Mannvit, geothermal activity in central Europe

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Vatnaskil
Land & Water Resource Consultants Ltd

Mannvit at a glance

An international consultancy offering a wide range of services in the fields of engineering, project management, geoscience, environmental studies, IT, construction material research and EPCM contracting.

- Founded in 1963.
- Employee-owned by over 100 shareholders
- Turnover in 2016: €45 million
- Management Systems certified:
  ISO 9001, ISO 14001, OHSAS 18001

Mannvit in Europe

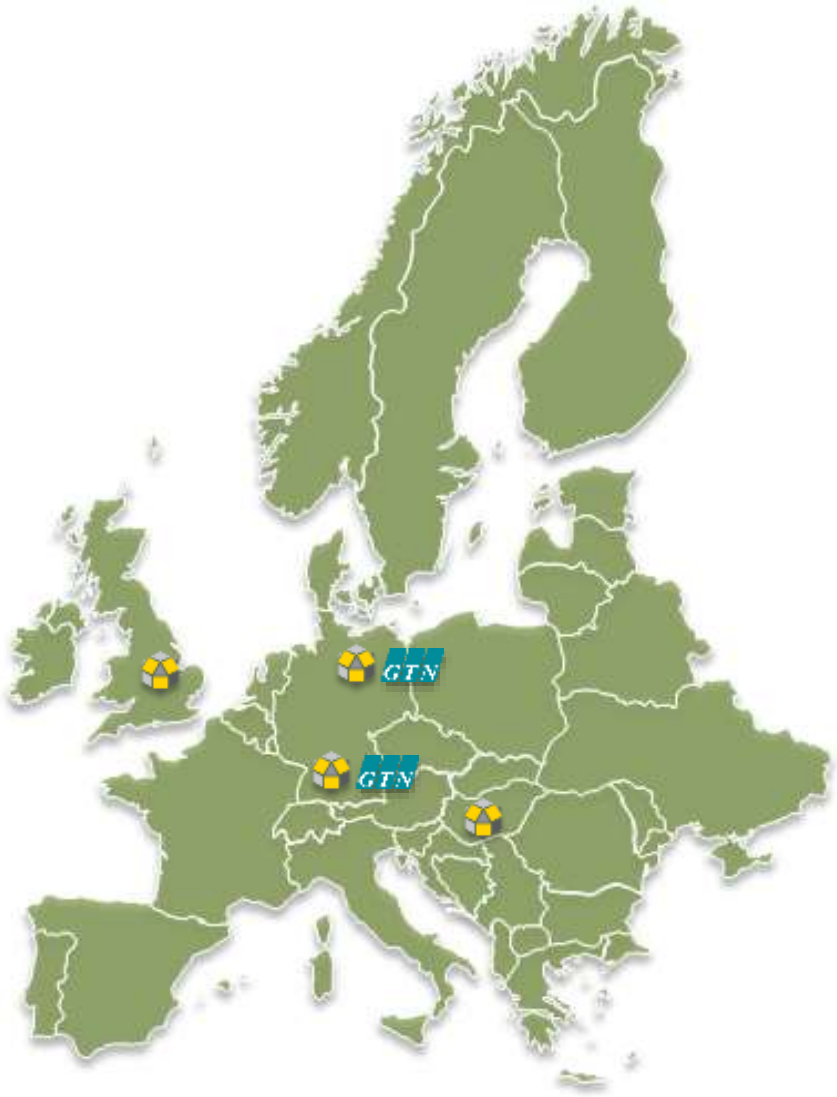
GTN

- Founded 1991
- Majority owned by Mannvit GmbH
- Employees 20
- Offices in Germany:
  - Neubrandenburg
  - Berlin
  - Unterhaching
- Turnover in 2016 1.7 million €

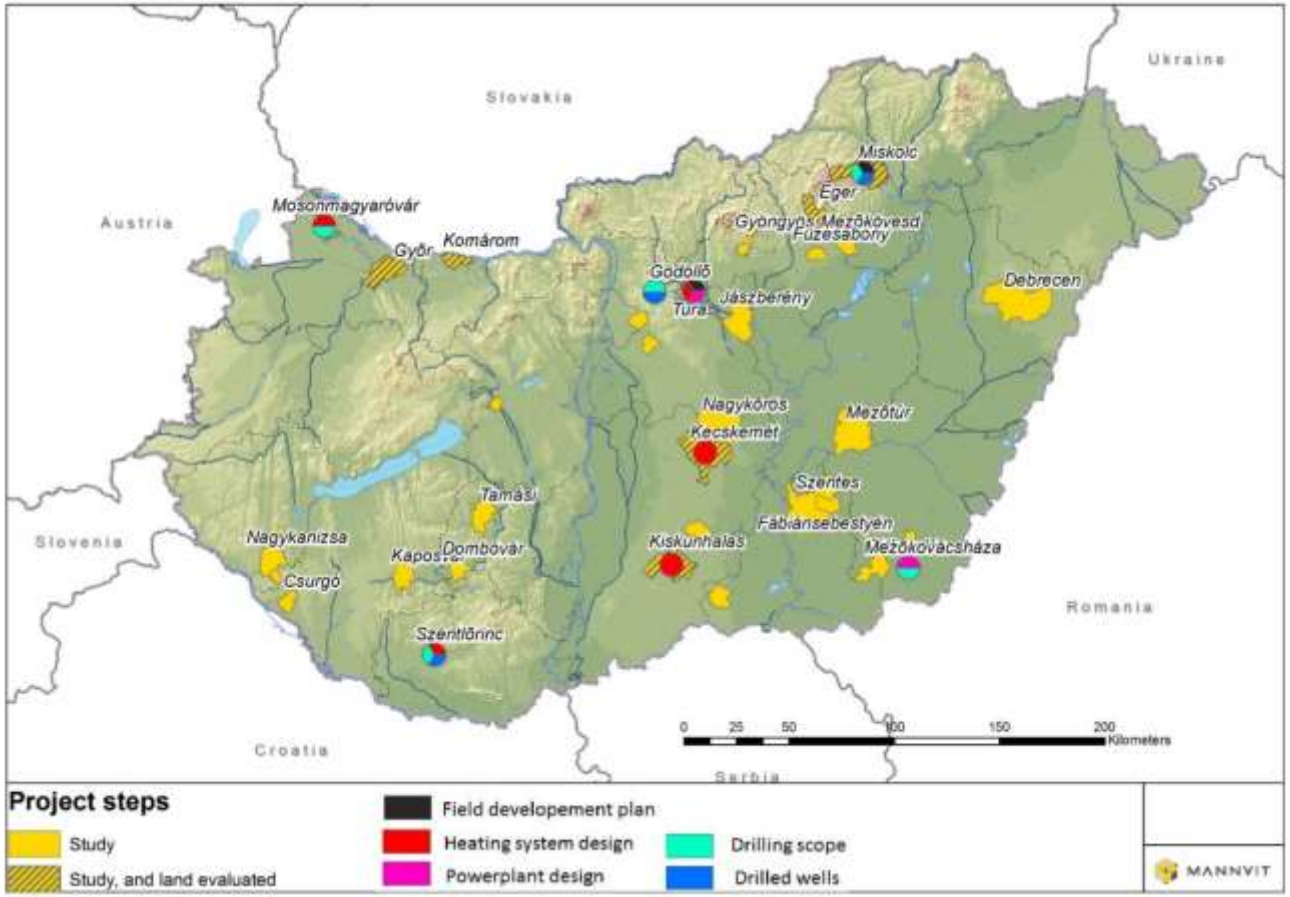
Mannvit Kft

- Founded 2007
- Owned by Mannvit hf
- Employees 23
- Office in Budapest
- Turnover in 2016 1.6 million €

Certified: ISO 9001, ISO 14001, OHSAS 18001



Projects in Hungary



District Heating Hungary

Szentlőrinc, Hungary

Geothermal District Heating Plant

Size:	3,2 MW
Year:	2007 - 2010

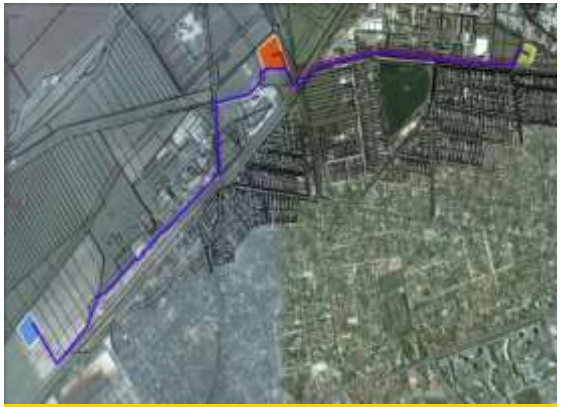
Role:
Geological and geophysical studies
Licensing and permitting
Well siting, design and testing
Drilling supervision
Reservoir modeling
EPCm - contractor

Miskolc, Hungary

Geothermal Exploration for heating purposes

Size:	55 MWth
Year:	2008 - 2011

Role:
Geological and geophysical studies
Licensing and Permitting
Field Development Plan
Well design and testing
Reservoir modeling
Environmental modeling
Drilling consultancy



Mosonmagyaróvár, Hungary

Geothermal Heat Plant

Size:	7,6 MWth
Year:	2012 - ongoing

Role:
Geological and geophysical studies
Licensing and permitting
Well siting, design and testing
Drilling supervision
Reservoir modeling
EPCm - contractor

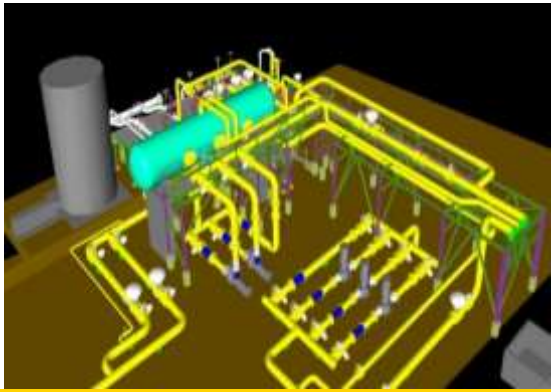
Combined heat and power

Tura, Hungary

Geothermal CHP Plant

Size:	3 MWe, 7 MWth
Year:	2016 - ongoing

Role:
Geological and geophysical studies
Field development plan
Licensing and permitting
Well testing
EPCm - contractor



Velika Ciglena, Croatia

Geothermal Power Plant

Size:	10 MWe
Year:	2015 - ongoing

Role:
Participation in the Basic- and detailed design of the geothermal part.

Germany

Berlin Palace, Germany

Geothermal Power heating and cooling system

Year: 2015-2019

Role:
Planning and construction site management for the entire heat and cold generation and distribution systems of this project.

Unterhaching, Germany

Geothermal heat & power plant

Year: 2003 - 2016

Size: 38 MWth - 3,36 MWe

Role:
Engineering, tendering, construction support of Drilling engineering, Geology, Thermal loop and Monitoring

Neustadt-Glewe Germany

Geothermal heating plant

Year: 1993 - 1995

Size: 10,7 MW

Role:
Feasibilty study
Licensing
Design, tendering and supervision

European Project Examples

Poland and the Baltic

Geothermal exploration	
Lativa	• Dobele • Liepāja
Lithuania	• Klaipėda • Šilutė • Vilkaviškis • Vydmantai
Poland	• Skierniewice • Stargard Szczeciński • Szczecin • Torun • Wroclaw

Poland and the Baltic

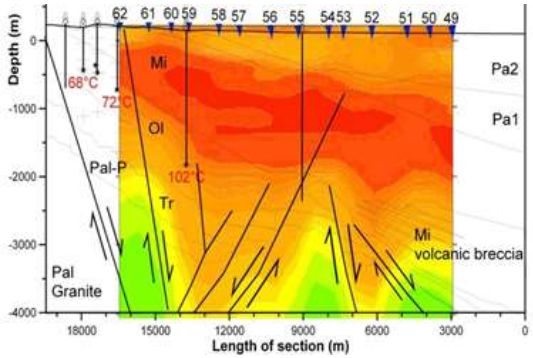
Geothermal exploration	
Year	• 2000 - ongoing
Role	• Feasibility studies • Due diligence • Re-injection • Workover and testing of existing wells.

Serbia

Promotion of Renewable Energy Sources and Energy Efficiency	
Year	• 2011 - 2012
Role	• Mapping of CHP and Geothermal potential in Serbia, evaluating geothermal potential on a nation wide scale.

Reservoir exploitation

- Well siting



Geological layers targeted

- Fractured crystalline rocks
- Fractured carbonate rocks
- Sandstone layers
- Lavas and volcanic sediments

✓ Total of 59 geothermal wells planned (excl.Iceland), sited and designed in 25 different projects in 4 countries. Depth of wells 1.100 - 3.800 m.

✓ Total of 49 wells drilled whereof;

- ✓ 47 deliver the expected flow rate and temperature. Two wells un-successful.

✓ **Success rate** high compared to statistics

MANNVIT

Mannvit
Geothermal Exploration Team

CONSULTING ENGINEERS VATNASKIL

Vatnaskil
Land & Water Resource Consultants Ltd

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MANNVIT HUNGARY

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LINDAL DIAGRAM

GEOTHERMAL ENERGY USES AT DIFFERENT TEMPERATURES

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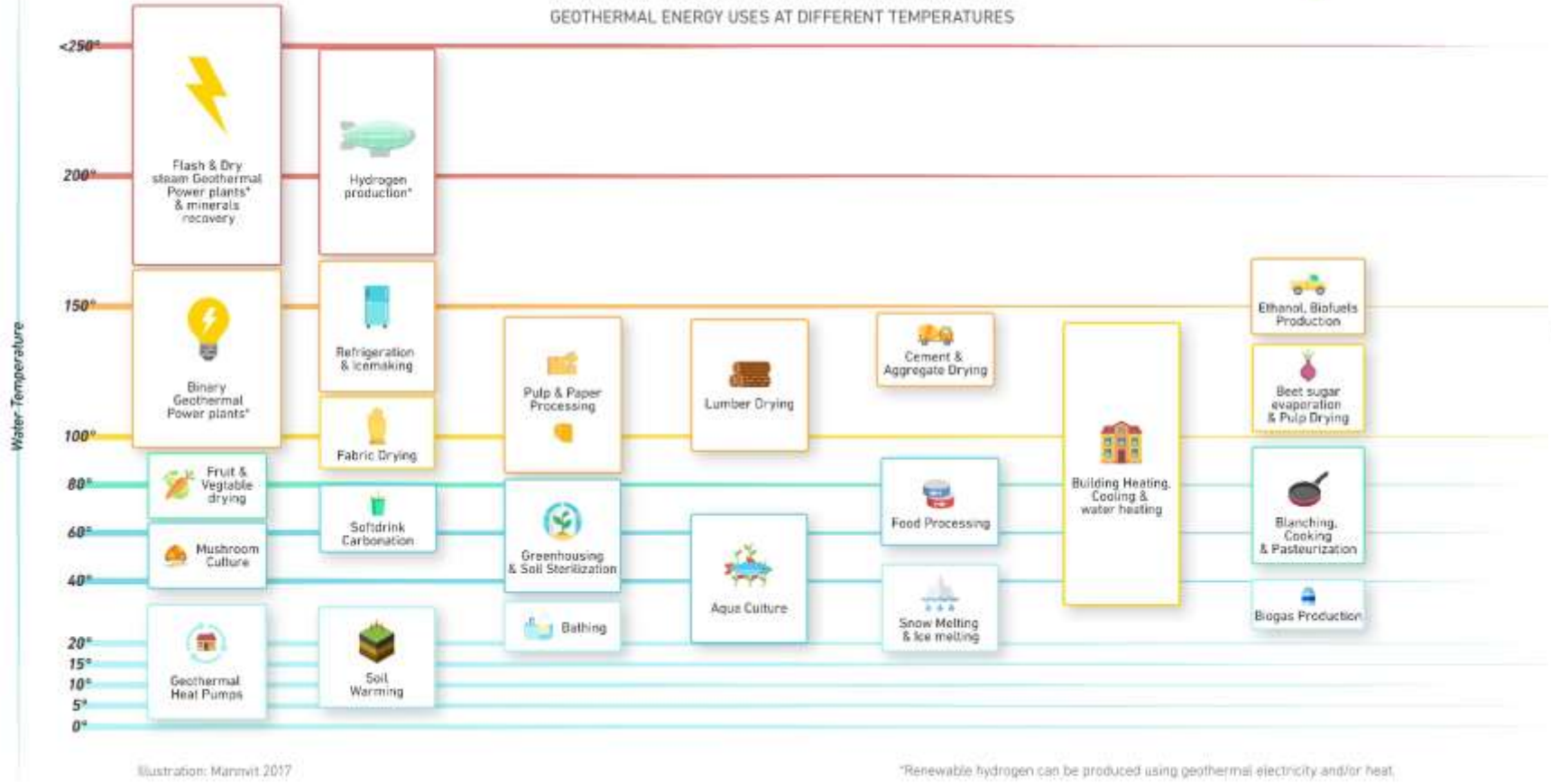

Illustration: Mannvit 2017

*Renewable hydrogen can be produced using geothermal electricity and/or heat.