Iceland Liechtenstein Norway grants

Norway grants

ORKUSTOFNUN
National Energy Authority

Geothermal District Heating and Good Practices in Iceland

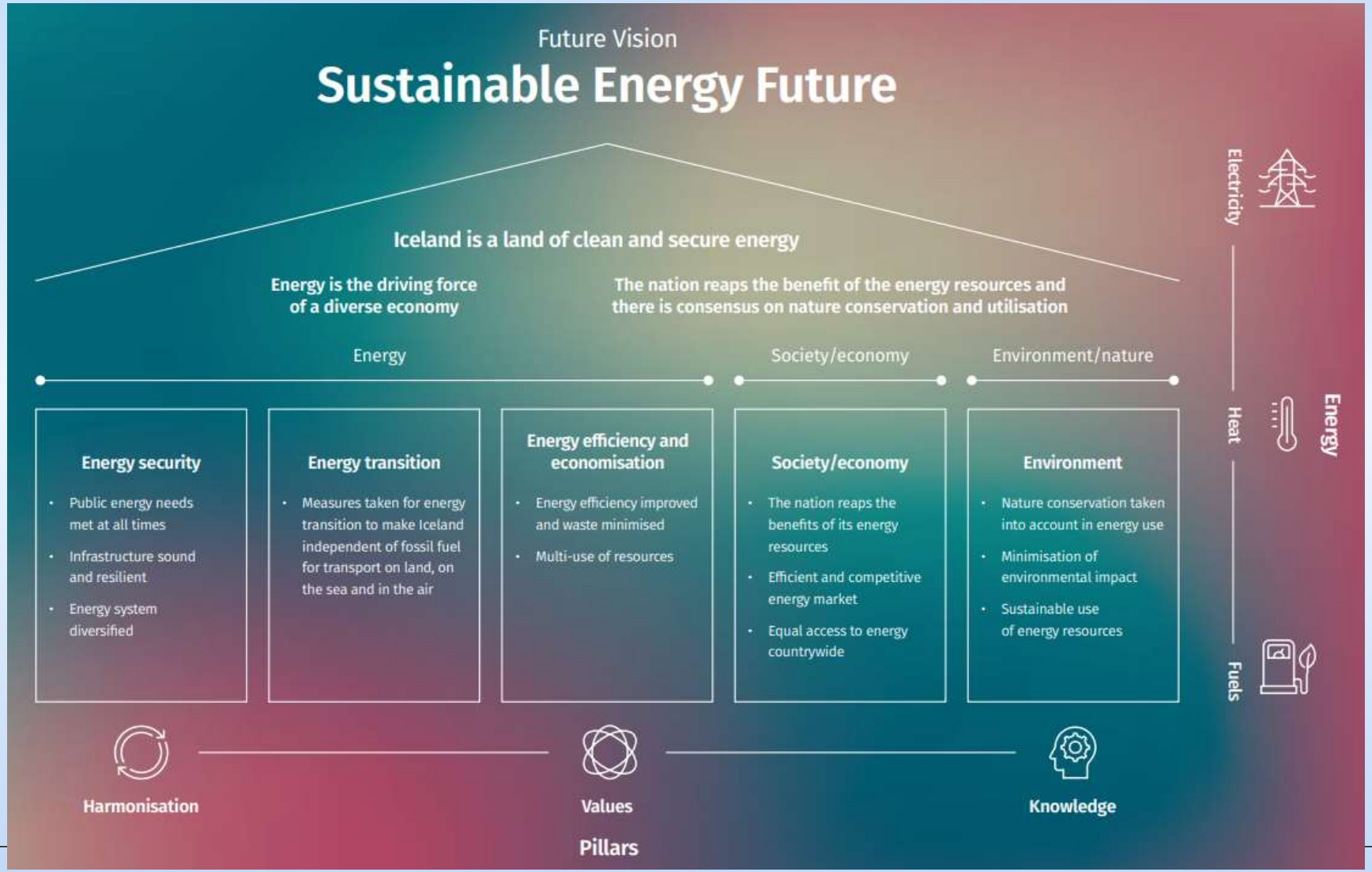
Baldur Pétursson
Manager International Projects

Heimir Tryggvason,
Specialist – district heating/geothermal energy

Orkustofnun
National Energy Authority (NEA)

9.05.2023

Policy Towards Sustainable Energy Future



Policy Towards Sustainable Energy Future is based on 8 key elements

Role and tasks of the National Energy Authority

Energy Policy Recommendation

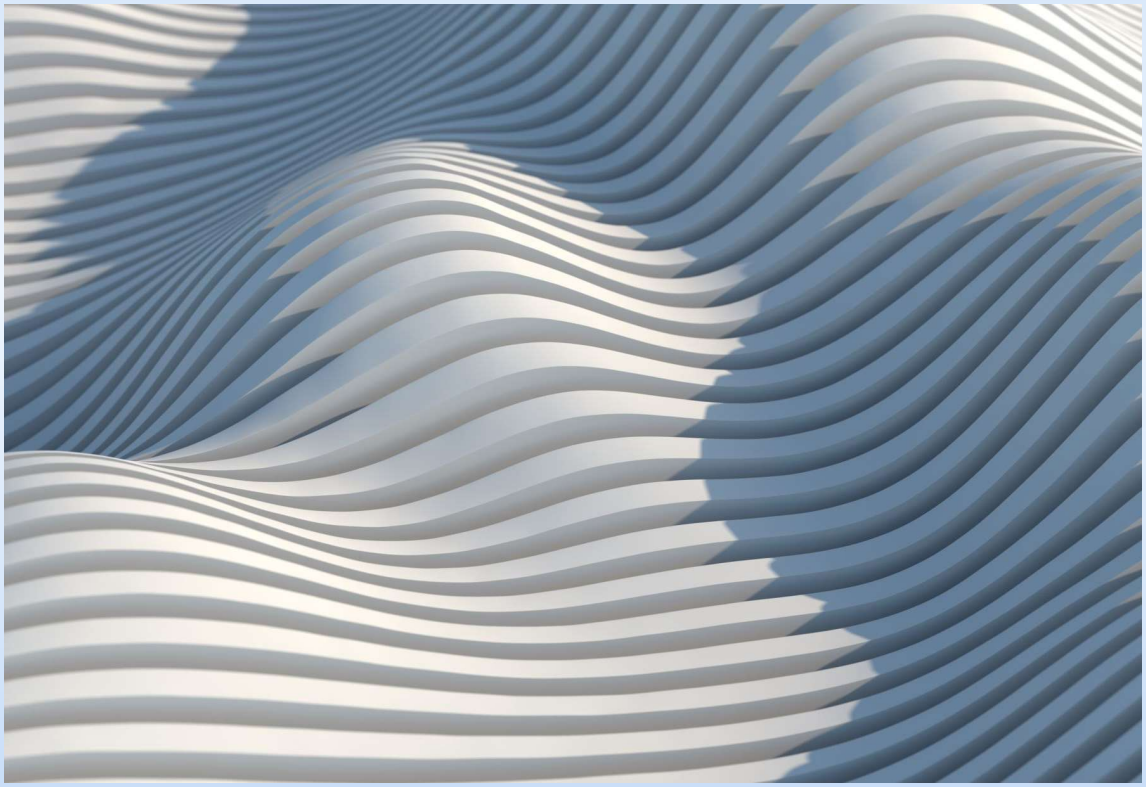
Climate change, energy transition and innovation

Licensing resources

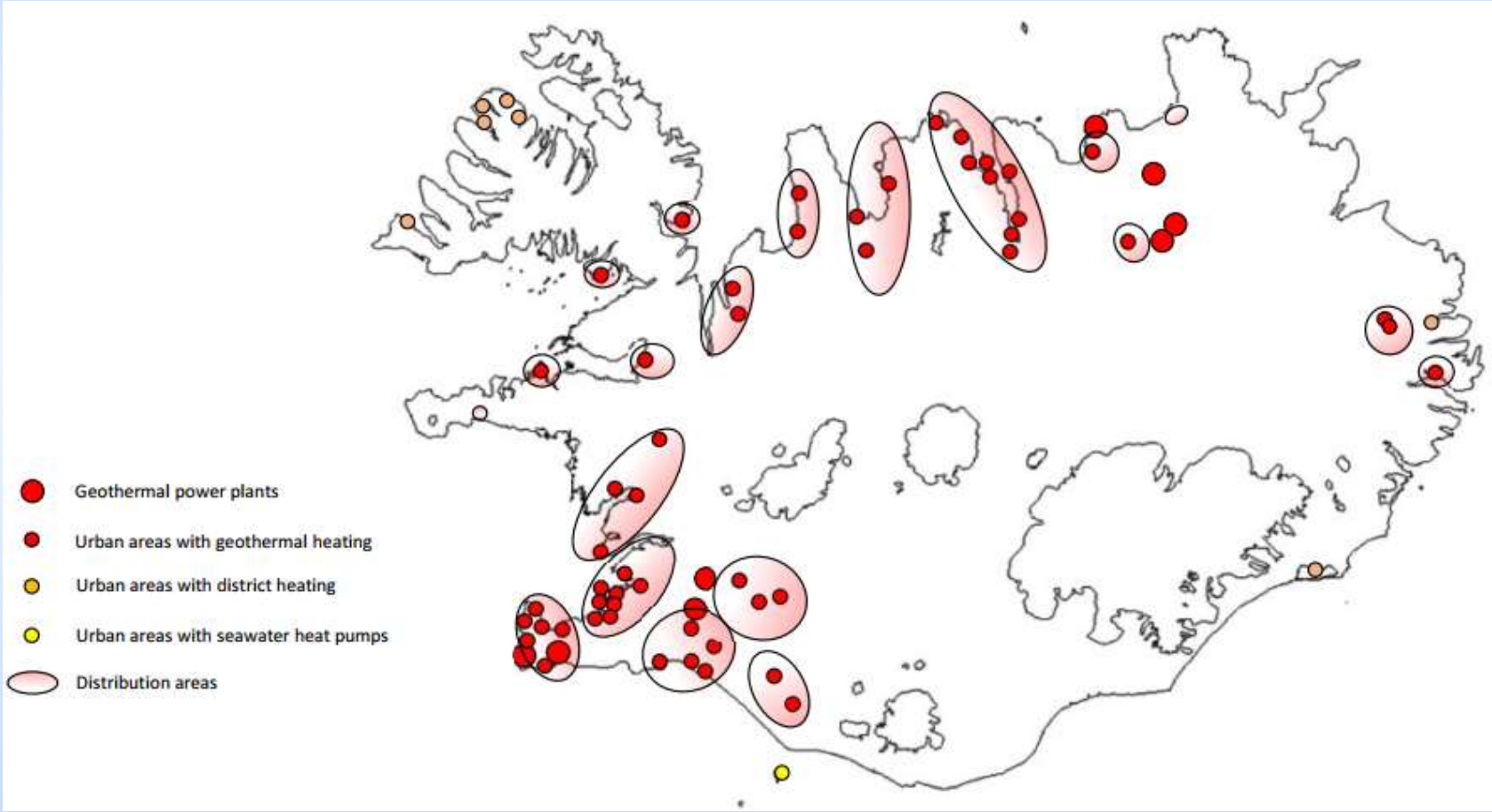
Monitoring resources

Data, energy efficiency, research

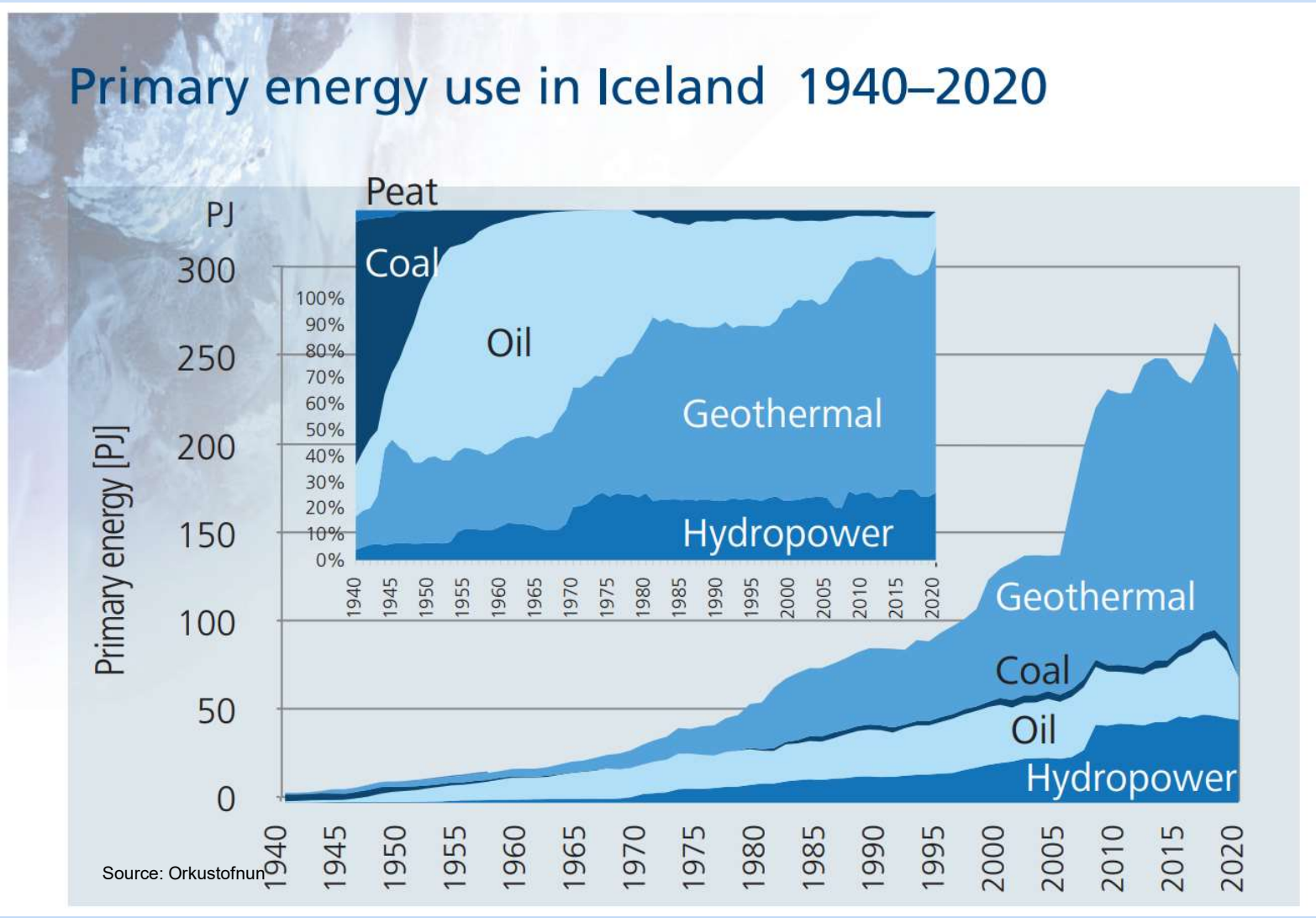
International cooperation and PR, (EEA Grants, WEC, Nordic, IGA, IEA, etc.)



District Heating Areas in Iceland



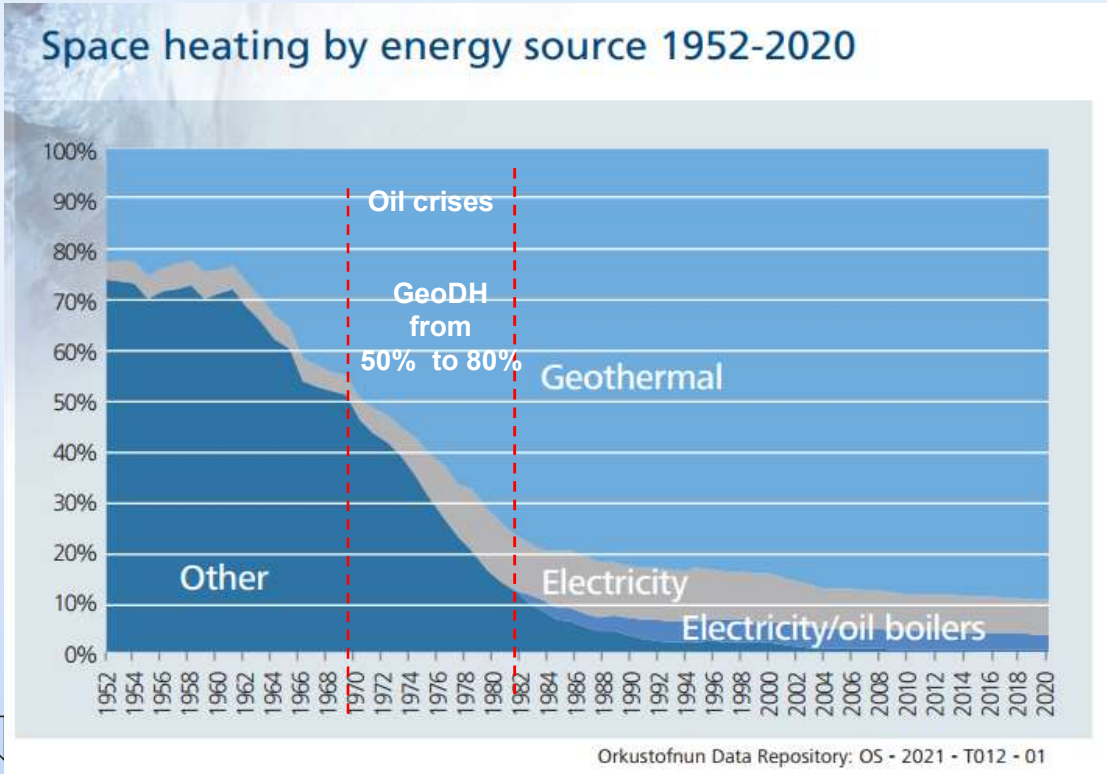
Primary energy used in Iceland

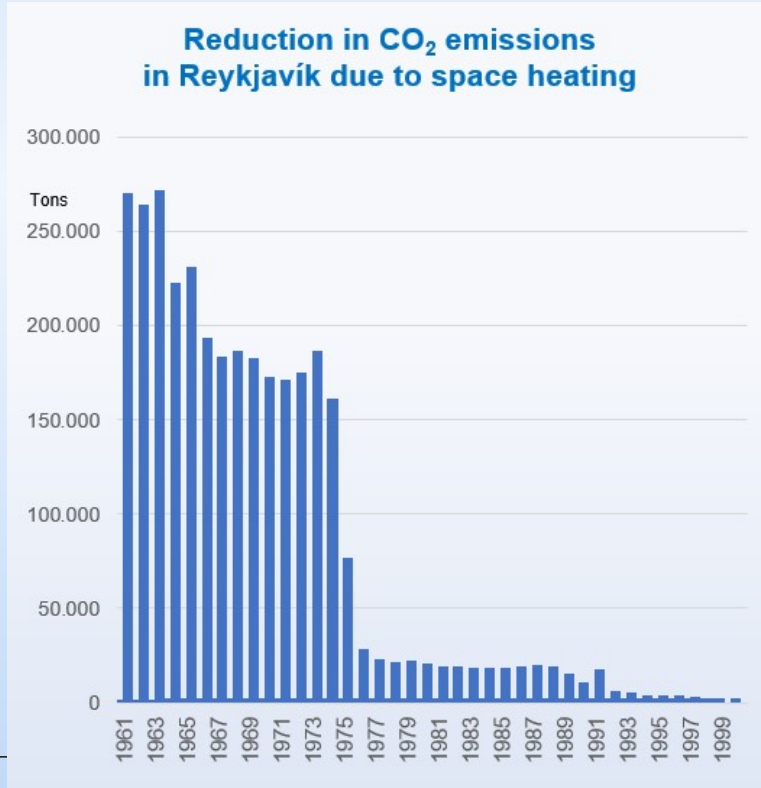


Expansion of GeoDH

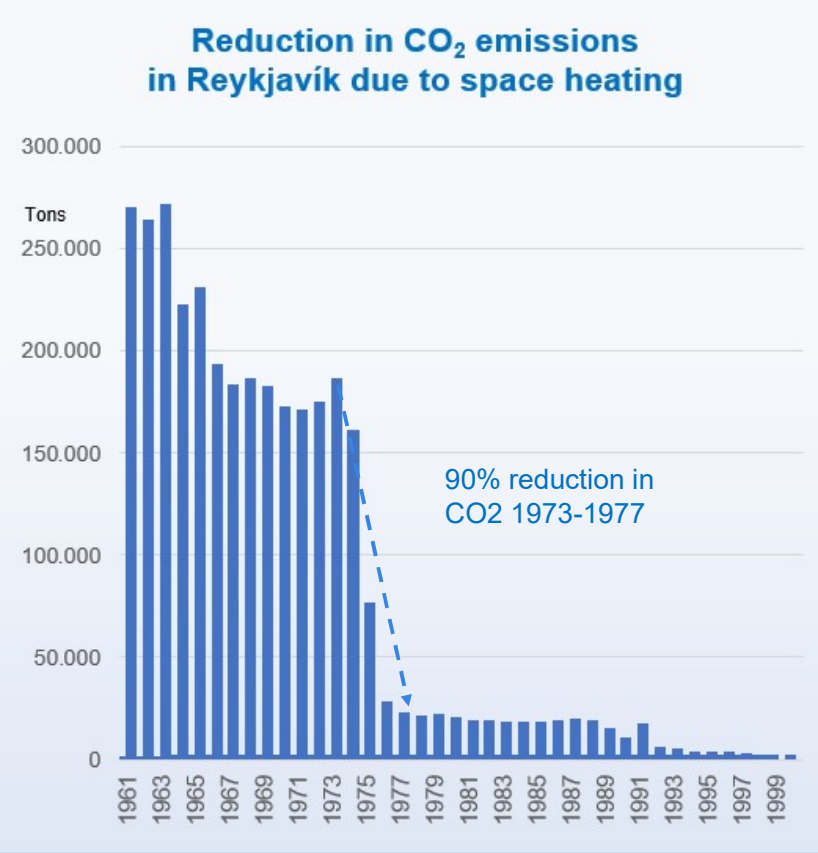
Space Heating by Source 1953–2019 and reduction of CO2

- External conditions – raised the need to increase geothermal heat and GeoDH Planning 1970 - 1982
- It took only 12 years to increase GeoDH from 50% to 90% of total space heating
- and it took only 12 years to decrease oil for heating from 50% to 10%
- the reduction of CO_2 emissions in Reykjavík decreased from 170.000 tons to 18.000 or 90%





Environmental and climate benefits of geothermal utilisation is mitigating climate changes



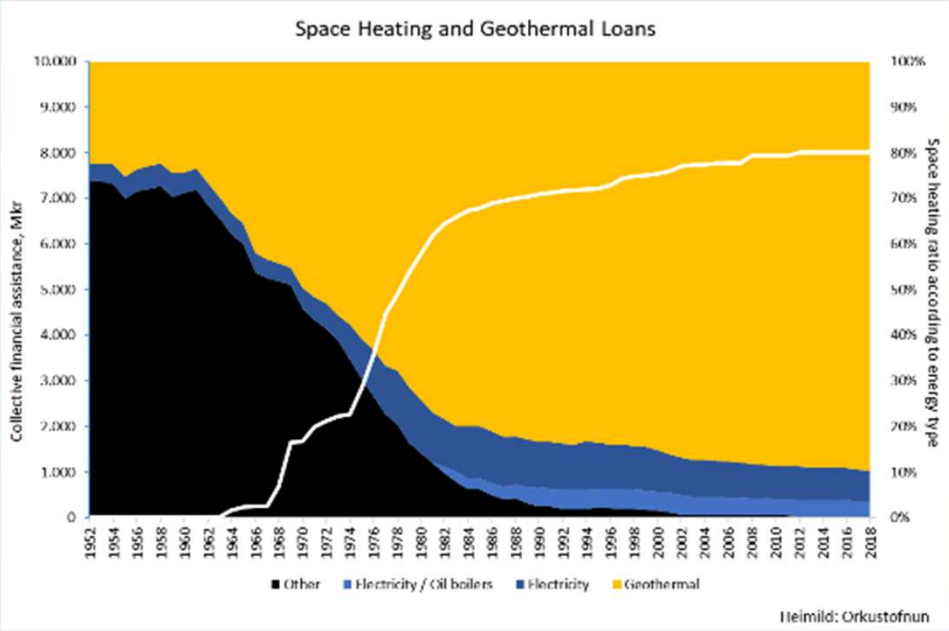
Reykjavík 1933 and today

Source: Reykjavik Energy

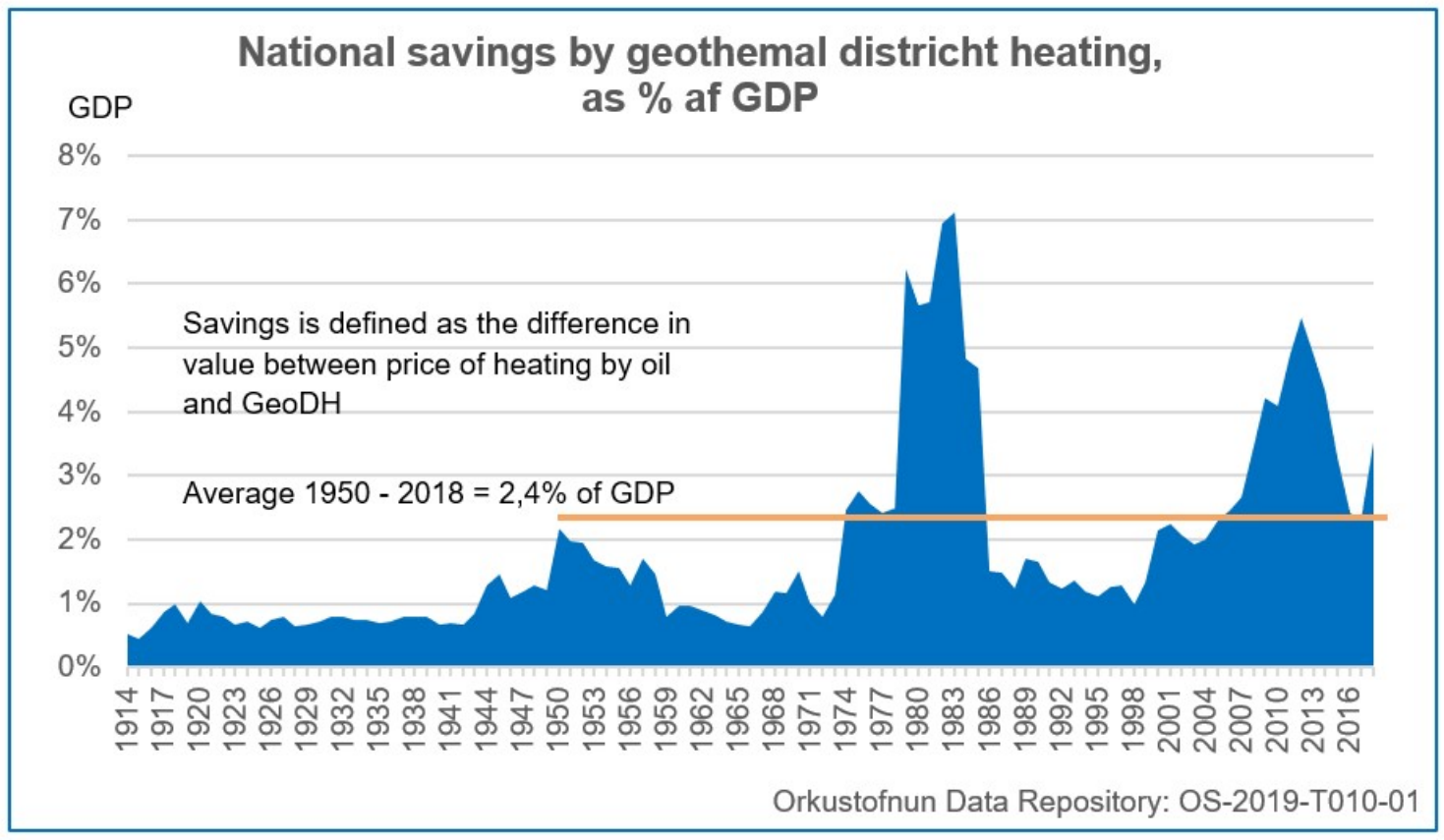
Icelanders also needed support for development of geothermal energy

350 geothermal loans granted by the government to address the upfront risk of locating geothermal resources by drilling

- Successful projects repaid the loans – **20 district heating systems developed**
- Unsuccessful projects received 50% funding vs. 50% loans
- Recent success rates of geothermal drilling: 44% for 1st well, 60% for 5th well and 75% for 15th well



Economic benefits of geothermal utilisation is valuable and increases energy security



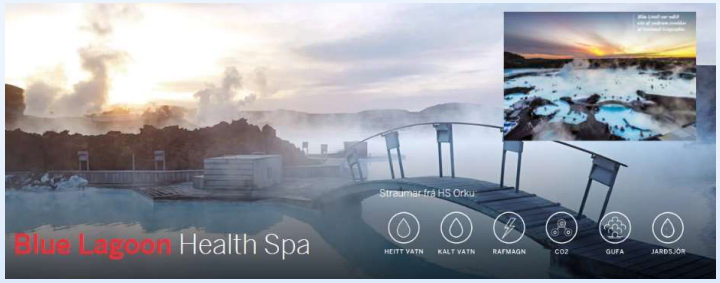
Utilisation of Geothermal Energy

Companies within the Resources Park at Reykjanes

Geothermal Power and Heat Generation

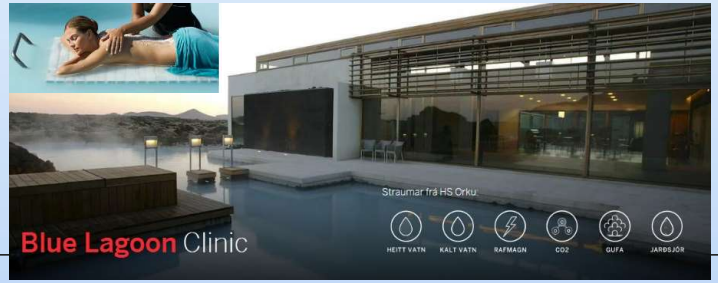
Geothermal Power and Heat Distribution

Blue Lagoon Health Spa

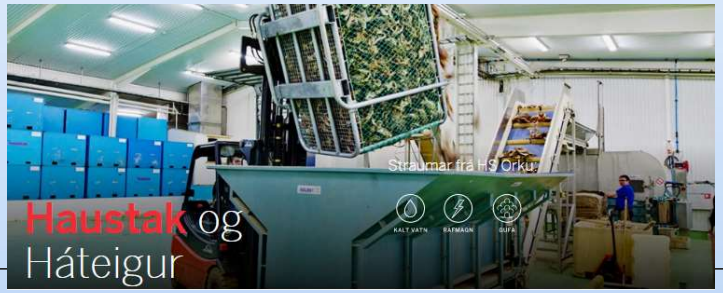


Blue Lagoon R&D Centre

Blue Lagoon Clinic

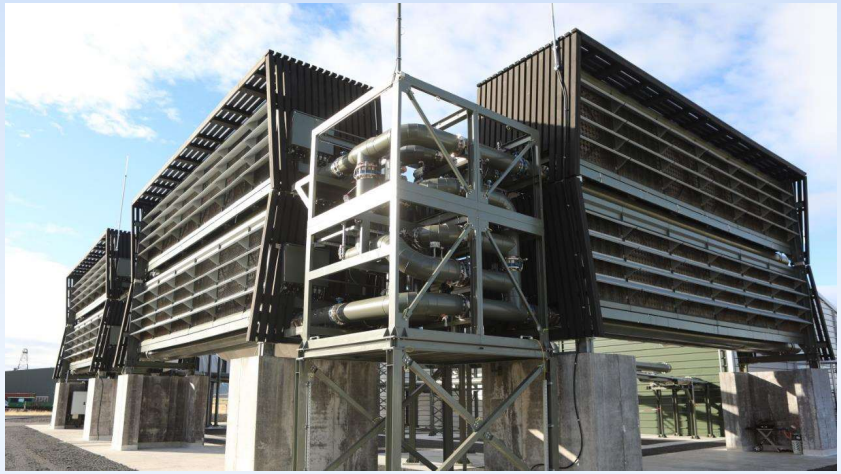


Fish Drying



Utilisation of Geothermal Energy

Companies at Hellisheiði Resources Park



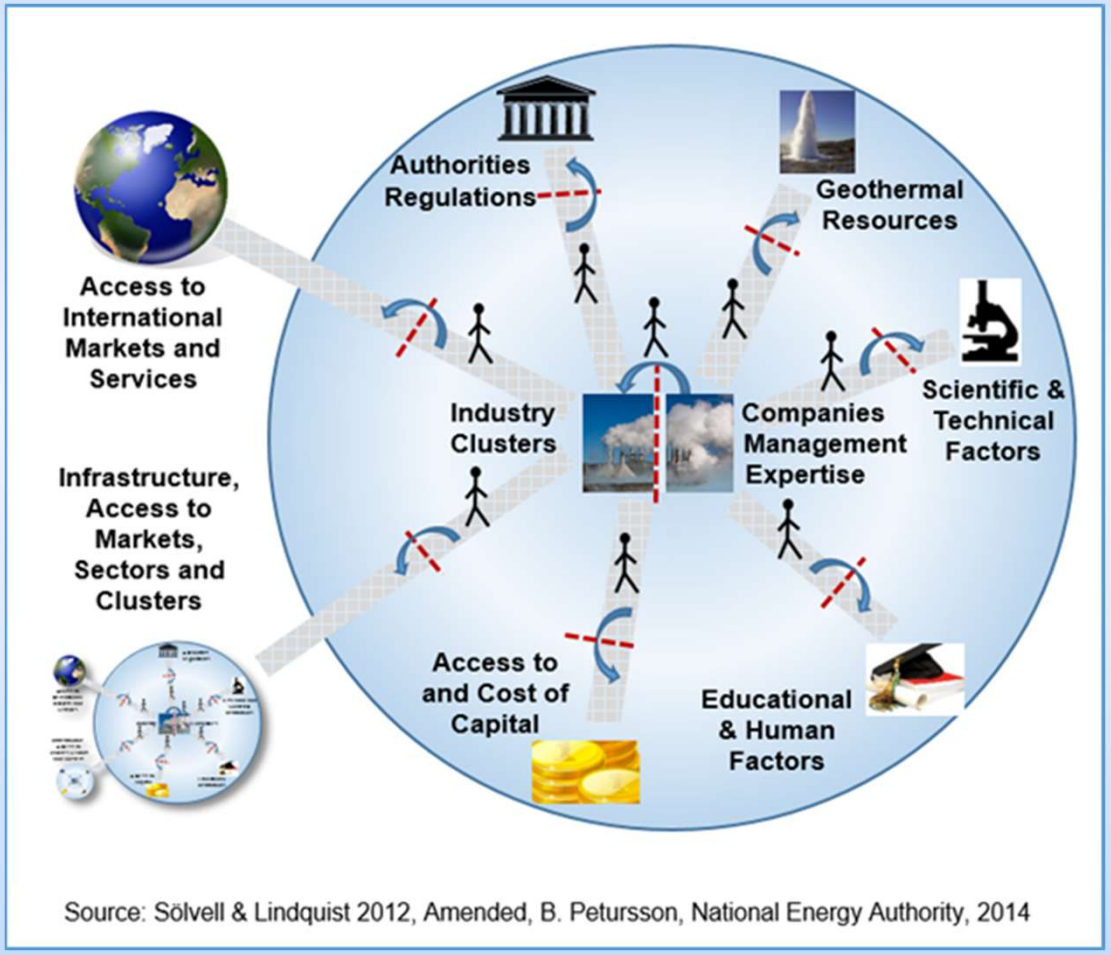
Competitiveness of the Geothermal Sector

Success of Geothermal District Heating is based on 8 Key Factors

8 Key Elements of Success in the Geothermal Sector and District Heating

1. Authorities and regulation,
2. Geothermal resources,
3. Scientific & technical factors,
4. Education & human factors,
5. Access to capital,
6. Infrastructure and access to markets, sectors and other clusters,
7. Access to international markets and services,
8. The company, management, expertise & industry, clusters assessment

In cooperation with international and domestic experts, on geothermal resources, finance, legal, management and other expertise.



Source: Sölvell & Lindquist 2012, Amended, B. Petursson, National Energy Authority, 2014

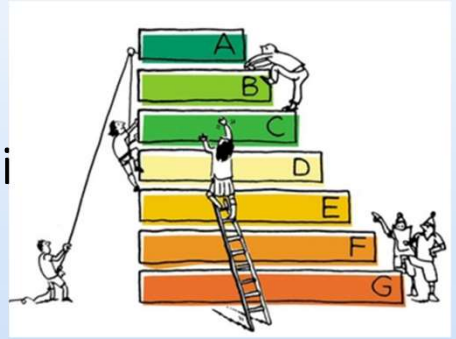
Geothermal DH in Iceland

- > 91% of house heating is through geothermal DH
  - Remaining houses heated with electricity – direct or through DH-system
- ~50% from high temp fields, cogeneration from geothermal power station

- DH companies are in public ownership
- They operate under a monopoly licence
  - Tarif changes need to be approved by the Minister of Energy
- Prices for house heating
  - Geothermal: 2,5 – 3 c€/kWh
  - Subsidized electricity: 4,5 c€/kWh
- Most systems have been operating since the 80's

NEA role towards DH-companies

- **Permitting** for research and utilization of geothermal
- Surveillance done by NEA
  - Utilization permits
  - **Data acquisition, analysis and publication –** Thermal utilization and usage
  - **Predictions**/plan for energy production and usage
  - **Counselling** for the ministry – Monopoly-licences, tariffs etc.
- **System for subsidizing** electrical house heating in “cold areas”
  - Grants for new geothermal DH systems – other energy saving soluti
- Participation in **various projects** regarding energy issues – other government agenises
  - Project on energy labelling for housing



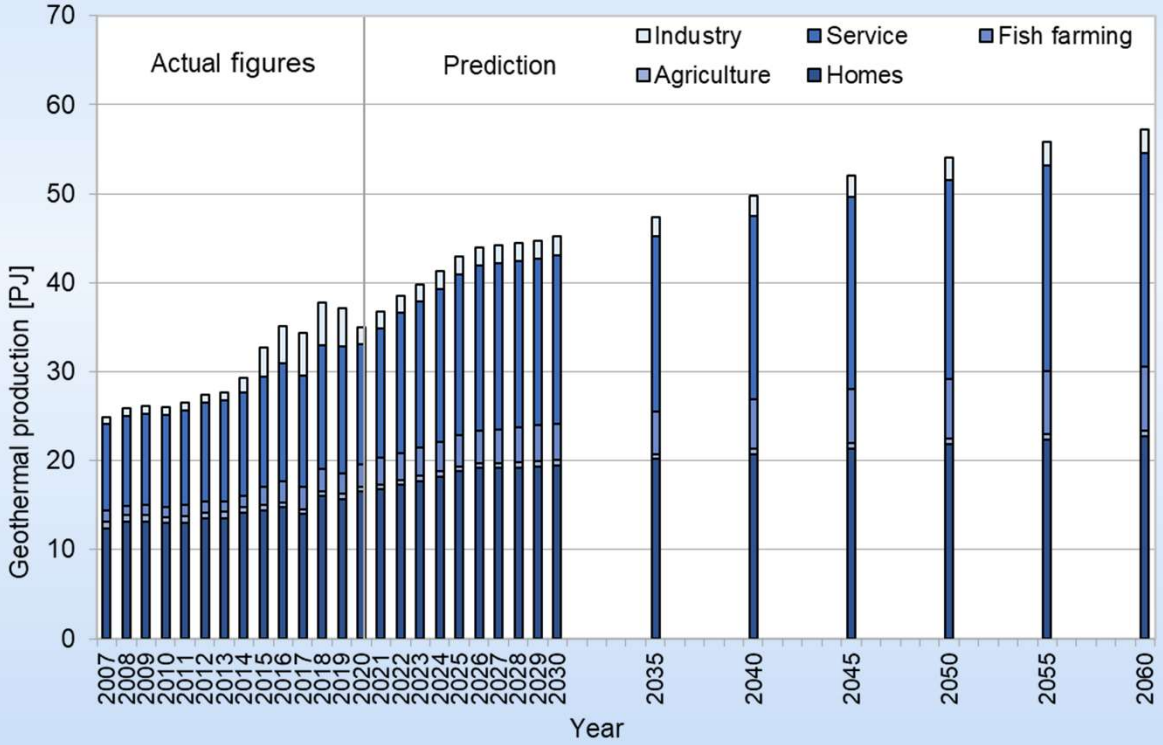
Geothermal Heating System at Höfn

The Latest Geothermal Heating Utility in Iceland

- Most cost effective for both customers and heating company if customers connect to the heating utility in the beginning.
  - Connection on later stages will depend on real costs in addition to the initial cost.
- Further work in progress: Further information, e.g. regarding technical information and requirements.

Prediction for geothermal – 2021-2060

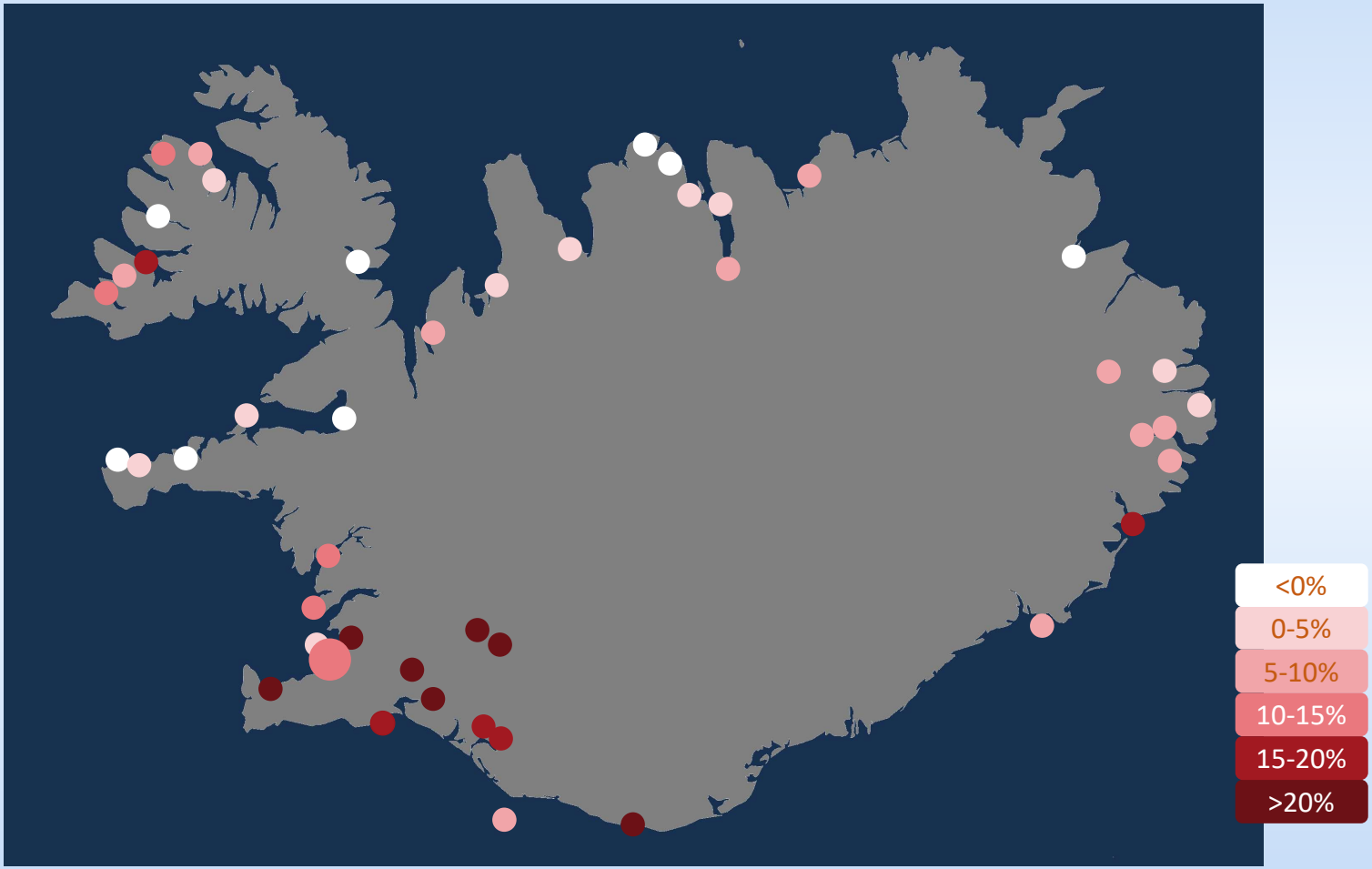
- Increase due to population growth
- Service sector usage increases faster than home
- Industry use greatly affected by few users not connected to the DH-systems
- Great increase in fish farming and lagoons – often connected to the DH systems



Population increase 2018-2023

- Systems / towns with over 250 inhabitants
- Population increase is 11% in the last five years
- 390.000 inhab. in 2023
- 29.000 (7%) due to migration

- Reykjavík area – 11,6%
- Suðurnes – 9,5%
- Suðurland – 15,5%



Coldest winter in Iceland for 28 years

Heiti potturinn helsti óvinur hitaveitunnar í frostinu

14.12.2022 - 14:15 Innlent · Frost · Hitaveita · Norðurland · Umhverfismál · Veður

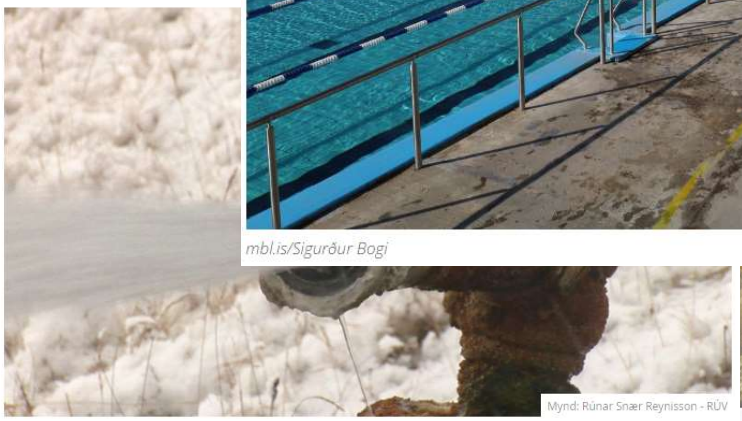
Innlent | mbl | 18.1.2023 | 15:03

Loka sundlaugum vegna skorts á heitu vatni

mbl.is/Sigurður Bogi

Djúpavogsbúar h hitaveitu

15.02.2022 - 14:48 Innlent · Austurlan



Mynd: Rúnar Snær Reynisson - RÚV

Veturinn er ökumönnum og hitaveitum erfiður.

Response to this situation

- DH companies are actively investing in increased capacity
  - Geothermal exploration
    - Main threshold is the lack of capacity for drilling
  - Other key items in the DH systems; tanks, pumping capacity, etc.
  - Pressure from DH-companies on price increase

- Active efforts to reduce waste
  - Awareness raising with the public
  - Active conversation with heavy users in industry
  - Smarter metering: Real time billing vs. estimated

- Icelandic government has announced grants for geothermal exploration in „Cold areas“ – three year effort

Renewables and Energy Transition is a powerful tool to mitigate global warming and increase energy security

Thank You