The ARRC/Pawsey Geothermal Demonstration Project: An Example of How to Engage the Community

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The first deep well for CSIRO's ARRC/Pawsey Geothermal Demonstration Project is scheduled to be drilled in the second quarter of 2012. In Australia, this is the largest planned demonstration of direct use geothermal energy and one of the most suburban. It is likely there will be regulatory requirements to engage stakeholders, including the surrounding community. Outlined in this paper is how we will engage the community, through workshops with small groups of influential locals, a larger community workshop, a survey of local residents and a community meeting close to commencement of drilling. In addition to demonstrating how to engage the community, the project is an unprecedented opportunity to facilitate greater understanding of geothermal technology with the community, and the outcomes will help to inform future demonstrations.

Keywords: Community, engagement, stakeholders, Geothermal, perception,

What is the ARRC/Pawsey Geothermal Demonstration Project?

In June 2010, CSIRO was granted funding from the Australian Government's Education Investment Fund as part of the Sustainable Energy for the Square Kilometre Array to develop Australia's largest direct use geothermal demonstration site using geothermal energy from the deep underground aquifers. It is proposed that the project will provide heating and cooling for the ARRC facility and contribute towards the substantial cooling requirements of the Pawsey Centre supercomputer. This project, the largest direct use demonstration of geothermal energy sources in Australia, will essentially take place

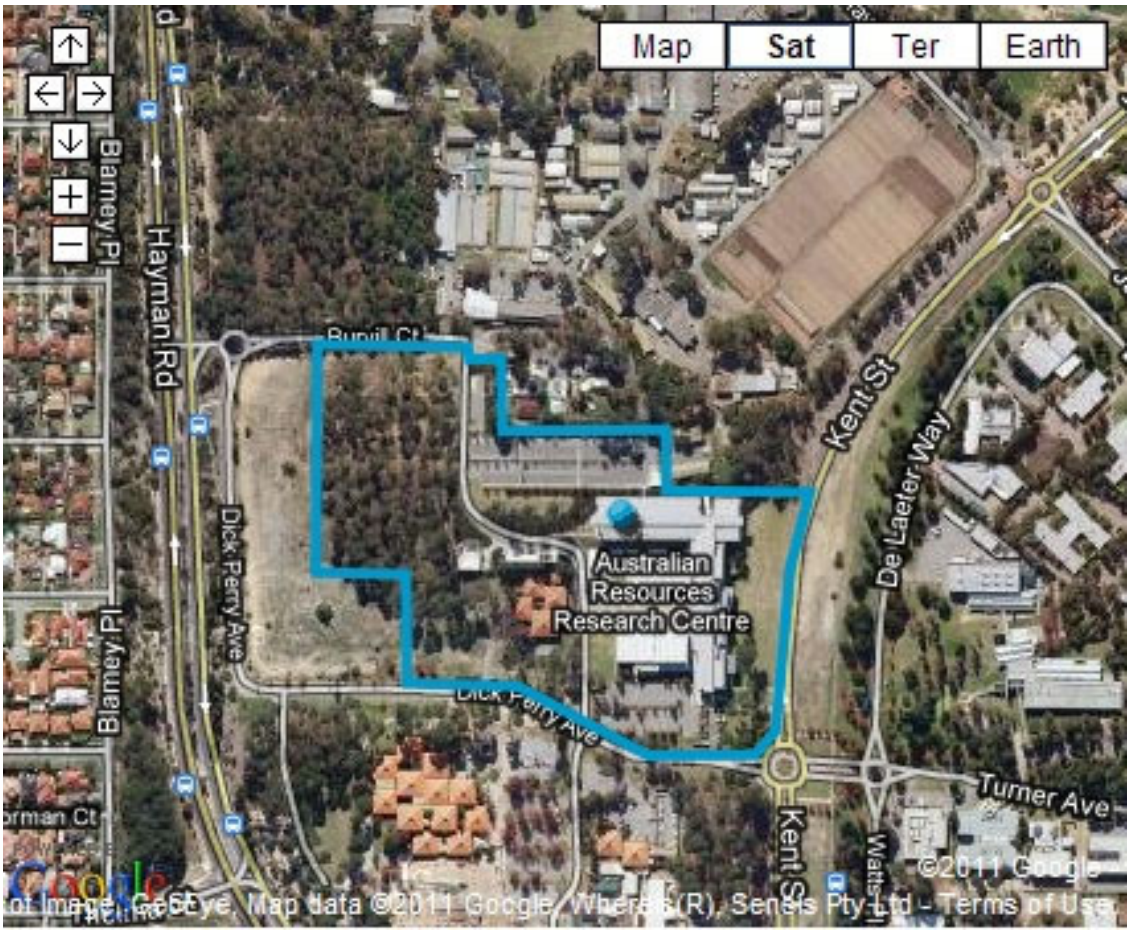

Figure 1: Aerial view of ARRC/Pawsey Centre in Kensington Perth where drilling is taking place. Source: http://www.csiro.au/places/ARRC.html

under the backyards of Kensington, Perth residents and as such provides an unprecedented opportunity to raise awareness about geothermal energy with the Australian community.

Factors that will contribute to the success of this demonstration are the reservoir conditions as well as the community's response. Data from nearby deep petroleum wells indicate that the geological conditions have the potential to sustain a geothermal production system. If CSIRO proceeds with the full production system, it will involve an extraction and reinjection well. Extracted water is pumped through a heat exchanger where the required energy is removed and all the water is reinjected back into the aquifer. Drilling of the exploration well could take place as early as March 2012, depending on drill rig availability. In this paper we outline reasons for communicating directly with the community about the demonstration and how this engagement will take place.

Figure 1 is an aerial view of where the drilling will take place at the ARRC/Pawsey Centre in Kensington, Perth.

Current Legislation and Regulation Encourages Engagement

Both government and industry recognise the importance of effective engagement for minerals and energy projects to enable a social licence to operate (Ministerial Council on Mineral and Petroleum Resources, 2005). Openness and transparency are critical components of successful engagement and this is endorsed at the highest levels of government and by organisations such as the Organisation for Economic Cooperation and Development (1995). This recognition has been translated into various regulations such as the *South Australian Petroleum and Geothermal Energy Act* (State of South Australia, 2000) and the *Western Australian Petroleum and Geothermal Energy Resources Act* (PGERA; State of Western Australia, 1967). These Acts stipulate the minimum requirements for consulting with stakeholders and, as is the case for all energy projects, it is for the project proponents to decide whether they will go beyond compliance (Ashworth and Cormick, 2011).

In addition to the PGERA, the Western Australian Department of Mines and Petroleum have a Schedule of Geothermal Energy Exploration and Production Requirements (State of Western Australia, 2009). These outline that geothermal operations must be conducted in a consultative manner and comply with relevant Acts, rules, regulations, by-laws or directions applicable to host Shires and Districts.

Further to this, the Western Australian Department of Mines and Petroleum's, also through their *Guidelines for the Preparation and Submission of an Environmental Plan*, requires extensive documentation of community/ stakeholder interests including who should be consulted, the types of consultation, levels of information provided, issues and concerns raised, resolutions and what the process is for communicating throughout the ongoing operations (Department of Mines and Petroleum, 2005).

Consequently community engagement will be a key aspect of this demonstration, as this will comply with the Acts, the geothermal industry's own commitment to best practice (Primary Industries and Resources South Government of South Australia, 2011) and the values of CSIRO and their industry partner, GT Power Pty Ltd. Before outlining the community engagement activities that are planned for this demonstration, the next section describes existing research that documents current community sentiment towards geothermal energy.

Community Sentiment and Methods for Increasing Awareness

CSIRO aims to engage with the community that falls in the vicinity of the ARRC/Pawsey Geothermal Demonstration. The aim of the engagement process is twofold. First, to provide the local residents with information about the project, and second, to consult with them by accessing their opinions and identifying any potential concerns they may hold about the general technology or specific project. Previous research has demonstrated that early engagement helps to minimise the risk of opposition, while facilitating acceptance of the technology (Ashworth et al., 2011).

Furthermore, this engagement is of value because although geothermal technology has many promising benefits for society, one cannot assume automatic acceptance. There are numerous cases where community reactions have stalled or halted the implementation of low emission energy technologies. For example nuclear power projects have been hindered (Pickett, 2002), wind energy sites have been met with opposition (Devlin, 2005; Kaldellis, 2005), and concerns have also been raised about carbon capture and storage technology (Huijts et al., 2007; van Alphen et al., 2007). Geothermal has not been immune to incidents or negative reactions, as demonstrated in the media reporting of earthquakes from the hot fractured rock project in Basel, Switzerland (Swiss Info, 2007). Furthermore, it seems Australians are still making sense of the technology.

Australians are still making sense of geothermal energy

To date, there have been two small scale examples of geothermal technology in Australia. The town of Birdsville in Queensland uses

geothermal electricity sourced from hot water from the Great Artesian basin and the town of Portland in Victoria used geothermal district heating scheme for about twenty years, using hot water from the Otway Basin resource (Australian Geothermal Energy Association, 2010). There are also several exploration projects around Australia and in Western Australia geothermal energy is already being used to heat school and public swimming pools. However, on the whole Australian's have had little exposure to the technology.

To understand the public response to geothermal, along with other technologies and climate change, CSIRO's Science into Society Group (SISG) and Energy Transformed Flagship (ETF) have surveyed and conducted workshops with communities around Australia. The results of a survey conducted in June, 2011 of 2000 Australians showed that self-rated knowledge of geothermal energy (hot rocks) was lower than self-rated knowledge of most other energy sources/technologies (see Table 1; Hobman et al 2011:16).

Table 1. Self-rated knowledge of energy sources and related technologies

Knowledge* of:	Mean	Standard Deviation	Range
Wind	4.1	1.5	1-7
Solar (concentrating solar/solar-thermal)	3.8	1.6	1-7
Nuclear	3.7	1.6	1-7
Coal (without carbon capture and storage)	3.4	1.7	1-7
Geothermal (hot rocks)	3.0	1.7	1-7
Gas or coal (with carbon capture and storage)	2.9	1.5	1-7
Biomass	2.6	1.6	1-7

* Likert rating scale from 1(no knowledge) to 7(high knowledge), with midpoint 4(moderate knowledge).

Survey respondents were also asked to rate their support for technologies when presented with a brief definition of the energy source/technology. The definition for geothermal was:

> *"The energy available as heat extracted from within the earth's crust, usually in the form of hot water or steam. These resources are accessed by drilling wells into the earth and piping the steam or hot water to the surface, where the contained energy can be converted into electricity or used in processes that require heat"* (Hobman et al 2011:16).

Based on this description support for the use of geothermal was high but less than solar and wind (see Table 2; Hobman et al 2011:16).

Table 2. Support for energy sources and related technologies

Support* for the use of:	Mean	Standard Deviation	Range
Wind	5.7	1.4	1-7
Solar (concentrating solar/solar-thermal)	5.7	1.2	1-7
Geothermal (hot rocks)	4.9	1.5	1-7
Gas or coal (with carbon capture and storage)	4.2	1.4	1-7
Biomass	4.1	1.4	1-7
Coal (without carbon capture and storage)	3.6	1.5	1-7
Nuclear	3.6	2.0	1-7

* Likert rating scale from 1(strongly disagree) to 7(strongly agree), with midpoint 4(unsure).

Discussions in community workshops have highlighted that water usage and seismic activity are concerns the public genuinely hold (Dowd et al., 2011). Following are examples of comments made by participants.

Water usage:

> *"I am really concerned about the amount of water required for geothermal. If we already have a water problem aren't they just making things worse buy needing so much water for making the energy?"*

> *"Townships would need to be relocated for geothermal to ensure that there are plenty of hot rocks and water for operation and the effect it would have on industry, compared to clean coal"*

Seismic activity instigated by geothermal drilling:

> *"Geothermal is seen as better as it isn't treating a symptom by covering up a problem, it is actually a solution in that it produces little or no emissions but it is also a threat when looking at the possibility of seismic results due to drilling"*

> *"Wasn't there two large mistakes made overseas by geothermal drillers? Didn't they cause an earthquake? That really scares me to think that we are still creating destructive harm to the earth in search of energy"*

Additional information was also sought by participants:

> *"Not many people are aware of geothermal, unlike that of clean coal which has been discussed. I for one would really like more information and if possible to talk to someone from the industry itself"*

Communication and community-based workshops encourage understanding

The field of risk communication has been developed to explore ways to involve the public in decision-making. Risk communication is an interactive process of information and opinion exchange among individuals, groups and government institutions, involving multiple messages about the nature of risk (Committee on Risk Perception and Communication 1989). Dowd et al (2011) cautions that even sound scientific information is inclined to draw out challenging public discussion (Weber and Word 2001:448), often because how we perceive risk is actually very complex in that it is shaped by our attitudes, social values and cultural traditions (Renn et al 1996:178). The success of communication strategies are more likely if the factual and opinion based content can be differentiated; such strategies allow for dialogue, and build trust (Renn et al., 1996: 179).

The community workshops previously conducted by CSIRO follow the principles outlined by Renn et al (1996). Dowd et al. (2011) has reported on the efficacy of these workshops in not only identifying the community's understanding of geothermal energy technology but also increasing their knowledge of the technology. How supportive participants were initially at workshops (Dowd et al., 2011) was similar to that reported in the recent survey of the Australian public (Hobman et al., 2011); participants were mostly positive towards geothermal but did not rate the technology as highly as solar or wind. Although support was unlikely to shift significantly during the course of a day long workshop, changes in self-rated knowledge were immediate with the majority of participants shifting from low to moderate ratings.

Activities that will be used for Engaging Local Residents

Engagement is often described as being planned and deliberate, involving activities that promote public participation (Victorian Government Department of Sustainability and Environment, 2005). In order to engage with the residents living around the demonstration site we have planned: 1) workshops with small groups of influential locals; 2) a large community workshop; 3) a survey of local residents; and 4) a community meeting near the drilling site. Each activity, in varying ways, will serve to inform the local community about the project, consult with them to access their opinions and identify potential concerns. Public participation through informing and consulting are recognised forms of engagement by the International Association for Public Participation (IAP2, 2011). Informing involves providing the community with balanced and objective information to assist them in understanding the problems, alternative, opportunities and/or solutions. Consulting involves obtaining public feedback on analysis, alternatives and/or solutions.

Workshops with small groups of influential locals

Four workshops will be conducted prior to the large community workshop. These workshops will be conducted in the evening to make them more accessible for the majority of members of the community with each workshop involving 8-10 community members and take place over 2 hours. Influential locals will be invited including councillors, indigenous leaders, business leaders, teachers and nearby residents. Experts from the project will be present to describe the project and address questions that may arise.

Large community workshop

The community workshop, which could have as many as 100 attendees, will serve to significantly raise awareness of the demonstration project. The workshop will commence with expert presentations about climate change, low emission energy technologies and then present detailed information about the demonstration. Participants will have the opportunity to discuss the benefits and risks of the demonstration, and have their questions responded to by scientists and project experts. This opportunity for discussion with peers should contribute to greater awareness amongst the participants who are also likely to share their enhanced understanding with family and friends after the workshop.

Survey of local residents

Closely following the large community workshop surrounding, residents will be invited to participate in a survey. The survey will include details about the demonstration such as timing and benefits, along with information to address key concerns raised during other engagement activities. These details will contribute to increasing awareness, especially for residents who could not be involved in the earlier workshops. The survey will ask residents about whether they feel informed and are supportive of the project. The results will provide a representative indication of the local response to the demonstration.

Community meeting at the ARRC auditorium

To conclude the community engagement activities for this stage of the demonstration project, we will conduct a community meeting, close to the drilling site in the ARRC auditorium. This meeting will serve to validate the community's earlier input and concerns, while also adding to the transparency of the project. The engagement activities will complement the project's wider communication plan, which includes activities ahead of the test drilling such as consultation with the City of South

Perth Council and notices to the community through the local paper.

Conclusion

The ARRC/Pawsey Geothermal Project is an unparalleled opportunity to demonstrate the technology but also to build social momentum through direct engagement. In addition to increasing community understanding and meeting regulatory requirements, we aim to provide an example of how the community can be engaged about geothermal energy that will assist in preparing future demonstrations.

References

Australian Geothermal Energy Association (AGEA), 2011, Australian Projects Overview, visited September 6 2011, at http://www.agea.org.au/geothermal-energy/australian-projects-overview

Ashworth, P. and Cormick, C. 2011, Enabling the Social Shaping of CCS Technology in "Carbon Capture and Storage: Emerging Legal and Regulatory Issues", Eds I. Havercroft, R. Macrory, and R.B. Stewart. Hart Publishing: London.

Committee on Risk Perception and Communication National Research Council, 1989, Improving Risk Communication, National Academy Press: Washington DC.

Devlin, E., 2005, Factors Affecting Public Acceptance of Wind Turbines in Sweden. Wind Engineering, 29, 503-511.

Department of Mines and Petroleum (DMP), 2005, Guidelines for the Preparation and Submission of an Environment Plan, visited September 6 2011, at http://www.dmp.wa.gov.au/documents/081755_EP_Outlines.pdf

Dowd, A., Boughen, N., Carr-Cornish, S. and Ashworth, P., 2011, Geothermal Technology in Australia: Investigating Social Acceptance. Journal of Energy Policy, published online at http://dx.doi.org/10.1016/j.enpol.2011.07.029

Huijts, N.M.A., Midden, C.J.H. and Meijnders A.L.., 2007, Social Acceptance of Carbon Dioxide Storage, Energy Policy, 35, 2780–2789.

Hobman, V., Ashworth, P., Graham, P. and Hayward, J., 2011 Working Report, The Australian Public's Preference for Energy Sources and Related Technologies, CSIRO: Brisbane.

International Association for Public Participation (IAP2), 2011, IAP2 Spectrum of Public Participation, visited September 6 2011, at http://www.iap2.org.au/resources/spectrum.

Kaldellis, J.K., 2005, Social Attitudes Towards Wind Energy Applications in Greece, Energy Policy, 33, 595-602.

Ministerial Council on Mineral and Petroleum Resources (MCMPR), 2005, Principles for Engagement with Communities and Stakeholders, Union Offset Printers: Canberra.

Organisation for Economic Cooperation and Development (OECD), 2005, Guiding Principles for Regulatory Quality and Performance, visited September 6 2011, at http://www.oecd.org/dataoecd/19/51/37318586.pdf

Pickett, S.E., 2002, Japan's Nuclear Energy Policy: From Firm Commitment to Difficult Dilemma Addressing Growing Stocks of Plutonium, Program Delays, Domestic Opposition and International Pressure, Energy Policy, 30, 1337-1355.

Primary Industries and Resources South Government of South Australia (PIRSA), 2011, PIRSA Geothermal Energy, visited September 8 2011, at http://www.pir.sa.gov.au/geothermal/ageg/technical_interest_groups/group_1

Renn, O., Webler, Th. and Kastenholz, H., Perception of Uncertainty: Lessons for Risk Management and Communication, in V.H. Sublet, V.T. Covello and T.L. Tinker (eds.), Scientific Uncertainty and Its Influence on the Public Communication Process. Dordrecht (Kluwer 1996), pp. 163-182.

Swiss Info, 2007, Geothermal Project Shakes Basel Again, visited September 8 2011, at

http://www.swissinfo.ch/eng/Home/Archive/Geothermal_project_shakes_Basel_again.html?cid=46284

State of South Australia, 2000, Petroleum and Geothermal Energy Act, visited September 8 2011, at http://www.legislation.sa.gov.au/LZ/C/A/PETROLEUM%20AND%20GEOTHERMAL%20ENERGY%20ACT%202000.aspx

State of Western Australia, 1967, Petroleum and Geothermal Energy Resources Act (PEGRA), visited September 8, 2011, at http://www.austlii.edu.au/au/legis/wa/consol_act/pagera1967429

State of Western Australia, 2009, Schedule of Geothermal Energy Exploration and Production, visited September 8, 2011, at http://www.dmp.wa.gov.au/documents/PD-PTLA-TGR-142D.pdf

Van Alphen, K., van Voorst tot Voorst, Q., Hekkert, K.P., and Smits, R.E.H.M., 2007, Societal Acceptance of Carbon Capture and Storage Technologies, Energy Policy, 35, 4368–4380.

Victorian Government Department of Sustainability and Environment, 2005, Effective

Engagement: Building Relationships with Community and Other Stakeholders. The Community Engagement Network: Melbourne, Victoria.

Weber, J.R., Word, C.S., 2001, The Communication Process as Evaluative Context: What Do Nonscientists Hear When Scientists Speak? BioScience 51, 487–495.