

The National Climate Disaster Fund

The cost of natural disasters is increasing due to climate change. Costs are currently borne by individuals, communities and governments. A National Climate Disaster Fund should be established to reduce the cost burden of natural disaster response and recovery to Australian households and taxpayers. It should be funded by a levy on coal, gas and oil production, as multi-national fossil fuel companies profit from climate change but make a very small contribution to the communities that bear its costs.

Mark Ogge
Tom Swann

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Level 1, Endeavour House, 1 Franklin St
Canberra, ACT 2601
Tel: (02) 61300530
Email: mail@tai.org.au

Website: www.tai.org.au

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Summary

Australia urgently needs a dedicated, independently administered fund to meet the escalating costs of natural disasters due to global warming.

Natural disasters already cost Australians over \$13 billion every year. These costs will escalate over coming years and decades as the frequency and intensity of natural disasters increases due to climate change.

Each year, Australia's natural disaster costs are driven by a small number of events with very high costs. Any increase in the frequency or intensity of these events will dramatically increase the costs of natural disasters to Australia. For instance, the 2011 Queensland floods are estimated to have cost \$14 billion. This event alone caused higher costs than the average annual costs of all disasters in Australia.

It is now clear that global warming increases both the frequency and intensity of many types of natural disasters including floods, bushfires, droughts and other extreme weather events. This is borne out by the science and experienced in unprecedented extreme events in Australia and globally.

The costs of natural disasters for Australia also extend beyond our borders. Assisting our Pacific neighbours is both a moral imperative and essential for regional stability and national security.

The National Climate Disaster Fund would reduce the burden of climate disaster response and recovery costs on Australian taxpayers, businesses and households.

It would be funded through a levy of \$1 per tonne of carbon dioxide for all coal, gas and oil produced in Australia and would raise around \$1.5 billion dollars per year at the prices and levels of production current at the time of writing this report.

A levy of \$1 per tonne of carbon dioxide is a small fraction of the economic harm caused by the emissions of these activities. The Social Cost of Carbon (SCC) which is a measure of these economic harms is conservatively estimated at around \$60 per tonne by the US Environmental Protection Authority (EPA), with more recent analysis finding a median estimate of US\$417 per tonne.

A levy is consistent with the fundamental economic principal that businesses should pay the costs of their externalities. It would shift the cost burden of climate related disasters from Australian households and businesses to the mostly global coal, oil and

gas majors we license to extract these fuels. The construction and resilience measures financed by the fund would create thousands of jobs.

The Climate Disaster Fund would protect the sectors the Australian community and economy that are most exposed to climate related disasters against ever increasing, and potentially crippling, costs. These include regions that are disproportionately impacted, particularly Queensland, and key industries that face escalating costs including agriculture, tourism, construction and manufacturing. It would reduce the burden on Australian taxpayers and ratepayers in meeting increasing costs of maintaining infrastructure, and delivery of health and social services associated with increasing disasters.

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Introduction

In a recent speech the head of the Australian Defence Force, General Angus Campbell observed that Australia is in "the most natural disaster-prone region in the world" and that "climate change is predicted to make disasters more extreme and more common." He also stated recent troop deployments in response to natural disasters in Australia and the Pacific region have been larger than traditional deployments in recent decades including Afghanistan.¹

Natural disasters can be frightening. They are also very costly. Deploying troops and emergency services, fighting fires and evacuating people from floods, repairing roads and power lines, all come with great costs. Disasters and slow onset impacts, like drought, can have huge costs across the Australian community, on farmers, the health sector, local councils and on state governments. These costs have flow on effects for other government services and broader economic activity.

Disaster costs are likely to escalate substantially in coming years as climate change increases disaster frequency and intensity and severity of natural disaster risks.

This report outlines the huge costs of natural disasters paid by individuals, taxpayers and businesses in Australia. It also proposes a solution.

A new National Climate Disaster Fund would provide a new source of government financing to help threatened regions and sectors to prepare and respond to disasters.

It would be financed by a levy on those companies causing the largest impact on climate change: companies mining fossil fuels in Australia.

The later sections of the report highlight the benefits of this approach to a wide range of regions across Australian and different sectors of the community.

¹ Clarke (2019) *Climate change could stretch our capabilities, Defence Force chief speech warns*, <https://www.abc.net.au/news/2019-09-25/australian-defence-force-angus-campbell-climate-change-speech/11543464>

The rising cost of natural disasters

Natural disasters include bushfires, heatwaves, floods and other extreme weather events as well as earthquakes. They impact infrastructure, essential services and communities and cost billions of dollars to individuals, governments and business in Australia every year.

The Australian Business Roundtable for Disaster Resilience & Safer Communities classifies the total economic cost of natural disasters as including:

- **Direct tangible costs** which include emergency response efforts and damage to property and infrastructure.
- **Indirect tangible costs** which include flow on effects to businesses and networks such as electricity, transport or telecommunication outages or disruptions to supply chains.
- **Intangible costs** which include death, injury and impacts on health and wellbeing, employment and community connectedness. Intangible costs are likely as great or greater than tangible costs but are more difficult to quantify.²

The total economic cost to Australia of natural disasters was \$18.2 billion a year in the 10 years to 2016, according to Deloitte Access Economics (DAE).³

Projecting future costs, on the basis of longer-term historical data, DAE find disaster costs increase, from an underlying cost of \$13 billion per year at present, rising in real terms to \$39 billion dollars per year by 2050.⁴ For context, this is equivalent to around 80 percent of the cost of building the entire National Broadband Network (NBN), every year.

This projection significantly underestimates future disaster costs. The projection excludes slow onset events like droughts. It also excludes the significant costs of heatwaves.⁵ Importantly, it excludes climate change, because it assumes the frequency and intensity of natural disasters will remain the same as historic averages.⁶

² Deloitte Access Economics (2017) *Building resilience to natural disasters in our states and territories*, http://australianbusinessroundtable.com.au/assets/documents/ABR_building-resilience-in-our-states-and-territories.pdf p. 16

³ Ibid.

⁴ Ibid, p. 20.

⁵ Ibid. p. 21.

⁶ Ibid, p. 22.

Climate related disasters are increasing in frequency and intensity globally as a result of climate change.⁷ Increasing temperatures and changing rainfall patterns in Australia are increasing risks including extreme heat, fire, drought, flash flooding and compound disaster impacts.⁸ Scientists are increasingly able to link human impacts on the climate system with conditions that increased likelihood of specific extreme climatic events, both in Australia and across the world.⁹

As climate change escalates, so too do the threats and costs of natural disasters.

Most natural disaster costs are caused by just a few very large events. The cost of the 2019 Queensland floods is expected to exceed \$5.6 billion,¹⁰ the 2011 Queensland floods cost over \$14 billion, and Victoria's Black Saturday Bushfires in 2009 cost over \$7 billion.¹¹

Because the costs of individual disasters are so large, even a small increase in the frequency of these events will result in a large increase in the overall costs of natural disasters. The frequency and severity of these types of events is already increasing and will continue to increase unless emissions are decisively reduced.

Australian Bureau of Meteorology (BOM) analysis shows "Pacific rainfall disruption" events, including the Queensland floods and droughts in eastern Australia, have already increased in frequency by 30 percent as a result of climate change. BOM projects the frequency of these disruptions to increase by 90 percent in the first half of this century and 130 percent in the latter half.¹²

⁷ BAMS (2018) Explaining Extreme Events from a Climate Perspective,

<https://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-society-bams/explaining-extreme-events-from-a-climate-perspective/>

⁸ BOM (2018) *State of the Climate 2018* <http://www.bom.gov.au/state-of-the-climate/State-of-the-Climate-2018.pdf>

⁹ E.g. American Meteorological Society (2019) *Explaining Extreme Events from a Climate Perspective* <https://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-society-bams/explaining-extreme-events-from-a-climate-perspective/>

¹⁰ Deloitte Access Economics (2019) *The social and economic cost of the North and Far North Queensland Monsoon Trough: Queensland Reconstruction Authority*, <https://www2.deloitte.com/au/en/pages/economics/articles/social-economic-cost-north-far-north-queensland-monsoon-trough.html>

¹¹ Deloitte Access Economics (2015) *The Economic Cost of the Social Impact of Natural Disasters*, <http://australianbusinessroundtable.com.au/assets/documents/Factsheets/Factsheet%20-%20The%20economic%20Cost%20of%20the%20Social%20Impact%20of%20Natural%20Disasters.pdf>

¹² BOM (2017) *Droughts and flooding rains already more likely as climate change plays havoc with Pacific weather*, <http://www.bom.gov.au/climate/updates/articles/a023.shtml>

The intensity and frequency of fire danger days and the length of the fire season are also increasing in Australia,¹³ with unprecedented fires in Australia and globally over recent years.¹⁴

Some regions are particularly heavily impacted by natural disasters and vulnerable to increasing climate disasters. Queensland makes up over 60 percent of Australia's total natural disaster costs. Over the last decade, Queensland natural disaster costs averaged over \$11 billion per year and have been projected to rise to \$18 billion per year by 2030 even before the additional impact of global warming is considered.¹⁵

The main reason for Queensland's high natural disaster costs are its susceptibility to floods and cyclones combined with a relatively large population concentrated in coastal areas. Climate change is increasing both flood frequency¹⁶ and intensity.¹⁷

Climate change will also reduce economic growth. Previous droughts have reduced Australia's GDP by 1% (compared to 2% reduction in the Global Financial Crisis). The Queensland 2010/11 floods reduced the state's Gross State Product (GSP) by 2.8%.¹⁸ Australian economic growth in the long term is expected to be reduced by \$130 billion per year under a 4-degree scenario, even looking only at slow-onset impacts and excluding the impact of acute natural disasters.¹⁹ Current Australian Government policies are consistent with 3 to 4 degree warming.²⁰

¹³ BOM (2018) *State of the Climate 2018*, <https://www.industry.gov.au/regulations-and-standards/australian-domestic-gas-security-mechanism>

¹⁴ Smee (2018) *Bushfires in the tropics: Queensland faces terrifying new reality*, <https://www.theguardian.com/australia-news/2018/dec/04/bushfires-tropics-queensland-terrifying-new-reality-cyclones-flooding>. Roe (2019) *Fear spreading as unprecedented fires burn through the Amazon*, <https://www.abc.net.au/radio/programs/pm/fear-spreading-as-unprecedented-fires-burn-through-the-amazon/11437648>. World Meteorological Organisation (2019) *Unprecedented wildfires in the Arctic*, <https://public.wmo.int/en/media/news/unprecedented-wildfires-arctic>

¹⁵ Deloitte Access Economics, *ibid*.

¹⁶ BOM (2017), *Droughts and flooding rains already more likely as climate change plays havoc with Pacific weather*, <http://www.bom.gov.au/climate/updates/articles/a023.shtml>

¹⁷ Climate Council (2017), *Intense rainfall and flooding: the influence of climate change*, https://www.google.com/search?q=change+capitals+to+lower+case&rlz=1C1GCEA_enAU863AU865&og=change+capitals+to+lo&aqs=chrome.1.69i57j0l5.13632j0j7&sourceid=chrome&ie=UTF-8

¹⁸ Climate Council (2019), *Compound costs: how climate change is damaging Australia's economy*, <https://www.climatecouncil.org.au/wp-content/uploads/2019/05/costs-of-climate-change-report-v3.pdf>

¹⁹ Kompas et al (2018) *The Effects of Climate Change on GDP by Country and the Global Economic Gains From Complying With the Paris Climate Accord*, <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018EF000922>

²⁰ Swann (2019), *Cold shower on economics of global warming*, <https://www.tai.org.au/sites/default/files/P729%20Cost%20of%20climate%20inaction%20%5BWEB%5D.pdf>

WHO PAYS THE COSTS CURRENTLY?

Every part of the Australian community is impacted by climate change and carries the costs one way or another as taxpayers, property owners, consumers, workers or businesses. However, this cost burden is not shared equitably, and there is limited relationship between those carrying out activities that are fuelling global warming and those carrying the financial burden of its impacts.

Direct costs such as emergency response, emergency relief and reconstruction are usually covered by state, federal and local governments, ultimately by tax and ratepayers. These costs have been estimated to make up around 10% of the total costs of natural disasters in Australia.²¹

Individuals directly impacted by the disaster absorb other direct costs, such as loss and damage to private property. Some of these costs are covered by insurance, which is ultimately paid by the wider community through higher premiums. Only a small proportion of natural disaster costs are covered by insurance.²² Many properties are likely to become uninsurable as the frequency of natural disasters rises.²³

There are also very large indirect social and economic costs including loss of income and impacts on people's physical and mental health. These indirect costs are estimated to be even greater than direct costs such as infrastructure and property damage. The social costs of the 2010-11 Queensland floods alone are estimated to be \$7.8 billion, and \$3.9 billion for the 2009 Black Saturday bushfires in Victoria.²⁴ These costs are largely absorbed by those impacted, but also require increasing resources for health and social services.

Without a National Climate Disaster Fund, these costs will continue to escalate, challenging the capacity of governments, businesses and individuals to pay. Direct costs such as emergency response, relief and reconstruction will require either raising taxes, or cuts to services such health and education. Exactly this has occurred in

²¹ Deloitte Access Economics (2017) *Building resilience to natural disasters in our states and territories*, http://australianbusinessroundtable.com.au/assets/documents/ABR_building-resilience-in-our-states-and-territories.pdf

²² Ibid. Chart 2.2 p.20.

²³ Ting et al (2019) *The runaway insurance effect*, <https://www.abc.net.au/news/2019-03-13/climate-data-reveals-australias-worst-affected-regions/10892710>

²⁴ Deloitte Access Economics (2015) *The Economic Cost of the Social Impact of Natural Disasters, Report Fact Sheet*, <http://australianbusinessroundtable.com.au/assets/documents/Factsheets/Factsheet%20-%20The%20economic%20Cost%20of%20the%20Social%20Impact%20of%20Natural%20Disasters.pdf>

Australia, with Federal Parliament passing legislation to redirect education funding to disaster relief.²⁵

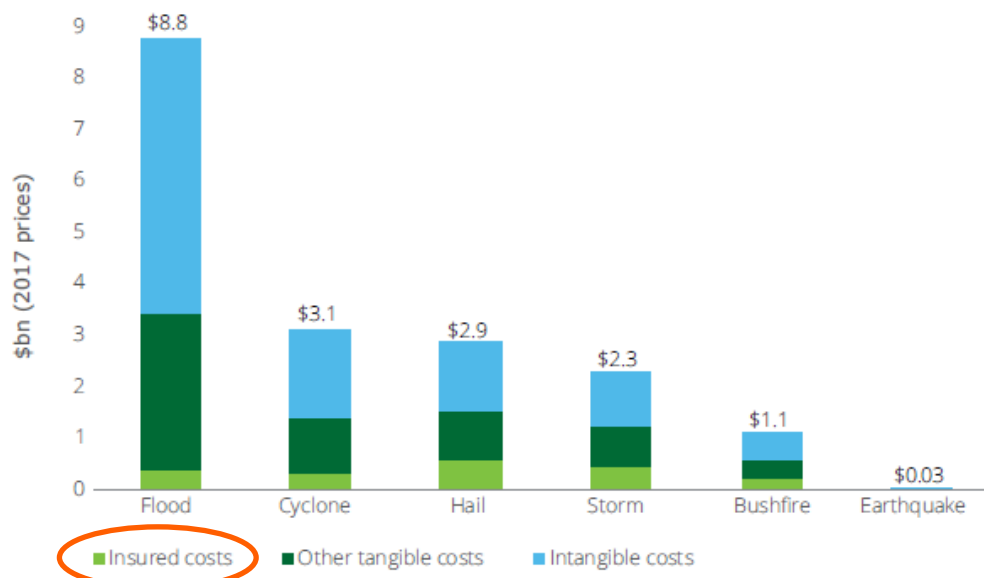
In addition to higher taxes and cuts to services, ordinary Australians will face increasing property damage and other indirect social and economic costs. Industries will suffer disruption and additional costs to maintain services and infrastructure including power and transport.

The impacts on various sectors of the Australian community are discussed in more detail below.

WHY INSURANCE IS NOT THE ANSWER

Insurance only covers a small fraction of the costs of natural disasters. In Figure 1 below, the light green area at the bottom of the columns represents the proportion of natural disaster losses covered by insurance. Only a small proportion of tangible costs of natural disasters are insured losses. The intangible costs are greater than tangible costs and are not covered by insurance.

Figure 1: Average annual cost, by disaster type*, 2007 to 2016



Source: orange added, DAE (2017) *Building resilience to natural disasters in our states and territories*, p. 20, http://australianbusinessroundtable.com.au/assets/documents/ABR_building-resilience-in-our-states-and-territories.pdf

²⁵ Murphy and Karp (2019) *Labor agrees with Coalition to redirect education funding to disaster relief* <https://www.theguardian.com/australia-news/2019/oct/17/labor-agrees-with-coalition-to-redirect-education-funding-to-disaster-relief>

Climate change is already driving up the cost of insurance. In Queensland, insurance companies have endured \$5.4 billion in payouts for 3 natural disasters including the Queensland 20/11 floods and Cyclone Yasi and Debbie. Large premium increases following these disasters are reportedly making insurance unaffordable for some residents. Suggestions that the government intervene to provide lower premiums to people living in disaster prone areas were rejected when a government taskforce found that it would come at a significant cost to taxpayers.²⁶

The situation is expected to become worse with analysts warning that up to almost 10 percent of residential properties Australia wide could become uninsurable by 2100 due to climate change.²⁷ Household insurance is usually provided on annual basis. Homeowners may be able to get insurance today, but if properties become uninsurable or very expensive to ensure within the current mortgage cycle or even the next, or even if there is a risk of this happening, it could have a significant effect on property values.

If people are unable to insure their properties and the property values fall, they can be forced into a position of being unable to sell out of increasingly disaster-prone areas. This is not only inequitable but creates perverse incentives for maladaptation where residents pressure councils to build sea walls and other infrastructure when retreat would be a better outcome.

The Climate Disaster Fund could be used to allow people in disaster prone areas the option for relocation when appropriate.

²⁶ Ludlow and Uribe (2018) *High premiums force North Queensland residents to abandon home insurance* <https://www.afr.com/politics/high-premiums-force-north-queensland-residents-to-abandon-home-insurance-20180619-h11kt8>

²⁷ Ting et al (2019) *The runaway insurance effect*, <https://www.abc.net.au/news/2019-03-13/climate-data-reveals-australias-worst-affected-regions/10892710>

The National Climate Disaster Fund

The National Climate Disaster Fund is proposed as source of government financing designed to help meet the dramatically increasing costs of disasters faced by Australia as a result of global warming.

The Climate Disaster Fund would be administered by an independent agency established under Commonwealth legislation containing a legislated mandate. It would be governed by an independent council of experts on climate science and natural disaster preparedness and response.

The fund would be financed by a levy on fossil fuel production occurring within Australia. The economic advantages of this approach are discussed below.

The committee would make annual adjustments to the size of the levy with reference to changes in the frequency, intensity and costs of natural disasters. It would distribute funds with reference to the needs of various constituents within the Australian community impacted by natural disasters.

FINANCING THE NATIONAL CLIMATE DISASTER FUND

While a levy could be applied in a number of ways, the levy here proposed is applied per tonne of carbon dioxide potential from fossil fuels extracted in Australia. The carbon dioxide is released when the fuel is combusted.

The proposed levy is \$1 per tonne of CO₂ potential in primary energy production.

Following earlier research,²⁸ the proposal here uses default emissions factors from the Intergovernmental Panel on Climate Change (IPCC).²⁹ Table 1 shows the CO₂ potential

²⁸ Swann (2019) *High Carbon from a Land Down Under Quantifying CO₂ from Australia's fossil fuel mining and exports*,

https://www.tai.org.au/sites/default/files/P667%20High%20Carbon%20from%20a%20Land%20Down%20Under%20%5BWEB%5D_0.pdf

²⁹ IPCC (2006) *IPCC Guidelines for National Greenhouse Gas Inventories*, Table 1.2, Table 1.4

https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

per tonne of fuel. Table 2 estimates revenue from a \$1 per tonne of CO2 levy applied on fossil fuel production in the 2017-18 financial year.³⁰

Table 1: IPCC factors for CO2 potential per tonne fuel

Fuel type	Mass to energy	Energy to CO2	Mass to CO2	Mass to CO2
<i>Units</i>	<i>TJ / Gg</i>	<i>kg CO2 / TJ</i>	<i>kg CO2 / Gg</i>	<i>t CO2 / t fuel</i>
Coal - coking	28.2	94600	2667720	2.67
Coal - thermal	25.8	94600	2440680	2.44
Coal - brown	11.9	96100	1143590	1.14
Gas - LNG	48	56100	2692800	2.69
Oil - crude / feedstocks	42.3	73300	3100590	3.10
LPG	47.3	63100	2984630	2.98

Source: IPCC (2006) *IPCC Guidelines for National Greenhouse Gas Inventories*, Table 1.2, Table 1.4
https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf.

Table 2: Revenue from \$1/tCO2 produced fossil fuel potential,

Fuel type	Energy		Energy to CO2		Levy	
<i>Units</i>	<i>PJ</i>	<i>TJ</i>	<i>kg CO2 / TJ</i>	<i>Mt CO2</i>	<i>\$/t CO2</i>	<i>Total (\$m)</i>
Black coal	12,370	12,370,055	94,600	1,170	\$1	\$1,170
Brown coal	473	473,344	101,000	48	\$1	\$48
Crude oil and NGL	572	572,015	68,750*	39	\$1	\$39
LPG	74	74,259	63,100	5	\$1	\$5
Natural gas	4,731	4,731,159	56,100	265	\$1	\$265
Total	18,603					\$1,527

Source: IPCC (2006) Department of Environment and Energy (2018) *Australian Energy Statistics*, Table J: Australian energy supply and trade, by fuel type, energy units *IPCC Guidelines for National Greenhouse Gas Inventories*, Table 1.4.

* nb energy data combines both crude and NGL, so CO2 factors here averaged.

The proposed levy would have raised more than \$1.5 billion, making a significant contribution to the current estimated costs of natural disasters in Australia at \$13 billion and rising.

Coal mining would make the greatest contribution to the Climate Disaster Fund at almost \$1.2 billion. Most of this would come from thermal coal and coking coal paying slightly less, with its lower volume being offset by the higher physical carbon content.

³⁰ For simplicity and completeness Table 2 uses data in energy units, however conversion into figures per tonne produces high correlation with numbers in Table 1, e.g. 2.60 tCO2 / t black coal, 1.04 t CO2 / t brown coal.

While Australia is the world's largest exporter of Liquefied Natural Gas (LNG), in terms of total carbon dioxide potential mined gas is still far smaller than coal.

WHY A LEVY ON FOSSIL FUEL COMPANIES?

A levy on fossil fuel production is an appropriate contribution from the companies making the single largest contribution of any activity in Australia to global warming.

Greenhouse gases from burning fossil fuels exported from Australia are more than double Australia's domestic emissions. Australia's domestic emissions are also dominated by fossil fuels, both in combustion (for example in coal fired power stations) and in mining and export themselves (for example fugitive emissions from coal mines and LNG production).

Australia is the world's fifth third largest fossil fuel miner and third largest exporter, behind only Russia and Saudi Arabia. Australia's fossil fuel exports make up 7% of all fossil fuel exports.³¹

The total costs of climate change and natural disasters to the Australian community now and into the future are far greater than the amount that is likely to be raised by the Climate Disaster Fund. The Climate Disaster Fund will make a significant contribution, but most costs will still fall on the Australian community.

It is important to note a levy of \$1 per tonne of carbon is a small fraction of the overall economic harm of emissions from fossil fuels produced in Australia.

The full cost of the economic harm that results from a tonne of carbon dioxide emitted is called the social cost of carbon (SCC). The US Environmental Protection Agency has calculated an average SCC in 2020 of \$59 per tonne of CO₂.³²

This is a highly conservative figure. Studies in the economic and scientific literature include a very wide range of estimates for a SCC, including into the hundreds and

³¹ Swann (2019) *High Carbon from a Land Down Under Quantifying CO₂ from Australia's fossil fuel mining and exports*,

https://www.tai.org.au/sites/default/files/P667%20High%20Carbon%20from%20a%20Land%20Down%20Under%20%5BWEB%5D_0.pdf

³² Converted at current exchange rates. US\$42 is the average SCC at a 3% discount rate in 2020. A lower discount rate that cares more about the future has a higher SCC. The SCC increases over time.

US EPA (2016) *Technical Support Document: -Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis -Under Executive Order 12866*

https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf

thousands of dollars per tonne. A more recent authoritative analysis found a median estimate of US\$417 per tonne.³³

While Australia's fossil fuel resources are owned by Australians, they are extracted and exported mostly by large global coal and oil and gas companies. These companies make virtually no contribution to paying the costs of increasing climate related disasters that are a direct consequence of the increasing concentration of greenhouse gases in the atmosphere. As shown in Table 3 below, these companies pay little if any company tax in Australia, and so are in a good position to be able to afford this modest contribution to the cost of the increasing natural disasters they are fuelling.

³³ Ricke et al (2018) *Country-level social cost of carbon*, <https://www.nature.com/articles/s41558-018-0282-y>

Table 3: Company tax paid by selected fossil fuel companies, 2016/17

Company	Total income	Taxable income	Tax payable
Anglo American Australia Ltd	3,118,892,554	63,340,550	0
BHP Billiton Mitsui Coal Pty Ltd	1,362,950,777	502,455,056	148,603,715
Chevron Australia Holdings Pty Ltd	2,239,084,398	0	0
ConocoPhillips Gas Holdings Pty Ltd	1,063,086,551	96,955,662	0
Glencore Investment Pty Ltd	1,510,526,283	3,333	1,000
Kogas Australia Pty Ltd	347,219,578	0	0
Origin Energy Ltd	14,831,085,653	188,035,752	0
Petronas Australia Pty Ltd	543,780,632	166,599	0
QCoal Ltd	584,684,879	0	0
Santos Ltd	3,715,263,715	0	0
Shell Energy Holdings Australia Ltd	5,422,622,681	0	0
Whitehaven Coal Ltd	2,397,760,947	5,557	0
Woodside Petroleum Ltd	6,595,185,778	944,614,958	0

Source: ATO (2018) *2016-17 Report of Entity Tax Information*

Table 3 above shows that most of the large fossil fuel exporters paid no company tax in Australia in 2016/17. This is not exceptional. In 2015/16 only Woodside and BHP Billiton Mitsui Coal paid company tax. It is clear that these companies derive huge benefit from the fossil fuels they export but pay little in return and nothing to specifically cover the costs of the climate damage their products cause.

Moreover, these companies and their industry groups claim the revenue they do provide to be funding other public services. Revenue from these companies cannot fund hospitals and schools while also paying for disaster response and preparedness.

The Climate Disaster Fund will shift the cost burden of climate related disasters from Australian governments, businesses and the community to the large, mostly foreign owned companies we allow to extract coal, gas and oil in Australia.

Reducing the burden of natural disaster costs on the Australian community increases the amount of money households, businesses and governments will have to spend on other goods and services in the Australian economy.

In contrast, because the companies extracting fossil fuels in Australia are overwhelmingly foreign owned, their profits are largely expatriated to overseas shareholders.

These companies are also highly capital intensive and increasingly automated, meaning that they employ far fewer people per dollar of value than most of the industries operating Australia that are currently shouldering the costs of global warming and natural disasters. As such, shifting the cost burden of natural disasters from labour intensive industries like tourism and manufacturing to fossil fuel producers is likely result in more jobs overall.

Exported fossil fuels are not used to provide energy for Australian consumers, and as such cannot be passed onto Australian consumers through higher energy prices. A \$1 per tonnes levy will have little if any effect on energy prices in Australia or jobs in the industry.

The levy is consistent with the “polluter pays” principle of internalising the negative impacts of economic activities, a fundamental principal of economics.

Beneficiaries of the Climate Disaster Fund

The Australian community is likely to face rising disaster costs, with some regions and sectors more impacted than others. National Climate Disaster Fund funding will be distributed across Australia but should be targeted to those facing the greatest disaster impacts.

QUEENSLAND

As noted above, Queensland bears around 60 percent of Australia's total natural disasters.³⁴ This is largely due to flooding and cyclones, combined with large populations in coastal areas. However, in more recent times, unprecedented drought and fires are making the state even more disaster prone. The increasing frequency of floods, fires and drought means these costs will almost certainly increase.

At the same time, the Commonwealth Government Grants Commission has reduced GST revenue transfers to the Queensland Government projects as the result of a change in treatment of disaster payments to local governments. In the 2019 update the Commission adjusted its method for assessing natural disaster expenditure. It no longer considers state government expenditure on disaster-affected local government assets to be necessary, resulting in a reduction in GST payments. Much of the Queensland Government disaster funding is through local governments.³⁵

The Climate Disaster Fund could greatly assist the Queensland Government and local councils in disaster response, relief and reconstruction.

AUSTRALIAN TAXPAYERS

Direct costs of natural disasters covered by Australian Governments include emergency response, relief and recovery. These costs are shared between the Federal and state governments under the Disaster Recovery Funding Arrangements (DRFA),

³⁴ Deloitte Access Economics (2017) *Building resilience to natural disasters in our states and territories*, http://australianbusinessroundtable.com.au/assets/documents/ABR_building-resilience-in-our-states-and-territories.pdf

³⁵ Queensland Government (2019) *Budget Papers 2019-20*, <https://budget.qld.gov.au/budget-papers/>

formerly the Natural Disaster Relief and Recovery Arrangement (NDRRA). Not all costs borne by governments are included in these arrangements, but it is estimated that of those that are, around 60% is covered by the Australian Government and 40% by state and territory governments.³⁶

The Australian and state governments are estimated to bear around 10% of the total costs of natural disasters each year.³⁷

Other indirect costs to governments not included in these figures include the loss of taxation revenue from impacted businesses and individuals, as well increased expenditure on health and social services.

As discussed above, individual climate related disasters like floods and bushfires can enormously inflate these costs. For instance, the 2018-19 summer Queensland fires and floods are estimated to have cost the Queensland Government \$1.5 billion.³⁸ Given the expected increase in frequency of these events, these costs will become increasingly difficult for governments to sustain.

Without an independent fund like the Climate Disaster Fund, the increasing costs of natural disasters will require governments to either raise taxes or cut services. If services are cut, natural disaster spending will come at the expense of spending on health, education and other essential services that we take for granted, at the very time that these services are needed most.

The Climate Disaster Fund would provide a source of funding to ensure Australian governments can continue to provide effective disaster response, relief and recovery as the frequency and intensity of natural disasters increases. It would reduce the need for governments to raise taxes or cut services to meet these escalating costs.

HEALTH AND THE HEALTH SECTOR

Natural disasters have devastating health impacts that impose a large cost burden on individuals and on our health system.

³⁶ Deloitte Access Economics (2017) *Building resilience to natural disasters in our states and territories*, http://australianbusinessroundtable.com.au/assets/documents/ABR_building-resilience-in-our-states-and-territories.pdf; Australian Government (nd) *Disaster Assist, Disaster arrangements* <https://www.disasterassist.gov.au/Pages/disaster-arrangements.aspx>

³⁷ Deloitte Access Economics (2017) *Ibid.* p.26

³⁸ Signato (2019) *'Summer of disasters' reveals the cost of climate change for Queensland taxpayers*, https://www.abc.net.au/news/2019-02-19/climate-change-and-the-cost-of-qlds-summer-of-disasters/10826122?WT.ac=statenews_qld

People affected by the 2010-2011 Queensland floods were 5.3 times more likely to report poorer health than those not affected, and 2.3 times more likely to experience post-traumatic stress disorder. The mental health impacts of these floods alone are estimated to have had a total cost of \$5.9 billion.³⁹

The Victorian Black Saturday Bushfires resulted in 173 deaths and 414 injuries, caused mental health impacts with a cost of over \$1 billion and increased the prevalence of chronic disease with a cost of \$320 million.⁴⁰

Heatwaves are less visible than other natural disasters but have serious health implications and costs. Heatwaves have caused more deaths in Australia since the 1890s than bushfires, cyclones, earthquakes, floods and severe storms combined.⁴¹ As well as an increase in heat-related deaths and illness, extreme heat increases irritability and psychological stress.⁴² Hot weather affects patterns in domestic violence,⁴³ interrupts sleep patterns and reduces capacity and willingness to exercise. All carry broad ramifications, such as increased accident risk, sedentary lifestyle-induced diabetes and cardio vascular disease.⁴⁴

Heatwaves are already far more frequent than other natural disasters and are forecast to increase severely under climate change. The Queensland Government projects that by 2050 heatwaves may go from a few days per year currently, to 30 days per year by 2030 in Brisbane, the Gold Coast and Noosa with single heatwaves lasting up to 2 weeks. By 2070, Mackay could be experiencing up to 70 heatwave days per year.⁴⁵

³⁹ Deloitte Access Economics (2016) *The economic cost of the social impact of natural disasters*, <http://australianbusinessroundtable.com.au/assets/documents/Report%20-%20Social%20costs/Report%20-%20The%20economic%20cost%20of%20the%20social%20impact%20of%20natural%20disasters.pdf>

⁴⁰ Ibid.

⁴¹ Queensland Government (2019) *Queensland State Heatwave Assessment 2019*, <https://www.disaster.qld.gov.au/dmp/Documents/QFES-Heatwave-Risk-Assessment.pdf>

⁴² Queensland Health (2015) *Heatwave Response Plan* https://www.health.qld.gov.au/_data/assets/pdf_file/0032/628268/heatwave-response-plan.pdf

⁴³ Auliciems and Di Bartolo (1995) *Domestic violence in a subtropical environment: police calls and weather in Brisbane*, *International Journal of Biometeorology* 39 (1).

⁴⁴ Kjellstrom et al. (2009) *The Direct Impact of Climate Change on Regional Labor Productivity*, *Archives of Environmental & Occupational Health* 64 (4); World Health Organisation (2017) *Preventing noncommunicable diseases (NCDs) by reducing environmental risk factors*, <https://apps.who.int/iris/bitstream/handle/10665/258796/WHO-FWC-EPE-17.01-eng.pdf;jsessionid=4E7CD6157CC879B57F179B388D89706A?sequence=1>

⁴⁵ Queensland Government, *Queensland Future Climate: Heatwaves*, QLD Government (2018) *Future Climate Dashboard*

The Australian Medical Association (AMA) now recognises climate change as a health emergency causing deaths and injury from heatwaves, infectious and vector born disease, extreme weather events, food insecurity and impacts on mental health.⁴⁶

Australian governments already struggle to provide adequate health funding. Escalating health costs from climate change and natural disasters will mean that scarce health resources are spread even more thinly unless new sources of funding are found.

The Climate Disaster Fund could provide a source of funding additional to traditional government health funding for medical resources required to meet the increasing costs of the health impacts of natural disasters.

LOCAL COUNCILS

Local governments are at the frontline of dealing with many of the impacts of climate change including natural disasters but have the least resources to cope with the impacts. In 2015/16, local governments were responsible for 25% of Australia's high value infrastructure assets, with only a 4% share of public sector revenue.⁴⁷

The Australian Local Government Association (ALGA) described the threats of climate change as follows:

There has been significant focus in this process and more broadly on the threats in the coastal zone - these include sea-level rise and storm surges. However, the presence of climate change in non-coastal areas is of equal importance, with flooding, more widespread and prolonged droughts and bushfire risk needing to be considered and assessed. In addition to those more clearly observed threats, it is important to consider the impacts of warmer temperatures and how that affects local biodiversity put at risk by the ability of pest species to travel further on land and in water.⁴⁸

⁴⁶ AMA (2019), *Media Release: Climate change is a health emergency*, <https://ama.com.au/media/climate-change-health-emergency>

⁴⁷ LGAQ (2017) *LGAQ Submission to the Senate Inquiry into the current and future impacts of climate change on housing, buildings and infrastructure*, https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/CCIInfrastructure/Submissions

⁴⁸ ALGA (2017) *Submission to the Senate Environment and Communications References Committee on Current and future impacts of climate change on housing, buildings and infrastructure*, https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/CCIInfrastructure/Submissions

Different Local Government Areas (LGAs) are impacted in different ways and to different degrees. Many LGAs face multiple threats, for instance there are many areas are subject to flooding, heatwaves, fire and drought.

LGAs in northern Australia are heavily impacted by flooding, with northern Queensland having experienced two devastating flood events in the last decade. As noted above, BOM modelling projects “Pacific rainfall disruptions,” including both floods and drought to have increased by 90% by 2050 and 130% by the end of the century due to global warming.

However, these regions are also the most heavily impacted by extreme temperatures and heatwaves. Northern Queensland LGAs such as Townsville, Rockhampton and Mackay currently experience just a few days per year over 35 degrees, but are projected to experience potentially over 100 days over 35 degrees annually by the end of the century if emissions continue to increase.⁴⁹ Darwin could experience over 300 days per year over 35 degrees by the end of the century.⁵⁰ All of these are exacerbated by the high relative humidity of these areas which in combination with high temperatures result in high wet bulb temperatures with amplify the risk of heat related illness and deaths.

LGAs throughout Australia are also impacted by the increasing frequency and intensity of bushfire weather. Climate change has contributed to an increase in the intensity of fire weather and lengthening of the fire season in Australia over recent decades.⁵¹

Continuing decreases in rainfall in south eastern Australia combined with increasing temperatures will exacerbate fire conditions. A CSIRO assessment of the potential impact of climate change on fire regimes in Australia in 2009 found that extreme fire danger days in south-eastern Australia may occur 5 percent to 65 percent more often by 2020,⁵² a projection that appears to be confirmed by current unprecedented fires.⁵³

⁴⁹ Ogge (2019) *HeatWatch QLD: Extreme heat in the Sunshine State*,

<https://www.tai.org.au/content/heatwatch-qld-extreme-heat-sunshine-state>,

⁵⁰ Ogge (2018), *Cooked with gas: Extreme heat in Darwin*, <https://www.tai.org.au/content/cooked-gas-extreme-heat-darwin>

⁵¹ BOM (2018) *State of the climate 2018*, <http://www.bom.gov.au/state-of-the-climate/australias-changing-climate.shtml>

⁵² CSIRO (2009) *Interactions between climate change, fire regimes and biodiversity in Australia: A preliminary assessment*, <https://www.environment.gov.au/climate-change/adaptation/publications/fire-regimes>

⁵³ Smee (2018) *Bushfires in the tropics: Queensland faces terrifying new reality*, <https://www.theguardian.com/australia-news/2018/dec/04/bushfires-tropics-queensland-terrifying-new-reality-cyclones-flooding>

Fire damages infrastructure and private property. It also has devastating impacts the health and wellbeing of local communities. All of these impacts place further strain the resources of local governments.

The Climate Disaster Fund could provide a reliable and growing source of funding for local governments to recover from natural disasters and build resilience to future disasters.

ABORIGINAL AND TORRES STRAIT ISLAND COMMUNITIES

Aboriginal and Torres Strait Island communities are particularly at risk from the impacts of climate change.

Many inland regional areas are already experiencing unprecedented increases in extreme heat, and the projections are dire for many parts of the country.

Tennant Creek is the home of the Waramungu people living on Patta land in central Australia. Historically it has experienced less than 20 days per year over 40C. Last summer however there were 69 days over 40C,⁵⁴ with CSIRO projections of up to 150 days per year over 40C by the end of the century.⁵⁵

In the Larrakia Nation around Darwin, the number of days over 35C in Darwin has increased from around 5 per year historically to over 20 in recent decades. CSIRO modelling estimates on our current emissions trajectory, this could rise to 132 days per year in 2030 and 275 days per year in 2070.⁵⁶

As described in the health section above, increasing extreme heat causes a range of serious Heat Related Illnesses (HRI) including heat stroke which can be fatal, and also

Smee (2019) *'Like nothing we've seen': Queensland bushfires tear through rainforest*

<https://www.theguardian.com/australia-news/2019/sep/09/like-nothing-weve-seen-queensland-bushfires-tear-through-rainforest>

⁵⁴ BOM (nd) *Climate Data Online*, Tennant Creek Airport Station,

http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=122&p_display_type=dailyDataFile&p_startYear=2019&p_c=-45942179&p_stn_num=015135

⁵⁵ BoM (2019) *Climate data online*, <http://www.bom.gov.au/climate/data/index.shtml>; CSIRO and BoM (2018) *Climate projections*, provided on request

⁵⁶ Ogge and Hanna (2018) *Cooked with gas Extreme heat in Darwin*,

https://www.tai.org.au/sites/default/files/P510%20Cooked%20with%20gas%20-%20Darwin%20days%20over%2035C%20FINAL_0.pdf

causes psychological stress, influences sleep patterns as well as patterns of alcohol use and domestic violence.

Aboriginal people living in hot areas are acclimatised to hot temperatures, but they are not acclimatised to the unprecedented temperatures projected over the coming decades if emissions continue to increase.

Many Aboriginal communities also experience entrenched economic disadvantage including in housing. Overcrowding is a significant problem, and there are low rates of air-conditioning in the housing stock. In 2016, only 20-30% of the NSW Aboriginal Housing Office and community owned housing stock in NSW were estimated to have air-conditioning despite extreme temperatures,⁵⁷ and warnings that without air-conditioning Indigenous residents could perish.⁵⁸

Sea level rise directly threatens the Torres Strait Islands, with increasing flooding, contamination of fresh water and roads and buildings and roads being washed away. Recent attempts at coastal defences have failed at least in part, and communities have resisted adaptation plans involving relocation.⁵⁹ Adaptation, whether it involves sea defences or relocation will be costly.

The Climate Disaster Fund could provide a source of funding to build resilience in Aboriginal communities by providing better housing with less over-crowding and better cooling systems. It could also be used to provide better health and community services to cope with the social and health impacts of increasing extreme heat. The Climate Disaster Fund could also assist with adaptation measures in the Torres Strait and other communities facing sea level rise.

FARMERS

Agriculture is on the frontline of global warming impacts in many ways. Increasing temperatures and falling precipitation can reduce cropping and livestock yields, the extreme case being drought. Increasing temperatures can also reduce soil moisture and increase erosion. Extreme heat can damage crops, stress livestock and make farm

⁵⁷ Gooch (2016) *Aboriginal Housing Office plans to roll out air-conditioning to properties in hottest regions of NSW*, <https://www.abc.net.au/news/2016-04-05/aboriginal-housing-office-plans-to-roll-out-air-conditioning/7300208>

⁵⁸ Paul (2013) *Warning Indigenous residents could 'perish' in hot houses*, <https://www.abc.net.au/news/2013-03-20/warning-indigenous-residents-could-27perish27-in-hot-houses/4583400>

⁵⁹ Roach (2019) *The Mayor Fighting to Save Her Island Home from Climate Change*, <https://time.com/5572445/torres-strait-islands-climate-change/>

work far more difficult, including having serious health impacts on farm workers. Floods can demolish crops, kill livestock and damage farm infrastructure including buildings, roads, machinery and fencing.

Impacts on cropping

A recent ABARE report found that changes in the climate since 2000 have significantly reduced farm productivity and crop yield:

The recent changes in climate have had a significant negative effect on the productivity of Australian cropping farms, particularly in south-western Australia and south-eastern Australia. In Western Australia, climate conditions between 2000–01 and 2014–15 lowered Total Farm Productivity (TFP) by an average of 7.7 per cent—relative to what would have been seen under long-run average conditions (1914–15 to 2014–15). In New South Wales climate conditions post 2000–01 lowered productivity by an average of 6.5 per cent.

A similar pattern is observed for wheat yields, although the climate effects are larger. Climate conditions between 2000–01 and 2014–15 lowered national wheat yields by around 11.9 per cent relative to long-run conditions (16.3 per cent in Western Australia and 14.8 per cent in Victoria).⁶⁰

Recent CSIRO research has found potential wheat yields in Australia have already declined by 27% from 1990 to 2015 below what they would otherwise have been due to climate impacts, mostly the fall in rainfall and increasing temperatures over this period.⁶¹

As would be expected, increasing global warming will continue to reduce agricultural productivity and yields.

The Garnaut review found that as a result of climate change and without mitigation, the Murray Darling Basin would be likely to lose up to half its annual irrigated agricultural output by mid-century.⁶²

⁶⁰ ABARE (2017) *Farm performance & climate-adjusted productivity for broadacre cropping farms*, http://data.daff.gov.au/data/warehouse/9aas/2017/FarmPerformanceClimate/FarmPerformanceClimate_v1.0.0.pdf

⁶¹ Hochman et al (2017) *Climate trends account for stalled wheat yields in Australia since 1990*, <https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.13604>

⁶² The Garnaut climate change review (2009) Chapter 6, *Climate Change Impacts on Australia*, <http://www.garnautreview.org.au/chp6.htm>

Extreme weather events also have serious impacts on crops. In 2011, Cyclone Yasi caused up to \$800 million damage to Queensland crops.⁶³ In 2019, extreme heat caused severe loss to fruit crops in South Australia⁶⁴ and extreme weather including heatwaves and frosts are thought to have caused \$750 million damage to grain crops in Western Australia.⁶⁵ While it is not possible to attribute any single event to climate change, as these kinds of events increase in frequency and intensity due to climate change, farmers will face increasing damage and costs.

Impacts on grazing

A recent CSIRO report examined 25 locations in south eastern Australia and found that without adaptation meat production could be reduced by up to 92% by 2050 and wool production by up to 95% as a result of climate change.⁶⁶

The February 2019 Queensland floods in and around Townsville were the highest recorded since records began in 1888, with rainfall records set as far west as Mt Isa.⁶⁷ They resulted in damage to agriculture estimated at \$432 million, including \$348 million in stock losses as well as indirect costs.⁶⁸

These kinds of events are increasing in frequency and intensity. As previously discussed, the frequency of Pacific rainfall disruptions including drought and flooding

⁶³ SBS News, (2013) *Cyclone Yasi to cost Aussie agriculture \$800m*,

<https://www.sbs.com.au/news/cyclone-yasi-to-cost-aussie-agriculture-800m>

⁶⁴ Schremmer (2019) *Extreme temperatures burn stone fruit from inside out, causing severe loss*,

<https://www.abc.net.au/news/rural/2019-01-16/heatwave-burns-stonefruit-from-inside-out/10717496>

⁶⁵ Varischetti (2019) *Extreme weather wipes a possible \$750 million off upcoming WA grain harvest*,

<https://www.abc.net.au/news/rural/2019-09-16/giwa-slashes-crop-forecast/11517752>

⁶⁶ Gaharamani and Moore (2014) *Systemic adaptations to climate change in southern Australian grasslands and livestock: Production, profitability, methane emission and ecosystem function*,

https://www.researchgate.net/publication/269106683_Systemic_adaptations_to_climate_change_in_southern_Australian_grasslands_and_livestock_Production_profitability_methane_emission_and_ecosystem_function

⁶⁷ Bureau of Meteorology (2019) *Special Climate Statement 69—an extended period of heavy rainfall and flooding in tropical Queensland*, <http://www.bom.gov.au/climate/current/statements/scs69.pdf>

⁶⁸ Deloitte Access Economics (2019) *The social and economic cost of the North and Far North Queensland Monsoon Trough: Queensland Reconstruction Authority*,

<https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-dae-monsoon-trough-social-economic-cost-report-160719.pdf>

have already increased by 30 percent and are projected to increase by 90 percent in the early part of this century, and 130 percent increase as century progresses.⁶⁹

An AgForce survey in October 2018 found that about half of Queensland's farmers had lost more than half their annual income due to drought.⁷⁰

Implications

Australia's farmers may be resilient and experienced in dealing with variations in the climate and even natural disasters. However, the science is telling us that conditions including the frequency and intensity of droughts, floods and other extreme weather events are moving beyond the parameters of anything we have experienced before and will continue to get worse for the foreseeable future.

The costs of these impacts will increase beyond levels that many farming enterprises can absorb, while government assistance will be limited by competing demands for scarce resources. Insurance will become more expensive, and in many cases difficult to attain. It is likely that many farmers will be forced to retreat from areas where changes to the climate make farming unviable.

The Climate Disaster Fund could provide a source of funding to assist farmers in recovering from natural disasters, building resilience, and as adjustment funding for those farmers forced to exit the industry due to changed climatic conditions.

INFRASTRUCTURE

Australian industry depends on infrastructure for energy, water and transport. Heatwaves can cause damage and disruption to power supplies, communications, water and sewerage infrastructure as well as road, rail and air transport.⁷¹ Floods and extreme weather events disrupt and damage roads, rail, waste storage, buildings,

⁶⁹ BOM (2017) *Droughts and flooding rains already more likely as climate change plays havoc with Pacific weather*, <http://www.bom.gov.au/climate/updates/articles/a023.shtml>

⁷⁰ AgForce (October 2018) *Media Release: Impact of drought laid bare in survey of Queensland farmers*, <https://agforceqld.org.au/index.php?tgtPage=news&id=view,763>

⁷¹ Queensland Government (2019) *Queensland state heatwave risk assessment 2019*, <https://www.disaster.qld.gov.au/dmp/Documents/QFES-Heatwave-Risk-Assesment.pdf>

water storage and other infrastructure.⁷² Fires and extreme temperatures damage transmission lines and power stations.⁷³ Droughts threaten water availability.

Interruptions to these essential services disrupt business and increase maintenance and reconstruction costs, ultimately flowing on to businesses through higher utility costs. The frequency and severity of these impacts will continue to increase unless emissions are decisively reduced.

When roads and rail are damaged in natural disasters it disrupts industry and business including both supply chains and distribution networks. Flooding and extreme heat, both of which are increasing as a result of global warming, present serious risks to infrastructure. The Queensland floods affected 9,000 km of the state's roads (around 29%) and around 3000 km of the state's railways.⁷⁴ Extreme heat can cause roads can melt,⁷⁵ rail to buckle,⁷⁶ and disruption to airlines.⁷⁷

Climate change and natural disasters also present serious risks and large costs to the electricity system. Blackouts disrupt businesses and industry, and the increasing costs to repair and maintain the power system are ultimately passed onto households and businesses through higher electricity prices.

During Cyclone Yasi in 2011, 220,000 Queensland electricity consumers lost their power supply. The cost of damage to electricity infrastructure was \$60-80 million, which does not include the cost of disruption to customers. An unprecedented storm in South Australia in 2016 brought down 22 transmission towers triggering a cascading failure of the electricity system in the state resulting in severe blackouts with an

⁷² Queensland Floods Commission of Inquiry (2012) *Final Report*, <http://www.floodcommission.qld.gov.au/about-the-commission/>

⁷³ ABC News (2019) *Vic fires threaten major power lines*, <https://www.abc.net.au/news/2009-01-31/vic-fires-threaten-major-power-lines/279192>

Climate Tracker (2019) *Country Summary, Australia*, <https://climateactiontracker.org/countries/australia/>

⁷⁴ Queensland Floods Commission of Inquiry (2012) *Chapter 10, Essential Services*, http://www.floodcommission.qld.gov.au/_data/assets/pdf_file/0014/11714/QFCI-Final-Report-Chapter-10-Essential-services.pdf

⁷⁵ Cheer (2018) *Traffic delays after 10 kilometres of Victoria's Hume Freeway melts*, <https://www.sbs.com.au/news/traffic-delays-after-10-kilometres-of-victoria-s-hume-freeway-melts>

⁷⁶ Lauder (2009) *Melbourne railway buckles under heat*, <http://www.abc.net.au/worldtoday/content/2008/s2477350.htm>

⁷⁷ Coffell and Horton (2017) *How hot weather – and climate change – affect airline flights* <https://theconversation.com/how-hot-weather-and-climate-change-affect-airline-flights-80795>

estimated cost to South Australian businesses of \$367 million (with median losses of \$5,000 per business).⁷⁸

Powerlines can cause fires in extreme conditions or be damaged by fires causing blackouts. With increasing extreme temperatures, more intense and longer fire seasons, and more dry lightning strikes, the risk of both increases. In 2007, the Tutong bushfire in Victoria damaged power lines causing power losses to 620,342 households and 66,890 businesses.⁷⁹ The costs of reducing this risk can be very large. Following the Black Saturday bushfires in Victoria in 2009, caused largely by powerlines failing in the extreme conditions the Government introduced a \$750 million Powerline Bushfire Safety Program (PBSP), including a \$200 million Powerline Replacement Fund to replace powerlines in high risk bushfire areas with insulated overhead lines or underground lines.⁸⁰

Power stations produce less electricity and are increasingly vulnerable to breakdowns as a result of increasing extreme temperatures, particularly coal power stations. During heatwaves in 2017 a series of coal and gas power station breakdowns and derating in SA, Queensland and NSW, led to 14% (3,600MW) of coal and gas power plant capacity being unavailable during peak demand periods across these states during their respective peak demand periods. This resulted in blackouts in South Australia and load shedding by industry in NSW.⁸¹ More recently, in January 2019, simultaneous breakdowns at two of Victoria's brown coal power stations resulted in blackouts and

⁷⁸ Climate Council (2019) Op.Cit.P.17.

⁷⁹ Deloitte (2015) *Building resilient infrastructure*, https://www.iag.com.au/sites/default/files/Documents/Announcements/ABR_Report-Building-resilient-infrastructure-020316.pdf

⁸⁰ Government News (March 2014) *Dangerous Victorian power lines to be buried to prevent bushfires*, <https://www.governmentnews.com.au/dangerous-victorian-power-lines-buried-prevent-bushfires/>

⁸¹ Ogge and Aulby (2017) *Can't stand the heat: The energy security risk of Australia's reliance on coal and gas generators in an era of increasing heatwaves*, <https://www.tai.org.au/sites/default/files/P454%20Can%27t%20stand%20the%20heat%20FINAL%20.31.pdf>

load shedding to industry.⁸² Drought also threatens both hydro power and coal power stations, as most use large amounts of water for cooling.⁸³

Industry also uses large amounts of water. In 2016/17, Australian industries other than agriculture used 2,662 gigalitres of water, more than Australian households.⁸⁴ Increasing water scarcity will inevitably lead to increasing water supply and costs issues for industrial and business users.

The Climate Disaster Fund could provide a source of funding for Australian business and industry to invest in climate resilience measures, both for their own businesses and the public infrastructure they rely on.

CONSTRUCTION

Construction is one of Australia's largest industries in terms of employment, employing over 1.1 million people, making up around 7% of the workforce.⁸⁵ The high portion of workers required to undertake strenuous activity outdoors on construction sites make it particularly exposed to the impact of heatwaves on worker's health and safety as well as productivity.

Worksafe Australia lists a range of serious heat related illnesses (HRIs) including heat exhaustion, heat cramps, dehydration and heat stroke which can be fatal. Business owners have a legal duty to ensure workers are "not exposed to health and safety risks arising from the business or undertaking".⁸⁶

⁸² Parkinson (2019) Brown coal generators failed the grid in Victoria heat-wave, blackouts, <https://reneweconomy.com.au/brown-coal-generators-failed-the-grid-in-victoria-heat-wave-blackouts-55696/> AEMO (2019) *Load Shedding in Victoria on 24 and 25 January 2019*, https://www.aemo.com.au/-/media/Files/Electricity/NEM/Market_Notices_and_Events/Power_System_Incident_Reports/2019/Load-Shedding-in-VIC-on-24-and-25-January-2019.pdf

⁸³ McDonald-Smith (2018), *Drought hit on Snowy Hydro leaves Vic prone to summer blackouts*, <https://www.afr.com/companies/energy/drought-hit-on-snowy-hydro-leaves-vic-prone-to-summer-blackouts-20180828-h14leq>

⁸⁴ ABS (2017) *Water Account, Australia, Summary*, <https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4610.0Main+Features22016-17?OpenDocument>

⁸⁵ ABS (2018) *6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, Table 4*. <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Nov%202018?OpenDocument>

⁸⁶ Worksafe Australia, *Guidance material: managing the risks of working in the heat*, https://www.safeworkaustralia.gov.au/system/files/documents/1712/guide_for_managing_the_risks_of_working_in_heat_1.pdf

Many regulators and researchers use 35 degrees as an important threshold for safety, work and climatic conditions. Academic researchers have pointed to this as a point where substantial productivity is lost. The CSIRO and Bureau of Meteorology publish 35 degree threshold predictions.⁸⁷

35 degrees is seen as the “Limit of high temperature tolerance” by the Occupational Health and Safety Representatives of the Victorian Trades Hall Council who recommend paid work breaks of 45 minutes per hour when the temperature reaches 34 degrees and that work ceases at 36 degrees.

Research has estimated that work absenteeism and reductions in work performance caused by heat cost the Australian economy nearly \$7 billion in 2013/14 alone.⁸⁸

Given the serious physical risk of exertion in extreme temperatures, the dramatic increase in days over 35 degrees projected for many locations will inevitably result in falling productivity in construction.

Western Sydney for example is Australia’s third largest economy, with a population of 1.6 million expected to grow by a further million residents within the next two decades. They will require an additional 400,000 dwellings as well as associated commercial construction, transport and other infrastructure. In total there are 52,000 construction workers in Western Sydney.⁸⁹

Historically Penrith in Western Sydney experienced an average of 13 days per year over 35 degrees. This is expected to rise to up to 22 days in 2030 and up to 59 days per year by 2090 as a result of global warming.⁹⁰ However this could be an underestimation given in 2017 Penrith experienced 38 days over 35 degrees and in 45 days in 2018.⁹¹

⁸⁷ Victorian Trades Hall Council (2018) *Heat*, <http://www.ohsrep.org.au/hazards/workplace-conditions/heat>; Singh et al (2015) *Working in Australia's heat: health promotion concerns for health and productivity*, Health Promotion International, <https://academic.oup.com/heapro/article/30/2/239/561863>; CSIRO and BoM (2015) *Climate change in Australia: Projections for Australia's NRM Regions*, <https://www.climatechangeinaustralia.gov.au/en/publications-library/technical-report/>

⁸⁸ Zander, Opperman and Garnet (2015) *Extreme heat poses a billion-dollar threat to Australia's economy*, <https://theconversation.com/extreme-heat-poses-a-billion-dollar-threat-to-australias-economy-41153>

⁸⁹ Western Sydney Regional Organisation of Councils (WSROC) website, Issues, <https://wsroc.com.au/issues-campaigns>

⁹⁰ Ogge et al (2018) *HeatWatch: Extreme heat in Western Sydney*, <http://www.tai.org.au/sites/default/files/Western%20Sydney%20Heatwatch%20%5BWEB%5D.pdf>

⁹¹ BOM Climate Data Online, Penrith, Penrith Lakes station 067113, <http://www.bom.gov.au/climate/data/index.shtml>

In Darwin, which has projected rise of up to 200 days over 35 degrees by mid-century combined with very high humidity, the impacts on productivity in the construction industry will be even more dramatic.

The Climate Disaster Fund could provide funding for the construction industry to adjusting to these conditions while protecting the health safety of workers exposed to increasing extreme heat.

TOURISM

Australia’s tourism industry relies on the experience of our unique natural environment. Every aspect of our natural environment is under threat from climate change. Our forests are threatened by increasing fires, our beaches by sea level rise, our wildlife by mass extinction and marine environment including the Great Barrier Reef by ocean heatwaves and acidification.

Heatwaves are also making it more difficult and potentially dangerous for domestic and overseas tourists to enjoy our diminishing natural assets. Many of our most popular tourist destinations are already experiencing far more frequent heatwaves and are projected to experience devastating conditions over coming decades. As shown in Table 4 below, Cairns is projected to go from a historic average of 4 days per year over 35 degrees historically to up to 104 days well within the lifetime of children born today under current emissions trajectories. Western Australian and Northern Territory destinations are projected to experience even more extreme conditions.

Table 4: Projections (high) of days over 35C per year at current trajectories (RCP 8.5)

	1981-2010	2030	2050	2070	2090
Darwin	47	156	209	275	317
Alice Springs	88	126	159	191	214
Cairns	4	15	33	65	104
Sydney	5	9	14	20	29
Gold coast	1	3	8	16	31
Perth	17	26	35	46	55
Broome	81	147	195	244	286
Melbourne	8	13	17	22	30

Source: CSIRO and Bureau of Meteorology (2018) Climate projections, provided on request

The Climate Disaster Fund could provide a reliable source of funding to assist tourism operators recover from natural disasters. It could also provide funding for tourism

enterprises to adapt to the changing circumstances of tourism in a warming world, and as adjustment funding to exit the industry where necessary as a result of natural disasters and global warming impacts.

SOCIAL SERVICES

Natural disasters have large social and economic costs and entrench disadvantage.

The 2019 Queensland floods are estimated to have affected 116,000 people and cost at least \$2.3 billion in health, social and community impacts. By April 2019 there were 81,298 applications for Personal Hardship Assistance Grants.⁹²

The mental health impacts of the 2019 Queensland floods alone are estimated to have cost \$1.6 billion, with around 62,000 people being provided with psychological first aid. Research following the Queensland 2011 floods has found that flood events can have lasting community impacts on mental health, alcohol misuse and family violence, and can exacerbate chronic disease. People from disadvantaged socioeconomic backgrounds and in regional and remote areas were likely to be affected more.⁹³

Similarly, the social and economic costs of Victoria's Black Saturday Bushfires are estimated to have been around \$3.9 billion, more than the direct tangible costs of damage to properties and infrastructure (\$3.1 billion). The mental health costs alone were over \$1 billion, and as with the Queensland floods, the rate of substance abuse and family violence and chronic disease also increased in affected communities. Short-term unemployment also spiked, with a 66% increase in the number of people receiving Newstart, subsiding over the following 12 months.⁹⁴

Heatwaves also have large health, social and economic costs. As well as an increase in heat-related deaths and illness, the rise in extreme heat increases irritability and

⁹² Deloitte Access Economics (2019) *The social and economic cost of the North and Far North Queensland Monsoon Trough: Queensland Reconstruction Authority*, <https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-dae-monsoon-trough-social-economic-cost-report-160719.pdf>

⁹³ Deloitte Access Economics (2019) *Ibid.* P.29

⁹⁴ Deloitte Access Economics (2017) *The economic cost of the social impact of natural disasters*, <http://australianbusinessroundtable.com.au/assets/documents/Report%20-%20Social%20costs/Report%20-%20The%20economic%20cost%20of%20the%20social%20impact%20of%20natural%20disasters.pdf>

psychological stress.⁹⁵ Hot weather affects patterns in domestic violence,⁹⁶ interrupts sleep patterns and reduces capacity and willingness to exercise. All carry broad ramifications, such as increased accident risk, sedentary life style-induced diabetes and cardio vascular disease.⁹⁷

Heatwaves also disproportionately affect disadvantaged communities. Proximity to the coast and access to cooling sea breezes greatly reduces the impact of heatwaves. In many Australian cities, cooler coastal suburbs tend to be more affluent, with lower socio-economic groups further from the coast in suburbs that can become heat traps.

Sydney is a good example with large difference in current and projected extreme temperatures between the affluent coastal eastern suburbs and less affluent inland western suburbs. Currently Western Sydney averages almost four times the amount of days over 35C as Central Sydney. By 2090 under current emissions trajectories the CSIRO projects that the eastern suburbs of Sydney could experience and average of up to 22 days over 35C in a year. In the same emissions scenario Richmond in Western Sydney passes this threshold 60 years earlier – by 2030 and could reach and average of up to 67 days per year over 35C by 2090.⁹⁸

Low-income households will increasingly struggle to afford the costs of installing and running air-conditioning in these conditions.

Remote regional communities and particularly indigenous communities are particularly at risk. Many inland regional areas are already experiencing unprecedented extreme heat, and the projections are dire for many parts of the country. In the Northern Territory for instance, the number of days over 35C in Darwin has increased from 6 per year to over 20 per year. CSIRO modelling estimates on our current emissions trajectory, this could rise to 132 days per year in 2030 and 275 days per year in 2070. Inland areas are likely to be worse. It is difficult to imagine these areas being habitable if these projections eventuate.⁹⁹

⁹⁵ Queensland Health (2015) *Heatwave Response Plan*

https://www.health.qld.gov.au/data/assets/pdf_file/0032/628268/heatwave-response-plan.pdf

⁹⁶ Auliciems and Di Bartolo (1995) *Domestic violence in a subtropical environment: police calls and weather in Brisbane*, International Journal of Biometeorology 39 (1).

⁹⁷ Kjellstrom et al. (2009) *The Direct Impact of Climate Change on Regional Labor Productivity*, Archives of Environmental & Occupational Health 64 (4); World Health Organisation (2017) *Preventing noncommunicable diseases (NCDs) by reducing environmental risk factors*, <http://apps.who.int/iris/bitstream/10665/258796/1/WHO-FWC-EPE-17.01-eng.pdf?ua=1>

⁹⁸ Ogge and Browne (2018) *HeatWatch: Extreme heat in Western Sydney*, <https://www.tai.org.au/sites/default/files/Western%20Sydney%20Heatwatch%20%5BWEB%5D.pdf>

⁹⁹ Hanna and Ogge (2018) *Cooked with gas: Extreme heat in Darwin*, <https://www.tai.org.au/content/cooked-gas-extreme-heat-darwin>

On top of this, as disasters increase, there will be greater demands put on the public purse from many directions. This is likely to lead to less resources being available for social services, just as the need increases.

The Climate Disaster Fund could provide a stable source of funding for providing and maintaining the growing cost social services required to cope with the impacts of natural disasters.

OUR PACIFIC NEIGHBOURS

Climate change is an existential threat to Pacific nations, particularly through sea level rise. Not only could the sea inundate entire island nations but can contaminate soil and drinking water. Fisheries, which are an essential source of food and revenue in these nations, now face collapse from increasing ocean heatwaves and acidification.¹⁰⁰

These island nations are also increasingly at risk from extreme weather events. Increasing ocean temperatures result in stronger storms and greater flooding. As discussed above, Australian Bureau of Meteorology modellings has found that “Pacific Rainfall Disruptions” including droughts and floods have already increased in frequency by 30% as a result of climate change and are projected to increase by 90% in the first half of this century and 130% in the latter half.¹⁰¹

It is uncertain whether the frequency of cyclones will increase, however, they are expected to become more intense, and it is expected that the “strongest future storms will exceed the strength of any in the past.”¹⁰²

Besides the devastating human and environmental tragedy, this is a critical issue of regional stability and national security for Australia. Australia will undoubtedly be required to play a leadership role in natural disaster response, relief and reconstruction to increasingly severe natural disasters and chronic climate impacts in the region.

Recently, the head of the Australian Defence Force, General Angus Campbell noted that Australia is in “the most natural disaster-prone region in the world” and that “climate change is predicted to make disasters more extreme and more common”. He

¹⁰⁰ IPCC (2019) *Special Report on the Ocean and Cryosphere in a Changing Climate*, <https://www.ipcc.ch/srocc/home/>

¹⁰¹ BOM (2017) Ibid.

¹⁰² Stefan et al (2018) *Does global warming make tropical cyclones stronger?* <http://www.realclimate.org/index.php/archives/2018/05/does-global-warming-make-tropical-cyclones-stronger/>

also noted that the level of commitment required from the ADF to respond to climate change-related events compared to more traditional deployments.¹⁰³

Without the Climate Disaster Fund, the impact of global warming including increasing natural disasters is likely to overwhelm existing funds for aid and development. Development projects are likely to be disrupted or made less effective by increasing natural disasters. Recently the Australian Government has redirected aid funding from other programs to assist with climate change impacts.¹⁰⁴ Without the Fund, natural disaster assistance may come at the expense of other important aid and development projects.

The Fund could provide a source of reliable funding for Australia to assist our Pacific neighbours in responding to and recovering from natural disasters as well as building resilience, without being at the expense of existing development programs.

¹⁰³ Clarke (2019) *Climate change could stretch our capabilities, Defence Force chief speech warns*, <https://www.abc.net.au/news/2019-09-25/australian-defence-force-angus-campbell-climate-change-speech/11543464>

¹⁰⁴ Harris (2019) *Australia to redirect \$500 million in foreign aid to new Pacific projects*, <https://www.smh.com.au/politics/federal/australia-to-redirect-500-million-in-foreign-aid-to-new-pacific-projects-20190812-p52gdl.html>

Conclusion

The increasing frequency and intensity of natural disasters due to climate change is already burdening the entire Australian community with large costs.

These costs fall on taxpayers, ratepayers, businesses and ordinary members of the community.

This financial burden will increase as the climate situation deteriorates. Unless a dedicated fund, financed from an alternative source is established, natural disaster costs will continue to erode essential services, infrastructure, and the economy as a whole, as well as having a devastating impact on individuals and communities.

A levy on fuel production is an appropriate source of funding as fossil fuel emissions are the largest source of greenhouse gases globally, and Australian coal and gas makes a disproportionate contribution to climate change. The companies extracting coal and gas from Australia are mostly large multinational companies who make little if any contribution to paying the costs of the global warming they are fuelling and little if any company tax in Australia.

Without this alternative source of funding, the burden will continue to increase on those constituencies who are currently bearing the burden of loss and damage from natural disasters and climate change, including farmers, local governments, businesses and the community as a whole.