



ARCTICGREEN

ARCTIC GREEN ENERGY
COMPANY OVERVIEW
HUNGARIAN ENERGY DELEGATION

05 July 2022

Reykjavik Iceland 1933

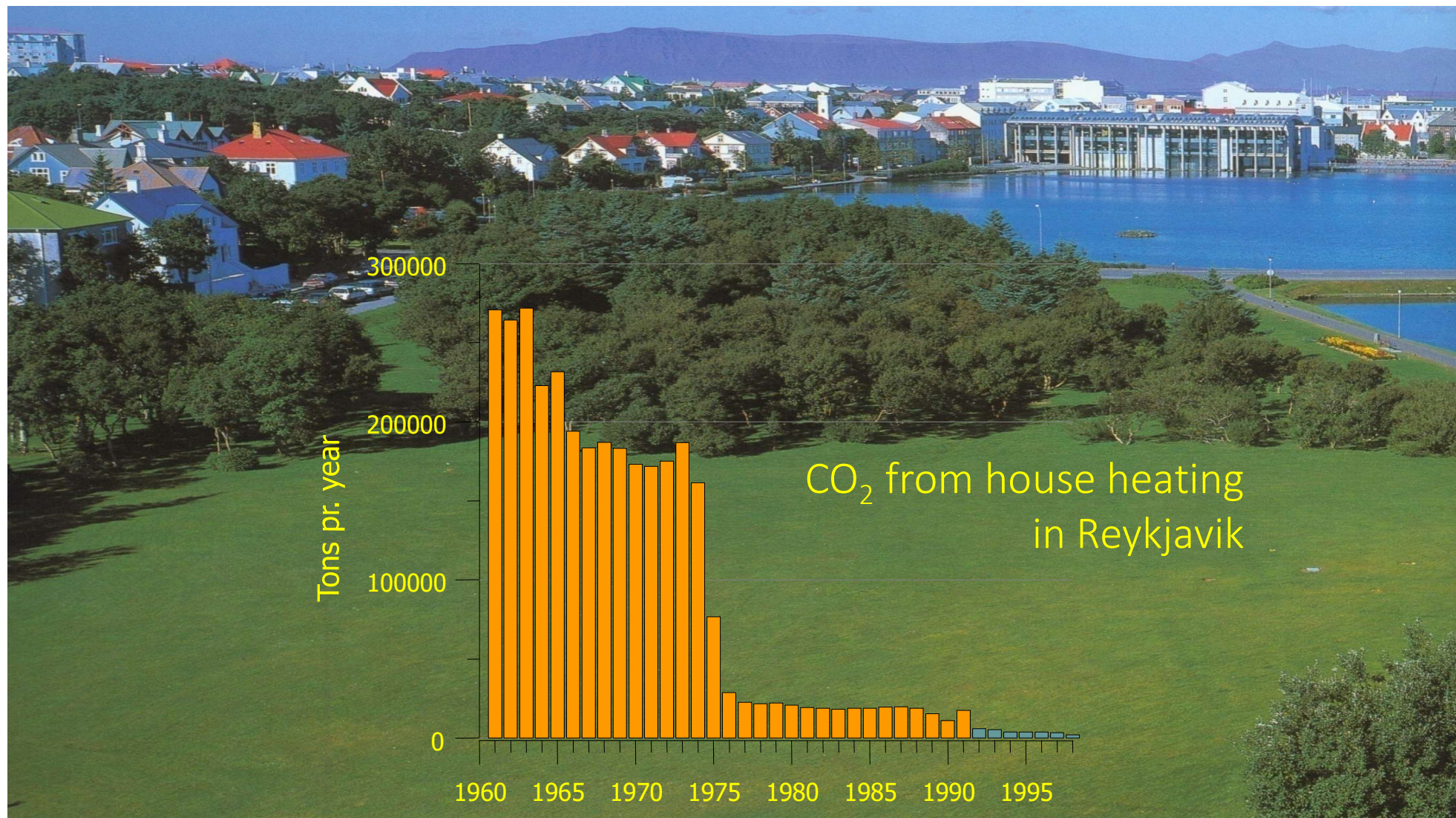
- Reykjavik in 1933 was one of the poorest economies in Europe
- Spending large part of foreign currency for importing coal for heating
- Coal cloud and pollution covered the city the whole winter
- Limited knowledge in geothermal energy



Reykjavik Iceland 2022

- In 2022 then 99% of houses in Reykjavik are heated with geothermal energy
- Oldest well drilled in 1921 is still in use. Payback time for the well was five years, it has been providing free clean heat for 96 years.
- Reykjavik is now the cleanest capital in Europe





Heat- and Power Production

- New technology enables power production and heat production from the same wells resulting in important cost sharing for drilling works.
- Iceland can provide the cheapest heating in Europe





Well-head Units

- With newest advanced technology it is possible to produce power from water as low as 80°C
- Combined heat- and power plants offers important cost sharing of drilling works and result in good price for clean heat





Clean power for industry

- Many industry producer want to pay higher price if the power is produced without pollution
- Iceland with a population of 380.000 is the largest manufacturer of aluminim in Europe





Public swimming pools

- After producing clean heat and power the geothermal water is still 40°C and ideal for public swimming pools
- It has turned out that geothermal water is healthy for the skin and supports healthy living.





Greenhouses

- Heating of greenhouses in winter time enables continuous production all year round
- Iceland is self sufficient in food production and can also produce fruits and vegetables in winter time
- Producing food in the neighbourhood saves foreign currency and reduces pollution in transportation





Healthy Living

- Low pollution, geothermal heating in 99% of houses and good access to swimming pools and spas supports healthy living
- Healthier life style reduces cost of health service
- Lung diseases develop less in fully heated houses. Covid diseases in Iceland are the lowest in Europe



Using geothermal to transform cities


Suffering Cities
with fossil fuel-based
infrastructure


 **Breathing Cities**
with geothermal baseload &
100% renewables



Direct use of
geothermal heat is the
most
**environmentally
friendly,
economically
viable** source of
clean heating for
cities


 **RENEWABLE** The earth's core naturally replenishes geothermal heat in endless supplies

 **BASELOAD** Constantly available energy source, irrespective of weather or time of day

 **WIDELY ACCESSIBLE** Geothermal heat can be generated in almost every country and on average can serve 30-50% of populations

 **PUBLIC HEALTH** Quality of life and even life expectancies dramatically improve following replacement of fossil fuel infrastructures

 **CARBON SAVINGS** Geothermal heating replaces dirty fuel systems and takes down the chimneys

 **ECONOMICAL** We have proven our heating solutions are economical and price competitive with fossil fuel alternatives

Arctic Green Energy

- Joint Venture with leading Chinese SOE, Sinopec
- Established in 2006 and profitable since 2009
- Market leader in China both in terms of market size and technical ability
- 1/3 market share of hydrothermal geothermal in China
- Exclusive rights to some of the most valuable geothermal concessions in China
- A national showcase in China for geothermal utilization and exploration
- Being prepared for an IPO
- The world's largest and fastest growing geothermal district heating company

#1	Market share & technical ability in Asia
60	Million m ² in connected capacity
320	Million m ² in additional signed projects
>60	Cities and/or counties with SGE exclusive concessions
>110	Patents registered
724	Wells drilled; average depth 2.2 km
719	Heat centrals in operation
602	Ground Sourced Heat Pumps in operation
3	Waste Heat Projects in operation
1	Sewage Pump Project in operation
3,5	Million tons of CO ₂ saved in YTD in 2021
20	Million tons of CO ₂ saved/year when already secured pipeline as been constructed

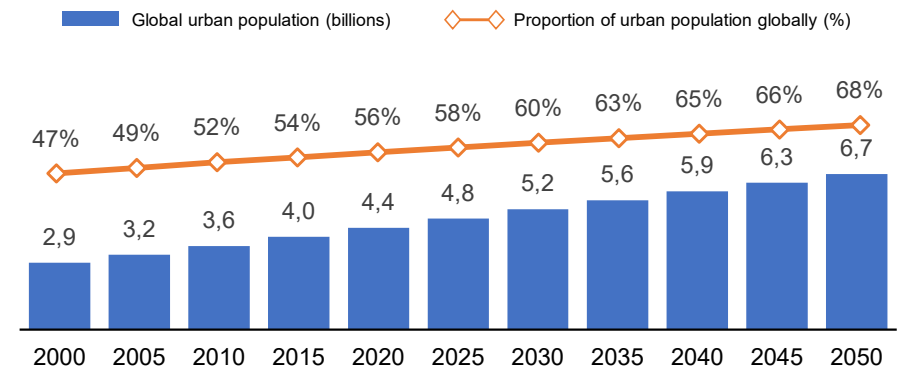
Heating and cooling cities remains one of the most significant global energy challenges

Increased urbanisation is set to drive heating and cooling demand higher...

- **Cities consume c. 75% of global primary energy** and emit between 50 and 60% of the world's total greenhouse gases
- Structural demographic shifts are making this issue increasingly important with **c. 70% of the world's population forecast to live within cities by 2050 (vs. c. 55% today)**
- Heating and cooling accounts for **almost half of cities' energy consumption**
- Heating from traditional energy sources poses a **material risk to the environment and overall health of the population**

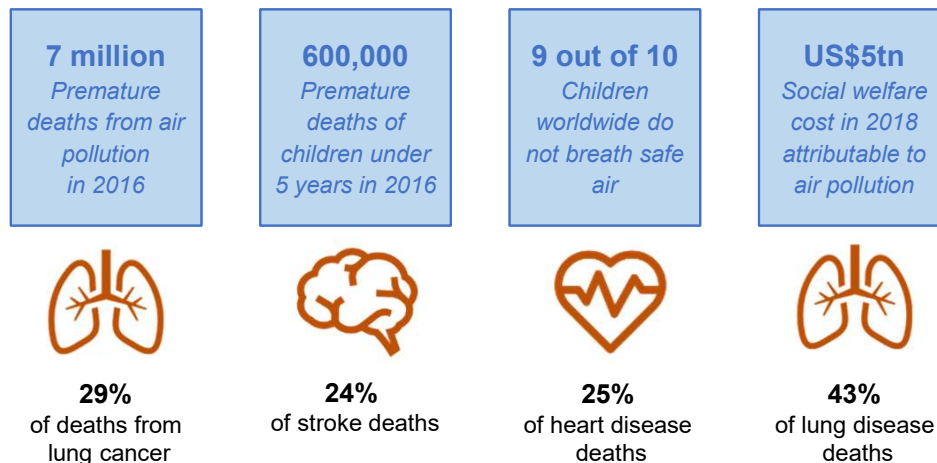
Source: United Nations World Urbanisation Prospects 2018

... as the global urban population is forecast to grow from 4.4 billion in 2020 to almost 7 billion by 2050



Source: United Nations World Urbanisation Prospects 2018

The impact of air pollution is already grave...



Source: Breathelife, World Health Organisation

... and international efforts to reduce carbonisation have increased

- Key international agreements such as the **Paris Accord (2016)**, which aim to reduce GHG emissions by binding signatory states to specific emission reduction targets, have **increased pressure on countries to decarbonise**
- The **Climate Ambition Alliance: Net Zero 2050** is a global initiative that was launched in 2019 which has brought together **70 countries, 393 cities, 763 companies and 27 investors** to achieve net-zero CO₂ emissions by 2050

Source: UN Climate Change, United Nations Framework Convention on Climate Change

Geothermal energy is clean, abundant and an ideal solution for sustainable power generation and district heating and cooling...



Earth's untapped potential

- Geothermal provides a **carbon-free, renewable, sustainable form of energy** that provides a **baseload supply of heat** that can be used to heat cities and generate electricity
- The heat in the upper 10 km of the Earth's crust contains at least **50,000 times as much energy as found in the world's fossil fuels**
- Despite this, the earth's geothermal energy resource remains **relatively underdeveloped**
- Geothermal power plants / district heating installations are capable of **supplying baseload electricity / heating capacity**

Geothermal energy vs. other renewable energy sources

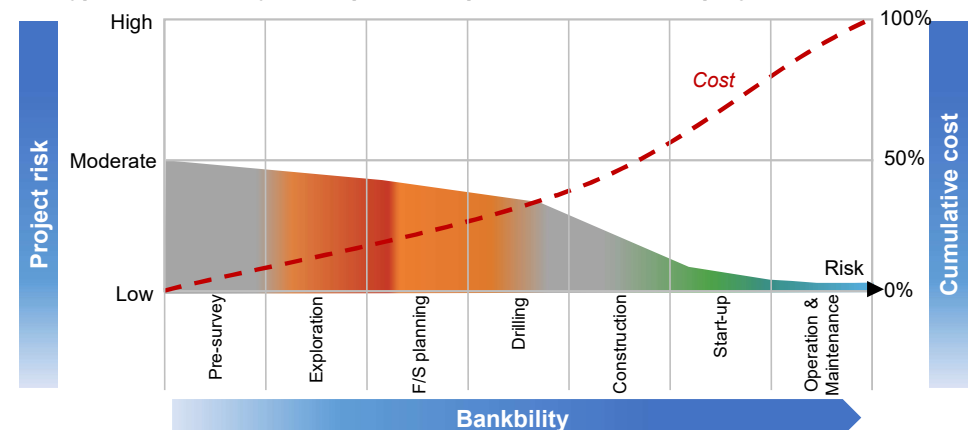
Renewable energy sources	Capacity factor (%)	Reliability of supply	Environmental impact	Main application
Geothermal	95-100%	Baseload	Minimal land usage	MWe and MWth
Biomass	c. 60%	Reliable	Minimal (non-combustible material handling)	MWth
Hydro	c. 40%	Intermittent /peakload; dependent on the weather	Significant	MWe
Wind	25-40%		Unightly for large-scale generation	MWe (limited)
Solar	24-30%			

Note: Capacity Factor = Total energy produced / energy produced if at full capacity
Source: Geothermal Energy Organisation

Why the time geothermal district heating is now?

- The growing need to develop **sustainable alternatives to traditional carbon-based energy sources** has driven geothermal's increasing prominence as it is one of the **few baseload renewable energy sources**:
- The primary drivers of geothermal's growth include:
 - The demand for **sustainable urbanisation**
 - The global demand for **decarbonisation**
 - District heating system use is **growing much faster than urbanisation**
- Geothermal energy is also becoming increasingly viable owing to:
 - Increasing knowledge** of the Earth's subsurface
 - Technical advances** improving the efficiency of geothermal
 - Improved project economics**

Typical uncertainty and expenditure profiles for a GeoDH project



Source: Company information

There is a renewable, baseload and profitable solution....



Direct use of Geothermal energy is the most environmentally friendly and profitable source of clean heating for cities

This has been proven on a massive scale



Market leader • Proven track record • Collaborative partner

Thank you