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Communication supporting the research on CO₂ storage at the Ketzin pilot site, Germany – a status report after ten years of public outreach

Alexandra Szizybalski*, Tanja Kollersberger, Fabian Möller, Sonja Martens,
Axel Liebscher, Michael Kühn

Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, Telegrafenberg, 14473 Potsdam, Germany

Abstract

Since 2004, research at the Ketzin pilot site in Germany contributes to the understanding of the geological storage of carbon dioxide (CO₂). For the Ketzin project public outreach has been a key element from the very beginning. Involvement of the local public, scientists, stakeholders and competent authorities allowed for the consideration of their different interests. The dissemination of up-to-date and factual information along the entire chain of activities is a central component of the project. The work presented here summarizes the activities and the experiences of the public outreach accompanying the research on CO₂ storage at the Ketzin pilot site.

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1. Introduction

"We are not afraid of the things that probably kill us, but of those others are afraid of. Here education policy and enlightenment are essential, so we are not being chased from a crisis to the next, without understanding." after Gerd Gigerenzer, director of the Max Planck Institute for Human Development in Berlin, Communicator Award 2011 (Interview translated from German into English, Stifterverband, www.stifterverband.info, 03.2013).

The introduction of new technologies can be influenced by the attitude of the general public [1]. Surveys investigating the awareness of carbon capture and storage (CCS) among the general public in Germany, for example show that CCS was still largely unknown in Germany in 2009, except in regions where a pilot power plant and a CO₂ storage site were planned, respectively [2]. But even in these specific regions only minor parts of the population stated to really know something about CCS. Results also suggested that survey participants perceived capturing CO₂ to be less problematic than transport and geological storage of CO₂ [3].

In order to increase the perception of the topic of CO₂ storage among the general public and to give people the possibility to develop an informed position the early start of information activities, the open and factual discussion of the technical, juridical, safety and environmental aspects of the technology with a suitable communication policy are recommended in socio-economic studies and public outreach manuals [4,5,6].

The societal relevance of the topics climate change in general and CO₂ storage in particular underlines the responsibility to inform the general public and especially the local population about the motivations, activities, risks and the developments.

* Corresponding author. Tel.: +49 (0)331-288-28695; fax: +49 (0)331-288-1529.

E-mail address: aszizy@gfz-potsdam.de

Worldwide, there is already a variety of commercial and research CCS/CO₂ storage projects. The internationally known storage project at Frio (USA) for example informed the general population through site visits, newsletters and an online log of research activities [7]. Information centers for CO₂ storage are also operated at some locations like Otway (Australia) and Decatur (USA). Projects that have recently started like Aquistore (Canada) integrate public events on site in their information concept, too [8,9].

As for other CO₂ storage projects, public acceptance is also an important aspect for the Ketzin project in Germany. Early and continuing cooperation with researchers, authorities, stakeholders and local residents [10] tries to consider all the different interests, as there are for example:

- The further usage of the site after abandonment of the former gas storage (see chapter 3.1),
- Safe and detailed research into CO₂ storage,
- Being well informed about the project progress,
- Contributing to safe operation of future commercial CO₂ storage sites and
- Increasing the public perception of CO₂ storage.

Since 2004, the research activities led by the GFZ German Research Centre for Geosciences have been accompanied by an open and transparent information policy and the following key communication objectives were identified:

- Inform all interested parties about the principles of geological storage, the plans and progress of the research activities at Ketzin.
- Assist in demonstrating to the local community the set-up and results of monitoring techniques.
- Identify issues likely to arise as a result of the project and prepare responses.

2. The Ketzin pilot site in brief

The GFZ runs Europe's longest-operating on-shore CO₂ storage site at the town Ketzin near Berlin. Predominantly within the frame of the European project CO₂SINK (CO₂SINK – CO₂ Storage by Injection into a Natural Saline Aquifer at Ketzin, 2004-2010) and the German funded follow-up project CO₂MAN (CO₂ Reservoir Management, 2010-2013) the Ketzin pilot site has been developed and the infrastructure been built. Investigations covering all aspects of a CO₂ storage site are conducted with the main focus on monitoring and modelling.

Injection of CO₂ at the Ketzin pilot site started in June 2008 and ended in August 2013. During this time, a total of 67,271 tonnes of CO₂ were injected. The sandstone formations used for this purpose lie at a depth of 630 m to 650 m and are sealed by more than 165 m of shaly cap rocks [11]. The Ketzin infrastructure comprises four deep and one shallow observation well for injection and/or monitoring. So far, geological storage of CO₂ has proceeded in a safe and reliable manner with no indication for any CO₂ leakage [12,13,14].

3. Communication at the Ketzin pilot site uses various tools

Our concept focuses on the local community but also on interested people from Germany and abroad. Thereby, we try to respond to interested laymen, the science community as well as decision makers and the responsible authorities. The concept of communication and dissemination of information uses different communication tools and is based on:

- Close cooperation with the local community
- Visitor centre and service at the Ketzin pilot site
- Project website since the very beginning
- Educational and information activities
- Provision of appropriate information material.

The information material itself was developed considering the varying background and knowledge of the audiences. People are informed for example via a website, brochures and short films. Moreover, several hands-on experiments were added to the information supply, in order to demonstrate CO₂ storage.

Fig. 1 gives an overview of the chronology of public outreach activities within the Ketzin project.

3.1 Direct communication and close cooperation with residents and authorities

The research activities at the pilot site have received support from the town of Ketzin from the inception of the project. In the early project stage, GFZ discussed with the owner of the land and of the mining rights (VNG Gasspeicher GmbH, VGS) and the

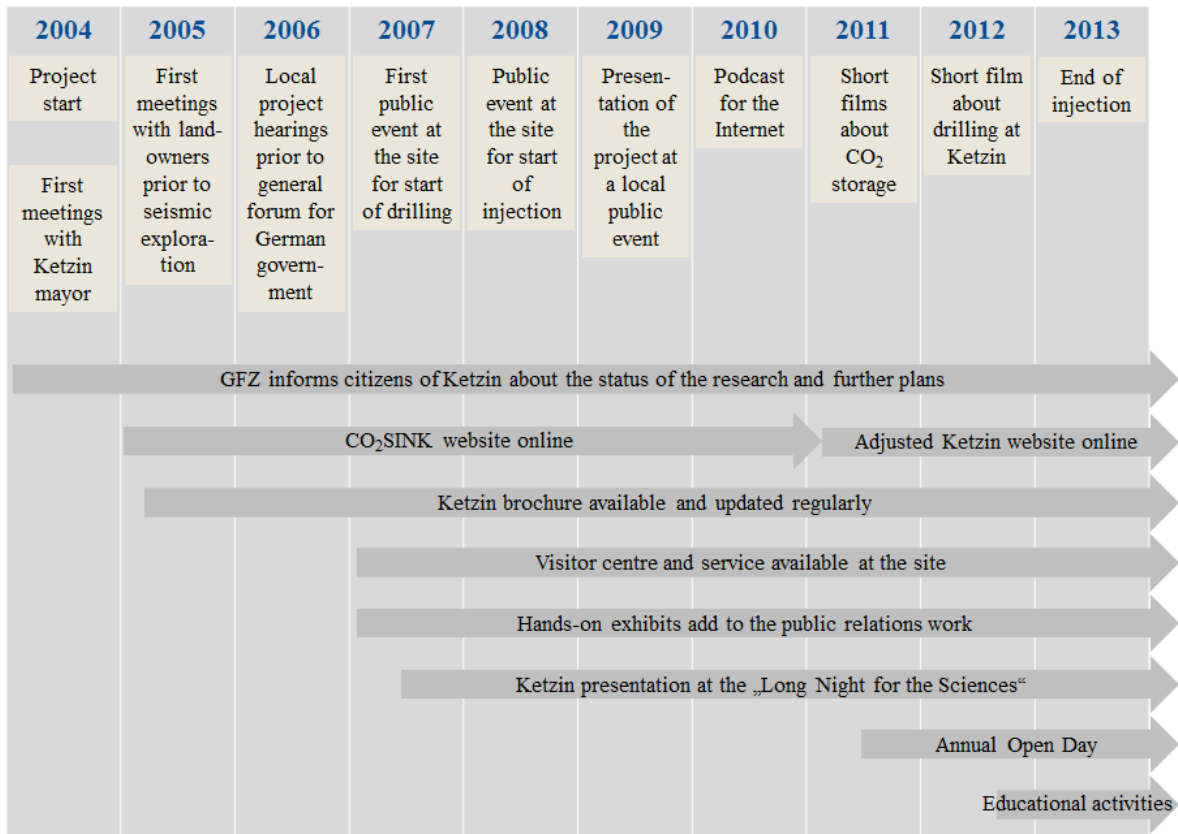


Fig. 1. Time line of public relations activities within the Ketzin project

mayor of Ketzin the potential usage of the site for CO₂ storage. At that point of time the former gas storage at Ketzin (town and natural gas was seasonally stored in a shallower sandstone reservoir from 1964 until 2000) had already been ceased.

The approval authority, the State Agency for Mining, Geology and Raw Materials (LBGR) of the State of Brandenburg was also involved earliest possible [15]. Clarification of the legal framework and the permitting procedures for CO₂ storage built confidence into the feasibility of the project.

Prior to the first seismic campaign within the initial project CO₂SINK in 2005, information about the research plans was provided to the involved landowners. Analogously, they were contacted prior to the seismic repeat measurements in 2009 and 2012. Simultaneously, the planned activities were announced in the local press.

General project hearings were held at the Ketzin town hall in May and September 2006, where the local population was informed about the project status and plans. It was only after this that a general forum was held in Berlin for key representatives of the German government and the media in October 2006.

Since then, the GFZ project management informs the Ketzin mayor on the current status of the research and further plans on a regular basis and reports to the town council once a year or if required. Several events at the Ketzin pilot site were also used to inform the local community and the general public about the project, e.g. the start of drilling in 2007 and the start of the CO₂ injection in 2008. At both occasions the local fire brigade supported the GFZ and provided food and drinks. The Ketzin project was also presented at local events, e.g. a harvest festival in 2009. In the course of the Ketzin project a continuous cooperation also evolved with the Ketzin tourist information. Since 2011, an annual open day is held at the Ketzin pilot site to keep the dialogue especially with the local residents. All these events are covered in the media in a positive to neutral manner.

Together with the communication and dissemination activities by GFZ, the fact that the research on CO₂ storage is feasible at the Ketzin site, probably also builds on and benefits from the former experiences with the storage operations of town and natural gas. Some inhabitants of Ketzin even worked on site in former times and are acquainted with the usage of the underground and its associated potential risks [16,17].

3.2 Visitor centre Ketzin

The visitor centre at the Ketzin pilot site is the most important contact point (Fig. 2). Since 2007, the centre is available and a visitor service is offered on a weekly basis. The building is made available by VGS. Initially, two small rooms were used to

exhibit the first information materials, e.g. posters, brochures, samples of reservoir rock, computer based displays of the injection process and a visual demonstrator of the CO₂ injection. In order to welcome larger visitor groups and more permanent exhibits the centre was expanded in 2011.



Fig. 2 The visitor centre at the Ketzin site and visitors, 2013

During a visit of the Ketzin pilot site, the guests are informed about the background, the activities and the results of the research work throughout a discourse. Here, the main focus lies on the monitoring and the modelling of the CO₂ distribution in the underground. The guided tour around the pilot site is perceived helpful in order to enhance the understanding and to visualise the dimensions of the Ketzin project. It also helps to create trust into the scientific equipment and technical facilities.

More than 2,100 visitors from all over the world have visited the pilot site within the CO₂MAN project from September 2010 to November 2013 (Fig. 3). Most of the visitors come from Germany (72%) and other European countries (15%). The GFZ research is especially attracting students and researchers (50%) from all over the world but also the general public is interested, making up 25% of the visitors. Besides the results of the experimental, monitoring and modelling activities, the gained experiences of the public outreach are also of growing interest.

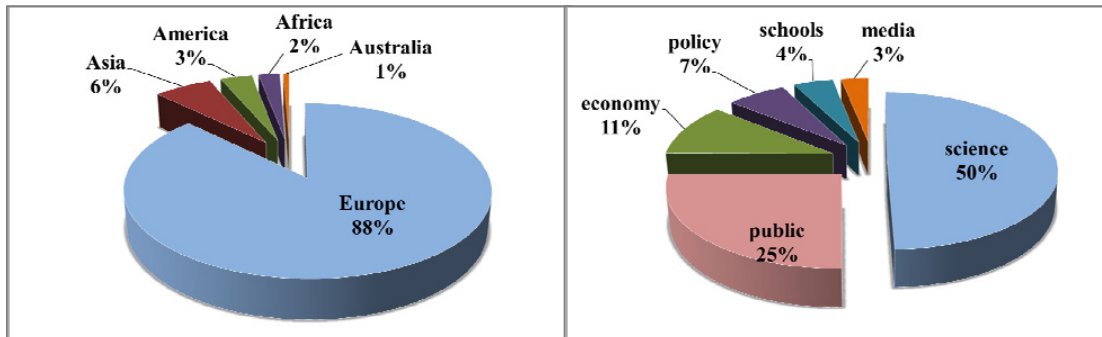


Fig. 3. Origin and background of the Ketzin visitors (September 2010 to November 2013)

3.3 Ketzin website

The first online information about the research project was available in October 2004 on a temporary website and on the IEAGHG's web based project database. The homepage of the initial CO₂SINK project was then released online in February 2005, however mainly in English. The web-based information forum www.co2ketzin.de was put online in German and English in 2011 (April and June, respectively, within the follow-up CO₂MAN project) to inform the interested public about the history and the current status of the Ketzin project. Therewith the former website was superseded. Additionally, more background information about the motivations of the research and CCS in general is available now. However, the main focus lies on presenting information about the on-going CO₂MAN project. Thus, the website includes descriptions of every research task, information about project partners, all Ketzin related publications, various information materials (e.g. brochures and films) and also frequently asked questions about the Ketzin pilot site and CO₂ storage in general. On the cover page we report about current research activities taking place at or in the vicinity of the pilot site (e.g. drilling or seismic campaigns) and about information events.

3.4 Educational and information activities

Since 2007, people are informed about the basic aspects of the Ketzin project at annual public events like the “Long Night for the Sciences” in Berlin and Potsdam where scientific institutes and universities are open for the public for one night. Besides interviews with the researchers, visitors have the possibility to inform themselves via posters, interactive exhibits, short films and hands-on experiments.

Since 2011, an annual open day at the pilot site presents the research on CO₂ storage at Ketzin. Visitors can learn about the current status of the research activities at a variety of information booths, during guided tours, presentations and



Fig. 4. Impressions of an annual open day at Ketzin; during guided tours (left) and scientific talks (right)

interactive exhibits (Fig. 4). As many researchers are available on that day, visitors have the chance to get first-hand information about the different monitoring techniques or the injection process, for example. The open day is carried out in close cooperation with the local community and is warmly received. We also include the local retail (e.g. musicians, bakery), the local fire brigade and the Ketzin tourist information help us with planning and realisation.

The public relations work has been expanded in 2012 by GFZ visiting schools and discussing with teachers and pupils on motivations, activities and results of the Ketzin project (Fig. 5). In order to appropriately present the project we use short films about the pilot site (see also chapter 3.5) besides a presentation which is adapted to the young listeners. With hands-on experiments the pupils can also experience different rock materials and their properties (reservoir and cap rock) and learn more about the gas carbon dioxide itself and the processes taking place in the underground during the storage.

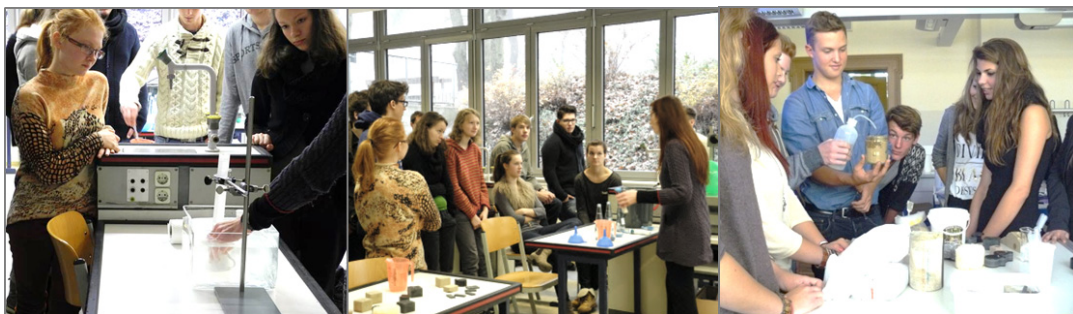


Fig. 5. GFZ staff teaches pupils about CO₂ storage and the research at the Ketzin pilot site

Additionally, presentations of the Ketzin project at public information events (e.g. initiative to enhance public perception of the science in Potsdam) complement the list of information activities.

3.5 Information material

A first project information brochure was available already in April 2005 and is updated on a regular basis in German and English. It introduces the reader to the setting of the Ketzin pilot site, to the motivation, the main objectives and the research results. The general GFZ information brochure includes a report on the Ketzin pilot site as well.

In 2010, a first podcast was produced by the German Helmholtz Association providing information about carbon capture and storage and the Ketzin project in German. This podcast added to other contributions in the internet, e.g. an English video on CCS from the year 2009 available on YouTube.

The Ketzin project is also presented in a broader context in a film entitled “The geological storage of CO₂” made up of seven five-minutes segments [18]. They were produced by GFZ in 2011/2012 and intend to enlighten the complexity of the topic. One of the short films gives an overview of the research on CO₂ storage at Ketzin. The latest film focuses on scientific drilling at the pilot site. As the fifth well (Ktzi 203) was drilled in summer 2012 we used this opportunity for a corresponding documentation. Therefore, the activities were accompanied by a film team and together with pictures from the drilling activities in 2011 (well P300) an introductory documentation arose. These short films are available on the website www.co2ketzin.de, on DVD and are also shown during our visits at schools, for example.

3.6 Experiments and exhibits

The hands-on experiments visualise and therefore intend to enhance the understanding of for example the trapping mechanisms that retain the CO₂ in the subsurface. One experiment was included for each mechanism (e.g. dissolution of a fizzy tablet in water while collecting the evolving gas demonstrates the gas solubility in water, Fig. 5). A further experiment was included to demonstrate the importance of rock porosity and permeability in the context of gas storage (Fig. 5, right). All these experiments are mobile and therefore, are used for school visits, the annual open day and at other general events.



Fig. 6. Physical model to experience different rock permeabilities (left), info terminal (middle) and CoreWall monitor array (right) demonstrating rock parameters during an open day at Ketzin

As the visitor centre on site is the main contact point a permanent exhibit on permeability [18] was set up in 2011. It introduces to rock properties and storage related processes by demonstrating the permeability of different rock types (e.g. sandstone - reservoir rock vs. claystone - cap rock (Fig. 6, left)) with respect to air.

A mobile computer terminal enables visitors to inform themselves easily and interactively [19]. This exhibit is mainly located at the visitor centre since 2011 but can be lent to museums, too. It comprises a monitor with a touch screen and a presentation in Kiosk mode (Fig. 6, middle). Both exhibits were taken over from the former CLEAN project (CLEAN: CO₂ Large-Scale Enhanced Gas Recovery in the Altmark Natural Gas Field, [19]).

In 2012, a further exhibit was added as an information tool. A mobile CoreWall (www.corewall.org) monitor array (Fig. 6, right) comprising four monitors and a core-mouse enables the user to visualise different information (pictures, densities, depths etc.) related to a rock core gained during drilling at the Ketzin pilot site.

4. Conclusion and outlook

First local public relations activities by GFZ started already in 2005, prior to any monitoring or drilling campaigns at the Ketzin pilot site. The outreach concept always focuses on personal, transparent and adequate information and communication. The distribution of factual information about the research motivation, objectives and the progress of the work at Ketzin is an important means through which the public can develop an independent and informed position.

The timely and continuous communication with the local residents results in a trusting ambiance in Ketzin, allowing the research on CO₂ storage e.g. large-scale seismic measurements, without severe restrictions. There are no local initiatives against the research project and no demonstrations.

Our activities are also reflected by a mainly positive media resonance, which in turn supports the feasibility of the research project and possibly helps to increase the public perception of CO₂ storage in Germany.

The close cooperation with the responsible mining authority allows the compliance with all legislation and a smooth project development.

CO₂ injection at Ketzin ended in August 2013. At public events and during guided tours on site, questions are raised related to the current status of CO₂ storage but also concerning the post-injection and closure phase at Ketzin. Therefore GFZ plans to continue its communication and information policy until the Ketzin pilot site will be finally closed.

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