Acceptance of Geothermal Projects in a Critical Environment in the Upper Rhine Graben

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ABSTRACT

Geothermal project development was widespread in the Upper Rhine Graben (URG) from the year 2000 on with many exploration licenses covering almost all areas of the Graben. Due to funding limitations and public opposition the development slowed down especially after the seismic events in Basel 2006/2007. Local action groups hindered the development of geothermal projects Germany especially after the Landau events in 2009. As a result, the very valuable geothermal resources of the URG are not sufficiently explored and therefore project development is far behind expectations. The research project TIGER on public acceptance in the geothermal sector showed ways to gain back the trust that was lost by the public. Projects like Trebur and the planned projects of Deutsche Erdwärme use a sophisticated dialogue process to manage acceptance und to include local knowledge into their projects.

1. INTRODUCTION

Geothermal development in the Upper Rhine Graben before the Basel events was welcomed and widely accepted. Deep geothermal use for power production in the Rhine Graben started with the international geothermal EGS research project in Soultz-sous-Forêts in 1988 after four years of preparatory work. With some seismic events which could be felt by the inhabitants of the nearby community during stimulation discussion started. Further development and operation was accepted when information was given and no more major seismic events were recorded. These discussions were local and therefore limited to Alsace.

Basel and the seismic events which took place in December of 2006 and until March 2007 started concerns about the negative effects of deep geothermal. During stimulation of granite at a depth of about 5000 m seismic events were recorded with a maximum of magnitude 3.4. Damage claims were processed by the insurance totaling more than 7 million SF. There are still different views if the amounts of settled claims truly reflect the damages caused by the seismic events, since there was a strong political will to calm down the situation. The EGS project was suspended following a study that Basel would experience several light earthquakes every year during the planned 30 year operation of the geothermal power plant (Baisch et al., 2009). After the seismic event a program was set up to take care of the inhabitants affected by the seismic events and to learn about their concerns and sensitivities.

In 2007 seven 140 m wells were drilled in Staufen near Freiburg. The wells were drilled to supply the town hall with heating energy using a ground source heat pump system. Due to a sensible geological situation and two insufficiently sealed wells, Staufen experienced massive heaving and substantial damage of several historic buildings in the central part of the city. The damages were related to geothermal energy and therefore were a substantial setback for the public perception of geothermal projects in the Upper Rhine Graben, irrespective of being a deep or shallow geothermal project.

The Landau geothermal project several induced small events with a magnitude of up to 2.7 occurred in August to September 2009. The power plant started its operation in November 2007. During drilling and during the stimulation of the injection well no seismic events were felt. During operation the geothermal brine was injected under a pressure of about 50 bar into the well until the seismic events occurred. The damages recorded were very small and have been settled in the majority of cases. There was a massive public upset and opposition against the power plant in Landau and opposition against geothermal project development in the region of Rheinland-Pfalz escalated.

The geothermal power plant of Insheim near Landau started operations in November 2012. The project induced some minor seismic events which did not cause damages.

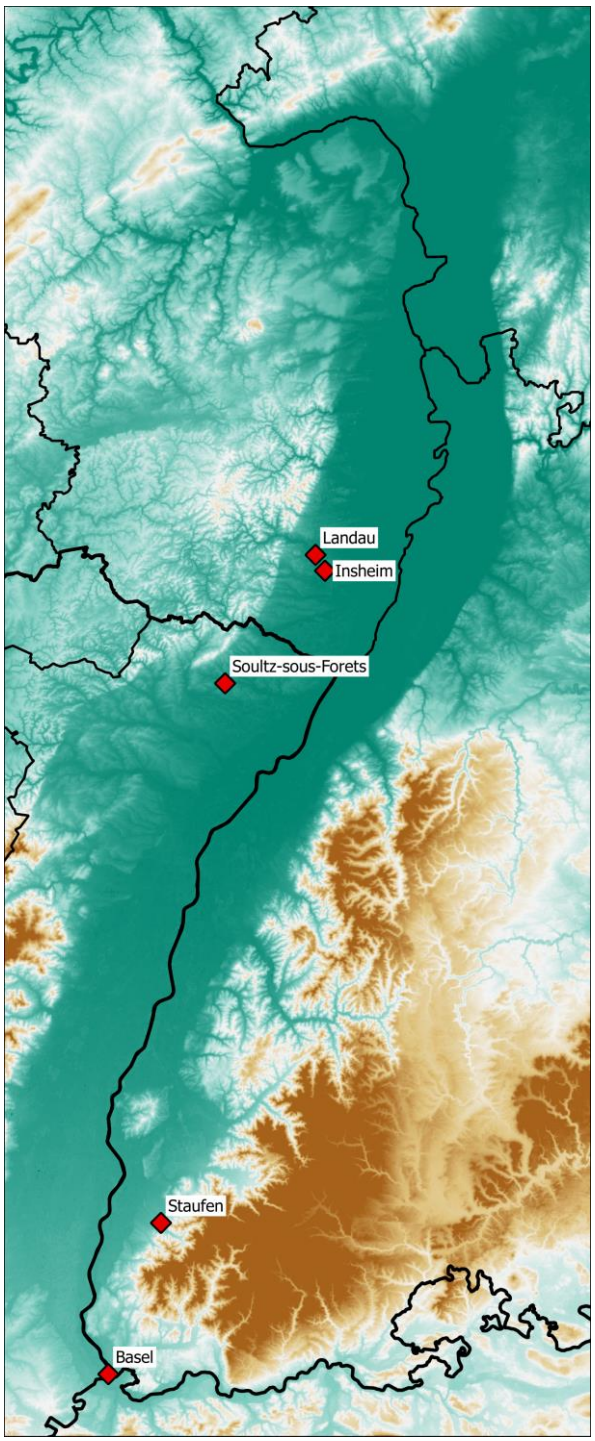

Figure 1: The location of the geothermal projects described in the Upper Rhine Graben

In Rheinland-Pfalz a mediation process was initiated by the state government to balance the interest of the geothermal developers and the public. The public was represented by local initiatives interested in a discussion process and action groups opposing geothermal development. After several lively and mostly controversial events the mediator presented a report of the results of the mediation process which also described the conditions for the future development of geothermal projects in Rheinland-Pfalz. While almost all of the project developers and the local initiatives have signed the report, some action groups opposed any rapprochement. Following the mediation process the "Geothermie-Forum Vorderpfalz" was established as an ongoing discussion platform between the geothermal operators, developers and the public, represented by the local initiatives. Recently the action groups attending the Forum with a guest status announced to leave the Forum to found their own platform called "Citizens Forum on Geothermal in the Upper Rhine Graben" (Geothermie-Bürgerforum-Oberrheingraben).

2. CURRENT SITUATION OF GEOTHERMAL DEVELOPMENT

With a new funding situation in France and with geothermal developers adapting to the situation of public acceptance geothermal development is gaining momentum again.

Geothermal projects are in communication with the authorities and the public at a very early stage. The development efforts have increased substantially compared to the times before 2010. New players have entered the geothermal market while other companies have left or ceased their activity. Figure 2 shows the concessions/projects actually existing in the Upper Rhine Graben.

Hessen

The northern part of the Upper Rhine Graben is still terra incognita for geothermal power projects. While concessions were granted as early as in the year 2000 the area is still waiting for the first well to be completed.

The northernmost project is situated near Königstein. It is an EGS research project by Rhein Main Deponie in a very early stage. Further to the South a project is developed near Massenheim North of the Main River. The developers, a cooperation between the city of Wiesbaden, the city utility of Wiesbaden and the publicly owned Rhein-Main Deponie face fierce opposition against the project by an action group based in the communities surrounding the project site.

The Trebur project south of the Main River was initiated by the Überlandwerke Groß-Gerau (ÜWG) and is expecting to complete the first well in August 2016. A substantial public acceptance process was carried out successfully and drilling has started with approval by the local public.

The second project developer in the area is Deutsche Erdwärme GmbH. 3D Seismic data evaluation will lead to target identification and drilling preparation near the city of Goddelau-Riedstadt.

Rheinland-Pfalz

Several exploration licenses exist and new ones are being granted by the mining authorities in Rheinland-Pfalz. The projects will be situated in the area south of Ludwigshafen down to the French border. As the new projects have not been localized yet, the new developments do start in a critical environment and public acceptance will be a major concern and activity by the developers.

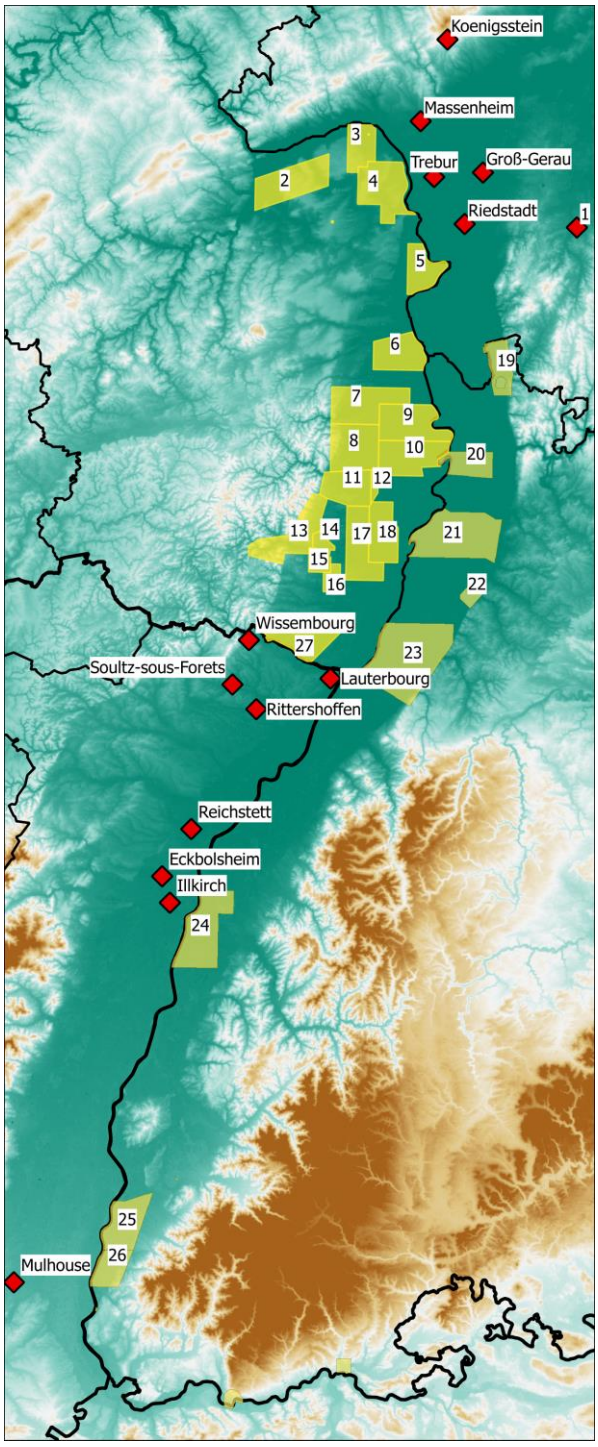

Figure 2: The location of (planned) geothermal projects and concession areas in the Upper Rhine Graben (1 Heubach; 2 Gensingen; 3 Mainz-West; 4 Bodenheim; 5 Eich; 6 Worms; 7 Mittelhaardt Mitte; 8 Mittelhaardt Süd; 9 Ludwigshafen; 10 Schifferstadt; 11 Speyerdorf; 12 Speyerdorf Ost; 13 Siebeldingen; 14 Landau; 15 Landau Süd; 16 Insheim; 17 Storchenaue;18 Lingenfeld; 19 Stadt Weinheim; 20 Schwetzingen; 21 Waghäusel-Philippsburg; 22 Bruchsal; 23 Karlsruhe Süd; 24 Neuried; 25 Südbaden; 26 Neuenburg; 27 Steinfeld).

Baden-Württemberg

One well has been already drilled in the Baden-Württemberg part of the Upper Rhine Graben. At Brühl the first well was successful with high temperatures and a substantial flow rate. The project is expected to be resumed after several years of stand-still. There is an active action group opposing the project even though the first well and testing was successful without any problems for the city and the neighbors. Stimulated by Landau the local action group was successful to change the attitude of the city council from very positive and supportive to negative and obstructive.

The Neuried project was initiated by the community of Neuried in 2004 and had been transferred to a private developer. While early development has been carried out without any public concerns, the seismicity in Landau and the drilling permit granted to the developer of the Neuried project started opposition to the project. In this situation the neighboring city of Kehl filed a court complaint against the drilling permit. The court decision is still pending.

New concessions have been granted and are under application for more projects to come in Baden-Württemberg.

Alsace

The success of the Rittershoffen geothermal project in 2015 which will start to deliver process heat to a company nearby helped stimulate geothermal development in Alsace.

There are three projects under preparation near Strasbourg and also projects in the north near the German border to Rheinland-Pfalz as well as in the south of Alsace (Figure 2).

The projects in and near Strasbourg have experienced opposition which is also stimulated by the action groups in Kehl near the French border.

3. INITIATIVES AND ACTION GROUPS

There are two types of groups active in relation to geothermal power plant development. The groups are defined by their intention and strategy.

The local initiatives target for recognition of the vital interests of the public and the community. They want

to be a critical partner within the development, to result in better geothermal energy production with acceptable effects on the neighbors and the environment. The local initiatives are open for discussion and open to settle an agreement with developers. They are working in local networks inside the community and share experience and views with local initiatives in the surrounding area.

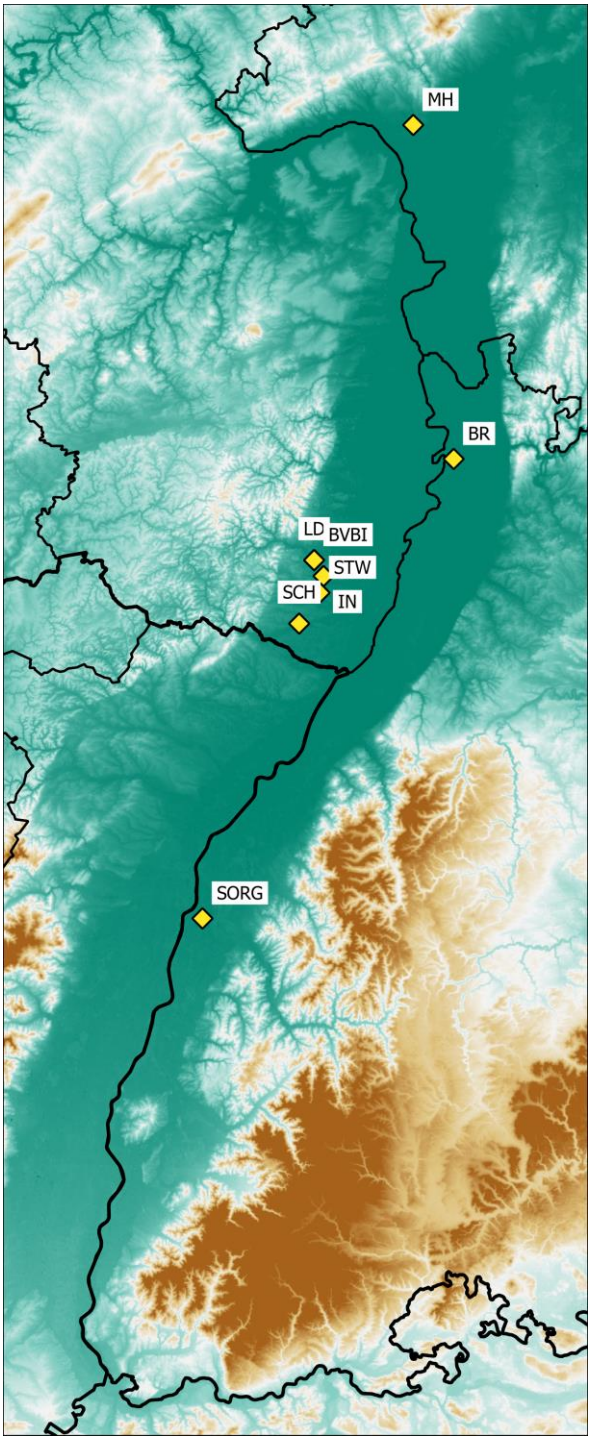

Figure 3 shows the location of local initiatives and action groups in the Upper Rhine Graben (MH: Bürgerinitiative Massenheim e. V.; BR: Bürgerinitiative Brühl Ketsch EV; LD: Bürgerinitiative Geothermie Landau Südpfalz e.V.; BVBI Bundesverband Bürgerinitiativen Tiefe Geothermie e. V.; STW: Bürgerinitiative Geothermie Steinweiler e. V.; IN: Bürgerinitiative Energieforum Rohrbach und Insheim e.V.; SCH: Schaidt AKTIV e. V.; SORG: Bürgerinitiative gegen Tiefe Geothermie im südlichen Oberrheingraben e. V.).

The typical action groups have the only intention to prevent geothermal projects. Action groups are formed and stimulated by one or more individuals. The members of the action groups are not interested in a discussion with the operators and developers to agree on how to enable geothermal energy production safely and efficiently but only how to avoid geothermal energy production. The strategy is to nationally and internationally cooperate with other action groups against geothermal. The activists are travelling to all locations where geothermal power plants are developed to agitate and organize a local action group.

A "German Association of Action Groups for Deep Geothermal Applications" (Bundesverband Bürgerinitiativen Tiefe Geothermie e.V.) has been established headed by the action groups in and around Landau. The action group opposing the Neuried project has extended its activity as the "Action Group against Deep Geothermal in the Southern Upper Rhine Valley" (Bürgerinitiative gegen Tiefe Geothermie im südlichen Oberrheingraben e.V.) and is actively also opposing projects in Alsace. The action groups leaving the mediation process "Geothermie-Forum Vorderpfalz" have announced to initiate a "Citizens Forum on Geothermal in the Upper Rhine Graben" (Geothermie-Bürgerforum-Oberrheingraben).

There is an active cooperation between the action groups which is based on a few individuals. They are joining citizens meetings about geothermal in all of the Upper Rhine Graben to stimulate opposition and to cooperate with local groups opposing the projects. Information and strategies are shared and city councils obliged to file law suits against permits for geothermal drilling or power plants.

The information used against geothermal projects are not only the seismic or other events that have occurred and caused opposition but all negative news which exist in the internet independent of their relevance or correctness. The strategy is to imply catastrophe, attractive news which is thankfully picked up by the press.

4. RESEARCH PROJECT TIGER – ACCEPTANCE OF DEEP GEOTHERMAL ENERGY IN GERMANY

Germany intends to provide 80 percent of its power consumption from renewable sources by 2050. Deep geothermal energy plays an important role in order to achieve this goal since geothermal energy is the only renewable energy that supplies round the clock power, heating and cooling. But compared to other forms of renewable energies geothermal energy is little used and rarely known. In combination with the well-

known scepticism of the population regarding new/large-scale technologies, the realization of deep geothermal energy power plants has stalled. Therefore, to fully exploit its potential, it is necessary to improve the acceptance of deep geothermal energy in the public perception.

From 2012 till 2015 the Federal Ministry for Economic Affairs and Energy in Germany fostered the interdisciplinary project “Deep Geothermal Energy – Acceptance and Communication of an Innovative Technology” (TIGER). The main objective of TIGER was to investigate the acceptance and knowledge about deep geothermal energy in the population, to identify acceptance drivers for the technology and to develop an efficient communication concept. For this purpose, a multi-method approach by combining social sciences and computational linguistics was designed and carried out (Fig. 4).

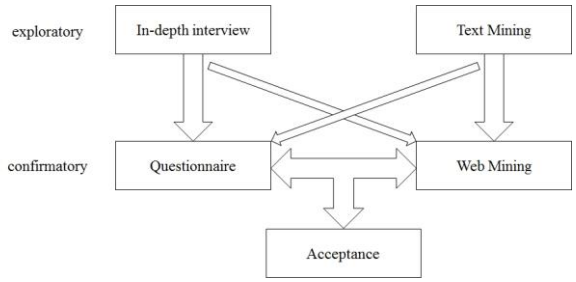

Figure 4: Multi-method approach: Text and Web Mining are combined with in-depth interviews and questionnaires to compensate the weaknesses of single methods. (Source: RWTH Aachen University)

In the exploratory phase was through in-depth interviews and Text Mining (analysis of internet discourses) analysed, which factors are relevant for the acceptance of deep geothermal energy. The aim was to gain insights into the perception of technology-related advantages (Fig. 5) and disadvantages (Fig. 6). In the confirmatory phase these insights were verified (quantified) by questionnaires and focused web queries (Web Mining). The in-depth interviews and questionnaires took place between December 2012 and September 2013, the Text and Web Mining evaluated an internet corpus from 2008 until 2012.

Figure 5: Advantages and perceived benefit aspects of geothermal energy mentioned by 170 participants of an interview-study. The size of the items (large= often, small=rare) give an indication how often the terms were called. (Source: RWTH Aachen University)

Figure 6: Perceived disadvantages from deep geothermal energy of the same study. (Source: RWTH Aachen University)

TIGER has also examined the attitudes and desires of citizens in relation to communication: When, how often and how they want to be informed. People like to be informed as early as possible through local newspapers at least once per month. However, there is a difference between those under 25 and over 35 years: the elders prefer newspaper articles, while younger want to be informed especially on the Internet. Moreover, people want not only be informed, but also more than two-thirds want to be involved.

Based on these results and identified positive and negative acceptance drivers the communication concept was developed. The concept includes analyses, messages and strategies for each stage of deep geothermal project to communicate early, openly and transparently. It ensures a good and effective communication between citizens, government and enterprises.

5. ACCEPTANCE IN THE UPPER RHINE GRABEN

Furthermore, depending on the location, the assessment of geothermal energy is very different. In the Upper Rhine Graben the attitude towards deep geothermal energy fluctuates heavily. For example, in 2012 the acceptance of deep geothermal energy in the Upper Rhine Graben was quite good (Fig. 7). Currently – in recognition of the statements made by local media and the active protest groups – the assessment of deep geothermal energy in the region is negative.

The region needs an entirely new approach to foster public acceptance. The population is well informed about deep geothermal energy, but distrusts the technology because of the events in Landau, Brühl or Staufen. To reach the people and to gain acceptance, project developers need to integrate all relevant stakeholders as early as possible into a well organised dialogue process to get wide support for the planned projects. In this dialogue process open issues must be identified and clarified. Especially the possible disadvantages must be intensively discussed and compared with the advantages. Even more, a comparison with other technologies should be made in order to make the benefits of deep geothermal energy clear and understandable.

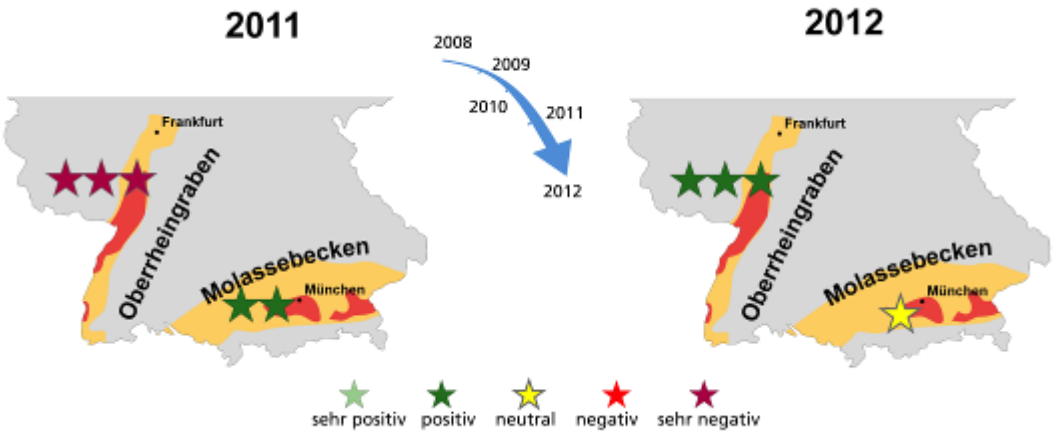

Figure 7: Colour and number of stars show the mood for deep geothermal energy in online debates in the years 2011 and 2012 at the sites Landau and Unterhaching. In Landau the attitude changed from a very negative to a very positive one. In Unterhaching, however, the contributions were more neutral than in the previous year.

6. EXAMPLES OF SUCCESSFUL PUBLIC ACCEPTANCE STRATEGIES

The Trebur project near Groß-Gerau in the northern Upper Rhine Graben has implemented a public acceptance strategy to develop the project only with acceptance by the majority of the public.

The strategy included:

- A study on local stakeholders and their views of geothermal energy
- Public meetings to share information and discuss
- Implementation of a stakeholder group of more than 20 local stakeholders (initiatives for nature and environment, farmers, public institutions, individuals) to intensively discuss geothermal energy in all its aspects and consequences.
- The stakeholder group summarized its discussions in a report describing the conditions required to accept the project.

A professional public survey showed a broad acceptance of the project by the public in the area in and around Trebur and Groß-Gerau.

The next illustrative example for communication within geothermal development is Deutsche Erdwärme, a development company founded in 2015 with the intention to develop several deep geothermal projects in the Upper Rhine Graben. Deutsche Erdwärme holds concessions in Rheinland-Pfalz, Hessen and Baden-Württemberg. For Deutsche Erdwärme, transparency and the management of stakeholders and public acceptance is a vital and crucial part of the development process, it is built in from the start of each project. To inspire confidence in the new development company, Deutsche Erdwärme started from the first day of theirs operations to discuss future plans with local communities and their council and administrative heads. For two projects, the plan to restore abandoned geothermal well sites was developed as one of the tasks for Deutsche Erdwärme, simply because the communities wished to go back to greenfield status and start new projects without remains from abandoned projects. Since the filling of a well and the renaturation of a drill site need substantial amounts of money, this task is seen by the communities as a proof of financial capability and a proof for trustworthiness. In general, Deutsche Erdwärme publishes all relevant information on their planned projects on its website.

Deutsche Erdwärme will initiate a dialog process to improve the planning of the projects using local knowledge and local skills. Members of the inner circle of the dialogue will be local stakeholders and local nature and other peer groups. Each dialogue process will start with an opening event for the inner circle to be followed by an information event for all citizens, press and greater public.

Deutsche Erdwärme plans to implement a local counsellor board, to deeply discuss critical and vital matters of the project.

The planned communication campaign is closely linked to the dialogue process and to the outcome of the meetings of the local counsellor board.

The dialogue process will be managed by DEUTSCHE UMWELTHILFE (DUH), a German nature protection organization which adopted geothermal energy as suitable and efficient energy source for heat and power. DUH has some experience in managing these dialogues, on behalf of federal governments they managed several similar process's for the erection of wind turbines and grid enforcement measures.

7. CONCLUSIONS

Geothermal project development in the Upper Rhine Graben will only be successful if local and regional public acceptance will be gained back. As the example of Trebur has shown, a public acceptance strategy allows geothermal project development in a friendly and supportive public environment.

Active action groups have been formed with the goal to prevent the use of geothermal energy in the Upper Rhine Valley. The origin of the action groups are from the Landau project with the initiators actively agitating in all areas of the Upper Rhine Graben. Independent of the correctness of their claims about geothermal energy they were successful to impede (Landau, Insheim, Brühl, Neuried, Massenheim) or even prevent (Strasbourg-Robertsau) geothermal development.

To induce a geothermal friendly environment the following activities will be necessary:

- Provide transparent and open information about geothermal energy to the public
- Implement an acceptance strategy for each project
- Be as open and transparent as possible to be trusted by the public
- The developers should cooperate in the Upper Rhine Graben also across the borders of Germany, France and Switzerland

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FURTHER INFORMATION

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www.bi-massenheim.de

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