

## **Risky Business: The role of communicating science stories in emotionally-charged debates**

**Helen Beringen<sup>1</sup>**

Commonwealth Scientific and Industrial Research Organisation (Townsville, Australia)

**Tsuey Cham<sup>2</sup>**

Commonwealth Scientific and Industrial Research Organisation (Brisbane, Australia)

**Andrea Walton<sup>3</sup>**

Commonwealth Scientific and Industrial Research Organisation (Brisbane, Australia)

### *Abstract*

The world's production of natural gas has increased each year since 2009, and global demand is on the rise. By 2040, natural gas is predicted to become the second-largest fuel in the global mix after oil. However, the debate around the impacts and opportunities of unconventional gas is polarising communities worldwide.

As governments and industry seek community acceptance for extraction of onshore gas resources, what role does science play? And how can effective engagement and communication of science provide much-needed knowledge to communities on the impacts and opportunities of onshore gas, particularly gas from unconventional sources such as coal seam gas, shale gas or tight gas?

This working case study from Australia's lead science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), explores engagement approaches to support effective communication of the key science questions asked by communities in gas regions. A science communication practitioner perspective from CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA) is used to discuss the role of targeted communication and engagement throughout the research process to build trust in the science, ensure relevance of the research and assist uptake of scientifically robust, independent and transparent information on gas development issues and opportunities. This is done within a strict governance structure to ensure research independence and trust in research findings.

Through an improved understanding of community concerns, GISERA aims to effectively communicate the risks and benefits associated with onshore gas.

### *Introduction*

The global extraction of natural gas has occurred for many decades, and is rising each year. The World Energy Outlook 2017 predicts natural gas will account for a quarter of global energy demand by 2040, becoming the second-largest fuel in the global mix after oil (International Energy Agency, 2017).

Unconventional gas, which is natural gas trapped in low permeable formations such as coal seams or in shale rock, is experiencing rising global demand due to the development of cheaper extraction methods. This has led to increased gas production, lowered energy prices, strengthened

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<sup>1</sup> Optional contact information (e.g., Corresponding author, email: mymail@myserver.xy.)

energy security and lowered air pollution and carbon dioxide emissions, when displacing coal in electricity generation (Knittel, Metaxoglou, & Trindale, 2015).

However, broader economic benefits (Fleming, Measham, & Cai, 2015) have been offset by questions and concerns about community impacts (Cham & Stone, 2013), including gas extraction methods such as hydraulic fracturing, or 'fracking'.

Other concerns include (Cham & Stone, 2013):

- uncertainty of the scale of the industry;
- uncertainty of the environmental and social impacts across the landscape and over time;
- the 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 unconventional gas 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
- the capacity to prevent and/or remediate accidents.

Communities require scientific information to help weigh up the local and global benefits versus the costs to host communities of these activities and to the wider environment.

This paper explores an Australian example of how targeted engagement aims to inform and support decision-making for community stakeholders, governments and industry.

#### *The Australian context*

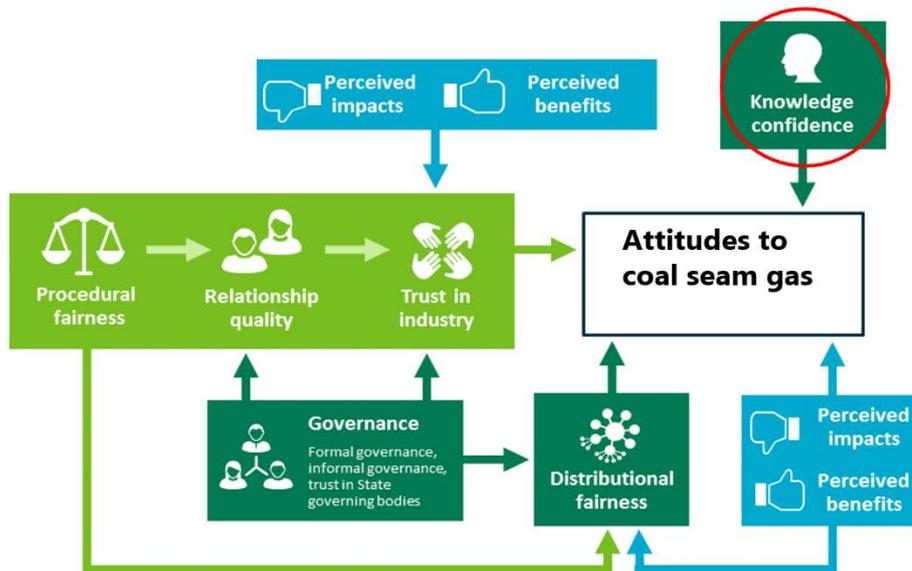
Over the past decade, gas is an increasing part of Australia's energy mix, with coal seam gas (CSG) making up 20 per cent of gas supplies (Department of Industry, 2016). Australia is predicted to become the largest producer and exporter of liquefied natural gas (LNG) in the next five years (Geoscience Australia, 2017).

However, like many other parts of the globe, development of Australia's unconventional gas resources remains a political and contentious issue. While many of the technological aspects related to the extraction and production processes of Australia's highly-regulated onshore gas development are known, the long-term cumulative environmental impacts are less well characterised. Moratoria and bans on unconventional and conventional gas exploitation continue in several states and territories. Debates over gas extraction occur against a backdrop of clashing values, which in turn drive people's beliefs, attitudes and behaviours. These include:

- economy vs ecology
- food security vs industrialised rural landscapes
- fossil fuels vs renewable energy
- rural lifestyle vs industrial development
- resource access rights vs autonomy
- city vs country

### Communicating Science

Sharing science outcomes plays an important role in helping local stakeholders to better understand the risks and opportunities arising from development of the gas industry in their region. People's perceptions of CSG are influenced by their perceptions of both risks (impacts) and benefits. Social research into local attitudes and perceptions of CSG development in regional New South Wales found that self-rated knowledge confidence was linked to people's perceptions of impacts. The highest levels of knowledge confidence were associated with the lowest perceptions of impacts. In contrast, knowledge confidence was not statistically associated with perceptions of benefits (Walton & McCrea, 2017). The social research also identified that knowledge confidence was only one of six main drivers of acceptance, finding that attitudes were also influenced by factors such as people's trust in industry, perceptions of governance, issues of fairness, as well as their perceptions of impacts and benefits. As depicted in Figure 1, perceived impacts and benefits both directly and indirectly influence attitudes (indirectly via distributional fairness and trust in industry). The research also showed that perceptions of impacts was the key driver of people's attitudes. Moreover, the research showed that in the case of potential impacts to groundwater, which was reported as the primary concern to communities about CSG, people believed the risk was not well understood by science or by communities, and that the risk was not manageable.



**Fig. 1:** Knowledge and values are both important. Source: Walton A, and McCrea R (2017)

This highlights one of the challenges for science communication: to reduce the uncertainty related to perceived risks and ensure the science incorporates matters important to communities in its analysis and communication of the risk. By better understanding community concerns, values, and perceptions of the risk, GISERA can provide more effective communication of information on actual risks and benefits associated with unconventional gas. Furthermore, this is an emotional debate so there is not only a need to explain the science, but also to listen (Sandman, 1993). Effective science communication necessitates connecting not only to the problems under scientific enquiry, but also to the people with a stake in those problems (Leith, O'Toole, Haward, & Coffey, 2017).

Science communication is also challenged by the human tendency for confirmation bias demonstrated when an individual engages with information. People tend to cherry-pick scientific data, often seeking information that confirms their existing values and beliefs, and interpreting

research findings in ways that further supports their views (Lord, Ross, & Lepper, 1979; National Academies of Sciences, 2017; Whitmarsh et al., 2015). In some cases confronting people with alternate facts even strengthens their beliefs, called the “backfire effect” (Cook & Lewandowsky, 2011). Recognising there is a diversity of views and values around the topic of unconventional gas, including ambivalence (Walton, McCrea, & Leoanard, 2016; Whitmarsh et al., 2015), and adopting a range of approaches and messages that will resonate with different audiences including a focus on those who are the most ambivalent (Whitmarsh et al., 2015) is likely to support more effective communication of the science.

### *Communications and engagement objectives*

Communications and engagement activities are a key component of the GISERA model. To achieve strategic and targeted communications and engagement, GISERA proactively:

- Engages with stakeholders and builds an understanding of research questions of interest for landholders, community, government and industry about the impacts, risks, challenges and opportunities associated with onshore gas development;
- Develops communication products to disseminate research findings and outcomes, which are tailored to meet the various needs of different stakeholders. These include providing technical scientific reports, fact sheets and key messages written in plain English, and video/animation explaining complex issues;
- Provides a web-based platform for all research to be archived and publicly available; and
- Raises awareness of CSIRO's focus on public good research and its outcomes, which includes the sustainable development of Australian industries, to inform public discourse, government policy development and gas industry best practice.

### *Engaging stakeholders – the process*

GISERA's stakeholder engagement process begins with consultation before the research commences, continues during the research process, and provides ongoing engagement even after the research concludes. Key elements include:

#### *1. Establishing relationships to support effective engagement and communications*

Identifying key audiences and developing relationships for future engagement including establishing an understanding of the purpose and objectives of GISERA.

#### *2. Focussing research topics*

Identifying research topics of value to the region under investigation to ensure projects are aligned with local issues of concern. This is undertaken through a variety of approaches including surveys, reviews and workshops. This process involves local community stakeholders, industry, government, and research scientists.

#### *3. Supporting stakeholder engagement during research*

Providing information to community members and other stakeholders to share research progress. This includes the delivery of early results or interim reports via web publication, stakeholder briefings and community consultations, including regional agricultural shows, local councils, community consultative committees or regional media outlets. This helps build and maintain relationships, develop two-way dialogue and communicate information in a way that resonates with stakeholders. Online tools such as infographics and milestone reports, videos and fact sheets are also important to highlight research progress.

#### *4. Sharing research outcomes to inform communities, governments and industry*

Communicating research outputs through multiple channels and providing opportunities to explore results, ask questions, and understand implications. These activities include knowledge transfer sessions, community information sessions, and stakeholder workshops. Publication of clear language products helps share science outcomes to wider audiences, along with strategic use of media releases, articles, blogs, and social media channels.

GISERA's social research has provided important insights into the perspectives and attitudes of regional stakeholders to support successful communication and engagement. The wider research teams are also involved in stakeholder engagement at all stages of the process, sharing scientific information in face-to-face interactions, report-backs and workshops involving host communities, regulators and government stakeholders, industry groups, and the academic and research community.

#### *The Trusted Advisor role*

People's confidence in their knowledge relies on their ability to trust their sources and an independent science source enhances the credibility in the information. Fundamental to GISERA's value proposition is its contribution as a credible source of information. To support its legitimacy GISERA has adopted a governance structure specifically designed to protect research independence and transparency, including:

- Protocols that require research to be conducted independently of the source of funding;
- Approval and review of research projects by Regional Research Advisory Committees comprising a majority of independent members;
- All research being publicly available on the GISERA website, along with minutes, decisions, discussions and communiques from committees.

These mechanisms provide a foundation for GISERA to be a 'Trusted Advisor', the science communication model used to engage, inform and respond to public demand for information on the impacts of the unconventional gas industry (Cham & Stone, 2013; Pielke, 2007). The 'Trusted Advisor' is critical in situations where there is no values-based consensus and high uncertainty in the community (Pielke, 2007).

#### *Conclusion*

GISERA operates within a highly complex and dynamic external environment. Despite the complexities and differing political viewpoints in relation to unconventional gas, GISERA remains committed to ensuring it engages with and delivers research about the impacts and opportunities of onshore gas to key stakeholders in the community, government and industry, while maintaining impartiality and trust.

Science communication plays a critical role, and delivering strategic, targeted communications underpins GISERA's communications objectives. In summary this requires GISERA to:

- Understand questions of interest for key stakeholders about the impacts, risks, challenges and opportunities associated with onshore gas development through the development of key relationships;
- Communicate clear, concise information on the science to address knowledge gaps in environmental, social and economic impacts, understanding stakeholder view points and values; and

- Provide a trusted and citable source of information on onshore gas development, and its social and environmental impacts and opportunities.

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