



GeoERA MUSE - Managing Urban Shallow geothermal Energy

(from the perspective of Geological Survey Organizations)

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Geological survey of Austria

Online presentation DGK, 11.11.2020



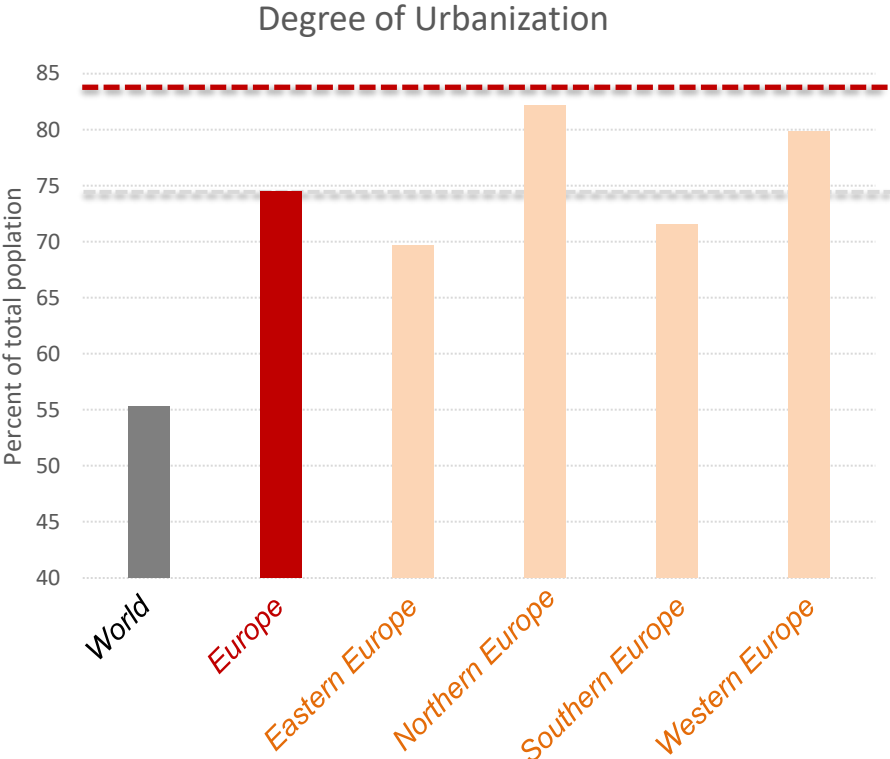
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Why talking about managing shallow geothermal energy in urban areas?

(1) Urbanization is continuously increasing in Europe...

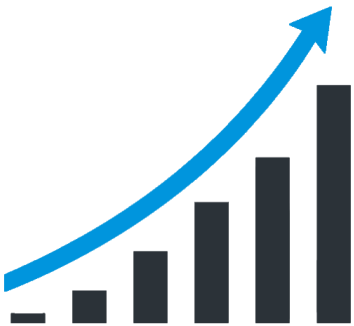


United Nations
Population Division
Department of Economic and Social Affairs

World Urbanization Prospects: The 2018 Revision
File 1: Population of Urban and Rural Areas at Mid-Year (thousands) and Percentage Urban, 2018

POPDBNUPRev 201811F01
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Suggested citation: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

... towards 84% in 2050



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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...

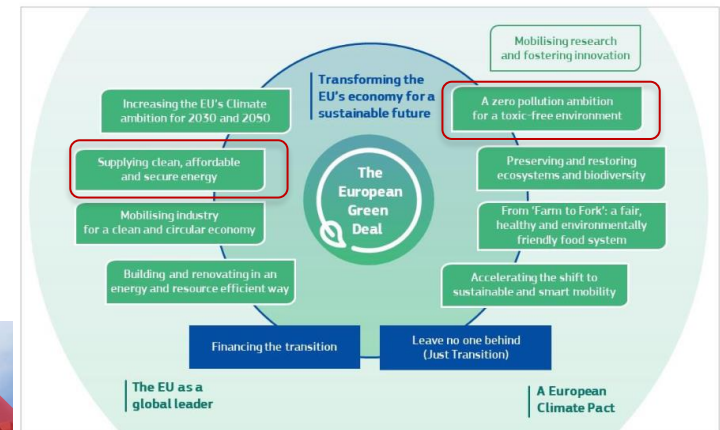
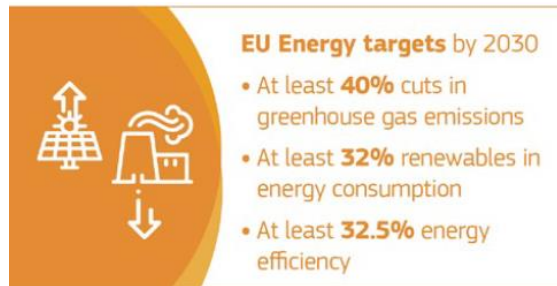


Figure 1: The European Green Deal



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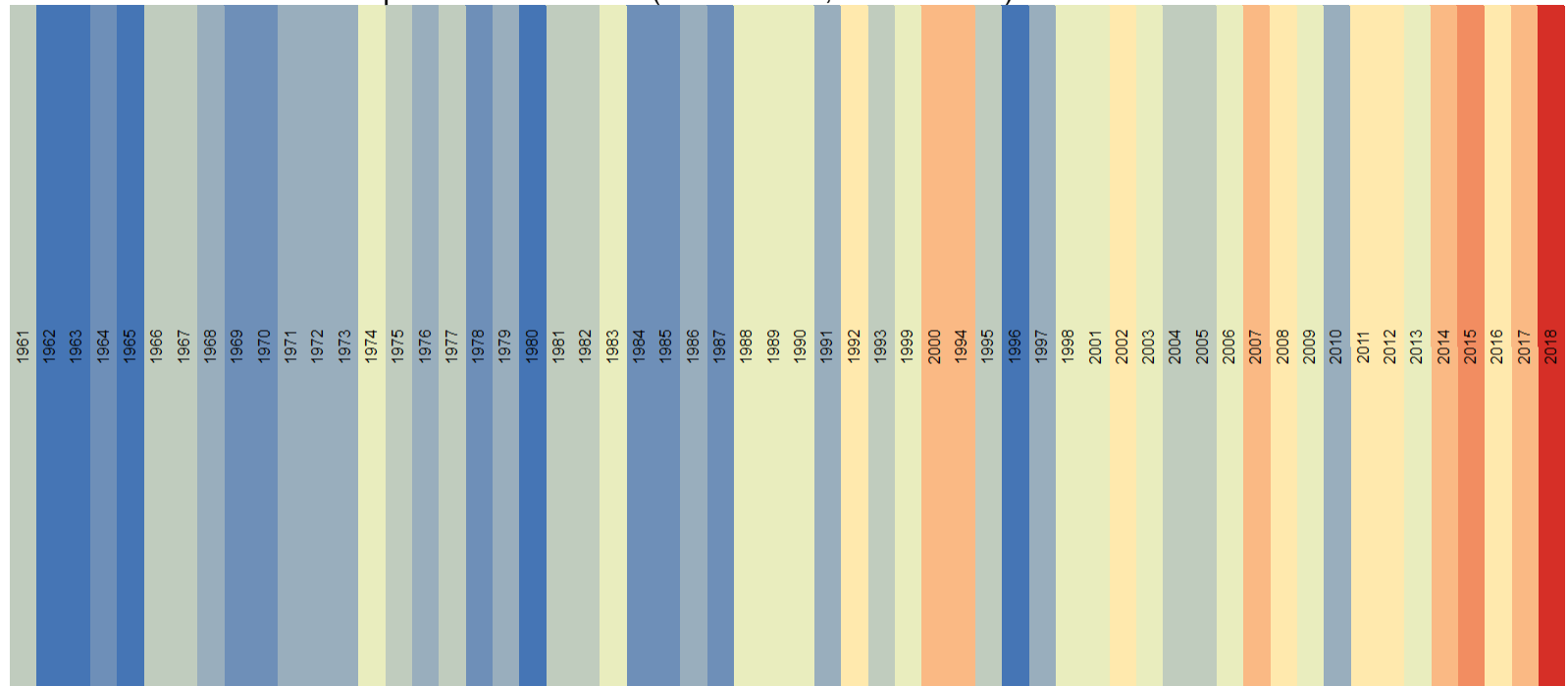


Why talking about managing shallow geothermal energy in urban areas?



- (1) Urbanization is continuously increasing in Europe...
- (2) Demanding an urban transition concerning energy, climate, environment, social inclusion...
- (3) Increasing the stress on the subsurface...

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



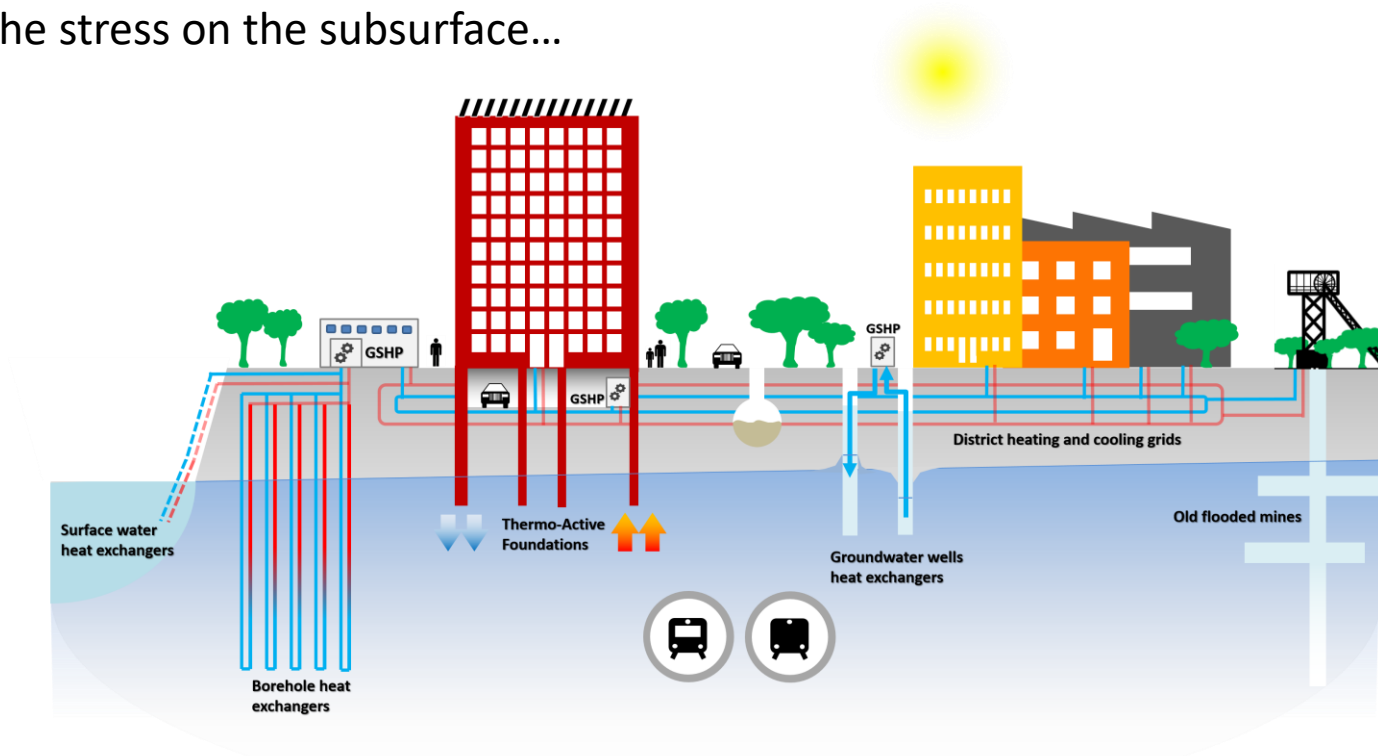
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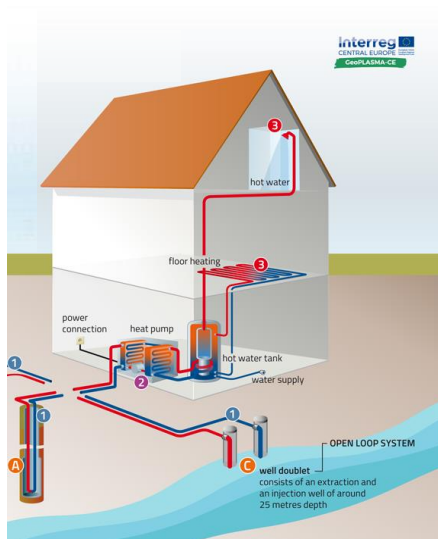


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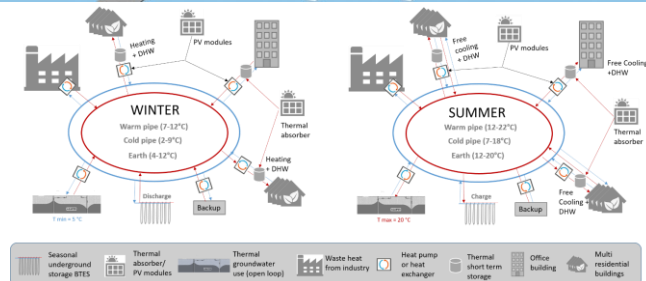


- (1) Urbanization is continuously increasing in Europe...
- (2) Demanding an urban transition concerning energy, climate, environment, social inclusion...
- (3) Increasing the stress on the subsurface...
- (4) Offering opportunities for shallow geothermal to leave a niche with new concepts...

From single family home use...



... towards DHC



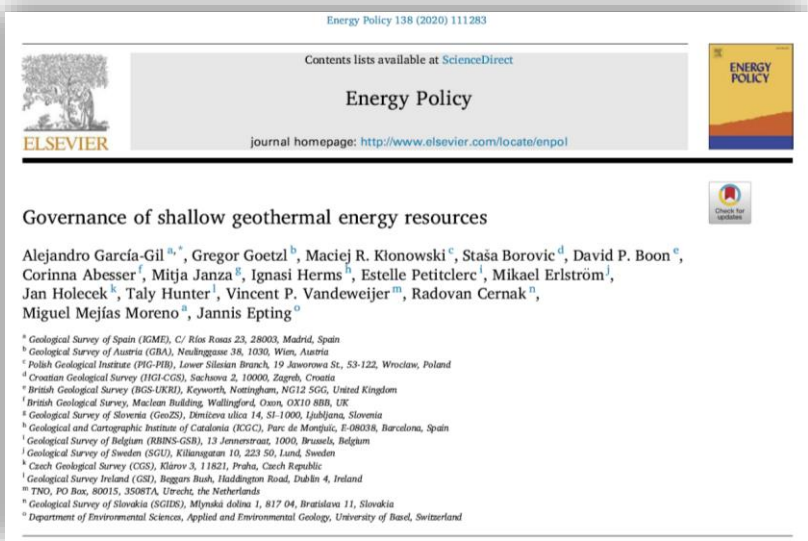
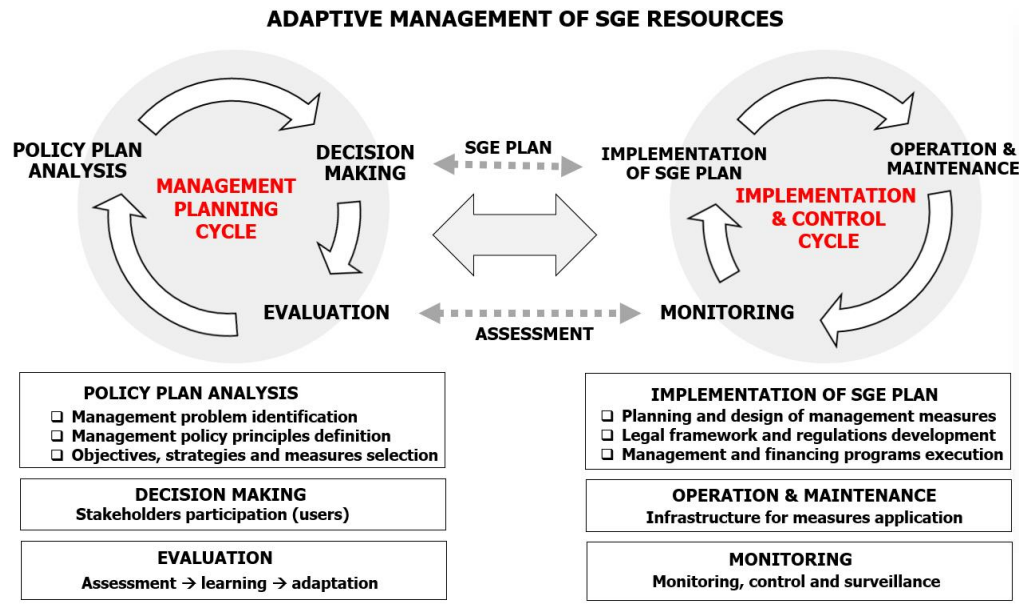
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- (3) Increasing the stress on the subsurface...
- (4) Offering opportunities for shallow geothermal to leave a niche with new concepts...
- (5) Requiring new management approaches for the subsurface...



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Knowing the subsurface conditions is key for management!



Sustainability & environmental protection

Resource assessment & management

Information & data portals

Governance

The role of GSOs in the urban transition process linked to shallow geothermal

Energy strategies, subsurface spatial planning

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



The Geological Surveys of Europe



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Managing Urban Shallow Geothermal Energy



16 Geological Survey Organisations (GSOs)


 17 letter of interests of local stakeholders: **Authorities, municipalities, universities, installers, drilling companies**

Project lead: Geological Survey of Austria

MUSE project partners



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

 Budget total: € 1,313,260
In-kind total: € 923,238

Project life time:
01.07.2017 – 30.09.2021



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Introducing urban shallow geothermal into the portfolio of EuroGeoSurveys

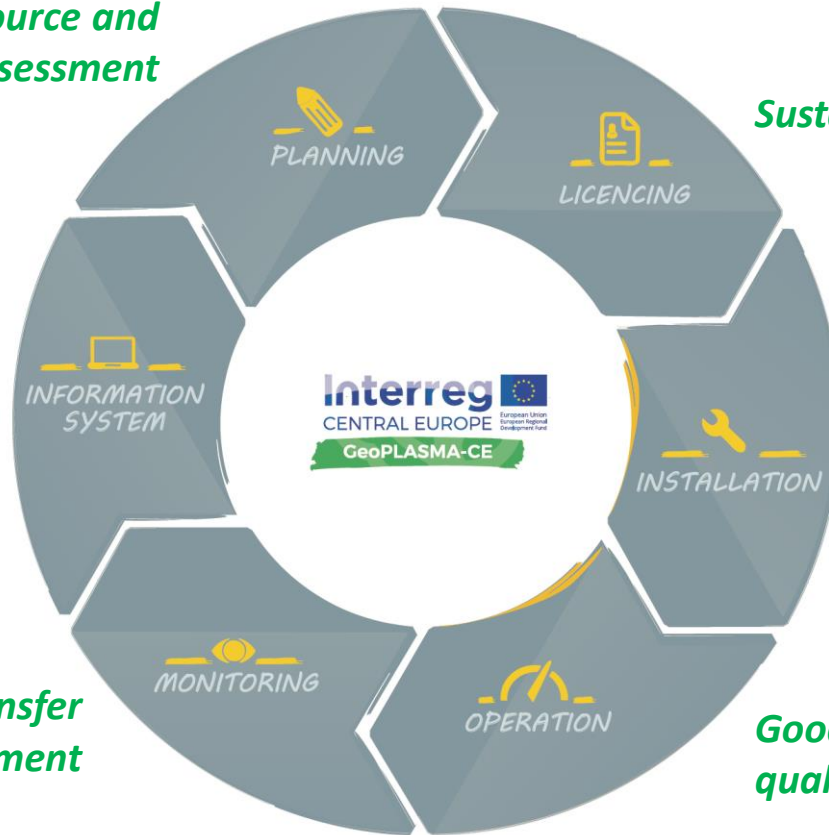


Catalogue of parameters and methods for resource and conflict of use assessment

Governance & energy strategies

Sustainable management approaches

Prototype of harmonized 2D web system for EGDI



Technical standards outside of scope

Knowledge transfer data assessment

Good practices & joint quality criteria

The cycled interogative management approach



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Pilot area activities

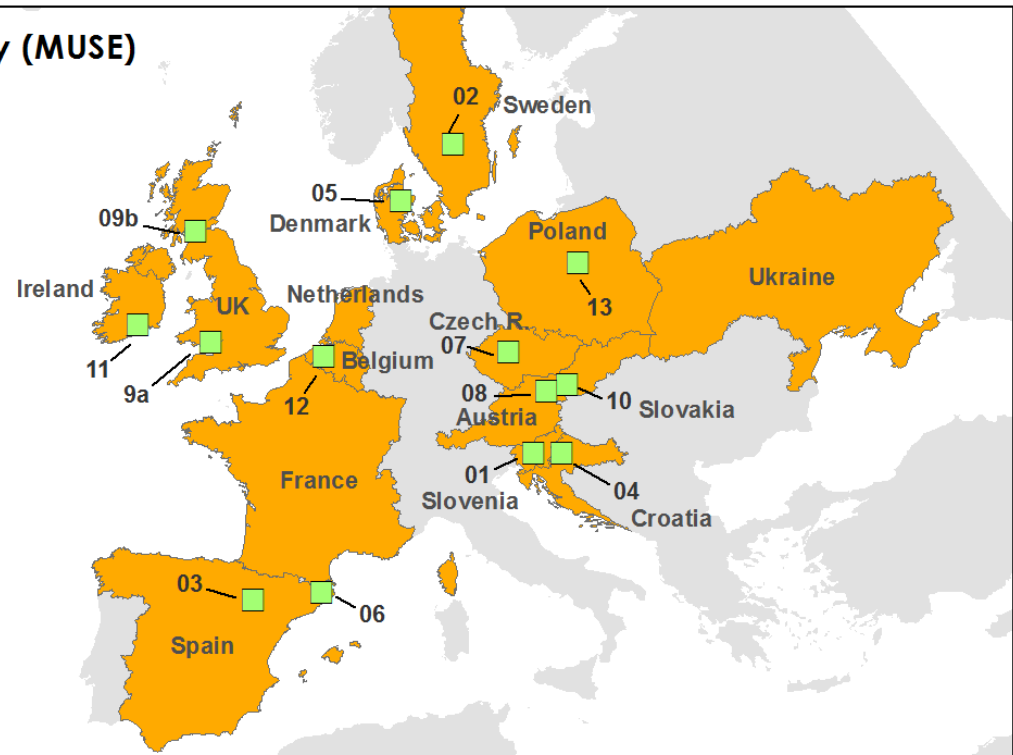
14 geological/climatological diverse urban pilot areas in Europe



Managing Urban Shallow geothermal Energy (MUSE)

MUSE - Pilot areas

- 01 - Urban area of Ljubljana city (Slovenia)
- 02 - Urban area of Linköping city (Sweden)
- 03 - Urban area of Zaragoza city (Spain)
- 04 - Urban area of Zagreb city (Croatia)
- 05 - Urban area of Aarhus city (Denmark)
- 06 - Urban area of Girona city (Catalonia, NE Spain)
- 07 - Urban area of Prague city (Czech Republic)
- 08 - Urban area of Vienna city (Austria)
- 09a - Urban areas of Cardiff city (Wales, UK)
- 09b - Urban area of Glasgow city (Scotland, UK)
- 10 - Urban area of Bratislava city (Slovakia)
- 11 - Urban area of Cork city (Ireland)
- 12 - Urban area of Brussels city (Belgium)
- 13 - Urban area of Warsaw city (Poland)



- Test and demonstration of elaborated methods to assess resources / possible limitations of use and targeted communication with stakeholders
- Providing proven concepts, strategies and tools for managing environmentally friendly heating and cooling in Europe



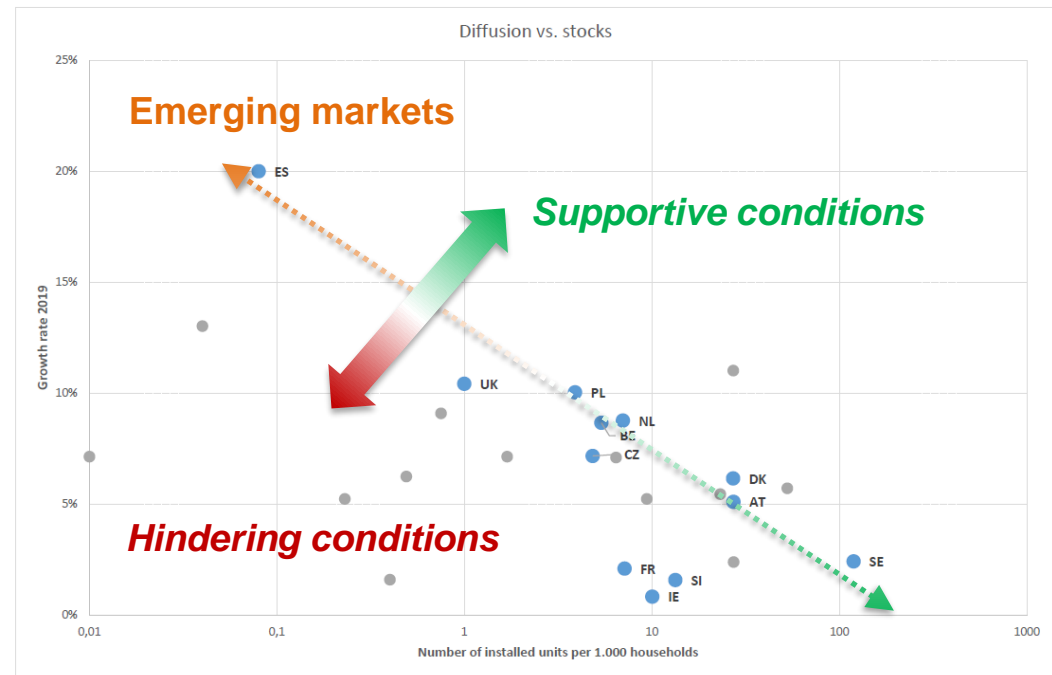
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MUSE provides a good cross section through the European GSHP market



Country	Diffusion (units / 1000 househ.)	Growth (sales 2019/stocks 2018)
Sweden	119,28	2,4%
Finland	52,72	5,7%
Austria	27,26	5,1%
Switzerland	27,25	2,4%
Estonia	27,18	11,0%
Denmark	27,13	6,2%
Norway	23,14	5,5%
Slovenia	13,35	1,6%
Ireland	10,06	0,8%
Germany	9,38	5,2%
France	7,16	2,1%
The Netherlands	7,01	8,8%
Lithuania	6,43	7,1%
Belgium	5,38	8,7%
Czech Republic	4,84	7,2%
Poland	3,9	10,0%
Hungary	1,69	7,1%
Bulgaria	1,47	
UK	1	10,4%
Macedonia	0,88	
Greece	0,75	9,1%
Cyprus	0,51	
Italy	0,49	6,3%
Serbia	0,4	1,6%
Portugal	0,23	5,2%
Ukraine	0,09	
Spain	0,08	20,0%
Romania	0,04	13,0%
Turkey	0,01	7,1%
Median (all)	4,84	6,3%
Median (MUSE)	7,01	6,7%



Figures based on the EGEN market report (EGEC, 2020)



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The MUSE approach

From different ideas to a set of solutions...



Subsurface characteristics

Bottom-up approach on existing concepts and requirements

Capitalizing results of previous and ongoing projects like GRETA, GeoPLASMA-CE, Brugeo...



Catalogue of concepts

Field campaigns

Data modelling

Data interpretation

Data representation



Work in progress

9 consecutive clusters (05/20 – 09/21)



Integration into EGD

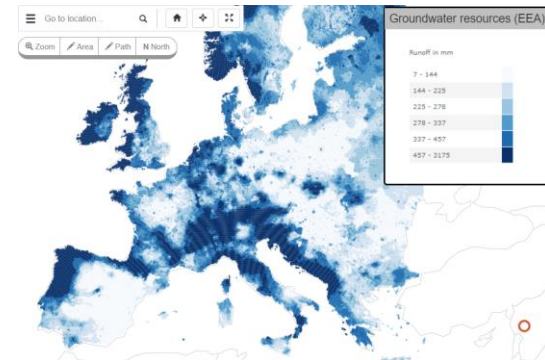
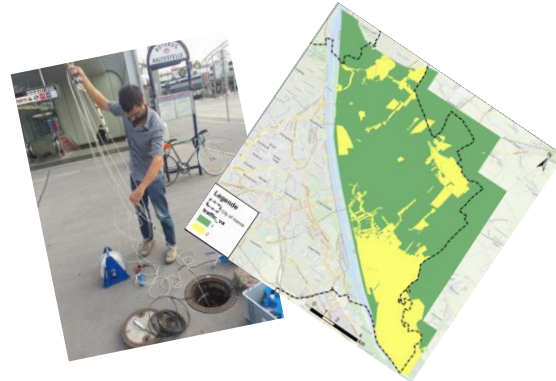
Functionalities (White Book)

Use of standardized protocols (INSPIRE, EGD)

Use of IT standards (INSPIRE, EGD)

Prototypes and role models for each selected parameter

- Technical glossary
- 47 joint characteristics
- BHE, GWHE
- Resources, conflicts of interest, field data



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Stakeholder communication



Target groups

- Local authorities and decision makers in the pilot areas
- Geological Surveys outside of MUSE
- International research teams and organizations, EU institutions
- (Lay public)

Objectives

Raise awareness

On existing gaps / hurdles for an efficient and sustainable use of SGE in urban areas in Europe

Identify measures

How to better integrate SGE in regional development and urban planning (e.g. RAP, SEAP)

Transfer knowledge

Between countries of well established-, emerging and juvenile markets for SGE

Assessment of

the required and expected role of Geological Surveys in managing shallow geothermal energy (SGE)

Support an active dialogue

On the future strategic role of SGE to support climate and energy strategies

Initiate strategic cooperation

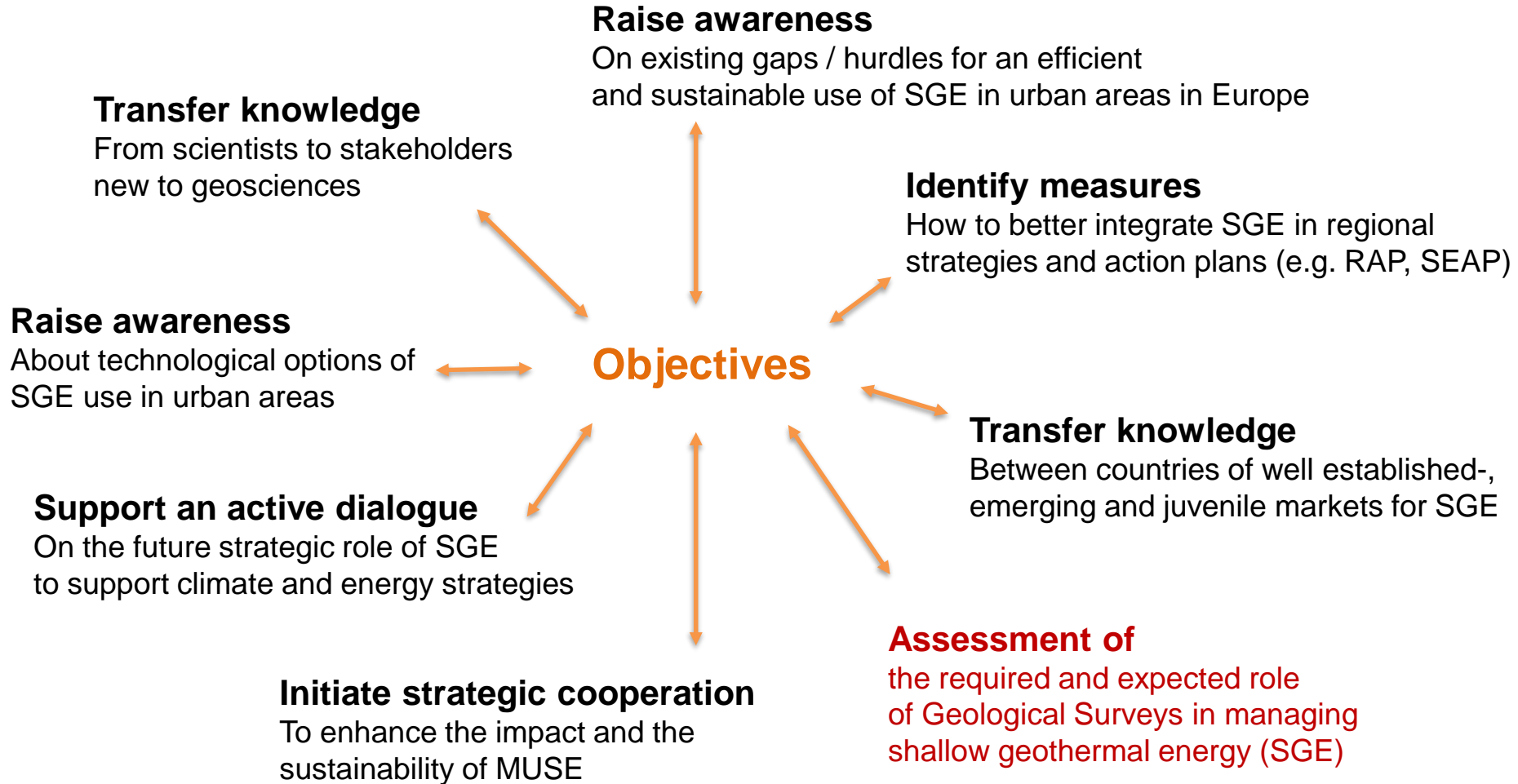
To enhance the impact and the sustainability of MUSE



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Stakeholder communication



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Conclusion

Achievements



- MUSE already set an important starting point to include shallow geothermal energy into the portfolio of EuroGeoSurveys → critical mass of 16 GSOs
- MUSE connected to the European research scene on shallow geothermal energy
- Stronger awareness on urban subsurface management in the context of energy supply → environmental protection and subsurface spatial planning achieved on an international and local level (inside the partners, inside EuroGeoSurveys and at local stakeholders)
- MUSE stipulated follow-up research on international (e.g. COST Action Geothermal-DHC) and national level

Lessons learned so far

- Low funding share → challenge for a comprehensive topic like shallow geothermal energy
- The implementation of MUSE is highly dynamic → it took 18 months for 16 organizations spread across Europe to align the different ideas and understanding of shallow geothermal
- The transfer of geoscientific ideas into EGDI (IT) infrastructure is a by far greater challenge than expected



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What will be after MUSE?



09/2021 End of MUSE

EGDI web information system & KR prototype

Shallow Geothermal Energy Days 2021 event

2022 Start of CSA – Geological Service for Europe

Expand catalogue of concepts

Integrate data from previous international projects to EGDI

Connect novel management concepts to governance

Expanded EGDI web information system & KR

2026 End of CSA



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Thank you for your interest in MUSE!



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