

# SUMMARY REPORT ON EXISTING ENERGY PLANNING STRATEGIES IN THE EU CONSIDERING THE USE OF SHALLOW GEOTHERMAL ENERGY

D.T4.1.3

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## List of abbreviations and acronyms used in this report

Abbreviation, acronym	Full name
BHE	borehole heat exchanger
EGEC	European Geothermal Energy Council
ETIPs	European Technology and Innovation Platforms
EC	European Commission
EU	European Union
GSHP	ground source heat pump
H&C	heating and cooling
GWD	Groundwater Directive
IEE	Intelligent Energy Europe
LCC	life cycle costing
NREAPs	National Renewable Energy Action Plans
RES	renewable energy sources
RHC-ETIP	European Technology and Innovation Platform on Renewable Heating & Cooling
RH&C	renewable heating and cooling
SEAPs	Sustainable Energy Action Plans (for cities)
SET Plan	Strategic Energy Technology Plan
SGE	shallow geothermal energy
WFD	Water Framework Directive



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## 1. Introduction

Over the last decades, the European Union has made essential efforts in order to optimize energy use with respect to climate change in order to meet the requirements of the Kyoto Protocol as well as several EU regulations. Special attention has been paid to mitigation of climate change by means of reduction of greenhouse gases and suspended dust emission into the atmosphere. Following these actions, a dedicated EU strategy has been elaborated and put in force which includes regulatory framework, legislation, awareness campaigns, scientific research, etc. Those take into account application of shallow geothermal energy (SGE), also called near surface geothermal energy or low temperature (low enthalpy) geothermal energy.

SGE contributes to mitigation of smog in urban areas, especially when associated with renewable electricity sources. It is a reliable source of energy used for space heating and cooling through application of diverse technologies of ground source heat pumps (GSHP), including both open- and closed-loop systems. In case of open-loop systems, the main heat carrier in the lower heat source is the groundwater which is extracted via the groundwater wells. In case of the closed-loop systems, the heat exchangers are placed underground. There are several types of heat exchangers, among which the most common are: horizontal loops, borehole heat exchangers (BHE), compact forms of ground heat exchangers (e.g. spiral), thermo-active foundation structures, etc.

## 2. General description of the deliverable

The deliverable *D.T4.1.3: Summary report on existing energy planning strategies in the EU considering the use of shallow geothermal methods*, has been accomplished as one of the results of the Technical Work Package 4 *Strategies for shallow geothermal energy assessment, mapping and planning*, under the terms of the Activity A.T4.1 *Assessment of user demand in the pilot areas and screening for existing energy planning and implementation strategies in the EU* and the task *Screening of previous projects and initiatives on existing energy planning strategies in the EU considering the use of shallow geothermal methods and assessing their impact on WPT4*.

The deliverable consists of two main parts:

- *Summary Report on Existing Energy Planning Strategies in the EU Considering the Use of Shallow Geothermal*;
- *Appendix I Review of previous and current projects, initiatives and policy documents*.

The summary report shortly describes the deliverable D.T4.1.3 and provides such information as the aim and scope. Furthermore it summarizes the main EU strategies referring to RES and SGE and provides a review of the major EU initiatives, organizations, projects and web portals screened in the Appendix I.



Those are listed and classified, according to their relevance to WPT4, in three groups: high relevance, medium relevance and low relevance. The appendix also provides short descriptions including acronym, title, web access, duration, financing source, summary, type, impact on WPT4 and benefit to the GeoPLASMA-CE project.

### 3. Aim and scope of this report

This summary report aims at identification of the main EU strategies referring to the application and development of SGE and underlines their general conditions and requirements. It compiles and evaluates the existing EU energy strategies, including binding legislation and the achievements of the accomplished and currently running projects. It also refers to the selected initiatives and policy documents and furthermore intends to harmonize the management strategies for the project pilot areas with the existing EU concepts.

Accomplishment of this deliverable establishes the following benefits for the project:

- publishing short description and hyperlinks to other websites, as provided in Appendix I, on the GeoPLASMA-CE project website - knowledge platform;
- picking up recommendations and conclusions for the GeoPLASMA-CE project joint strategy (D.T4.4.1) or the quality standards (D.T2.4.2);
- involving the stakeholders in the high level EU event to be organized towards the end of the GeoPLASMA-CE project.

### 4. Existing energy strategies in the EU

The **EU 2020 Energy Strategy** was established in 2010. This aims at reduction of the greenhouse gas emissions by at least 20%, increase of the share of renewable energy to at least 20% of consumption, and achievement of energy savings of 20% or more. Through the attainment of the targets, the EU can help to combat climate change and air pollution, decrease its dependence on foreign fossil fuels, and keep energy affordable for consumers and businesses. In order to meet these targets, the 2020 Energy Strategy sets out five priorities, among them the **Strategic Energy Technology Plan (SET Plan)** which aims to accelerate the development and deployment of low-carbon technologies. It also seeks to improve new technologies and bring down costs by coordinating national research efforts and helping to finance projects. The SET Plan promotes research and innovation efforts across Europe by supporting the most impactful technologies in the EU's transformation to a low-carbon energy system. It promotes cooperation amongst EU countries, companies, research institutions, and the EU itself. In order to support the implementation of the SET Plan the **European Technology and Innovation Platforms (ETIPs)** were created by bringing together EU countries, industry, and researchers in key areas. Those comprise the **European Geothermal Energy Council (EGEC)** and **ETIP on Renewable Heating and Cooling (RH&C)**.



The EU has also set itself a long-term goal of reducing greenhouse gas emissions by 80-95%, when compared to 1990 levels, by 2050. **The Energy Roadmap 2050**, also called **2050 Energy Strategy**, explores the transition of the energy system in ways that would be compatible with this greenhouse gas reductions target, while also increasing competitiveness and security of supply. The European Commission's 2011 Energy Roadmap set out four main routes to a more sustainable, competitive and secure energy system in 2050: energy efficiency, renewable energy (including SGE), nuclear energy, as well as carbon capture and storage.

In 2014 The European Council agreed on a new policy - **2030 Framework for Climate and Energy**, also called **2030 Energy Strategy**, including EU-wide targets and policy objectives for the period between 2020 and 2030. These targets aim to help the EU to achieve a more competitive, secure and sustainable energy system and to meet its long-term 2050 greenhouse gas reduction target. The figures for renewables and energy efficiency have subsequently been increased in the context of the **Clean Energy for all Europeans package**. The 2030 framework aims to help the EU address issues such as:

- taking the next step towards the goal of reducing greenhouse gas emissions by 80-95% below 1990 level by 2050
- high energy prices and the EU economy's vulnerability to future price rises, especially for oil and gas
- the EU's dependence on energy imports, often from politically unstable areas
- the need to replace and upgrade energy infrastructure and provide a stable regulatory framework for potential investors
- agree on a greenhouse gas reduction target for 2030.

The 2030 framework proposes the new targets and measures to make the EU's economy and energy system more competitive, secure and sustainable. It includes the targets for reducing greenhouse gas emission and increasing use of renewable energies, and proposes a new governance system and performance indicators. In particular, it proposes the following actions:

- a commitment to continue reducing greenhouse gas emissions, setting a reduction target of 40% by 2030 relative to 1990 levels;
- a renewable energy target of at least 27% of energy consumption, with flexibility for member states to set national targets;
- improved energy efficiency through the possible amendments to the energy efficiency directive;
- reform of the EU emissions trading scheme to include a market stability reserve;
- key indicators - on energy prices, supply diversification, interconnections between member states and technological developments - to measure progress towards a more competitive, secure and sustainable energy system;
- a new governance framework for reporting by member states, based on national plans coordinated and assessed at EU level.



In support of EU 2020 Energy Strategy the following EU Directives, namely: the **Renewable Energy Directive 2009/28/EC** and **Energy Efficiency Directive 2012/27/EU**, were put into force. The 2009/28/EC Directive specifies national renewable energy targets for each EU member state, taking into account its starting point and overall potential for renewables. EU countries set out how they plan to meet these targets and the general course of their renewable energy policy in **National Renewable Energy Action Plans (NREAPs)** including use of SGE for heating and cooling. Progress towards national targets is measured every two years when EU countries publish the national renewable energy progress reports. The 2012/27/EU Directive establishes a set of binding measures to help the EU to reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain, from production to final consumption. In 2016 the EC proposed an update to the Energy Efficiency Directive, including a new 30% energy efficiency target for 2030, and measures to update the Directive to make sure the new target is met. To help officials in EU countries implement the Energy Efficiency Directive, the European Commission publishes guidance notes.

The **Energy Union** helps to provide secure, affordable and clean energy for EU citizens and businesses. The Energy Union strategy builds further on the 2030 Framework for Climate and Energy and the European Energy Security Strategy. It is made up of five closely related and mutually reinforcing dimensions including innovation and competitiveness, energy efficiency, decarbonising the economy, research, innovation and competitiveness, all of them being crucial to GeoPLASMA-CE. The Commission's Clean Energy for All Europeans package, which was published in 2016, includes a proposal for a Regulation on the Governance of the Energy Union.

Except for the policies on energy and related legal framework the EU also establishes law on air quality and standards. Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants aims at limiting emissions of acidifying and eutrophying pollutants and ozone precursors in order to improve the protection in the Community of the environment and human health against risks of adverse effects from acidification, soil eutrophication and ground-level ozone. Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe, among others, defines the limits for the new air quality objectives for PM<sub>2.5</sub> (fine particles) including the limit value and exposure related objectives - exposure concentration obligation and exposure reduction target.

Two EU Directives refer to energy efficiency, namely: Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy related products and Directive 2010/30/EU on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products.

Another act of EU law exerting some influence on SGE, especially on open systems, is the **Water Framework Directive (WFD) 2000/60/EC**. This commits the EU member states to achieve good qualitative and quantitative status of all water bodies, including groundwaters and marine waters, by 2015. It is a



framework in the sense that it prescribes steps to reach the common goal rather than adopting the more traditional limit value approach. The Directive's aim for 'good status' for all water bodies will not be achieved, with 47% of EU water bodies covered by the Directive failing to achieve the aim. One important aspect of the WFD is the introduction of River Basin Districts and, based on them, water management system. The **Groundwater Directive (GWD) 2006/118/EC** refers to the protection of groundwater against pollution and deterioration and as such refers to the GSHPs in open systems.

## 5. Review of selected EU policies, initiatives, organizations and projects

This chapter summarizes the key EU policies (EU Directives), initiatives, organizations and projects referring to RES, SGE and the GeoPLASMA-CE project, as listed in the Appendix I, defined under the following categories:

Policy: EU policy documents prepared for the sake of RES strategy, including the regulatory framework, EU directives and initiatives undertaken by the EU institutions;

Organization: includes anything existing long-term, whether for-profit or not-for-profit, including networks, associations, think tanks, EU organizations, companies etc.

Project: any initiative with a fixed term, independent of area of activity, including all kinds of projects: research, development, demonstration, investment, structural, regional development, education, dissemination, promotion.

Web portal: knowledge hub, in some cases comprising geothermal map browsers.

The following EU policies, organizations, projects and web portals have been analysed for relevance to the GeoPLASMA-CE project, with special respect to WPT4 *Strategies for shallow geothermal energy assessment, mapping and planning*, namely:

- Renewable Energy Directive 2009/28/EC;
- Project ReGeoCities;
- Project progRESsHEAT;
- Project GRETA;
- Project STEP UP;
- Project GeoTrainet;
- The non-profit association European Geothermal Energy Council.





## 5.1. Renewable Energy Directive 2009/28/EC

<b>Acronym:</b> <b>Renewable Energy Directive 2009/28/EC</b>	<b>Title:</b> DIRECTIVE 2009/28/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC	<b>Type:</b> Policy
<b>Period of implementation:</b> 2003 until now	<b>Website:</b> <a href="https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive">https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive</a>	<b>Relevance to GeoPLASMA-CE with respect to WPT4:</b> high
<b>Partner countries:</b> EU(28)	<b>Financing source:</b> European Union	<b>Work packages, deliverables or outcomes relevant to WPT4:</b> Not applicable

### Summary

The Renewable Energy Directive establishes an overall policy for the production and promotion of energy from renewable sources in the EU. It requires the EU member states to fulfil at least 20% of its total energy needs with renewables by 2020 - to be achieved through the attainment of individual national targets. All EU countries must also ensure that at least 10% of their transport fuels come from renewable sources by 2020. The directive specifies national renewable energy targets for each country and represents the motivation behind the GeoPLASMA-CE project. It refers at several places to geothermal energy and provides its legal definition. The current renewable energy directive ends in 2020. As of 2016, a new Directive is being negotiated at present.

### Objectives

- to specify the national renewable energy targets for each country, taking into account its starting point and overall potential for renewables;
- to support progress towards the national targets;
- to propose the cooperation mechanisms;
- to promote the cooperation amongst EU countries (and with countries outside the EU) to help them meet their renewable energy targets.



## Impact on GeoPLASMA-CE

The Directive promotes cooperation amongst EU countries and with countries outside the EU to help them meeting their renewable energy targets. This cooperation can take the form of, for example, joint renewable energy projects, including SGE. The Directive establishes the rules and obligations for minimum requirements for the use of energy from RES, including SGE, both in new and in renovated buildings.

Necessity to meet the national renewable energy targets for each country is crucial for the scope and aim of the GeoPLASMA-CE project. It influences directly several aspects and outline of the project results, especially those under the WPT4, related to elaboration of strategies for the use of shallow geothermal energy at the investigated pilot areas and the assessment of user demand in the pilot areas and screening for existing energy planning and implementation strategies in the EU. The Directive is establishing the legal rules on energy policy binding each EU(28) members states, defines their obligations which are to be achieved and formulates the measures. It supports implementation of the EU 2020 Energy Strategy, EU 2030 Energy Strategy and the Energy Roadmap 2050. Thorough knowledge of this document is necessary for appropriate implementation of the entire WPT4. It provides background information for proper formulation of D.T4.1.1 referring the questionnaire template and the remaining deliverables, especially: D.T4.1.2 *Joint report on user demand and barriers for the implementation of shallow geothermal methods in energy planning strategies*, D.T4.1.3 *Summary report on existing energy planning strategies in the EU considering the use of shallow geothermal methods*, D.T4.2.1 *Draft strategies for the use of shallow geothermal energy in the investigated target regions and cities*, D.T4.2.2 *Qualitative report on the feedback of the users in the target regions on the draft strategies*, D.T4.2.3 *Reviewed strategies for the use of shallow geothermal energy in the investigated pilot areas* and D.T4.4.1 *Strategy report for future energy planning and management concepts to foster the use of shallow geothermal methods*.



## 5.2. Project ReGeoCities

<b>Acronym:</b> ReGeoCities	<b>Title:</b> Regulations of Geothermal HP systems at local and regional level in Europe	<b>Type:</b> Project
<b>Period of implementation:</b> 2012 - 2015	<b>Website:</b> regeocities.eu	<b>Relevance to GeoPLASMA-CE with respect to WPT4:</b> high
<b>Partner countries:</b> BE, DE, DK, ES, FR, GR, IE, IT, NL, RO, SE <b>International organizations involved:</b> European Geothermal Energy Council (EGEC)	<b>Financing source:</b> Intelligent Energy Europe	<b>Work packages, deliverables or outcomes relevant to WPT4:</b> Deliverable D2.2: General Report of the current situation of the regulative framework for the SGE systems Deliverable D3.4: Recommendation guidelines for a common European regulatory framework Deliverable D5.5: Report: Promoting the inclusion of shallow geothermal energy in SEAPS

### Summary

The ReGeoCities project focused on the achievement of the National Renewable Energy Action Plans geothermal targets 2020 marked by countries with ambitious objectives regarding ground source heat pumps by means of the removal and clarification of the non-technical administrative/regulatory barriers at local and regional level. It examined and promoted the best practices and an intelligent regulatory framework, supporting cities to reach their SEAPs and the 2020 climate and energy goals. The project developed the “The Heat Under Your Feet” campaign that promotes greater awareness about the ground source heat pump industry in Europe. The project has also engaged and collaborated with regional and local administrations during the project duration in order to validate the project results. A complete training program targeting the staff members in regional and local public authorities has been developed and implemented to provide this target group with the skills and tools that are needed to facilitate and assist during the regulative process of shallow geothermal systems.



## Objectives

- to overcome barriers related to regulation of geothermal resources and administrative procedures;
- to transfer best practices from mature to juvenile regions;
- to document, with recommendations to develop, a common pre-normative framework;
- to engage local administrations to implement project results;
- to develop a training program focused on the target groups (administrative personnel from the cities and regions);
- to achieve the smart-cities concept within SGE systems.

## Impact on GeoPLASMA-CE

The results of the ReGeoCities project have a great influence on both practical application of the SGE technologies as well as development of strategies for SGE use in the EU's urban areas. It refers to several aspect of the GeoPLASMA-CE project, especially under the WPT2 and WPT4. ReGeoCities provides a considerable review of the SGE and GSHP market in Europe and focuses on such aspects as: existing EU strategies, selected national strategies, binding legislation, regulatory framework, best practices, recommendation guidelines, tools for monitoring the SGE installations and standardized database.

The deliverable of ReGeoCities D2.2: *General report of the current situation of the regulative framework for the SGE systems* provides the legal definitions of several terms used in the context of SGE and binding in EU regulations. It also gives a detailed overview of the EU legal documents referring to SGE and some of its aspects on national level. This provides valuable information for accomplishment of WPT2, especially Deliverable D.T2.4.1 *Summary of national legal requirements, current policies and regulations of shallow geothermal use*.

The scope of ReGeoCities project covers also the selected issues of SGE in urban environments (D.3.3 *Main aspects for integration of SGE systems in Cities and Buildings*) and the support tools to boost the development of GSHP, including best practices in financial incentives, insurance schemes, management of resources and instructions for documentation (Deliverable D.3.1 *Best practice analysis report*). These results provide basic information and guidelines for activities focused on the urban areas developed in GeoPLASMA-CE, especially in two deliverables: D.T4.2.1 *Draft strategies for the use of shallow geothermal energy in the investigated target regions and cities* and D.T4.2.3 *Qualitative report on the feedback of the users in the target regions on the draft strategies*.

The deliverable D3.4: *Recommendation guidelines for a common European regulatory framework* presents a set of common regulatory framework guidelines, aimed at facilitating local authorities in Europe in implementing regulatory and permitting procedures for SGE systems. This deliverable reviews and gathers together information on EU energy regulatory framework and policies. Due to well elaborated guidelines on several aspects of SGE and GSHP application it contributes directly to D.T2.4.2 *Catalogue of reviewed*



*quality standards, current policies and regulations.* In addition it refers also to achievement of D.T2.5.1 *Catalogue of success criteria for a sustainable management of shallow geothermal use.*

In addition the deliverable D3.4 comprises the Annex II - a flowchart illustrating the processes of policy making at EU level combined with permitting, construction, monitoring and information. The flowchart provides general information important in case of for example deliverable D.T2.4.2 *Catalogue of reviewed quality standards, current policies and regulations.*

The deliverable D5.5: *Report: Promoting the inclusion of shallow geothermal energy in SEAPS* focuses on an important aspect of the H&C systems with GSHP - the life cycle costing (LCC) analyses due to its positive influence on the inclusion in SEAPs. These results provide information for analysis to be undertaken in terms of review and drafting the strategies on SGE use. Therefore this deliverable poses an important contribution to achievement of WPT4, namely deliverables: D.T4.2.1 *Draft strategies for the use of shallow geothermal energy in the investigated target regions and cities* and D.T4.2.3 *Reviewed strategies for the use of shallow geothermal energy in the investigated pilot areas.*

One of the main achievements of the ReGeoCities is the database for public authorities developed as an Excel spreadsheet. Application of the database is described in the deliverable 3.2 *Database Handbook.*

The database provides the local or regional administration the tools for registering the GSHP systems and helps obtaining the detailed information on the total number of systems in operation and total installed capacity; the location and dimensions of each system as well as some technical details. The functionality and structure of the database provides important input into the development of for example the questionnaires developed under WPT1, deliverable D.T1.1.1 *Template of a harmonized questionnaire for the web based decision support and information tool* and deliverable D.T1.2.1 *Template of a harmonized questionnaire for the web based expert platform.*



### 5.3. Project progRESsHEAT

<b>Acronym:</b> progRESsHEAT	<b>Title:</b> non	<b>Type:</b> Project
<b>Period of implementation:</b> 2008 - 2011	<b>Website:</b> <a href="http://www.progressheat.eu/">http://www.progressheat.eu/</a>	<b>Relevance to GeoPLASMA-CE with respect to WPT4:</b> high
<b>Partner countries:</b> AT, CZ, DE, DK, PT <b>International organizations involved:</b> Energy Cities, the European association of local authorities in energy transition	<b>Financing source:</b> Horizon 2020	<b>Work packages, deliverables or outcomes relevant to WPT4:</b> <ul style="list-style-type: none"> <li>• Heating &amp; cooling: Policy frameworks in six European cities, their regions and countries</li> <li>• Policy recommendations to decarbonise European heating and cooling systems</li> </ul>

#### Summary

The progRESsHEAT project aims at assisting the local, regional, national and EU political leaders in developing policy and strategies to ensure a quick and efficient deployment of renewables in heating and cooling networks. The project is intended to support the market uptake of existing and emerging renewable electricity, heating and cooling technologies. More specifically, the project helps policy makers develop integrated, effective and efficient policy strategies aimed at achieving a fast and strong penetration of renewable and efficient heating and cooling systems. This includes the analysis of cross-sectoral effects between the diverse renewables and energy efficiency measures in industrial heat and cold, waste heat, heating and cooling in buildings and district heating. Heating and cooling strategies will be developed through a profound analysis of (1) heating and cooling demand and future developments, (2) long-term potential of renewable energies and waste heat in the regions, (3) barriers & drivers and (4) a model-based assessment of policy intervention in scenarios up to 2050.

#### Objectives

- to support the implementation of national heating and cooling plans which were to be released by the EU member states by the end of 2015;
- to assist national policy makers in implementing suitable policies with a model-based quantitative impact assessment of local, regional and national policies up to 2050.



## Impact on GeoPLASMA-CE

The project analysed the barriers, issued recommendations for the promotion of geothermal energy and elaborated energy strategies for each of its 6 pilot areas. Although focused on the use of geothermal energy for district heating grids and using different pilot areas, much of the content is highly relevant since three partner countries are also represented in GeoPLASMA-CE. Consequently, a number of documents overlap in content with GeoPLASMA-CE outputs, e.g. 3 project reports:

- *Using Renewable Energy for Heating and Cooling: Barriers and Drivers at Local Level;*
- *Policy recommendations to decarbonise European heating and cooling systems;*
- *Heating & cooling: Policy frameworks in six European cities, their regions and countries.*

The project scope refers to energy policy in general, however, some points in the above reports are associated with geothermal energy. The reports review the relevant EU regulations, EU targets and case studies. The reports *Heating & cooling: Policy frameworks in six European cities, their regions and countries* contributes with the description of selected policies, as exemplary ones, in selected cities, to achievement of DT4.1.1 *Harmonized questionnaire template for assessing the user demand and energy management strategies in the pilot areas*. All three reports contribute to accomplishment of WPT4, especially D.T4.2.1 *Draft strategies for the use of shallow geothermal energy in the investigated target regions and cities* and D.T4.4.1 *Strategy report for future energy planning and management concepts to foster the use of shallow geothermal methods* as they provide some ready solutions in terms of policy drawing.

## 5.4. Project GRETA

<b>Acronym:</b> GRETA	<b>Title:</b> Near-surface Geothermal Resources in the Territory of the Alpine Space	<b>Type:</b> Project
<b>Period of implementation:</b> 2015 - 2018	<b>Website:</b> <a href="http://www.alpine-space.eu/projects/greta/en/home">http://www.alpine-space.eu/projects/greta/en/home</a>	<b>Relevance to GeoPLASMA-CE with respect to WPT4:</b> high
<b>Partner countries:</b> AT, CH, DE, FR, IT, SI <b>International organizations involved:</b> Climate Alliance	<b>Financing source:</b> Interreg Alpine Space 2014-2020	<b>Work packages, deliverables or outcomes relevant to WPT4:</b> <ul style="list-style-type: none"> <li>• WP2 - WP6</li> <li>• Deliverable 2.1.1: Overview and analysis of regulation criteria and guidelines</li> </ul>



## Summary

The project aims at improving energy efficiency and sustainable production of renewable geothermal energy in the Alpine region. The project will yield the geothermal potential maps which act as a decision support tool for the integration of SGE into policy instruments, e.g. energy plans and strategies, and can be used for the spatial planning of geothermal installations by public and private stakeholders. In addition, the guidelines will be developed to encourage the harmonization of regulations, authorization procedures and operational criteria for SGE utilization in the Alpine region. Strategies for the inclusion of SGE in policy instruments will also be formulated, thus contributing to a growth of NSGE utilization. The project will bring new opportunities to the utilization of SGE and foster the efficient implementation and operation of near-surface geothermal systems in the Alpine Space.

## Objectives

- **Increasing knowledge on the spatial distribution of NSGE potential in the area:**  
The Geothermal Potential Maps will be a decision support tool for the integration of NSGE into policy instruments, such as energy plans and strategies, and for the spatial planning of geothermal installations by public and private stakeholders.
- **Exchanging knowledge and best-practices on a transnational base:**  
Field observations (Case Studies) will be published considering technical, economic, environmental and social issues in order to give a general point of view among the situation and about NSGE applications progresses in the Alpine Space. Thus, regulations, authorization procedures and operational criteria of NSGE utilization will be reviewed and summarized into congruent guidelines.
- **Planning tools to develop a database open to all:**  
In order to increase the use of NSGE and thermal storage in the Alps, outputs of GRETA will review administrative procedures and operational criteria of NSGE utilization into congruent guidelines provided for the implementation of NSGE into policy instruments, such as energy plans and strategies, thus contributing to a growth of NSGE utilization.

## Impact on GeoPLASMA-CE

The relevance of the GRETA project to GeoPLASMA-CE is very strong due to very similar scope of both projects and convergent goals. WP2 of GRETA aims to crosscheck the existing country-specific regulations and to review best administrative practices for SGE systems in the Alpine region. Therefore, its results are valuable to GeoPLASMA-CE and contribute to deliverable D.T2.4.1 *Summary of national legal requirements, current policies and regulations of shallow geothermal use*. Deliverable T2.1.1: *Overview and analysis of regulation criteria and guidelines* of the GRETA project, provides guidelines for SGE and GSHP use, important for GeoPLASMA-CE as well. In addition it also contributes to achievements of deliverable D.T2.4.2 *Catalogue of reviewed quality standards, current policies and regulations*, with a collection of well-defined best practices which can be transferred to other EU member states.





In coordination with user interaction, existing national/regional regulations are reviewed and analysed focusing on main barriers and drivers affecting regulation of SGE plants in the Alpine regions. GRETA under WP3 deals with the relevant technical and operational criteria for shallow geothermal systems under the typical conditions of the Alpine environment. Results of these activities are applicable to GeoPLASMA-CE under WPT2, deliverable D.T2.4.2 *Catalogue of reviewed quality standards, current policies and regulations*. Best practice examples from existing plants will be analysed in order to derive a review of the most important technical and operational criteria for shallow geothermal installations of different kinds, with a transnational validity across the whole Alpine space. Results of these activities can be used for achievement of D.T4.1.2 *Joint report on user demand and barriers for the implementation of shallow geothermal methods in energy planning strategies*. The procedures and tools are developed to integrate SGE into the Energy Plans in WP5 and synthesized those into guidelines.

The results of the GRETA, especially the Deliverable 2.1.1: *Overview and analysis of regulation criteria and guidelines*, can be used in GeoPLASMA-CE. Under this deliverable a list of relevant previous projects, regulations on SGE including its comparative analysis are provided which is also relevant for the present summary report.

## 5.5. Project STEP UP

<b>Acronym:</b> STEP UP	<b>Title:</b> Strategies Towards Energy Performance and Urban Planning	<b>Type:</b> project
<b>Period of implementation:</b> 2012 - 2015	<b>Website:</b> <a href="https://www.stepupsmartcities.eu/">https://www.stepupsmartcities.eu/</a>	<b>Relevance to GeoPLASMA-CE with respect to WPT4:</b> high
<b>Partner countries:</b> BE, LV, SE, UK	<b>Financing source:</b> FP7	<b>Work packages, deliverables or outcomes relevant to WPT4:</b> <ul style="list-style-type: none"> <li>• Guidebook “Developing enhanced Sustainable Energy Action Plans”</li> <li>• WP2 reports</li> <li>• Webinars</li> </ul>

### Summary

The European Commission recognises the important role of cities and the difficult challenges they face and has launched a number of initiatives aimed at supporting cities to implement sustainable energy policy. For example, under the EU Covenant of Mayors, signatory cities commit to meeting or exceeding the EU’s 20% CO<sub>2</sub> reduction target. Through Sustainable Energy Action Plans (SEAPs)



signatory cities outline the activities, measures and time frames showing how they will reach the EU's CO<sub>2</sub> reduction target by 2020.

STEP UP aims to bring together excellence in energy planning and low carbon energy projects from the four partner cities to create a coherent and easy-to-use model for energy planning for dissemination across Europe.

## Objectives

STEP UP aims to enhance the existing Sustainable Energy Action Plans (SEAPs) in the four cities and:

- Create a model for energy planning that will deliver faster and greater impact, contributing to meeting Europe's 2020 energy and climate change targets;
- Help deliver wider policy objectives such as improving security of energy supplies, achieving urban regeneration, economic growth, tackling fuel poverty; and
- Make cities better places to live, work, learn, and do business.

## Impact on GeoPLASMA-CE

The project complements the Covenant of Mayors' SEAP process. Existing SEAP for four cities were improved based on a 9-step programme developed within the scope of the project. The 9-step programme provides a framework which guides the user through a targeted and constructive process of designing a SEAP or improving an existing one. The process starts with the identification and engagement of stakeholders, covers gap analysis and target setting, the identification of suitable actions and finally the implementation, monitoring and review of the completed SEAP.

The individual steps are summarized in the guidebook "Developing enhanced Sustainable Energy Action Plans - A STEP UP guide for cities". Each step is accompanied by a brief "lessons learned" section and relevant spreadsheet templates, and separate, more detailed guidebooks exist for a number of steps. A number of project management tools and visualization aids (e.g. PEST analysis, SWOT analysis, scenario analysis, radar charts etc.) are briefly introduced where appropriate. Although the guidebook was created to facilitate the compilation of entire SEAPs and is aimed specifically at urban areas, the content is presented such that it can be transferred to GeoPLASMA-CE pilot areas and applied to shallow geothermal energy usage. It can aid the regional strategies DT4.2.3 and provide input for the joint strategy recommendations DT4.4.1.

The report "Developing Sustainable Energy Projects" asserts the benefits of integrated measures over stand-alone actions and offers best practice examples. These could act as starting points for the elaboration of integrated measures in those pilot areas which collaborate closely with urban planners.

Further of interest are the "Stakeholder Analysis and Engagement Guidebook: Approaches and Tools", the reports Report D2.1 Stakeholder analysis and engagement plan and D2.2 Gap and issue analysis for existing sustainable energy action plans and web content related to heat demand mapping.



## 5.6. Project GeoTrainet

<b>Acronym:</b> GeoTrainet	<b>Title:</b> Geo-Education for a sustainable geothermal heating and cooling market	<b>Type:</b> Project
<b>Period of implementation:</b> 2008 - 2011	<b>Website:</b> <a href="https://ec.europa.eu/energy/intelligent/projects/en/projects/geotrainet">https://ec.europa.eu/energy/intelligent/projects/en/projects/geotrainet</a>	<b>Relevance to GeoPLASMA-CE with respect to WPT4:</b> high
<b>Partner countries:</b> AT, BE, FR, IRL, RO, ES, SE, UK	<b>Financing source:</b> Intelligent Energy Europe	<b>Work packages, deliverables or outcomes relevant to WPT4:</b> <b>Training materials:</b> <ul style="list-style-type: none"> <li>• GeoTrainet Training Manual for Drillers of Shallow Geothermal Systems</li> <li>• GeoTrainet Training Manual for Designers of Shallow Geothermal Systems</li> </ul>

### Summary

Ground Source Heat Pumps contribute greatly to energy saving and emission reduction. In Europe, a sustainable market has only been established in few countries. One of the barriers to a sustainable and growing geothermal market is the lack of appropriately skilled personnel, and the quality of design and drilling are not always satisfactory. Furthermore to keep quality up, a need for a certification programme for the GSHP workforce has been identified. The GeoTrainet project, supported by the European Commission's IEE programme ("Altener"), aims to develop a European-wide educational programme as an important step towards the certification of geothermal installations. From the different groups of professionals involved in a GSHP installation, the GEOTRAINET project focuses on two target groups: designers (those who carry out feasibility and design studies, including geology) and drillers (who make the boreholes and insert the tubes).

### Objectives

- to analyse the technologies applied in SGE in different EU countries;
- to analyse the legislation and policy with respect to SGE on EU and national levels;
- to provide the proper education of the professional personnel responsible for designing and drilling of the shallow geothermal systems across Europe;



- to create an international platform of experts on Geothermal Energy Heating and Cooling to provide the knowledge required for the education on this area;
- to create the curricula and programmes (training tools and didactic materials) for GSHP designers and drillers;
- to publish two training manuals available online:
  - GeoTrainet Training Manual for Drillers of Shallow Geothermal Systems;
  - GeoTrainet Training Manual for Designers of Shallow Geothermal Systems;
- to run the training courses for the designers and drillers of the SGE systems based on the unified curriculum;
- to transfer the best practices in SGE market.
- to improve an access to geological data needed for the design of Geothermal Energy Heating and Cooling installations;
- to prepare the guidelines to facilitate the acquisition of geological data to evaluate and size GSHP projects;
- to suggested the common standards and codes to create a unified European market;
- to developed a European structure for training in SGE and GSHPs;
- to developed a proposal for a European certification framework.

### Impact on GeoPLASMA-CE

Due to lack of the detailed information about the GeoTrainet project the impact on GeoPLASMA-CE project and WPT4 is difficult to be described and assessed. Nevertheless, two manuals published as the results of the project, i.e.: “GeoTrainet Training Manual for Drillers of Shallow Geothermal Systems“ and „GeoTrainet Training Manual for Designers of Shallow Geothermal Systems“ play a crucial role for the professionals and general stakeholders interested in SGE and GSHP, an as such are important for the proceeding of the GeoPLASMA-CE project. At present the training materials are available through the website ([geotrainet.eu/resources](http://geotrainet.eu/resources)) of GeoTrainet AISBL - the non-profit association established after the accomplishment of the EU project. Except for the extensive technical information, the manual for the designers includes some concise information on the regulatory framework and legislation connected with application of SGE in EU. Information available in the GeoTrainet training materials, due to period of implementation of the project, require some update, however in majority those are relevant to the whole scope of GeoPLASMA-CE and it results.



## 5.7. European Geothermal Energy Council

<b>Acronym:</b> EGEC	<b>Title:</b> European Geothermal Energy Council	<b>Type:</b> organization
<b>Period of implementation:</b>	<b>Website:</b> <a href="https://www.egec.org/">https://www.egec.org/</a>	<b>Relevance to GeoPLASMA-CE with respect to WPT4:</b> high
<b>Partner countries:</b> EU(28)	<b>Financing source:</b> membership fees	<b>Work packages, deliverables or outcomes relevant to WPT4:</b> market reports, policy consultations, communication possibilities

### Summary

EGEC, the European Geothermal Energy Council, is a non-profit international organisation founded in 1998 to promote the European geothermal industry and enable its development both in Europe and worldwide, by shaping policy, improving business condition, and driving more research and development. EGEC works with its members on policy, market intelligence, and communication, providing a link between the industry and European institutions. It comprises more than 120 members from 28 EU countries, including developers, equipment manufacturers, electricity providers, national associations, consultants, research centres, geological surveys, and public authorities, make EGEC a unique network, uniting and representing the entire geothermal sector.

### Objectives

- to work on a sound policy framework and financial instruments which allow geothermal energy to compete with traditional sources;
- to increase research and development in the area of SGE;
- to develop the geothermal industry inside and outside of Europe;
- to run a web portal offering a sound source of information regarding SGE, such as: publications, news, events, policy and research, position papers.

### Impact on GeoPLASMA-CE

The main impact of the European Geothermal Energy Council on the GeoPLASMA-CE project is the possibility of dissemination of the project results. In addition EGEC offers a unique possibility for international and European cooperation within the field of SGE, both between the intuitions and individual experts. Moreover, through EGEC, the project team can communicate the project achievements to the European institutions, including EC, as well as to other organizations and project teams.



## 6. Conclusions

This summary report covers the following EU policies (documents), projects, organizations and initiative relevant to the GeoPLASMA-CE project:

- Renewable Energy Directive 2009/28/EC;
- Project ReGeoCities;
- Project progRESsHEAT;
- Project GRETA;
- Project STEP UP;
- Project GeoTrainet;
- The non-profit association European Geothermal Energy Council.

Two EU Directives - Renewable Energy Directive 2009/28/EC and Energy Efficiency Directive 2012/27/EU, provides the binding EU law and basic energy policy documents, referring also to SGE. The listed projects were established in order to enhance implementation of the Directives and EU energy policies. Results of the ReGeoCities, progRESsHEAT and GRETA project are crucial to GeoPLASMA-CE in the context of SGE strategy building being incorporating into the regional action plans and development strategies. In case of the ReGeoCities the results of WP2 referring to analysis of legal regulations and transfer of best practices can be incorporated into the GeoPLASMA-CE project. Other important aspects are the recommendations developed in effect of the project. Those are also important in terms of passing the good practices. The progRESsHEAT refers to energy policy in a wider context and is important because of policy recommendations to decarbonisation of EU member states. Very important for GeoPLASMA-CE are the achievements of GRETA due to very similar scope and goals of both projects. The results of GRETA, especially the Deliverable 2.1.1: Overview and analysis of regulation criteria and guidelines, can be used in GeoPLASMA-CE. Under this deliverable a list of relevant previous projects, regulations on SGE including its comparative analysis are provided. The remaining organizations and the initiative “European Geothermal Energy Council and European Technology and Innovation Platform on Renewable Heating & Cooling” provide to the project an excellent web-based knowledge hub as well as possibilities for external communication, consulting and networking at the EU and international level.



## 7. Literature

Communication from the Commission to the European Union and the Council Energy Efficiency and its contribution to energy security and the 2030 Framework for climate and energy policy

Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance

Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (PDF). Brussels, Belgium: European Council. 5 June 2009

Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (Text with EEA relevance)

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration

Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

Energy roadmap 2050. Luxembourg: Publications Office of the European Union, 2012

European Commission, Directorate General for Energy, <https://ec.europa.eu/energy/en>