Database on environmental matters

Deliverable number: D.2.4

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The sole responsibility of this publication lies with the author. The European Union is not responsible for any use that may be made of the information contained therein. This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No [818242 — GEOENVI]
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Executive summary

This document aims at presenting the online database developed in the framework of H2020-GEOENVI project. The object of this database is to organise the information collected in work package 2 of this project. The decision was made to produce an online database to diffuse it more largely.

The database contains information about environmental matters regarding deep geothermal. When looking at these environmental concerns users can be looking for two types of information:

- A list of general environmental concern related to deep geothermal
- Information regarding the environmental concern of a specific geothermal site

That is why this database is organised in two parts, one part about general information, regrouping the work done in the other tasks of this work package and one part on specific site information that aims at being fed continuously by the deep geothermal community.

In the general part, the work of other tasks of this work package (Manzella et al., 2020; Ragnarsson et al., 2020) are regrouped and organised in a more user-friendly way, making links between topics and allowing classification with filters.

The site database contains site information that can be classified by filters. These site data are general information on sites as well as links or documents on environmental concerns such as impact assessment or life-cycle analysis (LCA).
Introduction

The objective of this report is to present the main features of the database that is published online (https://geo envi.brgm.fr/) and is the core of deliverable D2.4. The database will summarize the collection of data presented in other deliverables of WP2. It is comprised of different tabs that will be filled out during the GEOENVI project and onward.

The main content of the database is contained in two tabs: a) a site database, and b) a generic database on environmental matters.

The preliminary version of the database includes data from the sites selected for LCA purposes of the GEOENVI project. Input of data into the database will be completed during the lifetime of the GEOENVI project where geothermal developers will be encouraged to add information on present and new deep geothermal sites. For each site, there is the possibility to enter a summary of the operation as well as technical information. Furthermore, environmental documents such as life cycle studies or environmental impact assessments can be uploaded. Since some of these documents will be in the language of the relevant country where the site is located, a summary of these documents can be added in English. Very little information is mandatory for adding a new document so not to discourage people from adding sites.

The results from deliverables from the work done in tasks 2.1 and 2.2 of WP2 of the GEOENVI project (Manzella et al., 2020; Ragnarsson et al., 2020) is presented in tabs for information on environmental aspects. The content is though organised in a way that is more appropriate for a website, with filters and links to other pages. To date, only the basic structure is presented here but, a summary of the information from D2.1 (Ragnarsson et al, 2020) will be added as specific pages for each subject.

The homepage of the database presents briefly the project and its objectives and refers to the GEOENVI website for further information (Figure 1).
Further information is provided in sheets accessible with tabs that are available at the top of the page (Figure 1).

Besides the main contents mentioned previously, the site database and information on environmental aspects, there is a sheet with information on perception of some of the environmental risks and impacts described.

Another sheet is describing the main benefits of deep geothermal energy, based on published information to date.

Finally, a sheet on terminology is present containing the glossary from the D2.1 report (Ragnarsson et al, 2020). Its aim is to explain the technical terms used.

In this report, the following chapters will present each sheet with screenshot from the website database.
Site database

The site database (https://geoenvi.brgm.fr/operations) currently features information on the sites selected for LCA in the GEOENVI project (Figure 2). It consists of a list of sites and the filters available on the left to restrain the search are related to general information, geology of the area, reservoir characteristics or operations.

By clicking on the name for each site, it is possible to access further information (Figure 3), as well as upload environmental documents publicly available. These documents are generally in the language of the country where the site is located. Furthermore, links to published articles on environmental matters concerning these sites are also provided.
Figure 3: Description of Rittershoffen site. Environmental documents in pdf format are available.
How to add a new plant in the database

To add a new site the following environmental information is required:

- Information about site location, site name and nearest town
- Environmental information regarding the site: results for LCA, environmental impact study, environmental risk analysis, etc. This information may be a document (pdf format) to be uploaded or a link to a published article, report...
- Optionally (but recommended) more detailed information on the geothermal site such as description, type of operation, reservoir characteristics, geology, etc.

Before a new site is added an account must be created. This account will then be validated by an administrator. This step was implemented to avoid robot adding non-relevant information, but not barring that anyone can create an account.

Once an account has been created and the relevant person is logged in, the link “add a new site” will appear on the site database sheet. By clicking on this link, a form will be appear where information and documents can be added (Figure 4). This new addition will be validated before being published. This includes the verification that the environmental information is relevant to a specific site (e.g. published article, impact assessment that is a requirement of the licensing…). This process is explained in more detail in the tab “How to add a new site” on the website.

Figure 4: Form to add a new site. Red stars indicate mandatory information.
Information on environmental aspects

Information on environmental aspects (https://geoenvi.brgm.fr/environmental_aspects) is a database containing generic information on deep geothermal concerns. Environmental concerns from geothermal development can be categorized in various ways. In this report and in general for the GEOENVI project, environmental concerns have been categorized based on safeguard subjects, i.e., endpoint indicators, emphasizing environmental burdens. Any environmental phenomena, risk or impact, can be represented by a sequence of events, which consist of:

1. An initiating mechanism, located upstream and constituting a cause of the modifications;
2. An impacting phenomenon resulting from this cause that can harm people or the environment;
3. The potential effects on people or the environment.

The whole chain of events is represented with three lines (Figure 5). The top line concerns the potential causes, the middle line contains the environmental events or impacting phenomena and the bottom line contains the potential environmental consequences.

Figure 5: Environmental aspects, representing the potential causes, events and consequences.
By clicking on a page containing information on the corresponding topic will appear, once it has been filled. It will contain a summary of information provided in D2.1 (Ragnarsson et al. 2020) and D2.2 (Manzella et al. 2020).

Using the filter “Highlight causes and consequences of impacting phenomena”, and by clicking on an impacting phenomena, it is possible to see its causes and consequences if nothing is done to prevent or control it (Figure 6).

![Figure 6: Causes and consequences of seismicity.](image)

The filter “Discriminate impacting phenomena depending on risk / impact” allows to see which impacting phenomena is a risk and which one is an impact or if it can be both (Figure 7). The definition of risk and impact is given in the terminology tab.
Finally, the filter “Show consequences and phenomena that can be assessed with LCA” show the items that are assessed during the process of LCA (details are given in D3.1) (Figure 8).

Figure 7: Identification of risks and impacts.

Figure 8: Consequences that are assessed during LCA.

Favoring situations will be added as a filter. This will allow for the impacting phenomena related to specific context (e.g. geology or technology) to be selected.
Benefits of geothermal energy

A sheet describing the benefits of geothermal energy (https://geoenvi.brgm.fr/page/benefits-geothermal-energy) is available on the homepage of the website in one of the tabs (Figure 9). It is a summary based on previously published documents where some of the many advantages of geothermal energy is described. The purpose of this is to have information about the benefits readily available, to complement the environmental concerns that are generally focusing on the disadvantages.

Figure 9: Benefits of geothermal energy.
Conclusion

This online database that is the deliverable D2.4 in WP2 is formed of two parts: a generic database on environmental concerns related to deep geothermal and a site-specific database. Exhaustive generic information on environmental concerns with related risks and impacts is available, covering all kind of contexts and this part of the database will later include information from the results of other WPs of the GEOENVI project. Information will be added into the site-specific database further on by deep geothermal actors but for now it has information about sites that are being studied within the GEOENVI project. Various filters will later be implemented to be able to search these databases.

Bibliography

