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Message mapping for CCUS outreach: testing communications through focus group discussion

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Abstract

As part of ongoing efforts to improve public outreach related to carbon capture, utilization, and storage, the Outreach Working Group of the U.S. Department of Energy's Regional Carbon Sequestration Partnership Program explored the use of message mapping to facilitate effective communication. This paper describes the process undertaken to develop the message maps, the method for testing, and lessons learned thus far. The process of testing was found to be very helpful in developing a response that can be easily delivered by a project representative, shared among project communicators, and presented in language that is accessible to stakeholders.

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Keywords: CCUS; message mapping; outreach; public engagement; risk communication

1. Introduction

In 2003, the U.S. Department of Energy (DOE) began the Regional Carbon Sequestration Partnership (RCSP) Initiative. The initiative features partnerships that are assessing anthropogenic carbon dioxide (CO_2) sources, geology, and CO_2 transportation to determine the opportunities for carbon capture, utilization, and storage (CCUS) in their regions of the United States and Canada. Effective communication with partnership members as well as the general public is seen as important to the success of the effort, and each DOE RCSP has a dedicated outreach coordinator. These outreach personnel formed an Outreach Working Group (OWG) to help identify stakeholder segments, explore their concerns, and review different communication methods. This paper describes the OWG's interest in message mapping work, how it has been used thus far, and lessons from a preliminary application to the topic of CCUS and earthquakes.

1.1. CCUS communication challenges

Although familiar to a core group of technicians and regulators and experienced locally by a handful of communities, the combination of components that make up the practices of CCUS using anthropogenic CO_2 is relatively new to the technical and regulatory communities as well as to the general public. This underscores several specific challenges for CCUS communication to the general public, including the following:

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- Project voice: For obvious reasons, project teams mainly comprise people with scientific and engineering expertise and not necessarily people skilled and experienced in public communication.
- Stakeholder perception of risk: Few stakeholders are familiar with CCUS or have more than a basic knowledge of the underlying science and, therefore, often perceive risk differently than technical experts [1–3].
- Communications timing: Careful site screening and characterization are very important in reducing the potential risk of a CCUS project [4]. However, because the activities during this stage are visible, public engagement needs to begin well before site characterization has been completed. As a result, stakeholders in a community are likely to be introduced to CCUS at a stage when there is uncertainty about the project's fate and the ultimate suitability of a site—when the project team does not yet have adequate answers about site characteristics. This challenge can be even greater for greenfield sites where the stakeholders and the community have little experience with the equipment, activities, and surface structures that are required for assessing and implementing CCUS projects.
- Competing CCUS messages: The CCUS community is not a monolith. Information may be available to stakeholders from different groups of developers and may address conditions that differ between projects and areas (e.g., CCUS involving enhanced oil recovery, CCUS for storage only).

Risk communication literature suggests that in cases like this, project success is often a factor of the team's ability to build trust and relationships with stakeholders. This requires open and honest communication that is initiated early in the life of a project. Communications should be easy to understand and reflect the concerns of stakeholders [5–6]. The DOE RCSPs applied these principles in the verification tests to date and are striving to apply them in their ongoing demonstration projects. The experience and the preliminary lessons learned through outreach activities in DOE RCSP Phase II Validation Phase tests were summarized in a "Best Practices" report [7]. Since then, the OWG has continued to explore methods to improve its response to CCUS communication challenges, and that exploration has led the group to test the use of message maps.

1.2. The value of message maps in addressing CCUS communications

Message maps provide a framework for identifying, developing and organizing key messages and then recalling and delivering those messages [8]. A common form of a message map is a hub-and-spoke diagram in which the key messages and supporting points are portrayed in relation to each other. This image becomes a mental prompt for the user (reminiscent of memory training employed in the ancient world where images representing information would be placed in an orderly set of architectural backgrounds) [9]. Another form of message map is a table of key messages and supporting points. Both types of maps accommodate a breadth of topics and levels of detail.

The process of developing message maps imposes a structured framework for thinking about stakeholders, their concerns, and how your project impacts them. Covello identifies eight outcomes that arise from a diligent message mapping effort. They include 1) stakeholder identification, 2) anticipation of stakeholder concerns, 3) evaluation of the project and its potential impacts 4) development of clear and transparent messages to address those concerns, 5) the vetting of those messages both within and outside the project team, 6) guidance for project spokespeople, 7) creation of a set of sharable messages, and 8) the facilitation of consistent messaging [8].

Fairly detailed maps are useful in developing deliberative communications such as presentations, frequently asked questions, proposals, fact sheets, and other similar communications that are prepared in advance of use. Maps that are shorter and written in a speaking style are useful in preparing for and responding to a live audience such as at a public meeting or in talking with the media.

In the fall of 2011, the OWG conducted a workshop to develop a series of message maps focused on the benefits of CCUS projects. The resulting maps were based on the central idea that CCUS projects provided direct and indirect benefits to society through the investment of resources and increased scientific experience and in addressing emissions and other environmental impacts [10]. Each DOE RCSP can utilize the maps as it sees fit, including adding specific details that relate to its projects and regions. These "program benefit" maps are helpful in addressing the stakeholder concern of "why do CCUS?" but these maps are not helpful in responding to some of the common questions that have arisen—particularly relating to project-level safety and quality of life. For example:

- Could a CCUS project cause earthquakes?
- Could the presence of a CCUS project devalue my property?

- Could a CCUS project contaminate drinking water?
- Could stored CO_2 leak at the surface and cause sickness or death?

These questions are underlain by emotion. Message mapping was developed to help give clear and concise information in a crisis where emotions are high [11]. For this reason, the OWG decided to test message mapping in an attempt to improve responses to these emotion-laden questions by the public in CCUS forums. The OWG chose the topic of CCUS and earthquakes because of recent reports in the media suggesting a link between earthquakes and oil and gas activities [12–14]. The message map was intended to serve the needs of a nontechnical audience, and the messages were intended to be used in a group setting, in a written setting, or during an interview.

2. Methodology

The different approaches to message map development share several steps [8, 11, 15]:

1. Identify potential stakeholders
2. Identify potential stakeholder questions
3. Analyze questions to identify common sets of concerns
4. Develop key messages
5. Develop supporting facts
6. Test and practice messages
7. Deliver maps through appropriate information channels

In considering this situation involving CCUS and earthquakes, the OWG determined that it was entering the process at Step 3. The OWG has done extensive work to identify different stakeholder segments and has experience with communications activities with these segments during outreach for verification tests and ongoing outreach related to demonstrations and through interaction with educators, decision makers, and the general public. Throughout this experience, the OWG identified concerns about earthquakes as a commonly asked question and among the more emotion-laden concerns. As a result, the OWG focused on developing fact-based messages for testing in an appropriate setting. The OWG decided to test the map by mimicking a situation where a presentation is being given to a group of general stakeholders and a “more difficult question” arises—in this case, the question is based on a concern about the potential for a CCUS project to trigger an earthquake.

In developing the messages and the map, the OWG drew guidance from a report developed jointly by the U.S. Environmental Protection Agency, the U.S. Department of Homeland Security, and the Center for Risk Communication that focused on the use of message maps for use in crisis communication related to drinking water contamination events [11]. The report shared results of a media study indicating that “the average length of a sound bite in the print media is 27 words. The average duration of a sound bite in the broadcast media is nine seconds. The average number of messages reported in both the print and broadcast media is three. And, quotes most likely to be used as sound bites contained compassion, conviction, and optimism.” This assessment was the basis for a 27-word/9-second/3-message template that served as the guide for the CCUS message map research. At issue was whether this approach would prove to be useful in communications with general stakeholders.

2.1. Formulating the question

Developing the question to serve as the basis for the message map required the OWG to consider the stakeholder perspective: Is the main concern about the creation of any seismic energy or just about the potential for that energy to be felt at the surface and cause damage? The formulation of the question had an influence on the tone and path of the response. At least two maps were developed initially, one in response the question: “Will your CCUS project cause a damaging earthquake in my community?” And the second in response to the question: “Will CCUS cause earthquakes?” The first question raises the issues of accountability and trust as well as general safety. Ultimately, the group settled on the formulation in the second question.

2.2. Developing the messages

We found that it took significant discipline to formulate a technically correct, easy-to-understand, 27-word answer to the question: Will CCUS cause earthquakes? The exercise forces one to consider the most important points as well as conversational ways to convey them. The OWG developed several iterations and edits of the message map included in the appendix. The rationale for using such a short and rigid framework for a response is supported by studies indicating the challenge for the human brain in processing large amounts of new information, particularly where strong emotion is involved [16].

In developing the messages, the OWG considered terminology and information from experts as well as terminology and information that is publicly available to a stakeholder. Draft message maps were circulated to all members of the OWG as well as technical experts within the DOE RCSP program. Some of the suggested edits underscore the difficulty in adhering to the 27/9/3 guideline [8, 11]: in one case each of the three bullets was modified to a length that was greater than 27 words. One method for editing involved using role-play and saying a response out loud. A response based on the final map has been timed at 10 seconds for messages and 15 seconds for a response that draws on at least two supporting points for each message.

In addition, the OWG consulted the U.S. Geological Survey (USGS) public Web site dedicated to earthquake information [17]. This was a useful exercise in deciding to use the term “earthquake” as opposed to “seismicity” or “seismic activity.” It also led the OWG to adopt the terms “microearthquake” and “felt earthquake,” with the former being found on the USGS Web site and the latter being introduced based on work in the academic field.

2.3. Testing the Message

At the time of this paper, the OWG is in the process of testing and refining the message map on the topic of CCUS and earthquakes (i.e., at Step 6 in the overall message mapping process). To date, preliminary testing has been conducted through the implementation of two focus group discussions. Both discussions were conducted in the same community but one featured a resident focus group (i.e., involved randomly selected residents) and the second involved a student focus group (i.e., university graduate students enrolled in a Science, Technology, and Society course). The materials used in these initial focus groups, including the question, intended audience, type of spokesperson, and key messages and supporting points, are included as an appendix to this paper following the References section.

The OWG selected a community for the resident focus group (not students) that it hoped would provide an informed and candid opinion about the messaging and the process of message testing. The community had the following characteristics:

- Its convenience helped to minimize overall cost
- There are no known CCUS projects located in or nearby
- Proximity to coal and shale gas resources
- Proximity to national and state parks
- Midsize community with a stable population of about 45,000 and other demographic statistics (average income, home ownership rate) that are close to national averages.
- Proximity to epicenter of a 5.8-magnitude earthquake in 2011 that led to roughly 6000 reported incidents of damage in the area.

The participants in the resident focus group were recruited from the names listed in the local telephone book. Calls were primarily made during the early evening hours. Roughly 400 calls were made to recruit a resident focus group of 10 participants. The majority of calls were simply not completed; presumably no one was home or accepting calls. Of the calls that connected, about half of the people did not want to participate or discuss the focus group. Of the others, many were quite interested in participating but either had limited ability to attend an evening session or a conflict during the scheduled session. The participants in the student focus group were recruited through a professor.

3. Preliminary findings and discussion

3.1. Challenges and value of formulating variants of question

In retrospect, the apparent nuances between the two versions of the question considered for the basis of the message map proved to be unimportant because the focus groups took it upon themselves to test variants of the question as a means of assessing their response. In offering suggestions for improving the response, several participants suggested rephrasing the question so that it focused on the potential negative impact (i.e., the likelihood of damage), rather than the general one (i.e., the potential to create any earthquakes including microearthquakes). This provided an opportunity to grapple with the tension created by the tendency for scientists to be technically correct and for stakeholders to seek yes/no answers.

3.2. Challenges and value of developing message maps that stick to guidelines

Using the short format (e.g., the 27/9/3 template) proved useful in considering and modifying the messages. The edits suggested by the participants were specific and highlighted the potential for multiple interpretations of key words and phrases by audience members. Our sensitivity to terms resulting from the level of effort in the original composition process made it easier to appreciate and explore the points raised by the focus group participants during the session.

3.3. Challenges and value of testing

Some of the lessons from this preliminary test of the message map on the topic of CCUS and earthquakes include the following:

- We felt that going first to a community without any CCUS projects proved to be a license for very candid discussion. The participants seemed to feel free to identify with the perspective of both a project community resident and a project communicator. The moderators felt free to ask questions about people's feelings and perceptions of the messaging. This encouraged discussion about the appropriate topics, level of information, and its presentation.
- The participants wanted to understand the potential impacts in a detailed and straightforward way. This led to some constructive discussion of risk and uncertainty that, in the end, seemed to leave participants more comfortable with the technology. This is borne out by their written responses to a quick before-and-after survey, and it was borne out by their body language and the ease of discussion in the room by the end of the session.
- The participants wanted to know the moderators' personal reasons for being involved in this technology area. One person effectively said that they needed to hear this information before they could really listen to us. Another said they didn't care if our reason was to address climate or to pursue technical excellence, they just needed to understand our personal stories. One person commented that the tenor of the room changed after such personal statements were (almost inadvertently) made by the moderators during the question-and-answer discussion. We felt that this introduces and confirms the role of a personal connection to improve the audience's ability to really listen to the moderators' statements, as well as improving the ability of the moderator to connect effectively with the audience. Further, we feel this supports the notion that establishing a connection with the audience should be given equal weight with perfecting the content of the messages.
- There is no substitute for live sessions with surrogate audiences to test the organization, wording, and delivery of message map materials.

3.4. Next steps and how they might be used within a project

The focus groups provided useful suggestions for improving the content and the delivery of information on the topic of CCUS and earthquakes. These changes will be incorporated into a second iteration of a message map and further tested. Ultimately, the materials developed from the testing could be the basis of message maps utilized by program or project staff as well as the basis for staff communication training. The approach could also be used in refining messages to aid in discussion of project components or issues of safety and quality of life.

4. Conclusion

The intent of DOE RCSP CCUS outreach is to create an environment where the questions "Why are we doing CCUS?," "How does it work?," and "How might it affect us?" can be constructively discussed with stakeholders. The OWG is finding message mapping to be an approach with significant promise for helping to create this environment. Message mapping is useful in providing a framework and process for the collaboration of technical and communication personnel in articulating key messages and supporting points to form a cohesive set of statements. Subsequent real-world testing and message refinement adds value by both improving the communication materials and the ability of the project team members to effectively use these materials in engaging the public.

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Disclaimer

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Appendix: draft message map used in first round of focus groups

The following message map was developed in anticipation of receiving a question at a public meeting in which a general 10–15 minute overview of CCUS is presented. This set of three highlighted messages was developed using the 27 word/9 second/3 message guidance [1,2]. Speaking a highlighted message with two supporting points requires approximately 15 seconds as discussed in Section 2.2.

Question: **Will CCUS cause earthquakes?**
– Audience: general public – Spokesperson: trained project member
As injected CO_2 settles into pore spaces, the rock adjusts creating very small vibrations called microearthquakes: • A microearthquake is very small. It can be measured with sensitive equipment but cannot be felt. • This process is much like the effect of a house settling and creaking when the seasons change, but it takes place deep underground. • Each year, the U.S. Geological Survey (USGS) measures about one million three hundred thousand microearthquakes around the world caused by natural and manmade activities.
We select stable rock formations for CCUS projects. • Felt earthquakes occur when there is an abrupt shift of rock along a fracture in the earth (called a fault), which releases the energy that has built up along the fault. • USGS maps faults throughout the country. The project team will use these maps and consult with expert geologists on the probability for felt earthquakes and ground motion based on faulting, earthquake history, and rock types. • The project team will conduct detailed surveys in the local area to determine if there is any faulting of concern and to confirm safe formations for CO_2 storage.
We use proven—and regulated—controls to ensure CCUS project safety. • Well-established tests are used to determine the pressure, amount, and rate of CO_2 injection that a rock formation can take. The injection plan will be based on these measurements to ensure that pressure changes do not trigger earthquakes. • Federal and/or state permits are the vehicles for setting enforceable requirements for CO_2 injection, monitoring, and reporting. This monitoring includes surface monitoring, monitoring in the wellbore, and monitoring the rock formation pressure during injection. • CCUS projects are also designed to prevent CO_2 leakage for any reason, including felt earthquakes. Injection wells are cemented into place with steel casing and automatically shut down in the event of a break in injection tubing.

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