IEA perspective for geothermal energy

Milou Beerepoot

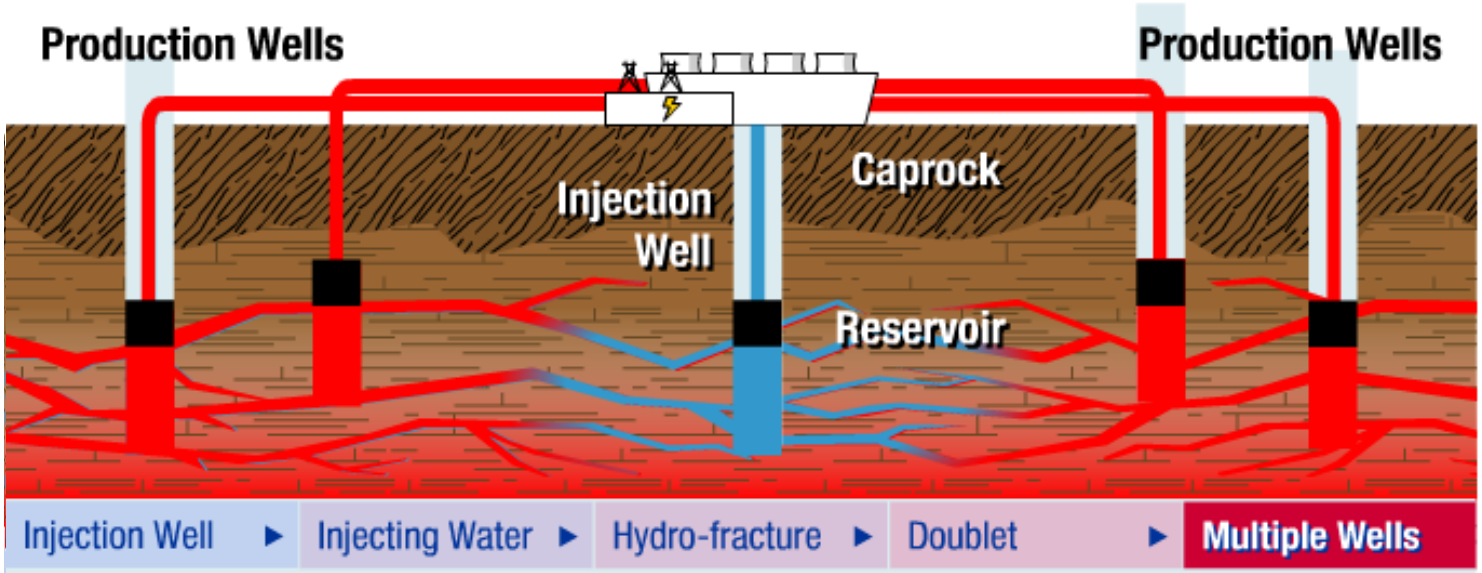
Geothermal energy..as we know it

Kamchatka geyers

Geothermal energy…has more to offer

170.000 buildings in Paris heated by geothermal energy in district heating, with more to follow..

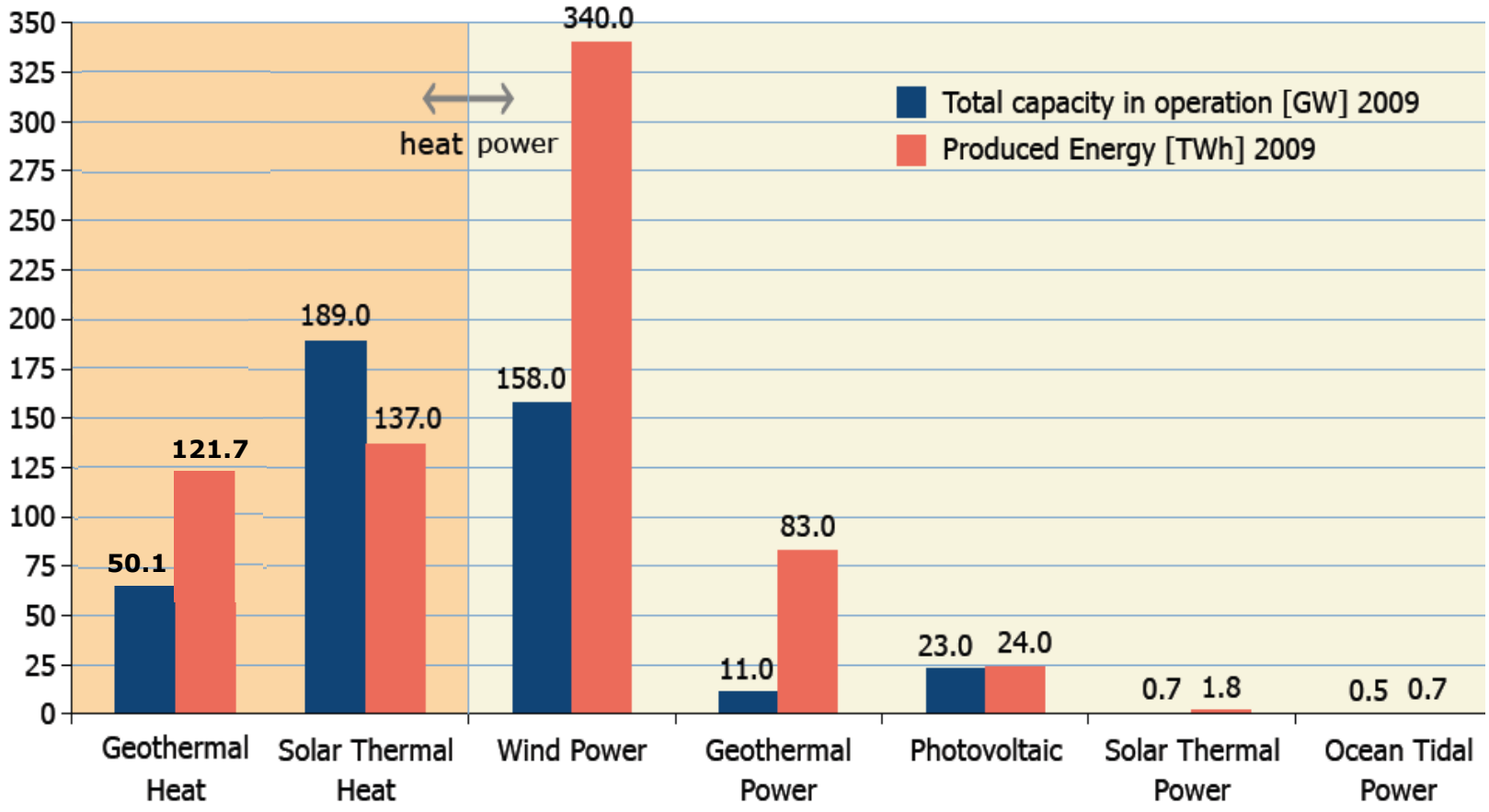
Geothermal energy…could offer silver bullet in future?



Source: animation from Office of Energy Efficiency and Renewable Energy (EERE) , US DOE/www.eere.energy.gov

Advanced geothermal technology: EGS

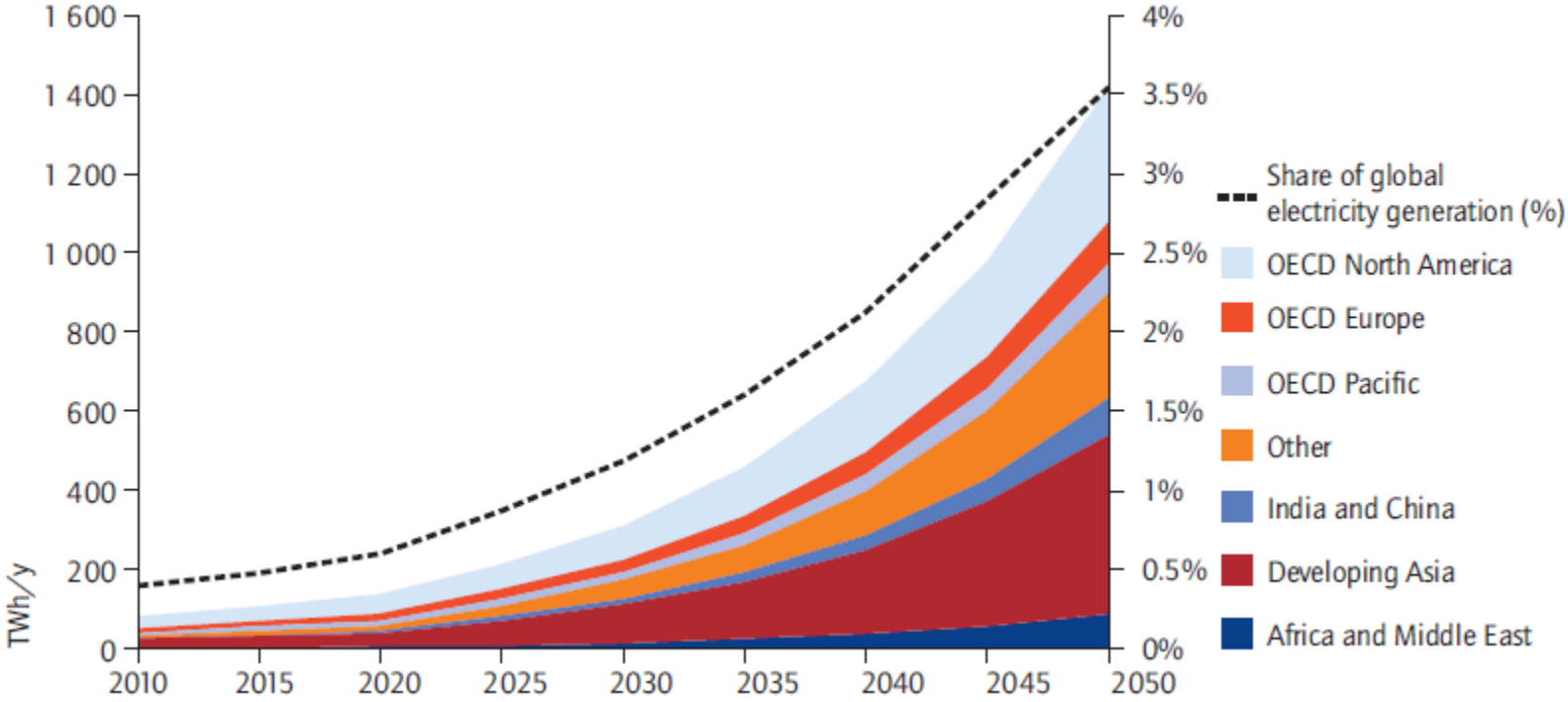
Geothermal heat and power today



Total capacity (GW_{el}), (GW_{th}) and produced energy (TWh_{el}), (TWh_{th}) 2009

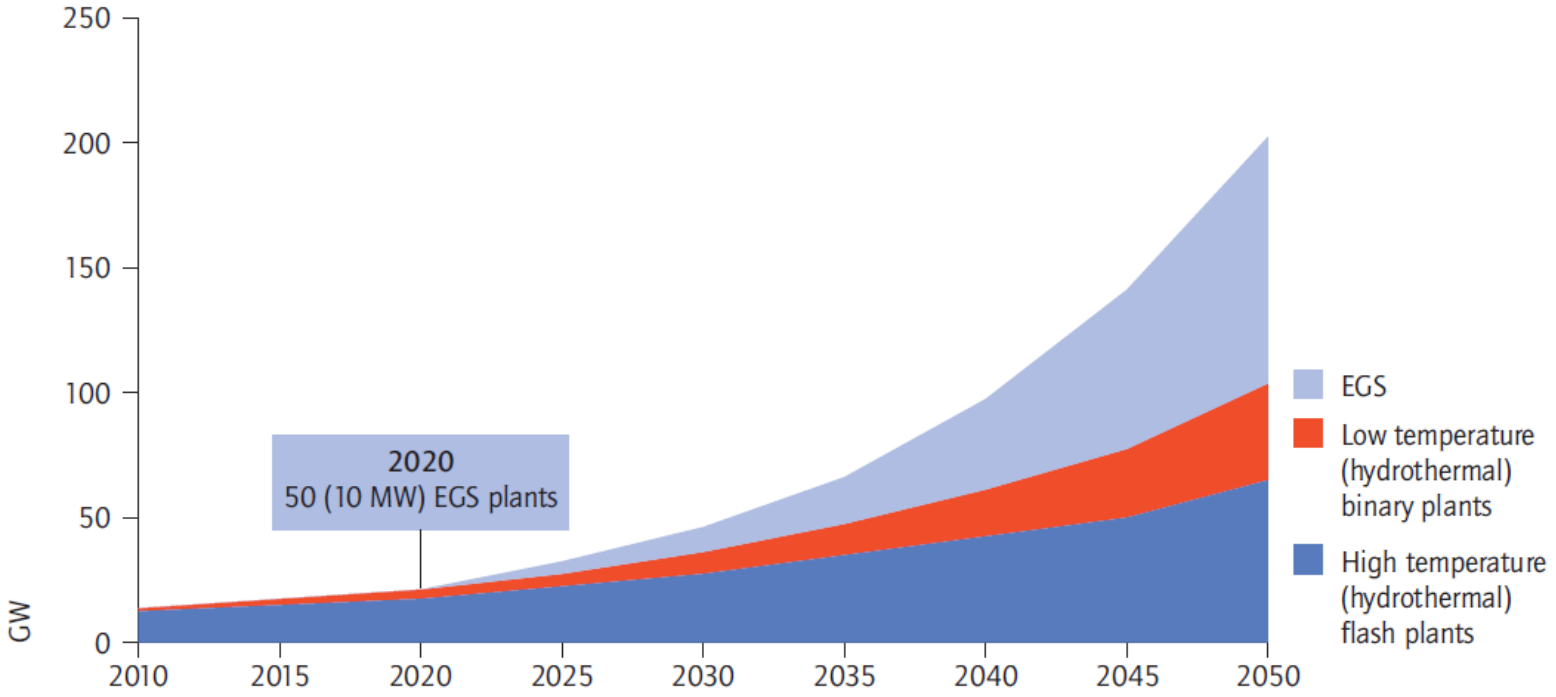
Source: (W. Weiss, 2010) complemented with geothermal heat from (Lund, 2010)

Roadmap vision of geothermal power production by region (TWh/y)



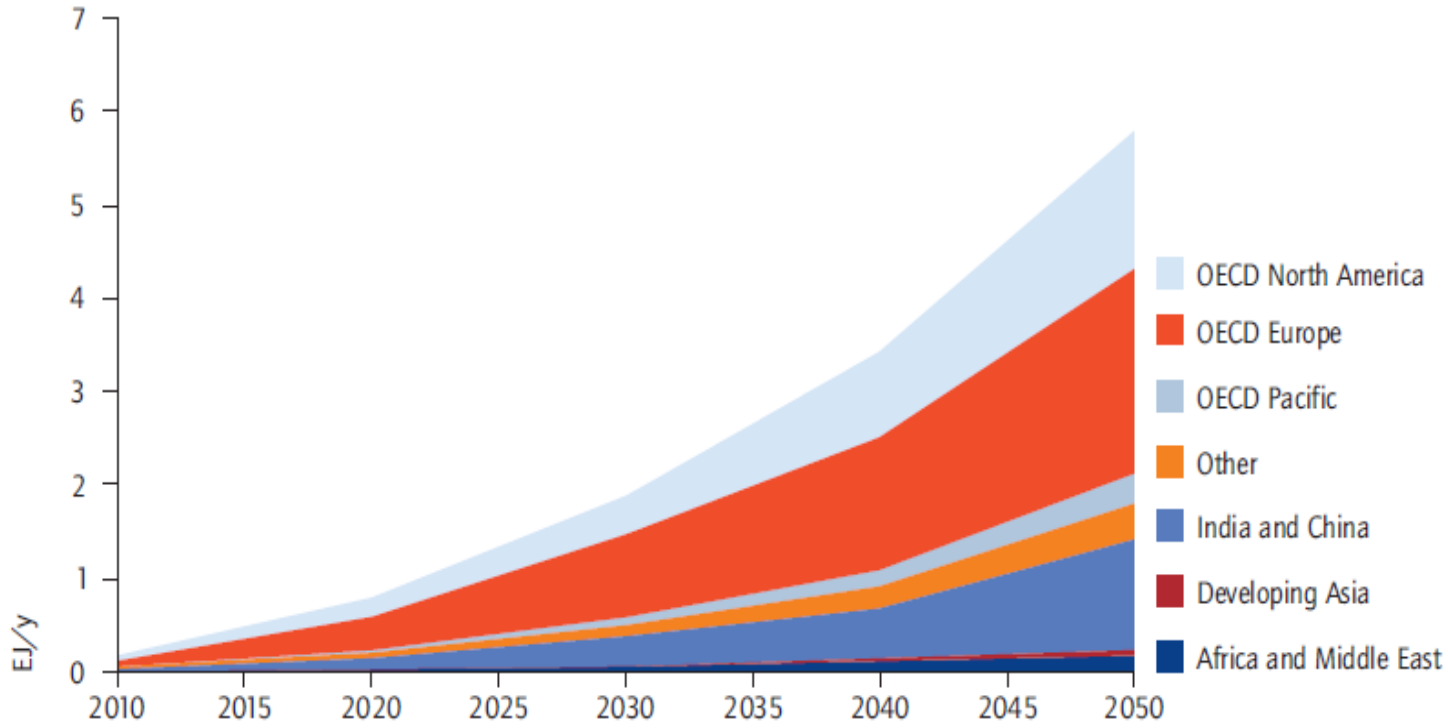
Geothermal electricity capacity could reach 200 gigawatts by 2050, providing 1400 TWh per year (3.5% of electricity production)

Growth of geothermal power capacities by technology (GW)



Enhanced Geothermal Systems (EGS) plays an important role in the roadmap vision for geothermal energy

Roadmap vision of direct use of geothermal heat by region (EJ/y)

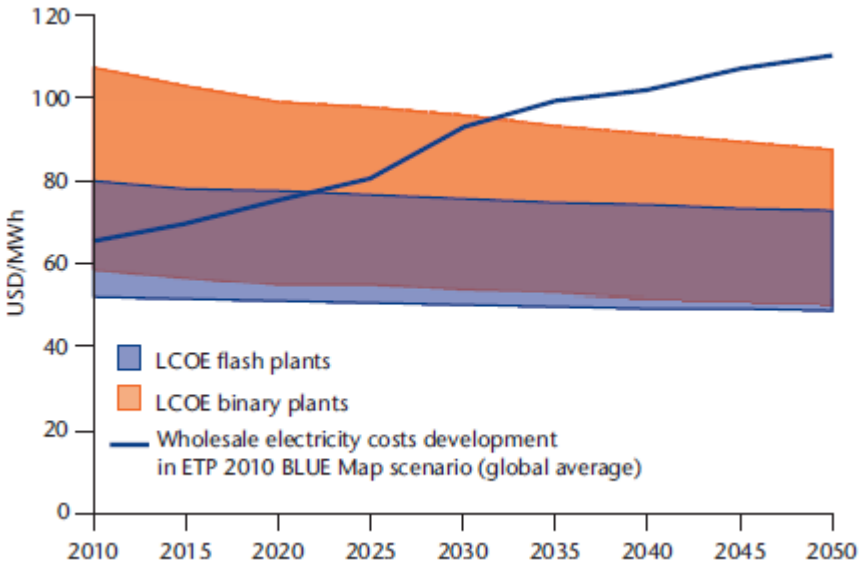


Geothermal heat could contribute to 5.8 EJ per year by 2050, (3.9% of final energy for heat), excluding ground source heat pumps

Technological challenges

- Development of advanced technologies (e.g. EGS) is essential to realize roadmap vision
- Improving EGS technology and address environmental issues is crucial
- Geological data and potential mapping needed
- Drilling risks and costs complicate geothermal development
- Geothermal should benefit from its potential to offer both power and heat

Economic challenges



- High temperature hydrothermal (e.g. renewables obligations) can already compete
- Some lower temperature hydrothermal needs (financial) policy support
- Insufficient policy incentives for geothermal direct heat, e.g. geothermal district heating
- EGS needs substantial RD&D investments

Non-economic challenges

- More awareness is needed of full range of geothermal resources available and of possible applications, especially geothermal heat
- Geothermal exploration risks increase costs: lack of risk mitigation schemes
- EGS technology needs to move forward in order to realize its promise. Moreover, social acceptance is crucial
- In some developing countries, additional efforts are needed to unlock huge potential

Potential for geothermal in Russia/CIS

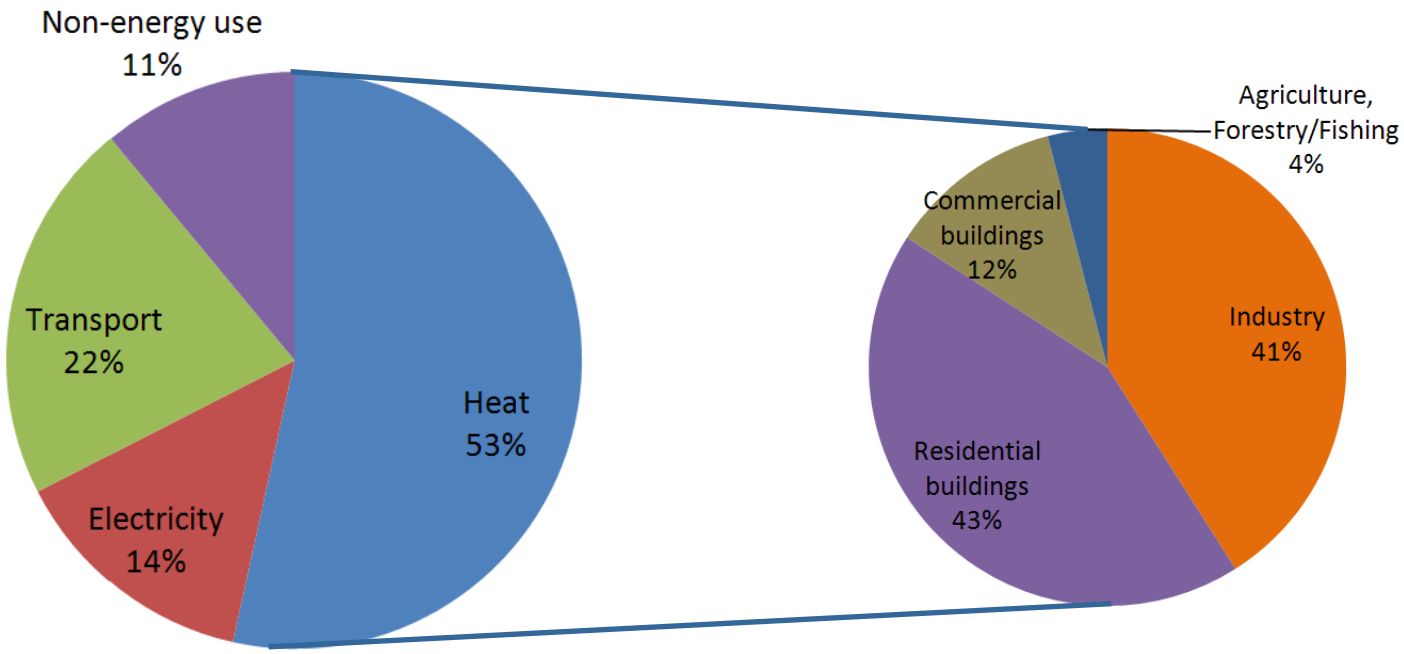
- **Geothermal power today (2010):**

2010	Capacity - MW_e	Production – Gwh_e/yr
Russia	82	441

- **Geothermal heat today (2010):**

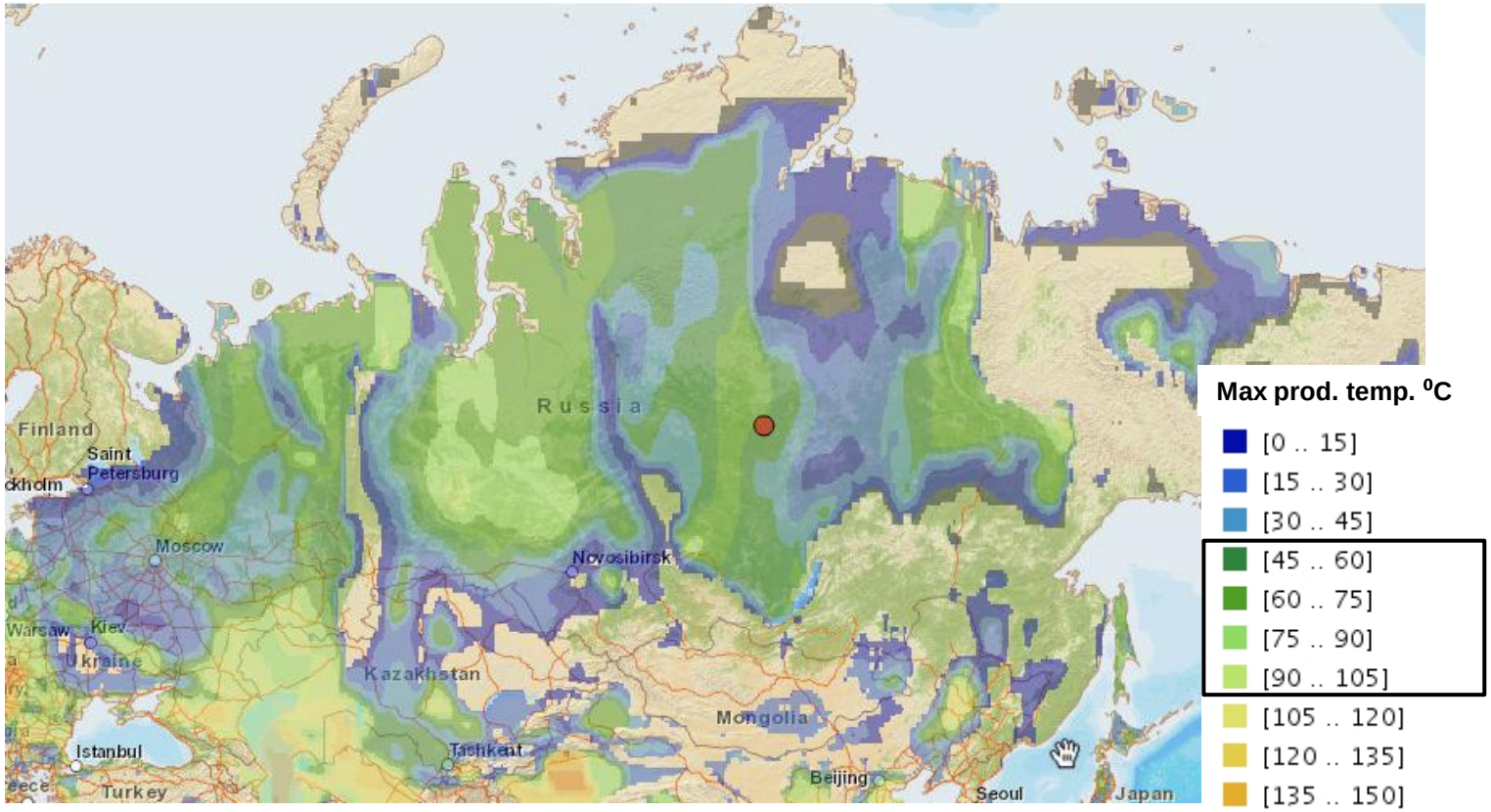
2010	Capacity - MW_{th}	Production – GWh_{th}/yr
Russia	308	1 707
Georgia	25	183
Ukraine	11	33
Tajikistan	3	15
Belarus	3	9
Armenia	1	4

Final energy demand in Russia



- **Final energy demand for heat in Russia/CIS offers huge savings potential -> geothermal medium temperature heat matches with building sector & agriculture heat demand**

Low and medium temp geothermal heat potential in Russia/CIS?



Source: www.thermogis.nl/worldaquifer

- **Aquifers offer considerable potential for low and medium temp geothermal heat in CIS**

Conclusions geothermal in Russia/CIS

- Geothermal is more than power production from high temperature hydrothermal resources
- Geothermal can offer both power and heat
- Geothermal (low and medium temperature) heat to be found in numerous aquifers in CIS
- Increased (political) awareness for addressing heat and alternative (renewable) heat sources could unlock geothermal heat potential
- Mapping of geothermal potential - improving and expanding geological datasets – helps development