Public science communication in a contested space: a working case study

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Abstract

Concerns about hydraulic fracturing, and the coal seam gas and shale gas industries, include health impacts of chemicals used, contamination of water supplies from fugitive methane gas, equity of land and water access and long term impacts on groundwater. Some of the general public perceive that these risks as too great and/or not well understood, and far outweigh the benefits, hence, there is opposition to the unconventional gas industry and the use of technologies associated with the industry. This conference paper discusses the science communication model – the Trusted Advisor – used to engage, inform and respond to public demand for more information on the impacts of the unconventional gas industry. The Trusted Advisor is critical in situations where there is no values-based consensus and high uncertainty in the community. In addition, the paper highlights the need for science communicators to acknowledge that people filter scientific information through their values, worldviews and life experiences. Providing effective science communication stems from this understanding and enables appropriate framing of messages/issues that resonate with the intended audience's values.

Introduction

In recent years the extraction of natural gas, a practice that has occurred for many decades, has created intense emotional debate. Why? The answer is partly due to an increase in demand for gas, particularly unconventional gas and the way it is being extracted.

Conventional and unconventional gas, such as coal seam, shale and tight gas, are becoming more and more important for Australia, both as a domestic energy source and as a provider of export income. Over the past decade Australia's gas consumption grew by four per cent per year and over the next two decades it is projected to increase by 2.9 per cent per year (Department of Resources Energy and Tourism et al., 2012). The majority of coal seam gas (CSG) production is from the state of Queensland which accounted for around 98 per cent of total CSG production in 2011–12 (the state of New South Wales produces the remainder). Production of CSG is expected to continue to grow, with a number of projects under construction and planned in both states, including three CSG export projects in the form of liquefied natural gas (LNG) in Queensland, due for completion over the next year or two (Bureau of Resources and Energy Economics, 2013). With regards to shale and tight gas Australia is likely to possess significant resources, although these are poorly quantified as exploration for these commodities within Australia has only recently commenced (Department of Resources Energy and Tourism et al., 2012).

The advent of the unconventional gas industry and the use of hydraulic fracturing as a technique to extract natural gas, particularly CSG, in regions and communities across eastern Australia, has thrown up a cloud of questions, concerns and challenges. There are a range of issues and reasons why members of the general public, such as environmental groups, Indigenous groups, suburbanites in Brisbane and Sydney, directly affected farmers/landowners and their communities oppose the CSG industry. These concerns include (Cham and Stone, 2013):

- uncertainty of the scale of the industry;
- uncertainty of the environmental and social impacts across the landscape and over time;
- equity of land and water access, extending to questions of 'who benefits?' and 'is any benefit worth the disruption to established community ways of life?';
- the full life cycle emission of greenhouse gases from CSG compared to that of black (and brown) coal;
- mobilisation of native contaminants that have previously been confined within coal seams;
- health impacts of chemicals used and those mobilised by hydraulic fracturing;
- contamination of water supplies from fugitive gas after hydraulic fracturing; and
- capacity to prevent and/or remediate accidents.

The unconventional gas industry and regulators tend to consider the above mentioned risks to be generally understood and manageable. However, some of the general public perceive that these risks as too great and/or not well understood, and far outweigh the benefits.

A recent paper by Cham and Stone (2013) highlighted the main psychological drivers behind some of these concerns and a possible approach to effectively address them. This conference paper takes their discussion a step further by discussing and analysing the science communication model currently used to engage, inform and respond to public demand for more information on the impacts of the unconventional gas industry.

Communicating science in a contentious space

What makes unconventional natural gas contentious?

Unconventional natural gas is a contentious subject because of the perceived environmental and human health impacts associated with this extractive industry. The perceived risks are filtered through people's personal values and beliefs. Hence, it has become a highly emotional and political topic of discussion.

Risk and risk perception

In the Oxford Dictionary, risk is defined as the possibility of something bad happening. Risk perception can be defined as the subjective judgment that people make about the likelihood and consequence of a risk (Slovic, 1999; Slovic, 1987). Research suggests that people do not perceive the risk of hazards according to a single dimension related to predicted injuries or fatalities but interpret risk according to several independent perceptual factors, termed 'dread', 'familiarity' and 'number of people exposed'(Slovic et al., 1980).

These commonly found dimensions of 'familiarity' or 'unknown risks', means that people might judge a technology to be 'risky' if they know little about it and/or they perceive that science and scientists know little about it (Rowe, 2004). Other important factors in forming risk perception is risk 'severity'(Sparks and Shepherd, 1994; Fischhoff et al., 1978) and perceived lack of control over averting or early remediation of incidents (Slovic, 1987).
For some of the general public, the perceived risks of CSG and shale gas industries far outweigh the benefits and, hence, there is opposition to the industry and use of technologies, such as hydraulic fracturing, associated with the industry.

Trust

Trust is another key factor that influences risk perception and therefore people's opposition or acceptance and adoption of new technologies. The general public's trust in regulatory institutions and the motives of scientists or in information about the risks and benefits of particular technological applications of science and technology play an important role. If a source is distrusted, it matters little how full or persuasive their information is. Hazard acceptability has been linked empirically with both risk perception and level of trust (Eiser et al., 2002).

In terms of the unconventional gas industry, Cham and Stone (2013) highlight the lack of trust the public has in gas developers and the lack of confidence in government to properly regulate the industry. Information provided by gas developers and/or government agencies about techniques, processes, regulation and risk management used in exploration and production of unconventional gas in Australia is generally treated with suspicion and distrust (Cham and Stone, 2013).

It is important to understand how people's attitudes and values influence their acceptance or rejection of hydraulic fracturing, the CSG development, and more broadly the unconventional gas industry.

Values and emotions

Studies on risk perception related to climate change, genetic modification, decentralised water systems have shown that people have a predisposition, based on their values, worldviews and emotional engagement with the information presented to understand it in a certain way (Leiserowitz, 2006; Mankad, 2012; Kahan et al., 2012; Moser, 2010). For example, Leiserowitz found that American risk perceptions and policy support on climate change are strongly influenced by experiential factors, including affect, imagery and values. Public responses to climate change are influenced by psychological, social and cultural factors (Leiserowitz, 2006). Results from a study by Kahan suggested that public divisions over climate change were not due to the public's incomprehension of science but from different segments of the public, whose members tend to develop risk perceptions that match with groups they identify with and that have similar values (Kahan et al., 2012).

Given this, it's reasonable to surmise that people often interpret science to fit their beliefs rather than base their beliefs upon science. As a consequence, it's important for science communicators to acknowledge that people filter scientific information through their values, worldviews and life experiences. Public perceptions of risk are distinct from risk

assessments made by experts. For example, scientific assessment of hydraulic fracturing would be based on biophysical analyses of the target zone as well as overlying and underlying rock structures, technical evaluation of wells and economic factors. In contrast, the public relies on evaluations based on values, emotions, worldviews and experiences. Communicating the science around an emotionally charged and politically contentious space such as CSG and shale gas is challenging but not impossible.

A working case study - The Gas Industry Social and Environmental Research Alliance

National issues such as the social, economic and environmental impacts of CSG developments are being addressed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia's national science agency. One vehicle by which CSIRO is conducting collaborative research in this contested natural gas domain is through the Gas Industry Social and Environmental Research Alliance (GISERA) – of which Australia Pacific LNG (a gas developer) is the other founding partner. GISERA undertakes public good research that addresses the potential social, economic and environmental impacts arising from Australia's natural gas industries.

GISERA's governance ensures that the highest standards of research independence, transparency and integrity are maintained. The GISERA Director must be an employee of CSIRO and the research program is overseen by an independent Research Advisory Committee. Currently there are 16 research projects underway in six subject areas: terrestrial biodiversity, surface and groundwater, greenhouse gas footprint, agricultural land management, marine environment and social and economic impacts. All GISERA research and outcomes are publicly available on its website, following CSIRO's rigorous peer-review process. In addition to the research work, GISERA has actively engaged in communicating the social, economic and environmental challenges and opportunities arising from unconventional gas development in Australia.

Building trust, being transparent and achieving credibility

Building trust, being transparent and achieving credibility takes time, especially in a contentious and emotional space such as unconventional gas. Added to this is the perception some in the community may have about GISERA as an entity that isn't independent because one of its co-founders is a major gas developer. Since the inception of GISERA it was clear that trust and credibility would only be achieved if transparency and independence was at the core of GISERA's governance framework. With theses aims and challenges in mind, a clear

and robust communication strategy was developed to guide GISERA through the actively contended public debate around CSG, shale gas and hydraulic fracturing. Based on rigorous science, a large volume of written, visual, aural and verbal communication material was developed and tailored to meet the widest range of audiences such as politicians, farmers, non-governmental organisations (NGOs), journalist, industry, science community and general public during the past two to three years.

The content of each communication product varied depending on the concerns and risks being addressed, the type of communication material produced and how the material would be used and distributed. For example, a range of fact sheets were produced to address some of the social and environmental impacts of CSG activities and provide technical information about hydraulic fracturing – a term that has become synonymous with unconventional gas development. Project video updates, info-graphics, print and online articles and brochures were also developed and produced to highlight aspects of research outcomes and build community understanding about social and environmental risks and opportunities associated with gas development. Some of these products were used as further information during engagements with community members, politicians, public servants and gas developers at face to face forums; a great engagement method for delivering science in a contentious space.

To date, GISERA has had about 185 engagements with various stakeholders through forums such as workshops, seminars, conferences and technical briefings. A critical aspect in establishing trust with the general public was engaging in public information sessions, acknowledging and answering their concerns, and understanding that people have different values. One of the key messages delivered at each forum was that GISERA is inclusive in its communication and engagement with proponents and opponents of CSG and shale gas; transparent with its governance and research activities; and independent with its scientific research.

GISERA's strong governance and communication strategy has resulted in the establishment of public trust in GISERA and has positioned it and CSIRO as a knowledgeable provider in an area full of scientific and science communication challenges. The continued demand for information and advice from GISERA shows that GISERA is meeting the needs of a range of stakeholders and that it is seen as a source of trusted information.

Being a trusted advisor

The role GISERA and CSIRO play in this unconventional gas domain is the role of a Trusted Advisor. Science is always uncertain, particularly in highly complex, politically charged issues such as CSG and shale gas, and it cannot dictate what action to take. Deciding what to do occurs through a political process of bargaining, negotiation, and compromise (Pielke, 2007). The Trusted Advisor is critical in situations where there is little by way of shared values about desirable outcomes as the Trusted Advisor can help all parties to better understand the range of impacts associated with various development scenarios, and provide a common platform for policy makers, developers and communities to negotiate and make decisions.

A Trusted Advisor is inclusive in its communication and engagement with those for and against unconventional gas; transparent with its governance and research activities; and independent with its scientific research. This enables the Trusted Advisor to be widely perceived as a trusted source of information and advice.

Trusted Advisors were fundamental in enabling effective political action to address issues such as ozone depletion and acid rain. In these cases, science did not change people's values or beliefs, but it did create new options that allowed for political compromise, given existing values and beliefs (Pielke, 2007).

Practising effective science communication

It's clear that information, decision-making and risk perception is not purely a cognitive unemotional process, but an emotional process that is filtered through factors such as culture, values, worldviews, affect and imagery. Understanding this is critical to providing effective science communication.

Key aspects of any science communication plan should stem from this understanding – by knowing the audience and understanding their values and point of view the science communicator can:

- define the purpose of the communication;
- identify what message/issue needs to be conveyed;
- frame the message/issue so that it resonates with the intended audience using appropriate language, images and metaphors;
- deliver message/issue using the appropriate media e.g. workshops, social media, print/online articles, fact sheets/brochures or radio interviews; and

- consider who is best to deliver message/issue e.g. scientist, politicians, business people, community leaders.

Concluding remarks

Community sanction has become a pivotal element in the adoption and implementation of new technologies that impact on society, environment and economy (Fisher et al., 2007). The technology doesn't need to be new to require community sanction or a 'social licence' as illustrated by the unfolding public debate on CSG and hydraulic fracturing in Australia and, indeed, around the world with regards to hydraulic fracturing.

The role of the Trusted Advisor is essential when there is no values-based consensus and high uncertainty in the community; critical to this role is being an effective science communicator. Providing effective science communication stems from an understanding that people filter scientific information through their values, worldviews and life experiences. The message needs to resonate with the intended audience's values. The impact of such effective science communication can bring about changes in peoples' attitudes and risk perception.
In this Trusted Advisor role science can help all parties to better understand the range of impacts associated with various development scenarios, and contribute to the development of new and innovative policy options that might allow for compromise among opposing parties.

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