



Mannvit

General Corporate Introduction



Creating and promoting a sustainable society

Mannvit

Founded

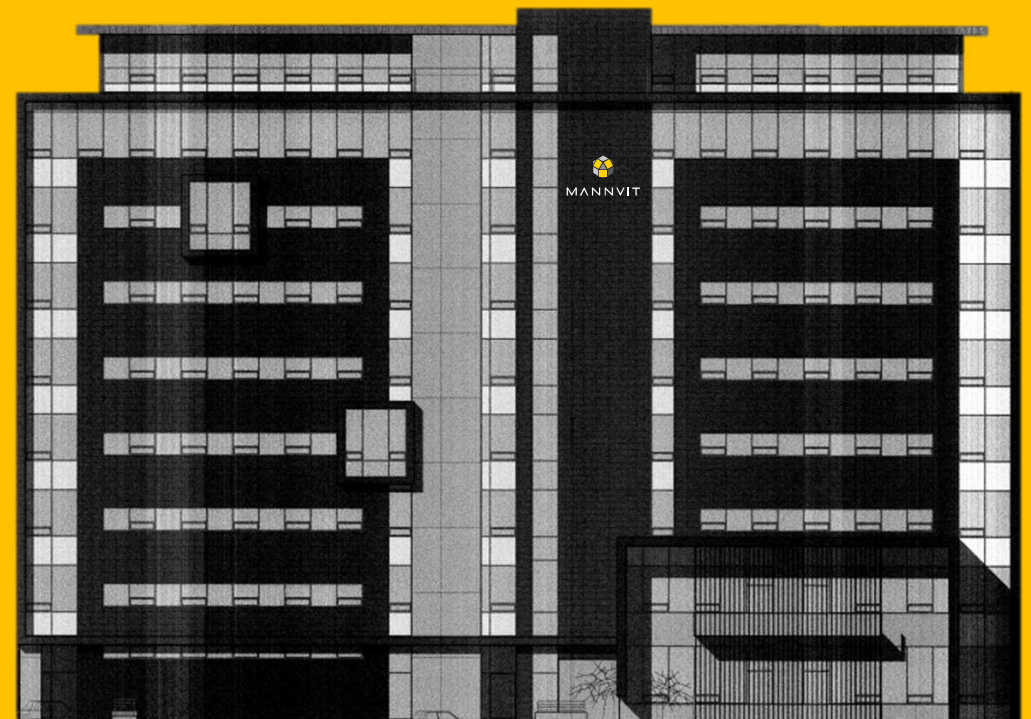
1963

Employees

300

Turnover 2021

€38 million



Offices

Iceland | Germany | Hungary | Greenland | Ethiopia | Indonesia



Mannvit has more than a half century of experience harnessing high- and low temperature fields and has contributed to over **2000 MW** in geothermal energy projects undertaken in more than 30 countries.



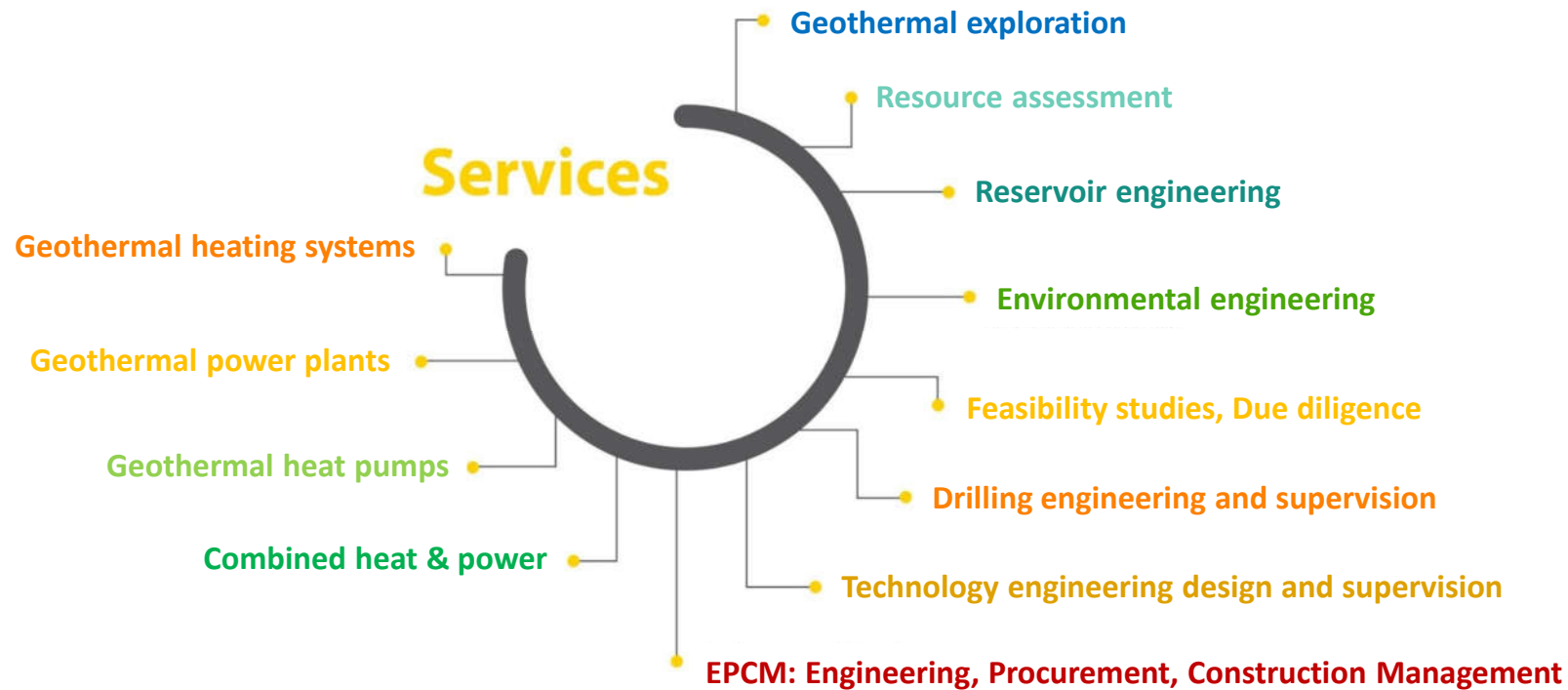


Consulting & Technical Service

—
Services in the fields of engineering, project management, geoscience, environmental studies, construction management and EPCM contracting.

Major markets are Europe, SE Asia and East Africa.

Over 50 years of experience in Geothermal energy





Sustainable Development Goals and Mannvit's role

„Create and support a sustainable society“ is Mannvit's role.

Mannvit works with 14 of the 17 United Nations' Sustainable Development Goals and our approach is to support projects with sustainability in mind.

ESG performance indicators can be found in Mannvit's Annual [Sustainability](#) Report.

The company's goal of Carbon neutrality was achieved in 2020. Carbon emissions the company is responsible for directly, were offset in cooperation with the Iceland Carbon Fund through planting of trees.



Mannvit Clients





Mannvit Kft.

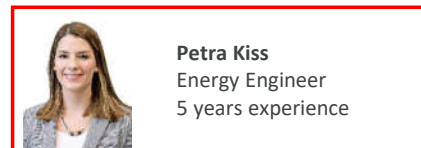
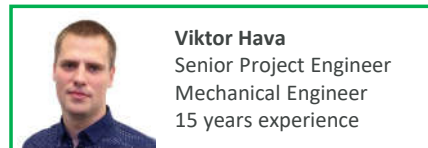
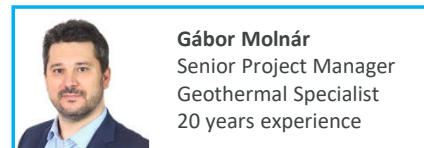
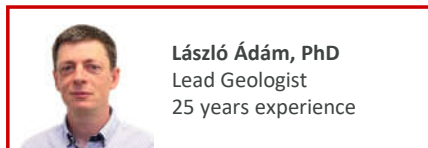
The Hungarian team



Creating and promoting a sustainable society

Hungarian Renewable Energy Team

Mannvit Hungarian team has the knowledge and experience to execute successful projects in the field of renewable energy



Experienced engineering team in renewable energy projects

- ✓ Project Manager, IPMA B
- ✓ Geologist, PhD
- ✓ Drilling Engineer, MSc
- ✓ Environmental Engineer, MSc
- ✓ Energy Engineer, MSc
- ✓ Mechanical Engineer, MSc
- ✓ Electrical Engineer, MSc
- ✓ Civil Engineer, MSc
- ✓ Procurement expert
- ✓ Licensing expert
- ✓ OSH specialist

Consulting Services for Developers

- Feasibility reports
- Field studies and hydrological services
 - Geotechnical, topographic and environmental, geodetic surveys, hydrological and more.
- Status reports and Due Diligence reports
- Technical planning and reports
- Engineering and EIA's
- Design and permitting
- Cost estimates at all project stages
- Time estimate and project schedules
- Risk analyses and mitigation program
- Construction management and commissioning
- Procurement and project management
- Project control, Quality control, Document control



International Co-operation

For the past decades, Mannvit has worked closely in Hungary and world-wide with developers, consulting firms and contractors – both in local and international projects.

With our offices and network stretching from Europe to Indonesia – we are able to offer consulting on a local and international levels.

Geothermal Energy

Direct Heat Utilization
Geothermal Heat Pumps
Electricity Production
Combined Heat Power



MANNVIT



Geothermal Energy is everywhere



Electricity Production

80 - 120 - ... °C



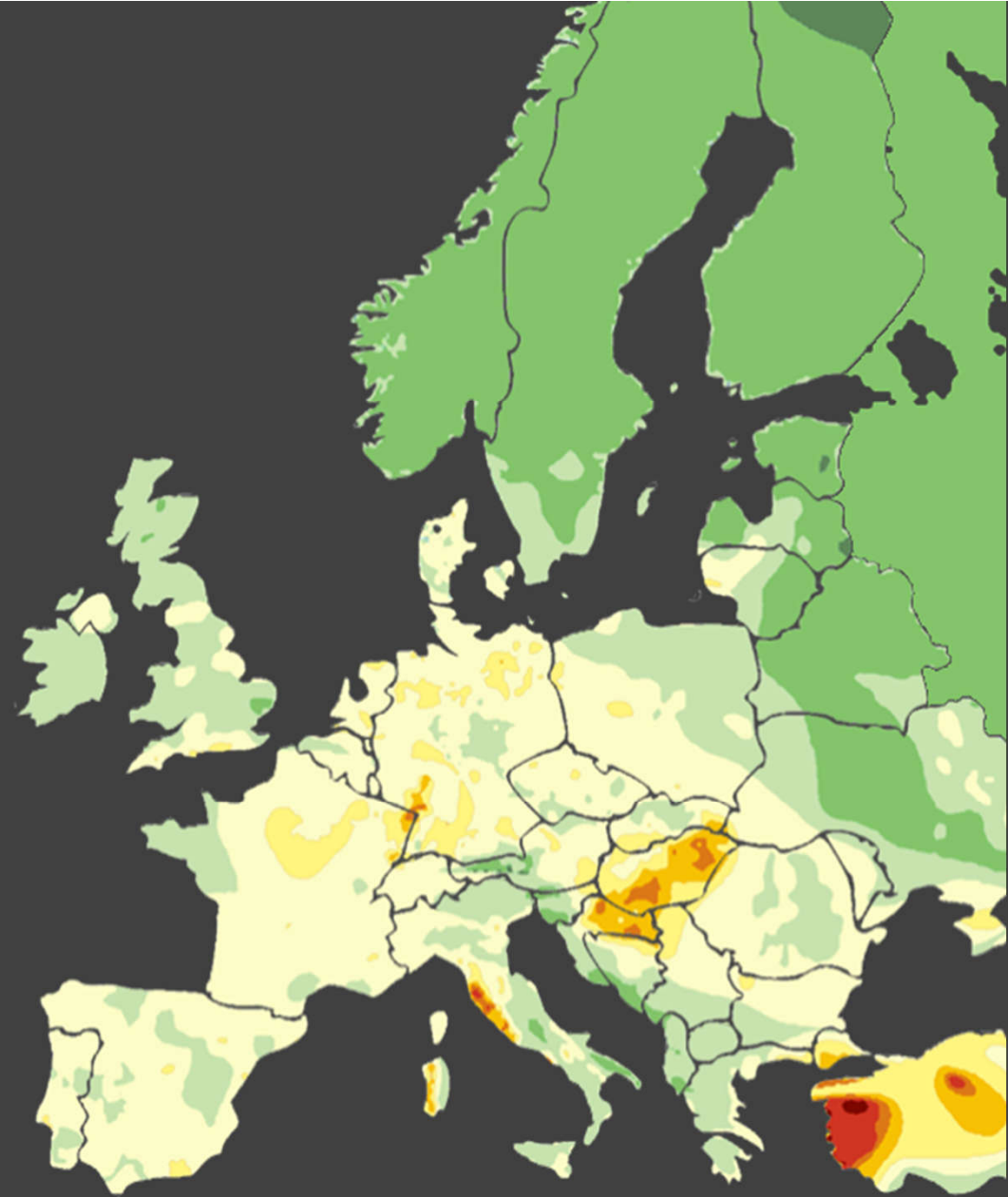
Geothermal Direct Heating

40 - 80 - 120 °C



Geothermal Heat Pumps

10 - 30 - 70 °C





Geothermal potential in Hungary



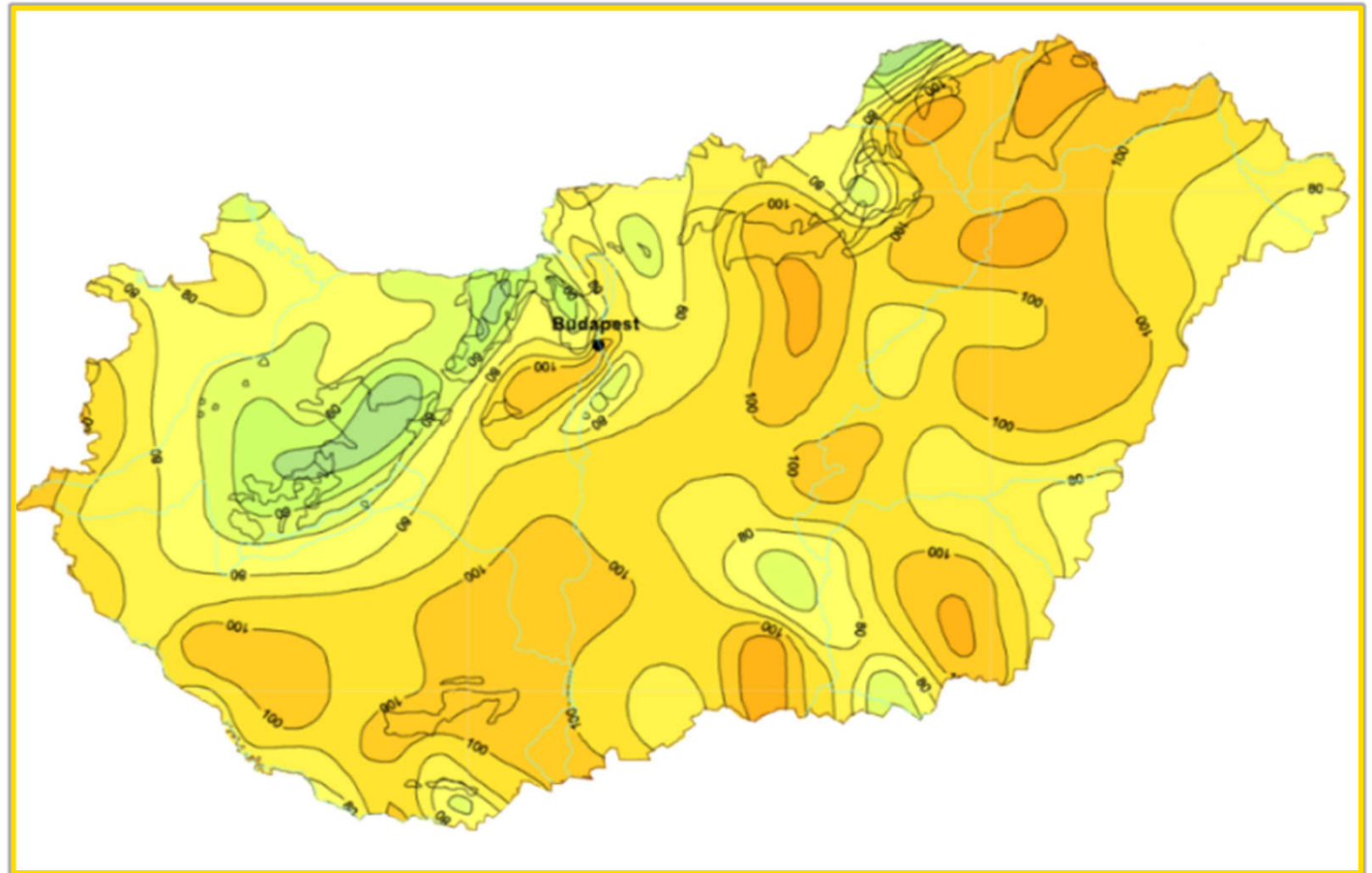
Geothermal temperature map at basement depth

Outstanding possibilities in
“medium” temperature range

- High heat flow
- High gradient ($^{\circ}\text{C}/\text{km}$)
- Water bearing rocks
- High amount of water

Typical temperatures:

- 40 – 80 $^{\circ}\text{C}$ almost everywhere
- 80 – 120 $^{\circ}\text{C}$ in several places
- 120 – 160 $^{\circ}\text{C}$ in certain places

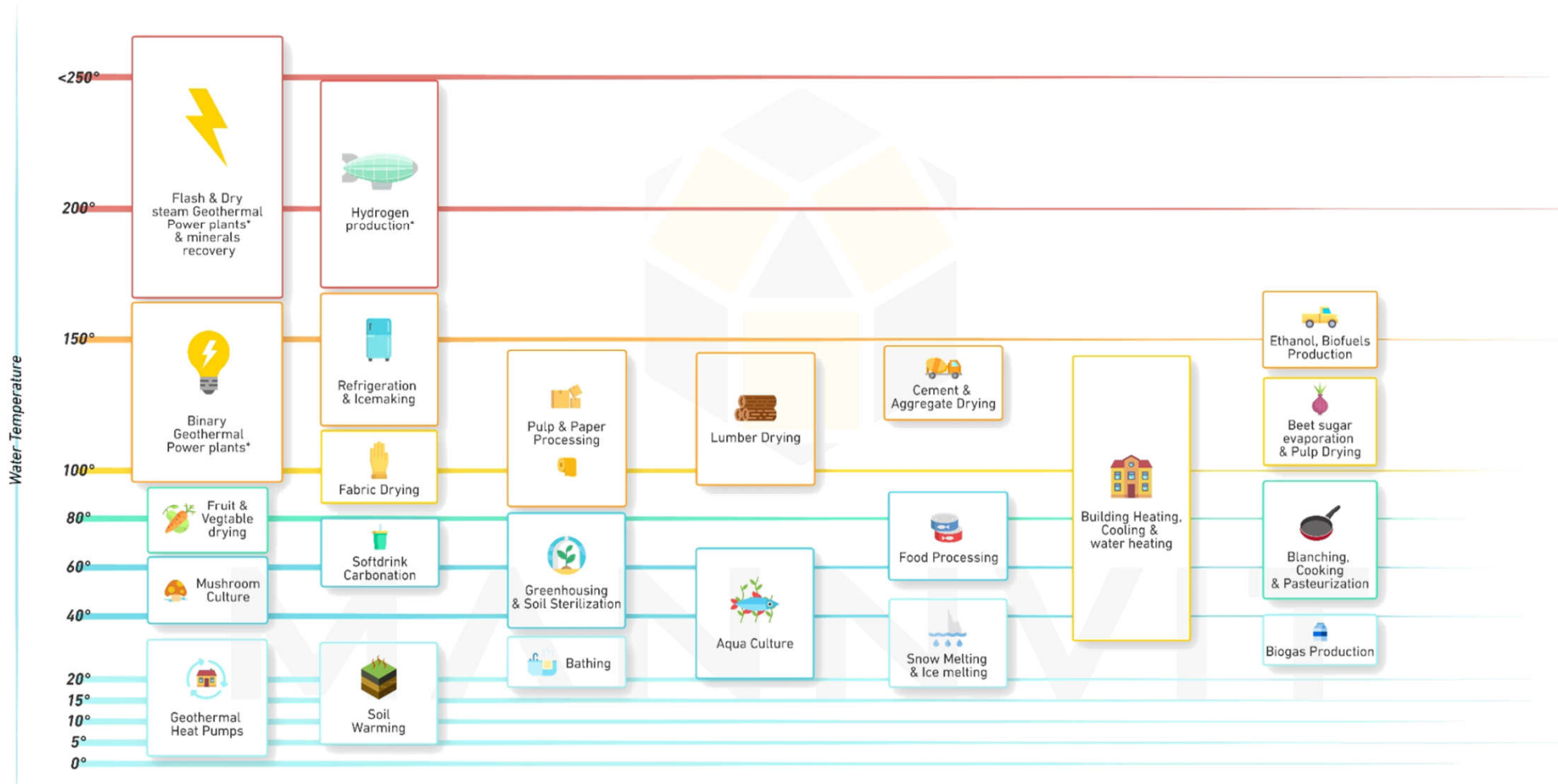




Geothermal Heat Utilization



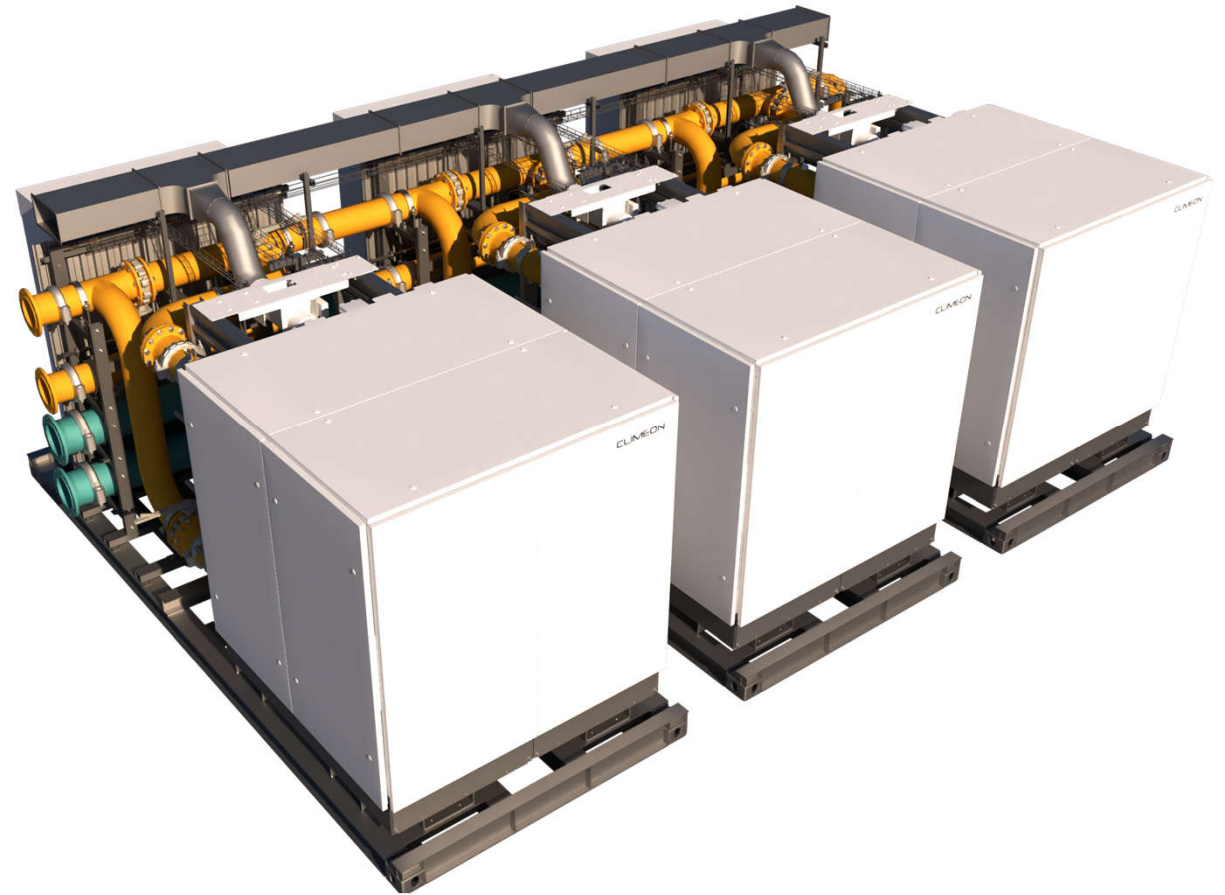
Lindal Diagram – Energy uses at different temperatures



Medium Temperature Power Plant

Electricity Production from heat

- Geothermal heat, industrial waste heat
- Medium enthalpy heat, 80 – 120 °C
- Organic Rankine Cycle (ORC)
- High efficiency
- Modular Units, scalable systems
- Plug and play
- Easy transport & maintenance
- Serial and parallel connection
- Flexible arrangement





Low Temperature Utilization

Geothermal Heat Pump

- Harvesting shallow thermal reservoirs
- Medium / low temperature resource, 20 – 80 °C
- Temperature boost by heat pump
- COP: 4.0 – 8.0
- Water discharge might be necessary

Direct Cooling

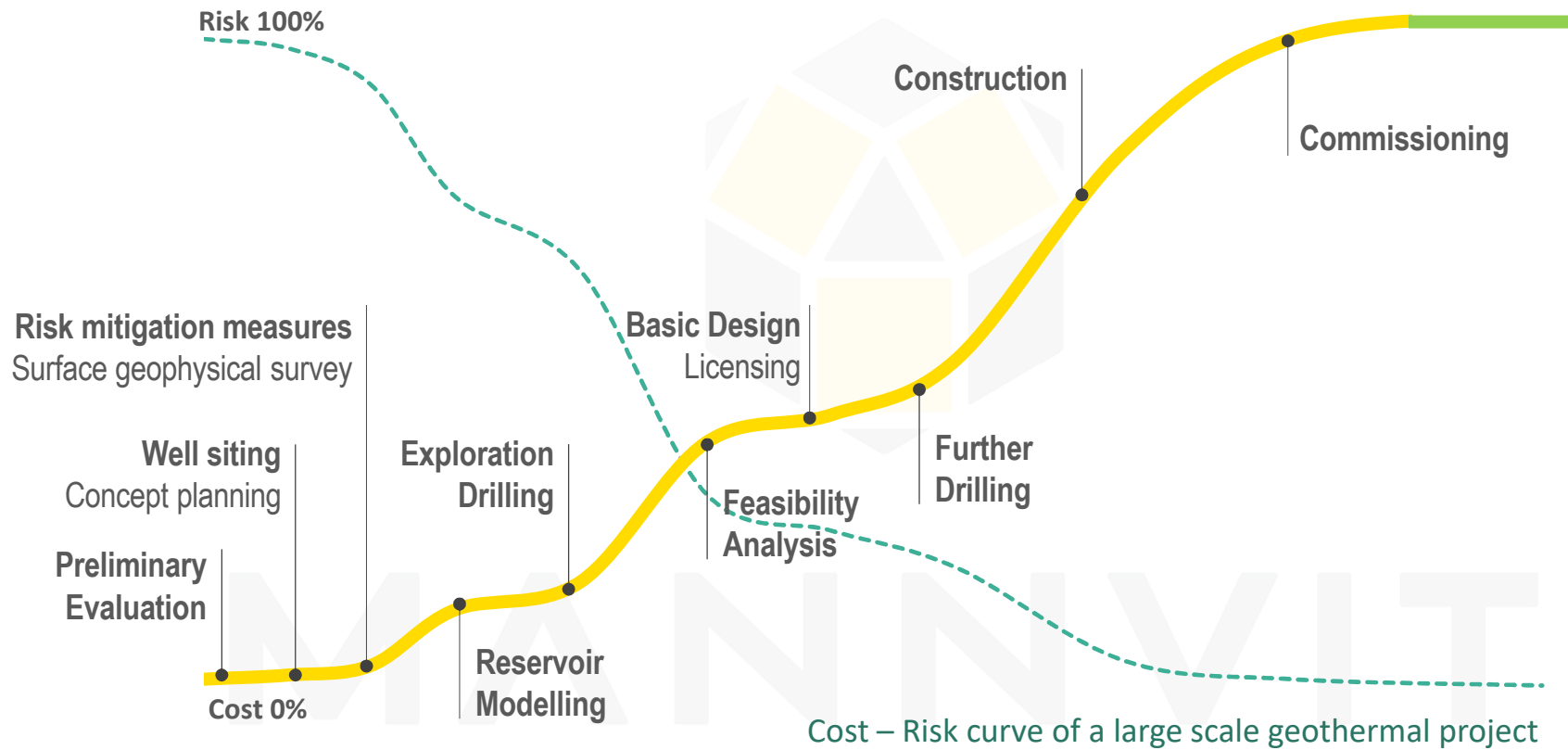
- Shallow wells, or nearby river
- Direct use of cold water, 5 – 15 °C
- Good efficiency cooling systems
- Water treatment might be necessary
- Water discharge might be necessary



Geothermal Project Development



Investment in geothermal is front-end loaded



Various Projects

Mannvit References

The Energy of nature

Geothermal Heat & Power Plant **300 MWe + 200 MWth** Hellisheidi

Overall plant design

Drilling engineering

Mechanical engineering

Project and construction management

Commissioning and start-up





Theistareykir Geothermal Power Plant 90 MWe

Period: 2011-2019

Lead design, Reservoir modelling, Well design, Drilling supervision.

Project management, tender & procurement docs, detail design, supervision mechanical installation, supervision assistance for control equipment installation, HV transmission lines & substations.

EIA of plant & transmission lines



7 AFFORDABLE AND CLEAN ENERGY



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Energy of nature

Tura Geothermal Power Plant 3 MWe + 7MWth

- Project management
- Design & Licensing
- Procurement
- Construction management
- Sire Supervision
- Commissioning

7 AFFORDABLE AND
CLEAN ENERGY



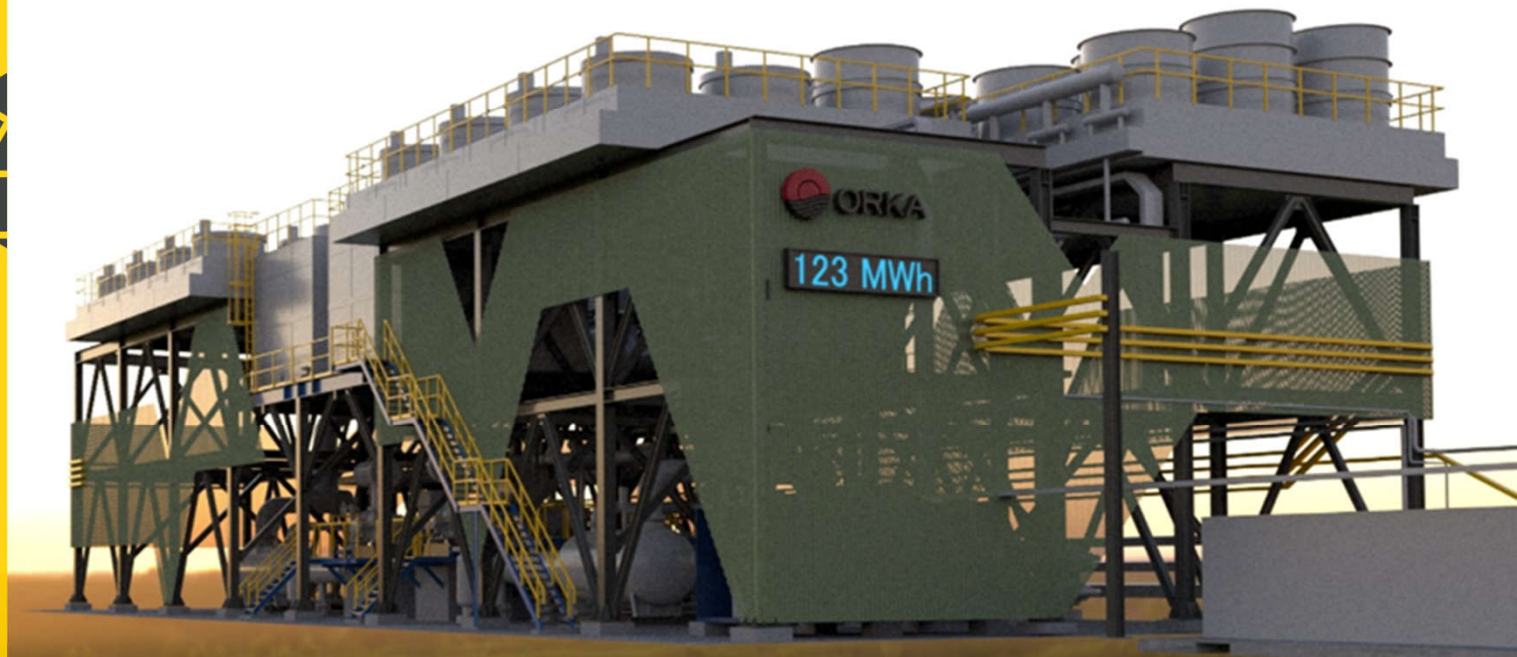
12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



13 CLIMATE
ACTION





Croatia

Velika Ciglena Geothermal Power Plant 17 MWe

Geothermal energy supply
Resource gathering system
Steam separator system
Re-injection system
Emergency release



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

13 CLIMATE ACTION

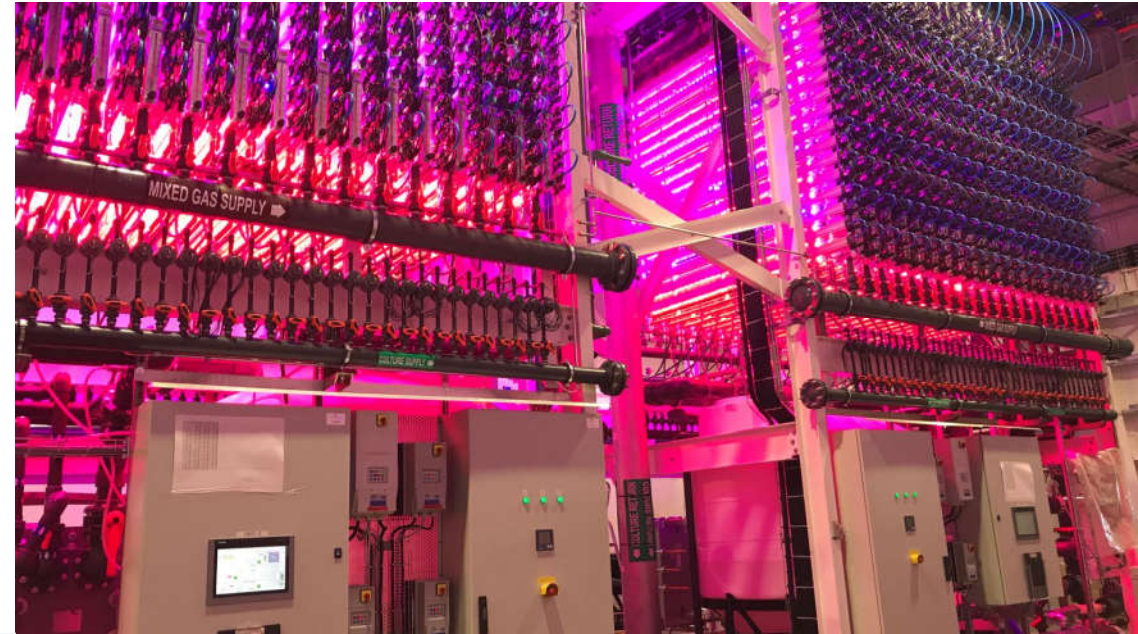


Vaxa Impact Nutrition

Micro-algae production.

CO₂, biomass, hot and cold water turned into feed stock protein and omega-3 supplements.

Project Management & Engineering



Hydrogen production station in Hellisheidi

700 kW Electrolyzer, design pressure 1000 bar.

Risk assessment, ATEX, Fire protection, Cost estimates.

Project management, Electrical connection design, Construction management.

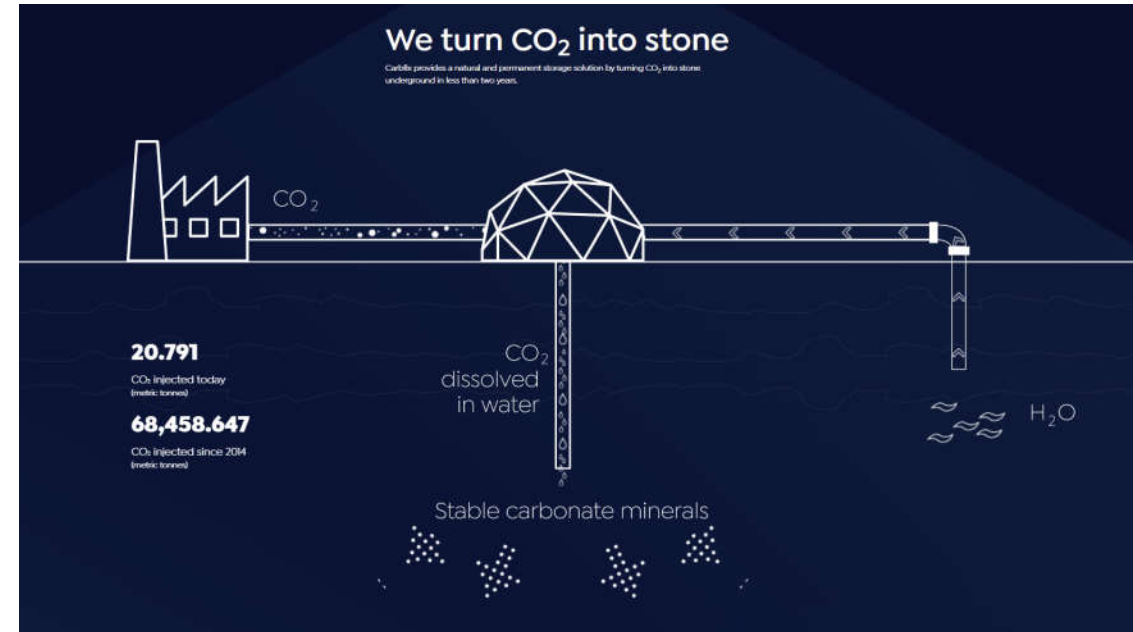




CarbFix

Carbon dioxide injection into bedrock, turning it into stone.

Engineering, Construction Supervision,
Design Coordination and Commissioning

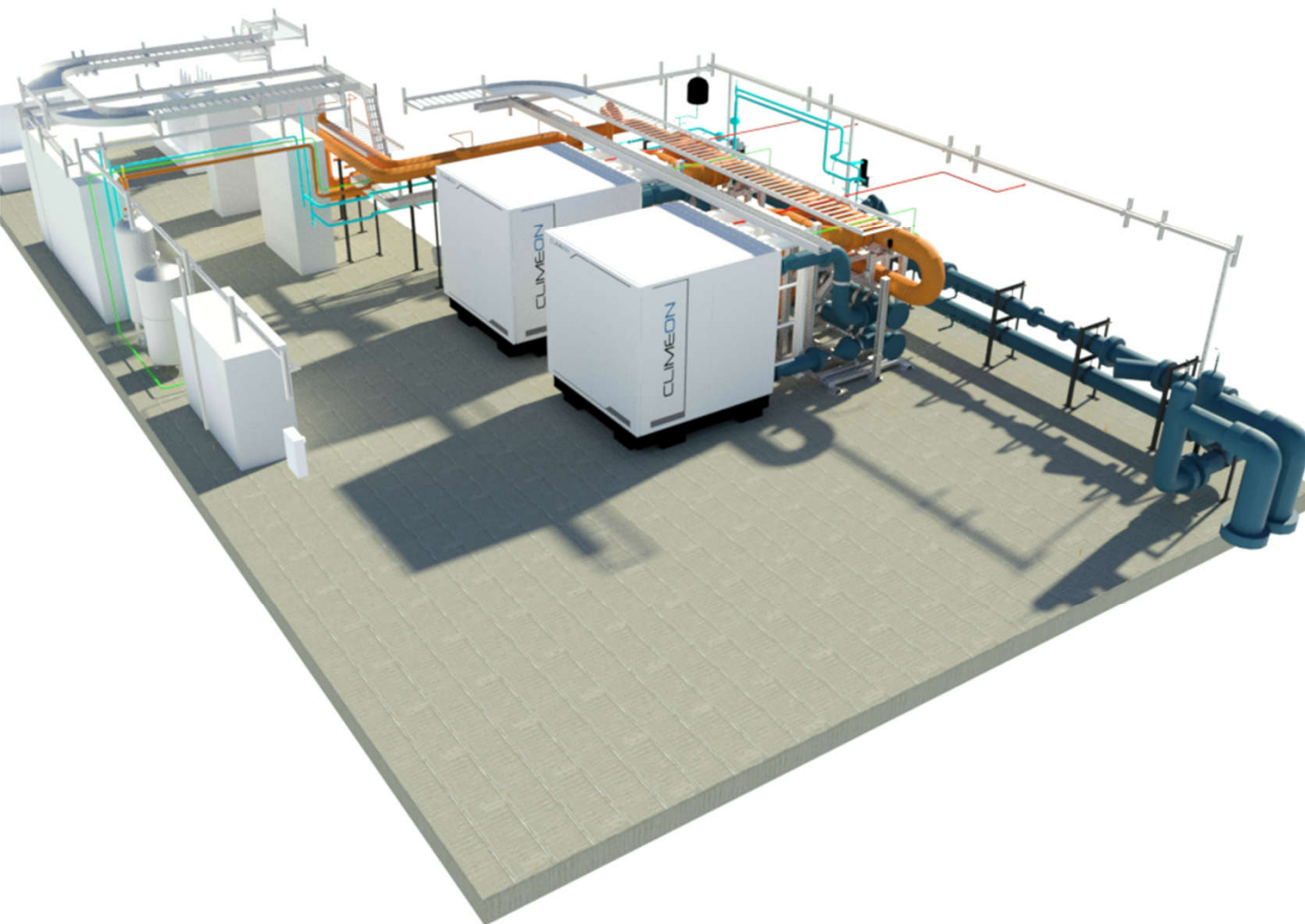


Climeworks Carbon Capture

Carbon dioxide removal using Climeworks' direct air capture technology. Phase 1 will capture 4000 tons of CO₂ per year.

Project Management, Design (building) and Procurement





Modular Geothermal power plant

Power generation, in addition to a heating system

300 kW, Low temperature geothermal power plant

- Geothermal technology
- Pressure equipment
- Cooling system
- Electrical system
- Connected facilities





Emmission free heating

District heating with geothermal energy

Project engineering

EPCM project management

Geology & Exploration

Well design, drilling supervision

Geothermal reservoir modelling

Licensing & permitting

Design & Procurement

Construction management



PV Plant & Substation 5 MW-250 MW

Electrical, civil, structural and HVAC design

substations and grid connection of photovoltaic plants

Design and due diligence

7 AFFORDABLE AND CLEAN ENERGY



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



13 CLIMATE ACTION





District heating

Geothermal Heating of Budapest

10-200 MW_{th}

Preparation of geothermal heat supply to the heating network in Budapest.

Geological exploration

Hydrogeological modelling

Detail design

Supervision



Utilization possibilities of abandoned hydrocarbon wells, Hungary

Mannvit in cooperation with BVH (Mining Asset Management Company) prepared comprehensive database about abandoned hydrocarbon wells appropriate for geothermal utilization in Hungary.

Mannvit and BVH are working hand in hand to utilize this hidden geothermal treasure.





Complex Renewable Solutions

Locally available renewable energy sources

Integrated energy studies

Energy optimization

Alternative energy supply

Sustainable operation

CO₂ emission reduction



Geothermal energy

Automotive and connected Industry

Heating & Cooling

Green Electricity

CO₂ emission free energy

Heat pump solutions

Studies & Exploration

Design & Execution

7 AFFORDABLE AND CLEAN ENERGY



12 RESPONSIBLE CONSUMPTION AND PRODUCTION

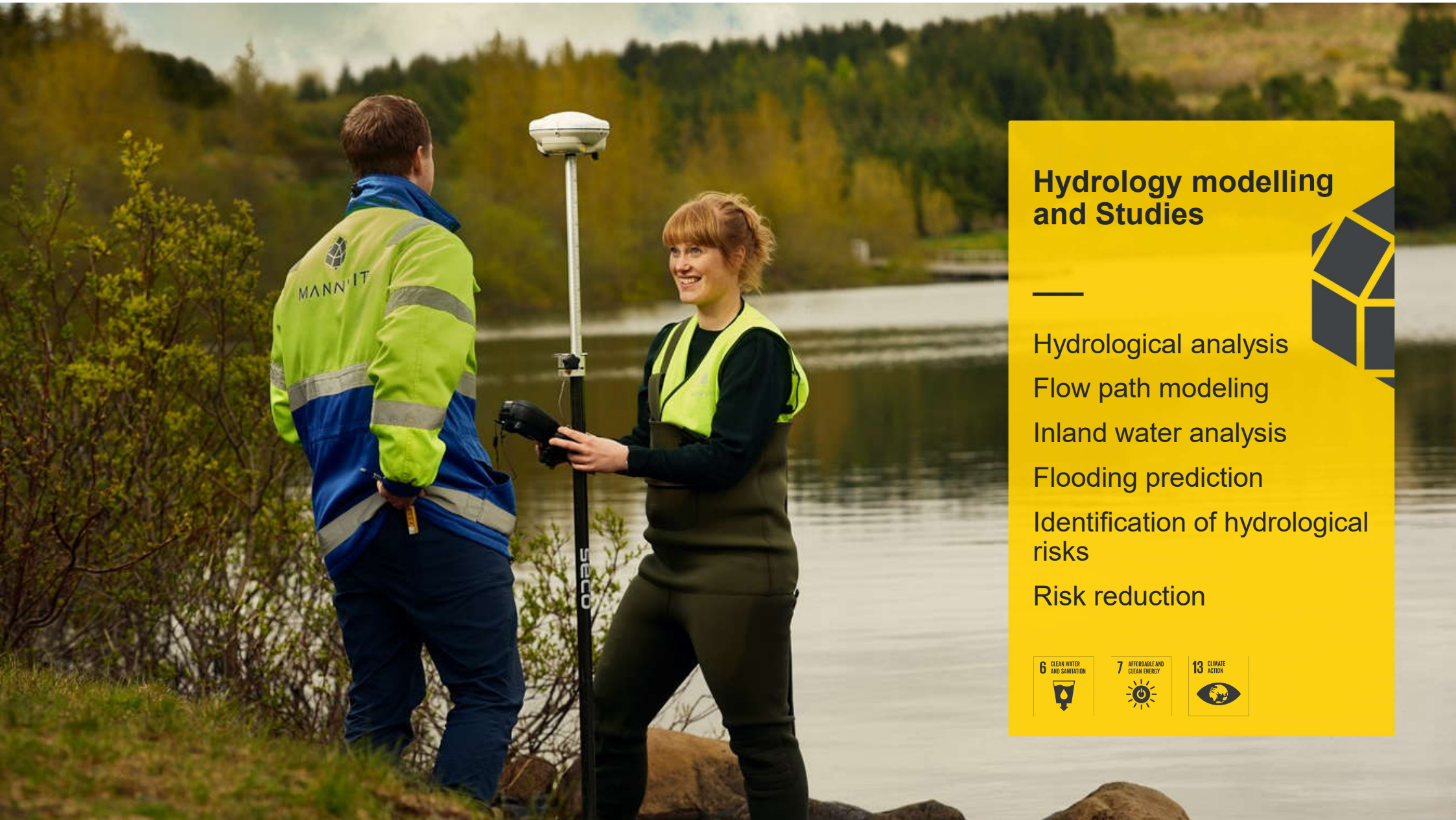


9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



13 CLIMATE ACTION





Hydrology modelling and Studies

Hydrological analysis

Flow path modeling

Inland water analysis

Flooding prediction

Identification of hydrological risks

Risk reduction



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