

# SUMMARY OF NATIONAL LEGAL REQUIREMENTS, CURRENT POLICIES AND REGULATIONS OF SHALLOW GEO THERMAL USE

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## 1. INTRODUCTION

Activity A.T2.4: Elaboration of quality standards for planning, construction and monitoring geothermal sites

Description of deliverable D.T2.4.1: Summary of national legal requirements, current policies and regulations of shallow geothermal use

The application form states:

*“The summary considers all aspects of licensing and management of shallow geothermal use including management of environmental impact. Results of D.T2.4.3 (Knowledge exchange workshop on legal requirements, procedures and policies) will be adapted for valorisation of results from previous studies (e.g. GRETA) for the 6 pilot areas.”*

Deliverable D.T2.4.1 will be compiled from the feedback of the subsequent survey, an assessment of existing international studies and initiatives and from the outcomes of the Knowledge Exchange Workshop (D.T2.4.3), which will take place during the project GRETA midterm conference on November 8th 2017 in Salzburg.

## 2. METHODOLOGY

This deliverable compiles a summary of national legal requirements, current policies and regulations of shallow geothermal use. Those regulations and processes can be significantly different from country to country and also between regions within one country. Therefore, a detailed questionnaire (chapter 2.2) was elaborated to get an overview on these topics in the partner countries. LP GBA elaborated questions based on the analyses of other previous and ongoing projects as well as on international guidelines for geothermal systems. Analyses include the GRETA project, ReGeoCites, the German VDI-guidelines, the Austrian guideline “ÖWAV Regelblatt 207” (OEWAV rule sheet 207), the guideline “Environmental good practice guide for ground source heating and cooling” by the British Environment Agency and the dissertation of Stefanie Hähnlein (“Oberflächennahe Geothermie - Nachhaltigkeit und rechtliche Situation”, 2013).

First, we identified criteria (see chapter 2.1) that represent important factors concerning the operation and installation of geothermal systems. Those criteria are also recognized as decisive factors for the legal requirements, policies and regulations of geothermal systems.

Second main topic is how the use of geothermal energy is regulated and executed in the partner countries. This includes on the one hand laws that are obligatory and on the other standards or (technical) guidelines whether they are obligatory or seen as recommendations. Documents are identified on a national, regional and local scale and have to be listed and described.

Partners then had to describe the implementation of those legal requirements and technical recommendations into licencing procedures and the role of the identified installation and operation criteria.

Therefore a two-part questionnaire was given to GeoPLASMA-CE partners. Questions were asked in an informative way to get an insight into each country’s regulation and a first impression of the differences between countries. Criteria were used without an evaluation of their importance. For this deliverable, the main question is how and how much the partner countries regulate SGES.

Results are then presented for each country and are compared in text and graphical presentations.



## 2.1. Criteria for planning, construction and monitoring geothermal sites

In total 43 criteria were selected for the questionnaire. The range of topics is very complex and often overlapping. The criteria can roughly be split up in two groups concerning the installation and operation of geothermal systems. Each group can be divided into sub-groups and is explained in the following chapters.

### 2.1.1. Installation criteria

Geological and geographical conditions, including endangered zones and areas of public interest are summed up as installation criteria. They build the first step for the planning of SGES and can limit the installation. All criteria are well known as areas where the installation of SGES can be difficult or subjected to risks (e.g. PK Geothermie, 2011, Stober and Bucher, 2014).

For the questionnaire, four regulation categories were defined to describe the awareness and the handling of those criteria in partner countries (Figure 1). The categories do not define the execution of the licensing procedure.

| LEGEND  | Explanation   |
|---|---|
| SGES not allowed  | The installation of SGES is not allowed due to present geological conditions or public interests.   |
| SGES allowed under special obligations or conditionally allowed | The installation of SGES is only allowed under special obligations or conditionally allowed due to present conditions or public interests.  |
| SGES not regulated  | The installation of SGES is not regulated. This means that present geological conditions or public interests are at this time not rated with regard to geothermal energy. As a result the installation of SGES is allowed under these conditions. |
| No topic in this country  | /   |

| LEGEND | Explanation   |
|--------|---|
|        | National/regional/local legally binding regulation  |
|        | Regulation by legally not binding instruments (like guidelines), but acknowledged as state of the art |
|        | No written regulations  |

Figure 1: Top: Possible regulations of criteria limiting the installation of SGES. Bottom: Possible regulations for installation, implementation and operation criteria.



### 2.1.1.1. Special geological conditions and endangered zones

Inconsiderate installation of SGES in areas with special geological conditions or endangered zones can cause a number of problems. Results can be problems with installation or operation of the SGES as well as environmental damage. Being aware of these conditions and using protective measures can reduce problems and risks many times over.

- Artesian aquifers
- Very shallow water table where reinjection can be problematic
- Perched groundwater layers
- Two or multiple aquifer layers
- Mineral water resources
- Thermal water resources
- Gas occurrences
- Mining areas
- Evaporates
- Swellable rocks
- Karst area
- Flood and erosion area
- Landslide area
- Coastal zone

### 2.1.1.2. Areas of public interests

- Water protection zone
- Nature protected ecosystem area
- Contaminated soil

## 2.1.2. Operation criteria

If the installation of a SGES is allowed by whomever, building and operation are also subjected to rules and limitations. Summed up as operation criteria those limitations are protective measures against environmental impacts by the SGES and to malfunctions.

The group of operation criteria is divided in criteria valid for all systems, criteria valid for open loop systems or closed loop systems.



#### 2.1.2.1. Operation criteria valid for all systems

- Drilling below groundwater table allowed
- Minimum distance to neighbouring plots
- Minimum distance to buildings
- Minimum distance to neighbouring wells
- Minimum distance to neighbouring closed loop systems
- Groundwater investigation necessary
- Certification for drilling companies needed
- Numerical simulations required

#### 2.1.2.2. Operation criteria valid for open loop systems

- Minimum distance between pumping and reinjection site
- Reinjection of groundwater
- Temperature difference between extracted and reinjected water
- Absolute allowed temperature range of reinjected water
- Allowed temperature change to other installations
- Accepted drawdown
- Pumping test obligatory

#### 2.1.2.3. Operation criteria valid for closed loop systems

- Minimum distance to other heat exchangers of the same installation
- Target value for the average initial and input temperature of the heat carrier fluid
- Regulations for heat-carrier-fluid type
- Regulations for refrigerant type
- Regulations for the backfilling of BHE
- Leakage test of ground loop and refrigerant tubing required
- Borehole drilling report
- Taking core samples required
- Thermal response test required
- Calculation of drilling depth required



## 2.2. Questionnaire

The questionnaire is based on the identified criteria and on questions concerning the legal regulation and licencing.

Therefore, batteries of questions to following four main topic areas were asked:

- Topic area A: Legal regulations/Licensing procedures
- Topic area B: Flow charts for licensing procedures in the pilot areas
- Topic area C: Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems
- Topic area D: Regulation elements for the installation, implementation and operation of shallow geothermal energy systems

Legal regulation and licencing procedures query national, regional and local conditions of SGES while flow charts and criteria concentrate more on the pilot areas.

The questionnaire was sent out in two parts. Part 1 contains topic A - Legal regulations and licencing procedures. The questions give attention to:

- Definitions
- Regulation of SGES in national, regional and local scale and the documents
- Licencing procedures and the responsible authorities
- Licencing documents
- Monitoring of SGES
- Liquidations procedures
- Flow charts of the licencing procedure in the pilot area

The flow charts from questionnaire part 1 were used to make a graphical interpretation of answers in topic area A. Flow charts contain the basic information for applicants to understand the process and identify the different steps. The next idea behind it is to make a very easy and short comparison of the licencing procedures of the pilot areas of GeoPLASMA-CE partner countries. The same was done in the GRETA-project. For GeoPLASMA-CE we adapted the style of the GRETA flow charts to make our results also comparable. The created flow charts represent the licencing procedures in the respective pilot area.

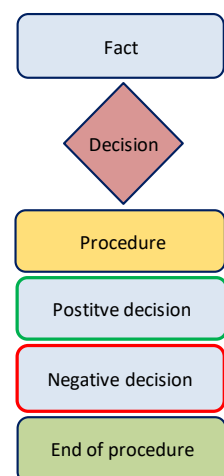


Figure 2: Symbols used for the flow chart. Shape and colour stand for specific steps within a licencing procedure. For the legend, the meaning is written in the elements.

Figure 3: Logo of the Interreg programme GRETA - Near-surface Geothermal Resources in the Territory of the Alpine Space



Part 2 of the questionnaire deals with the installation and operation criteria (see chapter 2.1) and their regulation. See the whole questionnaire in Annex 1.

**IMPORTANT NOTE:** As mentioned before, legal regulation and licencing procedures query national, regional and local conditions of SGES while flow charts and criteria concentrate more on the pilot areas. For convenience only, the report mentions the name of the country, with the exception to Germany, and not of the pilot area! The name of the processed pilot area is stated with the flow charts in chapter 4.3.4. In countries with more pilot areas, it is recalled.

### 3. RESULTS

#### 3.1. Country specific information

For detailed information, see the completed questionnaires from GeoPLASMA-CE partner countries in Annex 2-7.

## 4. COMPARATIVE STUDIES OF LEGAL REGULATION, LICENCING PROCEDURES AND CRITERIA

### 4.1. Definition of shallow geothermal energy

There are no official, legally noted definitions for shallow geothermal energy in all partner countries. Existing definitions are derived from explanations in methodical documents or some are derived from legal regulations, like drilling depth-regulations. Nevertheless, existing explanations define shallow geothermal by depth. Poland is the only country where two definitions are commonly used. Their minimum and maximum value, given with 100 m and 400 m, represent also the depth range of the partner countries (Figure 4).

The definition for geothermal energy itself can be summarized as follows: “Geothermal energy is the energy stored in the form of heat beneath the surface of the solid earth, used for heating and cooling.”

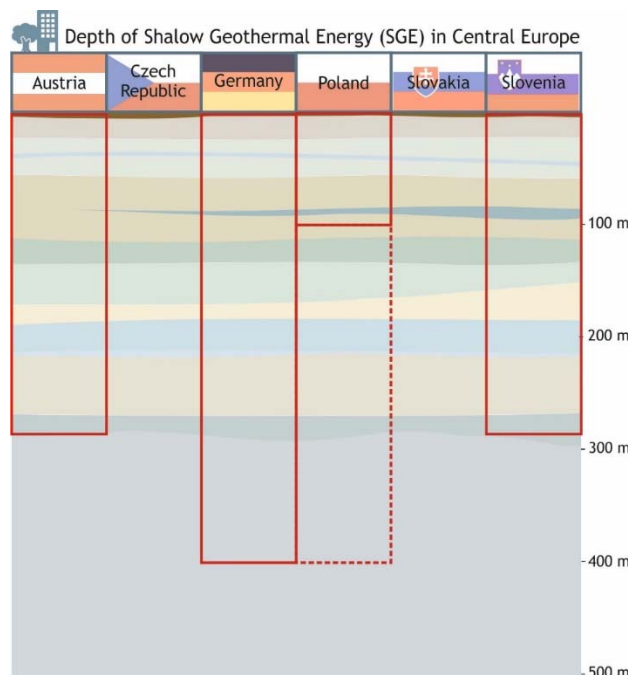


Figure 4: Graphical presentation of the depth limits for SGES in the GeoPLASMA-CE partner countries. Depths range between 100 and 400 m.

## 4.2. Legal framework

All partner countries have implemented SGES or geothermal energy in general into their legal framework. The thematic allocation varies from country to country and is as well dependent on the respective geothermal system.

Table 1 gives a summary of the legal framework and the following text a written explanation of the partner countries in GeoPLASMA-CE.

Table 1: List providing legally binding regulations dealing with geothermal energy in the partner countries. Note: Due to translation, some acts are slightly differently named in some countries but deal with the same topic!

Country abbreviations: AT... Austria, CZ... Czech Republic, DE... Germany, PL... Poland, SK... Slovakia, SI... Slovenia

| Document                                      | Partner countries  |
|---|--|
| Water act                                     | SI, SK, PL, DE, CZ, AT                                     |
| Mining act                                    | SI, PL, DE, AT (if depth > 300 m, not applicable for SGES) |
| Construction act                              | SI, PL, CZ   |
| Geological act                                | SK, DE, CZ   |
| Environmental protection act                  | PL, SI   |
| Act on support of renewable resources         | SK, PL   |
| Law on spatial planning                       | PL   |
| Decree on water protection area (local level) | SI, SK, DE, CZ, AT   |
| Decree on flood areas (local level)           | SK, CZ   |
| Land use local regulations                    | PL   |

### Austria

The Austrian Water Act 1959 represents the legal instrument. The Water Act regulates open loop systems in terms of extraction and reinjection of groundwater. For closed loop systems situations are stated where a submission for geothermal sites is necessary and how the submission is executed. Because the Water Act defines the regulation and application for geothermal systems very loosely, all federal states have their own rules for handling geothermal systems. General planning and management issues are governed by the administrative offices of the federal states in guidelines. The regional guidelines are not legally binding with regard to information that is not mentioned in the Water Act.

The Austrian Standards institute governs standards concerning shallow geothermal use. These standards are only legally binding if the legislator mentions them.

The NGO organization OEWA ("Österreichischer Wasser- und Abfallwirtschaftsverband", <http://www.oewav.at>), acting as an umbrella federation for service providers in water supply and waste business, also provides relevant guidelines for SGES.



The OEWAV rule sheet 207 - Thermal use of groundwater and soil - Heating and cooling - represents the most important guideline in Austria. The guideline is not legally binding, but it is generally considered as state of the art by the administrative authorities.

## Czech Republic

The Czech Water Act 254/2001 is a legal instrument for regulation of use of surface water as well as groundwater. The highest importance of use of water is water supply for population. Geothermal energy is not solved in Water Act, however the utilisation of shallow geothermal energy (SGE) comes across the problematics of extraction, reinjection of groundwater and the Water Act regulates issues concerning the risks of groundwater pollution and these topics.

The other legal instruments regulating the construction and utilisation SGE installations are Building Act 183/2006 and Geology act 62/1988. The SGE installations with depth impact lower than 30 m are solved by the permission based on the Building act. The Geology act regulates the drilling works deeper than 30 m when Regional Mining Authority supervises these works. In this case the permission according Building Act is required as well for surface parts of a construction.

The non-legislative guidelines and recommendations for SGE utilisation exist side by side the legally binding acts. The most important is methodical recommendation "Utilisation of energy potential of groundwater and rock environment by means of heat pumps" issued by Czech Ministry of Regional Development. Despite this recommendation is not legally binding, the permitting authority may force some requirements according this guideline if it is mentioned in the permitting authority statement.

Czech legal framework does not have stated the definition for shallow geothermal energy neither for source of geothermal energy and it does not solve the ownership of the geothermal energy. Some definitions covering this topic are spread in several non-legislative methodical documents.

## Germany

The Federal Water Act (WHG) regulates all aspects of water supplies and water economy. Geothermal energy use is regulated by the water act and has to be notified to the authorities if one or more of the following applies:

- any measures impacting on ground water
- any boreholes which might encounter groundwater
- any use of groundwater (extraction and injection, open loop)

The implementation of WHG is regulated in the legislation of each individual federal state. Thus, the WHG states the conditions under which a permission process has to be initiated, but how the process is defined in detail depends on state law.

Other documents like DIN-Regulations, ATV-Guidelines are only legally binding if the legislator mentions them. The guidelines of the DVGW and LAWA are not legally binding, but they are generally considered as state of the art by the administrative authorities.

Internal regulations (edicts or Erlass in German) for the geological surveys and local authorities, issued by the ministry of environment, are legally binding with regard to assessment of applications for geothermal plants and recommendations or requirements for the permission.



## Poland

All kind of regulations related to the installation and use of shallow geothermal energy in Poland have national level. In case of vertical borehole heat exchangers, the most important legal basis is “Geological and mining Law”. For horizontal installations and spiral-shaped installations, legal procedures are mostly gathered in “Construction Law”. Most important binding regulations for open loop systems are the Water Law, Environmental Protection Law and Law on the provision of environmental information and its protection, public participation in environmental protection and on environmental impact assessments.

The Polish Committee for Standardization is the organization responsible for regulating the standards for the installation of heat pumps and the use of shallow geothermal energy. Since January 1, 2003, the use of those standards is voluntary, except for public-funded activities under the Public Procurement Law, which imposes an obligation to consider them.

The PORT PC organization (“Polska Organizacja Rozwoju Technologii Pomp Ciepła“, - Polish Organization for Heat Pump Technology Development, <http://portpc.pl> ) deals with broadly defined heat pump technology and provides commonly noted guidelines. Those guidelines are not legally binding, but they are considered as best practice handbook.

## Slovakia

Legislation regulates drilling, building, construction and installation of geothermal systems and water protection. The responsible acts are focused on prospection of the geological environment, evaluation of the groundwater reserves and waste water discharges (including the thermally used water). None of the acts is regulating the energy stored and obtained from the geological environment.

The Slovak Water Act 409/2014, Coll. and the Geological Act 311/2013, Coll. represent the legal instruments. In Slovak legal framework there is no definition for shallow geothermal energy, though in the Geological Act, geothermal water and geothermal energy are defined:

- Geothermal energy is a heat energy with the source from residual heat of Earth and radioactive decay (Act 311/2013, Coll., §3, letter o).
- Geothermal water for groundwater with minimum temperature over 20 °C (Act 311/2013, Coll., §3, letter e).

The Geological Act regulates drilling works planning, executing and reporting - hydrogeological prospection. This applies to closed loop systems as well as open loop systems. For open loop systems, the Water Act is dealing with protection, efficient and economical exploitation, authorizations and obligations of the bodies of state water administration: Water is primarily used for drinking purposes. The utilization for other purposes is allowed - technical purposes, irrigation, etc. Water withdrawn from the ground has to be documented, reported and afterwards evaluated and approved by a commission (Hydrogeological commission acting under Ministry of Environment of Slovak republic). The outcome from this commission is basic information for local environmental offices for issuing the permission for water utilization.

Guidelines are given in Acts, Decrees and Slovak technical standards. Technical standards are not legally binding any more (they were till 1990-ties). Now they have recommendation form.

## Slovenia

The most used national legal instrument is the Slovenian Waters Act (No. 64/2002). The goals of this statutory law are: Prevention of pollution, recording and storage of research results, analysis of influence on water cycle, regulation of extraction, reinjection and monitoring of groundwater. For closed loop systems extraction fees, reinjection and monitoring are absent. The water act defines research permit, water



consent, water rights. In process of requiring research permits, the opinion of the local provider of public water supply is needed.

Second national legal instrument is the Slovenian Construction Act (No. 102/2004). This law only applies for pumping wells deeper than 30 m and to a greater extent to pumping wells deeper than 50 m, but shallower than 300m. For such pumping wells, a building permit is required. The goals of the Construction Act are similar to the Water act but pumping wells deeper than 50m requires a more detailed construction design, more control and review practices. In future a new building act is planned. On 01.06.2018 the Building Act, which is stricter for open loop systems, will replace the Construction Act.

The third national instrument is the Slovenian Mining Act (No. 61/2010). It is generally valid for all wells deeper than 300m. For such wells, it requires revised mining design and more control and review practices, which include mining, building, health and safety expertise. The Mining act also determines minimum distance between pumping and reinjection wells for open loop systems.

The most commonly used regulations for local areas are regulations that define drinking water protection areas.

Special areas like natural parks, cultural or natural monuments are protected by special national or local legislation (Nature Conservation Act). Causes for protection in these special areas are almost in all cases non-geological. Special permits, like nature conservation consent are usually needed. Only authority manages those special permits during the acquisition process of the research permit.

#### 4.2.1. Summary

All countries have legal requirements and recommendations like guidelines and standards for the installation and operation of SGES. Most important legally binding documents are the water act and the geological or mining acts. Those laws are implemented in all countries. Summed up, the water act is in the first place the main regulation element for open loop systems. The goal is to protect the groundwater with the regulation of

- Measures impacting on ground water (e.g. temperature change)
- Use of groundwater (e.g. extraction and reinjection)
- Groundwater contact (e.g. through drilling)

Mining, geology or construction acts mostly regulate the drilling works and environmental protection.

Most important fact is that none of those acts considers or is regulating the geothermal energy stored or obtained from the geological environment.

### 4.3. Licencing

The following chapter deals with the licencing procedures in the GeoPLASMA-CE partner countries and directives given by the European Union. The licencing procedures and required documents are presented for each country and afterwards evaluated according to EU-criteria.

#### 4.3.1. EU-Renewable Energy Directive

With the Renewable Energy Directive (2009/28/EC on the promotion of the use of energy from renewable sources, OJ L 140, 5.6.2009) the European Union published “... a central element of the Energy Union policy and a key driver for providing clean energy...” (Renewable Energy Progress Report, 2017). The directive also





includes an assessment of administrative barriers, to enhance future methods for licencing procedures. Administrative barriers, according to the directive, can delay or prevent projects with renewable energies. Therefore, six measures are asked from EU member states to be implemented into the administrative procedures for renewable energy systems.

- One stop shop (one responsible authority for the execution of a licencing procedure. This authority should also be easy to identify for applicants)
- Online application
- Maximum time limit for procedures
- Automatic permission after deadline passed
- Facilitated procedures for small-scale projects
- Identification of geographic sites



Figure 5: Administrative barriers in the EU in 2014 (from Energy Progress Report, 2017)

The summary of the Renewable Energy Progress Report (2017) shows for renewable energies in general that barriers remain (Figure 5 and 6).

|                 | One Stop Shop   | Online application | Maximum time limit for procedures | Automatic permission after deadline | Facilitated procedures for small scale producers | Identification of geographical sites |
|-----------------|-----------------|--------------------|-----------------------------------|-------------------------------------|--|--------------------------------------|
| Austria         | absent          | existing           | absent                            | absent                              | existing   | absent                               |
| Belgium         | existing        | partly existing    | existing                          | no information                      | existing   | partly existing                      |
| Bulgaria        | existing        | existing           | existing                          | existing                            | absent   | existing                             |
| Cyprus          | absent          | absent             | existing                          | absent                              | existing   | existing                             |
| Czech Republic  | absent          | existing           | existing                          | absent                              | existing   | existing                             |
| Germany         | existing        | existing           | existing                          | existing                            | existing   | existing                             |
| Denmark         | partly existing | existing           | existing                          | existing                            | existing   | existing                             |
| Estonia         | absent          | existing           | existing                          | existing                            | absent   | absent                               |
| Greece          | existing        | existing           | existing                          | absent                              | existing   | existing                             |
| Spain           | absent          | absent             | existing                          | absent                              | existing   | absent                               |
| Finland         | absent          | absent             | absent                            | absent                              | existing   | existing                             |
| France          | existing        | existing           | existing                          | absent                              | existing   | existing                             |
| Hungary         | absent          | existing           | existing                          | absent                              | existing   | existing                             |
| Croatia         | absent          | absent             | existing                          | no information                      | existing   | partly existing                      |
| Ireland         | absent          | existing           | existing                          | absent                              | existing   | existing                             |
| Italy           | existing        | absent             | existing                          | absent                              | existing   | absent                               |
| Lithuania       | absent          | existing           | existing                          | existing                            | existing   | no information                       |
| Luxembourg      | existing        | existing           | existing                          | absent                              | no information                                   | existing                             |
| Latvia          | absent          | absent             | existing                          | absent                              | absent   | absent                               |
| Malta           | existing        | existing           | existing                          | absent                              | existing   | existing                             |
| The Netherlands | existing        | existing           | existing                          | existing                            | existing   | existing                             |
| Poland          | absent          | absent             | existing                          | absent                              | existing   | absent                               |
| Portugal        | absent          | existing           | existing                          | absent                              | existing   | existing                             |
| Romania         | absent          | absent             | existing                          | absent                              | absent   | absent                               |
| Slovenia        | absent          | absent             | absent                            | absent                              | absent   | absent                               |
| Slovakia        | absent          | absent             | existing                          | absent                              | existing   | absent                               |
| Sweden          | existing        | existing           | existing                          | existing                            | no information                                   | existing                             |
| United Kingdom  | existing        | absent             | existing                          | absent                              | existing   | absent                               |

Figure 6: Availability of measures for administrative procedures in the EU in 2014 (From Energy Progress Report, 2017)





### 4.3.2. Licensing procedure

#### Austria

Concerning the assessment of SGES the offices of the national states are represented by the district offices (“Bezirkshauptmannschaften”), which are responsible for regulation issues.

In general, there are two declaration systems in Austria, a permitting procedure and a simplified notification procedure. One difference between both is that the permitting procedure includes building negotiations with neighbours. The second distinction is the appointed time from submission till decision. For installations submitted via notification procedure the time from submission till decision is 2 months at the most, while for installations via permitting procedure no specified time is given. Building and operating requirements laid down by the water agency are mandatory for systems licensed with a permitting procedure and self-obligating in a notification procedure.

The choice of the licensing procedure depends on the geological setting, on water protection zones and possible interactions with other water rights and public installations.

For open loop systems the permitting procedure is always mandatory. For closed loop systems affecting other installations and water rights, also the permitting procedure is mandatory. Other closed loop systems must be submitted via notification procedure only when they lie within a water protection zone or in a sensitive location. The water authority reserves the right to change the applied procedure if necessary due to the circumstances. This is typically if the agency has a suspicion that other water rights or public installations could be influenced.

Sensitive locations are defined by the federal states and can be:

- Karst areas
- Contaminated sites
- Areas with unstable ground
- Areas with confined groundwater
- Gas occurrences
- Thermal or mineral water resources
- Evaporites

Licensing procedures always end with the notification of completion and the acceptance by the responsible water agency. Users are then obligated to keep an operating diary.

Installations where no licensing procedure is necessary are not subjected to any other actions. Therefore, they are not recorded at the water agencies and potential damage to surroundings would be undetected or not assignable.

Each national state provides its own information (mostly guidelines) concerning the regulation of geothermal systems. Basic information is available via the internet platforms of the national states. Detailed information concerning the exact location is provided by telephone consultation. Most national states provide geological information and information on existing open loops systems via GIS-applications (“Wasserbuch”) and for more detailed information by telephone consultation. Some national states, like Salzburg and Vienna, also provide maps of SGES potential for open and closed loop systems.

For submission of application forms, the local departments of the water authorities are the entry points. The water authorities in general belong to the Ministry of Agriculture, Forestry, Environment and Water



Management. The water authorities exclusively carry out the licensing and possible interactions with other license holders.

Documents submitted to the local water authorities are forwarded to the federal state government water agencies for a second proof.

The granting for systems handled with a notification procedure is valid for 25 years and regulated within the water act. For systems handled with a permitting procedure, the period is set individually. After expiry of the granted period, a request for an extension has to be submitted to the water authorities.

### Czech Republic

There is at least one procedure needed in case of licensing procedure for SGES. It is licencing from the local building authority or from the regional authority if the borehole is deeper than 30 m. In this case the regional mining authority also supervises the drilling works.

Open loop systems additionally always need a license from the local water authority. It sets limits of water pumping in case of an open loop system.

Closed loop systems need this license only in specific cases (it is not exactly determined in which cases).

The procedure takes different time. It depends how difficult the procedure is. One law act takes up to 30 days. Granted construction permit last forever until HP is build.

### Germany

Each federal state of Germany has its own regional procedure of licencing, regulated by their regional rules/laws (in Saxony: Sächs.WG). In some federal states, each authority has to be notified separately via corresponding forms. Often, either the drilling contractor or the planner obtains the required permissions and notifications on behalf of the applicant.

In some federal states, the notifications and applications have to be submitted by an authorized expert. It may also be necessary to provide a survey report with the application forms. This is not the case in Saxony.

In general, for open loop systems and closed loop systems, the permitting procedure is mandatory.

Closed loop systems:

First, an application for drilling activities has to be submitted to the local environmental authority, represented by the water authority, as per §49 WHG. Additionally, an application for drilling has to be submitted to the regional geological survey as per Lagerst.G.

If the geothermal borehole is deeper than 100 m and/or the usage will influence across property borders, the well has to be applied to the regional mining authority. Additionally, an approval of the Federal Office for the Safety of Nuclear Waste Management (BFE) is required for drilling deeper than 100 m.

In Saxony, the online portal ELBA.SAX provides a one-stop shop for permitting vertical BHE and notifying all relevant authorities, i.e. up to four steps are performed automatically.

The relevant authorities check the legal (water act) and (hydro-)geological situation. If the location and the application are deemed safe, a permission for drilling (and/or permission to look for and use geothermal energy by mining proceeding) will be given.

In Saxony, a special requirement applies to geothermal installations exceeding 30 kW heating capacity. In this case, a pilot well has to be drilled. A TRT measurement and a pumping test have to be performed. Based on this data, the design of the geothermal plant has to be calculated. The design is submitted to and verified by the geological survey which then gives recommendations to the water authority.



Open loop systems:

First, an application for drilling and implementation of pumping and reinjection tests has to be submitted to the local environmental authority, represented by the water authority. Additionally, an application for drilling has to be submitted to the regional geological survey as per Lagerst.G.

If the geothermal borehole is deeper than 100 m and/or the usage will influence across property borders and/or it is a commercial application, the well has to be applied for with the regional mining authority.

If the yield and water quality is sufficient, the application for the permission to use a groundwater heat pump can be submitted to the local water authority. After reviewing all issues, permission to build and use the groundwater heat pump including drilling of additional wells is given.

The licencing procedure takes at least four weeks. The granting is generally unlimited, but in some cases restricted to 20 years.

In Saxony, the water authorities' permitting process for open-loop systems is not yet integrated into ELBA.SAX, i.e. until 2019, applicants have to submit a separate application to the water authorities in addition to the online notification.

## Poland

There are some main differences in legal procedures between open loop systems and closed loop systems.

Open loop systems are not widespread in Poland. Strong influence on environment requires fulfilling many legal procedures, which involve the execution of specialized analyses and hydrogeological studies. The need to develop the environmental and water condition report, obtain a Water Law permit with the decision on the environmental condition (requirements of the "Water Law", "Environmental Protection Law" and "Law on the provision of environmental information and its protection, public participation in environmental protection and on environmental impact assessments"). Complicated formal and legal procedures are the main cause of the lack of popularity of open loop systems.

Much more widespread are closed loop systems. They are showing significantly less environmental impact, which results in relatively less legal requirements. In case of vertical borehole heat exchangers, the most important legal basis is "Geological and mining Law". For the horizontal installations and spiral-shaped installations, legal procedures are mostly gathered in "Construction Law".

Requests for permission to start construction of SGES installations should be submitted to the office of the District Head. In case of drilling boreholes more than 30 m deep, both for closed and open loop system installations the requirements specified in the Geological and Mining Law should be fulfilled. Drilling of boreholes located in the mining area and holes with a depth of more than 100 m, regardless of the area, must be reported to the Regional Mining Authority. For open loop systems another application is made to the Department of Environmental Protection, which, after consultation with the State District Sanitary Inspector, issues a permit to commence work. In both cases, the public administration authorities of district level ("Starostwo powiatowe") have 30 days to consider the applications. If there are no objections after the 30 days since the application has been submitted, the installation can begin. Start of work must be reported 2 weeks before the first construction activities. Water Law permit for GWHP is issued for 10 years.

## Slovakia

All the boreholes (for any purpose) are at first drilled under the Geological Act. The responsible entity is the Ministry of Environment. Geological and hydrogeological prospection in case of open loop systems include drilling, pumping test (performed by licenced company). The final report form states the outcomes of the geological survey. If groundwater is used the report should contain a calculation of approved amounts of ground water that are available for utilization. The project is filed in the central register of geological



works (managed by SGIDS, Geofond). Drilling projects under 10 m (or total value less than 1000 Euro) are not filed.

After the geological survey is done, boreholes that come to the permanent utilization have to be „re-classified“.

There is no special/specific licencing procedure for permitting shallow geothermal systems installations. Generally, three possible methods/setups for shallow geothermal energy systems are present:

- Horizontal, closed loop system - There is no mention in legislation for this method of installation. The rules for „earth works“ (digging works) are part of the Building Act (Note: no information about this practice).
- Vertical, closed loop system - After the geological survey is done boreholes that come to the permanent utilization have to be „re-classified“ as a „building structure“ based on Building Act. The purpose of the drilling and borehole and way of utilization should be stated in condition of the utilization by the local construction office (Note: no information about the practice).
- Open loop system - All boreholes that come to the permanent utilization are „re-classified“ as a „water work“ based on the Water Act. The purpose of the well is stated in condition of the utilization by the local construction office. Responsible authority for reclassification is the Ministry of Environment (MoE) and local environmental office states the conditions for pumping, utilization and emission of the used water to the ground.

The Hydrogeological comity under the Ministry of Environment (MoE) evaluates the final report. The MoE states the amount - issues the permission for approved volume of the water that can be pumped/utilised. If less than 0.5 l/s (or 1250 m<sup>3</sup> per month or 15000 m<sup>3</sup> per year) is pumped (used) an evaluation by comity is not needed. State Water Administration Department of Environmental Care / District Environmental Office process the next step: the Water permit.

Based on evaluation the regional environmental office issues the permission for water abstraction and states conditions for water reinjection or emission into surface water.

The duration of the procedure varies. Usually from application at the District Environmental Office till issuance of the permission it takes 1 month.

## Slovenia

For closed loop systems there are permitting procedures in case of drilling into the aquifer. This installation requires the research permit and water consent. For open loop systems there are permitting procedures in any case: research permit and water consent are required for the construction of installation. Water right is required for operation, i.e. water abstraction.

Water consent is required for interventions/constructions on waterside and coastal land, on protected areas or natural risk zones, for water abstraction, waste water emissions or where impact on groundwater is possible (aquifer recharge, reinjection) as well as for other interventions/constructions that could have impact on water regime (Waters Act, A. 150).

New Rules on the recorded special use of water (Ur. l. RS, no. 48/15 in 62/16) is introducing simplified water permit procedure. From 1.10.2018 on, these rules will be operational and “facilitated procedures for small scale producers” will be applied for open loop systems.

Conditions for simplified water permit procedure:

- Water is abstracted from aquifer by well or from the sea (not from spring or surface water)
- Groundwater research permit was already obtained, if required
- Location not on water protection area



- Heat power < 16 kW
- Groundwater is not abstracted from thermal water aquifer ( $T < 20 \text{ }^{\circ}\text{C}$ )
- $L > 50$  m from observation well in national monitoring network (owned by the governmental institutions)
- In accordance with river basin management plans
- In accordance with legislation of drinking water supply
- All abstracted water has to be returned in the same aquifer

The permitting procedure for drilling in aquifer is managed on national level by Slovenian Water agency, which is a body affiliated to the Ministry of the Environment and Spatial Planning.

For pumping wells deeper than 30 m a building permit is required the permitting procedure is managed on national level by the Ministry of the Environment and Spatial Planning. For wells in depth between 30 and 50 m simple construction design is required for building permit.

For open loop systems water right is obligatory. For vast majority of uses water right is water permit. If open loops systems use thermal water then water right is a concession.

Water right defines quantity of water abstraction, water-fee and monitoring.

Responsible authorities for the different permits and the water consent are:

- State water protection authority - Slovenian Water Agency (Research permit)
- Local or state water protection authority - Slovenian Water Agency (Water consent)
- Local Building Authority - administrative unit of Ministry of the Environment and Spatial Planning (Building permit)
- State water protection authority - Slovenian Water Agency (Water permit)

The procedure for research permit or water consent takes around 14 days, for building permit 3 weeks, for water right depends on complexity of the case.

### 4.3.3. Documents

#### Austria

The submission for geothermal systems requires general data about the system and about the operator. For example:

- Regulatory information about the property where the geothermal system is installed (e.g. the owner, appertaining water rights),
- Geological and geographical information about the property where the geothermal system is planned to be installed,
- Technical details of the installation (e.g. heat pump type, heating/cooling power, depth of installations),
- Operational details (e.g. operational temperatures, water extracting rate).



Application forms are partly provided by the federal states but are not mandatory. Submission documents just need to contain predetermined information! This information is predetermined by the legislator (Water act 1959) and can be extended by the national states.

Application forms or submission documents are the same for both procedures. Information about this and about geothermal systems in general can be found in guidelines of the national states of Austria.

In general, there is one application form or one submission report to submit. Online application via special online tools is at the moment not possible in Austria. However, application can be done via e-mail.

### Czech Republic

The standardised application forms do not exist in the CZE. It is solved by individual communication with the local authority. Online application is not possible in the Czech Republic.

### Germany

Each federal state has its own application forms (templates). There are different documents for different legal procedures, e.g. closed and open loop systems. The submission for geothermal systems requires general data about the system and about the operator. In general, the following are obligatory (extract):

- the location,
- name of the owner,
- name of the drilling company and/or planner,
- certifications of drilling companies,
- number and depth of boreholes,
- heat/cooling capacity of the heat pump,
- drilling diameter,
- grouting,
- type of carrier fluid inside of heat pipes
- for open loop additionally: groundwater yield, water quality (chemistry)

Online application is available.

### Poland

Closed loop: Boreholes drilled for the purpose of using earth's heat, with a depth of less than 30 m, are not subject to the provisions of the Geological and Mining Law and do not require notification for geological administration. However, it is advisable to report all kind of work and to provide geological/hydrogeological data from the borehole, which will then serve scientific purposes in geological exploration and environmental control.

For a borehole of 30-100 m depth the Geological and Mining Law states, that planning and geological research for the use of earth's heat is a geological work, and that the intention to implement it should be reported in the form of a "geotechnical site investigation plan (GSIP)" to the competent geological administration authorities. If, within 30 days of submission of the GSIP, the district head does not raise objections, the work can begin.





For a borehole of 30-100 m depth located in the mining area a "mining works operation plan" should be developed in addition to the "geotechnical site investigation plan".

For a borehole with a depth of more than 100 m, both the "geotechnical site investigation plan" and "mining works operation plan" must be prepared and approved by the District Mining Authority.

Table 2: Required documents for application in Poland depending on borehole depth and location.

| depth [m]<br>depth of borehole     | geotechnical site investigation<br>plan | mining works operation plan |
|------------------------------------|---|-----------------------------|
| >30 (outside the mining area)      | NO                                      | NO                          |
| >30 (in the mining area)           | YES                                     | NO                          |
| 30 - 100 (outside the mining area) | YES                                     | NO                          |
| 30 - 100 (in the mining area)      | YES                                     | YES                         |
| > 100 (regardless of area)         | YES                                     | YES                         |

After completion of the works and studies, the contractor shall submit geological documentation (drilling report) of the borehole within 6 months of completion of the project. Documentation is forwarded to the relevant geological administration authorities.

Open loop: Same procedure as closed loop for the drilling, but there is a special GSIP for water pumping wells necessary. In addition, a hydrogeological estimation of the site has to be reported in the first step of the procedure. The submission for the water permit requires a water condition report and an environmental impact report.

## Slovakia

The application itself is the final report from prospection or evaluation of hydrodynamic (pumping) testing. In the objective of the study the purpose of geological works has to be clearly stated. The applicant also has to describe the purpose of the water use. The structure of the final report is given in the Geological Act. Otherwise, standardised application forms or online applications do not exist in Slovakia.

Documents needed for application and issuance of the water permit are:

- the final report of the hydrogeological survey;
- the decision of the MoE on the approval of the final report with the calculation of groundwater quantities;
- Hydrogeological report according to § 37 par. 1 of Act no. 364/2004 Z.z. about water;
- Waterworks project; statement/evaluation from the office of water-related significant watercourses (SVP sp.p.)

**Slovenia** The standardised application forms exist separately for water authority (separately for research permit and water consent) and building authority. The complexity of application documents depends on the depth of the well and if the well is a pumping well.

- Research permit



<http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/VodnePravice/RPV.doc>

- Water consent

[http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/PravicaGraditi/Vloga-VodnoSoglasje\\_Priloga1.doc](http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/PravicaGraditi/Vloga-VodnoSoglasje_Priloga1.doc)

- Building permit (for pumping well in depth from 30 to 50 m)

<https://e-uprava.gov.si/.download/vloge/dokumenti/11179/file-content>

- Building permit (for pumping well in depth from 50 to 300 m)

<https://e-uprava.gov.si/.download/vloge/dokumenti/11178/file-content>

- Water right

<http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/VodnePravice/Tehnoske.doc>

Application forms are available online. Forms and appendixes can be sent to the authority by e-mail.

#### 4.3.4. Evaluation of the GeoPLASMA-CE partner countries according to the EU-directives for administrative procedures

Simple licencing procedures can be an important tool for fostering renewable energy systems in general. For GeoPLASMA-CE the evaluation is based on the EU directive 2009/28/EC on the promotion of the use of energy from renewable sources (OJ L 140, 5.6.2009). Focus is here on five of the six described administrative barriers (see also chapter 4.3.1 of this report). The identification of geographic sites was not asked as part of licencing procedures for this project at this time. Tables 12 and 13 identify based on the descriptions from the partners and the created flow charts the practice of “one-stop-shop” in terms of involved entities and the number of steps during the procedure. Flow charts also help to identify facilitated procedures for SGES.



Austria - Vienna

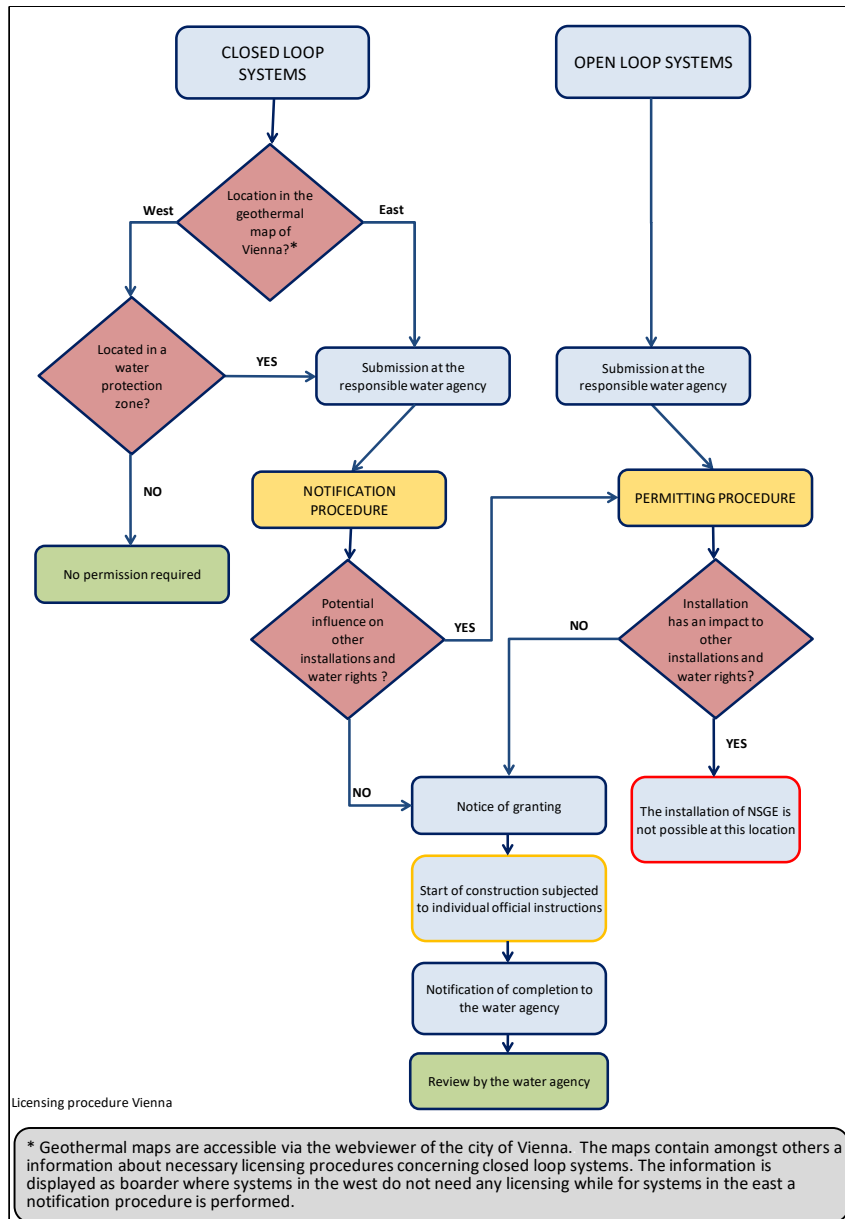


Figure 7: Flow chart of Vienna

Table 3: Implementation of the administrative measures from the EU- Renewable Energy Directive in Vienna

| AUSTRIA - Vienna                           |          |  |
|--|----------|--|
| <b>One stop shop</b>                       | existing | For all SGES the only responsible authority is the water authority |
| <b>Online application</b>                  | existing | Via email  |
| <b>Max. time limits</b>                    | existing | 60 days. Only if a facilitated procedure.                          |
| <b>Automatic permission after deadline</b> | existing | Only if a facilitated procedure.                                   |
| <b>Facilitated procedures</b>              | existing | Notification procedure for closed loop systems.                    |

AUSTRIA - Lower Austria (Part of PA Vienna and Bratislava)

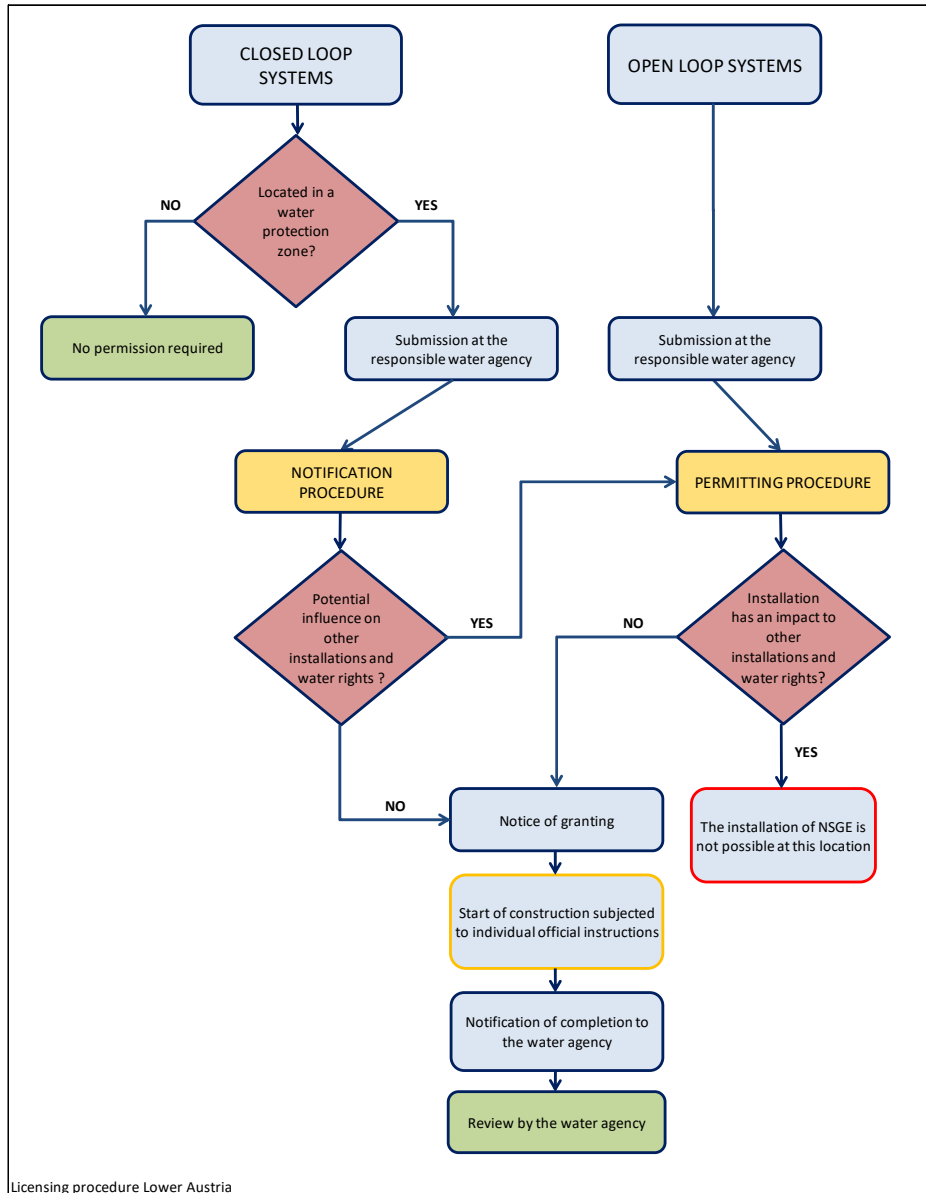


Figure 8: Flow chart of Lower Austria (part of the PA Vienna and Bratislava)

Table 4: Implementation of the administrative measures from the EU- Renewable Energy Directive in Lower Austria

| AUSTRIA – Lower Austria                    |          |  |
|--|----------|--|
| <b>One stop shop</b>                       | existing | For all SGES the only responsible authority is the water authority |
| <b>Online application</b>                  | existing | Via email  |
| <b>Max. time limits</b>                    | existing | 60 days. Only if a facilitated procedure.                          |
| <b>Automatic permission after deadline</b> | existing | Only if a facilitated procedure.                                   |
| <b>Facilitated procedures</b>              | existing | Notification procedure for closed loop systems.                    |



**AUSTRIA - Burgenland (Part of Bratislava)**

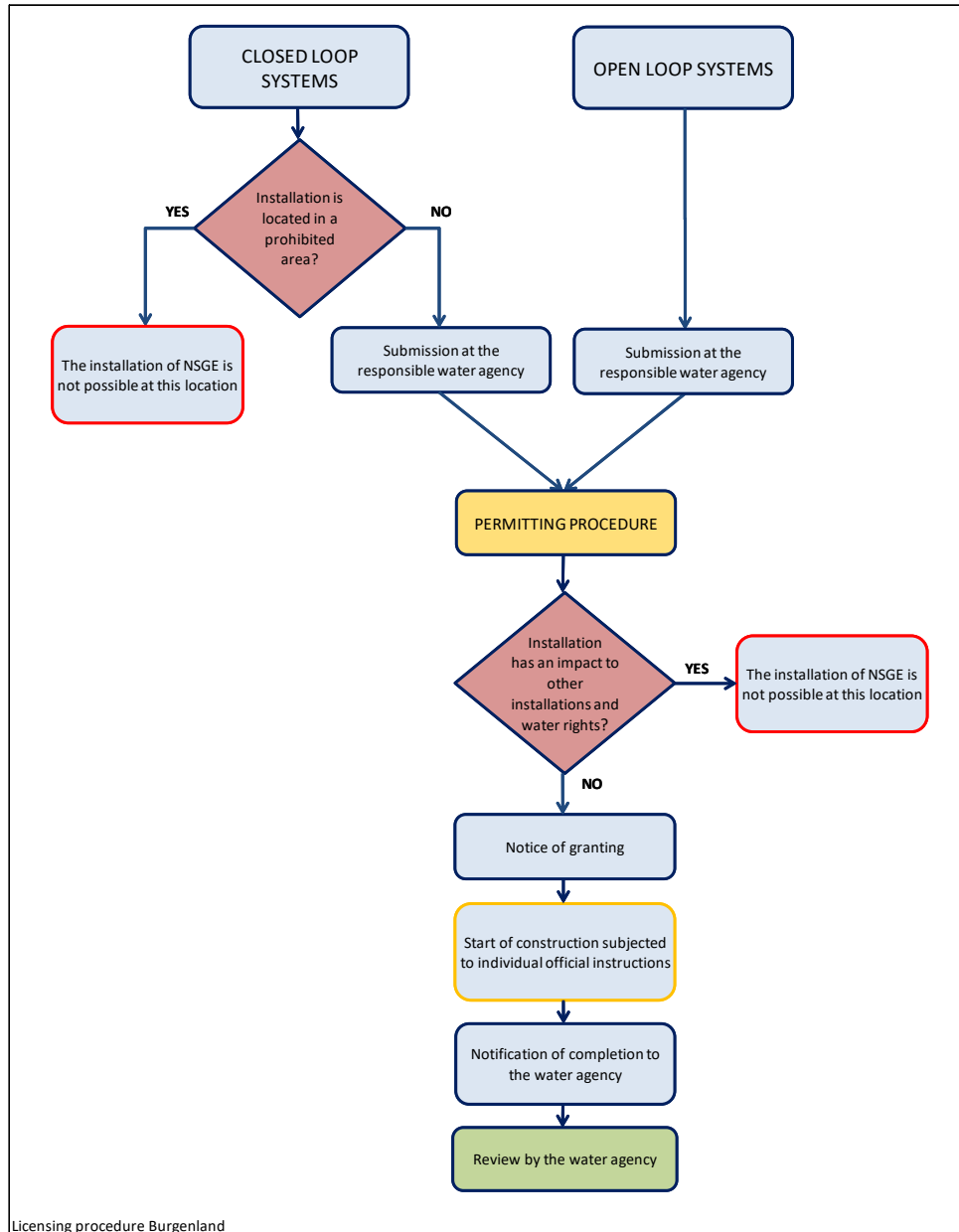


Figure 9: Flow chart of Burgenland (part of PA Bratislava)

Table 5: Implementation of the administrative measures from the EU- Renewable Energy Directive in Burgenland

| AUSTRIA - Burgenland                       |          |  |
|--|----------|--|
| <b>One stop shop</b>                       | existing | For all SGES the only responsible authority is the water authority |
| <b>Online application</b>                  | existing | Via email  |
| <b>Max. time limits</b>                    | absent   | /  |
| <b>Automatic permission after deadline</b> | absent   | /  |
| <b>Facilitated procedures</b>              | absent   | /  |



Czech Republic - Broumov

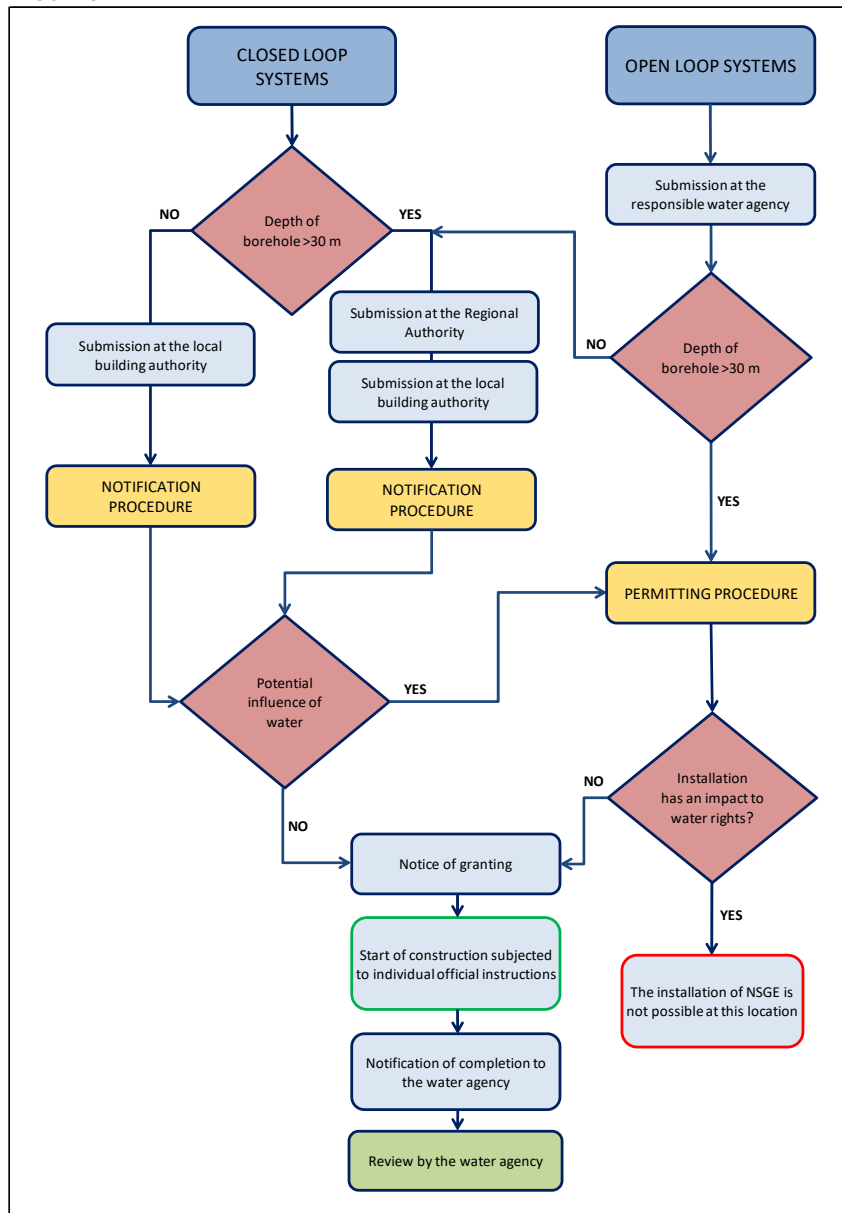


Figure 10: Flow chart of the permission procedure in the Czech Republic

Table 6: Implementation of the administrative measures from the EU- Renewable Energy Directive in Broumov

| CZECH REPUBLIC – Broumov            |          |   |
|-------------------------------------|----------|---|
| One stop shop                       | existing | Only if a facilitated procedure.  |
| Online application                  | absent   | /   |
| Max. time limits                    | absent   | /   |
| Automatic permission after deadline | absent   | /   |
| Facilitated procedures              | existing | Existing for closed loop systems and when no potential influence on water occurs. |

Saxony (Germany) - Closed loop systems

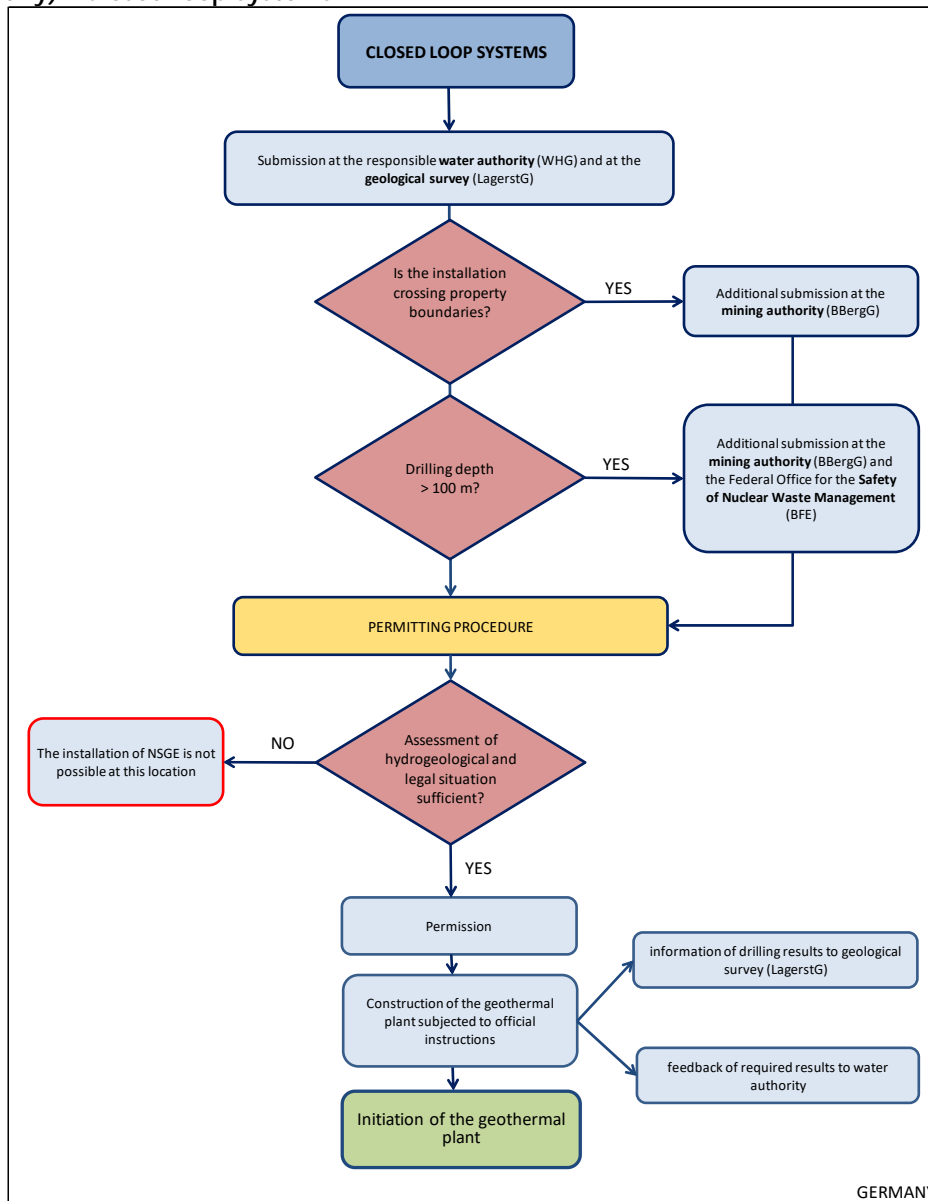


Figure 11: Flow chart for closed loop systems in Saxony, PA Vogtland

Table 7: Implementation of the administrative measures for closed loop systems from the EU- Renewable Energy Directive in Saxony

| SAXONY (GERMANY) – Vogtland                |          |   |
|--|----------|---|
| <b>One stop shop</b>                       | existing | The water authority is processing the whole procedure and confers with other authorities if necessary   |
| <b>Online application</b>                  | existing | yes   |
| <b>Max. time limits</b>                    | existing | one month   |
| <b>Automatic permission after deadline</b> | absent   | Work may start after deadline has elapsed; however, as soon as the groundwater level is reached, all work has to cease until the permission is obtained |
| <b>Facilitated procedures</b>              | absent   | Only one procedure for all closed loop systems  |

### Saxony (Germany) - Open loop systems

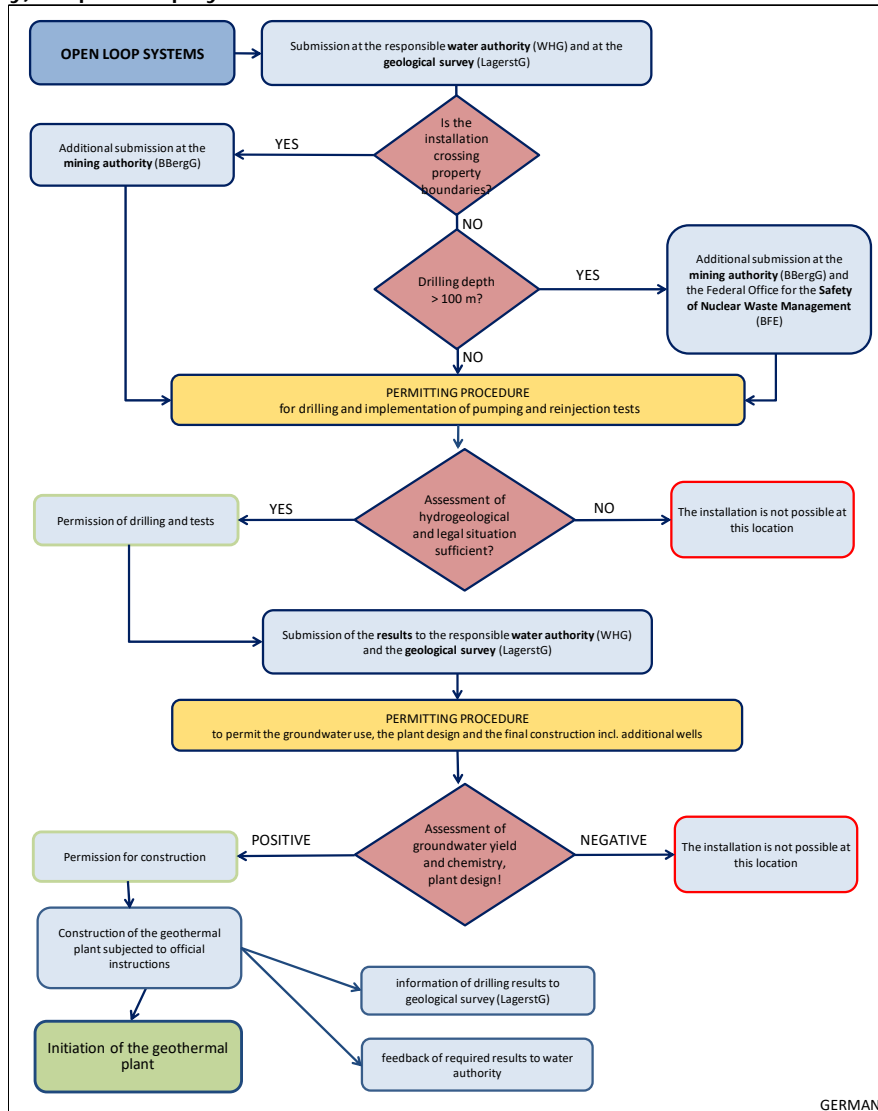


Figure 12: Flow chart for open loop systems in Saxony, PA Vogtland

Table 8: Implementation of the administrative measures for open loop systems from the EU- Renewable Energy Directive in Saxony

| SAXONY (GERMANY) – Vogtland                |          |   |
|--|----------|---|
| <b>One stop shop</b>                       | absent   | 2 procedures are necessary. One for drilling and pumping test and one for groundwater use and final construction.   |
| <b>Online application</b>                  | absent   | No, only the drilling notification is online. The forms required for obtaining permission from the water authorities are available online but have to be submitted by mail. |
| <b>Max. time limits</b>                    | existing | one month   |
| <b>Automatic permission after deadline</b> | absent   | Work may start after deadline has elapsed; however, as soon as the groundwater level is reached, all work has to cease until the permission is obtained                     |
| <b>Facilitated procedures</b>              | absent   | No discrimination between different open loop systems   |



Poland - Walbrzych

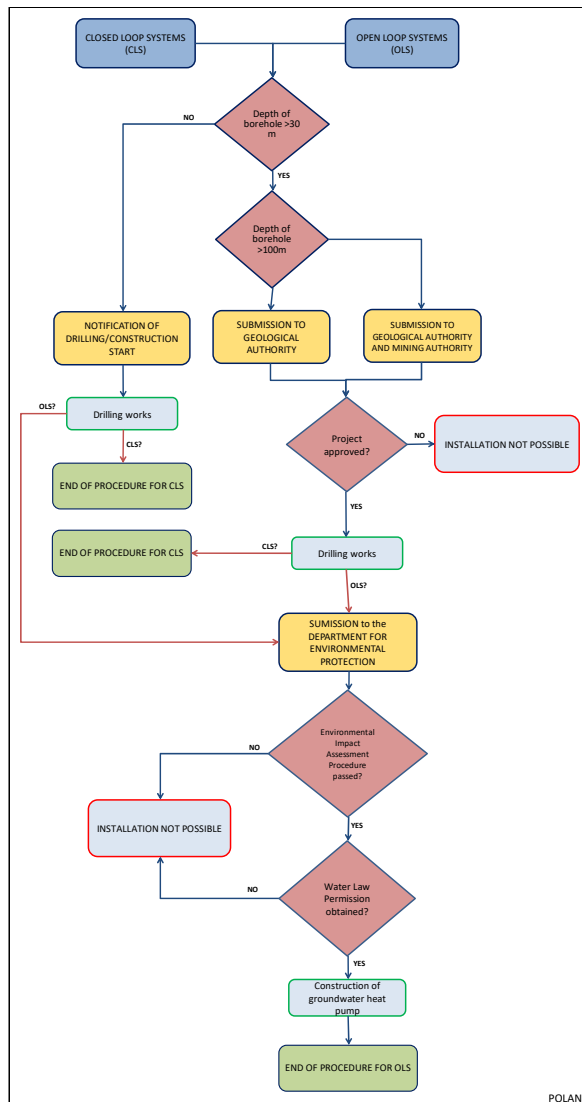


Figure 13: Flow chart of PA Walbrzych, Poland

Table 9: Implementation of the administrative measures from the EU- Renewable Energy Directive in Walbrzych

| POLAND - Walbrzych                         |          |  |
|--|----------|--|
| <b>One stop shop</b>                       | existing | Only if a facilitated procedure. Otherwise 2 procedures necessary. One for drilling and pumping and One for groundwater use and final construction. Each procedures works as a one-stop-shop-procedure |
| <b>Online application</b>                  | existing | yes  |
| <b>Max. time limits</b>                    | existing | 30 days  |
| <b>Automatic permission after deadline</b> | existing | yes  |
| <b>Facilitated procedures</b>              | existing | Only Notification of drilling needed for closed loop systems > 30 m.   |



Slovakia - Bratislava

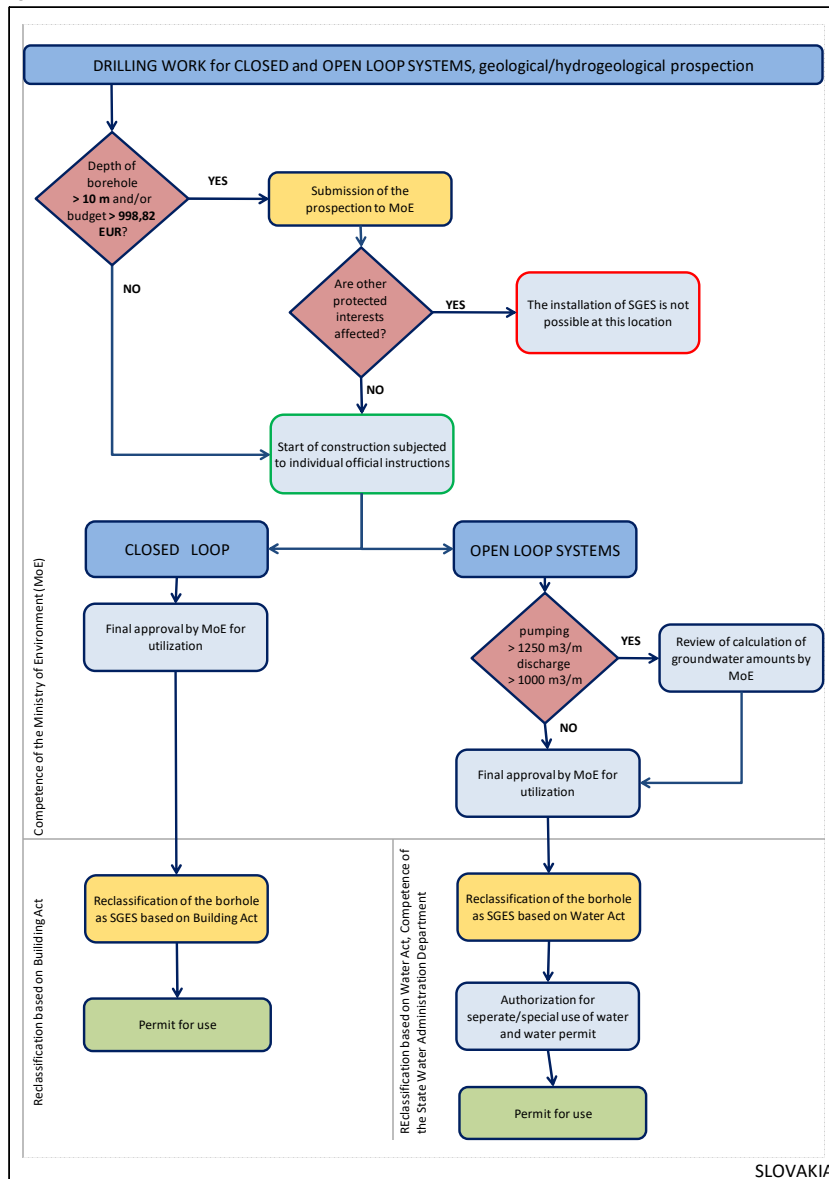


Figure 14: Flow chart of PA Bratislava, Slovakia

Table 10: Implementation of the administrative measures from the EU- Renewable Energy Directive in Bratislava

| SLOVAKIA - Bratislava               |        |   |
|-------------------------------------|--------|---|
| One stop shop                       | absent | In general 2 steps for the licencing required. First step is the submission of the drilling project. Afterwards the borehole has to be reclassified as geothermal energy systems. Both steps works as a one-stop-shop-procedure |
| Online application                  | absent | /   |
| Max. time limits                    | absent | /   |
| Automatic permission after deadline | absent | /   |
| Facilitated procedures              | absent | /   |





Slovenia - Ljubljana

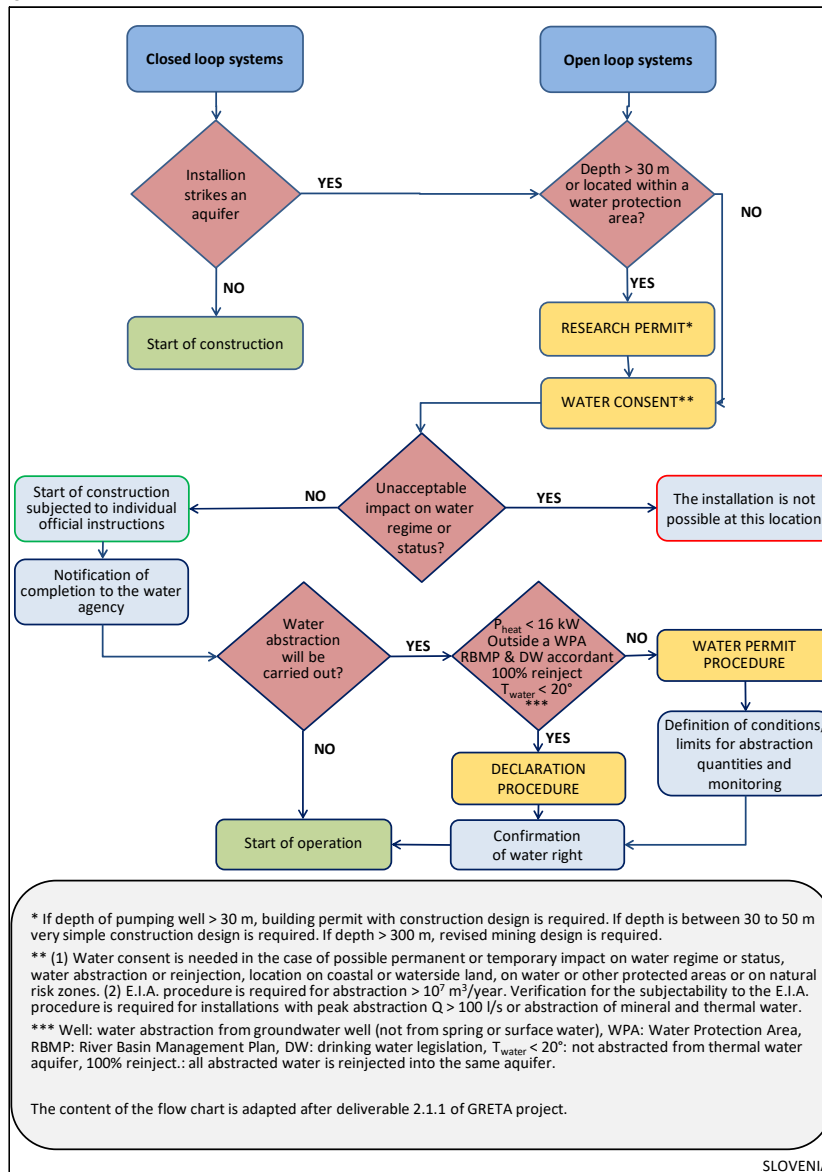


Figure 15: Flow chart of Ljubljana, Slovenia

Table 11: Implementation of the administrative measures from the EU- Renewable Energy Directive in Ljubljana

| SLOVENIA - Ljubljana                |          |  |
|-------------------------------------|----------|--|
| One stop shop                       | absent   | /  |
| Online application                  | existing | e-mail   |
| Max. time limits                    | existing | 120 days (two month for research permit and 60 days for water consent)   |
| Automatic permission after deadline | absent   | Absent for research permit<br>Existing for water consent (not for flood, costal, inner water protected and water side)   |
| Facilitated procedures              | existing | No procedure for closed loop systems when no aquifer is present.<br>Simplified procedure for open loop systems possible. |

#### 4.3.5. Summary

##### One-stop-shop

Table 12: Entities during a licencing procedure for SGES in the GeoPLASMA-CE partner countries. The numbering of the entities in the table is regardless of their order in the licencing process.

| Country          | Entity 1   | Entity 2  | Entity 3                               | Entity 4  |
|------------------|--|---|--|---|
| Austria          | Local or national water authorities                      |   |  |   |
| Czech Republic   | Local building authority                                 | Local water protection authority  | Mining authority                       |   |
| Saxony (Germany) | Water authority  | Geological survey   | Mining authority                       | Federal office for the safety of nuclear waste management |
| Poland           | District head responsible for mining and geological laws | Mining authority  | Department of environmental protection | State district sanitary inspector                         |
| Slovakia         | Ministry of Environment (MoE)                            | State water administration department of environmental care/<br>District environmental office | Building authority                     |   |
| Slovenia         | State water protection authority                         | Local water protection authority  | Local building authority               |   |

Table 12 sums up the entities involved in a licencing process. Table 13 shows the number of maximum steps from application till granting. One-stop-shop is carried out if the number of maximum active steps within the procedure is 1 for the applicant. Only Austria provides one-stop-shop procedures for both SGES, open and closed loop systems. In other countries, more steps have to be undertaken as a rule. This is because drilling and the geothermal system itself are treated as two different concerns. Considering active and passive steps no country has less than two steps. Poland and the Czech Republic have established facilitated procedures (e.g. for systems with little drilling depth) where also a one-stop-shop application can be done.

Table 13: The number of maximum steps (does not include steps like improvement of reports or resubmission) and minimum steps (in brackets) during a licencing procedure. Steps are separated into active and passive steps. Active means that these steps have to be done by the applicant. One-stop-shop is achieved if only one active step is present. Passive means that these steps are carried out by the authority where the licencing procedure is started.

| Installation                                |             | Austria | Czech Republic | Saxony (Germany) | Poland | Slovakia | Slovenia |
|---|-------------|---------|----------------|------------------|--------|----------|----------|
| Steps and documents for open loop systems   | Active      | 1       | 2              | 2                | 3      | 2        | 4        |
|   | Passive     | 1       |                | 4                | 1      |          | 1        |
|   | Total steps | 2       | 2              | 6                | 4      | 2        | 5        |
| Steps and documents for closed loop systems | Active      | 1       | 3              | 1                | 2      | 2        | 3        |
|   | Passive     | 1       |                | 3                |        |          | 1        |
|   | Total       | 2       | 3              | 4                | 2      | 2        | 4        |

## Facilitated procedures

Facilitated procedures are for smaller or decentralised sites if allowed by the legal framework. The EU directive calls them notification procedures. Austria, Czech Republic and Poland established those notification procedures for closed loop systems. Austria and Slovenia are the only countries with cases where no procedures are required for closed loop systems.

## Closed loop systems

Table 14: Summary of the compliance of the EU directive to reduce administrative burden for closed loop systems

|                         | <b>One stop shop</b> | <b>Online application</b> | <b>Maximum time limit for procedures</b> | <b>Automatic permission after deadline</b> | <b>Facilitated procedures for small scale producers</b> |
|-------------------------|----------------------|---------------------------|--|--|---|
| <b>Austria</b>          | existing             | existing                  | existing                                 | existing                                   | existing  |
| <b>Czech Republic</b>   | existing             | absent                    | absent                                   | absent                                     | existing  |
| <b>Saxony (Germany)</b> | existing             | existing                  | existing                                 | absent                                     | absent  |
| <b>Poland</b>           | existing             | existing                  | existing                                 | existing                                   | existing  |
| <b>Slovakia</b>         | absent               | absent                    | absent                                   | absent                                     | absent  |
| <b>Slovenia</b>         | absent               | existing                  | existing                                 | absent                                     | existing  |

## Open loops systems

Table 15: Summary of the compliance of the EU directive to reduce administrative burden for open loop systems

|                         | <b>One stop shop</b> | <b>Online application</b> | <b>Maximum time limit for procedures</b> | <b>Automatic permission after deadline</b> | <b>Facilitated procedures for small scale producers</b> |
|-------------------------|----------------------|---------------------------|--|--|---|
| <b>Austria</b>          | existing             | existing                  | absent                                   | absent                                     | absent  |
| <b>Czech Republic</b>   | absent               | absent                    | absent                                   | absent                                     | absent  |
| <b>Saxony (Germany)</b> | absent               | existing                  | existing                                 | absent                                     | absent  |
| <b>Poland</b>           | absent               | existing                  | existing                                 | existing                                   | absent  |
| <b>Slovakia</b>         | absent               | absent                    | absent                                   | absent                                     | absent  |
| <b>Slovenia</b>         | absent               | existing                  | existing                                 | absent                                     | absent  |

In general, the compliance of the European Renewable Energy Directive (Chapter 4.3.1) in content to reduce administrative burden is more integrated into procedures for closed loops systems than in those for open loop systems. Comparing the situation in GeoPLASMA-CE partner countries for geothermal systems with renewables in general (Figure 6), the situation is better for closed loop systems. Renewables (Figure 6) in general show 14 accordance for the GeoPLASMA-CE countries and the screened topics in EU-evaluation.



GeoPLASMA-CE closed loop evaluation shows 18 hits. Procedures for open loop systems result in only nine hits.

#### Documents

Required documents are easy to find and clear for all states. If information is not provided in guidelines, the authorities themselves give information about the content. In general the more complex the procedure, the more complex the documents.

### 4.4. Liquidation procedures

Liquidation procedures are only obligatory in Slovenia. The legal regulations are rules in criteria for the designation of a water protection zone. Saxony (Germany) includes the regulation and requirements for the liquidation in the permission documents and demands a notification to the responsible water authority. The process is regulated in a guideline. Austria has a guideline that describes the liquidation, but no instrument that demands it. In Slovakia boreholes not used after prospectation-works, require liquidation. However, no legal or methodical document solves liquidation. Czech Republic and Poland have no regulations concerning the liquidation of SGES.

### 4.5. Monitoring

No GeoPLASMA-CE partner country has any regulations concerning the monitoring of closed loop systems.

For open loop systems there are different handlings. Only Saxony (Germany) has no regulations or requirements for the monitoring of open loop systems. In Slovenia the monitoring of the quantity of abstracted water is obligatory (Water Act No. 67/2002).

For Poland, Austria, Slovakia and Czech Republic there is no legal requirement of monitoring heat pump installations itself. The order for monitoring depends on the installation and is then stated in the water permission.

### 4.6. Urban vs. non-urban areas

No country reports legal or recommended regulations that differ between urban and non-urban areas.

### 4.7. Flow charts

The created flow charts represent the licencing procedures in the respective pilot area. Flow charts are included in the working reports in ANNEX X and are presented in chapter 4.3.4.

### 4.8. Study of installation and operation criteria

The elaboration of criteria concentrates on the handling in the pilot areas. Regulations for criteria were asked as well.

Following chapters give an overview of the handling of installation, implementation and operation criteria and their regulation in the GeoPLASMA-CE partner countries, respectively their pilot areas. For convenience only, we mention the name of the country and not of the pilot area, with exception to Germany! The name



of the processed pilot area is stated with the flow charts in chapter 4.3.4. In countries with more pilot areas, it is recalled if necessary.

#### 4.8.1. Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems

The handling of the installation of SGES in special geological and geographical conditions can be regulated by national, regional or local regulations. This is the case for some criteria in Austria, Germany, Poland and Slovenia. Most of the time the regulation is executed via guidelines or rulesheets. These documents are not legally binding, but recognised as state of the art. Therefore, these recommendations play a decisive role in the licencing processes. Figure 16 provides an easy comparison of the legal situation and the known rules of thumb in the GeoPLASMA-CE partner countries, respectively pilot areas.

| Regulation element  | GeoPLASMA-CE Partner country |   |                |                  |        |          |          |
|---|------------------------------|---|----------------|------------------|--------|----------|----------|
|   | Austria                      |   | Czech Republic | Saxony (Germany) | Poland | Slovakia | Slovenia |
| Artesian aquifers   | *                            | * | *              | *                |        | *        | R        |
| Very shallow water table where reinjection can be problematic |                              |   | *              |                  | N      | *        |          |
| Perched groundwater layers                                    |                              |   | *              |                  |        | *        |          |
| Two or multiple aquifer layers                                | *                            | * | *              |                  |        | *        |          |
| Mineral water resources                                       | N                            | * | *              | N                |        | *        |          |
| Thermal water resources                                       | N                            | * | *              | N                |        | *        |          |
| Gas occurrences   |                              | * | *              | N                |        |          | N        |
| Mining areas  |                              |   | *              | N                | *      | *        | N        |
| Contaminated soil   |                              | * | *              |                  |        | *        |          |
| Evaporites (e.g. NaCl, gipsum)                                |                              |   |                |                  |        | *        |          |
| Swellable rocks (e.g. anhydrite, clay)                        |                              |   |                |                  |        | *        |          |
| Karst area  |                              |   |                |                  |        | *        |          |
| Water protection area   | N                            | N | *              | N                | N      | *        | N        |
| Nature protected ecosystem area                               |                              |   | *              | *                | N      | *        | N        |
| Flood and erosion areas                                       |                              |   | *              | *                | N      | *        | N        |
| Landslide areas   |                              |   |                |                  |        | *        | N        |
| Costal zones  |                              |   |                |                  |        |          | N        |

| LEGEND  |
|---|
| SGES allowed under special obligations or conditionally allowed |
| SGES not allowed  |
| SGES not regulated  |
| No topic in this country  |

Figure 16: Comparison of the regulation of special geological and geographical conditions, which can limit the installation of shallow geothermal energy systems.

N/R... Legally binding on a National/Regional level

\*... Recommended by officially accepted guidelines



Main outputs from the comparison are:

- All countries have regulations or at least rules of thumb for single criteria
- No country has regulations or at least rules of thumb for all criteria
- No criteria is treated/regulated in the same way in all GeoPLASMA-CE countries
- Four countries (Austria, Germany, Poland and Slovenia) have legally binding regulations in the pilot areas.
- Some countries have no regulations written down or a known handling for single criteria
- Regional and local rules of thumb seem to be more important for the installation of geothermal systems
- Some criteria show all possible regulations
- Single criteria show different regulation in one country

#### 4.8.2. Regulation elements for the installation, implementation and operation of shallow geothermal systems

Figure 17 gives an overview about the situation of regulation in GeoPLASMA-CE partner countries, respectively pilot areas. Like for criteria that limit the installation of SGES, legal instruments and recommendations or rules of thumb regulate criteria for installation, implementation and operation.

Main outputs from the comparison:

- All countries have regulations or at least rules of thumb for single criteria
- No country has regulations or at least rules of thumb for all criteria
- Only one criteria (drilling below groundwater table) is regulated in the same way in all GeoPLASMA-CE countries
- All countries have legally binding regulations for single criteria.
- Some countries have no regulations written down or a known handling for single criteria
- Regional and local rules of thumb seem to be more important for the installation, implementation and operation of geothermal systems



| Regulation element  | GeoPLASMA-CE Partner country |                |                  |        |          |          |
|---|------------------------------|----------------|------------------|--------|----------|----------|
|   | Austria                      | Czech Republic | Saxony (Germany) | Poland | Slovakia | Slovenia |
| Drilling below groundwater table allowed  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Minimum distance to neighboring plot [m]  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Minimum distance to buildings [m]   | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Minimum distance neighboring wells [m]  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Minimum distance to neighboring closed loop systems [m]                                   | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Groundwater investigations necessary (Hydrochemistry)                                     | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Certification for drilling companies needed   | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Certification for planners or installers needed   | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Numerical simulations required  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Minimum distance between pumping and reinjection site [m]                                 | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Reinjection of used groundwater   | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Temperature difference between extracted and reinjected water [°C, K]                     | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Absolute allowed temperature range of the reinjected water [°C]                           | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Allowed temperature change [°C]   | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Accepted drawdown [cm]  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Pumping test obligatory   | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Minimum distance to other heat exchangers of the same installation [m]                    | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Target value for the average initial and input temperature of the heat carrier fluid [°C] | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Regulations for heat carrier fluid type   | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Regulations for refrigerant type  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Regulations for the backfilling of BHE  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Leakage test of ground loop and refrigerant tubing required                               | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Borehole drilling report required   | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Taking core samples required  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Thermal response test required  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |
| Calculation of drilling depth required  | Yellow                       | Green          | Yellow           | Yellow | Green    | Green    |

| LEGEND       | Explanation   |
|--------------|---|
| Yellow       | National/regional/local legally binding regulation  |
| Light Yellow | Regulation by legally not binding instruments (like guidelines), but acknowledged as state of the art |
| Green        | No written regulations  |

Figure 17: Comparison of the regulation of criteria handling with the installation, implementation and operation of SGES

### 4.8.3. Summary

Both categories of criteria are mostly handled in different ways in different countries. For example, installations in areas with gas occurrences are not allowed in Slovenia while they are allowed under special obligations in Saxony (Germany) and in some regions not regulated in Austria. Regional and local rules of thumb seem to be more important for the application of those criteria during a licencing process. Though the presented results reflect official information, it is likely that the situation looks different in reality. The fact that all countries execute licencing procedures, including a detailed evaluation of the present SGES, suggests that those criteria have more importance in practice than on paper. Reported from countries like Slovakia and Slovenia a lot of not regulated criteria are very well taken into account during licencing (anecdotal evidence). This results in case-by-case decisions.



## 5. INTERNATIONAL STUDIES

Two former works dealing with legal requirements have been studied for the GeoPLASMA-CE project and will be briefly described in this chapter.

Both works started with the evaluation of parameters, congruent with the questions and criteria in GeoPLASMA. The final outputs give a recommendation of how a licencing procedure can be executed and how to deal with single criteria, like temperature changes, distances between installation and monitoring.

- Pasquali, R., O`Neill, N. (2015): D3.4 Recommendation guidelines for a common European regulatory framework, ReGeoCities, Co-funded by the Intelligent Energy Europe Programme of European Union
- Haehnlein, S. (2013): Sustainability and policy for the thermal use of shallow geothermal energy and International legal status of the use of shallow geothermal energy in *“Oberflächennahe Geothermie - Nachhaltigkeit und rechtliche Situation”* (Shallow geothermal energy - sustainability and legal situation), Dissertation, Tübingen

The GeoPLASMA-CE team used these studies for the preparation of the questionnaire for this deliverable and as a comparative study for legal regulations. The outcomes of these studies should also help to create a catalogue of reviewed quality standards, current policies and regulations (Deliverable D.T2.4.2 of the GeoPLASMA-CE project).

### 5.1. ReGeoCities

The project ReGeoCities analysed the regulatory framework of 10 EU countries. As result, they identified barriers preventing the growth and development of SGES in Europe.

Based on these barriers they developed tools for simplified regulatory requirements. The tools should allow authorities to quantify the potential of SGES and provide a basis for energy planning on a local level.

As main output, they propose an administrative process as flow chart (Figure 18). Main point is the differentiation between the handling of small domestic or residential systems and larger scale systems where the licencing and the needs for elaboration and documentation are more complex for large scale systems. The flow chart gives an overview of the steps a procedure has to include. Recommendations how to execute the licencing and about the information that should be provided from officials from the project include following topics:

- Legislation - focusing of definitions of geothermal terms in legislative instruments
- Regulations
  - Regulatory definitions (System type, Size/installed capacity, temperature, depth)
  - Environmental regulatory requirements
  - Recommendations for the preservation of the local environmental conditions
  - Systems size





- Aquifer characteristics
  - Borehole completion and collector installation
  - Heat transfer fluid & leakage
  - End user & building integration recommendations
  - Land zoning and urban areas
  - Energy contributions
- Permitting and & licencing process
  - Monitoring
  - Existing local & national policy
  - Information
  - Training & certification
  - Standards
  - Other measures

All recommendations explain the need of explanation and regulation of single criteria within the discussed topics. They also point out that official recommendations for local areas should include parameters like acceptable temperature changes or appropriate separation distance between neighbouring closed loop collectors. Focusing on the licencing procedure following recommendations are made:

- It is important to focus on the type and utilisation of the considered system
- Open and closed loop systems as single applications
- Online application should be provided for especially small system
- The licencing process should facilitate the collection of spatial data
- Short licencing times are recommended (30 days for small scale, 60-90 days for large scale)
- Permitting of open loop systems should fulfil requirements with respect to the abstraction of groundwater and water discharge
- Execution of notification and permitting for borehole drilling
- Evaluation of the subsurface conditions and environmental impacts of large scale systems, including a monitoring program for the operation

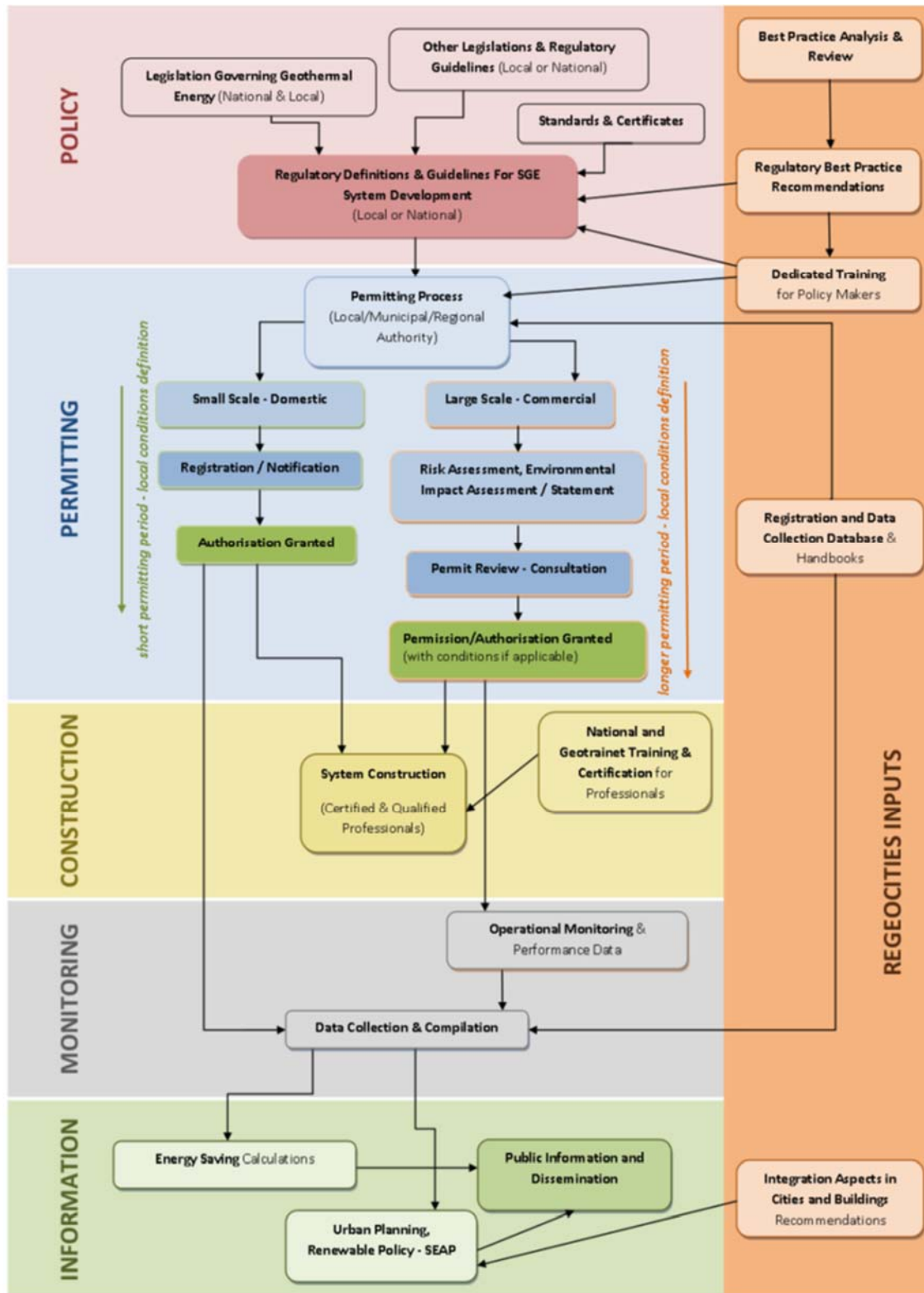


Figure 18: Flow chart developed by the ReGeoCities project



## 5.2. Stefanie Hähnlein

In her paper “International legal status of the use of shallow geothermal energy” Haehnlein (2013) identified a worldwide (the study considers 60 countries) present heterogeneity considering the legal status and regulation of geothermal energy systems. Most countries have no legally binding regulations and existing regulations show a wide range of values (e.g. acceptable temperature change ranges from 3K to 11K in Europe). Based on her results Haehnlein points out the urgent need of further research on the environmental impact and a legal management.

Her work “Sustainability and policy for the thermal use of shallow geothermal energy” provides recommendations for a policy including a legal framework. The focus lies on a sustainable use of shallow geothermal energy and therefore the results follow a precautionary principle. Workflow include relevant environmental, technical as well as social aspects. The provided flow chart subdivided into 6 levels for the licencing (Figure 19). The levels are following:

1. *Type* - open or closed systems
2. *Usage* - storage or direct use
3. *Size* of the system

*Based on the levels 1-3 the following steps are recommended:*

4. *Technical assessment* - a technical assessment should be performed to avoid and evaluate potential consequences in size and intensity. The main objective should be a system that operates sustainable for decades. The assessment includes:
  - Geological prerequisites
  - Hydrogeological prerequisites
  - Analytical solutions for temperature influences are sufficient for small scale systems
  - For large scale systems a numerical simulation is required
5. *Environmental assessment* - Necessary for to identify environmental consequences. Potential alterations of the natural groundwater character and anthropogenic contaminations are taken into consideration. Haehnlein recommends, in reference to technical requirements like temperature differences or distances to other installations, always a case-by-case review and static regulations.
6. *Licensing*

Steps 1-5 help for the decision if the system should be rejected or if it can be installed after a licencing process.

The process itself should include:

- Drilling notice
- Site plan
- Dimensions of the planned installation
- Results of the technical assessment
- Results of the environmental assessment

During operation of larger scale installations Haehnlein recommends the performance of a temperature monitoring.

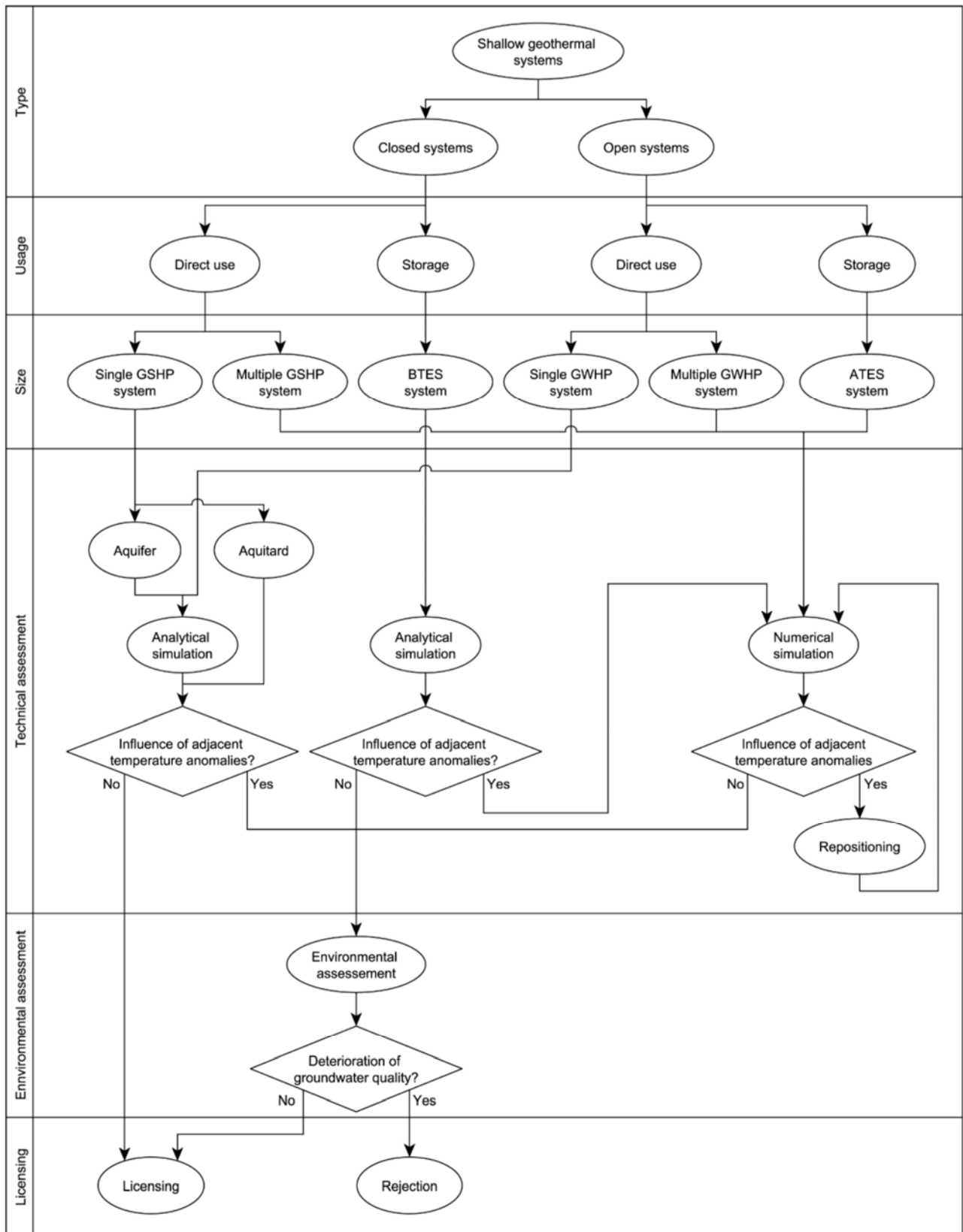


Figure 19: Suggested legal framework by Haehnlein, 2013



## 6. SUMMARY

Following conclusion can be drawn from the comparison of the Geo-PLASMA-CE partner countries and pilot areas:

- In general, all topics asked within this elaboration of legal requirements, current policies and regulations for shallow geothermal use show big heterogeneities among the GeoPLASMA-CE partner countries.
- No country regulated the ownership and the use of geothermal energy.
- The regulations refer to the drilling and/or the use and change of groundwater. A standardization for the GeoPLASMA-CE partner is not possible.
- The licencing processes are variable. They range from simple notification procedures to complicated licencing with many documents and many different approvals for the same type of installation.
- Geological aspects are treated different emphasis. While some countries include geological offices into the procedure, others do not even mention them.
- Approach to drilling hazards is very different - the same hazard may lead to automatic denial of permission in some countries, may be heavily regulated and granted under obligations in others, and in other countries yet again it is not regulated at all!
- Some regulations appear to be hand-me-downs from regulations relating to other content (building regulations, mining regulations) and are not really footed in any scientific findings related to geothermal energy
- Similarly, many decisions (in particular, those related to drilling hazards) seem to be taken on a case-by-case basis and thus depend on experience and local knowledge of personnel involved.
- Many parameters important to planners are not regulated or not even defined in legal terms.
- No obligation for monitoring in most countries, although monitoring important for both closed and open loop systems (monitoring not only of quantity/quality of extracted/injected water but also performance criteria such as downhole temperature)
- The compliance of the Renewable Energy Directive 2009/28/EC is at most at the beginning. Nevertheless, the implementation of the requirements is better for closed loop systems than for open loop systems. Otherwise, if a country doesn't have a definition for geothermal energy, or an application form, or hardly any regulations for the installation of SGE sources - how do we expect them to implement Renewable Energy Directive 2009/28/EC?

## 7. LITERATURE

British Environment Agency: Environmental good practice guide for ground source heating and cooling

European Commission (2017): Renewable Energy Progress Report, Brussels

Hähnlein, S. (2013): Oberflächennahe Geothermie - Nachhaltigkeit und rechtliche Situation, Dissertation, Tübingen

*ÖWAV Regelblatt 207* (ÖEWAV rule sheet 207)

2009/28/EC on the promotion of the use of energy from renewable sources, OJ L 140, 5.6.2009 (Renewable Energy Directive)

Pasquali, R., O`Neill, N. (2015): D3.4 Recommendation guidelines for a common European regulatory framework, ReGeoCites, Co-funded by the Intelligent Energy Europe Programme of European Union

PK Geothermie (2011): Fachbericht zur bisher bekannten Auswirkungen geothermischer Vorhaben in den Bundesländern, Wiesbaden

Stober, I. and Bucher, K. (2014): Geothermie, Springer Spektrum, 2. Auflage

VDI-guidelines

### Slovenia

Legal Information System of the Republic of Slovenia (<http://www.pisrs.si/>). Decree on the water protection area for the aquifers of Ljubljansko barje and outskirts of Ljubljana.

Legal Information System of the Republic of Slovenia (<http://www.pisrs.si/>). Decree on the water protection area for the Ljubljansko polje aquifer.

Project GRETA (Interreg, Alpine Space). Deliverable D 2.2.1 - Comparison of NSGE installations in the Alpine region selected for reproducibility and transferability relevance. Version: DRAFT (GRETA\_WP2A22\_D 2.2.1 Comparison of NSGE inst 06.docx). June, 2017.. Available at: [http://www.alpine-space.eu/projects/greta/deliverables/d2.2.1\\_provisoire\\_comparison\\_of\\_installations.pdf](http://www.alpine-space.eu/projects/greta/deliverables/d2.2.1_provisoire_comparison_of_installations.pdf)

**Project GRETA (Interreg, Alpine Space). Deliverable D 2.2.1 - Overview and analysis of regulation criteria and guidelines for NSGE applications in the Alpine region.** Available at: [http://www.alpine-space.eu/projects/greta/deliverables/d2.1.1\\_analysisofregulations.pdf](http://www.alpine-space.eu/projects/greta/deliverables/d2.1.1_analysisofregulations.pdf)



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**Project GRETA (Interreg, Alpine Space). Deliverable D 2.2.1** - Overview and analysis of regulation criteria and guidelines for NSGE applications in the Alpine region: Annex 3: Near surface geothermal energy regulations by countries. Available at: [http://www.alpine-space.eu/projects/greta/deliverables/d2.1.1\\_annex3.pdf](http://www.alpine-space.eu/projects/greta/deliverables/d2.1.1_annex3.pdf)



## ANNEX

Annex 1: Questionnaire

Annex 2: Working report Austria

Annex 3: Working report Czech Republic

Annex 4: Working report Poland

Annex 5: Working report Saxony, Germany

Annex 6: Working report Slovakia

Annex 7: Working report Slovenia



# ANNEX 1

## SUMMARY OF NATIONAL LEGAL REQUIREMENTS, CURRENT POLICIES AND REGULATIONS OF SHALLOW GEOHERMAL USE

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Compiled questionnaire for D.T2.4.1

07 2017

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 **Geologische Bundesanstalt**

LANDESAMT FÜR UMWELT,  
LANDWIRTSCHAFT  
UND GEOLOGIE

 Freistaat  
**SACHSEN**

 **CZECH  
GEOLOGICAL  
SURVEY**

 **GeoZS**  
Geološki zavod  
Slovenije



  
**AGH**  
AGH UNIVERSITY OF SCIENCE  
AND TECHNOLOGY

 **geoENERGIE**  
Konzept

 **Giga**  
infosystems

 Bundesverband  
**Geothermie**

 City of  
Ljubljana





**Activity A.T2.4:** Elaboration of quality standards for planning, construction and monitoring geothermal sites

**Description of deliverable D.T2.4.1:** Summary of national legal requirements, current policies and regulations of shallow geothermal use

In the application form it say:

*"The summary considers all aspects of licensing and management of shallow geothermal use including management of environmental impact. Results of D.T2.4.3 (Knowledge exchange workshop on legal requirements, procedures and policies) will be adapted for valorisation of results from previous studies (e.g. GRETA) for the 6 pilot areas."*

Deliverable D.T2.4.1 will be compiled from the feedback of the subsequent survey, an assessment of existing international studies and initiatives and from the outcomes of the Knowledge Exchange Workshop (D.T2.4.3), which will take place during the project GRETA midterm conference on November 8th 2017 in Salzburg.

**Aim of the survey:**

With this questionnaire we will collect country-specific information to following topics areas:

A. Legal regulations/Licensing procedures

Questions to specific topics are given in the subsequent part of this document.

B. Flow charts for licensing procedures in the pilot area

It aims at a graphically interpretation of your answers in topic area A.

C. Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems

This sections contains questions which should be filled out in an excel sheet (document named: Questionnaire\_D.T2.4.1\_part\_2)

D. Regulation elements for the installations, implementation and operation of shallow geothermal energy systems

This sections should be also be filled out in the excel sheet (document named: Questionnaire\_D.T2.4.1\_part\_2)

For each topic a series of questions is given. The focus lies on open loop systems (in the means of groundwater heat pumps - GWHP) and closed loop systems (in the means of borehole heat exchangers - BHE) and on your pilot area! Questions are formulated in a very general manner. Please answer as precise as possible. There are no needless answers!

As example and help you find the answers for Austria below.

Depending on the output, the deliverable will then contain passages, tables and graphical interpretations of your answers.



## A. LEGAL REGULATIONS/ LICENSING PROCEDURES

1. Definition of shallow geothermal energy in your country!

*Answer*

2. Is the use of geothermal energy regulated in your country?

Which levels of regulations do you have in your country? Explain in terms of NATIONAL, REGIONAL and LOCAL with the according regulation instrument (act, rule guideline, official order etc.) and its character (legally binding/obligatory or recommended)!

Please also summarize the regulation with a few sentences!

|          |             |  |            |  |
|----------|-------------|--|------------|--|
| NATIONAL | Instrument: |  | Character: |  |
|          | Instrument: |  | Character: |  |
| REGIONAL | Instrument: |  | Character: |  |
|          | Instrument: |  | Character: |  |
| LOCAL    | Instrument: |  | Character: |  |
|          | Instrument: |  | Character: |  |

OTHER IMPORTANT DOCUMENTS like GUIDELINES, TECHNICAL GUIDELINES, HANDBOOKS, MANUALS:

*Answer*

EXPLANATION OF GEOTHERMAL REGULATIONS:

*Answer*

3. How does the licensing procedure for shallow geothermal energy systems (SGES) work in your country? Are there different procedures for the licensing of SGES? What is the difference?

Why are the procedures different? Are they different for different regions? For different systems?

How is information for the submission provided?

What is the end of the procedure?

*Answer*



4. What is needed for the submission of a shallow geothermal energy system? Are there different documents for different procedures? Do application forms exist?

*Answer*

5. Entities for the applications of SGES

Which administrative entities are involved in the licensing procedure of SGES? Which of them are the first contact points for the submission?

How much time does the procedure take from submission till granting? How long is the granting valid and are there any restrictions for extension?

Are online applications available?

*Answer*

6. Are there official requirements for the installation and operation linked to the granting (catalogue of requirements)? Are there different requirements for SGES in urban and non-urban regions?

**NOTE: Details to the first questions will also be answered in topic area C. and D. Please give just a short explanation!**

*Answer*

7. Are there some special requirements concerning the installations and operation of SGES in your pilot area?

*Answer*

8. Are there some liquidation procedures after abandonment for SGES?

*Answer*

9. Are there regulations for monitoring of SGES? If yes, how does the monitoring have to be executed?

*Answer*

## B. FLOW CHARTS FOR LICENSING PROCEDURES in the PILOT AREA

In the GRETA project, the licensing procedures are presented as flow charts. We would like to implement these flow charts also in GeoPLASMA-CE!

For GeoPLASMA-CE, we suggest to elaborate the flow charts for the pilot areas, where maybe some additional regional or local regulations are present.

**Please prepare a flow chart for your pilot area! A template is provided in a separate document:**

Flow Chart\_D.T2.4.1\_Template (The template contains the Vienna-version to change and overwrite)

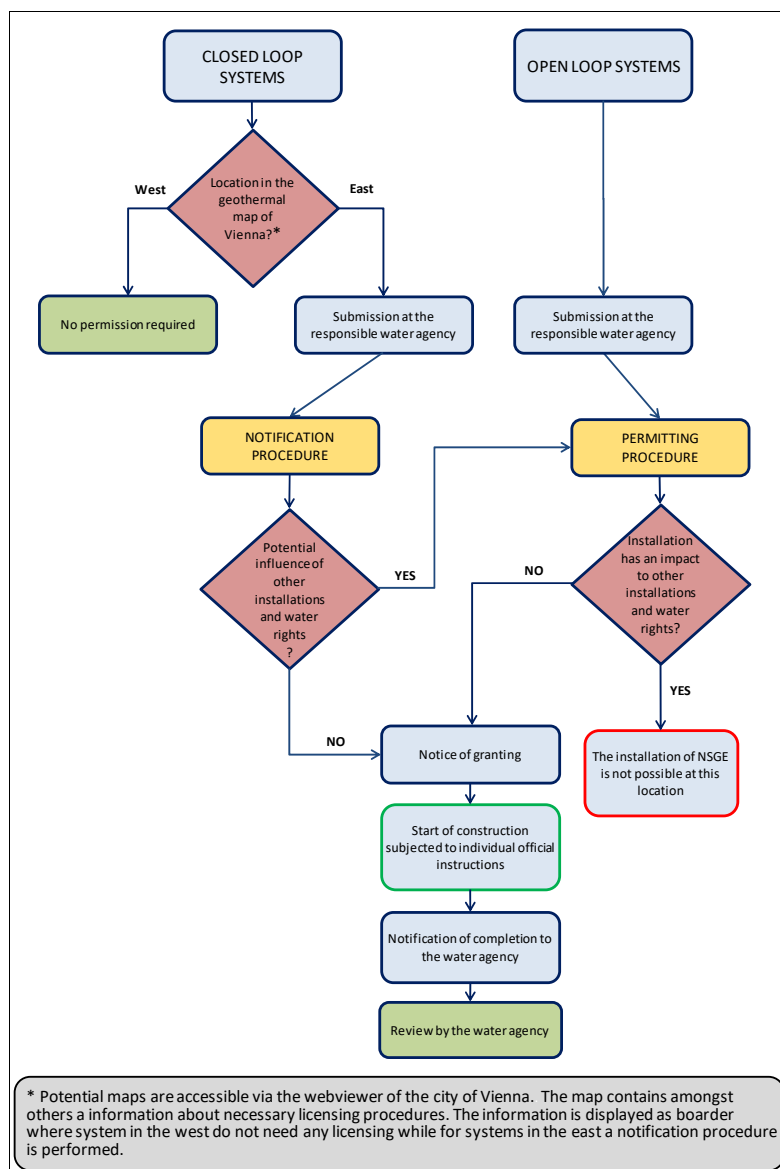


Figure1: The GeoPlasma-CE flow chart for Austria. The flow chart represents the national implementation of geothermal systems and the specific regulations in the pilot area! The style is based on the flow charts designed for the Interreg project GRETA.



For topic areas C and D: Questions focusing on special geological and geographical conditions and regulations elements are presented in an excel sheet!

## C. SPECIAL GEOLOGICAL AND GEOGRAPHICAL CONDITIONS WHICH CAN LIMIT THE INSTALLATION OF SHALLOW GEOTHERMAL ENERGY SYSTEMS

| C. Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems (SGES) |  |   |                  |                    |                     |
|--|--|---|------------------|--------------------|---------------------|
| Regulation element   | Explanation  | PILOT AREA  |                  | GENERAL            |                     |
|  |  | SGES allowed under special obligations or conditionally allowed | SGES not allowed | SGES not regulated | National regulation |
| Artesian aquifers  |  |   |                  |                    |                     |
| Very shallow water table where reinjection can be problematic  |  |   |                  |                    |                     |
| Perched groundwater layers   |  |   |                  |                    |                     |
| Two or multiple aquifer layers   |  |   |                  |                    |                     |
| Mineral water resources  |  |   |                  |                    |                     |
| Thermal water resources  | Are those areas, with special conditions which can limit the installations of SGES, regulated in your country?   |   |                  |                    |                     |
| Gas occurrences  | Are there different submission procedures or special requirements for the installation? Are there criteria which influence the regulation?                             |   |                  |                    |                     |
| Mining areas   | Please fill in the implementation at a national level (if legally binding) and possible regional and local regulations and their character (obligatory or recommended) |   |                  |                    |                     |
| Contaminated soil  |  |   |                  |                    |                     |
| Evaporites (e.g. NaCl, gipsum)   |  |   |                  |                    |                     |
| Swellable rocks (e.g. anhydrite, clay)   |  |   |                  |                    |                     |
| Karst area   |  |   |                  |                    |                     |
| Water protection area  |  |   |                  |                    |                     |
| Nature protected ecosystem area  |  |   |                  |                    |                     |
| Flood and erosion areas  |  |   |                  |                    |                     |
| Landslide areas  |  |   |                  |                    |                     |
| Costal zones   |  |   |                  |                    |                     |
| Others...  |  |   |                  |                    |                     |

ALL SYSTEMS



## D. REGULATION ELEMENTS FOR THE INSTALLATIONS, IMPLEMENTATION AND OPERATION OF SHALLOW GEOTHERMAL ENERGY SYSTEMS

| D. Regulation elements for the installations, implementation and operation of shallow geothermal energy systems (SGES) |              |  |          |                     |                   |
|--|--------------|--|----------|---------------------|-------------------|
| Regulation element   | PILOT AREA   |  |          | GENERAL             |                   |
|  | Requirements |  |          | National regulation | Other regulations |
| Drilling below groundwater table allowed   |              |  |          |                     |                   |
| Minimum distance to neighboring plot [m]   | GWHP:        |  | BHE:     |                     |                   |
| Minimum distance to buildings [m]  | GWHP:        |  | BHE:     |                     |                   |
| Minimum distance neighboring wells [m]   | GWHP:        |  | BHE:     |                     |                   |
| Minimum distance to neighboring closed loop systems [m]  | GWHP:        |  | BHE:     |                     |                   |
| Groundwater investigations necessary (Hydrochemistry)  | GWHP:        |  | BHE:     |                     |                   |
| Certification for drilling companies needed  |              |  |          |                     |                   |
| Certification for planners or installers needed  |              |  |          |                     |                   |
| Numerical simulations required   |              |  |          |                     |                   |
| Minimum distance between pumping and reinjection site [m]  |              |  |          |                     |                   |
| Reinjection of used groundwater  |              |  |          |                     |                   |
| Temperature difference between extracted and reinjected water [°C, K]  |              |  |          |                     |                   |
| Absolute allowed temperature range of the reinjected water [°C]  |              |  |          |                     |                   |
| Allowed temperature change [°C]  |              |  |          |                     |                   |
| Accepted drawdown [cm]   |              |  |          |                     |                   |
| Pumping test obligatory  |              |  |          |                     |                   |
| Minimum distance to other heat exchangers of the same installation [m]   |              |  |          |                     |                   |
| Target value for the average initial and input temperature of the heat carrier fluid [°C]                              | Heating:     |  | Cooling: |                     |                   |
| Regulations for heat carrier fluid type  |              |  |          |                     |                   |
| Regulations for refrigerant type   |              |  |          |                     |                   |
| Regulations for the backfilling of BHE   |              |  |          |                     |                   |
| Leakage test of ground loop and refrigerant tubing required  |              |  |          |                     |                   |
| Borehole drilling report required  |              |  |          |                     |                   |
| Taking core samples required   |              |  |          |                     |                   |
| Thermal response test required   |              |  |          |                     |                   |
| Calculation of drilling depth required   |              |  |          |                     |                   |





# ANNEX 2

## SUMMARY OF NATIONAL LEGAL REQUIREMENTS, CURRENT POLICIES AND REGULATIONS OF SHALLOW GEOHERMAL USE

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Working report for D.T2.4.1

08 2017

Austria

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LANDESAMT FÜR UMWELT,  
LANDWIRTSCHAFT  
UND GEOLOGIE







## A. LEGAL REGULATIONS/ LICENSING PROCEDURES

### 1. Definition of shallow geothermal energy in your country!

Shallow geothermal energy in Austria summarizes all geothermal systems installed from the surface down to a depth of 300 m.

### 2. Is the use of geothermal energy regulated in your country?

Which levels of regulations do you have in your country? Explain in terms of NATIONAL, REGIONAL and LOCAL with the according regulation instrument (act, rule guideline, official order etc.) and its character (legally binding/obligatory or recommended)!

Please also summarize the regulation with a few sentences!

#### REGULATION LEVELS

|  |             |   |            |                           |
|--|-------------|---|------------|---------------------------|
| NATIONAL<br>(federal state of Austria)   | Instrument: | Water Act 1959                                    | Character: | Obligatory, binding       |
| REGIONAL<br>(national states of Austria) | Instrument: | Guidelines of the national states                 | Character: | Recommendation            |
| LOCAL<br>(Districts)                     | Instrument: | Official order (e.g. for water protections areas) | Character: | Binding on national level |

OTHER IMPORTANT DOCUMENTS like GUIDELINES, TECHNICAL GUIDELINES, HANDBOOKS, MANUALS:

The Austrian Standards institute governs the following standards concerning shallow geothermal use:

- OENORM B 2601 - Wassererschließung - Brunnen (drilling and well techniques)
- OENORM B 2261 - Brunnenbauarbeiten Werkvertragsnorm (well techniques)



- OENORM B 4401, OENORM B 4400-1 und OENORM B 4400-2 - Bohrprotokoll (drilling reports)
- OENORM EN 805 - Wasserversorgung - Anforderungen an Wasserversorgungssysteme und deren Bauteile außerhalb von Gebäuden (water supply, borehole heat exchanger)

These standards are only legally binding if the legislator mentions them.

The NGO organization OEWAU ("Österreichischer Wasser- und Abfallwirtschaftsverband", <http://www.oewav.at>), acting as an umbrella federation for service providers in water supply and waste business, provides the following relevant guidelines:

- OEWAU RB 207 - Thermische Nutzung des Grundwassers und des Untergrunds - Heizen und Kühlen (shallow geothermal use).
- OEWAU RB 208 „Bohrungen zur Grundwassererkundung“ (drillings and wells).

The guidelines of the OEWAU are not legally binding, but they are generally considered as state of the art by the administrative authorities.

#### EXPLANATION OF GEOTHERMAL REGULATIONS IN AUSTRIA:

The Austrian Water Act 1959 represents the legal instrument. The Water Act regulates GWHP in terms of extraction and reinjection of groundwater. For BHE and SHC situations are stated where a submission for geothermal sites is necessary and how the submission is executed. Because the Water Act defines the regulation and application for geothermal systems very loosely, all federal states have their own rules for handling geothermal systems.

The federal Water Act (WRG 1959 as amended) is at the responsibility of the federal ministry of Agriculture, Forestry, Environment and Water Management (<https://www.bmlfuw.gv.at/>). The responsibility for the execution of the federal Water act is transferred to the governors of the 9 national states of Austria, represented by its administrative offices ("Ämter der Landesregierungen"). General planning and management issues are governed by the administrative offices of the federal states in guidelines. The guidelines are not legally binding, concerning information that is not mentioned in the Water Act.

Concerning the assessment of SGES the offices of the national states are represented by the district offices ("Bezirkshauptmannschaften"), which are responsible for regulation issues.



3. How does the licensing procedure for shallow geothermal energy systems (SGES) work in your country? Are there different procedures for the licensing of SGES? What is the difference?

Why are the procedures different? Are they different for different regions? For different systems?

How is information for the submission provided?

What is the end of the procedure?

In general, there are two declaration systems in Austria for geothermal systems. A permitting procedure and a simplified notification procedure. One difference between both is that the permitting procedure includes building negotiations with neighbours. The second distinction is the appointed time from submission till decision. For installations submitted via notification procedure the time from submission till decision is 2 months at the most. While for installations via permitting procedure no specified time is given. Building and operating requirements laid down by the water agency are mandatory for systems licensed with a permitting procedure and self-obligating in a notification procedure.

The choice of the licensing procedure depends on the geological setting, on water protection zones and possible interactions with other water rights and public installations.

For open loop systems the permitting procedure is always mandatory. For closed loop systems affecting other installations and water rights, also the permitting procedure is mandatory. Other closed loop systems must be submitted via notification procedure only when they lie within a water protection zone or in a sensitive location. The water authority reserves the right to change the applied procedure if necessary due to the circumstances. This is typically if the agency has suspicion that other water rights or public installations could be influenced.

Sensitives locations are defined by the federal states and can be:

- Karst areas
- Contaminated sites
- Areas with unstable ground
- Areas with confined groundwater
- Gas occurrences
- Thermal or mineral water resources
- Evaporites

Each state has its own definitions according to the geological and hydro(geo)logical conditions. Sensitive zones can be checked at the internet platforms of the federal states. There all states mark at least zones with confined aquifers. Information for sensitive zones is available directly at the local water agencies (e.g. internet platform, telephone consultation) or by local planners and installers.



Licensing procedures always end with the notification of completion and the acceptance by the responsible water agency. Users are then obligated to keep an operating diary.

Installations where no licensing procedure is necessary are not subjected to any other actions. Therefore, they are not recorded at the water agencies and potential damage to surroundings would be undetected or not assignable.

Each national state provides its own information (mostly guidelines) concerning the regulation of geothermal systems. Basic information is available at the internet platforms from the national states. Detailed information concerning the exact location is provided by telephone consultation. Most national states provide geological information and information on existing GWHP via GIS-applications ("Wasserbuch") and for more detailed information by telephone consultation. Some national states, like Salzburg and Vienna, also provide maps of SGES potential for BHE and GWHP.

#### 4. What is needed for the submission of a shallow geothermal energy system? Are there different documents for different procedures? Do application forms exist?

The submission for geothermal systems requires general data about the system and about the operator.

For example:

- Regulatory information about the property where the geothermal system is installed (e.g. the owner, appertaining water rights)
- Geological and geographical information about the property where the geothermal system is planned to be installed.
- Technical details of the installation (e.g. heat pump type, heating/cooling power, depth of installations)
- Operational details (e.g. operational temperatures, water extracting rate)

Application forms are partly provided by the federal states but are not mandatory. Submission documents just need to contain predetermined information! This information is predetermined by the legislator (water act 1959) and can be extended by the national states.

Application forms or submission documents are the same for both procedures. Information about this and about geothermal systems in general can be found in guidelines of the national states of Austria.

In general, there is one application form or one submission report to submit.



## 5. Entities for the applications of SGES

Which administrative entities are involved in the licensing procedure of SGES?  
Which of them are the first contact points for the submission?

How much time does the procedure take from submission till granting? How long is the granting valid and are there any restrictions for extension?

Are online applications available?

For submission of application form there are two contact points in Austria:

- The federal state government water agencies for GWHP with water abstraction > 5l/s
- The local departments of the water authorities for all BHE and GWHP with water abstraction < 5l/s

The water authorities in general belong to the Ministry of Agriculture, Forestry, Environment and Water Management. The legal instrument is represented by the Austrian Water Act 1959.

The water authorities exclusively carry out the licensing. The water authority also carries out possible interactions with other license holders. For installations submitted via notification procedure, the time from submission till decision is 2 months at the most. While for installations via permitting procedure no specified time is given.

Documents submitted at the local water authorities are forwarded to the federal state government water agencies for a second proof.

The granting for systems handled with a notification procedure is valid for 25 years and regulated within the water act. For systems handled with a permitting procedure, the period is set individually. After expiry of the granting-period, a request for an extension has to be done at the water authorities.

Online application is at the moment not possible in Austria.

## 6. Are there official requirements for the installation and operation linked to the granting (catalogue of requirements)? Are there different requirements for SGES in urban and non-urban regions?

NOTE: Details to the first questions will also be answered in topic area C. and D. Please give just a short explanation!

Legal requirements for the installation and operation are not given in Austria. However, the legislation demands the compliance of the state of the art. The state of the art is given in the ÖWAV Guideline 207 and accepted by all national states. Requirements contained deal with operational criteria (e.g. working temperatures) and the installation of the system (e.g. distances to neighbouring plot).

On a legal level there are no differences between urban and non-urban areas. Also there are no regulations in the ÖWAV Guideline 207.



The experience shows in most national states that in cities the regulation of the operation and the construction of a geothermal system is more “strict” due to a big density of appertaining rights. Especially temperature spreading rates for reinjected water could be narrower in cities than in rural regions.

## 7. Are there some special requirements concerning the installations and operation of SGES in your pilot area?

Vienna

No special requirements compared to other national states. Only limitation is that the temperature range for reinjected water is narrower than in other national states/regions.

Vienna: 5 - 18°C

Rest: 5 - 20 °C

Hainburg (Austrian part of the Bratislava pilot area)

Hainburg belongs to the national state Burgenland. In general, Burgenland is, according due their geologic circumstances, stricter with SGES than other national states. This primarily concerns the installations of SGES and not the operation.

E.g. For closed loop systems a drilling supervision from regional authorities is required.

## 8. Are there some liquidation procedures after abandonment for SGES?

There is no regulation on a legal level. The OEWAV Guideline 207 describes liquidation procedures according to the state of the art (OENORM B2601 for GWHP). Qualified companies must perform all works.

Steps of the liquidation procedure for ground water heat pumps (GWHP):

- Evaluation of subsurface contamination and restoration of subsurface in good environmental quality.
- Deconstruction of subsurface installations and backfilling of installations pipes by natural material (e.g. sand, gravel, soil).
- Prevention of groundwater contamination by surface water.
- Prevention of shortcuts of different aquifers.

Steps of the liquidation procedure for borehole heat exchangers (BHE):



- Extraction of heat carrier fluids from circulation pipes
- Backfilling of circulation pipes (liquid-tight).
- All subsurface installations have to be removed according to workflows described for groundwater use.

Notification of liquidation to public authority.

#### 9. Are there regulations for monitoring of SGES? If yes, how does the monitoring have to be executed?

In general, there is no legal requirement on operational monitoring at the Austrian Water Act. However, obligatory operational monitoring is decided on case to case by the responsible authority in case of significant groundwater use in open loop systems. The obligation of monitoring is regulated at the individual administrative notification related to the permission of use.

The operational diary must contain:

Periodical (commonly monthly) operational monitoring of groundwater use (temperature of produced water, yield, temperature of injected water) and written documentation (no quality standards for reporting). Documentation of operational incidents and services carried out.

In case of extensive groundwater use passive monitoring at observation wells (e.g. Vienna).



## B. FLOW CHARTS FOR LICENSING PORCEDURES IN THE PILOT AREA

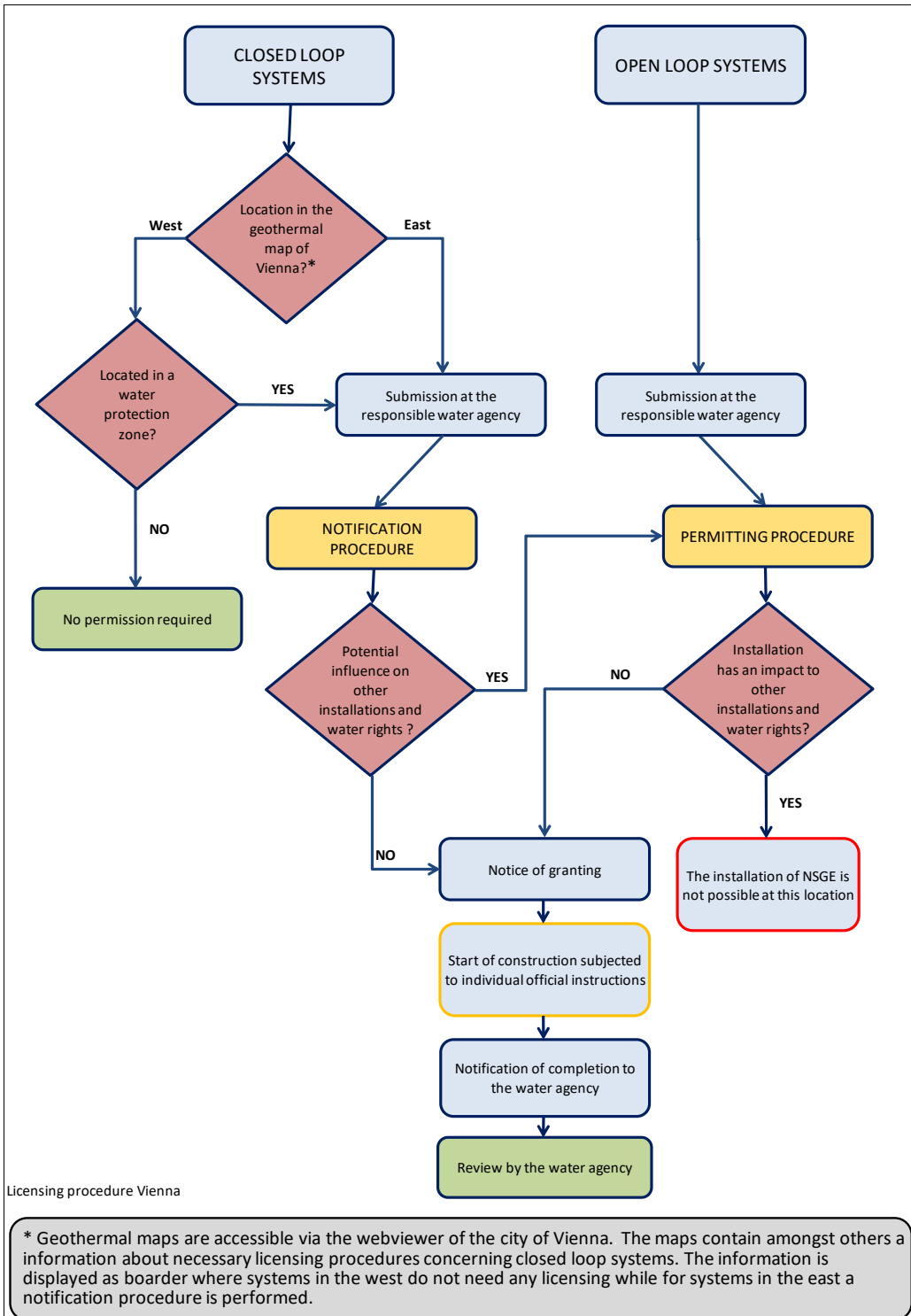
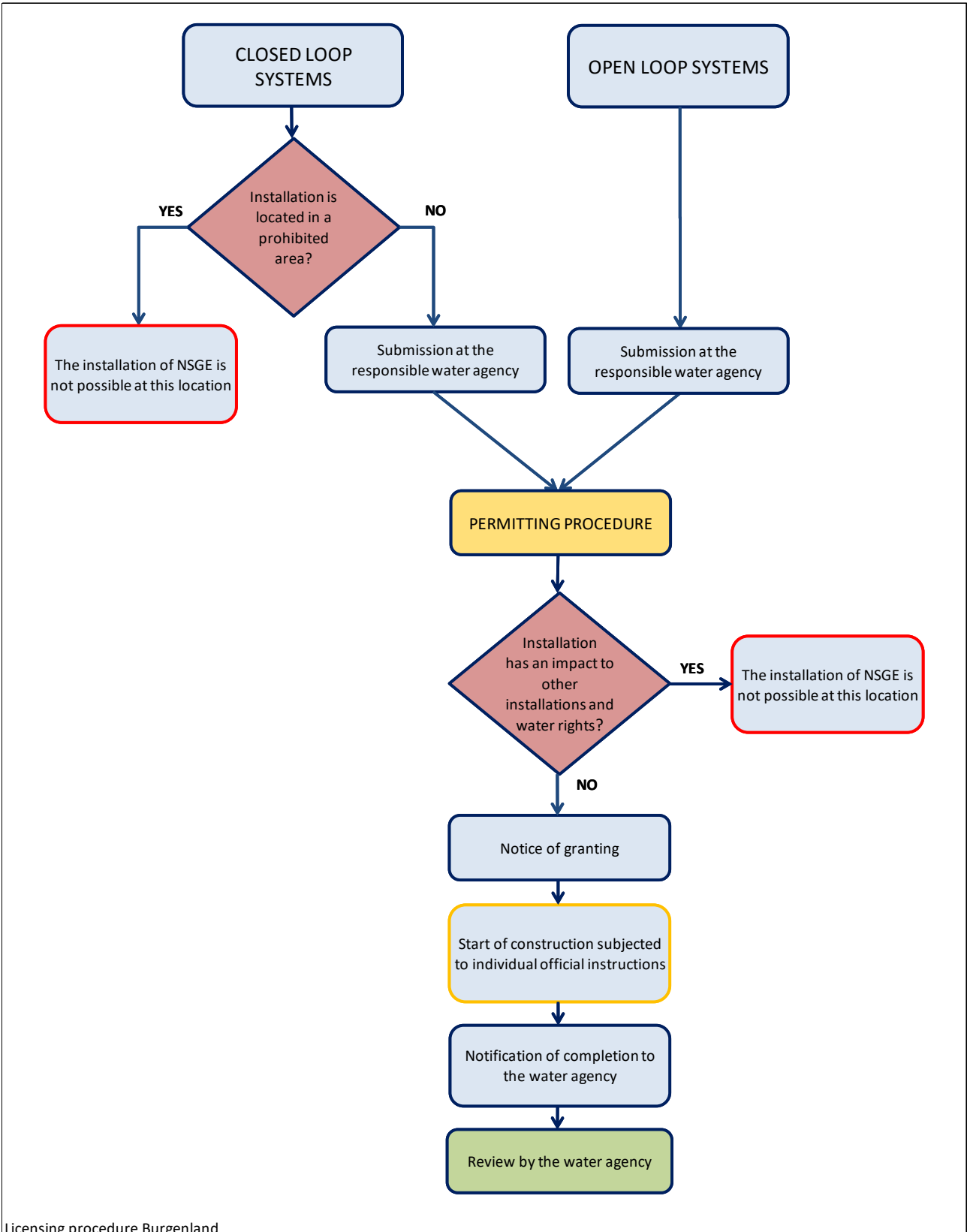


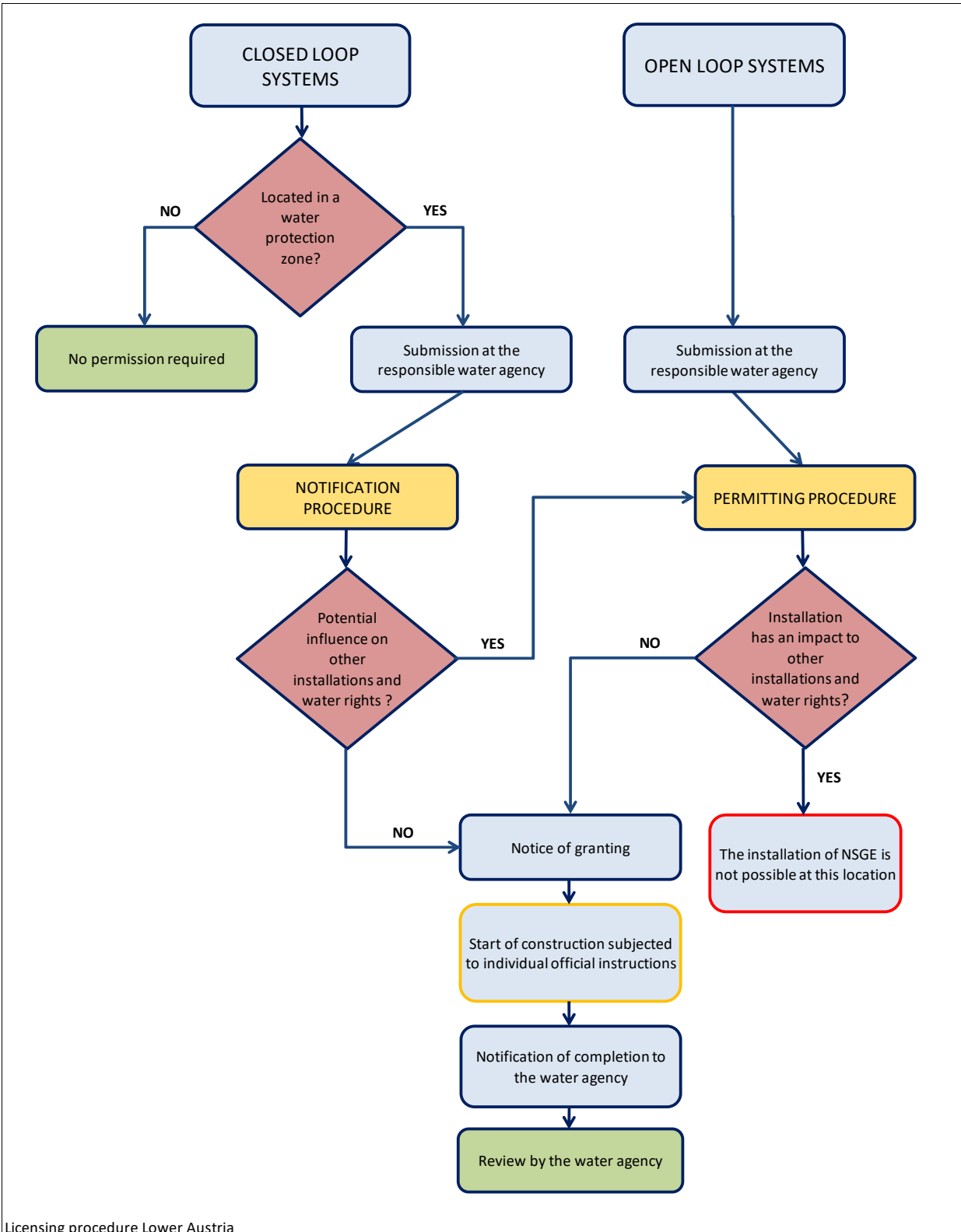
Figure 1: Flow chart for pilot area Vienna





Licensing procedure Burgenland

Figure 2: Flow chart for Burgenland, part of pilot area Bratislava



Licensing procedure Lower Austria

Figure 3 Flow chart for Lower Austria, part of the pilot areas Vienna and Bratislava



# C. SPECIAL GEOLOGICAL AND GEOGRAPHICAL CONDITIONS WHICH CAN LIMIT THE INSTALLATION OF SHALLOW GEOTHERMAL ENERGY SYSTEMS

| C. Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems (SGES) |   | PILOT AREA - VIENNA   |                  |                    | GENERAL  |   |
|--|---|---|------------------|--------------------|--|---|
|  |   | SGES allowed under special obligations or conditionally allowed | SGES not allowed | SGES not regulated | National regulation according to the Water act 1959  | Other regulations   |
| Regulation element   | Explanation   | V, H, BHE, NBHE   | HGWHP<br>NGWHP   |                    | Installation must be submitted at the water agency (§31c)  | National: ÖWAV Guideline 207: Generally the installations is not recommended! Exception: low artesian pressures! Drilling of artesian aquifers with pressure of > 3m above surface should be forbidden. <b>Regional:</b> allowed at productive aquifers with low artesian pressure, limitation of drilling depth in areas with artesian aquifers are possible:<br>Not regulated   |
| Artesian aquifers  |   | V, H, BHE, NBHE   | HGWHP<br>NGWHP   |                    | Installation must be submitted at the water agency (§31c)  | National: ÖWAV Guideline 207: Generally the installations is not recommended! Exception: low artesian pressures! Drilling of artesian aquifers with pressure of > 3m above surface should be forbidden. <b>Regional:</b> allowed at productive aquifers with low artesian pressure, limitation of drilling depth in areas with artesian aquifers are possible:<br>Not regulated   |
| Very shallow water table where recharging can be problematic   | Are those areas, with special conditions which can limit the installations of SGES, regulated in your country?  | V, H, N   |                  | V, H, N            | Not regulated  | Not regulated   |
| Perched groundwater layers   | Are there different submission procedures or special requirements for the installation?   | V, H, N   |                  | V, H, N            | Only regulated if drilling through several (different) pressurized aquifers! Then installation must be submitted at the water agency (§31c).   | Not regulated   |
| Two or multiple aquifer layers   | Are there criteria which influence the regulation? Please fill in the implementation at a national level (if legally binding) and possible regional and local regulations and their character (obligatory or recommended) | V, H, N   |                  | V, H, N            | Not regulated or mentioned in this context. In general handled like water protection zones.  | National: ÖWAV Guideline 207 demands that different aquifers should not be connected through drilling!<br><b>Regional:</b> like ÖWAV Guideline 207.   |
| Mineral water resources  |   | V, H, N   |                  | V, H, N            | Not regulated or mentioned in this context. In general handled like water protection zones.  | Not regulated   |
| Thermal water resources  |   | V, H, N   |                  | V, H, N            | Not regulated or mentioned in this context. In general handled like water protection zones.  | Not regulated   |
| Gas occurrences  |   | V   | H, N             | H, N               | Not regulated  | National: ÖWAV Guideline 207: The possibility of gas should be estimate. The use of gas warning equipment and special requirements for drilling has to be considered. In case of gas occurrence public authorities and emergency services have to be contacted! <b>Regional:</b> like ÖWAV Guideline 207  |
| Water protection area  |   | V, N  | H                |                    | Regulates the definition of protection zones and the responsibility for the regulation of legal projects in this zones (§34). The water act also regulates the required licensing procedure for SGES in water protection zones (§31c). | National: ÖWAV Guideline W72, regulates the classification and handling with water protection areas. The document is not legally binding. However all national states act according to this guideline. Recommendations for the installation of SGES are: 1) no SGES in water protection zone I and II. 2) SGES only allowed under special obligations or conditionally allowed. <b>Regional:</b> Each water protection area has it's own order which is legally binding. The order regulates amongst others the use of geothermal energy. |
| Nature protected ecosystem area  |   |   |                  | V, H, N            | Not regulated  | National: each national states has it's own nature protection laws. They could include building restrictions. Geothermal energy systems are not mentioned explicit.   |
| Mining areas   |   |   |                  | V, H, N            | Not regulated  |   |
| Contaminated soil  |   | V   |                  | H, N               | Not regulated  |   |
| Evaporites (e.g. NaCl, gipsum)   |   |   |                  | V, H, N            | Not regulated  | National: ÖWAV Guideline 207: Demands detailed geological investigations of the project area and a adaptation of the drilling techniques due to the geological circumstances. <b>Regional:</b> like ÖWAV Guideline 207. Some national states have stricter rules concerning geological risks.   |
| Swellable rocks (e.g. anhydrite, clay)   |   |   |                  | V, H, N            | Not regulated  |   |
| Karst area   |   |   |                  | V, H, N            | Not regulated  |   |
| Flood and erosion areas  |   |   |                  | V, H, N            | Not regulated  |   |
| Landslide areas  |   |   |                  | V, H, N            | Not regulated  |   |

ALL SYSTEMS

Table 1: Filled questionnaire for topic C, Austria

## D. REGULATION ELEMENTS FOR THE INSTALLATION, IMPLEMENTATION AND OPERATION OF SHALLOW GEOTHERMAL ENERGY SYSTEMS for the pilot area Vienna

| D. Regulation elements for the installations, implementation and operation of shallow geothermal energy systems (SGES) |   |   |   |          |   |  |  |
|--|---|---|---|----------|---|--|--|
| Regulation element   | PILOT AREA - VIENNA   |   |   |          | GENERAL   |  |  |
|  | Requirements  |   |   |          | National regulation according to the Water act 1959 | Other regulations  |  |
| ALL SYSTEMS  | Drilling below groundwater table allowed  | Like the national regulation.   |   |          |   | Allowed till 300 m. Mining Act (MinroG) if borehole is deeper than 300 m.  | <b>Regional, local:</b> Limitation of drilling or excavating depth due to special conditions (e.g. artesian aquifers) or because of official orders (like for water protection zones)  |
|  | Minimum distance to neighboring plot [m]  | GWHP:   | not regulated                                     | BHE:     | 2,5 m   | Not regulated  | <b>National:</b> 2,5 m is recommended by the ÖWAV Guideline 207; <b>Regional:</b> national states might have their own distance regulations  |
|  | Minimum distance to buildings and other installations (e.g. canal) [m]                    | GWHP:   | not regulated                                     | BHE:     | 1,5 m   | Not regulated  | <b>National:</b> not regulated <b>Regional:</b> not regulated  |
|  | Minimum distance neighboring wells [m]  | GWHP:   | preexisting rights are not allowed to be affected | BHE:     | preexisting rights are not allowed to be affected   | no distance defined, rule is that preexisting rights are not allowed to be affected.   | <b>National:</b> no distance defined, rule is that preexisting rights are not allowed to be affected. <b>Regional:</b> not regulated   |
|  | Minimum distance to neighboring closed loop systems [m]                                   | GWHP:   | not regulated                                     | BHE:     | not regulated                                       | Not regulated  | <b>National:</b> not regulated <b>Regional:</b> not regulated  |
|  | Groundwater investigations necessary (Hydrochemistry)                                     | GWHP:   | not demanded, but recommended                     | BHE:     | not regulated                                       | Not regulated  | <b>National:</b> ÖWAV Guideline 207: for GWHP test are strongly advised <b>Regional:</b> recommended, rarely obligatory  |
|  | Numerical simulations required  | GWHP:   | case-by-case assesment                            | BHE:     | case-by-case assesment                              |  | <b>National:</b> ÖWAV Guideline 207 strongly advised when complex geothermal loop systems are installed or complex hydrogeological conditions are present <b>Regional:</b> case-by-case decisions  |
|  | Certification for drilling companies needed   | Qualification criteria after VÖBU (Vereinigung Österreichischer Brunnenbau-, Bohr- und Spezialtiefbauunternehmen (Austrian associations of drilling companies)) demanded; companies should fulfil the requirements for professional execution |   |          |   | Not regulated  | <b>National:</b> not regulated! The ÖWAV Guideline 207 gives the state of the art for drilling in Austria (ÖNORM B 2601, ÖNORM B 2261 or the ÖWAV Guideline 208) <b>Regional:</b> like ÖWAC GL 207   |
|  | Certification for planners or installers needed   | not regulated   |   |          |   | Not regulated  | <b>National, regional:</b> not regulated!  |
| OPEN LOOP SYSTEMS  | Minimum distance between pumping and reinjection site [m]                                 | Distance must be calculated. Case-by-case decision;   |   |          |   | Not regulated  | <b>National, regional:</b> case-by-case decision. Small scale single use: simplified analytic estimation. Large scale, multiple wells or complex settings: numerical modelling is recommended (= ÖWAV Guideline 207).  |
|  | Reinjection of used groundwater   | like ÖWAV Guideline 207 recommendation  |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207: The reinjection of used groundwater to the same aquifer is standard and favoured. Well-founded exceptions if there are special conditions (e.g. very thick top layer). <b>Regional:</b> Guidelines of the national states; most national states, as well as Vienna, assume the recommendation from the ÖWAV Guideline 207 |
|  | Temperature difference between extracted and reinjected water [°C, K]                     | 6 K (regarded as reference value)   |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207 recommends 6K. <b>Regional:</b> 6K or stricter. Only Corinthia has no regulations for the temperature difference.  |
|  | Absolute allowed temperature range of the reinjected water [°C]                           | 5 - 18 °C (the upper limit value is stricter in Vienna due to facing problems with very warm groundwater)   |   |          |   | Not regulated  | <b>National:</b> recommendation (from ÖWAV Guideline 207) is a temperature range from 5 to 20 °C. <b>Regional:</b>   |
|  | Allowed temperature change [°C]   | 1°C   |   |          |   | Not regulated  | <b>National:</b> regulation from ÖWAV Guideline 207 is 1 °C <b>Regional:</b> 1°C or not regulated (then case-by-case proofing).  |
|  | Accepted drawdown [cm]  | 10 cm   |   |          |   | Not regulated  | <b>National:</b> not regulated. <b>Regional:</b> not regulated in most national states, if regulated then 10 cm are accepted.  |
|  | Pumping test obligatory   | No, but recommended in not well known regions. Pumping test are generally in the interest of the operator.  |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207: test are strongly advised <b>Regional:</b> recommended, rarely obligatory   |
| CLOSED LOOP SYSTEMS  | Minimum distance to other heat exchangers of the same installation [m]                    | 8 - 10 m recommended  |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207 not regulated. <b>Regional:</b> some national states recommend min. distances for heat exchangers of the same installation. Nevertheless a underrun of this distance is no reason for a negative permission procedure  |
|  | Target value for the average initial and input temperature of the heat carrier fluid [°C] | Heating:  | -1,5 °C (after 5-50 years)                        | Cooling: | 30 °C (after 5-50 years)                            | Not regulated  | <b>National:</b> ÖWAV Guideline 207 (see Pilot Area) <b>Regional:</b> like ÖWAC GL 207   |
|  | Regulations for heat carrier fluid type   | like ÖWAV Guideline 207   |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207: limitation to the use of heat carrier fluids classified as having a low environmental impact ("Wassergefährdungsklasse 1") <b>Regional:</b> like ÖWAV GL 207  |
|  | Regulations for refrigerant type  | like ÖWAV Guideline 207   |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207 - regulations taken over from ÖNORM EN 378-3 and ÖNORM M 7755-1 <b>Regional:</b> like ÖWAV Guideline 207   |
|  | Regulations for the backfilling of BHE  | In general like ÖWAV Guideline 207. Although the use of ready-made backfilling materials is highly recommended.   |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207 Recommended workflow to guarantee a complete backfilling. Quality criteria for the filling: density > 1,3 g/cm <sup>3</sup> . <b>Regional:</b> like ÖWAC GL 207  |
|  | Leakage test of ground loop and refrigerant tubing required                               | like ÖWAV Guideline 207   |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207 Adapted from ÖNORM EN 805; pressure test based on pure water at an initial pressure of 12 bar. Evaluation of the test based on nomographs. <b>Regional:</b> like ÖWAC GL 207   |
|  | Borehole drilling report required   | like ÖWAV Guideline 207   |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207 - regulations taken over from ÖNORM B 4401 and ÖNORM 4400-1 and ÖNORM B 4400-2. <b>Regional:</b> like ÖWAV Guideline 207   |
|  | Taking core samples required  | like ÖWAV Guideline 207   |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207: one sample every 5 meters and by change of lithology is recommended! <b>Regional:</b> like ÖWAV Guideline 207.  |
|  | Thermal response test required  | case-by-case decision   |   |          |   | Not regulated  | <b>National:</b> ÖWAV Guideline 207: strongly advised when complex geothermal loop systems are installed <b>Regional:</b> rarely required  |
| Calculation of drilling depth required   | like ÖWAV Guideline 207   |   |   |          | Not regulated                                       | <b>National:</b> ÖWAV Guideline 207 states the calculation after VDI 4640 or after SIA 384/6 as appropriate methods. <b>Regional:</b> like ÖWAC GL 207 |  |

Table 2: Filled questionnaire for topic D, Austria



# ANNEX 3

## SUMMARY OF NATIONAL LEGAL REQUIREMENTS, CURRENT POLICIES AND REGULATIONS OF SHALLOW GEOHERMAL USE

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Working report for D.T2.4.1

08 2017

Czech Republic

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LANDESAMT FÜR UMWELT,  
LANDWIRTSCHAFT  
UND GEOLOGIE



City of  
Ljubljana





## A. LEGAL REGULATIONS/ LICENSING PROCEDURES

### 1. Definition of shallow geothermal energy in your country!

There does not exist a definition of shallow geothermal energy in the Czech legal framework. There exists only definition in methodical documents, but this definition is not legally binding.

### 2. Is the use of geothermal energy regulated in your country?

Which levels of regulations do you have in your country? Explain in terms of NATIONAL, REGIONAL and LOCAL with the according regulation instrument (act, rule guideline, official order etc.) and its character (legally binding/obligatory or recommended)!

Please also summarize the regulation with a few sentences!

#### REGULATION LEVELS

|          |             |  |            |                                       |
|----------|-------------|--|------------|---------------------------------------|
| NATIONAL | Instrument: | Building act (Stavební zákon) No. 183/2006   | Character: | Obligatory binding                    |
|          | Instrument: | Water act (Vodní zákon) No. 254/2001         | Character: | Obligatory binding                    |
|          |             | Geology act ("Geologický zákon") No. 62/1988 |            | Obligatory binding                    |
| REGIONAL | Instrument: |  | Character: |                                       |
|          | Instrument: |  | Character: |                                       |
| LOCAL    | Instrument: | Water protection area                        | Character: | binding on local administrative level |
|          | Instrument: | Flood areas                                  | Character: | binding on local administrative level |



OTHER IMPORTANT DOCUMENTS like GUIDELINES, TECHNICAL GUIDELINES, HANDBOOKS, MANUALS:

Legislation is published on public web sites: <http://www.mvcr.cz/>, [www.mmr.cz](http://www.mmr.cz), <http://eagri.cz/public/web/mze/>, <http://www.mzp.cz/>

Methodics for instalation of heat pumps: Ministry of regional developement (IN CZE):  
<http://www.mmr.cz/cs/Uzemni-a-bytova-politika/Uzemni-planovani-a-stavebni-rad/Stanoviska-a-metodiky/Uzemni-rozhodovani-a-stavebni-rad/Tepelna-cerpadla>

Other legislation concerning drilling, building, construction and instalation of heat pumps and water protection:

- zákon č. 183/2006 Sb., o územním plánování a stavebním řádu (stavební zákon), ve znění pozdějších předpisů prováděcí vyhlášky k tomuto zákonu:
  - vyhláška č. 499/2006 Sb., o dokumentaci staveb, ve znění vyhlášky č. 62/2013 Sb.
  - vyhláška č. 501/2006 Sb., o obecných požadavcích na využívání území, ve znění pozdějších předpisů
  - vyhláška č. 503/2006 Sb., o podrobnější úpravě územního rozhodování, územního opatření a stavebního řádu, ve znění vyhlášky č. 63/2013 Sb.
  - vyhláška č. 268/2009 Sb., o technických požadavcích na stavby, ve znění vyhlášky č. 20/2012 Sb.
  - vyhláška č. 26/1999 Sb. HMP, o obecných technických požadavcích na výstavbu v hlavním městě Praze, ve znění pozdějších předpisů
  
- zákon č. 360/1992 Sb., o výkonu povolání autorizovaných architektů a o výkonu povolání autorizovaných inženýrů a techniků činných ve výstavbě, ve znění pozdějších předpisů
  
- zákon č. 254/2001 Sb., o vodách a o změně některých zákonů (vodní zákon), ve znění pozdějších předpisů prováděcí vyhlášky k tomuto zákonu:
  - vyhláška č. 432/2001 Sb., o dokladech žádosti o rozhodnutí nebo vyjádření a o náležitostech povolení, souhlasů a vyjádření vodoprávních úřadů, ve znění pozdějších předpisů
  - vyhláška č. 20/2002 Sb., o způsobu a četnosti měření množství vody, ve znění vyhlášky č. 93/2011 Sb.
  - vyhláška č. 590/2002 Sb., o technických požadavcích pro vodní díla, ve znění vyhlášky č. 367/2005 Sb.
  
- zákon č. 62/1988 Sb., o geologických pracích, ve znění pozdějších předpisů prováděcí vyhlášky k tomuto zákonu:
  - vyhláška č. 206/2001 Sb., o osvědčení odborné způsobilosti projektovat, provádět a vyhodnocovat geologické práce
  - vyhláška č. 282/2001 Sb., o evidenci geologických prací, ve znění vyhlášky č. 368/2004 Sb.
  - vyhláška č. 368/2004 Sb., o geologické dokumentaci





- vyhláška č. 369/2004 Sb., o projektování, provádění a vyhodnocování geologických prací, oznamování rizikových geofaktorů a o postupu při výpočtu zásob výhradních ložisek, ve znění vyhlášky č. 18/2009 Sb.
- zákon č. 100/2001 Sb., o posuzování vlivů na životní prostředí a o změně některých zákonů (zákon o posuzování vlivů na životní prostředí), ve znění pozdějších předpisů
- zákon č. 44/1988 Sb., o ochraně a využití nerostného bohatství (horní zákon), ve znění pozdějších předpisů
- zákon č. 61/1988 Sb., o hornické činnosti, výbušninách a o státní báňské správě, ve znění pozdějších předpisů
- zákon č. 458/2000 Sb., o podmínkách podnikání a o výkonu státní správy v energetických odvětvích a o změně některých zákonů (energetický zákon), ve znění pozdějších předpisů
- zákon č. 165/2012 Sb., o podporovaných zdrojích energie a o změně některých zákonů, ve znění zákona č. 407/2012 Sb.
- zákon č. 500/2004 Sb., správní řád, ve znění pozdějších předpisů

### 3. How does the licensing procedure for shallow geothermal energy systems (SGES) work in your country? Are there different procedures for the licensing of SGES? What is the difference?

Why are the procedures different? Are they different for different regions? For different systems?

How is information for the submission provided?

What is the end of the procedure?

There is always at least one procedure needed in case of licensing procedure for SGES. It's licence form local building authority

There is always at least one authority needed for licensing procedure - local building authority.

There is difference between open loop and closed loop system, open loop systems need always license from local water authority. Closed loop systems need this license only in specific cases (it's not exactly determined in which cases).

Open loop systems:

The procedure is permitted and solved on local administrative basis.





Local Building Authority permits installation of heat pump.

Local water protection authority authorizes hydrogeological report needed for construction permission. It sets limits of water pumping in case of open loop system.

Closed loop systems:

You always need a permit from local building authority. Mining administration provides supervision during drilling over 30 m of depth.

#### 4. What is needed for the submission of a shallow geothermal energy system? Are there different documents for different procedures? Do application forms exist?

The standardised application forms do not exist in the CZE. It is solved by individual communication with the local authority.

The case study from Trutnov (city) local building authority. It may differ in other cities:

Together with the application shall be submitted the following documents named in Section 8 of the Decree No. 432/2001., On the documents of the request for a decision or an opinion and on the requisites of permits, approvals and statements of the water authority:

- A. A geodetic situation of wider vicinity of the site of the intended building, a map in a scale of 1: 10,000 to 1: 50,000
- B. A copy of the cadastral map of the territory to which the consent relates
- C. Expert assessment of impact on drainage rates
- D. The assessment of water protection authority
- E. The assessment of hydrogeology expert
- F. List and type of protected areas and protection zones in the concerned area

#### 5. Entities for the applications of SGES

Which administrative entities are involved in the licensing procedure of SGES?  
Which of them are the first contact points for the submission?

- 1) Local Building Authority
- 2) Local water protection authority
- 3) In case of boreholes deeper >30 m, Regional Authority permits the drilling of deep boreholes.



- 4) Regional Mining Authority supervises the borehole drilling works (in case >30 m).

How much time does the procedure take from submission till granting? How long is the granting valid and are there any restrictions for extension?

The procedure takes different time period. It depends how difficult the procedure is. One law act takes up to 30 day. Granted construction permit last forever until HP is build.

Are online applications available?

No.

6. Are there official requirements for the installation and operation linked to the granting (catalogue of requirements)? Are there different requirements for SGES in urban and non-urban regions?

NOTE: Details to the first questions will also be answered in topic area C. and D. Please give just a short explanation!

No.

7. Are there some special requirements concerning the installations and operation of SGES in your pilot area?

General requirements are applicable in pilot areas. No special requirements are needed.

8. Are there some liquidation procedures after abandonment for SGES?

The liquidation is not solved in any methodical document nor law binding document.

9. Are there regulations for monitoring of SGES? If yes, how does the monitoring have to be executed?

In case of open loop system, the water protection authority permits and sets the maximum volume of pumped water and it may require the pumping monitoring.



## B. FLOW CHARTS FOR LICENSING PORCEDURES IN THE PILOT AREA

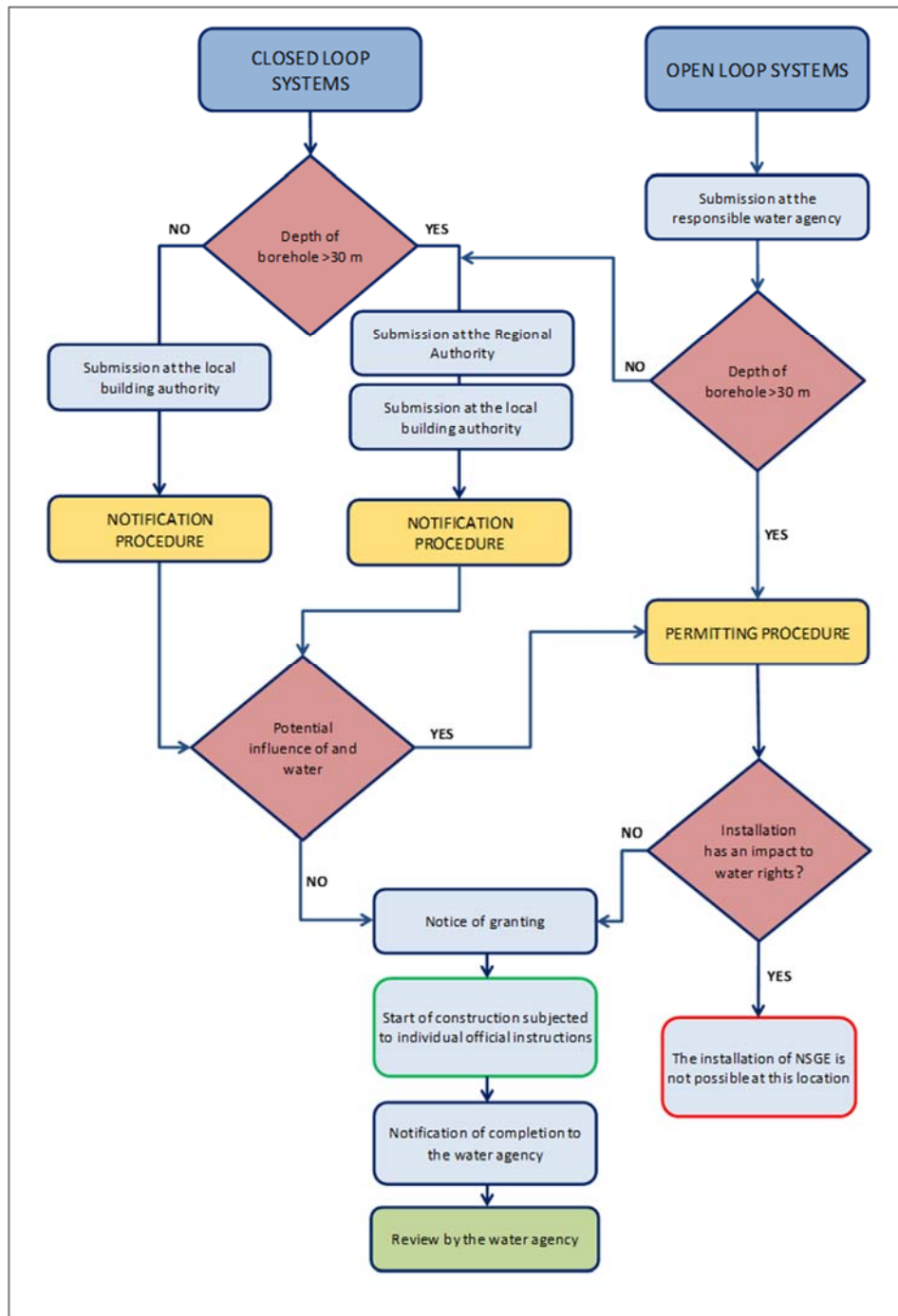


Figure 1: Flow chart for Czech Republic



## C. SPECIAL GEOLOGICAL AND GEOGRAPHICAL CONDITIONS WHICH CAN LIMIT THE INSTALLATION OF SHALLOW GEOTHERMAL ENERGY SYSTEMS

| C. Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems (SGES) |   |                  |                    |                     |  |
|--|---|------------------|--------------------|---------------------|--|
| Regulation element   | PILOT AREA  |                  |                    | GENERAL             |  |
|  | SGES allowed under special obligations or conditionally allowed | SGES not allowed | SGES not regulated | National regulation | Other regulations  |
| Artesian aquifers  | X   |                  |                    |                     | The assessment of hydrogeology expert is needed<br>1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority is needed |
| Very shallow water table where reinjection can be problematic  | X   |                  |                    |                     | The assessment of hydrogeology expert is needed  |
| Perched groundwater layers   | X   |                  |                    |                     | The assessment of hydrogeology expert is needed  |
| Two or multiple aquifer layers   | X   |                  |                    |                     | The assessment of hydrogeology expert is needed  |
| Mineral water resources  | X   |                  |                    |                     | The assessment of hydrogeology expert is needed<br>1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority is needed |
| Thermal water resources  | X   |                  |                    |                     |  |
| Gas occurrences  | No shallow gas occur in the area of CZE                         |                  |                    |                     |  |
| Mining areas   |   |                  | X                  |                     |  |
| Contaminated soil  |   |                  | X                  |                     |  |
| Evaporites (e.g. NaCl, gipsium)  | No evaporites occur in the area of CZE                          |                  |                    |                     |  |
| Swellable rocks (e.g. anhydrite, clay)   |   |                  | X                  |                     |  |
| Karst area   |   |                  | X                  |                     |  |
| Water protection area  | X   |                  |                    |                     | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority is needed  |
| Nature protected ecosystem area  | X   |                  |                    |                     | 1) The assessment of hydrogeology expert is needed<br>2) The permission of nature protection authority is needed   |
| Flood and erosion areas  | X   |                  |                    |                     | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority is needed  |
| Landslide areas  |   |                  | X                  |                     |  |
| Costal zones   | Do not occur in the area of CZE                                 |                  |                    |                     |  |

Table 1: Filled questionnaire for topic C, Czech Republic



## D. REGULATION ELEMENTS FOR THE INSTALLATION, IMPLEMENTATION AND OPERATION OF GEOTHERMAL ENERGY SYSTEMS

| D. Regulation elements for the installations, implementation and operation of shallow geothermal energy systems (SGES) |  |  |
|--|--|--|
| Regulation element   | GENERAL  |  |
|  | National regulation  | Other regulations  |
| <b>ALL SYSTEMS</b>   |  |  |
| Drilling below groundwater table allowed   | It is solved in drilling permission granted by Regional Authority according act No. 61/1988.       |  |
| Minimum distance to neighboring plot [m]   |  | Not solved by legal act, however it is a part of the constuction plan which has to agreed by local construction authority.   |
| Minimum distance to buildings [m]  |  |  |
| Minimum distance neighboring wells [m]   |  |  |
| Minimum distance to neighboring closed loop systems  |  |  |
| Groundwater investigations necessary (Hydrochemistry)  |  |  |
| Certification for drilling companies needed  | Yes, needed according act No. 61/1988.   |  |
| Certification for planners or installers needed  | Yes. Certified construction engineer is allowed to prepare construction plans. (Act. No. 254/2001) |  |
| Numerical simulations required   | Not solved in the CZE  |  |
| <b>OPEN LOOP SYSTEMS</b>   |  |  |
| Minimum distance between pumping and reinjection site [m]  |  | Not solved by legal act, however it is a part of the constuction plan which has to agreed by local construction authority and the conditions of use of groundwater are granted by local water protection authority. The assessment of hydrogeology expert is needed. |
| Reinjection of used groundwater  |  |  |
| Temperature difference between extracted and reinjected water  |  |  |
| Absolute allowed temperature range of the reinjected water [°C]  |  |  |
| Allowed temperature change [°C]  |  |  |
| Accepted drawdown [cm]   |  |  |
| Pumping test obligatory  |  |  |
| <b>CLOSED LOOP SYSTEMS</b>   |  |  |
| Minimum distance to other heat exchangers of the same  |  | Not solved by legal act, however it is a part of the constuction plan which has to agreed by local construction authority.   |
| Target value for the average inital and input temperature of   |  |  |
| Regulations for heat carrier fluid type  |  |  |
| Regulations for refrigerant type   |  |  |
| Regulations for the backfilling of BHE   |  |  |
| Leakage test of ground loop and refrigerant tubing required  |  |  |
| Borehole drilling report required  |  |  |
| Taking core samples required   |  |  |
| Thermal response test required   |  |  |
| Calculation of drilling depth required   |  |  |

Table 2: Filled questionnaire for topic D, Czech Republic

# ANNEX 4

## SUMMARY OF NATIONAL LEGAL REQUIREMENTS, CURRENT POLICIES AND REGULATIONS OF SHALLOW GEOHERMAL USE

Working report for D.T2.4.1

07 2017

POLAND

 **Geologische Bundesanstalt**

LANDESAMT FÜR UMWELT,  
LANDWIRTSCHAFT  
UND GEOLOGIE

 Freistaat  
**SACHSEN**

 **CZECH  
GEOLOGICAL  
SURVEY**

 **GeoZS**  
Geološki zavod  
Slovenije



  
**AGH**  
AGH UNIVERSITY OF SCIENCE  
AND TECHNOLOGY

 **geoENERGIE**  
Konzept

 **Giga**  
infosystems

 Bundesverband  
**Geothermie**

 City of  
Ljubljana





## A. LEGAL REGULATIONS/ LICENSING PROCEDURES

### 1. Definition of shallow geothermal energy in your country

There is no official definition of shallow geothermal energy in Poland. Somehow, as shallow may be considered geothermal well up to 100m, as usually it does not require full legal procedure. Some summarizes as shallow geothermal energy in Poland all geothermal systems installed from the surface down to a depth of 400 m.

### 2. Is the use of geothermal energy regulated in your country?

Which levels of regulations do you have in your country? Explain in terms of NATIONAL, REGIONAL and LOCAL with the according regulation instrument (act, rule guideline, official order etc.) and its character (legally binding/obligatory or recommended)!

Please also summarize the regulation with a few sentences!

#### REGULATION LEVELS

|          |             |   |            |                     |
|----------|-------------|---|------------|---------------------|
| NATIONAL | Instrument: | Geological and mining Law (Prawo geologiczne i górnictwo) - 2011                          | Character: | Obligatory, binding |
|          | Instrument: | Water Law (Prawo wodne) - 2001  | Character: | Obligatory, binding |
|          | Instrument: | Environmental Protection Law (Prawo ochrony środowiska) - 2001                            | Character: | Obligatory, binding |
|          | Instrument: | The Law on spatial planning (Ustawa o planowaniu i zagospodarowaniu przestrzennym) - 2003 | Character: | Obligatory, binding |
|          | Instrument: | Construction Law (Prawo budowlane) - 1994   | Character: | Obligatory, binding |
|          | Instrument: | Law on the provision of environmental information   | Character: | Obligatory, binding |





|  |             |   |            |                     |
|--|-------------|---|------------|---------------------|
|  |             | and its protection, public participation in environmental protection and on environmental impact assessments (Ustawa o udostępnianiu informacji o środowisku i jego ochronie, udziale społeczeństwa w ochronie środowiska oraz o ocenach oddziaływania na środowisko) - 2008  |            |                     |
|  | Instrument: | Act on Renewable Energy Sources (Ustawa o odnawialnych źródłach energii) - 2015   | Character: | Obligatory, binding |
|  | Instrument: | Ordinance of the Minister of the Environment amending the Regulation on detailed requirements for geological work projects, including works for which the license is required (Rozporządzenie Ministra Środowiska z dnia 1 lipca 2015 r. zmieniające rozporządzenie w sprawie szczegółowych wymagań dotyczących projektów robót geologicznych, w tym robót, których wykonywanie wymaga uzyskania koncesji) - 2015 | Character: | Obligatory, binding |
|  | Instrument: | Ordinance of the Minister of the Environment on other geological documentation (Rozporządzenie Ministra Środowiska z dnia 6 grudnia 2016 w sprawie innych dokumentacji geologicznych) - 2016  | Character: | Obligatory, binding |
|  | Instrument: | Ordinance of the Minister of the Environment on hydrogeological and engineering geology documentation   | Character: | Obligatory, binding |



|          |             |   |            |                     |
|----------|-------------|---|------------|---------------------|
|          |             | (Rozporządzenie Ministra Środowiska z dnia 18 listopada 2016 r. w sprawie dokumentacji hydrogeologicznej i dokumentacji geologiczno-inżynierskiej) - 2016 |            |                     |
| REGIONAL | Instrument: | none  | Character: |                     |
|          | Instrument: |   | Character: |                     |
| LOCAL    | Instrument: | Land use local regulations  | Character: | Obligatory, binding |
|          | Instrument: |   | Character: |                     |

**OTHER IMPORTANT DOCUMENTS like GUIDELINES, TECHNICAL GUIDELINES, HANDBOOKS, MANUALS:**

The Polish Committee for Standardization is the organization responsible for regulating the standards for the installation of heat pumps and the use of shallow geothermal energy. Since January 1, 2003, the use of those standards is entirely voluntary, except for public-funded activities under the Public Procurement Law, which imposes an obligation to take account of them:

- PN-EN 378-1:2017-03, PN-EN 378-2:2017-03, PN-EN 378-3:2017-03, PN-EN 378-4+A2:2012 - Instalacje ziębnicze i pompy ciepła - Wymagania dotyczące bezpieczeństwa i ochrony środowiska (Cooling systems and heat pumps - Safety and environmental requirements),
- PN-EN 14511-1:2014-02, PN-EN 14511-2:2014-02, PN-EN 14511-3:2013-12, PN-EN 14511-4:2014-02 - Klimatyzatory, ziębiarki cieczy i pompy ciepła ze sprężarkami o napędzie elektrycznym, do grzania i ziębienia (Air conditioners, liquid coolers and heat pumps with electrically operated compressors, for heating and cooling),
- PN-EN 1997-1:2008 /A1:2014-05 - Eurokod 7: Projektowanie geotechniczne - Część 1: Zasady ogólne (Eurocode 7: Geotechnical Design - Part 1: General principles),
- PN-EN 12831:2006 - Instalacje ogrzewcze w budynkach - Metoda obliczania projektowego obciążenia cieplnego (Heating systems in buildings - Method of calculating design heat load),
- PN-EN 15450:2007 - Instalacje ogrzewcze w budynkach - Projektowanie instalacji centralnego ogrzewania z pompami ciepła (Heating systems in buildings - Design of central heating systems with heat pumps),
- PN-EN 1861:2001 - Instalacje ziębnicze i pompy ciepła - Schematy ideowe i montażowe instalacji, rurociągów i przyrządów - Układy i symbole (Cooling systems and heat pumps - Schemes ideas and installation of pipes and piping instruments - Systems and symbols),
- PN-EN 206+A1:2016-12 - Beton - Część 1: Wymagania, właściwości, produkcja i zgodność (Concrete - Part 1: Requirements, properties, production and compatibility),
- PN-EN 805:2002 - Zaopatrzenie w wodę - Wymagania dotyczące systemów zewnętrznych i ich części składowych (Water supply - Requirements for external systems and their components),



- PN-EN 1254-3:2004 - Miedź i stopy miedzi - Łączniki instalacyjne - Część 3: Łączniki do rur z tworzyw sztucznych z końcówkami zaciskowymi (Copper and copper alloys - Installation switches - Part 3: Plastic pipe fittings with clamping tips),
- PN-EN 1610:2015-10 - Budowa i badania przewodów kanalizacyjnych (Construction and testing of sewer lines),
- PN-S-02205:1998 - Drogi samochodowe - Roboty ziemne - Wymagania i badania (Roads - Earthworks - Requirements and research),
- PN-B-02481:1998 - Geotechnika - Terminologia podstawowa, symbole literowe i jednostki miar (Geotechnics - Basic terminology, letter symbols and units of measurement),
- PN-EN 12201-1:2012, PN-EN 12201-2 +A1:2013-12, PN-EN 12201-3 +A1:2013-05 - Systemy przewodów rurowych z tworzyw sztucznych do przesyłania wody oraz do ciśnieniowej kanalizacji deszczowej i sanitarnej - Polietylen PE (Plastic piping systems for water and rainwater and sanitary sewage systems - Polyethylene PE),
- PN-EN 14511-1:2014-02, PN-EN 14511-2:2014-02, PN-EN 14511-3:2013-12, PN-EN 14511-4:2014-02 - Klimatyzatory, ziębiarki cieczy i pompy ciepła ze sprężarkami o napędzie elektrycznym, do grzania i ziębienia (Air conditioners, liquid coolers and heat pumps with electrically operated compressors, for heating and cooling),
- PN-EN 15632-1 +A1:2015-02, PN-EN 15632-2 +A1:2015-02, PN-EN 15632-3 +A1:2015-03, PN-EN 15632-4:2009 - Sieci ciepłownicze - System preizolowanych rur giętkich (Heating networks - Pre-insulated flexible pipe system),
- PN-EN ISO 15875-1: 2005/A1:2008, PN-EN ISO 15875-2: 2005/A1:2008 - Systemy przewodów rurowych z tworzyw sztucznych do instalacji wody ciepłej i zimnej - Usieciovany polietylen PE-X (Plastic pipe systems for hot and cold water installations - Cross-linked polyethylene PE-X).

The PORT PC organization (“Polska Organizacja Rozwoju Technologii Pomp Ciepła“, - Polish Organization for Heat Pump Technology Development <http://portpc.pl> ) deals with broadly defined heat pumps technology and provide commonly noted guidelines. Their main objectives of the activities are:

- improving the quality of heat pumps installations,
- disseminate knowledge about heat pumps,
- creating conditions for the rapid and harmonious development of the heat pump market in Poland,
- training courses and exams to ensure EUCERT accreditation for the installers,
- substantive support of projects in the form of the publishing series "Guidelines for design, construction and commissioning of heat pump installations".

The guidelines are not legally binding, but they are considered as best practice handbook.

#### EXPLANATION OF GEOTHERMAL REGULATIONS:

All kind of regulations related to the installation and use of shallow geothermal energy in Poland has national level (table 1). There are some main differences in legal procedures between open loop systems and closed loop systems.



Open loop systems, also called groundwater heat pumps (GWHP), are not widespread in Poland. Strong influence on environment requires to fulfil many legal procedures which involve the execution of specialized analyzes and hydrogeological studies, the need to develop the environmental and water condition report, obtain a Water Law permit with the decision on the environmental condition (requirements of the “Water Law”, “Environmental Protection Law” and “Law on the provision of environmental information and its protection, public participation in environmental protection and on environmental impact assessments”). Complicated formal and legal procedures are the main cause of the lack of popularity of open loop systems.

Much more widespread are closed loop systems. They are showing significantly less environmental impact, which results in relatively less legal requirements. In case of vertical borehole heat exchangers, the most important legal basis is “Geological and mining Law”. For the horizontal installations and spiral-shaped installations, legal procedures are mostly gathered in “Construction Law”.

### 3. How does the licensing procedure for shallow geothermal energy systems (SGES) work in your country? Are there different procedures for the licensing of SGES? What is the difference?

Why are the procedures different? Are they different for different regions? For different systems?

How is information for the submission provided?

What is the end of the procedure?

#### Vertical borehole heat exchangers

On the basis of the Geological and Mining Law and its implementing acts, the following procedures and the most important steps for drilling boreholes for the placing of vertical ground heat exchangers have to be fulfilled:

- 1) Preparation of geotechnical site investigation plan (GSIP) and mining works operation plan (MWOP), if required.

The scope of elaboration of the documentation of execution of geological works for using the heat of the earth is determined by the ordinance of the Minister of the Environment “on the detailed requirements for other kinds of geological documentation”. The qualifications of persons entitled to fulfil documentation are specified in the relevant article of Geological and Mining Law.

- 2) Project submission and notification of accession to works specified in GSIP (draft drilling project).

According to the Geological and Mining Law, the project of geotechnical-site-investigation-plan has to be reported to the district head. The start of geological works may occur if, within 30 days from the date of submission of the GSIP, the district head/starost does not raise objections to the plans. In accordance with Geological and Mining Law, in the case of boreholes drilled at depths of



over 100 m or over 30 m for boreholes placed in the mining area, a mining works operation plan must be developed.

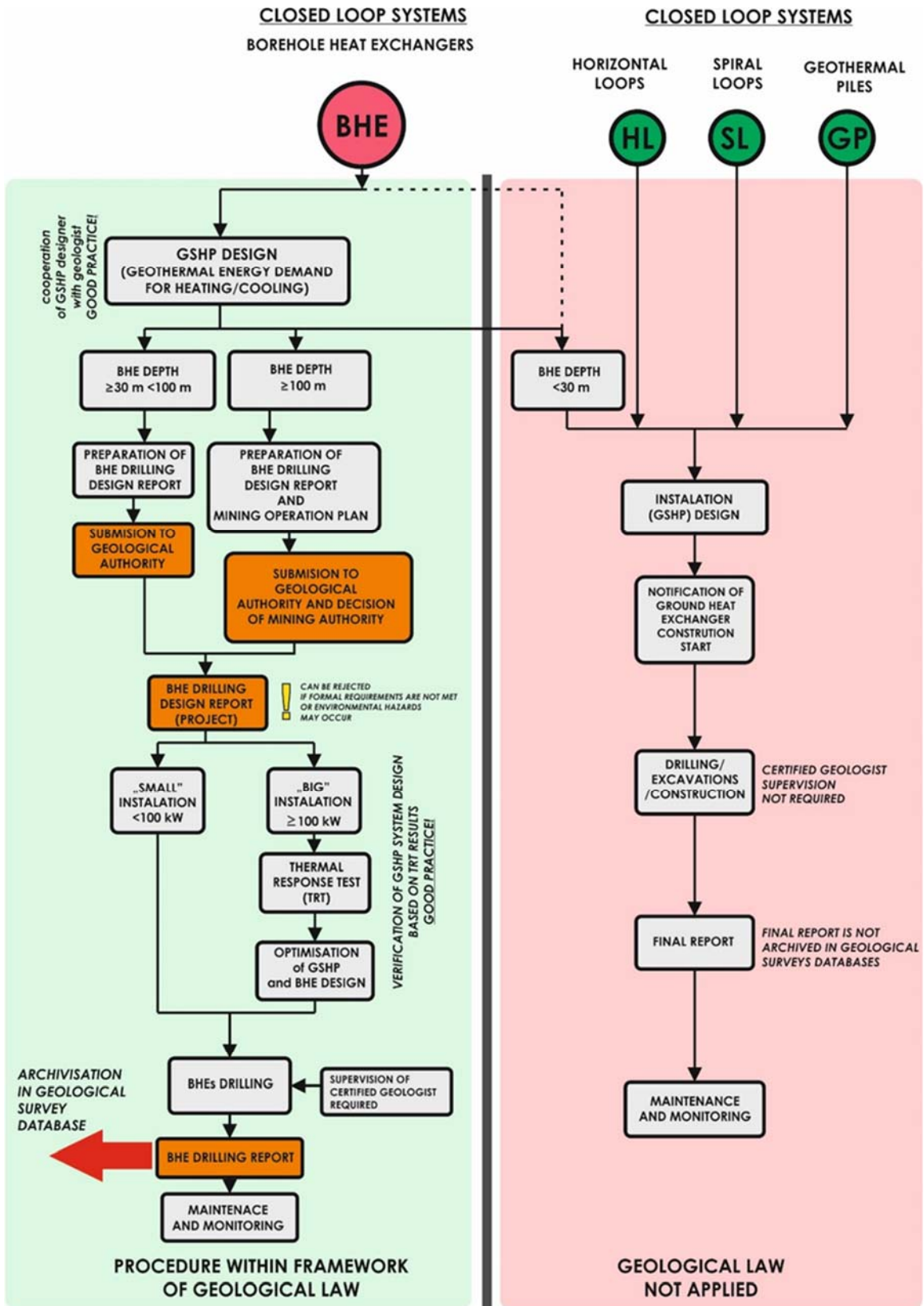


Figure 1: Types of ground heat exchangers for closed loop systems and their geological law framework. Scheme for location outside mining area.

### 3) Carry out the drilling work.

Qualified persons in accordance with the relevant requirement of Geological and Mining Law can only carry out drilling processes. These are the people managing and supervising the mining plant. Specialists holding the hydrogeological/hydrogeotechnical qualifications of category IV or V. may carry out the management and supervision of geological works.

### 4) Drawing up the geological documentation and hand it over to the competent geological administration.

According to the Geological and Mining Law, the results of geological works and their interpretation, all geological data acquired during the work, evaluation of accomplished goal together with the justification have to be presented in the geological documentation.

## Horizontal and spiral-shape heat exchangers

Horizontal and spiral-shape heat exchangers in accordance with the Construction Law must be interpreted as a thermal connection to a building, which does not require a building permit. The intention of building a horizontal or spiral-shape ground heat exchanger should be reported to the mayor or president, competent for the place of construction work. The application should be submitted not less than 30 days before the expected start date. Construction submissions should include information such as the type, scope and manner of construction of the heat exchanger and project planned start date. The heat exchanger construction may start if within 30 days from the date of service of the notification, the competent authorities does not raise any objections. It is recommended that the location of the heat exchanger should be consulted with the District Team for Planning and Design Documentation.

## Open loop systems

The Geological and Mining Law govern drilling of the borehole and preparation of the geological documentation. The legal procedure is analogous to the typical groundwater intakes for which, after appropriate research, exploitation resources have to be determined. The results of the geological works, drilling and tests performed in the well are presented in the form of "Hydrogeological documentation determining the exploitation resources of underground water bodies". For the open loop systems which discharge water to the aquifer the "Documentation of hydrogeological conditions related to the injection of water into the rock mass" is also required. Documentation has to be approved by the competent geological administration. Drilling process must be preceded by the execution and approval of the geotechnical site investigation plan.

According to the Water Law (WL), the usage of open loop systems should be treated as a special use, even if the installation is for household use. This is determined by the low threshold of the amount of water usage adopted in the WL, not exceeding 5 m<sup>3</sup>/day. Even the smallest installations, which meet the heating needs of a typical family, require a daily water intake of about 15 m<sup>3</sup>/d. Notwithstanding this, the WL says that the use of water for energy purposes is always a special





use. The water intake for open loop systems in each case requires a WL permit. Similar to the closed loop systems, the regulations of the Water Law may operate in the case of occurrence of a groundwater protection areas (due to the possibility of contamination of the aquifer). The water used in heating-cooling process is classified as a waste and the discharge (for sewers, surface water reservoirs or deep aquifers) requires special Water Law permits issued by the district mayor/starost.

According to the Environmental Protection Law, the owner of the installation is responsible for possible environmental pollution and he is obligated to refund the costs of removing the effects of pollution. Devices for groundwater extraction of more than 10 m<sup>3</sup>/h and boreholes/wells for water supply are eligible for projects that may have significant effects on the environment. An assessment whether the report is required and what is scope of the report, the investor obtains by asking the competent authority of local government (city or municipality office). The commune mayor or mayor issues a decision on the need for the report after consultation with the Department of Environmental Protection of the competent District Office and the State District Sanitary Inspector.

#### 4. What is needed for the submission of a shallow geothermal energy system? Are there different documents for different procedures? Do application forms exist?

Boreholes drilled for the purpose of using earth's heat, with a depth of less than 30 m, are not subject to the provisions of the Geological and Mining Law and do not require notification for geological administration. However it is advisable to voluntarily report all kind of work and to provide geological/hydrogeological data from the borehole, which will then serve scientific purposes in geological exploration and environmental control.

For a borehole of 30-100 m depth the Geological and Mining Law states, that planning and geological research for the use of earth's heat is a geological work, and that the intention to implement it should be reported in the form of a "geotechnical site investigation plan (GSIP)" to the competent geological administration authorities. If, within 30 days of submission of the GSIP, the district head does not raise objections to, the work can begin.

For a borehole of 30-100 m depth located in the mining area a "mining works operation plan" should be developed in addition to the "geotechnical site investigation plan".

For a boreholes with a depth of more than 100 m, both the "geotechnical site investigation plan" and "mining works operation plan" must be prepared and approved by the District Mining Authority.

| $h_w$ [m]<br>depth of borehole             | geotechnical site investigation plan | mining works operation plan |
|--|--------------------------------------|-----------------------------|
| >30 (outside the mining area)              | NO                                   | NO                          |
| >30 (in the mining area)                   | YES                                  | NO                          |
| 30 < $h_w$ < 100 (outside the mining area) | YES                                  | NO                          |
| 30 < $h_w$ < 100 (in the mining area)      | YES                                  | YES                         |
| > 100 (regardless of area)                 | YES                                  | YES                         |



After completion of the works and studies, the contractor shall submit geological documentation of the borehole within 6 months of completion of the project. Documentation is forwarded to the relevant geological administration authorities.

The geotechnical site investigation plan performed to obtain Earth's heat include:

**DESCRIPTIVE PART:**

- the location of the proposed geotechnical works
- discussion of current research
- list of archives
- description of geological structures and hydrogeological conditions
- predicted profiles of excavations and boreholes
- presentation of the possibility of achieving the goal (description and justification of the number of excavations and boreholes)
- determination of geological samples to be transmitted
- timetable
- environmental impact on protected areas, including NATURE 2000 areas
- expected construction of boreholes and excavations
- information on the closing of aquifers

**GRAPHICAL PART**

- Topographic map - scale of at least 1: 100 000 (1: 500 000 for sea charts)
- geological, hydrogeological, geotechnical maps, etc., depending on the kind of the planned works
- height field map - scale of not less than 1 : 50 000
- geo-environmental map - scale of not less than 1 : 50 000
- geological cross sections

The maps should indicate the place or area of the intended works. Topographic maps must be obtained from a national geodetic/cartographic resources or by the Naval Hydrographic Office and Maritime Offices.

As it was mentioned before that construction of open loop systems requires fulfilling many legal procedures. The basis for the implementation of a GWHP is obtaining a Water Law permit. Water Law permit is a type of permit issued by a decision of a state administration. The decision of the Water Law permit allow:

- special use of water (sewage disposal, surface and underground water extraction)
- construction of hydraulic-engineering structures (wells, ponds, bridges, levees)



- other activities that may affect water quality and water/sewage management (discharge of industrial waste to sewerage, discharge of rainwater, regulation of water flow, agricultural use of sewage)

The water condition report is the basic document which allow an authorization of Water Law permit. This comprehensive study report consists of descriptive and graphical parts.

The DESCRIPTIVE PART should include:

- designation of the institution applying for the license with indication of its registered office and address
- description of the purpose and scope of the intended use of the waters
- specification of the type of measuring equipment
- indication of the legal status of properties situated in the area of the intended use of water or planned waterworks, showing the premises and addresses of their owners
- indication of the obligations of the applicant for a third-party beneficiary
- characteristics of waters covered by a Water Law permit
- arrangements resulting from the conditions of use of waters of the water region
- determining the impact of the water management of the plant/construction on surface water and groundwater
- presentation of the planned start-up period and the manner in which the start-up, shutdown, failure or damage of measuring equipment and the size, conditions of use of water and water equipment in these situations
- information on forms of nature protection occurring within the range of the intended use-of-water areas or planned water facilities

The GRAPHICAL PART should include:

- plan of water facilities and the extent of the intended use of water or planned waterworks, including the designation of the property and its stretch, plotted on the heightfield map of the site
- the essential longitudinal and transverse cross sections of water devices and the water flowing areas within the influence of these devices
- layout of measuring devices
- functional or technological scheme of water facilities

The water condition report, on basis which the Water Law permission for groundwater abstraction has been issued, should additionally include:

- determination of the maximum water consumption per hour and daily average
- technical description of devices for groundwater abstraction
- determination of types of devices for recording and measuring water consumption





- determination of the range and frequency of required water analysis

The water condition report, on basis which the Water Law permission to discharge sewage to the groundwater or sewerage has been issued, should additionally include:

- technological diagram sheet with the materials mass balance and types of used materials, fuels and other information that is relevant for the purposes of environmental protection
- determination of the quantity, condition and composition of wastewater or minimum percentage of pollution reduction in wastewater or, in the case of industrial wastewater, the permissible quantities of pollutants, in particular the quantities of substances especially harmful to the aquatic environment expressed in units of mass per unit of raw material, fuels or developed product and the anticipated way of their purification
- results of measurements of the quantity and quality of wastewater
- description of installations and equipment used for collecting, purifying and discharging wastewater
- project and frequency of the required analyzes of discharged wastewater, groundwater or surface water above and below the site of discharge
- description of equipment used to measure and record the quantity, condition and composition of wastewater
- description of the water quality at the site of intended sewage discharge
- information on how to use sewage sludge

The other important element of the GWHP legal procedure is preparation of the environmental impact report.

The environmental impact report should include:

- description of the planned project
- description of environmental elements and possible influence of the planned project on the environment
- description of existing protected monuments in the neighborhood of the planned project
- description of expected environmental effects in case of project inaction
- description of the variant proposed by the applicant, an alternative variant and the most environmentally-responsible option with the justification for their choice
- determining the predicted environmental impacts of the variants analyzed, including possible major accident
- description of forecasting methods used by the applicant and description of envisaged significant impacts of the proposed project on the environment, including direct, indirect, secondary, cumulative, short, medium and long term, permanent and temporary environmental changes



- description of the anticipated actions to prevent, reduce or compensate for the negative environmental impacts, in particular the elements and objects of the NATURA2000 areas
- indication of whether it is necessary to establish a restricted use area within the meaning of the legislation and to define the boundaries of such area, land use restrictions, technical requirements for buildings and their uses
- presentation of issues in graphic form
- presentation of issues in cartographic form on a scale that corresponds to the subject and detail analyzed in the issues report that allow for a comprehensive presentation of conducted environmental impact studies
- analysis of possible social conflicts related to the planned project
- presentation of proposals for monitoring the impact of the planned project at the stage of its construction and operation or use, in particular the aims and objects of the NATURA2000 areas
- indication of the difficulties resulting from technical deficiencies or gaps in contemporary knowledge encountered in developing the report
- summary in the non-specialized language of the information contained in the report, for each report element
- the name of the person or persons preparing the report
- sources of information that form the basis of the report

The environmental impact report is part of the environmental impact assessment procedure, which may be part of the environmental decision-making procedure.

## 5. Entities for the applications of SGES

Which administrative entities are involved in the licensing procedure of SGES?  
Which of them are the first contact points for the submission?

How much time does the procedure take from submission till granting? How long is the granting valid and are there any restrictions for extension?

Are online applications available?

Requests for permission to start construction of SGES installations should be submitted to the office of the District Head. In case of drilling boreholes more than 30 m deep, both for closed and open loop system installations the requirements specified in the Geological and Mining Law should be fulfilled. Drilling of boreholes located in the mining area and holes with a depth of more than 100 m, regardless of the area, must be reported to the Regional Mining Authority. In addition to the GWHP, the application is made to the Department of Environmental Protection, which, after consultation with the State District Sanitary Inspector, issues a permit to commence work. In both



cases, the public administration authorities of district level (“Starostwo powiatowe”) have 30 days to consider the applications.

If there are no objections after the 30 days since the application has been submitted, the installation can begin. Start of work must be reported 2 weeks before the first construction activities. Water Law permit for GWHP is issued for 10 years.

## 6. Are there official requirements for the installation and operation linked to the granting (catalogue of requirements)? Are there different requirements for SGES in urban and non-urban regions?

NOTE: Details to the first questions will also be answered in topic area C. and D. Please give just a short explanation!

There are no official requirements beside general compliance of the products, e.g. with efficiency or CFC and HCFC gases regulations. Still, there are requirements, if installation had been financially supported by a public institution - usually, a given environmental effect must be achieved (e.g. a given reduction of CO<sub>2</sub> emission), what determines some technical constrains.

There is no mandatory distinction between urban and country areas, but they may be observable in issued decisions (e.g. because of planned underground infrastructure).

## 7. Are there some special requirements concerning the installations and operation of SGES in your pilot area?

Within the Kraków area there is plenty of, often comparatively shallow, potable water reservoirs, which cannot be contaminated. In some parts of Kraków, especially in proximity of the Vistula river, water-to-water heat pumps may be subject of corrosive ions activity. Thus, some open-loop installations may need to be equipped with additional water-to-water heat exchanger to provide HP working conditions that are acceptable by the device producer. Also, in the most densely built up parts of the city, open-loop systems’ productivity may need to be limited because of subsidence risk. Similarly - close-loop systems may be forced to reduce its power per meter so that certainly avoid freezing the soil to protect building foundations.

In the past a considerable part of the Wałbrzych area was a hard coal mining area. Many old shafts and excavations of historical coal exploitation are not properly localised on present maps and such areas should be excluded for future SGES installations or very carefully examined before permission is given.

## 8. Are there some liquidation procedures after abandonment for SGES?

There are no procedure described for heat pumps installations. Relevant authority may demand liquidation of not used wells in an indirect water-intake-protection-area.



9. Are there regulations for monitoring of SGES? If yes, how does the monitoring have to be executed?

There is no legal requirement of monitoring heat pump installations itself. In some cases water/wastewater quality and/or water table, level monitoring may be required (determined in the water permission). If public financial support was granted, financing institution may demand adequate data (still, sensitive data protection acts are binding).



# B. FLOW CHARTS FOR LICENSING PROCEDURES IN THE PILOT AREA

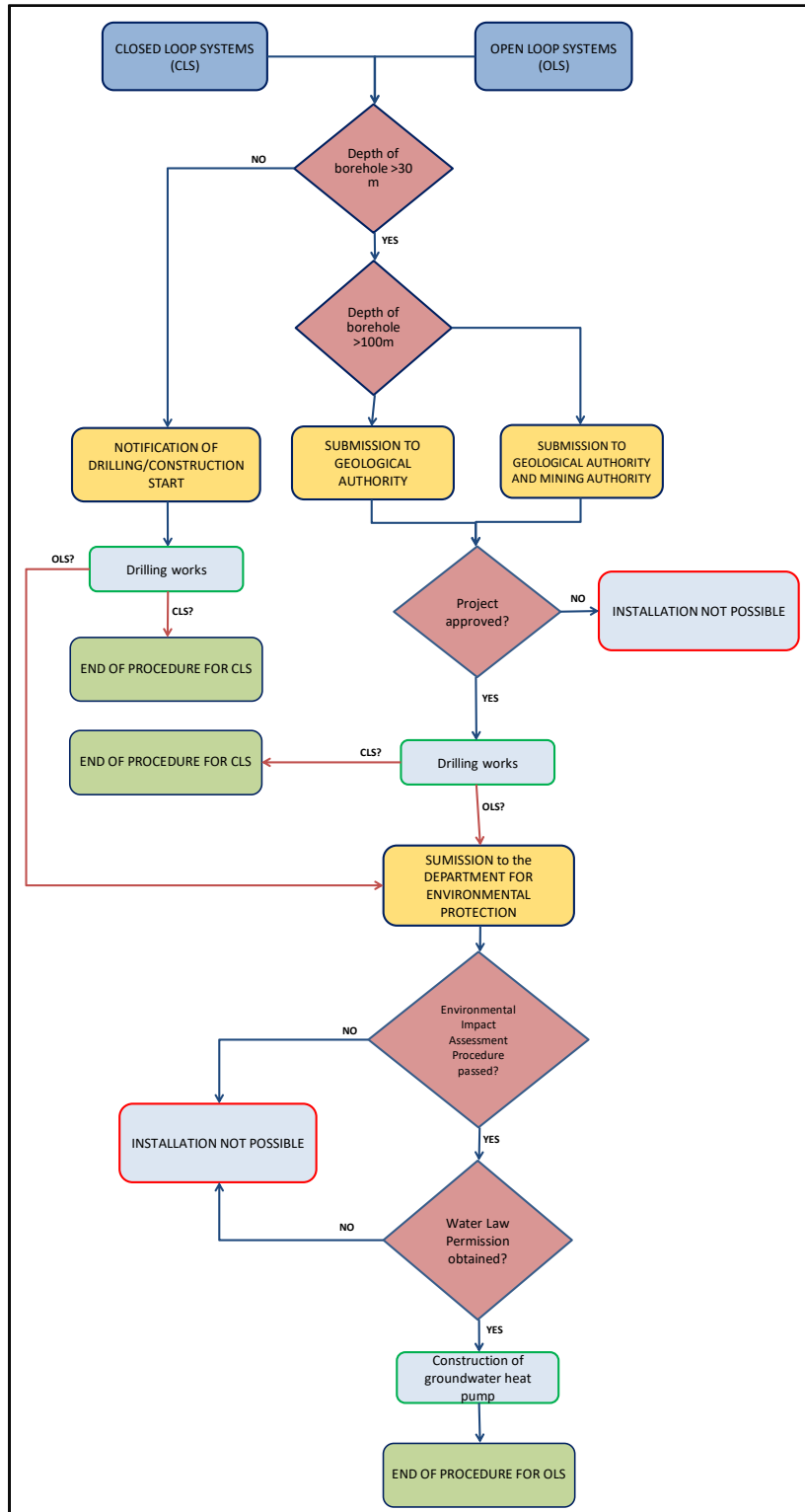


Figure 2: Flow chart Poland



## C. SPECIAL GEOLOGICAL AND GEOGRAPHICAL CONDITIONS WHICH CAN LIMIT THE INSTALLATION OF SHALLOW GEOTHERMAL ENERGY SYSTEMS

| C.-Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems (SGES) |   |                  |                     |   |
|--|---|------------------|---------------------|---|
| LEGAL BASE   |   |                  |                     |   |
| Regulation element   | PILOT AREA: Kraków and Wałbrzych                                |                  | National regulation | Other regulations   |
|  | SGES allowed under special obligations or conditionally allowed | SGES not allowed |                     |   |
| Artesian aquifers  |   |                  | X                   | not regulated   |
| Very shallow water table where reinjection can be problematic  | X   |                  |                     | Anyone who has temporarily changed water relations is obliged to take action to restore them, once this change ceases to be necessary - Environmental Protection Law Art. 100.  |
| Perched groundwater layers   |   |                  | X                   | not regulated   |
| Two or multiple aquifer layers   |   |                  | X                   | not regulated   |
| Mineral water resources  | X   |                  |                     | According to Geological and Mining Law mineral water is treated as a mineral resource. Any kind of usage of mineral water requires appropriate concessions (except for waters coming from mine drainage). - Geological and Mining Law Art. 5., Art. 203.                                |
| Thermal water resources  | X   |                  |                     | According to Geological and Mining Law thermal water is treated as a mineral resource. Any kind of usage of thermal water requires appropriate concessions (except for waters coming from mine drainage). - Geological and Mining Law Art. 5., Art. 203.                                |
| Gas occurrences  | X   |                  |                     | If amount of dissolved CO <sub>2</sub> is bigger than 250mg/dm <sup>3</sup> water is treated as a mineral resource. Any kind of usage of mineral water requires appropriate concessions (except for waters coming from mine drainage). - Geological and Mining Law Art. 5., Art. 203.   |
| Mining areas   | X   |                  |                     | For boreholes placed in the mining area, a mining works operation plan must be developed - Geological and mining Law Art. 86.   |
| Contaminated soil  |   |                  | X                   | not regulated   |
| Evaporites (e.g. NaCl, gipsum)   |   |                  | X                   | not regulated   |
| Swellable rocks (e.g. anhydrite, clay)   |   |                  | X                   | not regulated   |
| Karst area   |   |                  | X                   | not regulated   |
| Water protection area  |   | X                |                     | prohibited in the water protection areas according to Water Law Art. 54.  |
| Nature protected ecosystem area  | X   |                  |                     | During the construction works the developer of the project is obliged to take into account the protection of the environment in the area, and in particular the protection of the soil, plant life, natural terrain relief and water conditions - Environmental Protection Law Art. 75. |
| Flood and erosion areas  | X   |                  |                     | In areas of special risk of flooding, construction and other activities that may increase risk are prohibited or need special permission - Water Law Art. 88l   |
| Landslide areas  |   |                  | X                   | not regulated   |
| Coastal zones  |   |                  | X                   | not regulated   |
| Others...  |   |                  |                     |   |

ALL SYSTEMS

Table 1: Filled questionnaire topic C, Poland

## D. REGULATION ELEMENTS FOR THE INSTALLATION, IMPLEMENTATION AND OPERATION OF SHALLOW GEOTHERMAL SYSTEMS

| D. Regulation elements for the installations, implementation and operation of shallow geothermal energy systems (SGES) |   |  |   |          |   |  |  |
|--|---|--|---|----------|---|--|--|
| Regulation element   | PILOT AREA: Kraków and Wałbrzych  |  |   |          | LEGAL BASE  |  |  |
|  | Requirements  |  |   |          | National regulation   | Other regulations  |  |
| ALL SYSTEMS  | Drilling below groundwater table allowed  | yes; drilling cannot cause water flow between watertables nor to be more susceptible to surface contaminations   |   |          |   | Boreholes with a depth of more than 30 m are subject to the provisions of the Geological and Mining Law; Water Law regulates water issues Ustawa Prawo Wodne z dnia 18 lipca 2001 r., Dz.U. 2001 nr 115 poz. 1229; new version of this act is to be passed by the Parliament autumn 2017   | PORT PC guidelines   |
|  | Minimum distance to neighboring plot [m]  | GWHP:  | 5m (less, if accepted by neighboring owner)   | BHE:     | 3m  | not regulated  | PORT PC guidelines   |
|  | Minimum distance to buildings [m]   | GWHP:  | -   | BHE:     | 1,5m  | not regulated  | PORT PC guidelines   |
|  | Minimum distance neighboring wells [m]  | GWHP:  | if water permit required - well should not affect surroundings; allowed productivity is determined individually; in the protected area of water intake it is forbidden to drill new wells | BHE:     | in the protected area of water intake it is forbidden to locate any objects (direct protection area) or it may be limited (indirect protection area)            | not regulated  | PORT PC guidelines   |
|  | Minimum distance to neighboring closed loop systems [m]                                   | GWHP:  | -   | BHE:     | 6m or 8% of well depth  | not regulated  | PORT PC guidelines   |
|  | Groundwater investigations necessary (Hydrochemistry)                                     | GWHP:  | may be necessary, if water permit requirement apply   | BHE:     |   | Geological and Mining Law Art. 88., Art. 90.   |  |
|  | Certification for drilling companies needed   | driller must be qualified, as well as geologist and mining plant supervisor (if required)  |   |          |   | Drilling process and supervision of geological works may be carried out only by qualified persons in accordance with the relevant requirement of Geological and Mining Law Art. 50. (Ustawa z dnia 9 czerwca 2011 r. Prawo geologiczne i górnicze, Dz.U. 2011 Nr 163 poz. 981)   |  |
|  | Certification for planners or installers needed   | yes  |   |          |   | Certification required in accordance with Act on Renewable Energy Sources 2015 (Ustawa z dnia 20 lutego 2015 r. o odnawialnych źródłach energii, Dz.U. 2015 poz. 478)  |  |
| Numerical simulations required   | no  |  |   |          | not regulated   |  |  |
| OPEN LOOP SYSTEMS  | Minimum distance between pumping and reinjection site [m]                                 | for small injection wells (up to 5m <sup>3</sup> /24h)- not regulated, otherwise - determined individually   |   |          |   | not regulated  |  |
|  | Reinjection of used groundwater   | if volume of water excess 5m <sup>3</sup> /24h requires water permission, injecting used water is canceling water usege fees (if the only change in water properties is decrease of the temperature) |   |          |   | Water Law 2001; Environmental Protection Law and subsequent regulations of the Minister of the Environment (Rozporządzenie Ministra Środowiska z dnia 18 listopada 2004 r. w sprawie warunków, jakie należy spełnić przy wprowadzaniu ścieków do wód lub do ziemi oraz w sprawie substancji szczególnie szkodliwych dla środowiska wodnego, Dz.U. 2014 poz. 1800; Ustawa z dnia 27 kwietnia 2001 r. Prawo ochrony środowiska, Dz.U. 2001 nr 62 poz. 627) |  |
|  | Temperature difference between extracted and reinjected water [°C, K]                     | not regulated; suggested 3-5 K difference  |   |          |   | not regulated  | PORT PC guidelines   |
|  | Absolute allowed temperature range of the reinjected water [°C]                           | the lowest temperature is legally not regulated, temperature of injected water cannot exceed 35°C  |   |          |   | Rozporządzenie Ministra Środowiska z dnia 18 listopada 2004 r. w sprawie warunków, jakie należy spełnić przy wprowadzaniu ścieków do wód lub do ziemi oraz w sprawie substancji szczególnie szkodliwych dla środowiska wodnego, Dz.U. 2014 poz. 1801   |  |
|  | Allowed temperature change [°C]   | not regulated; suggested 3-5 K difference  |   |          |   | not regulated  | PORT PC guidelines   |
|  | Accepted drawdown [cm]  | determined individually  |   |          |   | Water Law 2001 (Ustawa Prawo Wodne z dnia 18 lipca 2001 r., Dz.U. 2001 nr 115 poz. 1229); new version of this act is to be passed by the Parliament this autumn  |  |
| Pumping test obligatory  | common, not mandatory   |  |   |          | Water Law 2001 (Ustawa Prawo Wodne z dnia 18 lipca 2001 r., Dz.U. 2001 nr 115 poz. 1229); new version of this act is to be passed by the Parliament this autumn |  |  |
| CLOSED LOOP SYSTEMS  | Minimum distance to other heat exchangers of the same installation [m]                    | not regulated, suggested 6m or 8% od heat exchanger's depth  |   |          |   | not regulated  | PORT PC guidelines   |
|  | Target value for the average initial and input temperature of the heat carrier fluid [°C] | Heating:   |   | Cooling: |   | not regulated  |  |
|  | Regulations for heat carrier fluid type   | EU regulations on environmentally harmful fluids; fluids cannot contaminate underground water nor the soil   |   |          |   | not regulated  | PN-EN 378-4+A2:2012 – Cooling systems and heat pumps - Safety and environmental requirements |
|  | Regulations for refrigerant type  | EU regulations on environmentally harmful fluids   |   |          |   | not regulated  | PN-EN 378-4+A2:2012 – Cooling systems and heat pumps - Safety and environmental requirements |
|  | Regulations for the backfilling of BHE  | not mandatory, guidelines suggest bentonite or quartz sand filling of the well;  |   |          |   | not regulated  | PN-EN 378-2+A2:2012 – Cooling systems and heat pumps - Safety and environmental requirements |
|  | Leakage test of ground loop and refrigerant tubing required                               | practically yes - fluids cannot contaminate underground water nor the soil   |   |          |   | not regulated  | PN-EN 378-4+A2:2012 – Cooling systems and heat pumps - Safety and environmental requirements |
|  | Borehole drilling report required   | Borehole with a depth of more than 30 m require geotechnical site investigation plan with geological documentation of a borehole; clients are always encouraged to demand it                         |   |          |   | Geological and Mining Law Art. 88., Art. 92.   |  |
|  | Taking core samples required  | no   |   |          |   | not required   |  |
|  | Thermal response test required  | no   |   |          |   | not regulated  | PORT PC guidelines   |
| Calculation of drilling depth required   | no  |  |   |          | not regulated   | PORT PC guidelines   |  |

Table 2: Filled questionnaire topic D, Poland

# ANNEX 5

## SUMMARY OF NATIONAL LEGAL REQUIREMENTS, CURRENT POLICIES AND REGULATIONS OF SHALLOW GEOTHERMAL USE

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Working report for D.T2.4.1

07 2017

SAXONY, GERMANY

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LANDESAMT FÜR UMWELT,  
LANDWIRTSCHAFT  
UND GEOLOGIE







## A. LEGAL REGULATIONS/ LICENSING PROCEDURES

### 1. Definition of shallow geothermal energy in your country!

Shallow Geothermal energy is the form of energy stored below the surface of the solid earth as heat down to a depth of 400 m.

### 2. Is the use of geothermal energy regulated in your country?

Which levels of regulations do you have in your country? Explain in terms of NATIONAL, REGIONAL and LOCAL with the according regulation instrument (act, rule guideline, official order etc.) and its character (legally binding/obligatory or recommended)!

Please also summarize the regulation with a few sentences!

| NATIONAL |             |   |                                       |
|----------|-------------|---|---------------------------------------|
|          | Instrument: | Wasserhaushaltsgesetz (WHG)<br><i>(Federal Water Act)</i>   | Character: Legally binding/Obligatory |
|          | Instrument: | Bundesberggesetz (BBergG)<br><i>(Federal Mining Act)</i>  | Character: Legally binding/Obligatory |
|          | Instrument: | Lagerstättengesetz (LagerStG)<br><i>(Mineral Deposits Act)</i>  | Character: Legally binding/Obligatory |
|          | Instrument: | Allgemeine Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS)<br><i>(Administrative Regulation on Substances Hazardous to Water)</i> | Character: Legally binding/Obligatory |
|          | Instrument: | DVGW-Guidelines   | Character: recommended                |
|          | Instrument: | LAWA-Guidelines   | Character: recommended                |
|          | Instrument: | VDI 4640 Blatt 1 bis 3  | Character: recommended                |



|  |             |  |            |                            |
|--|-------------|--|------------|----------------------------|
|  | Instrument: | § 21 und §37 Abs. 2 Standortauswahlgesetz (StandAG) ( <i>Repository Site Selection Act</i> )                               | Character: | Legally binding/Obligatory |
| <b>REGIONAL</b>  |             |  |            |                            |
|  | Instrument: | Sächsisches Wassergesetz (SächsWG) ( <i>Saxon Water Act</i> )  | Character: | Obligatory                 |
|  | Instrument: | <i>Guideline Saxony</i> (Leitfaden, Informationsbroschüre)   | Character: | recommended                |
|  | Instrument: | Sächsische Hohlraumverordnung - SächsHohlrVO ( <i>Saxon Ordinance on Cavities</i> )  | Character: | Obligatory                 |
|  | Instrument: | Sächsische Anlagenverordnung - SächsVAwS ( <i>Saxon Ordinance on Installations Handling Materials Hazardous to Water</i> ) | Character: | Obligatory                 |
| <b>LOCAL</b>   |             |  |            |                            |
|  | Instrument: | Wasserschutzgebietsverordnungen ( <i>Ordinances on Water Protection Areas</i> )  | Character: | Obligatory                 |
| <b>OTHER IMPORTANT DOCUMENTS like GUIDELINES, TECHNICAL GUIDELINES, HANDBOOKS, MANUALS:</b>  |             |  |            |                            |
| <p>DIN-Regulations, ATV-Guidelines are only legally binding if the legislator mentions them.</p> <p>The guidelines of the DVGW and LAWA are not legally binding, but they are generally considered as state of the art by the administrative authorities.</p> <p>Internal regulations (edicts or <i>Erläss</i> in German) for the geological surveys and local authorities, issued by the ministry of environment, are legally binding with regard to assessment of applications for geothermal plants and recommendations or requirements for the permission.</p>   |             |  |            |                            |
| <b>EXPLANATION OF GEOTHERMAL REGULATIONS:</b>  |             |  |            |                            |
| <p>The Federal Water Act (WHG) regulates all aspects of water supplies and water economy. Geothermal energy use is regulated by the water act and has to be notified to the authorities if one or more of the following applies:</p> <ul style="list-style-type: none"> <li>▫ any measures impacting on ground water</li> <li>▫ any boreholes which might encounter groundwater</li> <li>▫ any use of groundwater (extraction and injection, open loop)</li> </ul> <p>The implementation of WHG is regulated in the legislation of each individual federal state. Thus, the WHG states the conditions under which a permission process has to be initiated, but how the process is defined in detail depends on state law.</p> |             |  |            |                            |



LagerStG (*Mineral Deposits Act*) mandates that notification of all drilling operations have to be submitted to the geological survey and all results (geological data) have to be made available to the geological survey.

BbergG (*Federal Mining Act*) mandates that the mining authorities have to be notified of all drilling activity beyond 100m depth.

StandAG (*Repository Site Selection Act*) mandates that drilling depth is limited to 100 m unless exemption is given by the Federal Office for the Safety of Nuclear Waste Management (BFE).

VwVwS (*Administrative Regulation on Substances Hazardous to Water*) regulates the use of materials hazardous to water (e.g. grout, heat vector fluid).

### 3. How does the licensing procedure for shallow geothermal energy systems (SGES) work in your country? Are there different procedures for the licensing of SGES? What is the difference?

Why are the procedures different? Are they different for different regions? For different systems?

How is information for the submission provided?

What is the end of the procedure?

Each federal state of Germany has its own special regional procedure of licencing, regulated by their regional rules/laws (in Saxony: Sächs.WG). Each authority has to be notified separately via corresponding forms. Often, either the drilling contractor or the planner obtain the required permissions and notifications on behalf of the applicant. In some federal states, the notifications and applications have to be submitted by an authorized expert. It may also be necessary to provide a survey report with the application forms. This is not the case in Saxony.

In general, for open loop systems and closed loop systems the permitting procedure is mandatory.

Closed loop systems:

First, an application for drilling activities has to be submitted to the local environmental authority, represented by the water authority, as per §49 WHG. Additionally, an application for drilling has to be submitted to the regional geological survey as per Lagerst.G.

If the geothermal borehole is deeper than 100 m and/or the usage will influence across property borders, the well has to be applied to the regional mining authority. Additionally, an approval of the Federal Office for the Safety of Nuclear Waste Management (BFE) is required for drilling deeper than 100 m.

These authorities check the legal and (hydro-)geological situation. If the location and the application are deemed safe, a permission for drilling (and/or permission to look for and use geothermal energy by mining proceeding) will be given.



In Saxony, a special requirement applies to geothermal installations exceeding 30 kW heating capacity. In this case, a pilot well with special measurement (TRT) and calculation and design of the geothermal plant has to be completed and verified by the geological survey in order to give recommendations to the water authority.

Open loop systems:

First, an application for drilling and implementation of pumping and reinjection tests has to be submitted to the local environmental authority, represented by the water authority. Additionally, an application for drilling has to be submitted to the regional geological survey as per LagerStG.

If the geothermal borehole is deeper than 100 m and/or the usage will influence across property borders and/or it is a commercial application, the well has to be applied for with the regional mining authority.

If the yield and water quality is sufficient, the application for the permission to use a groundwater heat pump can be submitted to the local water authority. After reviewing all issues, permission to build and use the groundwater heat pump including drilling of additional wells is given.

#### 4. What is needed for the submission of a shallow geothermal energy system? Are there different documents for different procedures? Do application forms exist?

Each federal state has its own application forms (templates). There are different documents for different legal procedures, e.g. closed and open loop systems.

The submission for geothermal systems requires general data about the system and about the operator.

In general, the following are obligatory (extract):

- the location,
- name of the owner,
- name of the drilling company and/or planner,
- certifications of drilling companies,
- number and depth of boreholes,
- heat/cooling capacity of the heat pump,
- drilling diameter,
- grouting,
- type of carrier fluid inside of heat pipes
- for open loop additionally: groundwater yield, water quality (chemistry)



## 5. Entities for the applications of SGES

Which administrative entities are involved in the licensing procedure of SGES?

The local environmental authority, represented by the water authority, the geological surveys and the regional mining authority (drilling >100 m, across property boundary) and the Federal Office for the Safety of Nuclear Waste Management (drilling >100 m).

Which of them are the first contact points for the submission?

The local environmental authority, represented by the water authority, and the geological survey.

How much time does the procedure take from submission till granting?

Min. 4 weeks.

How long is the granting valid and are there any restrictions for extension?

Generally unlimited, in some cases 20 years

Are online applications available?

Yes.

## 6. Are there official requirements for the installation and operation linked to the granting (catalogue of requirements)? Are there different requirements for SGES in urban and non-urban regions?

NOTE: Details to the first questions will also be answered in topic area C. and D. Please give just a short explanation!

There are requirements regarding the installation imposed by quality standards from the guidelines of VDI 4640 and the guideline of federal states as well as the regulations by law. Additionally, there are requirements included to the permission of the plant, how the heat pump has to operate, e.g. the carrier fluid temperature inside the pipes has to be above -3°C.

## 7. Are there some special requirements concerning the installations and operation of SGES in your pilot area?

Same as question 6

## 8. Are there some liquidation procedures after abandonment for SGES?

The regulation and requirements are included in the permission. The regulations according to guidelines DVGW W-135. The lower water authority (licensing authority) has to be notified of a liquidation.



9. Are there regulations for monitoring of SGES? If yes, how does the monitoring have to be executed?

No.



## B. FLOW CHARTS FOR LICENSING PROCEDURES IN THE PILOT AREA

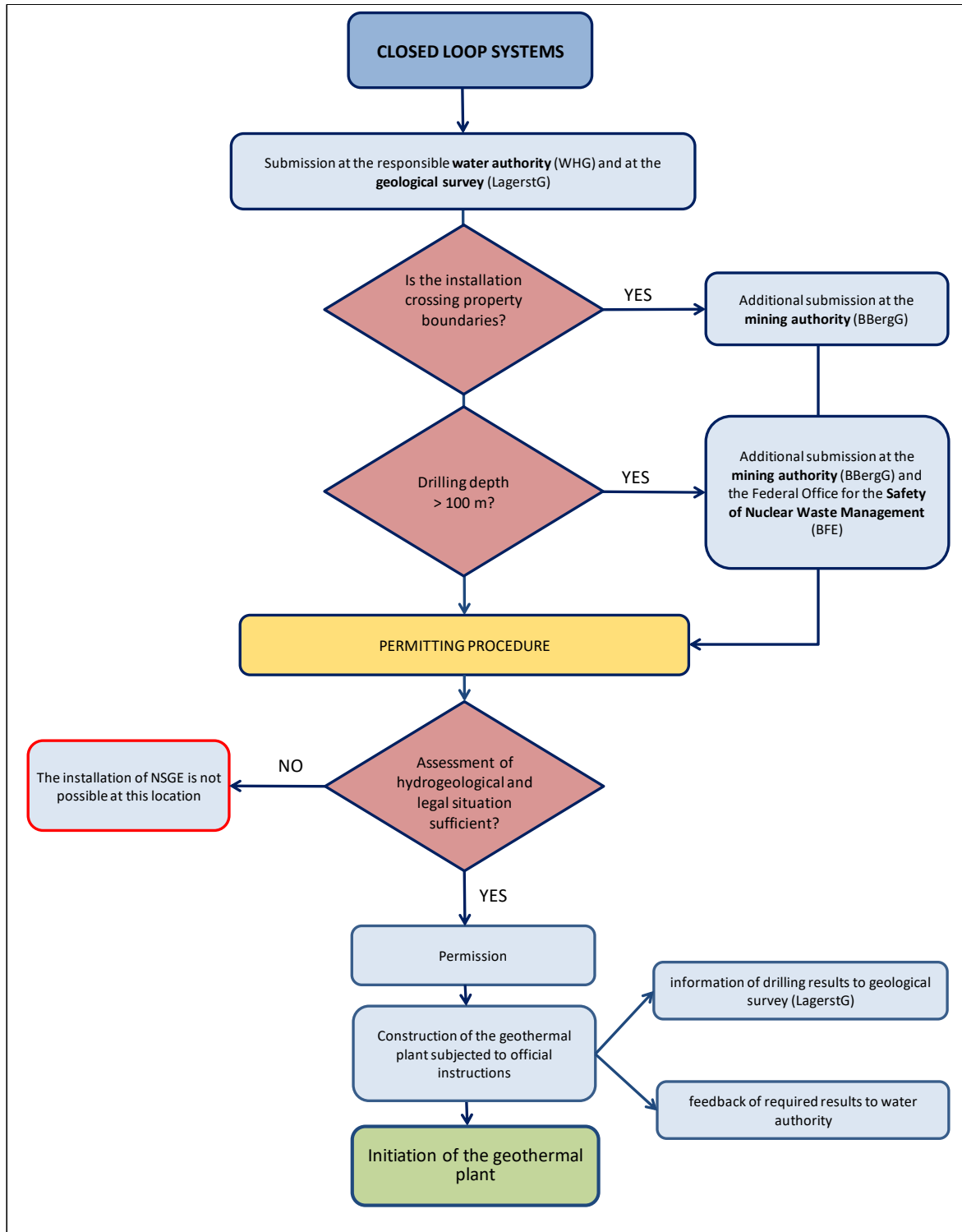


Figure 1: Flow chart „Closed loop systems“, Germany

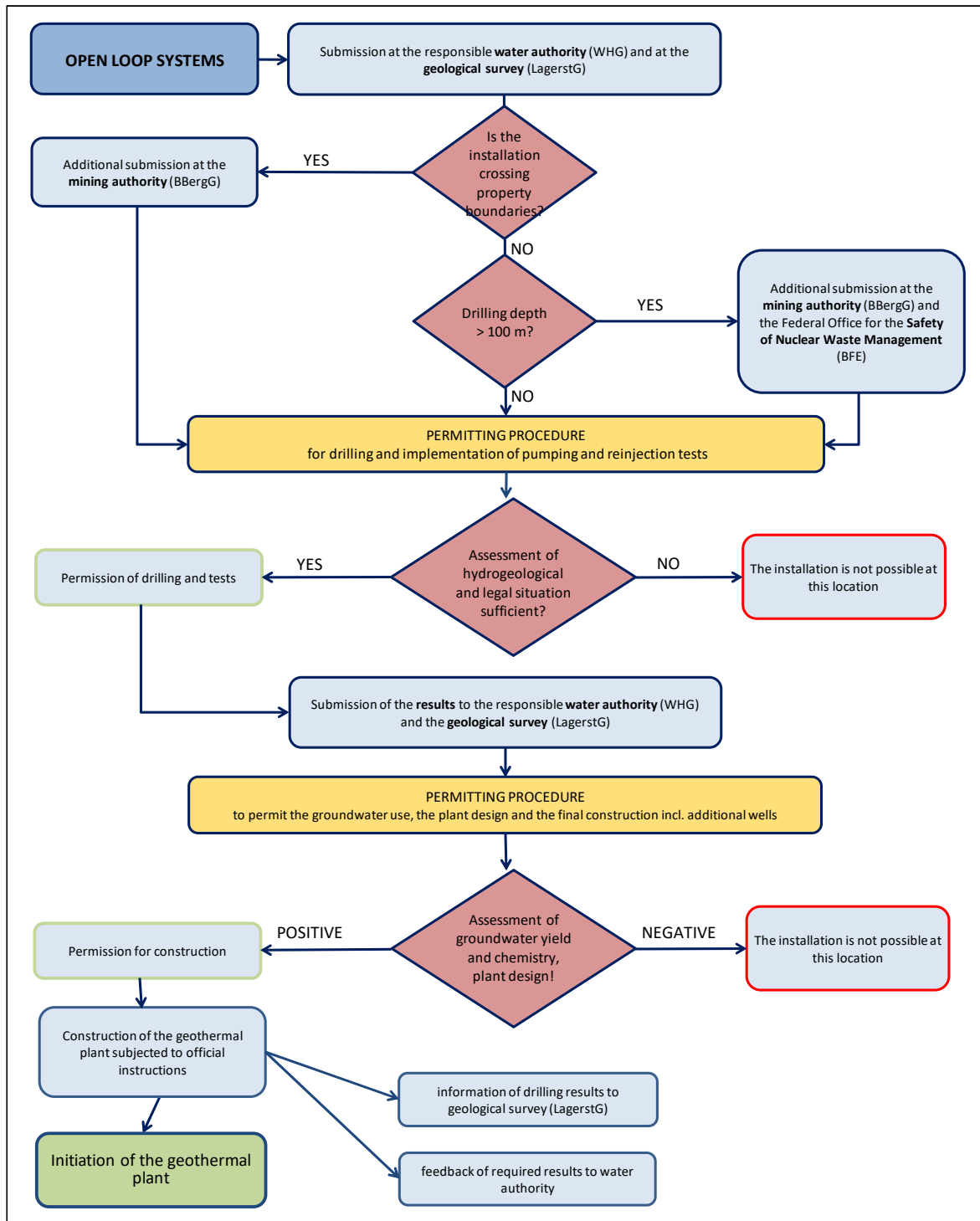


Figure 2: Flow chart „Open loop systems“, Germany





# C. SPECIAL GEOLOGICAL AND GEOGRAPHICAL CONDITIONS WHICH CAN LIMIT THE INSTALLATION OF SHALLOW GEOTHERMAL ENERGY SYST

| C. Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems (SGES) |   |                  |                    |                        |  |
|--|---|------------------|--------------------|------------------------|--|
| Regulation element   | PILOT AREA  |                  |                    | National regulation    | GENERAL                                    |
|  | SGES allowed under special obligations or conditionally allowed | SGES not allowed | SGES not regulated |                        | Other regulations                          |
| Artesian aquifers  | X   |                  |                    | No national regulation | Case by case                               |
| Very shallow water table where reinjection can be problematic  |   |                  | X                  |                        | No regulation                              |
| Perched groundwater layers   |   |                  | X                  |                        | No regulation                              |
| Two or multiple aquifer layers   | X   |                  |                    |                        | Case by case                               |
| Mineral water resources  |   | X                |                    |                        | Case by case                               |
| Thermal water resources  |   | X                |                    |                        | Local regulation                           |
| Gas occurrences  | X   |                  |                    |                        | Local regulation                           |
| Mining areas   | X   |                  |                    |                        | Case by case                               |
| Contaminated soil  | X   |                  |                    |                        | Case by case                               |
| Evaporites (e.g. NaCl, gypsum)   |   |                  | X                  |                        | No regulation                              |
| Swellable rocks (e.g. anhydrite, clay)   |   |                  | X                  |                        | No regulation                              |
| Karst area   |   |                  | X                  |                        | No regulation                              |
| Water protection area  | X   | X                |                    |                        | Local regulation (decree, legally binding) |
| Nature protected ecosystem area  | X   |                  |                    |                        | Local regulation                           |
| Flood and erosion areas  | X   |                  |                    |                        | Case by case                               |
| Landslide areas  |   |                  | X                  |                        | No regulation                              |
| Costal zones   |   |                  |                    |                        | Not occurring in pilot area                |
| Others...  |   |                  |                    |                        |  |

Table 1: Filled questionnaire for topic C, Germany



# D. REGULATION ELEMENTS FOR THE INSTALLATION, IMPLEMENTATION AND OPERATION OF SHALLOW GEOTHERMAL SYSTEMS

| D. Regulation elements for the installations, implementation and operation of shallow geothermal energy systems (SGES) |   |  |          |  |  |   |
|--|---|--|----------|--|--|---|
| Regulation element   | PILOT AREA  |  |          |  | GENERAL  |   |
|  | Requirements  |  |          |  | National regulation  | Other regulations   |
| Drilling below groundwater table allowed   | Notifications, permissions as per flow chart (SächsWG)  |  |          |  | Notifications, permissions as per WHG                      | Notifications, permissions as per SächsWG   |
| Minimum distance to neighboring plot [m]   | GWHP:   | 5 m  | BHE:     | 5 m  |  | VDI, regional guidelines (Leitfäden)  |
| Minimum distance to buildings [m]  | GWHP:   | 3 m  | BHE:     | 3 m  |  |   |
| Minimum distance neighboring wells [m]   | GWHP:   |  | BHE:     |  |  |   |
| Minimum distance to neighboring closed loop systems [m]  | GWHP:   |  | BHE:     | 10 m   |  |   |
| Groundwater investigations necessary (Hydrochemistry)  | GWHP:   | Yes  | BHE:     | No   |  | Regional guidelines (Leitfäden)   |
| Certification for drilling companies needed  | X   |  |          |  | DVGW-W120  |   |
| Certification for planners or installers needed  |   |  |          |  |  |   |
| Numerical simulations required   | X   |  |          |  |  | In some cases as requirement of permission  |
| Minimum distance between pumping and reinjection site [m]  |   |  |          |  |  |   |
| Reinjection of used groundwater  | x   |  |          |  | WHG general requirement: no adverse effects on groundwater | Regional guidelines (Leitfäden)   |
| Temperature difference between extracted and reinjected water [°C, K]  | X   |  |          |  |  | VDI 4640, Blatt 1, regional guideline   |
| Absolute allowed temperature range of the reinjected water [°C]  | 20°C  |  |          |  |  | VDI 4640, Blatt 1, regional guideline   |
| Allowed temperature change [°C]  | 6K  |  |          |  |  | VDI 4640, Blatt 1, regional guideline   |
| Accepted drawdown [cm]   |   |  |          |  |  | Will be limited by water authority (case by case)   |
| Pumping test obligatory  | X   |  |          |  |  | VDI 4640, Blatt 1, regional guideline   |
| Minimum distance to other heat exchangers of the same installation [m]   |   |  |          |  |  |   |
| Target value for the average initial and input temperature of the heat carrier fluid [°C]                              | Heating:  | -1,5 °C average of inlet and outlet temperature; -3°C outlet temperature | Cooling: | <20° C for resulting groundwater temperature |  | For heating: regulated by decree of ministry; for cooling, VDI  |
| Regulations for heat carrier fluid type  | X   |  |          |  |  | Allgemeine Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) (> 30 kW and commercial use); in water protection zones regulated by water authority |
| Regulations for refrigerant type   | X   |  |          |  |  | DIN 8901  |
| Regulations for the backfilling of BHE   | X   |  |          |  |  | VDI 4640  |
| Leakage test of ground loop and refrigerant tubing required  | X   |  |          |  |  | VDI 4640, DIN 8075, Bescheid uWB, recommended in guidelines Saxony  |
| Borehole drilling report required  | X   |  |          |  |  | Lgst.G., DIN EN ISO 14689-1   |
| Taking core samples required   | Cores are not required, but cutting samples have to be taken every 1 m and stored for at least 1 month after submission of results to the geological survey |  |          |  |  | Drilling confirmation, LgstG  |
| Thermal response test required   | X   |  |          |  |  | > 30kW, regional requirement  |
| Calculation of drilling depth required   | X   |  |          |  |  | VDI 4640, Blatt 1, regional guideline   |

Table 2: Filled questionnaire for topic D, Germany

# ANNEX 6

## SUMMARY OF NATIONAL LEGAL REQUIREMENTS, CURRENT POLICIES AND REGULATIONS OF SHALLOW GEOHERMAL USE

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Working report for D.T2.4.1

07 2017

SLOVAKIA

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 **Geologische Bundesanstalt**

LANDESAMT FÜR UMWELT,  
LANDWIRTSCHAFT  
UND GEOLOGIE

 Freistaat  
**SACHSEN**

 **CZECH  
GEOLOGICAL  
SURVEY**

 **GeoZS**  
Geološki zavod  
Slovenije



  
**AGH**  
AGH UNIVERSITY OF SCIENCE  
AND TECHNOLOGY

 **geoENERGIE**  
Konzept

 **Giga**  
infosystems

 Bundesverband  
**Geothermie**

 City of  
Ljubljana





## A. LEGAL REGULATIONS/ LICENSING PROCEDURES

### 1. Definition of shallow geothermal energy in your country!

In Slovak legal framework there is no definition for shallow geothermal energy. Though in Geological Act geothermal water and geothermal energy are defined.

Geothermal energy is a heat energy with the source from residual heat of Earth and radioactive decay (Act 311/2013, Coll., §3, letter o).

Geothermal water for groundwater with minimum temperature over 20 °C (Act 311/2013, Coll., §3, letter e).

Note: There is no official definition for shallow geothermal energy in standards or any other official document that would be valid for SVK.

### 2. Is the use of geothermal energy regulated in your country?

Which levels of regulations do you have in your country? Explain in terms of NATIONAL, REGIONAL and LOCAL with the according regulation instrument (act, rule guideline, official order etc.) and its character (legally binding/obligatory or recommended)!

Please also summarize the regulation with a few sentences!

#### REGULATION LEVELS

|          |             |  |            |                              |
|----------|-------------|--|------------|------------------------------|
| NATIONAL | Instrument: | Geological Act 311/2013, Coll.<br>Renewable resources Act. 181/2017, Coll. | Character: | Legally / obligatory binding |
|          | Instrument: | Water Act 409/2014, Coll.  | Character: | Legally / obligatory binding |
|          | Instrument  | Act on support of renewable Resources 181/2017, Coll.                      | Character  | Legally / obligatory binding |



|       |             |                        |            |                                       |
|-------|-------------|------------------------|------------|---------------------------------------|
| LOCAL | Instrument: | Water protection areas | Character: | binding on local administrative level |
|       | Instrument: | Flood areas            | Character: | binding on local administrative level |

**OTHER IMPORTANT DOCUMENTS like GUIDELINES, TECHNICAL GUIDELINES, HANDBOOKS, MANUALS:**

The guidelines are given in Acts, Decrees and Slovak technical standards.

Technical standards are not legally binding any more (they were till 1990-ties). Now they have recommendation form.

Legislation concerning drilling, building, construction and installation of heat pumps and water protection:

Geological Act 311/2013, Coll. - drilling, prospection, reporting of the prospection

Water act 409/2014, Coll. - water management, water quantity and quality

Act on support of renewable Resources 181/2017, Coll. - mainly rights and obligations electricity market participants,

Building Act. 50/1976 Coll. in later Amendments.

Slovak technical standards OTN ŽP 3201:05, 3202:05 - monitoring the hydrological regime of surface and groundwater

Slovak technical standard - OTN 73 6614 - testing of groundwater resources

**EXPLANATION OF GEOTHERMAL REGULATIONS in Slovakia:**

The Acts are focused rather on prospection of the geological environment, evaluation of the groundwater reserves and waste water discharges (including the thermally used water). The Slovak Water Act 409/2014, Coll. and the Geological Act 311/2013, Coll. represent the legal instruments. In Slovak legal framework there is no definition for shallow geothermal energy. Though in Geological Act. geothermal water and geothermal energy are defined.

Geothermal energy is a heat energy with the source from residual heat of Earth and radioactive decay (Act 311/2013, Coll., §3, letter o)).

Geothermal water for groundwater with minimum temperature over 20 °C (Act 311/2013, Coll., §3, letter e).

Open loop systems: Geological Act is regulating drilling works planning, executing and reporting - hydrogeological prospection. Water Act is dealing with protection, efficient and economical exploitation, authorizations and obligations of the bodies of state water administration: Water is primarily used for drinking purposes. The utilization for other purposes is allowed - technical purposes, irrigation, etc. Water withdrawn from ground has to be documented, reported and afterwards evaluated and approved by commission (Hydrogeological commission acting under Ministry of Environment of Slovak republic). The outcome from this commission is basic information for local environmental offices for issuing the permission for water utilization.

Closed loop systems:



In case of drilling - Geological Act. is regulating drilling works planning, executing and reporting.

None of the acts is regulating the energy stored and obtained from the geological environment.

3. How does the licensing procedure for shallow geothermal energy systems (SGES) work in your country? Are there different procedures for the licensing of SGES? What is the difference?

Why are the procedures different? Are they different for different regions? For different systems?

How is information for the submission provided?

What is the end of the procedure?

All the boreholes (for any purpose) are at first drilled under the Geological Act. After the geological survey is done, boreholes that come to the permanent utilization have to be „re-classified“:

- To a „building structure“ based on Building Act (closed loop systems).
- Re-classification to a „water work“ is based on Water Act if the water is used (open loop systems).

There is no special/specific licencing procedure for permitting the shallow geothermal systems installations.

There are generally 3 possible methods/setups for shallow geothermal energy systems: a) „horizontal collector“ - closed loop system; b) „probe, vertical collector“ - borehole- closed loop system; c) „probe, vertical collector“ - borehole- open loop system.

a) **Horizontal collector for closed loop system** - There is no mention in legislation for this method of installation. The rules for „earth works“ (digging works) are part of the Building Act (Note: no information about this practise).

b) **„Probe, vertical collector“ - borehole- closed loop system** - After the geological survey is done boreholes that come to the permanent utilization have to be „re-classified“ to a „building structure“ based on Building Act (closed loop systems). The purpose of the drilling and borehole and way of utilization should be stated in condition of the utilization by the local construction office (Note: no information about the practise).

c) **„Probe, vertical collector“ - borehole- open loop system** - All the boreholes that come to the permanent utilization are „re-classified“ to a „Water work“ based on Water Act. The purpose of the well is stated in condition of the utilization by the local construction office.



The licencing of the geothermal installation is part of the utilization purpose of the well, where the conditions of utilization are stated in water permit utilization (only for open loop systems where the water is used in the system).

Generally, groundwater is used for other purposes than the drinking and the Ministry of Environment and local environmental office states the conditions for pumping, utilization and emission of the used water to the ground.

The procedure for open loop systems is following:

- 1) Geological / Hydrogeological prospection - drilling, pumping test (performed by licenced company) - project of the works approved by investor, filed in central register of geological works (managed by SGIDS, Geofond). Drilling projects under 10 m (or total value less than 1000 Euro) are not filed.
- 2) Final report form the outcomes of the geological survey. If groundwater is used the report should contain calculation of approved amounts of ground water that are available for utilization.
- 3) The Hydrogeological comity under Ministry of Environment (MoE) evaluates the final report. The MoE states the amount - issues the permission for approved volume of the water that can be pumped/utilised. If less than 0.5 l/s (or 1250 m<sup>3</sup> per month or 15000 m<sup>3</sup> per year) is pumped (used) an evaluation by comity is not needed.
- 4) State Water Administration Department of Environmental Care / District Environmental Office process the next step: the Water permit. Documents needed for application and issuance of the water permit are:
  - o the final report of the hydrogeological survey;
  - o the decision of the MoE on the approval of the final report with the calculation of groundwater quantities;
  - o Hydrogeological report according to § 37 par. 1 of Act no. 364/2004 Z.z. about water;
  - o Waterworks project; statement/evaluation from the office of water-related significant watercourses (SVP sp.p.)
- 5) Based on evaluation the regional environmental office issues the permission for water abstraction and states conditions for water reinjection or emission into surface water.

#### 4. What is needed for the submission of a shallow geothermal energy system? Are there different documents for different procedures? Do application forms exist?

It concerns only open loop systems. The application itself is final report from prospection or evaluation of hydrodynamic (pumping) testing. In the objective of the study the purpose of geological works has to be clearly stated. The applicant also has to describe the purpose of the water use. The structure of final report is given in Geological Act. Otherwise, standardised application forms do not exist in Slovakia.



The process is described above (question 3).

## 5. Entities for the applications of SGES

Which administrative entities are involved in the licensing procedure of SGES? Which of them are the first contact points for the submission?

- 1) Ministry of Environment - application - project of the geological works
- 2) State Water Administration Department of Environmental Care/ District Environmental Office

How much time does the procedure take from submission till granting? How long is the granting valid and are there any restrictions for extension?

The procedure takes different period. Usually from application at the District Environmental Office till issuance of the permission it takes 1 month.

Are online applications available?

No.

## 6. Are there official requirements for the installation and operation linked to the granting (catalogue of requirements)? Are there different requirements for SGES in urban and non-urban regions?

NOTE: Details to the first questions will also be answered in topic area C. and D. Please give just a short explanation!

No.

## 7. Are there some special requirements concerning the installations and operation of SGES in your pilot area?

General requirements are applicable in pilot areas. No special requirements are needed if the general rules stated in Acts are fulfilled.

If the volatile substances (CFCs, other volatile coolants) are part of the media (used in refrigeration or heat pumps), the installations by approved persons and companies is needed. Used amounts in industry are obligatory to report to the District Environmental Office.





#### 8. Are there some liquidation procedures after abandonment for SGES?

The liquidation is not solved in any methodical nor law binding document.

Liquidation of the boreholes are needed after the prospection is over and the boreholes will not be utilized (at the phase of the prospection).

#### 9. Are there regulations for monitoring of SGES? If yes, how does the monitoring have to be executed?

In case of open loop systems the Ministry of Environment sets the maximum volume of pumped water and maximum drawdown allowed. In conditions of the utilization of groundwater protection, rules and monitoring of the utilization are stated. Monitoring of the pumped groundwater quality and reinjected water can be stated in water permission.



# B. FLOW CHARTS FOR LICENSING PROCEDURES IN THE PILOT AREA

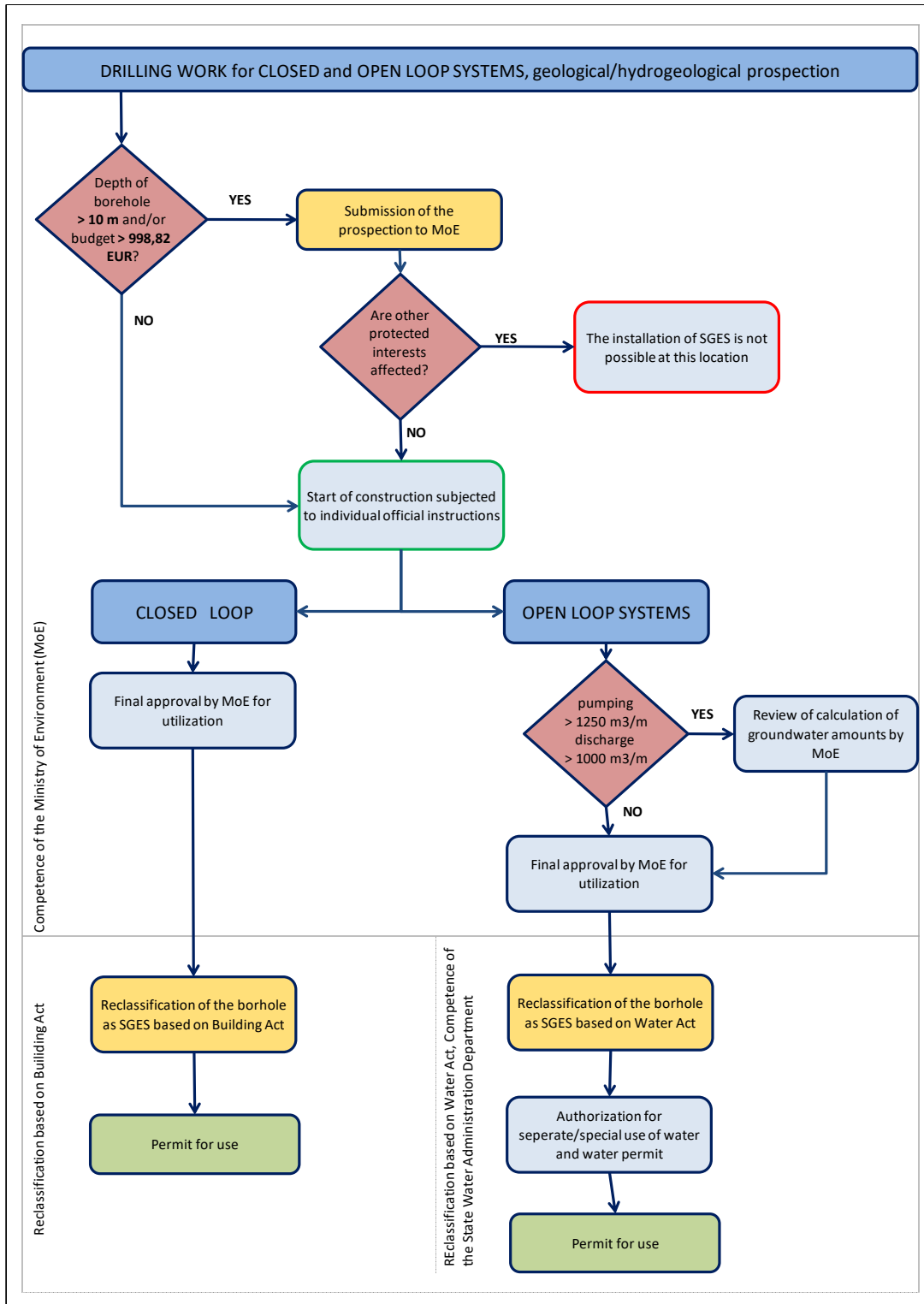


Figure 1: Flow chart Slovakia



# C. SPECIAL GEOLOGICAL AND GEOGRAPHICAL CONDITIONS WHICH CAN LIMIT THE INSTALLATION OF SHALLOW GEOTHERMAL ENERGY SYSTEMS

| C. Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems (SGES) |   |                  |                    |  |  |
|--|---|------------------|--------------------|--|--|
| PILOT AREA   |   |                  | LEGAL BASE         |  |  |
| Regulation element   | SGES allowed under special obligations or conditionally allowed | SGES not allowed | SGES not regulated | National regulation  | Other regulations  |
| Artesian aquifers  | X<br>(All aquifers are treated the same way)                    |                  |                    |  | The assessment of hydrogeology expert is needed<br>1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed |
| Very shallow water table where reinjection can be problematic  | X   |                  |                    |  | The assessment of hydrogeology expert is needed  |
| Perched groundwater layers   | X   |                  |                    |  | The assessment of hydrogeology expert is needed  |
| Two or multiple aquifer layers   | X   |                  |                    |  | The assessment of hydrogeology expert is needed  |
| Mineral water resources  | X   |                  |                    |  | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed  |
| Thermal water resources  | X   |                  |                    |  | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed  |
| Gas occurrences  |   | No shallow gas   |                    |  |  |
| Mining areas   | X   |                  |                    |  | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed  |
| Contaminated soil  |   | X                |                    | No national regulations. The assessment is based on individual assessment of every new prospecting |  |
| Evaporites (e.g. NaCl, gipsium)  | X   |                  |                    |  | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed  |
| Swellable rocks (e.g. anhydrite, clay)   | X   |                  |                    |  | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed  |
| Karst area   | X   |                  |                    |  | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed  |
| Water protection area  | X   |                  |                    |  | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed  |
| Nature protected ecosystem area  | X   |                  |                    |  | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed  |
| Flood and erosion areas  | X   |                  |                    |  | 1) The assessment of hydrogeology expert is needed<br>2) The permission of local water protection authority / Ministry of Environment is needed  |
| Landslide areas  |   | X                |                    |  |  |
| Coastal zones  |   | Do not occur     |                    |  |  |

Table 1: Filled questionnaire for topic C, Slovakia



# D. REGULATION ELEMENTS FOR THE INSTALLATION, IMPLEMENTATION AND OPERATION OF SHALLOW GEOTHERMAL ENERGY SYSTEMS

| D. Regulation elements for the installations, implementation and operation of shallow geothermal energy systems (SGES) |   |  |          |   |   |
|--|---|--|----------|---|---|
| Regulation element   | PILOT AREA  |  |          | LEGAL BASE  |   |
|  | Requirements  |  |          | National regulation   | Other regulations   |
| Drilling below groundwater table allowed   | Generally the drilling under the water table is allowed. But it is based on individual evaluation. If geothermal water is tapped (over 20°C) reporting to Ministry of Health needed.        |  |          | It is solved in Geological Act and Water Act  | like national regulation  |
| Minimum distance to neighboring plot [m]   | GWHP:   |  | BHE:     | Not solved by legal act   |   |
| Minimum distance to buildings [m]  | GWHP:   |  | BHE:     | Not solved by legal act   |   |
| Minimum distance neighboring wells [m]   | GWHP:   |  | BHE:     | No regulation   | Not solved by legal act, well interaction based on evaluation of the final report             |
| Minimum distance to neighboring closed loop systems [m]  | GWHP:   |  | BHE:     | Not solved by legal act   |   |
| Groundwater investigations necessary (Hydrochemistry)  | GWHP:   |  | BHE:     | It is solved in Geological Act and Water Act  | Based on purpose and evaluation of the final report   |
| Certification for drilling companies needed  |   |  |          | Yes, needed according act No. 61/1988.  | like national regulation  |
| Certification for planners or installers needed  |   |  |          | Geological works have to be done by Geological Act. The responsible person solving geological prospection has to have approval form Ministry of Environment = geological approval and geological competence           | like national regulation  |
| Numerical simulations required   |   |  |          | Not solved by legal act   |   |
| Minimum distance between pumping and reinjection site [m]  |   |  |          | Not solved by legal act   |   |
| Reinjection of used groundwater  |   |  |          | It is solved in Geological Act and Water Act  |   |
| Temperature difference between extracted and reinjected water [°C, K]  |   |  |          | Not solved by legal act   |   |
| Absolute allowed temperature range of the reinjected water [°C]  | The Local Environmental Authority states this threshold in Water Permission based on their decision. The max. value can be between 23 - 25 °C (verbal information from MoE, water section). |  |          | The Water Act treats the change in temperature (after its utilization) as a change of the quality. The reinjected water temperature threshold is not stated for ground water. For surface water it is generally 26°C. | Reinjected water temperature is stated in Water permission from Local environmental authority |
| Allowed temperature change [°C]  |   |  |          | Not solved by legal act   |   |
| Accepted drawdown [cm]   |   |  |          | It is solved in Geological Act and Water Act by permission as output form final report  | like national regulation  |
| Pumping test obligatory  |   |  |          | Yes for open loop, for yields over 0.5 l/s, it is solved in Geological Act and Water Act  | like national regulation  |
| Minimum distance to other heat exchangers of the same installation [m]   |   |  |          | Not solved by legal act   |   |
| Target value for the average initial and input temperature of the heat carrier fluid [°C]                              | Heating:  |  | Cooling: | Not solved by legal act   |   |
| Regulations for heat carrier fluid type  |   |  |          | Not solved by legal act   |   |
| Regulations for refrigerant type   |   |  |          | Not solved by legal act   |   |
| Regulations for the backfilling of BHE   |   |  |          | Not solved by legal act   |   |
| Leakage test of ground loop and refrigerant tubing required  |   |  |          | Not solved by legal act   |   |
| Borehole drilling report required  |   |  |          | Not solved by legal act   |   |
| Taking core samples required   |   |  |          | Not solved by legal act   |   |
| Thermal response test required   |   |  |          | Not solved by legal act   |   |
| Calculation of drilling depth required   |   |  |          | Not solved by legal act   |   |

Table 2: Filled questionnaire for topic D, Slovakia

# ANNEX 7

## SUMMARY OF NATIONAL LEGAL REQUIREMENTS, CURRENT POLICIES AND REGULATIONS OF SHALLOW GEOHERMAL USE

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Working report for D.T2.4.1

07 2017

SLOVENIA

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LANDESAMT FÜR UMWELT,  
LANDWIRTSCHAFT  
UND GEOLOGIE





## A. LEGAL REGULATIONS/ LICENSING PROCEDURES

### 1. Definition of shallow geothermal energy in your country!

There is no definition of shallow geothermal energy in the Slovenian legal framework. In Energy Act (no. 17/2014 - EZ-1) general definition of geothermal energy is used - "Geothermal energy is the energy stored in the form of heat beneath the surface of solid earth". There is no strictly defined border between deep and shallow geothermal energy, but depth 300 m is often used.

### 2. Is the use of geothermal energy regulated in your country?

Which levels of regulations do you have in your country? Explain in terms of NATIONAL, REGIONAL and LOCAL with the according regulation instrument (act, rule guideline, official order etc.) and its character (legally binding/obligatory or recommended)!

Please also summarize the regulation with a few sentences!

|          |             |  |            |                                       |
|----------|-------------|--|------------|---------------------------------------|
| NATIONAL | Instrument: | Waters act (Zakon o vodah) No. 64/2002   | Character: | Obligatory binding                    |
|          | Instrument: | Construction Act (Zakon o graditvi objektov) No. 102/2004  | Character: | Obligatory binding                    |
|          | Instrument: | Mining Act (No. 61/2010)   | Character: | Obligatory binding                    |
| LOCAL    | Instrument: | Water protection area<br><br>Decree on the water protection area for the aquifers of Ljubljansko barje | Character: | binding on local administrative level |



|  |  |  |  |  |
|--|--|--|--|--|
|  |  | and outskirts of Ljubljana;<br><br>Decree on the water protection area for the Ljubljansko polje aquifer |  |  |
|--|--|--|--|--|

**OTHER IMPORTANT DOCUMENTS like GUIDELINES, TECHNICAL GUIDELINES, HANDBOOKS, MANUALS:**

- Guidelines for drilling in shallow geothermal system (present version for test use only):  
<http://www.energetika-portal.si/podrocja/rudarstvo/plitva-geotermalna-energija/>,  
[http://www.energetika-portal.si/fileadmin/dokumenti/podrocja/rudarstvo/geotermija/smernice\\_plitva\\_geoen\\_maj\\_2016.pdf](http://www.energetika-portal.si/fileadmin/dokumenti/podrocja/rudarstvo/geotermija/smernice_plitva_geoen_maj_2016.pdf),
- Guideline for minimum hydrogeological report for water right (from ministry responsible for water)  
[http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/Hidrogeolosko\\_porocilo-navodilo1.pdf](http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/Hidrogeolosko_porocilo-navodilo1.pdf)
- Guideline for hydrogeological report for water right (from ministry responsible for water)  
[http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/Hidrogeolosko\\_porocilo-navodilo2.pdf](http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/Hidrogeolosko_porocilo-navodilo2.pdf)
- Guideline for pumping and slug test for dimensioning and building of heat pumps (from ministry responsible for water)  
[http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/Navodila\\_za\\_izvedbo\\_preizkusa.pdf](http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/Navodila_za_izvedbo_preizkusa.pdf)

**EXPLANATION OF GEOTHERMAL REGULATIONS:**

The most used national legal instrument is Slovenian Waters Act (No. 64/2002). The goals of this statutory law are: prevention of pollution, recording and storage of research results, analysis of influence on water cycle, regulation of extraction, reinjection and monitoring of groundwater. All this goals relate to GWHP. For BHE extraction, reinjection and monitoring are absent. The water act define research permit, water consent, water rights. The authority also evaluates possibility for special area (e.g. artesian aquifer, flood area). In process of requiring research permit the opinion from local provider of public water supply is needed.

Second national legal instrument is Slovenian Construction Act (No. 102/2004). This law only applies for pumping wells deeper than 30 m and to a greater extent to pumping wells deeper than 50 m, but shallower than 300m. For such pumping wells, building permit is required. The goals of Construction Act are similar to Water act but for pumping wells deeper than 50m requires more detailed construction design, more control and review practices. In future new building act is planned, which is stricter for GWHP.



Third national instrument is Slovenian Mining Act (No. 61/2010). It is generally valid for all wells deeper than 300m. For such wells, it requires revised mining design and more control and review practices, which include mining, building, health and safety expertise. Mining act also determinates minimum distance between pumping and reinjection wells for GWHP.

The most commonly used regulations for local area are regulations that define drinking water protection areas. Those areas cover major part of urban Ljubljana pilot area. Slovenian government adopted legislative acts.

In Slovenia, there are some special protected areas like natural parks, cultural or natural monuments, which are protected with special national or local legislation. Causes for protection in these special areas are almost in all cases non-geological. Special permits are usually needed.

### 3. How does the licensing procedure for shallow geothermal energy systems (SGES) work in your country? Are there different procedures for the licensing of SGES? What is the difference?

Why are the procedures different? Are they different for different regions? For different systems?

How is information for the submission provided?

What is the end of the procedure?

For BHE (Borehole heat exchange) there are permitting procedures in case of drilling into the aquifer. This installation requires the Research permit and Water consent. For GWHP there are permitting procedures in any case: Research permit and Water consent are required for the construction of installation. Water right is required for operation, i.e. water abstraction.

Water consent is required for interventions/constructions on waterside and coastal land, on protected areas or natural risk zones, for special uses of water (water exploitation), waste water emissions or where impact on groundwater is possible (aquifer recharge, reinjection) as well as for other interventions/constructions that could have impact on water regime (Waters Act, A. 150).

New Rules on the recorded special use of water (Ur. I. RS, no. 48/15 in 62/16) is introducing simplified water permit procedure. From 1.10.2018 on, these rules will be operational and "facilitated procedures for small scale producers" will be applied also for groundwater heat exchangers in Slovenia.

Conditions for simplified water permit procedure:

1. Water is abstracted from aquifer by well or from the sea (not from spring or surface water)
2. Groundwater research permit was already obtained, if required
3. Location not on water protection area





4. Heat exchange < 16 kW in heat power
5. Groundwater is not abstracted from thermal water aquifer ( $T < 20\text{ }^{\circ}\text{C}$ )
6.  $L > 50\text{ m}$  from observation well in national monitoring network (owned by the governmental institutions)
7. In accordance with river basin management plans
8. In accordance with legislation of drinking water supply
9. All abstracted water has to be returned in the same aquifer

The permitting procedure for drilling in aquifer is managed on national level by Slovenian water agency, which is a body affiliated to the Ministry of the Environment and Spatial Planning.

For pumping wells deeper than 30 m building permit is required the permitting procedure is managed on national level by the Ministry of the Environment and Spatial Planning. For wells in depth between 30 and 50 m simple construction design is required for building permit.

For GWHP water right is obligatory. For vast majority of uses water right is water permit. If GWHP uses thermal water then water right is concession.

Water right defines quantity of water abstraction, payment to the state and monitoring.

#### 4. What is needed for the submission of a shallow geothermal energy system? Are there different documents for different procedures? Do application forms exist?

The standardised application forms exist separately for water authority (separately for research permit and water consent) and building authority. The complexity of application documents depends of depth of wells and if the well is pumping well.

##### *Research permit*

<http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/VodnePravice/RPV.doc>

##### Water consent

[http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/PravicaGraditi/Vloga-VodnoSoglasje\\_Priloga1.doc](http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/PravicaGraditi/Vloga-VodnoSoglasje_Priloga1.doc)

##### Building permit (for pumping well in depth from 30 to 50 m)

<https://e-uprava.gov.si/.download/vloge/dokumenti/11179/file-content>

##### Building permit (for pumping well in depth from 50 to 300 m)

<https://e-uprava.gov.si/.download/vloge/dokumenti/11178/file-content>

## Water right

<http://www.dv.gov.si/fileadmin/dv.gov.si/pageuploads/ObrazciVlog/VodnePravice/Tehnoloske.doc>

Case study from Ljubljana pilot area, for a pumping well in depth of 48 m:

- Research permit:
  - hydrogeological study (includes construction design)
  - copy of plan of plots with well sights (often included in hydrogeological study)
  - Opinion from local provider of public water supply
- Water consent:
  - design documentation (in practice hydrogeological study is used)
  - location data is written in form (plot numbers)
- Building permit:
  - Opinion from local provider of public drinking water supply
  - In form data with sketch and distances from other lots
- Water permit (usually when well is built and completed and proven successful):
  - hydrogeological report (if abstraction rate is  $> 2$  l/s hydrogeological report, otherwise minimum hydrogeological report)
  - copy of plan of lot with well sights (often included in hydrogeological study)
  - technical documentation, especially about water facilities and systems with machines and devices
- Opinion from local provider of public water supply (not obligatory but very recommended)

## 5. Entities for the applications of SGES

Which administrative entities are involved in the licensing procedure of SGES?

Which of them are the first contact points for the submission?

- 1) State water protection authority - Slovenian Water Agency (Research permit)
- 2) Local or state water protection authority - Slovenian Water Agency (Water consent)
- 3) Local Building Authority - administrative unit of Ministry of the Environment and Spatial Planning (Building permit)
- 4) State water protection authority (Slovenian Water Agency - Water permit)



How much time does the procedure take from submission till granting?

The procedure for research permit or water consent takes around 14 days, for building permit 3 weeks, for water right depends on complexity of the case.

How long is the granting valid and are there any restrictions for extension?

-

Are online applications available?

Forms are available online also in active form. Forms and appendixes can be sent to authority by e-mail.

**6. Are there official requirements for the installation and operation linked to the granting (catalogue of requirements)? Are there different requirements for SGES in urban and non-urban regions?**

NOTE: Details to the first questions will also be answered in topic area C. and D. Please give just a short explanation!

No. It does not exist.

**7. Are there some special requirements concerning the installations and operation of SGES in your pilot area?**

General requirements are applicable in Ljubljana pilot area with some adjustments on some areas. The pilot area is the biggest city municipality in Slovenia, which is mainly urban with nearby hills, fields and forests. Some areas are protected by Natura 2000, areas of natural and ecological values (forests, flood plains), cultural heritage (mainly special buildings) and flood areas. Installation and operation of SGES on these areas are restricted, but the competent authority could conditionally allow it. Strict restrictions are implemented on drinking water protection areas (Decree on the water protection area for the aquifers of Ljubljansko barje and outskirts of Ljubljana, Decree on the water protection area for the Ljubljansko polje aquifer).

**8. Are there some liquidation procedures after abandonment for SGES?**

Liquidation after end of use is obligatory. This is defined in rules on criteria for the designation of a water protection zone no. 64/2004. These rules require liquidation with no possibility of pollution for BHE and GWHP. These rules are also adopted in water protection decrees for Ljubljana pilot area.



Liquidation of HP containing ozone depleting substances or fluorinated greenhouse gases was also defined with decree on the use of products and equipment containing ozone depleting substances or fluorinated greenhouse gases (No. 41/2010), but this decree is not valid from October 2016, so EU decree 517/2014/EU values now.

**9. Are there regulations for monitoring of SGES? If yes, how does the monitoring have to be executed?**

For GWHP monitoring is obligatory. Water Act No. 67/2002 requires that and conditions are given in water right by water protection authority - Slovenian Water Agency.

For GWHP monitoring of quantity of abstracted water (cumulative and temporally) is obligatory, even in case that that 100 % reinjection. Monitoring of piezometric level in pumping or reinjecting well is currently obligatory by water right. From 1.10.2018, monitoring of piezometric level won't be obligatory anymore, because rules on the recorded special use of water No. 48/15 will apply.



## B. FLOW CHARTS FOR LICENSING PROCEDURES IN THE PILOT AREA

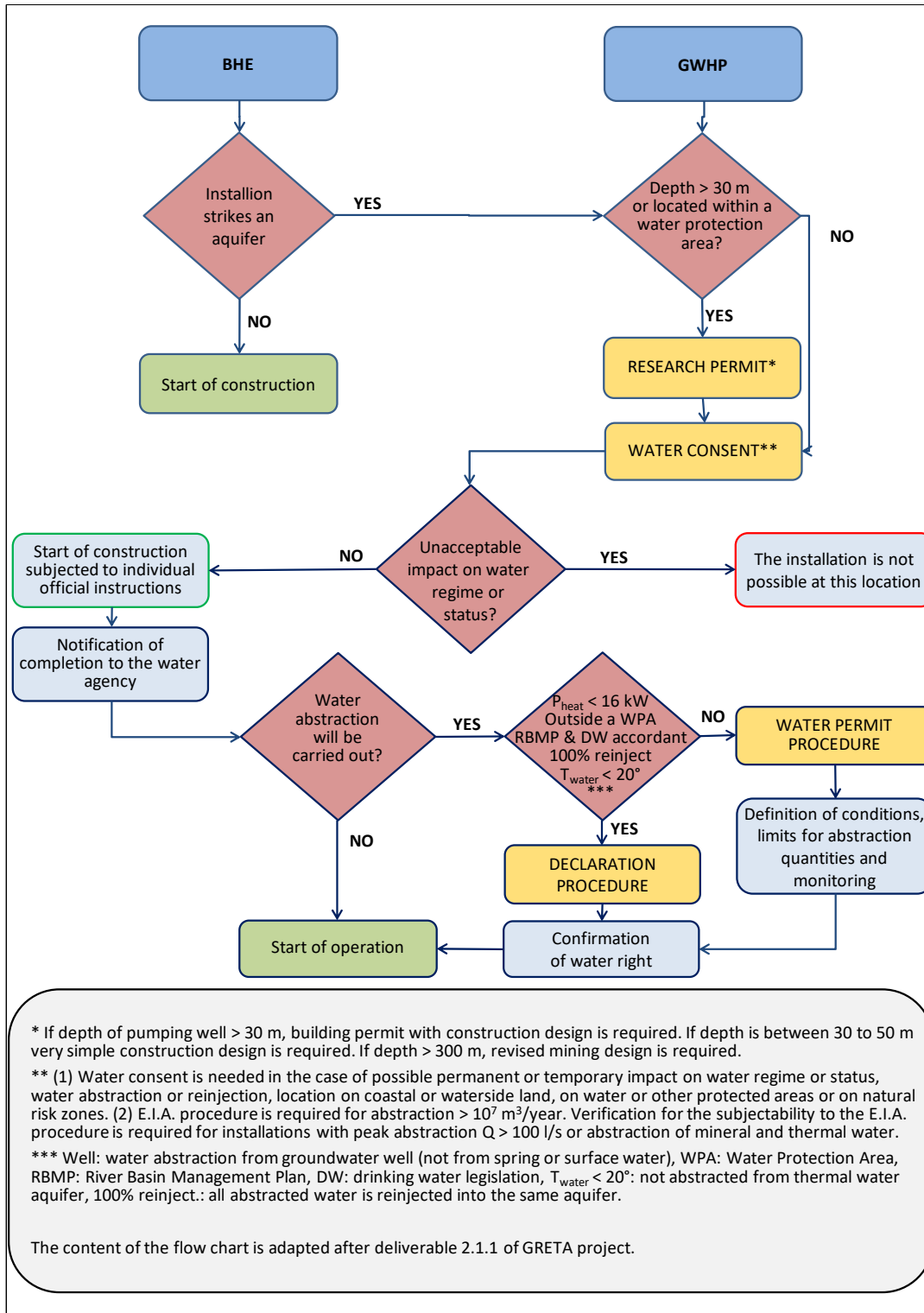


Figure 1: Flow chart Slovenia



## C. SPECIAL GEOLOGICAL AND GEOGRAPHICAL CONDITIONS WHICH CAN LIMIT THE INSTALLATION OF SHALLOW GEOTHERMAL ENERGY SYSTEMS

| C. Special geological and geographical conditions which can limit the installation of shallow geothermal energy systems (SGES) |   |                  |                    |   |   |
|--|---|------------------|--------------------|---|---|
| Regulation element   | PILOT AREA  |                  |                    | GENERAL   |   |
|  | SGES allowed under special obligations or conditionally allowed | SGES not allowed | SGES not regulated | National regulation   | Other regulations   |
| Artesian aquifers  |   | X (GWHP)         |                    | not regulated   | Decree on the water protection area for the aquifers of Ljubljansko barje and outskirts of Ljubljana  |
| Very shallow water table where reinjection can be problematic  |   |                  | X                  | not regulated   | not regulated   |
| Perched groundwater layers   |   |                  | X                  | not regulated   | not regulated   |
| Two or multiple aquifer layers   |   |                  | X                  | not regulated   | not regulated   |
| Mineral water resources  | X   |                  |                    | Waters Act (No. 64/2002)  | like national regulation  |
| Thermal water resources  | X   |                  |                    | Waters Act (No. 64/2002)  | like national regulation  |
| Gas occurrences  |   | X                |                    | Mining Act (No. 61/2010)  | like national regulation  |
| Mining areas   | X   |                  |                    | Mining Act (No. 61/2010)  | like national regulation  |
| Contaminated soil  |   |                  | X                  | not regulated   | not regulated   |
| Evaporites (e.g. NaCl, gypsum)   |   |                  | X                  | not regulated   | not regulated   |
| Swellable rocks (e.g. anhydrite, clay)   |   |                  | X                  | not regulated   | not regulated   |
| Karst area   |   |                  | X                  | not regulated   | not regulated   |
| Water protection area  | X   | X                |                    | Decree Ordinance /National level  | Decree on the water protection area for the aquifers of Ljubljansko barje and outskirts of Ljubljana, Decree on the water protection area for the Ljubljansko polje aquifer |
| Nature protected ecosystem area  | X   |                  |                    | Ministry is granting the Nature conservation consent (Nature Conservation Act (A.105 (4)), (UI RS, No. 96/04 – official consolidated text, 61/06 – ZDru-1, 8/10 – ZSKZ-B in 46/14)) | like national regulation  |
| Flood and erosion areas  | X   |                  |                    | Decree on conditions and limitations for constructions and activities on flood risk areas (A. 6, An. 1) (UI RS, No. 89/08).   | like national regulation  |
| Landslide areas  | X   |                  |                    | Waters Act (No. 64/2002)  | like national regulation  |
| Costal zones   | X   |                  |                    | Waters Act (No. 64/2002)  | like national regulation  |

Table 1: Filled questionnaire for topic C, Slovenia



## D. REGULATION ELEMENTS FOR THE INSTALLATION, IMPLEMENTATION AND OPERATION OF SHALLOW GEOTHERMAL SYSTEMS

| D. Regulation elements for the installations, implementation and operation of shallow geothermal energy systems (SGES) |   |  |       |          |                     |  |   |
|--|---|--|-------|----------|---------------------|--|---|
| Regulation element   | PILOT AREA  |  |       |          | GENERAL             |  |   |
|  | Requirements  |  |       |          | National regulation | Other regulations  |   |
| ALL SYSTEMS  | Drilling below groundwater table allowed  | allowed under special obligations or conditions        |       |          |                     | not regulated  | Decree on the water protection area for the aquifers of Ljubljansko barje and outskirts of Ljubljana, Decree on the water protection area for the Ljubljansko polje aquifer |
|  | Minimum distance to neighboring plot [m]  | GWHP:  | 1.5 m | BHE:     | 1.5 m               | Construction Act (No. 102/2004), Waters Act (No. 64/2002)                                    | like national regulation  |
|  | Minimum distance to buildings [m]   | GWHP:  |       | BHE:     |                     | Construction Act (No. 102/2004), Waters Act (No. 64/2002)                                    | Requirements set by the competent permitting authority  |
|  | Minimum distance neighboring wells [m]  | GWHP:  |       | BHE:     |                     | Construction Act (No. 102/2004), Waters Act (No. 64/2002)                                    | Requirements set by the competent permitting authority  |
|  | Minimum distance to neighboring closed loop systems [m]                                   | GWHP:  |       | BHE:     |                     | Construction Act (No. 102/2004), Waters Act (No. 64/2002)                                    | Requirements set by the competent permitting authority  |
|  | Groundwater investigations necessary (Hydrochemistry)                                     | GWHP:  |       | BHE:     |                     | Construction Act (No. 102/2004), Waters Act (No. 64/2002)                                    | Requirements set by the competent permitting authority  |
|  | Certification for drilling companies needed   |  |       |          |                     |  | not regulated   |
|  | Certification for planners or installers needed   |  |       |          |                     |  | not regulated   |
| Numerical simulations required   |   |  |       |          |                     | not regulated  |   |
| OPEN LOOP SYSTEMS  | Minimum distance between pumping and reinjection site [m]                                 | 25 m   |       |          |                     | Mining Act (No. 61/2010)   | like national regulation  |
|  | Reinjection of used groundwater   | obligatory   |       |          |                     | Construction Act (No. 102/2004), Waters Act (No. 64/2002)                                    | like national regulation  |
|  | Temperature difference between extracted and reinjected water [°C, K]                     |  |       |          |                     |  | not regulated   |
|  | Absolute allowed temperature range of the reinjected water [°C]                           |  |       |          |                     |  | not regulated   |
|  | Allowed temperature change [°C]   |  |       |          |                     |  | not regulated   |
|  | Accepted drawdown [cm]  | not regulated  |       |          |                     | not regulated  | Requirements set by the competent permitting authority if groundwater quantitative status is endangered   |
|  | Pumping test obligatory   | obligatory for research permit                         |       |          |                     | Waters Act (No. 64/2002)   | Requirements set by the competent permitting authority  |
| CLOSED LOOP SYSTEMS  | Minimum distance to other heat exchangers of the same installation [m]                    |  |       |          |                     |  | not regulated   |
|  | Target value for the average initial and input temperature of the heat carrier fluid [°C] | Heating:   |       | Cooling: |                     | not regulated  | not regulated   |
|  | Regulations for heat carrier fluid type   | not regulated  |       |          |                     | not regulated  | Regulation (EU) No 842/2006, Regulation (EC) No 1005/2009   |
|  | Regulations for refrigerant type  | not regulated  |       |          |                     | not regulated  | Regulation (EU) No 842/2006, Regulation (EC) No 1005/2009, SIST EN 378-1:2008, SIST EN 378-2:2008, SIST EN 378-3:2008   |
|  | Regulations for the backfilling of BHE  |  |       |          |                     |  | not regulated   |
|  | Leakage test of ground loop and refrigerant tubing required                               | not regulated (obligatory for refrigerant tubing only) |       |          |                     | Decree on the use of fluorinated greenhouse gases and ozone-depleting substances (No. 60/16) | like national regulation  |
|  | Borehole drilling report required   | obligatory   |       |          |                     | Waters Act (No. 64/2002)   | like national regulation  |
|  | Taking core samples required  | obligatory for research permit                         |       |          |                     | Waters Act (No. 64/2002)   | like national regulation  |
|  | Thermal response test required  |  |       |          |                     |  | not regulated   |
|  | Calculation of drilling depth required  | obligatory   |       |          |                     | Waters Act (No. 64/2002), Construction Act (No. 102/2004)                                    | like national regulation  |

The content of the table is adapted after deliverable 2.1.1 of GRETA project.

Table 2: Filled questionnaire for topic D, Slovenia