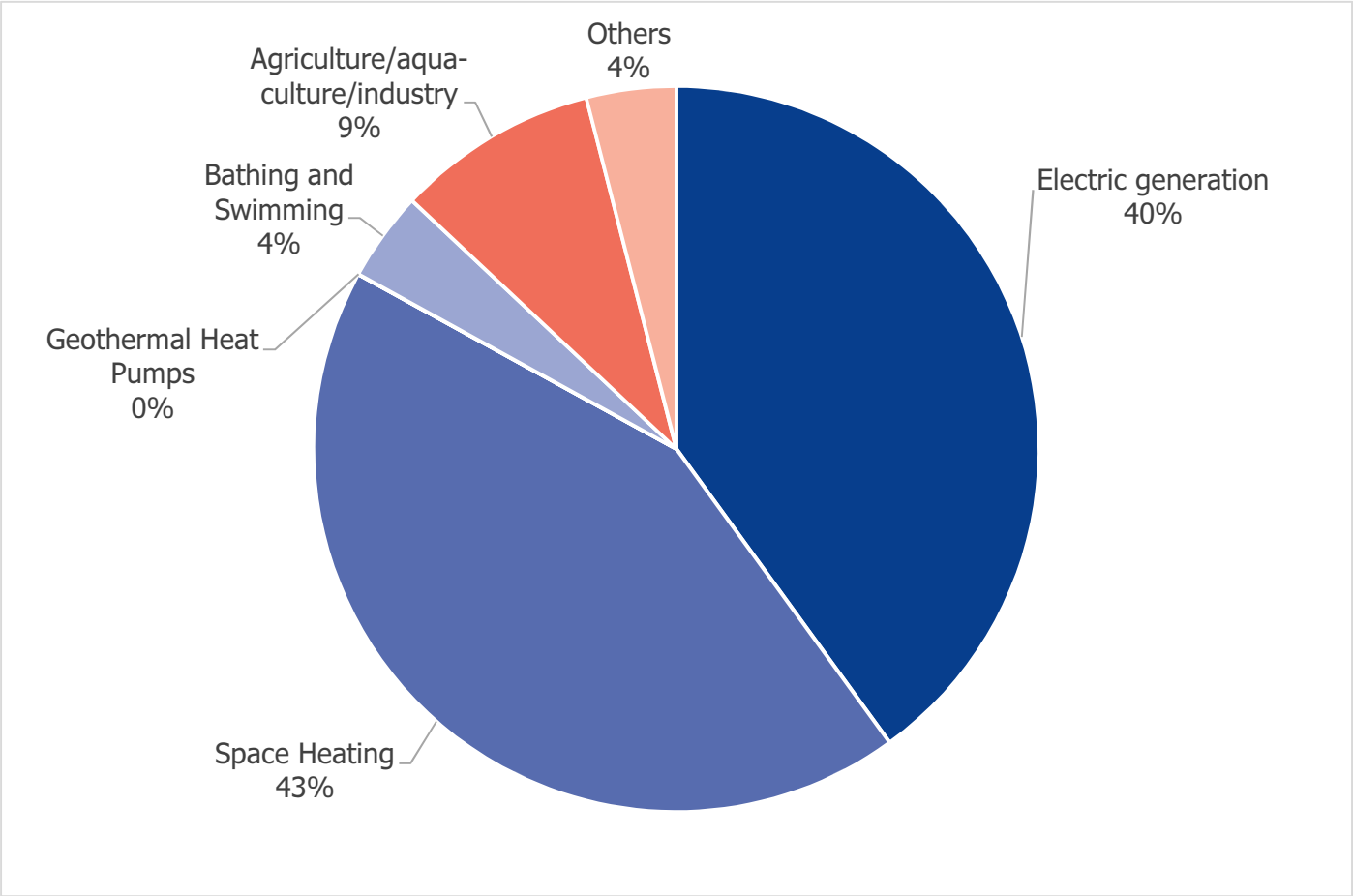
Space Heating in Iceland 1970-2014

90% Geothermal



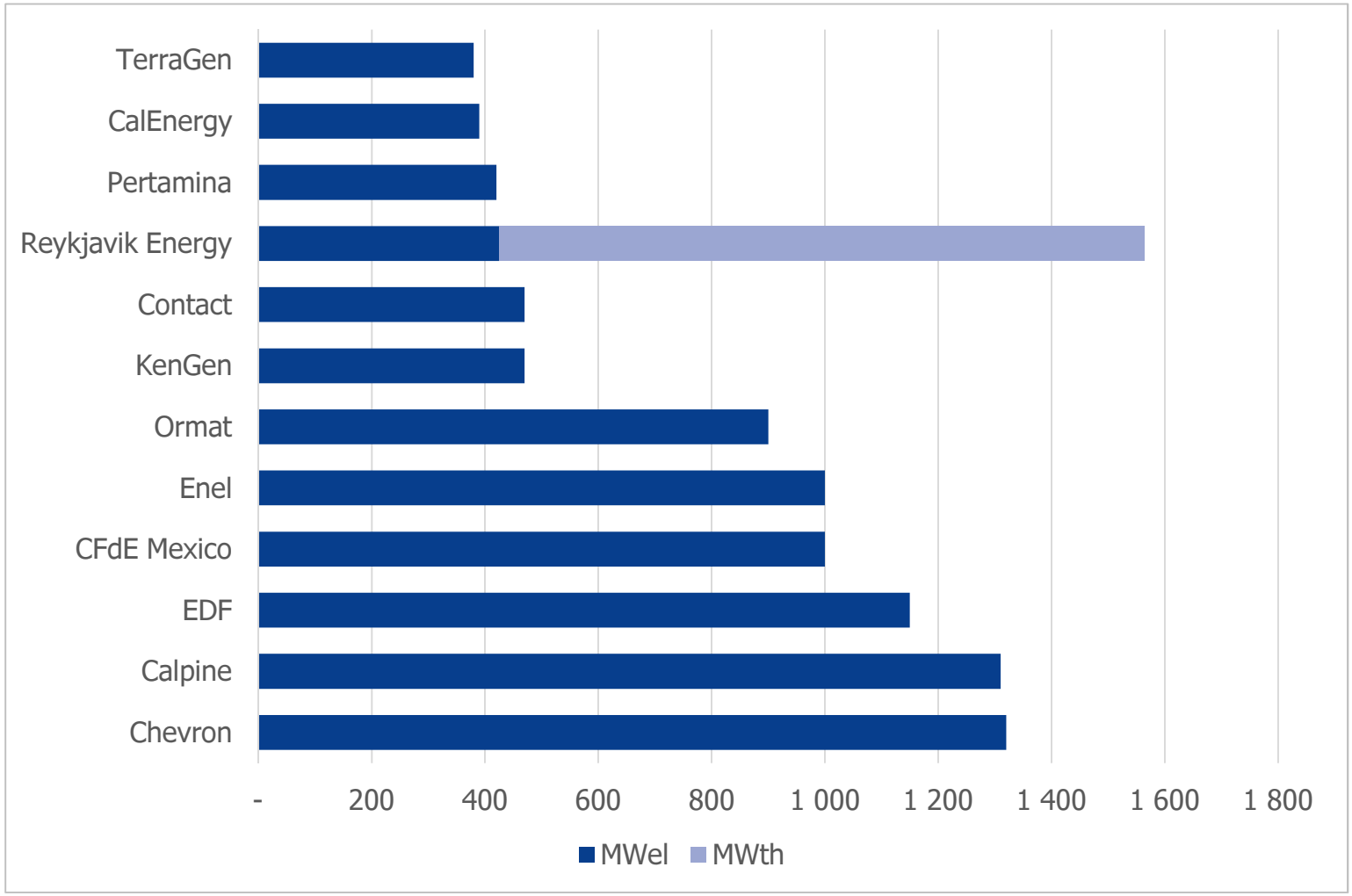
Source: NEA, 2015

Iceland geothermal utilization



Source: IEA; 2014

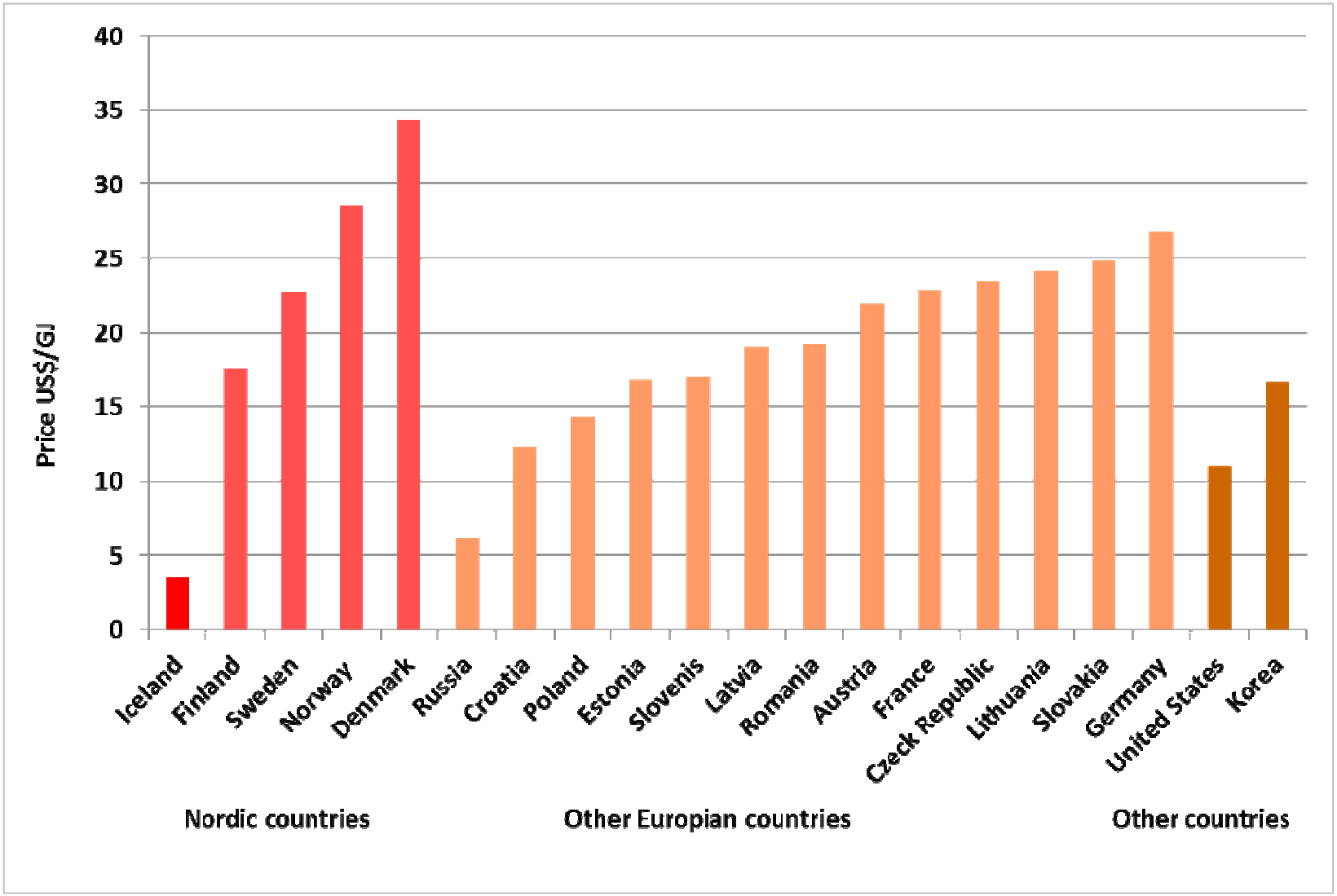
Major Geothermal Companies



Source: Bertani, 2015

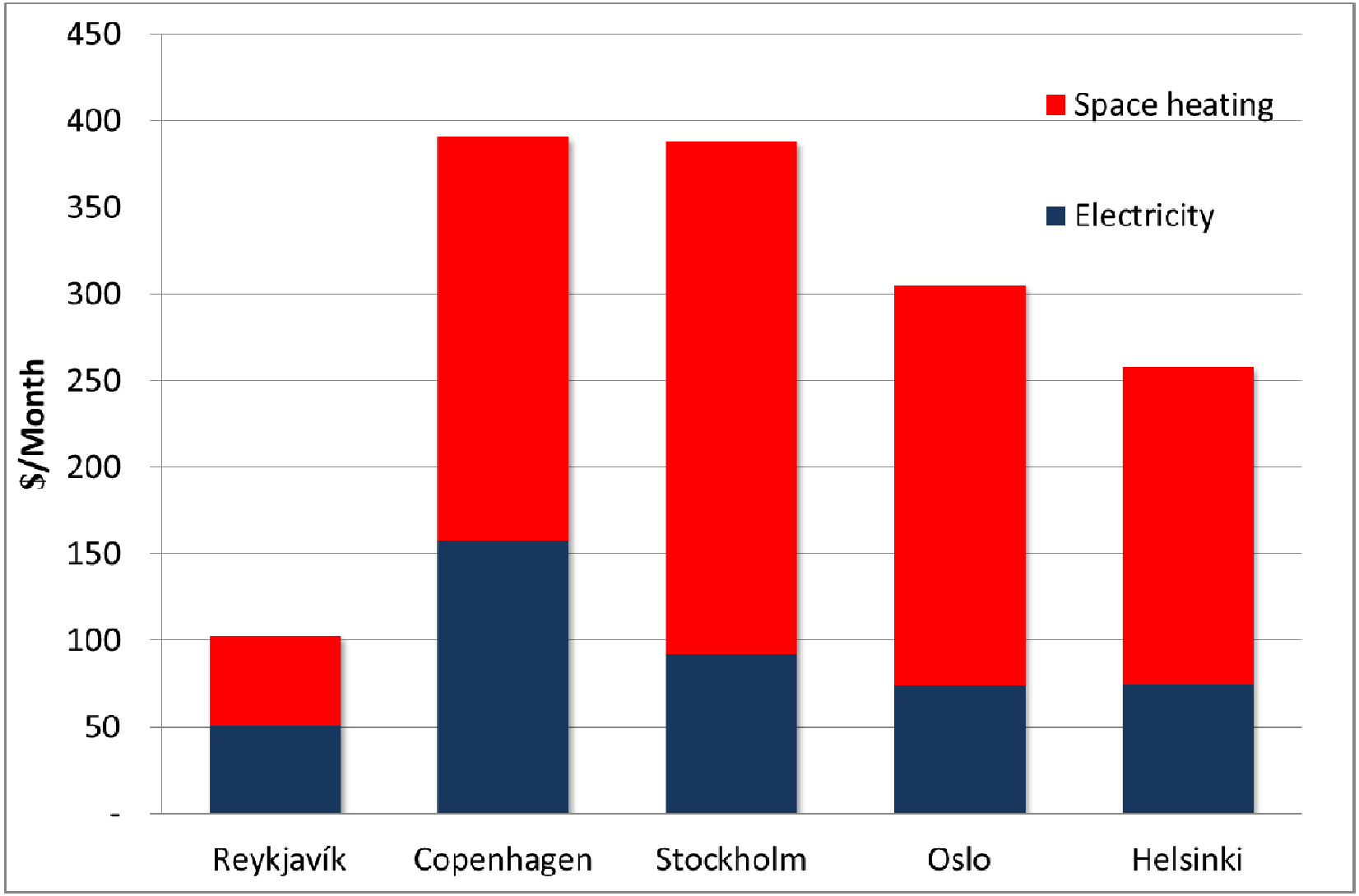
Heating prices in various countries

April 2015



Comparison of Energy Prices

3 person home – 100 m2



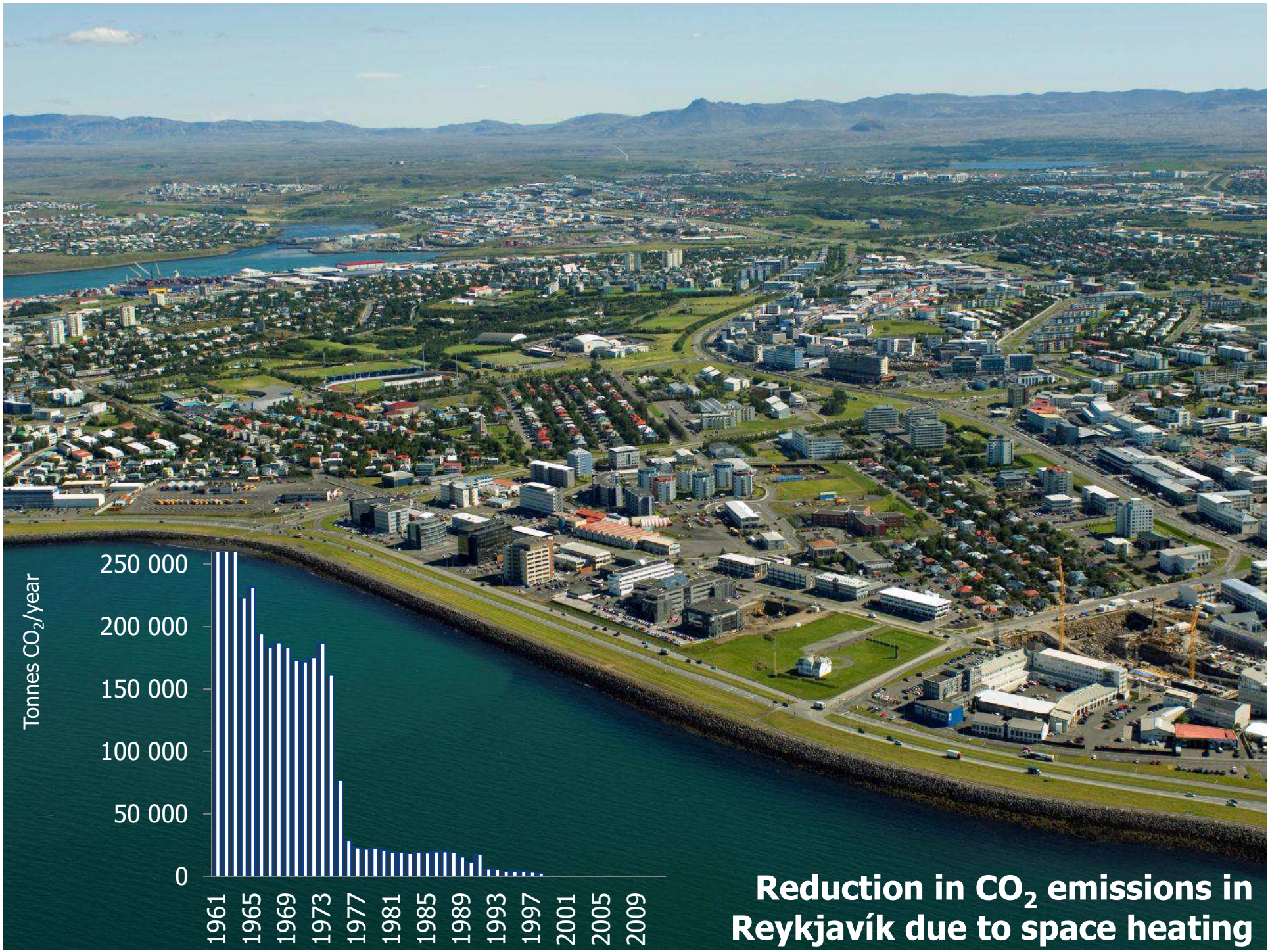
Benefits to Icelanders

- In 2010 Iceland's total economic benefit from geothermal was calculated to be about **$600** million.
- This equals **5%** of GDP
- Includes:
  - Space heating benefits
  - Power Generation
  - Related industry benefits
  - Resource leasing
  - Social impacts

Source: Kristofersson, 2012

Reykjavík in 1933

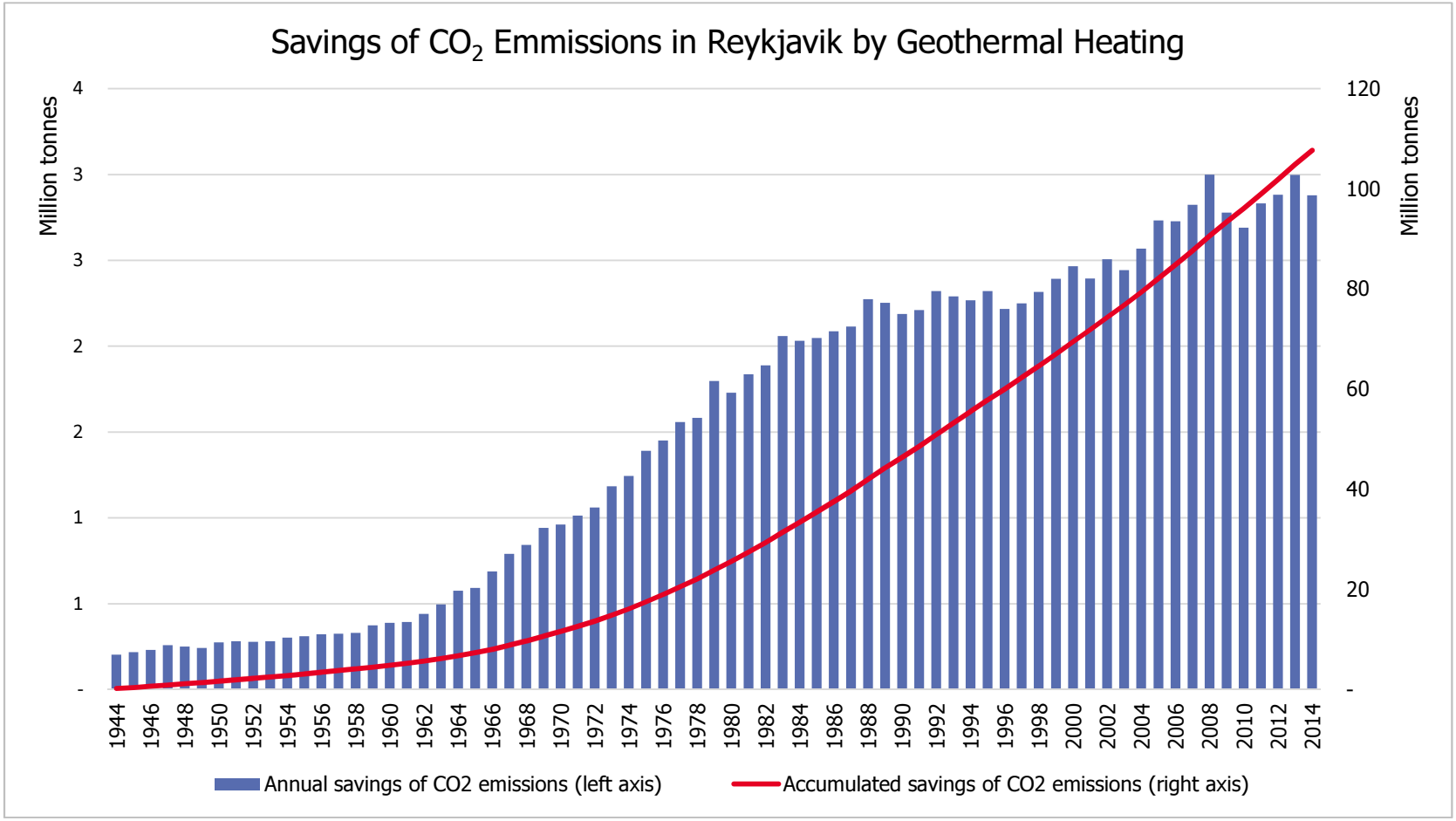
Reykjavík today



Reduction in CO_2 emissions in Reykjavík due to space heating

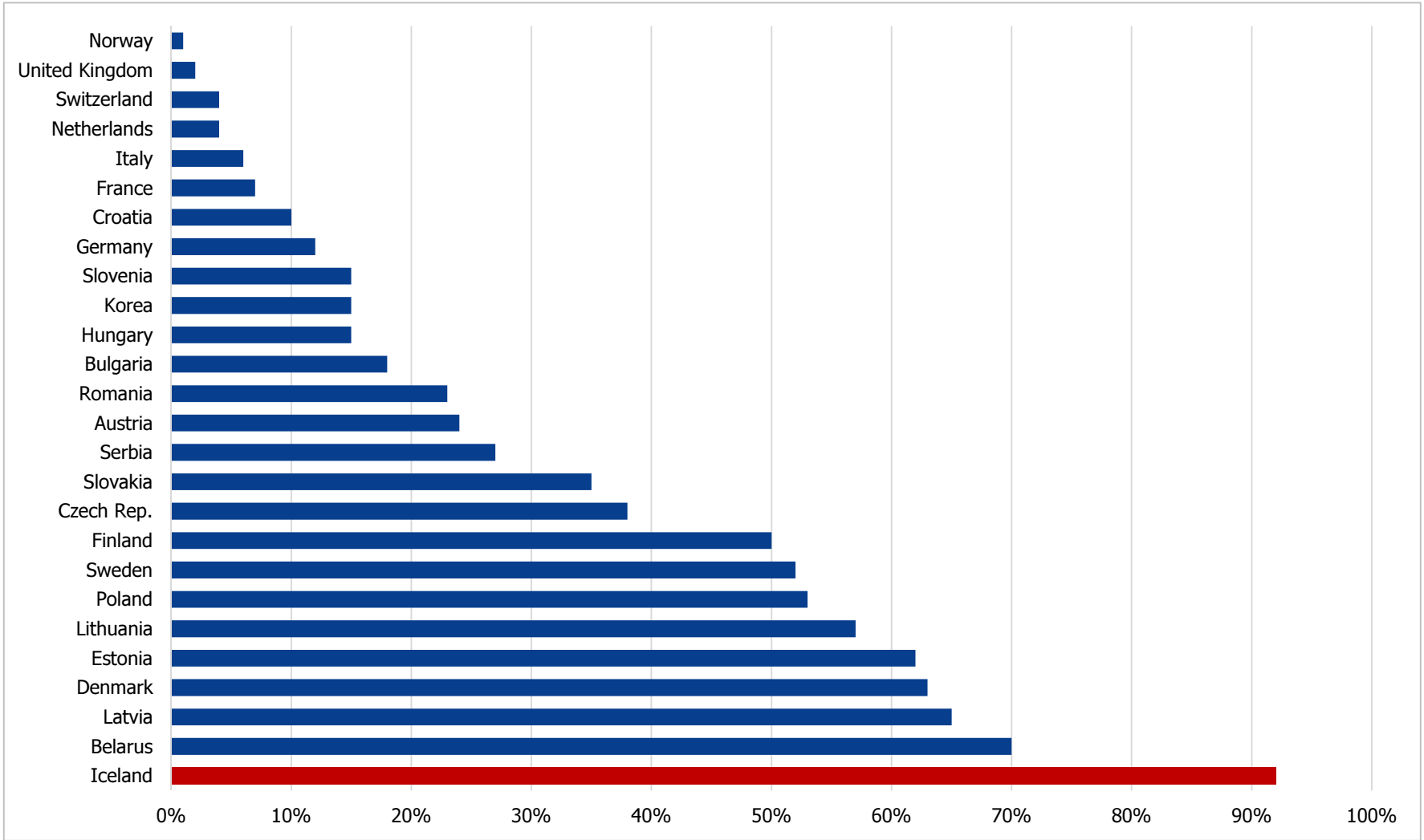
Emissions

What if Oil was used for Space Heating in Reykjavík instead of Geothermal?



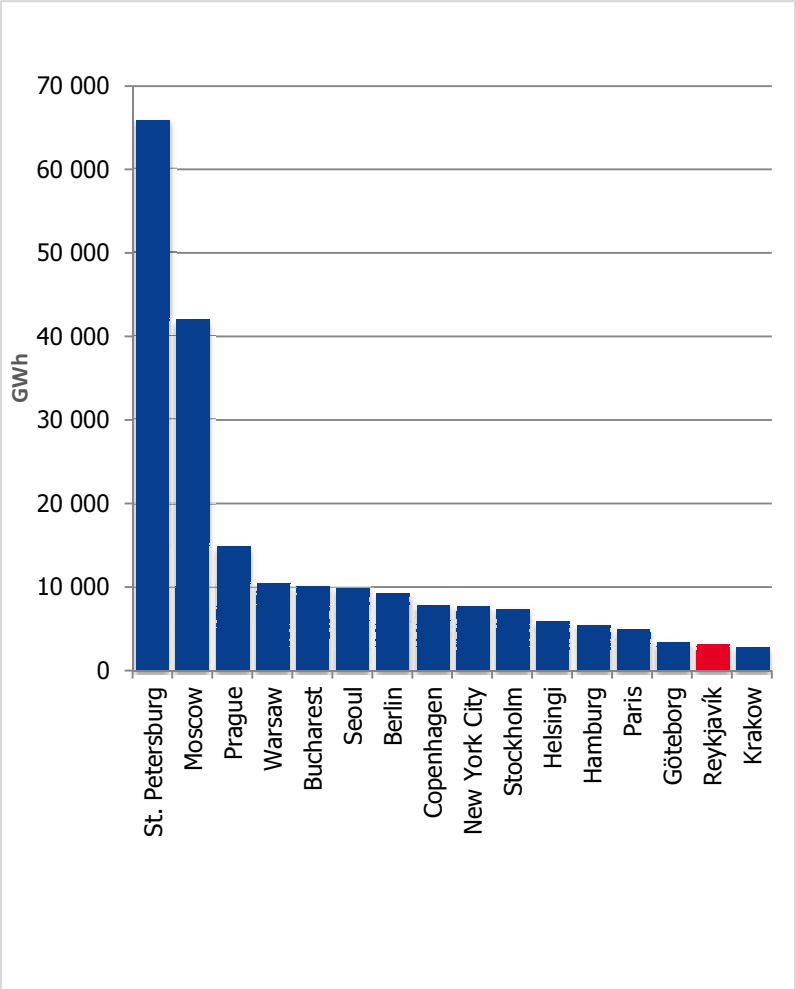
Source: Gunnlaugsson, 2015

Percentage of citizens served by district heating 2015



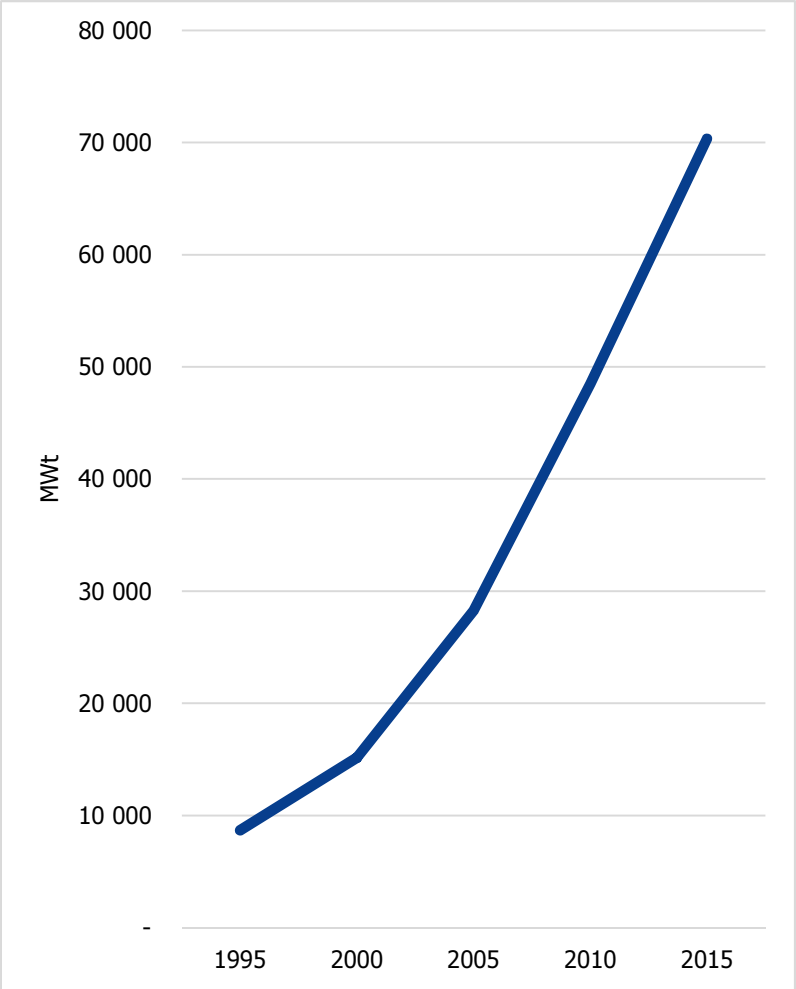
Source: EuroHeat; 2015

Major District Heating Cities



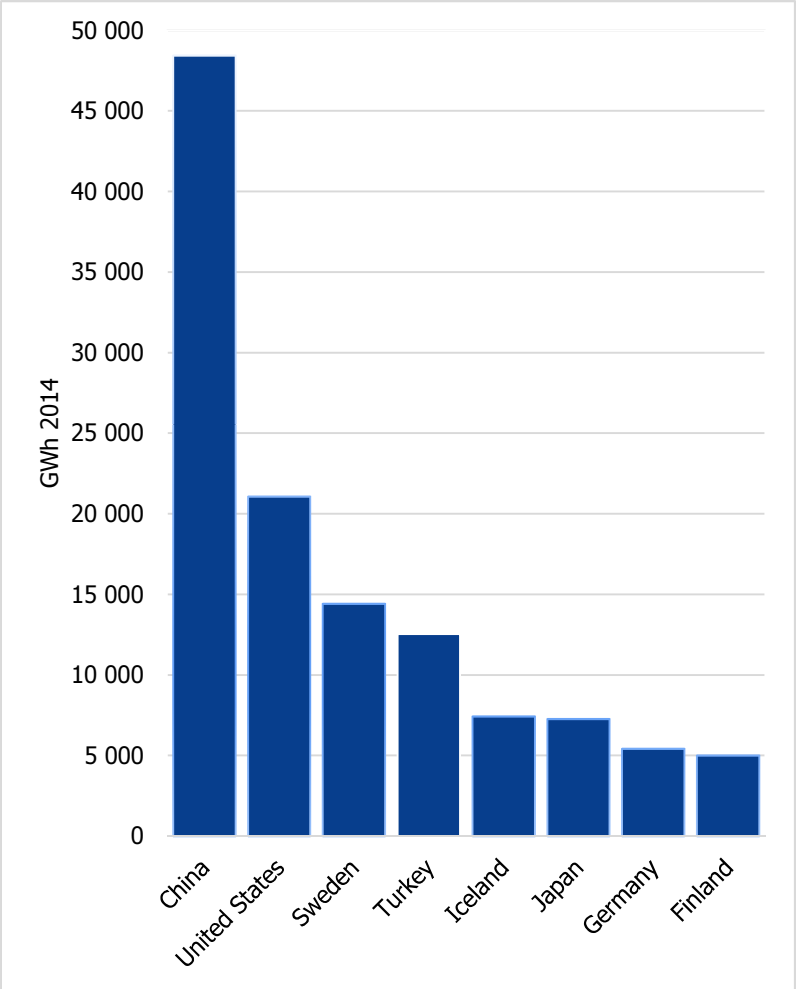
Source: Gunnlaugsson, 2002

World-wide direct use of geothermal



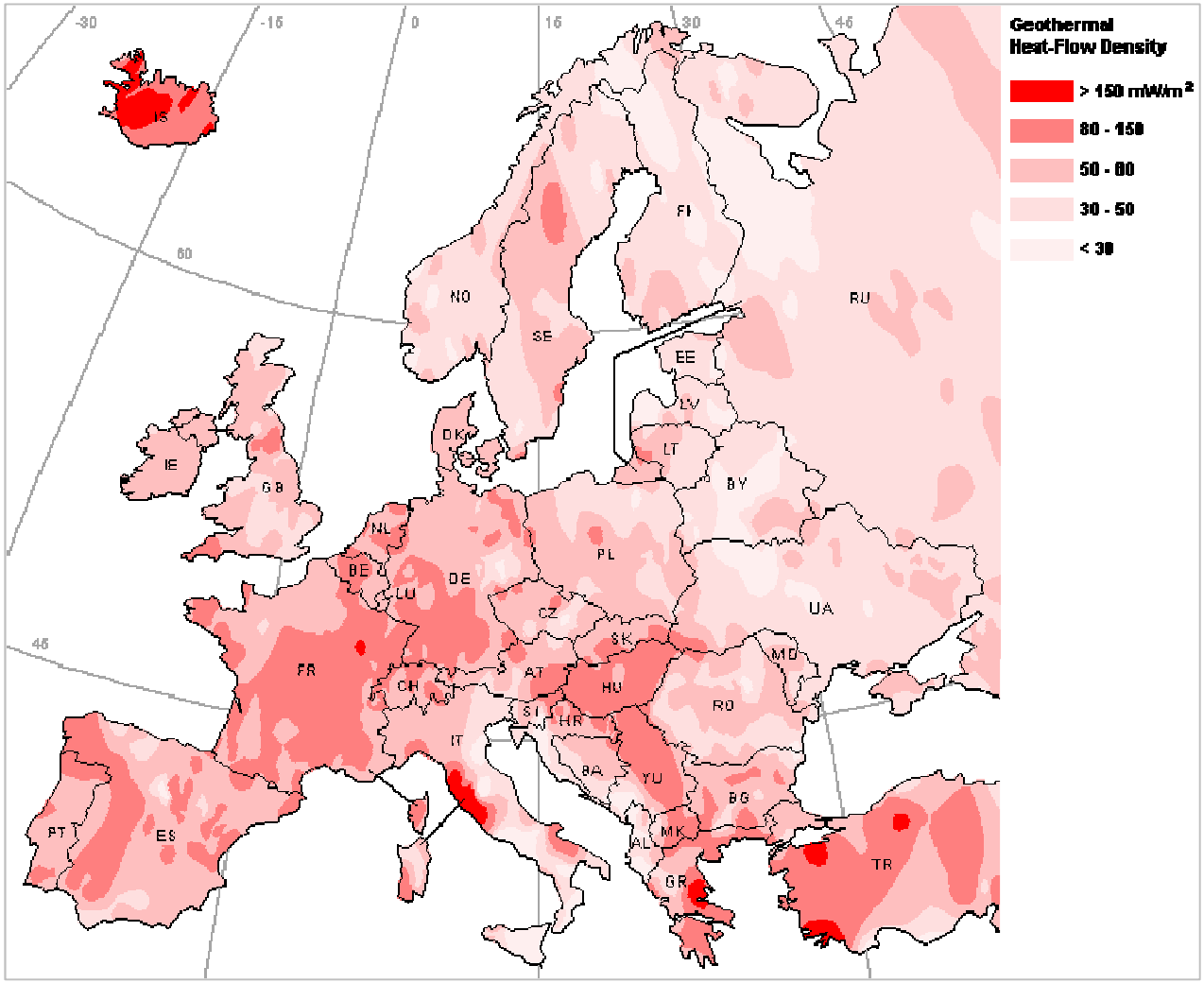
Source: Lund and Boyd, 2015

Largest direct users of geothermal



Source: Lund and Boyd; 2015

Geothermal map of Europe



Source: Energie-Atlas GmbH, 2002

Conclusion

- One of the cleanest energy sources
  - About 100,000,000 tonnes of CO_2 have been saved in Reykjavík by using geothermal water for heating houses
- Sustainable energy source
- Tremendous economic benefit for Iceland
- Exciting research and development on going

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