Economics Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Industry Portfolio
Budget Estimates Hearing 2014-15
2-3 June 2014

AGENCY/DEPARTMENT: Commonwealth Scientific & Industrial Research Organisation

TOPIC: CSG fugitive emissions study

REFERENCE: Written question - Senator Waters

QUESTION No.: SI-124

CSG fugitive emissions study
Field Measurements of Fugitive Emissions from Equipment and Well Casings in Australian Coal Seam Gas Production Facilities was released on 31 July 2014 and claimed that CSG fugitive emissions were not significantly higher than current government estimates.

1. Does this report settle the question of the magnitude of fugitive emissions from CSG?
2. One of the qualifications that CSIRO placed on the report was that it had a very small sample size – 43 wells out of the estimated 5,000 already operating, or less than 1% of all wells. I understand that US studies have found that much of the fugitive emission from unconventional gas may come from a small number of "mega-emitters".
   a. In your understanding, do you expect that the situation in Australia will be similar, with "mega-emitters" accounting for a significant proportion of CSG fugitive emissions?
   b. In your understanding, did the sample size in the recent study adequately account for the wide variability in fugitive emissions levels?
3. The study only looked at a few stages of production, and didn't look at well completion, gas compression, water treatment, pipelines and downstream activities, however the largest leak you found was at a water facility that was outside the scope of the study (p 34), do you have reason to suspect that those leaks are commonplace?
4. Have overseas studies identified significant fugitive emissions at the stages of production which you did not study?
5. Another qualification was that the measurements were taken over a short timeframe – and that long term trends like deterioration and poor maintenance might not have been captured – how long would you have to measure for to get an accurate picture?
6. Has anyone in CSIRO commenced or completed any work to identify an appropriate time period over which to measure fugitive emissions from CSG facilities?
7. Please provide a summary of the above work to date, if any.
8. I understand that some of the largest leaks the study identified were fixed immediately. That is positive, but on page 35 the study notes that since wells operate largely unattended, there may be some time between when the leak forms and when it is repaired.
   a. Were those leaks detected as a result of the study being undertaken?
   b. Do you know how long it would have taken if you hadn't been there to pick up those leaks?
9. You didn't find any well casing leaks, but the study notes that US estimates are that 6-7% of wells are subject to integrity failure. Do you think that means there are no casing leaks in Australia?
10. The study pointed out that a randomised sample was not used because of the method used for well selection. In relation to this issue:
    a. Is CSIRO confident that the initial lists of wells or facilities provided by participating companies were complete lists rather than incomplete ones?
    b. What measures did CSIRO take to ensure that those lists were complete lists?
    c. Did CSIRO make any requests to access particular wells or classes of wells which were denied by participating companies?

d. How many such requests were denied?
e. How many wells were subject to those requests?
f. How many CSG companies were not participating companies?
g. Did CSIRO make any offers to those companies to participate which were turned down?
h. How many such offers were turned down?
i. What segment of the market, broken down by total wells, was not represented in the study?
j. Is the CSIRO aware of poor compliance records among those companies not represented?
k. Please provide a timeline of when particular companies agreed to participate in the study, including the date on which all data gathering was completed.

11. I understand this is the first phase of a collaborative research program between the Department and CSIRO into CSG fugitive emissions.
    a. Does that program have a name?
    b. When is that program expected to publish its next piece of work?
    c. What's the overall timeframe for that program?
    d. What is the budget, broken down by financial years, in the next four years?
    e. Has that program lost staff or resources from the recent budget cuts to CSIRO?
    f. Will that program be subject to delays as a result of funding reductions at the CSIRO since September 2013?
    g. How long are those delays if any expected to be?
    h. Please provide a detailed summary of the scope of that program.
    i. How large is the sample size of wells and facilities covered expected to be?
    j. Will the program examine the adequacy of current emissions factors as the last study did?
    k. In particular, does the program cover, well completion, gas compression, water treatment, pipelines and downstream activities?
    l. In relation to well selection – will the same system be employed to select wells as was used in the last study – i.e. selection from a list provided by companies who have volunteered to participate?
12. Did the CSIRO ever ask any other government agency for advice on compelling CSG companies to participate, or to provide access to particular wells or classes of wells?
13. Is the CSIRO aware of any powers which might be used to compel such cooperation?
14. Has CSIRO considered compelling cooperation from CSG companies or other industry players?

Shale and Tight Gas

15. Is there any similar work proposed or funded for shale or tight gas?
16. Please provide the following details about any such work:
    a. Timeline – including expected publication dates
    b. Budget
    c. FTE committed
    d. Scope – stages of production to be examined, temporal range
    e. Will the companies involved be obliged to provide access to wells and facilities, or will the work be done on a voluntary basis?
    f. Other funding sources (i.e. GISERA, private funds)
17. Does the CSIRO consider that the knowledge base in relation to fugitive emissions is settled?
18. Does the CSIRO consider the current emissions factors in relation to shale and tight gas to be adequately backed up by scientific evidence?
19. Have you advised the Department of Environment, the Department of Industry or the relevant Ministers regarding the adequacy of the scientific evidence behind emissions factors for shale and tight gas?

What was the date of that advice? If more than once, please provide all.

ANSWER

It's important to note that this study was a pilot study, measuring emissions at 43 CSG wells (37 in Queensland and six in New South Wales) encompassing less than 1 per cent of the existing CSG wells in Australia. It is also important to note that emissions were measured from well pads, so the results cannot give a full representation of the whole-of-life emissions.

The CSIRO study found that the range of methane emissions from equipment leaks across the sample of wells was consistent with the Method 1 emission factor currently used in the National Greenhouse Gas Emissions Reduction Reporting for general equipment leaks.

1. No. The CSIRO study provides initial estimates of fugitive emissions from one sample of coal seam gas wells in Qld and NSW. While the sampling methodology used to select wells for the sample is sound and conclusions from the study are robust within the constraints of the study, further work is needed to increase the sample size of measured wells. This will reduce uncertainties in the magnitude of fugitive emissions from CSG.
2.
    a. Yes. The situation observed in the United States, where very few 'mega-emitters' account for a significant proportion of CSG fugitive emissions, is likely to be common among gas wells and infrastructure of all types worldwide.
    b. The sample methodology was designed to representatively select wells from the population of all wells (classified by production region, well age, horizontal and vertical drilling, hydraulically fractured or not, varying gas production rates, surface gas pumps versus free flowing gas) in order to cover the full variation in possible fugitive emissions. Within the constraints of the study, the researchers were confident that the wide variability in fugitive emissions levels was represented in the sample.
3. The CSIRO study was confined to observations of fugitive emissions associated with CSG wells and infrastructure on well pads. Measurement of fugitive emissions associated with water infrastructure beyond the well pad was outside the scope of the study. However, at one site CSIRO had an unplanned opportunity to make a single estimate associated with a water gathering line near the well pad and it is this measurement that is mentioned in the study. CSIRO expects that 'associated water' and facilities will generate methane emissions due to degassing of dissolved methane. The CSIRO Report recommends further investigation of these sources of methane to determine their frequency.
4. Yes. For example, some studies have found emissions during the flow back period after hydraulic fracturing operations in shale and tight gas wells. Downstream processing facilities are also known sources of fugitive emissions. Similar measurements to those undertaken in the phase 1 CSIRO study are required to determine whether or not these fugitive emissions sources are significant in Australia.
5. A long term, robust sampling and monitoring system is required to measure changes in fugitive emissions over time. The detailed design and development of such a monitoring system, including how long you would need to measure to get an accurate picture, has not yet been undertaken.
6. The development of a monitoring system for fugitive emissions has not yet been undertaken. However, CSIRO is currently undertaking some research which will inform the development of a monitoring system (see Question 7).
7. CSIRO, through GISERA, is conducting research on trace gas emission and atmospheric transport which is relevant to developing a monitoring system for fugitive emissions.
8.
    a. Yes.
    b. No.

9. Although the CSIRO study did not identify any well casing leaks, it is not possible to conclude that there are no casing leaks in Australia.

10.
   a. CSIRO asked for a list of wells and this was supplied by companies. Wells were selected from this list based on the criteria in the report. Wells of different types were as noted in response to question 2b. Companies arranged site visits to selected wells. CSIRO relied on companies to provide comprehensive lists.
   b. CSIRO asked companies to provide the information on a voluntary basis and the companies cooperated.
   c. No access was denied to CSIRO. Some wells that were initially selected but were shut-in or decommissioned were not sampled. Other wells were then selected by CSIRO for measurement and the required access was provided by the participating companies.
   d. None.
   e. None.
   f. The participating CSG companies and well localities were listed in Table 3.1 of the CSIRO report.
   g. No.
   h. None.
   i. The companies represented in Table 3.1 of the CSIRO report represent the majority of upstream gas production in eastern Australia.
   j. No.
   k. Companies agreed to participate in the study by telephone conversations and email correspondence. These emails span the dates 20/03/2013 to 18/10/2013. Measurements on CSG wells were made between April and November 2013. The period of consultation and measurement overlap as different companies responded at different times.

11.
   a. No.
   b. Following completion of fieldwork, a report will be provided to the Department of the Environment who will oversee publication, with an expectation of publishing prior to the end of 2015.
   c. Currently the research consists of a second phase of field measurements that CSIRO will finish by June 2015 with the associated report to be prepared thereafter.
   d. The Department of the Environment has contributed a total of $190,000 in funding for work to be completed in the next 9 to 12 months.
   e. Redundancies have occurred in CSIRO but with staff changes and redeployment core competencies have been retained in this project.
   f. No.
   g. Not applicable.
   h. The scope of Phase 2 is to collect Australian-specific field data measurements from elements in the CSG exploration and production chain over the next 9 to 12 months. The details of the scope and methods to be applied are being refined in the first part of this work.
   i. These details are being defined in the first part of this work. Final sample size of wells is to be determined as part of the project implementation over the next 9 to 12 months.
   j. Yes.
   k. The scope will focus on elements in the exploration and production chain. The primary focus will be on well completions. Gas compression and water treatments facilities will be included with sample numbers to be defined. Pipelines and downstream activities will not be covered in Phase 2.

l. The selection of well completions will be based on company schedules associated with drilling and finalization of wells. This is necessary to capture emissions occurring at the time of completion. The selection process will be similar to the first phase reported in the CSIRO report of June 2014. However, the project implementation may need to be altered based on contingencies associated with drilling schedules.

12. No.
13. No.
14. No.

Shale and Tight Gas

15. The Department of the Environment is in discussions with CSIRO about measuring emissions from shale gas fields. Measurement of a shale gas or tight gas well may be included in the current work.
16. At present any shale gas well included in the Department of Environment 'Research program to undertake measurement of fugitive emissions from coal seam gas activities' contract would be covered by the current Phase 2 project. There will be no additional funding or staff commitments to undertake such work if it were to proceed.
    a. Not applicable.
    b. Not applicable.
    c. Not applicable.
    d. Not applicable.
    e. Not applicable.
    f. None.
17. No.
18. The current emissions factors for shale and tight gas would benefit from further Australian specific measurements tailored to the equipment and methods used here to ensure that current emissions factors are supported by scientific evidence.
19. Part of Phase 2 includes a literature review 'Emission Factors for Estimating CSG Fugitive Emissions – Review of Recent Literature'. Part of this literature review considered emissions factors from shale gas. This literature review has been forwarded to the Department of the Environment which is responsible for publication.
20. The literature review 'Emission Factors for Estimating CSG Fugitive Emissions – Review of Recent Literature' was dated June 2014.