Expert Report

NSW Independent Planning Commission,

Vickery Extension Project - Supplementary Advice

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During the Vickery Extension Project public hearing, I was asked a number of questions by the Commissioners. I provide the following brief responses to those questions.

1. Will moving coal transport from trucks to rail have a significant impact on the greenhouse gas emissions from the Project?

No, as most of the emissions associated with the Project will come from the combustion of the coal rather than the transport of the coal. It is important to note that it doesn't matter where on Earth the coal is burned, the CO_2 emitted becomes part of the well-mixed burden of CO_2 in the global atmosphere, which in turn is contributing to climate change and its impacts around the world. Thus, burning of coal from the Vickery Extension Project will contribute to the worsening impacts of climate change in Australia no matter where the coal is burned. Examples of such impacts are the repeated bleaching of the Great Barrier Reef, and the increase in the size and intensity of bushfires, such as those experienced in the Black Summer of 2019/2020.

2. Does the fact that the applicant has made a commitment to sell coal to countries that are signatories to the Paris Agreement alleviate your concerns in relation to Scope 3 emissions?

No. Virtually every country that is a signatory to the Paris Agreement - and that is nearly all countries on Earth - have made commitments that are not consistent with the temperature target range of the Paris Agreement (keeping temperature rise to 'well below 2°C and aiming for 1.5°C'). In fact, current policy commitments would most likely lead to 3°C or more of heating (Rogelj et al. 2016). Furthermore, most countries are not on track to meet even their inadequate Paris commitments, and thus global emissions of greenhouse gases have continued to rise since 2015, the time of the Paris Agreement. Australia is a good example of this problem. Our commitment is a 26-28% reduction in emissions by 2030 (on a 2005 baseline), which is woefully inadequate according to the science (and the recommendations of the Climate Change Authority, which were for a 45-65% reduction by 2030). Furthermore, we are not on track to meet even these very weak targets. One has to remember that the Paris Agreement does not directly determine what future emissions will occur as a result of decisions made at the Project level.

3. (To the extent that it is within your expertise) what is your opinion on carbon capture and storage and high energy low emissions technology?

To the best of my knowledge, carbon capture and storage (CCS) is still far from the commercialization stage. There are some pilot facilities in operation around the world, but they are small in number and are often used for enhanced oil recovery. Given this situation, CCS should never be used as a rationale for approving new fossil fuel developments or extensions to existing fossil fuel developments. I don't know much about 'high energy low emissions technology', but I have not seen it mentioned in the list of solutions to the climate change challenge. If it were viable now to be deployed at scale, it certainly would be prominently mentioned in the climate solutions literature, including the IPCC reports, and I have not seen it mentioned there.

4. What are the environmental (and other) impacts that are likely to arise under a temperature increase of 3.2℃?

I stated to the Commissioners my opinion that we are currently on track for temperature rises in the vicinity of 3.2ºC. Here are a number of projected impacts on Australia of a 3°C temperature rise (both for the environment and more generally). Note that at these high rises in global average temperature, there is not a large difference in the projected impacts for a 3°C or a 3.2°C temperature rise:

- The majority (70-90%) of tropical coral reefs are projected to die at a temperature rise of 1.5°C and over 99% will be dead at a 2°C temperature rise (IPCC 2018). At a temperature rise of 3°C, it is virtually certain that the Great Barrier Reef will be dead.
- It is highly likely that there will be substantial losses in the ocean's biotic productivity, a significant increase in ocean acidity, and the deterioration of coastal ecosystems such as mangroves and seagrasses (Hoegh-Guldberg et al. 2014).
- Kakadu National Park (a World Heritage site) has an average relief above sea level of about 0.5 metres. At 3°C of heating, sea level is projected to rise by about 0.8 metres by 2100, substantially changing these iconic wetlands. These impacts may occur well before 2100 as sea levels along the Northern Territory coast are currently rising at about twice the global average (Pettit et al. 2018).
- Impacts on terrestrial ecosystems include: (i) increasing desertification; (ii) loss of rainforests; (iii) woody shrub encroachment into alpine herb fields and savannas; (iv) increasing frequency, extent and intensity of bushfires; (v) forest dieback, especially in areas affected by clearing and drought (Hughes 2014).
- Freshwater systems will suffer from higher air and water temperatures, reductions in flows in drought-affected areas, declining water quality and disruption to hydrodynamics. The Murray-Darling Basin will continue to decline (Kingsford et al. 2017).
- Observed decreases in cool season rainfall in southeast and southwest Australia are projected to intensify at 3°C of heating (Feng et al. 2019), presenting a formidable challenge to broad-acre cropping (Howden et al. 2014). At the current 1.1°C of heating, the profitability of broad-acre cropping has already been reduced by 22% (Hughes et al. 2019).

- A 3°C temperature rise would significantly increase heat stress and reduce the productivity of pasture-based dairy cattle in temperate zones (Lees et al. 2019) and beef cattle in northern Australia. Declining forage production due to declining or more variable rainfall would likely reduce numbers and productivity of domestic livestock (sheep and cattle) (McKeon et al. 2009).
- Rural and regional communities are particularly vulnerable to increasing droughts, bushfires and heatwaves. At a 3°C temperature rise, impacts on profits and business viability are likely to cause increasing unemployment and possibly higher suicide rates (Hanigan et al. 2012).
- Longer and more intense heatwaves will increase human mortality and morbidity in our cities and towns, especially among the most vulnerable - homeless, poor, outdoor works, elderly and those with pre-existing conditions (Cowan et al. 2014; Toloo et al. 2015). There will be knock-on impacts on social and health services (Sun et al. 2019).
- More than 85% of Australia's population lives along the coast. A sea-level rise of 1.1 metre (an upper level projection for 2100 under a high emissions scenario) would place about $226 billion (in 2008 $) at risk of inundation (DCCEE 2011).

The list could go on, but the point is that the high-probability impacts are severe, presenting very large challenges to our health, well-being, economy, livelihoods, and natural ecosystems. Australia at a 3°C temperature rise would be largely unrecognizable compared to 20th century Australia, and would be one of the toughest continents on the planet for humans to thrive upon.

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