

Independence Pay

Gas industry-funded research at the CSIRO

The gas industry funds CSIRO research into environmental and social effects of coal seam gas. To remove possible or perceived bias, gas industry funding should be via a trust and industry representatives should not direct research.

Discussion paper

Matt Grudnoff
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Level 5, 131 City Walk
Canberra, ACT 2601
Tel: (02) 61300530
Email: mail@tai.org.au
Website: www.tai.org.au

Summary

As community and political opposition to unconventional gas projects has increased, the gas industry has funded research within the Commonwealth Scientific and Industrial Research Organisation (CSIRO) into the environmental and social impacts of unconventional gas projects, including coal seam gas (CSG). The result of this funding agreement with the CSIRO is the Gas Industry Social and Environmental Research Alliance (GISERA).

CSG and hydraulic fracturing (or “fracking”) are controversial issues in many communities. The governments of Victoria, Tasmania and the Northern Territory have placed or are planning to place moratoriums on the extraction of unconventional gas, while NSW has seen two projects abandoned due to community opposition. Unconventional gas has struggled to gain a social licence to operate in many parts of the country.

The gas industry has repeatedly claimed that the risks associated with unconventional gas extraction including fracking are small, and manageable with good regulation. If these claims are supported by research from GISERA under the well-respected name of the CSIRO, this would add considerable weight to the industry’s push to begin operations in many parts of Australia, or expand existing operations. For the industry, the stakes couldn’t be higher.

Industry-funded research is problematic in such situations, where the industry has so much to gain from a particular outcome. Studies of industry funded research in other industries has shown that research findings that benefit the industry are far more likely in industry sponsored studies than in independently funded studies. For example, industry sponsored research into the effectiveness of artificial sweeteners in weight loss has been found to be 17 times more likely to deliver a favourable result for industry than non-industry funded research. While this does not mean that all industry funded research should be dismissed, it does mean that any industry funded research that is produced should be closely scrutinised.

In this case, regardless of what the actual social and environmental outcomes of unconventional gas extraction are, if GISERA research suggests positive impacts then the gas industry benefits.

So how independent is the research that GISERA produces? Does gas industry funding give the industry access, and the potential to influence the organisation’s research? Analysis of the governance and organisational structure of GISERA shows that the gas

industry has strong representation on committees that oversee GISERA's research program.

These committees prepare the annual research program and research budgets. For example, the National Research Management Committee (NRMCM) sets the strategic priorities and direction of GISERA research and its budget for each region. This committee makes decisions by a simple majority and the gas industry makes up 50 per cent of the committee membership.

The Regional Research Advisory Committees in both NSW and Queensland each have two members from the gas industry. On the Queensland committee 6 of its 11 members are either from the gas industry or the CSIRO, with other stakeholders forming a minority.

Industry representation on these committees increases the potential for the independence of GISERA's research to be compromised and for the perception of bias. Put simply, if GISERA is to be seen as independent from the industry it researches then any potential industry influence must be eliminated.

Already GISERA's presentation of research results does not give the impression of independence. An article co-written by its Director downplays the scale of greenhouse emissions associated with CSG and failed to note significant limitations of the research the article was based on.

If the gas industry really believes that unconventional gas extraction is safe and that GISERA's research is independent, then there is no need for industry representation on important and influential committees.

The industry should therefore immediately vacate all positions on these committees. Gas industry funding for research should be placed in trust with the government and contracted to the CSIRO rather than the current direct funding arrangements.

Introduction

The extraction of unconventional natural gas, including coal seam gas (CSG), is a controversial issue in Australia. There is considerable public concern about its environmental and social impacts. These concerns are exacerbated because unconventional gas extraction is a relatively new practice and its environmental impacts are uncertain.

The gas industry is vocal in defence of unconventional gas extraction, including hydraulic fracturing (or “fracking”). The industry claims that the environmental impacts are small and manageable with good regulation. Despite these claims, community concern across a number of states has resulted in restrictions being placed on unconventional gas extraction and the industry has struggled to gain the social licence it needs to operate in many parts of the country.

As part of the gas industry’s attempt to improve public perceptions, it has formed an alliance with the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Together they have formed the Gas Industry Social and Environmental Research Alliance (GISERA).

The purpose of GISERA is to do research into the environmental and social impacts of unconventional gas extraction. CSIRO’s reputation as a trusted research institution could help sway the public and government to accept the development of unconventional gas if GISERA’s findings are supportive.

But how independent is research that is funded primarily by the industry that needs to gain a social licence to operate? Does the industry have input into the research process? These are important questions in assessing how trustworthy and independent GISERA’s research program is.

GISERA has a number of important committees that oversee its research process. The gas industry has representation on those committees and this creates the potential for bias, or a perception of it, in the results of the research.

If the gas industry is truly convinced that unconventional gas extraction is safe and GISERA’s research is independent then it is strange that the industry has decided to have significant representation on important and influential committees. We call on the gas industry to immediately vacate all positions on these committees.

The potential for bias with industry sponsored research has been looked at in many different studies in many different industries all over the world. What has been found

is that where the industry will benefit from a particular predetermined outcome, that outcome is more likely in industry funded research than in independently funded research.

Unconventional gas extraction is an important social and environmental issue that deserves independent high quality research. A close examination of potential bias in any research on this issue is important if Australia is to get the best social and environmental outcomes.

CSIRO and industry funding

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) has a lot of credibility with the Australian people in the areas of science and technology. People trust the integrity of its research, but this trust has been hard won over many decades. This trust can also be lost if the CSIRO does not maintain the high standards that Australians have come to expect from their premier science organisation.

The CSIRO is primarily funded by the government. It also has a long history of close associations with industry, including in instances where there is a potential conflict between research objectivity and industry need. But industry funding usually occurs when the research is about improving the productivity of a particular industry. For example research into crop varieties that require less water or are more resistant to disease.

Gas and oil industry funded CSIRO research has previously centred on assessing the quantity and location of resources and improving engineering associated with drilling and extracting resources. Industry funding of this type of research makes sense for a number of reasons.

The first is that almost all the benefits generated by this research flow directly to the industry. Secondly the researchers' and the industry's incentives for the results of the research align.

In research to improve drilling techniques, industry will only benefit if the research improves productivity. If industry were to use their funding to bias the results, and this moved the research away from improved productivity, then the industry would gain no benefit. The industry only gains from getting the science right.

This is an important distinction. Generally the tradition of industry funding in the CSIRO is not for all kinds of research. It is rather for research where the interests of the researcher and the industry align and the best outcome for the industry is in making genuine scientific progress.

There are other forms of research where industry funding makes less sense. Research where the industry can benefit regardless of whether the objective result is reached is at far higher risk of bias if it is funded by industry. In this case the industry can benefit from what we will call a predetermined outcome. If research to determine the outcome is funded by industry there is a risk that the research will be pushed towards

the predetermined outcome that is in the best interest of industry rather than the scientifically correct outcome.

INDUSTRY FUNDING'S IMPACT ON RESEARCH

There is a rich academic literature on the effects of industry funding on research where the industry will benefit from a predetermined outcome. Studies that have looked at the results of pharmaceutical device research has shown that industry sponsored studies are more likely to have favourable results for the sponsoring industry than studies without industry funding.¹

This is the kind of research that is at risk of bias. Studies that show the pharmaceutical device is more effective than others on the market could see the device more widely used and the company producing the device could potentially make larger profits. This would be the case regardless of whether the device is objectively more effective. The company then has a predetermined outcome that will make it more profitable regardless the scientific facts.

A recent example of this is a Sydney University study that claims industry funding leads to bias in artificial sweetener research.² The study found that industry sponsored research into the effectiveness of artificial sweeteners in weight loss was 17 times more likely to deliver a favourable result than non-industry funded research.

This is another example of the type of research that is at risk of bias. A finding that artificial sweeteners help in weight loss is likely to see a greater demand for artificial sweeteners. This will occur regardless of whether artificial sweeteners actually help with weight loss. The industry has a predetermined outcome that will make it more profitable.

INDUSTRY FUNDING OF GISERA

The CSIRO has entered into a research agreement with the gas industry to look at the environmental and social impacts of unconventional gas extraction. The Gas Industry Social and Environmental Research Alliance (GISERA) has been set up with \$15 million from its partners which include five gas companies and the CSIRO.³ The five gas

¹ Lundh et al. (2012) *Industry sponsorship and research outcome*

² Mandrioli et al. (2016) *Relationship between Research Outcomes and Risk of Bias, Study Sponsorship, and Author Financial Conflicts of Interest in Reviews of the Effects of Artificially Sweetened Beverages on Weight Outcomes: A Systematic Review of Reviews*

³ GISERA, *About Us*

companies are Australia Pacific LNG, QGC, AGL, Santos and Origin Energy. More recently GISERA has also attracted some government funding.

According to the director of GISERA, Professor Damien Barrett:

The alliance is an agreement between five companies and CSIRO to undertake research in the community's interest on environmental and social issues around the establishment of gas.⁴

IS INDUSTRY FUNDING APPROPRIATE FOR THE RESEARCH THAT GISERA DOES?

As discussed above, industry funding of research works well when the researchers and funders all have the same incentive to find the correct answer and doesn't work well when industry funders have an incentive to find a predetermined outcome.

So which type of research is GISERA undertaking? They are looking at the social and environmental impacts of unconventional gas extraction. This research looks at the costs and benefits of unconventional natural gas. In Professor Barrett's words it does so to:

provide unbiased, trusted and highest quality information to communities so they can make up their own minds.⁵

The importance of this is that this allows:

People make up their minds in relation to the industry. That is all about gaining the social licence to operate.⁶

The reason for this research is that unconventional gas (including CSG, shale gas and tight gas) is a divisive issue in the community. The industry lacks a social licence and as a result both major political parties have put heavy restrictions on the extraction of unconventional natural gas. These restrictions have included a moratorium on its extraction and the controversial process of hydraulic fracturing. New South Wales,⁷ Tasmania⁸ and Victoria⁹ all have heavy restrictions, moratoriums or outright bans on CSG extraction. In many cases this has been bipartisan policy. The newly elected

⁴ Herbert (2016) *CSG industry focus of research funding in north west New South Wales*

⁵ Herbert (2016)

⁶ Herbert (2016)

⁷ Bourne (2014) *Australia's NSW government announces new coalseam gas rules*

⁸ Rockliff et al. (2015) *Fracking Moratorium to Continue*

⁹ Andrews (2016) *Victoria Bans Fracking To Protect Farmers*

Northern Territory government has also promised a moratorium on fracking.¹⁰ Queensland is the one state that has a wide scale CSG industry and this has led to division and tension in the community.¹¹

The purpose of GISERA's research program is essentially designed to help answer the question of whether unconventional gas extraction should be given a social licence to operate.

THE CONFLICT OF INTEREST

Industry funding of research works well when conflicts of interest are small and easily managed. In such a situation the industry has the potential to help researchers with their insider knowledge but has no real incentive to lead the research to any predetermined outcome.

In the case of GISERA the potential for a conflict of interest is large. Research findings that show the industry makes a positive contribution have the potential to ease the current restrictions in many states and territories and give a green light for the industry to set up and produce. Research that shows the industry makes a negative contribution could potentially see moratoriums expanded and extended and could see the industry locked out of some states and territories indefinitely. For the industry the stakes couldn't be higher.

In this situation any industry funded research using the CSIRO's reputation would need to be very carefully managed with strict safeguards in place to insure the research was not biased or influenced by the industry in any way.

Unfortunately in the case of GISERA the safeguards might not be sufficiently robust. The structure of GISERA does not lend itself to minimising the potential for industry manipulation. In fact the level of industry input into the various stages of the research process heightens the potential for bias.

GISERA'S STRUCTURE AND THE POTENTIAL FOR BIAS

The structure of GISERA heightens the potential for bias. The National Research Management Committee, with half the members being representatives of the gas industry, means that the industry has some level of influence over research questions.

¹⁰ Dias (2016) *Fracking moratorium takes effect in NT, Chief Minister Michael Gunner says*

¹¹ Merkel (2012) *CSG: what is it, where does it come from, and why is it so controversial?*

According to GISERA:

The National Research Management Committee (NRMC) is responsible for establishing strategic priorities and direction of GISERA; approving commercialisation opportunities identified by partner organisations or a Regional Research Advisory Committee; and approving the Annual Research Program and Budget for each region.¹²

This committee makes decisions by a simple majority and the gas industry makes up 50 per cent of the committee membership.

There are also two Regional Research Advisory Committees. One is in New South Wales and one is in Queensland. According to GISERA:

Each Regional Research Advisory Committee (RRAC) is responsible for preparing the Annual Research Program and Budget each year, advising on science direction and gaps and technical issues, approving research projects and reporting on performance against KPIs.¹³

The RRACs were formed in early 2016 from the Research Advisory Committee.¹⁴ The Research Advisory Committee had a strong representation of Queensland stakeholders. As GISERA's work became more involved in NSW the Research Advisory Committee was split into two RRACs to focus on each state.

Professor Damian Barrett is the director of GISERA and he is at pains to explain that despite the funding arrangement the research is independent of gas industry influence. In an interview with Lisa Herbert for ABC Rural he assured listeners that:

We have a mechanism as part of GISERA to ensure the independence of CSIRO in the work that it undertakes.¹⁵

He went on further to explain what that mechanism is:

Yes well we have a governance mechanism as part of the alliance that ensures that all the money that goes into research is allocated to research projects by an independent Research Advisory Committee. And the committee is made up of a majority of external stakeholders.¹⁶

When pushed on who those external stakeholders were Professor Barrett said:

¹² GISERA, *National Research Management Committee*

¹³ GISERA, *NSW Regional Research Advisory Committee*

¹⁴ GISERA, *Research Advisory Committee (now replaced with Regional Research Advisory Committee)*

¹⁵ Herbert (2016)

¹⁶ Herbert (2016)

We have members from the agricultural community, from the cotton growers, from the NSW government and other stakeholders.¹⁷

What Professor Barrett doesn't say is that the largest single group of stakeholders represented is the gas industry. Two of the 10 members on the Queensland Regional Research Advisory Committee are gas representatives¹⁸ while the New South Wales Regional Research Advisory Committee also has two gas representatives in its 10 members.¹⁹

So the advisory committees, which are identified by Professor Barrett as mechanisms that ensure that the research is independent, actually have strong representation from the very industry that funds the research. In another interview in 2014 Professor Barrett explained how the Research Advisory Committee (the forerunner of the Queensland RRAC) maintains its independence:

The Research Advisory Committee is composed of a number of members from CSIRO, industry and stakeholders, in particular stakeholders in Queensland. The way the advisory committee is set up is that the number of agriculture and external stakeholders on that committee must be equal to or exceed the number of industry and CSIRO representatives on that committee.²⁰

While this is currently true for the NSW RRAC, it is not correct for the Queensland RRAC. According to the GISERA website, of the 10 Queensland RRAC members, five are either from the gas industry or CSIRO.²¹ But Professor Barrett, who is the chair of the Queensland RRAC, is not included in those numbers. His inclusion increases the number of gas industry and CSIRO members to six from a committee of 11. This is greater than 50 per cent.

POTENTIAL INDUSTRY BIAS

The access that the gas industry has to the various research committees gives it an opportunity to have important input into the strategic direction of the research program. They also have input into the direction and funding of research projects.

When undertaking research, the questions that studies aim to answer are important because they shape the direction of the research. A slightly different research question

¹⁷ Herbert (2016)

¹⁸ GISERA, *Queensland Regional Research Advisory Committee*

¹⁹ GISERA, *NSW Regional Research Advisory Committee*

²⁰ Winchelsea Unconventional gas forum, May 2014

²¹ GISERA, *Queensland Regional Research Advisory Committee*

has the potential to lead studies in different directions and produce very different research outcomes.

Academic studies have shown that in other industries, industry sponsored research has led to biased results when the industry can benefit from a predetermined outcome.²² Given this situation it is strange that the industry is so strongly represented in the various research committees.

The gas industry might argue that it wants independent research on the social and environmental impacts of unconventional natural gas. That it is frustrated that no organisation is willing to fund such research and this is why it has funded the CSIRO to do this research. The gas industry has been very clear that it believes that the economic benefits of unconventional gas are large and the environmental and social risks are small and easily managed with good regulation.²³

If it truly is the case that the industry wants independent research into the social and environmental impacts of unconventional gas, then it is strange that it has chosen to be so involved in the committees that direct that research. If the gas industry is correct about the social and environmental impacts of unconventional natural gas then there are other methods it could employ to reduce the risk and perception of bias.

The central concern is with the way in which the gas industry and the CSIRO have chosen to oversee the research. If the industry wanted to reduce the potential and perception of bias then it could remove itself from all committees involved in research decision making processes.

To reduce the risk of bias further the industry could have entered into an agreement with the government to put further distance between the research and the industry funding. The gas industry could have put funding for the research in trust with the government and then the government could have contracted the CSIRO to do the research. Independent research works well when researchers have no financial or other interest in a particular outcome. This requires appropriate governance separation between funders and researchers.

The industry did not choose any of these options. Instead, it chooses to sit on committees that oversee the research. This gives it the opportunity to influence that research. The desire to gain a social licence gives it a motive to influence the research. These two together create the perception of bias.

²² White et al. (2010) *Corporate Manipulation of Research: Strategies Are Similar Across Five Industries*

²³ APPEA (2015) *Australia's top science advisor says fracking is safe*

The industry might argue that it should have representation on the committees that direct the research because it has been the primary funder. This is the central concern about industry sponsored research. It is the mixing of funding of the research and the oversight of the research that creates the potential and perception of bias. Independent research requires that those who fund the research are disinterested in the outcome of that research. For these reasons we call on the industry to immediately vacate all positions on these research committees.

PRESENTATION OF RESEARCH RESULTS

Part of the objective of GISERA as identified by Professor Barrett was to provide the community with the results of the research so they can make up their own minds. This involves presenting the research results in ways and forums that are easily accessible for the general public.

Professor Barrett has been involved in a number of public forums and has published research findings on accessible websites like The Conversation.²⁴ An example of this is CSIRO's 2014 research paper for the Department of Environment: Field Measurements of Fugitive Emissions from Equipment and Well Casings in Australian Coal Seam Gas Production Facilities.²⁵

The original paper was not produced by GISERA – it was produced by another part of the CSIRO – but Professor Barrett and one of the papers authors, who also works for GISERA, wrote about the research findings on The Conversation.

The paper's objective was to measure fugitive emissions from CSG. There has been very little measurement of the amount of fugitive emissions from extracting CSG. This is important since fugitive greenhouse gas emissions from CSG are predominately methane (CH₄), a highly potent greenhouse gas. Even low rates of fugitive emissions have the potential to dramatically increase greenhouse gas emissions from CSG and close the emissions gap between electricity generation from CSG and coal.²⁶

At the moment the government's estimates of fugitive emissions from unconventional gas including CSG are based mainly on measurements of fugitive emissions from conventional gas extraction. Recent measurements of unconventional gas in the United States (US) have shown far higher rates of fugitive emissions than those found in conventional gas.

²⁴ Barrett et al. (2014) *Coal seam gas emissions lower than US: first Australian study*

²⁵ Australian Government (2014) *Field Measurements of Fugitive Emissions from Equipment and Well Casings in Australian Coal Seam Gas Production Facilities*

²⁶ Grudnoff (2012) *Measuring Fugitive Emissions: Is coal seam gas a viable bridging fuel?*

The US measurements of unconventional gas are not necessarily applicable to Australian CSG. Unconventional gas in the US is mainly shale gas and tight gas which are likely to have different rates of fugitive emissions than Australian CSG. Measurement of fugitive emissions from CSG would help show whether the gas industry's often repeated claim that CSG can help reduce Australia's greenhouse gas emissions is true or not.²⁷

While the research was a first step in the measurement of CSG fugitive emissions it contained a number of limitations which would restrict its usefulness in being able to draw any definitive conclusions about the magnitude of CSG fugitive emissions.

The first major limitation of the study was the size of the sample. The study measured fugitive emissions from 43 wells. There are around 5,000 CSG wells in Australia. The 43 sampled wells represents less than one per cent of CSG wells. Such a small sample increases the possibility that the sampled wells fugitive emissions are significantly different from the average fugitive emissions of all wells.

The second major limitation of the study was the selection of the wells. Ideally the wells used in the research should be representative of the well population. This was not the case for this study. As the report author says:

Because individual companies agreed to participate in the project at different times during the course of the project it was not possible to make a properly randomised selection of wells at the start of the project. Instead, wells were selected on an ad hoc basis in the order that companies agreed to participate.²⁸

The selection of wells was further compromised by the fact that the gas industry provided the initial list of wells that could be tested. From this industry list the 43 sampled wells were selected by the researchers. This effectively gave the industry the power to exclude certain wells since they could chose not to include some wells on their list. This creates the potential for bias where the industry could only include wells that are likely to have lower emissions.

This kind of bias does not have to be conscious. For example the industry may have chosen wells that are easily accessible, but easily accessible wells may have significantly different fugitive emissions from the average of all wells.

Another limitation was that all the wells that were sampled were in the production phase. That is there was no measurement of fugitive emissions from exploratory wells

²⁷ APPEA, *How natural gas can minimise greenhouse emissions*

²⁸ Australian Government (2014)

or from decommissioned wells. The report noted that emissions are likely to change over time particularly during periods of repair and maintenance.

The final limitation was that the study only measured fugitive emissions from the well pad. This is only a part of the potential fugitive emissions. There are also fugitive emissions from compression stations, water and gas gathering lines and water treatment plants. The report notes that there were larger leakage sources coming from outside the well pad.

In fact at times the field workers encountered problems because out of scope leakages, that is leakages that were not included because they were not part of the well pad but were close by, were so large they overwhelmed their methane measuring equipment. This made finding small well pad leaks difficult.

These limitations were all noted in the report by the authors. The report was a limited attempt to measure emissions and the ability to draw larger conclusions about fugitive emissions of the whole industry from this report is difficult.

An important form of bias is giving undue weight to certain findings in the research.²⁹ While the research itself might cover all aspects and present all findings, the presentation of those findings could emphasis certain positive aspects of the research while glossing over negative aspects. This form of bias is particularly problematic when highly technical findings are being presented to a non-technical audience.

The lead author on the paper, Stuart Day – who works for GISERA – and Professor Damian Barrett – the Director of GISERA – wrote an article about the report for The Conversation. Despite the limitations of the research, the article had a different tone. Under the heading ‘Coal seam gas emissions lower than US: first Australian study’ the article says:

In the first Australian study of its kind, new CSIRO research now gives an indication of how much those “fugitive emissions” might be, and how we can start to reduce them.³⁰

While the study did note the smallness of the sample it made no mention of the potential sample bias or that there was no attempt to measure all fugitive emissions.

The article also downplayed the size of the measured fugitive emissions saying:

On closer scrutiny, some of the leaks were due to faulty seals on equipment and pumps, which could be easily fixed, while other emissions were associated with

²⁹ Ioannidis (2005) *Why Most Published Research Findings Are False*

³⁰ Barrett et al. (2014)

exhaust from gas-fuelled engines used to power water pumps that are not regarded as “fugitive” emissions.³¹

Someone reading the article could be forgiven for believing that the CSIRO, a trusted organisation, had made an important first step in measuring fugitive emissions from CSG and found them to be smaller than in the US and the report could well be overstating the actual fugitive emissions.

Indeed the heading of the article ‘Coal seam gas emissions lower than US: first Australian study’ is incorrect. The paper does not show that CSG emissions are lower in Australia than in the US. There are far too many limitations on the research to make such a claim.

³¹ Barrett et al. (2014)

Conclusions

The structure of GISERA is increasing the potential for bias. This is particularly the case because the industry has a lot to gain from findings that show that the extraction of unconventional gas has large positive benefits and small and easily managed negative consequences.

The best way to reduce the potential for bias in research is to do the research in a way that excludes those who might benefit from a predetermined outcome. But now that GISERA has been set up are there ways to improve its structure to reduce the potential for bias?

One very important way would be for the gas industry to remove itself from all of GISERA's research committees. The presence of gas industry representatives increases the potential for bias as gas representatives have the opportunity to direct the research program.

While the industry may wish to have close ties with the research program given it has funded the research, these close ties create the perception of bias and call into doubt the independence of the research. This is particularly the case given that studies conducted about industry funded research in other industries has shown that it is more likely to make findings that favour its sponsors than independently funded research.

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