The Projekt GRAME - One Step towards our 2040 Vision of 100% Renewable District Heating in Munich

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Contents

- SWM Energy
- 2040 Munich District Heat Vision
- The Project GRAME
- 3 D Seismic Munich South
SWM Business Units

- Power (Production, Distribution, Sales)
- District Heating (Production, Distribution, Sales)
- Gas (Distribution, Sales, Exploration)
- Water (Production, Distribution, Sales)
- Public Swimming Pools (Indoor, Outdoor, Saunas, Ice Skating)
- Mobility (MVG: Metro, Tram, Bus)
- Telecommunication (Networks, Sales, M-Net)
The vision for SWM’s district heating system **fully renewable** from 2040

To achieve this vision, SWM aims at the continuous development of deep **geothermal** resources
Geothermal – M-Energy Geological Conditions

Malm
Thermal Water Reservoir
Fractures, Karst, Facies

100 °C
140 °C
93 °C
65 °C
35 °C
Energy Supply SWM
Project GRAME

„Ganzheitlich optimierte und nachhaltige Reservoirerschließung für tiefengeothermische Anlagen im bayerischen Molassebecken
- Entwicklung eines 50 MWe Kraftwerks und Erschließung von 400 MWth für die Fernwärme in München“

Optimized and Sustainable Reservoir Development for Deep Geothermal Plants in the Bavarian Molasse Basin
- Design of a 50 MWe Powerplant and Development of 400 MWth for the Munich District Heating
GRAME Topics

- Development Concept of 400 MWth
- Reservoir Drilling and Engineering
- Standard Well Design
- 3D Seismic Survey
- Geothermal District Heating Model
Participants in GRAME

- SWM Services GmbH
  - Coordinator GRAME
  - Project Conception
  - Project Realisation

- Erdwerk GmbH
  - Geological Modeling
  - Seismic Interpretation
  - Reservoir Modeling

- Chair of Energy Systems
  - Innovative Plants
  - Net Connection Geothermal
  - Energetic Calculations

- LIAG Leibniz Institute for Applied Geophysics
  - Physical Methods
  - Probability of Success Studies
  - Large Scale Modeling
Timetable

Year 1  2015
Geological Models
Concepts and Simulations
Innovative Technologies
Public Relations

Year 2  2016
3 D Seismic Data Acquisition
Processing and Interpretation
3 D Modeling
Innovative Technologies

Year 3  2017
True Reservoir Model
Development Design
Geothermal District
Heating Model
1. SWM Seismic Surveys Munich
   - 2 D Line Length = 200 km
   - 3 D Survey Area = 20 km²

2. SWM Seismic Survey GRAME 2015
   - 3 D Survey Area = 170 km²
Seismic Campaign 2015-2016

<table>
<thead>
<tr>
<th>Surveys</th>
<th>Parameters</th>
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<tbody>
<tr>
<td>3 D Seismic</td>
<td>170 km², 7587 Vibro Points, 35 Vibro Lines, Line Spacing 400 m in the Northwest, 500 m in the Southeast</td>
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<tr>
<td>2 D Seismic</td>
<td>4 Lines of 6 km, Distance of Vibro Points 50 m</td>
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<tr>
<td>Sheawave experiment</td>
<td>35 Vibro Points, 4 Vibro-Trucks, Distance of Vibro Points 500 m</td>
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<tr>
<td>Check-Shot-Surveys</td>
<td>In the Riem Th1 and Freiham Th1 Wells, Distance of Measurement Points 25 m, 130 Depth Levels, one external Vibro-Truck</td>
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Project Development
Thanks for your attention!