Submission to the Climate Change Authority
Caps and Targets Review: Issues Paper

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Carbon Budgets and Climate Justice

Summary

This submission focuses on how to determine Australia's fair and defensible share of the global emissions budget. The submission draws on two pieces of research that are currently being undertaken at the Social Justice Initiative: 'The Health Implications of Unconventional Gas' and 'The Carbon Budget Problem'. The research is supported by an Australian Research Council Discovery grant, a grant from the Graham Wood Foundation and from Kindness House. We gratefully acknowledge this support.

Key Recommendations

The submission focuses on the moral and political implications of Australia's current emissions profile, resource exports and carbon counting framework.

In the deliberations on **how to determine Australia's fair and defensible share of the global emissions budget**, we claim that the Authority ought to consider several key issues concerning:

- Whether to count at least some of the emissions from fossil fuel exports in Australia's carbon budget.
- Whether and to what extent Australia should bear moral responsibility for the consequences of the release of emissions from its exports.
- Whether there should be a moratorium on the development of unconventional gas reserves in the light of their impact on health and their emissions profile.

1 Approaches to determining Australia's fair and defensible share of the global emissions budget.

a) Counting Australia's Emissions

In order to allocate emissions between countries we need to measure how much CO2-e a country is emitting. In determining how to view the scope and significance of Australia's Co2-e emissions the Authority should consider several moral issues that arise for standard methods of counting emissions. The current IPCC guidelines that are used by the UNFCC state that national inventories of GHG emissions "…include

greenhouse gas emissions and removals taking place within national territory and offshore areas over which the country has jurisdiction.".[1] What they call "scope 1+2" emissions are those emissions that are produced within a country's borders by various types of activity (industrial activity, transport and so on). Scope 3 emissions are the emissions that are produced outside a country's borders. These latter are not part of the country's emissions budget. To give an example, if a country exports coal the emissions that are generated in extracting the coal and transporting it to a port are part of that country's emissions budget because they occur within its territorial boundary. The emissions that are produced when the coal is burnt are part of the budget of the country that burns them.

Accounting for emissions in this way seems an intuitively plausible way of dividing the emissions budget. There are two dimensions to this question. The first concerns the basic carbon accounting that is occurring under the current framework. The second is whether a country ought to take responsibility for the consequences of its exported emissions. If we think of this question in terms of the scope 1-3 framework the moral and budgetary responsibility seems to fit nicely into the framework set down by the IPCC. Countries have moral and budgetary responsibility for scope 1 and 2 emissions but not for scope 3 emissions. What happens to the planet as a result of a country's scope 1 and 2 emissions is that country's responsibility. What happens as a result of what others do with exported fossil fuels for instance, is a matter for the recipient country.

However, things are not so simple. There is a plausible case for saying that countries have prima facie responsibility for at least part of the harms caused by their scope 3 emissions. Consider the following analogies. Suppose that a country produced and exported large amounts of tobacco to a developing country that did not have health warnings for smoking. Given what we know about the links between smoking and death and disease, the exporting country is plausibly implicated in the harm caused and morally responsible for at least some of that harm. Though transnational tobacco companies contributed significantly to the economies of several nations through employment and foreign direct investment, they were successfully confronted with the notion that they were well aware of the deleterious effects of their product on the consumer (and public at large who suffered the health costs of smokers) and thus could not escape responsibility for mitigating the manner in which they promoted and advertised their product. Another example concerns hazardous waste. Where one country knowingly ships its dangerous medical or industrial waste to a country that has low or no standards for its safe disposal, we can say that the exporter bears some responsibility for harms that may result when the waste is not properly disposed of. This is still likely to be the case even where there was consent from the importer to take the waste. More obvious still is the case of uranium exports. There are good reasons why many countries place restrictions on the end destinations of their product. The risks of weapons proliferation, accidents at reactors, storage issues and so on is just too great with some countries to countenance an export program. Should a country knowingly export uranium to a country where safety is lax we could rightly accuse it of being irresponsible and having a share in the blame if an accident were to happen. We could make similar analogies with the exports of other things such as live animals or dangerous industries.

What these examples demonstrate is that there are cases where harms are the responsibility of agents who may not have directly caused the harm. In formulating its

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2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 1 *Introduction to the 2006 guidelines,* p. 1.4.

view on Australia's emissions budget, the Authority ought to consider that exporting fossil fuels is like these other harms in morally relevant respects and that in many cases resource exporting nations have at least some prima facie responsibility for the harms that they cause through the export and use of resources in a climate constrained world. Australia benefits economically from this trade – and from fuelling climate change – without acknowledging that benefit or the costs. Leaving the responsibility for mitigation to others involves an abrogation of ethical responsibility to the market and to the consumer. According to a recent report when export emissions are added to domestic emissions, Australia jumps from the 15th to 6th biggest polluter globally.[2]

b) Unconventional gas

Australia has significant reserves of unconventional gas, with combined estimated reserves of coal seam, shale and tight gas amounting to over three and a half times those of conventional gas.[1] The industry is undergoing a rapid growth as a result of advances in gas extraction techniques, with a substantial increase in LNG exports predicted over the next 20 years. While the Australian shale industry is still in its infancy, increasing interest in these reserves will likely see a considerable expansion of hydraulic fracturing in Australia in the near future.

Despite the apparent benefits of unconventional gas for domestic supply and export earnings, the industry has been beset with controversy over its potential health and environmental impacts.

One of the major selling points of the industry is its relatively climate-friendly profile. However, although combustion of unconventional gas produces only about 40% of the greenhouse gas emissions of coal, this climate-friendly profile is called into question by the level of fugitive emissions that the extraction and transport of unconventional gas produces. There is considerable disagreement about the amount of fugitive emissions, with estimates ranging from 0.1% - 9% of gas produced (the US Environmental Protection Agency has revised its estimated level upwards to approximately 2.4%). Estimates vary based on the data sources used, the mix of venting and flaring that is assumed, and the amount of potential fugitive emissions that are presumed to be captured for use.[2-6] Notably, there are as yet no reliable figures for Australian operations.[7]

Shale, coal seam and tight gas are mostly made up of methane, which has a much greater global warming potential than carbon dioxide—current conservative estimates are that it has an effect 25 times greater than carbon dioxide over a 100 year period, and 72 times greater over a 20 year period.[8] Although many discussions of the benefits of gas only consider the implications of emissions over a 100 year period, the nature of climate change and the possibility of 'tipping points' in the short-term means that it is equally important to consider the 20 year period. Several reports have estimated fugitive emissions to be of a level that would likely undermine its climate benefits compared to coal from such a short-term perspective.[9]

Furthermore, given Australia's high level of LNG exports—which are expected to reach nearly 70% of production by 2035—the effects on overseas markets must also be taken into account. While increased gas production typically displaces coal use on the domestic front, this is not likely to be true for export countries, where it may instead displace emerging renewable markets. In addition, the technology used for generating energy from LNG in export countries cannot be assumed to be of comparable efficiency

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[2] F. Green and R. Finighan, *Laggard to Leader: How Australia Can Lead the World to Zero Carbon Prosperity*, July 2012, page 16.

to that deployed in Australia, with the potential of further increasing Australia's greenhouse gas responsibility.[10]

Aside from climate considerations, fears over the potential health implications of hydraulic fracturing have resulted in numerous protests and calls for the practice to be halted or heavily regulated. While there is a dearth of conclusive evidence regarding the health effects of fracturing, there is some emerging consensus over the areas of greatest potential risk and uncertainty[11]—many of which have not attracted much public attention.

The risk of fracturing chemicals polluting drinking or irrigation water appears low, however it cannot be dismissed. It is likely that any exposure would be to heavily diluted chemicals at levels where their toxicological effects are not always well understood. In particular, chemicals affecting the endocrine system can affect humans at extremely low quantities.[12] Furthermore, the fate of stranded fracturing fluids (the 20-40% of fluids that remain underground after the operation has ceased) has not been well established, and reports from the US indicate a high level of failure rate for abandoned wells.[13] Additionally, it is known that fracturing causes minor seismic activity, and while this is not likely to result in earthquakes that can be felt, it introduces a further risk of damage to well-casings.[14]

However, while the risks from fracturing chemicals have been a focus of substantial public concern, it is wastewater—which contains naturally occurring contaminants as well as fracturing and drilling fluids—that appears to be a much greater risk.[13,15] There are many documented cases of spills, failures of holding dams, and the accidental and planned release of wastewater in Australia and overseas.[16-18] Natural contaminants present in gas reservoirs such as heavy metals and radioactive materials have serious and well-known health effects, and typically have a longer half-life than fracturing chemicals.[13] Uranium and heavy metals can be mobilised by fracturing and drilling chemicals[19], and radon (a highly mobile gas that is the second biggest cause of lung cancer) has been detected in raised quantities in Australian gas developments.[20] Such radioactive material is difficult and costly to remove from wastewater.
Although unconventional gas developments are not responsible for the same level of air pollution by damaging particulate matter as coal developments, they produce emissions from infrastructure and stationary equipment, gas processing, venting and flaring. Fugitive methane emissions can turn into ground level ozone and combine with particulate matter to form smog, both of which contribute to respiratory disease in particular.[21] Gas-field haze is a well-known effect of unconventional gas developments in the US, and such pollution can travel substantial distances past the source. The cumulative risks from all these sources are difficult to estimate, however it has recently been stressed that there is no 'safe' level of air pollution.[22]

Gas developments can also have numerous social and psychological effects, which can exacerbate more direct health effects. While there are some potential benefits to local communities, recent reports indicate sustained individual and community stress caused by coal seam gas operations in Australia.[23] The use of fly-in, fly-out work forces in the mining industry has also come under scrutiny for its effects on community cohesion, as well as being associated with high levels of alcohol and drug use, mental health issues and violence.[24]

These risks need to be considered in relation to the way the future environmental and social backdrop is likely to be shaped by climate change. In particular, increases in droughts and floods are likely to exacerbate many of the risks, especially those associated with water pathways.

Any discussion of such health implications must acknowledge that these are only meaningful in a comparative framework. While it is common to favourably compare

unconventional gas with the coal-fired energy, this sets a low bar and obscures less favourable comparisons that can be made with other forms of energy generation.

Summary of concerns regarding unconventional gas

Fugitive emissions

- Australia currently world's 4th largest exporter of LNG, predicted to be 3rd by 2035.
- Fugitive emissions need to remain below 3.2% for net climate benefits relative to coal over *all* time frames (Alvarez et al 2012). Wigley of US National Center for Atmospheric Research estimates they need to be kept below 2%.
- High estimates - Howarth et al 3.6 – 7.9%; measurements of 9% in Utah. Low estimates 0.1% (Clark et al); 2% (Jiang).
- Australia's fugitive emissions projected to increase from 42 Mt CO2-e (2008-2012) to 58 Mt CO2-e (2030) (DCCEE 2012).
- If the world uses the high recovery rate for shale gas (EIA), this would be nearly 30% of the global emissions budget (Broderick et al et al).
- The US EPA has set up a Global Methane Initiative scheme to reduce fugitive emissions, predicting they can be reduced by 40%.

Fracturing chemicals

- Approx. 0.1 to 0.5 litres of chemicals are injected per square metre (shale gas) (Lechtenbohmer et al 2012).
- *Potential* health effects of chemicals used in Aus include cancer, skin and eye irritation, respiratory problems, damage to the nervous system and blood cells, endocrine disruption, reproductive problems.
- Halliburton has developed 'cleanstim' – a food grade fluid.
- Industry maintain that there have been no confirmed cases of aquifer contamination from fracturing fluids, however there is at very least one.

Naturally occurring materials

- Rock waste cuttings from the Marcellus shale have been shown to be 25 times more radioactive than background levels. No info found on Australian shale.
- Radon detected in water at levels over the EPA limit in NY State, unclear whether this is from fracturing.
- NORM is also an issue in oil and conventional gas industries.
- Several reports of animal deaths as a result of exposure to wastewater in the US.
- Waste salts a well-known issue, but unclear what direct health implications they have.

Air pollution

- 'Downwinder's syndrome'—symptoms associated with exposure to air pollutants—has received some attention but no confirmed patterns in Australia.
- Several recorded incidents of explosions due to build up of methane.
- Wastewater and blowouts also potential sources of air pollution.

Social and psychological

- Noise also a potential issue in gas developments.

Social justice considerations

- Impacts felt most heavily by rural populations, who may not see the benefits.
- Mixed support from Indigenous communities, with some welcoming it as a solution to intergenerational poverty and others opposing it.
- The exact nature of effects on workers is unclear, though silicosis, shift work, and exposure

to chemicals and NORM exposure have been raised.

- Many potential health effects disproportionately effect the elderly and children.
- Some studies indicate disproportionate effects of pollution related illness on those from lower socio-economic backgrounds.
- Nature of health and environmental impacts means that they might effect future populations.

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