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Social Site Characterisation for CO_2 storage operations to inform public engagement in Poland and Scotland.

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Abstract

Public support has proven crucial to the implementation of CO_2 capture and storage (CCS) demonstration projects. Whereas no method exists to guarantee local public acceptability of any project, a constructive stakeholder engagement process does increase the likelihood thereof. Social site characterisation can be used as an instrument to plan and evaluate an approach for actively engaging local stakeholders. Social site characterisation is the process of repeatedly investigating local public awareness and opinions of a specific CCS project, changes therein over time, and underlying factors shaping public opinion as a parallel activity to technical site characterization. This paper presents results from the EU FP7 SiteChar project in which social site characterisation (a.o. surveys) and public participation activities (focus conferences) were conducted by a multidisciplinary team at two prospective CCS sites in in Poland (onshore) and Scotland (offshore). Results demonstrate that social site characterization and focus conferences are powerful tools to raise public awareness about complex issues such as CCS and to initiate local discussion and planning processes with the appropriate type of information, through appropriate media, and involving all relevant stakeholders. Application and the duration of effects in real-life project settings will be discussed.

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1. Introduction

At the local level public support has proven crucial to the implementation of CO_2 capture and storage (CCS) demonstration projects, as recently demonstrated by the public's reaction to CCS projects in amongst others the Netherlands [1], Germany [2], and Poland [3]. Although there are also examples in which local demonstrations received public support or have at least not been rejected, such as the Lacq project in France [4], the experiences emphasize that if local CCS projects are to take off the public should be consulted and involved in decision-making about prospective CCS projects. Whereas no method exists to guarantee public acceptability of any project, a constructive stakeholder and citizen's participation process does increase the likelihood thereof.

Social site characterisation is the process of investigating and monitoring the local social circumstances in the area, changes therein over time, and underlying factors shaping public awareness and public opinion as a parallel activity to technical site characterisation [5,6]. It can also be used to design, plan, and evaluate a process of active and constructive local stakeholder and citizen engagement with the aims of building trust, raising public awareness, and informing public opinion. Similar to other aspects of site characterization [7], social site characterization is site-specific. Although there are general 'best practice' approaches which clearly describe the steps to follow [see for example 8-12 as well as comparative reviews of approaches in 3,13], the implementation of each step should be tailored to the area in question and to the needs of the participants in the process.

This paper presents results from the SiteChar† project in which social site characterisation and public participation activities were conducted by a multidisciplinary team at two prospective CCS sites: an onshore site and an offshore site. The onshore site is the Załęcze & Żuchlów site in Poland and the offshore site is the North Sea Moray Firth site in Scotland, for which the research focused on the communities in Morayshire. Both sites are largely rural with a few major towns. Presently it is unclear if and when CO2 injection will happen at either of these sites. The research approach has been kept identical as much as possible for both sites to enable cross-country comparisons of the results.

The paper is divided in two parts. The first part reports on the analytical phase of the social site characterisation using qualitative as well as quantitative research methods, as a first step to planning of local public engagement activities [14]. In the second part the authors describe the design of the 'focus conference' public participation method [15] which aimed to raise public awareness and assist public opinion forming on CCS as well as to initiate an enhanced cooperation in planning of new storage sites between site operators, competent authorities, and the local public.

The activities described in this paper are part of a range of research and public participation activities including the setup of public information web pages and information meetings. A second survey will evaluate the results of the public engagement activities. Results are expected mid-2013.

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† http://www.sitechar-co2.eu/

2. Social Site Characterisation

To enable effective public engagement, key to social site characterisation is collecting information to answer two questions: (1) who are the stakeholders or interested parties? And (2) what factors drive their perceptions of and attitudes towards CCS? To collect reliable information to answer these questions, the authors used a set of complementary qualitative and quantitative methods:

- Desk research into key historical, social, geographical, economic, industrial, and political characteristics of the site;
- Interviews with local stakeholders to inform them about and involve them in the SiteChar project and record their questions, needs, concerns, and recommendations for local public participation;
- Media analysis of local newspapers to investigate the frequency and tone of media coverage of CCS in the region, e.g. arguments pro and con CCS;
- Surveys using representative samples to characterise the local population in terms of awareness and opinions of CCS as well as present perceptions of the area, local needs, and trusted stakeholders.

The use of a combination of qualitative and quantitative social research techniques require a great amount of effort, time, and expertise. At the same time, the use of a set of complementary methods for obtaining a 'social map' of the area produces the most reliable, consistent, and detailed lessons regarding effective public engagement strategies. Together they provide a full, detailed description of the area and minimize the chance that important issues are overlooked. Furthermore the use of multiple methods enables verification of results against each other, which makes findings more robust and thus a more reliable base for developing public participation strategies. Since there is no room in this paper to address each of the methods in-depth, we will focus on the method and results of the survey as a quantitative method for obtaining reliable data about the local population. For a full description of the methods as well as results and implications we refer to SiteChar Deliverable D8.1 [15].

2.1. Survey – Method

To obtain quantitative information about local awareness and perceptions of CCS, surveys were conducted in both Poland and Scotland by market research firms among a representative sample of the local population (N = 1000 in Poland, N = 850 in Scotland), in the period May-June 2011. The present survey took the shape of a telephone interview about satisfaction with the local area. The interviewer would introduce the research as a 15-minutes interview about 'life in your local area' whereby local area was defined to the respondents as 'the area within about 20 miles or 20 minutes driving from your home'.

Apart from local plans for CCS, two other local issues were included in the questionnaire. Data from the desk research, interviews and media analyses were used to identify issues that are or may become a source of local tension or controversy, may impact people's satisfaction with their living environment, and may transfer to feelings about yet other issues such as CCS. At both sites we identified one 'high-profile' development which had given rise to local discussion and media attention, and one 'low-profile' development which was still in an early stage and had not (yet) been a topic of much debate. In Poland, the 'high-profile' issue was the construction of a ring road in one of the districts and the 'low-profile' issue was the construction of a wind farm. In Scotland, the 'high-profile' issue was the possible closure of a local Royal Air Force base (RAF) that employed many people in the region and the 'low-profile' issue was the possible creation of a Marine Protection Area.

The survey addressed the following topics in the order listed here: Satisfaction with local area; Attachment to local area; Issues facing the area; Issue I (CCS); Issue II (high profile); Issue III (low profile); Perceived involvement in decision making; Extent of local activism; Trusted representatives and

organisations; Preferred information sources; Personal information (e.g. occupation). The issue of CCS was always mentioned first, thus evaluations of other issues could not influence thoughts about CCS. The high-profile issue was mentioned second and the low-profile issue was mentioned last. The reason for placing the high-profile issue second was that questions about this issue are relatively easy for respondents to answer, thereby balancing difficult and easy questions across the survey which improves the validity of responses [16, 17]. For each issue the interviewer asked similar questions, but here we will focus on the questions about CCS.

First, all respondents were asked how much, if anything, before the interview, they knew about local plans for CCS (N = 1,000 in Poland; N = 850 in Scotland). Second, only those respondents who had at least heard about plans for CCS (n = 145 in Poland; n = 389 in Scotland) were asked what exactly they had heard about the plans. These were open-ended questions allowing for multiple answers which were categorized afterwards. Third, they were asked whether, overall, they think it would have a positive or negative impact on their local area. The fourth question depended on the answer given to the third question. If respondents indicated they expected a negative impact (n = 29 in Poland; n = 50 in Scotland) or positive impact (n = 89 in Poland; n =237 in Scotland, they were asked to specify why. If respondents expected no impact at all or did not know (n = 27 in Poland; n = 102 In Scotland) , no further questions were asked. Finally, to obtain an extra measurement of awareness of CCS in general, all respondents (N = 1,000 in Poland; N = 850 in Scotland) were asked how much, if anything, they knew about CCS in general before the interview.

The technique of surveying people on satisfaction with their local area in general has a couple of advantages. Firstly, it allows for survey research early in the process of project development without giving rise to premature concerns about the technology within the community. Secondly, by collecting information about local issues and satisfaction with the area in general, the project team got a much richer picture of how the community views itself, what residents find important, what they identify themselves with, etcetera. This is valuable information since people are likely to evaluate CCS in the context of other ongoing local issues. The technique of asking people for their opinion on issues only when they indicate to have at least heard of it, and subsequently only asking to specify their opinion if they have one, works extremely well for obtaining reliable measures of awareness, knowledge and perceptions of issues as it carefully avoids to force people to state an opinion about something they have never heard of and/or have no positive or negative feeling about.

2.2. Survey - results

Issues facing the area. As expected, neither CCS nor climate change are priority issues to the local communities. Unemployment is mentioned as the major issue of concern by 47% of the 1000 respondents in Poland, followed by lack of (public) transport (38%). Unemployment is mentioned as the major issue of concern by 39% of the 850 respondents in Scotland, followed by the possible closure of the local RAF (21%), and lack of facilities and opportunities for the young (20%). Climate change is not among the main issues of concern. In Poland it ranks as the 6^{th} issue, mentioned by 6% of the respondents, and in Scotland it ranks 11^{th}, mentioned by 2% of the respondents.

Awareness of CCS. Of the Polish participants, 27% reported to have heard of CCS in general and 15% reported to have heard of local CCS. Of the Scottish respondents, 57% reported to have heard of CCS in general and 46% reported to have heard of local CCS. These percentages show that awareness of CCS is much lower in Poland than in Scotland.

Knowledge of CCS. When asked what they had heard about plans for CCS, of the Polish respondents who had heard of CCS 25% answered ‘just that it’s going to happen’, 9% answered ‘to stop CO_2 going into the atmosphere, and almost 8% thought CO_2 storage is related to waste dump. Of the Scottish

respondents who had heard of CCS 50% answered either 'just that it's going to happen' or 'just that they are looking into it', 6% answered 'to stop CO_2 going into the atmosphere' and 9% mentioned that the CO_2 will be 'injected in empty oil and gas fields'.

Expectations of CCS. Of the Polish respondents who have heard of CCS, 61% think that a CCS project would have a slight to very positive impact on the region and 20% think that a CCS project would have a slight to very negative impact on the region. The remaining 19% either does not expect positive or negative impacts or does not know. Of the group expecting positive impacts, 53% think that CCS will be better for the environment, 18% think it may reduce toxic waste, and 9% think it may help stop climate change. Of the group expecting negative impacts, 69% think it will be bad for the environment, 11% think it may escape to the surface and suffocate people, and 9% thinks it may escape to the ground water.

Of the Scottish respondents who have heard of CCS, 61% think that a CCS project would have a slight to very positive impact on the region and 13% think that a CCS project would have a slight to very negative impact on the region. The remaining 26% either does not expect positive or negative impacts or does not know. Of the group expecting positive impacts, 69% reports jobs as main positive outcome, 25% think it will be better for the environment, and 21% think it will improve the local economy. Of the group expecting negative impacts, 30% mention that it will be bad for marine life/environment and 15% mention it will be bad for fishing.

Preferred communication channels. At both sites, the internet is the most preferred medium. Of the Polish respondents, 49% list the internet as their preferred information medium. Other trusted media are national and local newspapers (15-25%) and the local radio station (14%). Among the Scottish respondents the internet is the most preferred medium of 42%, followed by the local newspaper Press & Journal (22%), local councillors (22%) and national or local government (21%). Next to these sources of information, in both countries some respondents say they get their information also from family, friends, neighbours and other people in the community (7% in Poland and 5% in Scotland).

Trusted individuals and organisations. Of the Polish respondents, 23% say they trust no one to represent their interests in decisions affecting their local area and 20% say they do not know. The most trusted are the community council (18%), community authorities (7%) and the elected head of the respondent's village (7%). Of the Scottish respondents, 23% say that they trust no one to represent their interests in decisions affecting their local area and 25% say they do not know. The Scottish National Party (SNP) is mentioned most often as a trusted source, by 7% of the respondents.

3. Focus Conferences

3.1. Focus Conferences – Method

The objective of the present study is to apply and evaluate a newly developed participation method called the "focus conference" which combines some effective elements from the already existing repertoire of other public participation methods [see for example 18-22] such as focus groups [23, 24], the Large Group Process [25], deliberative polling [26], consensus conferences [27], and citizen's juries [28]. This participation tool was developed by the Independent Institute for Environmental Issues (UfU) and together with the organizations authoring this paper, this is the first time that the focus conference method is applied and evaluated in the current form.

The aim of the focus conferences was to present and test a format in which project operators, authorities, and the local public could enhance their cooperation in project planning. As such, focus conferences aim to serve as a "hinge" between social site characterisation as a research effort and as applied to real-life project settings. Therefore, the aim was to have prospective site operators and competent authorities take part in the discussion. At the Polish site the operator will be PGNiG, who

therefore presented the industry perspective at the Polish Focus Conference. The presence of the project developer as well as the site being onshore and easy to locate made it possible in Poland to have a realistic discussion about possible local application of CCS. In Scotland, the operator is yet unknown and the site is offshore. Therefore, the discussion focused more strongly on national deployment on CCS. A Shell representative was found willing to present the general industry view on CCS and a representative from the Scottish Government was present to explain the national policy view on CCS.

The focus conference method structures the participation process in two weekends with one month between the weekends. In the setup of the focus conference particular emphasis is given to providing knowledge, giving space for open discussions, allowing each participant to gain their own experiences and creating opportunities to compare their own opinion with the opinion of others during as well as between the weekends. The focus conferences on CCS for the SiteChar project took place on two weekends in March and April 2012. A group of 11 (Scotland) and 16 (Poland) participants recruited from the local public gathered on two weekends to be informed about CCS technology, to discuss their perceptions of the rewards and risks of CCS technology, and to state their conditions for acceptable implementation of CCS projects. The same group participated in both weekends. Respondents were recruited by a market research firm and we aimed for a representative sample as much as possible by taking into account several socio-demographic criteria (age, gender, social and labour market position). Participants received financial compensation for travel, were provided with food and lodging and received an allowance.

During the weekends the participants had the opportunity to learn the scientific, technical and social aspects of CCS technology and to learn different points of view on CCS technology. Time was taken to create trust in the neutrality of the organizers, to create a safe environment in which participants did not feel inhibited to express themselves, and to select the speakers and discussion materials, ensuring that all key perspectives on CSC were represented and the discussion would be balanced. To this end, experts from research, politics, industry and NGOs were invited to participate in both weekends, during which they gave presentations and answered questions from the participants. This process resulted in a positioning paper written by the participants representing a statement on CCS technology from their perspective, which they wrote during the last weekend of the conference.

3.2. Focus Conferences – Results

Reflections on the process of the focus conferences and their application to real-life project settings can be found in paragraph 4. Here we summarize the key messages from the focus conference participants. However, interested readers are strongly encouraged to read the citizens' own (more elaborate) wording of the issues. The positioning papers can be found in D8.2 of SiteChar [15].

In Scotland, the participants' most important condition for acceptable deployment of CCS seemed to be that if CCS is at all worth pursuing, it should only be developed as part of a suite of options to combat climate change. More specifically, most of them think that CCS should be developed on a parallel track with renewable energies. In Poland, the majority of the participants agreed that there are too many open questions regarding risks, benefits to the region, costs, and the position of the government. In all, the Polish participants think that at present CCS is generally too costly to invest in and that locally there are too many uncertainties to justify a project that lacks a clear local benefit. On balance, of the Scottish participants, 5 want CCS along with other measures; 3 are undecided as to whether they want CCS; 2 don't want CCS but prefer other measures; 1 abstained from voting. Of the Polish participants, 11 think that there are at present too many uncertainties to opt for CCS. The other 5 participants are against the application of CCS in the gas fields in their area, Załęcze and Żuchlów. Key messages from both groups are summarized below.

1. Agreeing that climate change happens and that measures should be taken does not imply agreement on CCS as a suitable method to curb climate change. Although eventually climate change is the only justification for CCS, the technology has other short-term and mid-term benefits that could be significant for implementation. Both groups mentioned that if CCS is to be effective against climate change, it is not enough to introduce this technology only in Scotland or in Poland. Its application should be worldwide.

2. Acceptability of CCS is related to other measures to combat climate change. Both groups in majority agreed that they preferred other measures to combat climate change than CCS. Furthermore, albeit more explicitly in the Scottish than in the Polish group, both agreed that if CCS is used it should be a short-term solution implemented along with an exit strategy as to not divert attention from other options which are perceived to be more sustainable in the long-term such as renewable energy.

3. Pay attention to national and local advantages and disadvantages. On a national level there may be benefits such as the further use of coal, which is the main argument in Poland, or the country taking a leading role in developing the technology, which was raised as an opportunity in both groups. The Polish participants mentioned that the introduction of the technology could lead to increased influence of Poland on the European policy for climate protection. However they could also think of international downsides such as becoming a "garbage dump" for European CO_2 emissions. To the Polish group, therefore, one of the conditions for accepting a local CCS project was that only CO_2 produced in the region would be stored. In contrast, Scottish participants discussed a possible role for Scotland as a main store of imported CO_2. Nationally as well as locally, employment can be an issue. Attention should also be paid to possible local disadvantages. In Poland, location of the storage site raises concerns with the participants about possible loss of value of surrounding real estate.

4. Pay attention to risks and uncertainties. Regarding the acceptability of risk, both groups discussed the 'unknowns' of CCS and the reliability of information on risks. Among the Polish group, the acceptability of risks gained weight in the discussion when it became clear that a CCS project would have little if any direct benefits to the region. Along with the costs of CCS, the presence of too many uncertainties was the main reason for the Polish participants not to opt for CCS.

5. National and European governments should clarify their role/position. The participants were explicit in their view on the role of National governments and the European government in developing a vision and stimulating public involvement in decision-making on solutions to climate change. The Scottish participants stated that if CCS is to be developed further, they would like to see a variety of regulations or conditions to the development. The government is not entirely trusted on viewing CCS as part of a long-term strategy for curbing climate change instead of being just a "quick fix" to get them out of the problem of needing deep carbon cuts to meet Government targets. Regarding the regulation of safety, both groups stated that it should be made clear with whom the responsibility for the project lies. The Polish participants mentioned that the government should financially support the development of CCS and generally should provide clear legislation on CCS.

6. Citizens expect public communication and participation activities. Both groups agree that for effective public engagement, information campaigns on CCS are needed. Moreover both groups mentioned that the public should not just be informed about CCS, but also about alternative solutions to reduce CO_2 emissions into the atmosphere such as renewable energy. The Polish participants proposed a referendum to let the citizens decide if their want a project in the area or not. The Scottish participants recommended public engagement to be built-in to project development from the start, not just for CCS but also for other low carbon technologies.

4. Discussion

This paper presents results from the SiteChar project in which social site characterisation and public participation activities were conducted at two prospective CCS sites in Poland and Scotland. Social site characterisation and focus conferences can provide insight in the way local CCS plans will be perceived by the local stakeholders, which can be quite different across countries and even within countries across sites. The results can be used to start up the process of information provision (draft a FAQ page, address misconceptions, manage expectations, etcetera) and public engagement (involve stakeholders, select proper location and format, etcetera). Regarding the content of communication, findings underline the importance of transparency in information provision, the need to discuss CCS in the context of climate change and mitigation options, the need for expectations management, information needed to fill knowledge gaps, and the need for an open dialogue about the risks of CCS, particularly CO_2 leakage. Regarding the process of project development, these findings show which stakeholders to involve and which communication channels to use.

This paper introduced two new techniques for obtaining public responses to project plans for CCS technology. First, the surveying technique presented in this paper shows that reliable measures of public awareness and thoughts about project plans can be obtained, without worrying people up front that something in their area may happen and without encouraging them to develop opinions that have no base in awareness or knowledge of any plans. Second, the focus conference method is suitable for raising public awareness and to assist public opinion formation about complex issues such as CCS. Moreover, the method is can be used to initiate local discussion and planning processes together with the local community in a balanced, informed way. Whereas surveys offer the opportunity to obtain results that can be generalized to the community as well as a baseline to measure shifts in local situation, focus conferences provide a rich, in-depth picture of the process of awareness raising and opinion formation within the community. Together they result in reliable first-hand accounts from Polish and Scottish citizens themselves on (1) awareness and knowledge of CO_2 and CCS and climate change; (2) questions and concerns about CCS in context of other climate mitigation methods; (3) expectations of CCS on (inter)national level; (4) expectations of local CCS plans; and (5) conditions for implementation of CCS on (inter)national as well as local scale.

4.1. Public participation beyond research settings

Key components to successful public participation are that (1) (a selection of) local citizens can obtain information about possibilities for plans in the region; (2) in a very early stage, so that (3) they can make suggestions for optimising any future decision-making about the technology from a local, social perspective, and thereby feel (4) listened to, involved, and empowered. The focus conferences seem to have met these components. Firstly, professional recruitment firms recruited a varied sample of 11-16 citizens from the local area ensuring as many different perspectives from the local public as possible. Secondly, as it is yet uncertain if actual projects will ever be developed at both sites, involvement at this stage leaves room for citizens' views to be truly taken into account. Thirdly, both groups indicated to be positive about the process of the focus conferences and about the idea that the public was consulted in such an extended and involved manner. They were generally very interested in the topic and highly motivated. Fourthly, after the event they reported to feel involved and listened to. Many participants mentioned that they want to stay informed and involved in further activities.

However, some questions remain regarding the duration of these effects and their applicability to a real project setting. One of the main critiques on 'public engagement' in the literature is that it is often a one-off intervention that satisfies funders and researchers, but does not provide long-term institutional capacity building of engagement or acceptance by policy makers[29-31]. Public engagement efforts are only effective if they make citizens feel listened to, involved, and empowered. In a real project setting, this can only be achieved if the citizens' suggestions are taken seriously and are truly taken into account in decisions regarding the project as well as in general policy making. Regarding the duration of effects of the focus conference on public attitudes and empowerment, the participants have indicated they wish to stay involved but it is hard to foresee how long this commitment will last and how their attitude will develop. Within the scope of the SiteChar project, information meetings have been planned at both sites as a follow-up to the focus conferences which will give at least some indication of endurance of involvement. Furthermore, as part of the European project ECO_2[‡], in-depth post-hoc interviews with the focus conference participants will be conducted to see what they think of the event in retrospect.

The techniques for social site characterisation and public participation presented in this paper are suitable for raising public awareness about complex issues such as CCS and to initiate local discussion and planning processes with the appropriate type of information, through appropriate media, and involving all relevant stakeholders. However, the proof of the pudding is in the eating. For a long term effect in a real life project setting, it will be vital that these efforts as well as their outcomes are embedded in real projects and are related to national policy agendas and priorities.

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References

[1] Brunsting S, De Best-Waldhober M, Feenstra CFJ, Mikunda, T. Stakeholder Participation and Onshore CCS: Lessons from the Dutch CCS Case Barendrecht. *Energy Procedia* 2011; 4: 6376-6383.

[2] Dütschke E. What drives local public acceptance: Comparing two cases from Germany. *Energy Procedia* 2011; 4: 6234-6240.

[3] Breukers S, Pol M, Upham P, Lis A, Desbarats J, Roberts T, Duetschke E, et al. Engagement and communication strategies for CCS projects: Gaps between current and desired practices and exemplary strategies. NEARCO2 report 2011.

[4] Ha-Duong M, Nadaï A, Campos AS. A survey on the public perceptions of CCS in France. *Energy Procedia* 2008; 1:4757-4764.

[‡] http://www.eco2-project.eu/

[5] Wade S, Greenberg S. Afraid to start because the outcome is uncertain? Social site characterisation as a tool for informing public engagement efforts. *Energy Procedia* 2009; 1: 4641-4647.
[6] Wade S, Greenberg, S. *Social Site Characterisation: From Concept to Application. A re-view of relevant social science literature and a toolkit for social site characterisation.* Available at https://www.globalccsinstitute.com/sites/default/files/publications/16456/social-site-characterisation-concept-application.pdf, 2011.
[7] Neele F, Delprat-Jannaud F, Vincké O, Volpi V, Nepveu M, Hofstee C., et al. The SiteChar approach to efficient and focused CO2 storage site characterisation. *Energy Procedia*, 2013; this volume.
[8] NETL. *Best Practices for: Public Outreach and Education for Carbon Storage Projects*, First Edition, National Energy Technology Laboratory, US Department of Energy, 2009.
[9] WRI. *Engaging Communities in Energy and Infrastructure Projects.* World Resources Institute, Washington DC, USA, 2009.
[10] Ashworth P, Bradbury J, Feenstra CFJ, Greenberg S, Hund G, Mikunda T, Wade S, Shaw H. *Communication/Engagement. Tool Kit for CCS Projects.* Energy Transformed Flagship, National Flagships Research, Commonwealth Scientific and Industrial Research Organisation (CSIRO), 2011.
[11] Raven RPJM, Jolivet E, Mourik RM, Feenstra YCFJ. 'EST EEM: Managing societal acceptance in new energy projects - A toolbox method for project managers'. *Technological Forecasting and Social Change* 2009, 76: 963-977.
[12] IISD. Carbon Capture and Storage Communication Workshops. University of Calgary, International Institute for Sustainable Development (IISD), Climate Change Central (Canada) CCS projects Climate Change Central, 2007.
[13] Hammond J, Shackley S. *Towards a Public Communication and Engagement Strategy for Carbon Dioxide Capture and Storage Projects in Scotland.* A Review of Research Findings, CCS project experiences, Tools, Resources and Best Practices. Working paper SCCS, 2010.
[14] Brunsting S, Pol M, Paukovic M, Kaiser M, Zimmer R, Shackley S, Mabon L, Hepplewhite, F, Loveridge R, Mazurowski M, Polak-Osiniak D, Rybicki C. *Qualitative and quantitative social site characterisations.* Deliverable D8.1 of SiteChar: Characterisation of European CO_2 storage, 2011.
[15] Brunsting S, Mastop J, Pol M, Kaiser M, Zimmer R, Shackley S, Mabon L, Howell R. *Trust building and raising public awareness.* Deliverable D8.2 of SiteChar: Characterisation of European CO_2 storage, 2012.
[16] Bishop GF, Tuchfarber AJ, Oldendick RW. Opinions on fictitious issues: The pressure to answer survey questions. *Public Opinion Quarterly* 1986, 50: 240-250.
[17] Schuman H, Presser S. *Questions and answers in attitude surveys.* Academic Press, New York, 1981.
[18] ÖGUT (Austrian Society for Environment and Technology). The Public Participation Manual. Shaping the future together. ÖGUT-News 01/2007.
[19] Creighton JL. *The Public Participation Handbook: Making Better Decisions Through Citizen Involvement*, San Francisco, 2005.
[20] Elliott J, Heesterbeek S, Lukensmeyer CJ, Slocum N. Participatory Methods Toolkit. A practitioner's manual. Joint publication of the King Baudouin Foundation and the Flemish Institute for Science and Technology Assessment (viWTA), 2005.
[21] Rowe G, Frewer, LJ. A Typology of Public Engagement Mechanisms. *Science, Technology, & Human Values* 2005, 30: 251-209.
[22] Beierle TC, Cayford J. Democracy in Practice: Public Participation in Environmental Decisions, Washington DC, 2002.
[23] Byers P, Wilcox, J. Focus Groups: A qualitative opportunity for researchers. *Journal of Business Communication* 1991, 28: 63-78.
[24] Bradbury J. 'Public understanding of and engagement with CCS', in Markusson, N. et al. (eds.), The Social Dynamics of Carbon Capture and Storage, Routledge, London; 2012, p. 45 – 73.
[25] Ashworth P, Carr-Cornish S, Boughen N, Thambimuthu K. Engaging the public on Carbon Dioxide Capture and Storage: Does a large group process work? *Energy Procedia* 2009, 1: 4765-4773.
[26] Fishkin JS, Luskin RC. Deliberative polling and citizen consultation. UK CEED Bulletin 1999, 55: 6-9.
[27] Einsiedel EF, Jelsoe E, Breck T. Publics at the technology table: the consensus conference in Denmark, Canada, And Australia. *Public Understanding of Science* 2001, 10: 83-98.
[28] Crosby N, Kelly JM, Schaefer P. Citizens Panels: A New Approach to Citizen Participation. *Public Administrative Review* 1986, 46: 170-78.
[29] Lovbrand E, Pielke R, Beck, S. A democracy paradox in studies of science and technology. *Science, Technology, & Human Values* 2011; 36: 474.
[30] Wickson F, Delgado A, Kjølberg KL. Who or What is 'The Public'? Nature Nanotechnology 2010;5: 757-758.
[31] Wynne B. Public engagement as a means of restoring public trust in science: Hitting the notes, but missing the music? *Community Genetics* 2006; 9: 211-220.