Projektinfo **17**/2016

Detailed information on energy research

Communication concept for deep geothermal energy

Improving public engagement in the planning and operation of plants through active and early dialogue

BINE Information Service

Technical innovations can only be successful if they are supported by the public. Plants for utilising renewable energies are also dependent on this backing. Early and comprehensive communication with the public is therefore indispensable. For deep geothermal energy, scientists have analysed public perceptions and have developed a communication concept. It offers operators and authorities a wealth of ideas and support for active and transparent public relations.

It is intended that renewable energies will provide over 80 % of the power supply in Germany by 2050. In addition to wind and solar energy, hydropower and biomass, the natural, deep thermal heat deposits in the earth are also being developed. The geothermal power plants and heating networks are contributing to the success of the energy transition. Until now, however, there has been very little public perception of deep geothermal energy as a renewable energy source. In Germany, the geothermal resources are located in water and rock layers 400 metres below ground. Currently, most of the facilities are situated in the northern Upper Rhine Graben and in the Bavarian Molasse Basin in the greater Munich area. The two regions have very different geological structures at the relevant depth. This has a considerable influence on the course of the drilling and excavation work, as well as on the plant operation.

If a geothermal project is to be successful, it is not only the geological conditions, drilling and plant technology as well as the economic concept that are important but also public support. Acceptance is based on sound factual information, transparency and trustworthy communication on an equal footing from the beginning. Companies, operators and authorities therefore need to communicate the necessary material and project information at an early stage. Depending on

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the local conditions, specific communication concepts need to be developed for the respective plant.
In geothermal energy, this task is left to corporate structures where small companies with fewer than 20 employees form the majority. In the past, these companies have mainly focussed on technical aspects and have little experience in communication. In order to support companies and operators in carrying out public relations work, communication experts, social scientists, engineers and representatives from the industry have investigated the acceptance of deep geothermal energy in a research project called TIGER. Here the focus was on developing a communication concept with various digital information services for operators and authorities. The detailed version of the concept will appear as a book at the beginning of 2017.
The presented tools for active public relations work have been developed as an example for geothermal energy. However, they can also be applied to other technologies such as wind farms or planning procedures for new overhead transmission lines.

Geothermal energy in the public gaze

Representative and statistically confirmed surveys [2, 3] have shown that in Germany 89 % of the public consider geothermal energy to be a sensible energy form. 81 % have expressed their support for public funding and 71 % would approve the construction of plants in their vicinity. The benefits of geothermal energy listed by those surveyed include local energy provision, sustainability and environmental friendliness, as well as the fostering of renewable energies. Unknown risks, costs and earthquakes were in particular mentioned as disadvantages (Fig. 1). Given the perceived importance of „unknown risks“, the scientists have concluded that the public relations work needs to be based on explaining the strengths and weaknesses of geothermal energy.
Those surveyed expected to be comprehensively informed about the planning of new geothermal plants as early as possible. In particular, the public demand the publication of expert appraisals, such as on the economic viability or seismic surveys. Most of those surveyed preferred the local press as a source of information and round tables as a place for active public participation.

No acceptance without communication

The wishes and expectations expressed by the public in regard to geothermal energy confirm the findings from communication research that general technical innovations will only be accepted by the population through providing comprehensive information (Fig. 3).
Professional, active communication with the public should therefore be scheduled in and financially budgeted for when planning every new plant.
One of the key recommendations is to present the opportunities and risks posed by geothermal energy in a manner that is sensitive to the situation and mood. This is a prerequisite for achieving credibility.
Companies and operators must be able to conduct dialogue with the public at an early stage and transparently across the entire lifecycle of the plant, from the exploration and drilling phase to the plant‘s construction and operation as well as its final decommissioning in a few decades. At the beginning, the focus needs to be on providing information about geothermal energy and its potential risks as well as regarding the specific local planning. Possible topics include local geological structures in the target horizon, information about drilling and plant engineering, the planned geothermal heat and electricity production or the risk of seismic events and the precautions taken to avoid them.

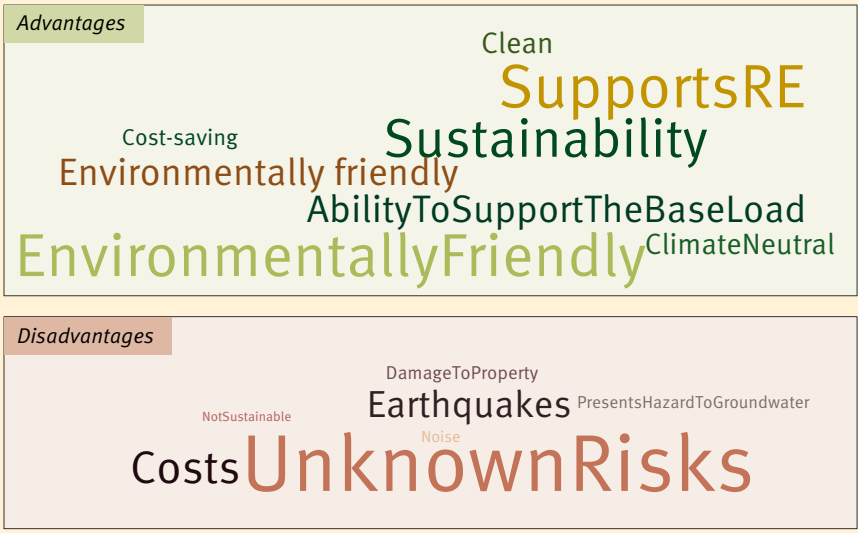

Fig. 1 *The perceived advantages and disadvantages of deep geothermal energy as described by survey respondents. (Kluge et al. 2015 [2])*

Fig. 2 *The structure of the TIGER communication concept*

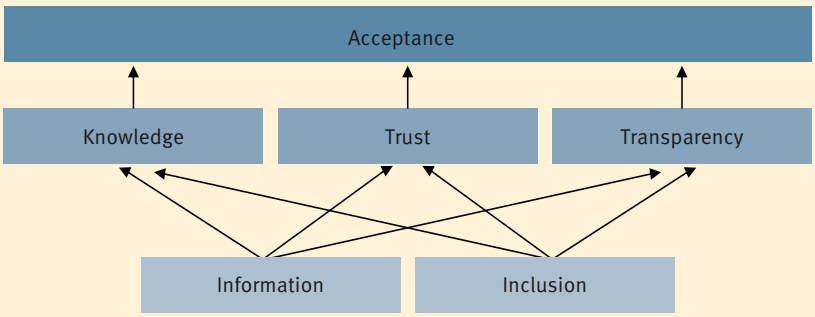

Fig. 3 *Acceptance is based on these building blocks. (Kluge et al. 2016 [1])*

The following requirements apply to the communication:

- **Continuity**
  Communication with the public is a constant task. The operators should, for example, define and continually provide information about the beginning and end of the work, key interim results and new expert appraisals as key communication opportunities
- **Fixed communication paths**
  All news about the facility should be published via

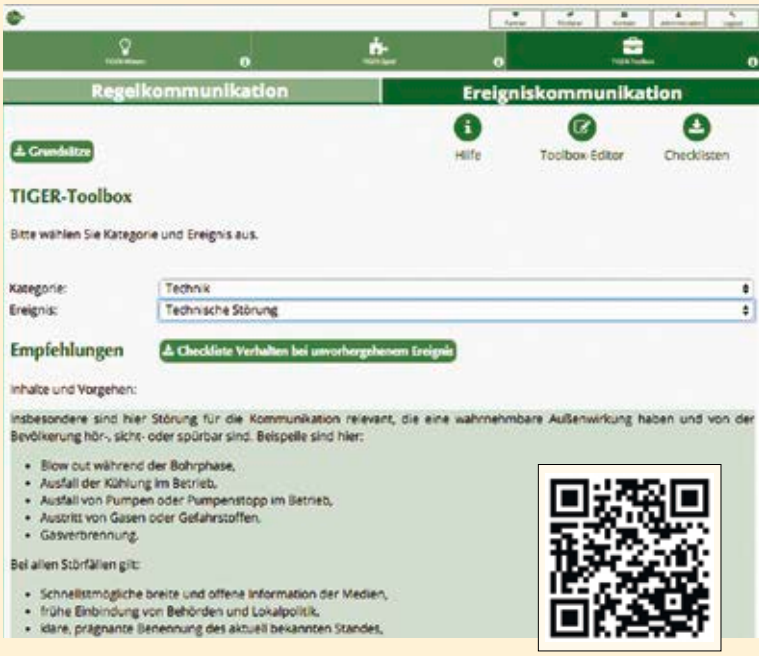

Fig. 4 *The TIGER toolbox provides recommendations and templates for active public relations work. The QR code to the right accesses the TIGER app.*

Fig. 5 *A pipe handler automatically transports the individual parts of the drill pipe from the store to the drill drive. This reduces noise emissions.*

fixed communication channels. This therefore requires close cooperation with the local media, as these are the public's preferred means for finding out information.

- **The project needs a face**
  A designated contact for the project, who is present on the ground and is known locally, will support the credibility of the messages.
- **Core messages**
  Communication needs core messages that sum up the local opportunities and risks.
- **Media evaluation**
  Operators should regularly evaluate the media coverage of their facility or commission corresponding service providers.
- **Presence in the event of an emergency**
  In order to respond to any incident that occurs despite all the precautions taken at a plant, the operators need to determine in advance the responsibilities and processes for informing the public as quickly as possible. Particularly in such events it is important that the designated contact promptly informs the general public and local media, and is available to answer questions. The information can be disseminated even faster in such a situation via the website for the project or social media.

The findings of the research project demonstrate just how complex the communicative and acceptance processes are in practice. The highly complex interaction of attitudes, opinions, fears and perceived benefits makes flexible and dynamic communication necessary. There must also be creativity and empathy for the people, conditions and needs on the ground.

TIGER app and toolbox

The TIGER app, developed as part of the project, offers a variety of services for practically supporting the communication concept:

A module is used for knowledge transfer. It provides basic information and diagrams on deep geothermal energy in Germany as well as links to existing videos and information portals. All information can be accessed via a PC, tablet and smartphone.
With the TIGER game, the app offers a playful approach to exploring the theme. The idea of the game is to supply a fictional world as successfully as possible with heat and electricity from geothermal sources. In addition to the technology, it is also important to gain the approval of the local population near the facilities. You can only win if you take all requirements equally into account.
The TIGER toolbox (Fig. 4) provides the plant operators and participating companies with recommendations for public relations work. The recommendations for action are based on the different phases for constructing plants and provide suggestions as to which target groups should be informed and when. This is supplemented by check lists, for example for public relations work.

Utilising technical possibilities

In geothermal projects, there is also technical scope to reduce the impact on the environment and the population. Impairments can be caused, for example, by noise emissions during drilling, by vehicles, by the handling of the extracted thermal water (e.g. odours, dissolved ingredients) and seismic events. The impacts can often be mitigated by technical measures such as restrictions on construction site traffic, the use of a pipe handler (Fig. 5) for the drilling rig, enclosing the facilities and improving the visual appearance of the overall facility. The beginning and end of all work steps that are perceptible in the surrounding environment should be communicated in advance.

System analysis and acceptance research

Whether innovative energy technology is successful in practice depends not only on the plant technology working optimally. The interplay and interaction between individual technologies within the overall energy supply system, economic and environmental conditions and socio-scientific aspects also have a considerable influence. In energy research, these aspects from the context of system analysis are becoming increasingly important. The goal of system analysis is to holistically view and assess the abundance of technologies, concepts and influencing factors in order to provide a guide for future research strategies.
Decisions on the future energy provision are of considerable social relevance. Communication with users and stakeholders as well as acceptance research are therefore key tasks. These apply to both small installations in the domestic environment or workplace as well as larger installations, such as wind farms or geothermal plants.
An aspect that always features is concerned with the conditions that need to be met in order to gain active public support and acceptance. Here are some examples:
The Kirchweidach geothermal facility in the rural district of Altötting principally uses geothermal energy for its power plant and heating network. However, the heat that is not technically usable in the plants is also utilised to heat a 12-hectare greenhouse. Here the heating is used to grow around six million kilograms of vine tomatoes each year without CO_2 emissions. The development of offshore wind power was monitored by a long-term, social scientific study. Local residents, tourists and regional experts expressed their opinions in surveys and workshops. One finding was that support decreases during the construction phase of the farms but then increases again during the operating phase.
In the energy efficient refurbishment of complete housing estates, the early involvement of the residents in the planning is standard. This includes recording the residents' interests and suggestions in district energy concepts and continually reporting on the progress of the implementation.

Project participants

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Links and literature

- The long version of the TIGER communication concept will be published in the second quarter of 2017 by Springer Verlag, Heidelberg.
- [1] Kluge, J., Kowalewski, S., & Ziefle, M. (2016). As simple as possible and as complex as necessary – A communication kit for geothermal energy projects, 18th International Conference on Human-Computer Interaction, Toronto.
- [2] Kluge, J., Kowalewski, S., & Ziefle, M. (2015). What can we learn from the geothermal energy sector for communication concepts for large-scale projects, 2nd International Conference on Human Factors and Sustainable Infrastructure.
- [3] Kowalewski, S., Borg, A., Kluge, J., Himmel, S., Trevisan, B., Eraßme, D., Ziefle, M. & Jakobs, E. M. (2014): Modelling the influence of human factors on the perception of renewable energies. Taking geothermics as an example, Advances in Human Factors, Software and System Engineering, 155–162.

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