Case Study

Improving fugitive emissions management in the Australian LNG industry

The Challenge

As LNG plant operators act to reduce greenhouse gas emissions, tracking progress requires emissions to be accurately calculated and reported.

Fugitive emissions is a broad category of greenhouse gas emissions from the fossil fuel industry, making up 10.5% of Australia's total greenhouse gas inventory. Because fugitive emissions include methane leaks as well as venting and flaring of greenhouse gases such as CO_2, there are myriad locations at an LNG plant where fugitive emissions may occur. This complicates both estimation and measurement of fugitive emissions.

Greenhouse gas legislation defines a range of estimation methods for industry to choose between. These methods assume fugitive emissions are correlated with, and calculable from, another quantity, such as plant capacity or the number of particular equipment items. Although different factor-based methods exist, there is little understanding of how greatly estimates vary between methods—and why.

While factor-based estimates are used for greenhouse gas reporting, only measurements can give plant-specific data on fugitive emissions. Measurement challenges include reconciling broad aerial measurements with narrowly focused plant measurements, and developing sensors for key emission sources.

Improvements to fugitive emission measurement and estimation are needed to help industry identify, report, and reduce this important subgroup of greenhouse gas emissions.

Outcome

When reporting, companies estimate fugitive emissions using methods in greenhouse gas legislation, particularly the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*. Our first step was to develop an LNG plant case study to test and compare these methods. In total, seven deficiencies in legislation were found and their underlying causes investigated.

We found scenarios where vented methane emissions from compressors were counted twice or omitted due to mistaken use of factors prescribed by legislation. We also pinpointed a mathematical error in the legislation relating to methane emissions from flaring. Beyond identifying these and other issues, we developed an improved factor for calculating methane leaks from gas processing plants that substantially increases confidence in the estimated value.

In addition to reviewing estimation methods, we investigated technologies to measure methane emissions. Measurement from the air, such as drone-mounted sensors, is an emerging way to accurately measure methane emissions from LNG plants. One potential use of this technology is measuring methane above flares. These measurements could be used by companies to specify their own flare destruction factors when reporting fugitive emissions, rather than the current approach of legislation specifying this factor.

Our review concluded that aerial measurements require more testing in Australia. Tests that release controlled amounts of methane into the atmosphere are costly and logistically challenging, yet are needed to ensure aerial measurements are accurate enough for fugitive emissions reporting and to validate estimated values.

Impact

Our report *Improving fugitive emissions management in the Australian LNG industry* contains 11 recommendations for industry and regulators.

In the area of greenhouse gas reporting, our recommendations help industry better partition their fugitive emission sources within the current framework of methods. Our recommendations for improving estimation methods will help regulators take the next step of amending legislation.

In the area of methane measurement, our recommendations provide steps to reach the goal of measurement-informed fugitive emission inventories. These steps require collaboration across industry due to the cost of developing and deploying measurement technologies. Collaboration between industry and regulators is also needed to ensure reasonable rules are developed for using measured data when reporting fugitive emissions.

Next steps

We plan to communicate the problems with greenhouse gas legislation found through this work to the Department of Climate Change, Energy, the Environment and Water (DCCEEW), which administers the legislation. Findings of this work can then inform future amendments to legislation and make fugitive emissions reporting more consistent.