Geothermal energy in urban environments
How Geological Surveys can provide information needed to make geothermal investments and governance decisions

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- EuroGeoSurveys and the “Geothermal Decade” 2021 - 2030

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Why managing shallow geothermal in urban areas?

(1) Increasing Urbanization in Europe

Degree of Urbanization

<table>
<thead>
<tr>
<th>Region</th>
<th>Percent of total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>50</td>
</tr>
<tr>
<td>Europe</td>
<td>80</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>75</td>
</tr>
<tr>
<td>Northern Europe</td>
<td>85</td>
</tr>
<tr>
<td>Southern Europe</td>
<td>75</td>
</tr>
<tr>
<td>Western Europe</td>
<td>75</td>
</tr>
</tbody>
</table>

... towards 84% in 2050
Why talking about managing shallow geothermal energy in urban areas?

(1) Increasing Urbanization in Europe

(2) Urban transition concerning energy, climate, environment, social inclusion
Why talking about managing shallow geothermal energy in urban areas?

(1) Urbanization is continuously increasing in Europe...
(2) Urban transition concerning energy, climate, environment, social inclusion
(3) Increased stress on the subsurface!

Colored mean annual air temperatures for Vienna (1961: 10.8 C, 2018: 13.8 C)

**Urban Subsurface Heat Islands**

**Interfering utilization of the shallow subsurface**

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Why talking about managing shallow geothermal energy in urban areas?

(1) Urbanization is continuously increasing in Europe...
(2) Demanding an urban transition concerning energy, climate, environment, social inclusion...
(3) Increased stress on the subsurface
(4) Shallow geothermal – a developing, dynamic market

Figures based on the EGEC Geothermal market report 2019 (© EGEC, 2020)

- **Sweden**: 12% of households use SGE!
- Market depend on energy BCs – dynamics!
- Integrative management approaches needed at a certain critical diffusion level

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Why talking about managing shallow geothermal energy in urban areas?

1. Urbanization is continuously increasing in Europe...
2. Demanding an urban transition concerning energy, climate, environment, social inclusion...
3. Increased stress on the subsurface
4. Shallow geothermal – a developing, dynamic market

From single family home use… … towards G5 DHC
Management dilemmas and their implications

(1) First come first served vs. prioritization of use
The first interest claimed is ≠ the most meaningful but the simplest way of governance!

(2) Linear governance procedures vs. consideration of summation effects
Static governance models leading to low efficiency of subsurface use
Lack of data on the subsurface
Management dilemmas and their implications

(3) Promoting the use of RES vs. environmental protection
   Rigid thresholds for operation
   Lack of capitalizing synergies
   Reluctant authorities

(4) Antiquated procedures vs. new technological developments
   Most countries do not acknowledge shallow geothermal as an energy source
   Storage and large scale uses become more important
Management goals

• High system efficiencies
• High system sustainability
• Reduction of legal barriers
• Efficient use of the urban subsurface
• Minimum environmental impact
• High degree of flexibility and adaptability
• Access to data for decision making

Individual interests

Community interests
Integrative management approaches – a way forward

**Characteristics**

- Cycled procedures
- Bidirectional & continuous information exchange
- Web based information systems
- Link to spatial, environmental & energy planning instruments

**Data management?**
**Financing / available resources?**
**Competences?**

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The role of GSOs on the process

**National Geological Survey Organisations**

- Data assessment & expertise
- Communication
- Consultation
- (Regulation)

**Added value**

- Pooling and transferring expertise
- Addressing trans-national issues
- A joint data infrastructure
- Enhance the impact of national GSOs
- Consult EU organisations

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GeoERA MUSE: Managing Urban Shallow Geothermal

MUSE is one of 15 GeoERA (ERA-NET Co-Fund Action of 45 European GSOs) projects

- 16 Geological Survey Organisations
- 01.07.2018 – 30.09.2021
- Budget total: € 1,313,260
  In-kind total: € 923,238

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Introducing urban shallow geothermal into the portfolio of EuroGeoSurveys

Catalogue of parameters and methods for resource and conflict of use assessment

Prototype of joint 2D web information system (EGDI)

Governance & strategy analyses

Sustainable management approaches

Technical standards outside of scope

Development and testing of concepts

Good practices & joint quality criteria

The cycled integrative management approach

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What will be after MUSE?

10/2021 End of MUSE

EGDI web information system & KR prototype

Expand catalogue of concepts

Connect novel management concepts to governance

2022 Start of H-EU CSA – Geological Service for Europe

Integrate data from previous international projects to EGDI

Ext padded EGDI web information system & KR

2026 End of CSA

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Thank you for your interest in MUSE!

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