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Beyond Zero Emissions Submission

Foreign Affairs, Defence and Trade References Committee
Department of the Senate
PO Box 6100 Parliament House
Canberra ACT 2600

2 August 2017

Dear Committee Secretary,

Beyond Zero Emissions welcomes the opportunity to provide a submission to the Committee's inquiry into the implications of climate change for Australia's national security.

Beyond Zero Emissions is an Australian climate solutions think tank. Since 2006 we've helped governments, businesses, and individuals address one fundamental question: How can Australia rapidly transition to a zero carbon emissions economy?

We demonstrate through research that technical solutions to climate change already exist, are practical and feasible, and can be implemented immediately. This submission relates to terms of reference d. and e. of the inquiry, in reverse order.

e. The role of climate mitigation policies in reducing national security risks

Current Australian research has found that unmitigated climate change will lead to severe humanitarian crises, forced migration, political instability and conflict. The Asia-Pacific region, including Australia, is considered one of the worst affected areas.¹

To mitigate the impact of climate change, Australia can show the way in moving from a carbon intensive economy to a 'zero carbon economy'.

The *Zero Carbon Australia Plan* by Beyond Zero Emissions and research partner organisations is a series of publications which show how Australia can rapidly decarbonise

¹ Dunlop, I. and Spratt, D., *Disaster Alley: Climate Change, Conflict and Risk*. Breakthrough (on-line magazine), National Centre for Climate Restoration, Melbourne, 2017, <https://www.breakthroughonline.org.au/>

the energy, buildings, transport, land use, export and industrial sectors. (Key publications and fact sheets are at **Attachment A**.)

For example, the *Stationary Energy Plan* (2010) was the first report of the series. It modelled a transition to 100% renewable energy generation over ten years using a mix of 60% concentrated solar thermal power, 40% wind power and a 2% back up from biomass and hydroelectricity.

Many endorsed the Stationary Energy Plan as a visionary and yet achievable roadmap for deploying renewables, including **the Hon Malcolm Turnbull MP** who said at the launch:

"I believe our long-term global goal is to, very substantially, reduce our emissions, a goal that will require almost all of our energy to be produced from zero, or very near zero, emission sources ... The work they [Beyond Zero Emissions and the Melbourne Energy Institute] have done is important. ... It provides the most comprehensive technical blueprint yet for what our engineers, our scientists can begin to do for us tomorrow. ... A zero emission future ... is absolutely essential if we are to leave a safe planet to our children and the generations that come after them."

Implementing the *Zero Carbon Australia* suite of plans will demonstrate in a practical way how an economy can be transitioned to a zero carbon-emissions future.

This also represents an opportunity for Australia to be a low cost industrial nation taking on energy intensive industries using no carbon inputs.

Australia could even be a Renewable Energy Superpower, given our almost limitless supply of renewable energy. Australia's demonstrated economic solar and wind energy resources are estimated to be 75% greater than Australia's coal, gas, oil and uranium resources combined.

Australia is well positioned to become a renewable energy superpower having the advantages of:

- ✓ world class solar and wind resources
- ✓ a widespread electricity distribution grid
- ✓ a skilled and innovative workforce and industry sector
- ✓ capable research organisations: universities and the CSIRO
- ✓ proximity to the large and growing Asian markets
- ✓ a secure, stable society and
- ✓ high quality and abundant mineral resources.

d. the role of Australia's overseas development assistance in climate change mitigation and adaptation more broadly

The implementation in Australia of the *Zero Carbon Australia Plan* research will provide a blueprint that can be used in aid projects and diplomatic discussions to help other countries achieve the same results.

In addition, Beyond Zero Emissions' new *Zero Carbon Community Guide* (2017) can show communities in Australia and other countries how they can run cost-effective, rapid zero emissions strategies in nine steps, see **Attachment A**. Any aid project aimed at climate change mitigation can benefit from the practical policy advice given to local governments.

While different countries will have different circumstances, Australia's experience of successful decarbonisation will be a useful way ahead for countries that do not have the wealth or scientific/industrial expertise to decarbonise quickly.

BZE recommendations:

That the Committee include in its recommendations to the Australian Government:

- support a rapid transition to a zero carbon Australian economy
- harness the economic opportunities of Australia being a carbon-free renewable energy superpower
- use the Australian experience of rapid decarbonisation to aid other countries to achieve similar reductions in carbon emissions.

Attachment A

Zero Carbon Australia Plan - Key Publications and Fact Sheets

1. [Stationary Energy Plan \(2010\),](#)
2. [Renewable Energy Superpower \(2015\),](#)
3. [Land Use – Agriculture and Forestry \(2014\),](#)
4. [Buildings Plan \(2013\),](#)
5. [Electric Vehicles \(2016\),](#)
6. [High Speed Rail \(2014\)](#)
7. [Zero Carbon Communities Guide \(2017\)](#)

All of these publications are available for free downloading from the Beyond Zero Emissions website: <http://bze.org.au/>



STATIONARY ENERGY

The technical feasibility of 100% renewable electricity using only proven and viable technologies and replacing transport oil, heating gas and industrial use of fossil energy has been demonstrated and is expected to reduce Australia's ongoing emissions by over 50%.

Context

A reliable, secure national electricity grid supplied by 100% renewable energy sources is technically feasible and affordable in Australia. It could be achieved within ten years, with sufficient commitment and investment

Detailed modelling of supply and demand on an hourly timescale was performed over several years of actual data for electricity demand, wind power and solar resources, to confirm that the mix of technologies and storage was sufficient to ensure reliability.

Since the release of the Stationary Energy Plan in 2010, the University of New South Wales (UNSW), Australian Energy Market Operator (AEMO) and other analysis have shown that a number of scenarios based on 100% renewables in the National Electricity Market are feasible and affordable.

In 2010, implementing the proposed renewable infrastructure over a ten-year timeframe was calculated to require an investment of \$37 billion/year over ten years - the equivalent of 3% of GDP.

This cost includes upgrades to the grid and installation of new high voltage DC transmission lines and factors in an increase in electricity demand of 40% to 2030 as transport, heating and industrial fossil energy are all electrified.

Proposed Power Grid for 100% Renewable Electricity



1. Beyond Zero Emissions November 2016



Renewable Energy Superpower

There are policy, revenue and investment implications for Australia in the transition to an economy based on its vast, high quality, and as yet untapped, renewable energy resources.

Context

The world is transitioning from the fossil energy era to the renewable energy era, in order to contain global warming to well below 2°C.

This is bringing major changes to the energy system, international trade, security and the distribution of energy intensive production across the world.

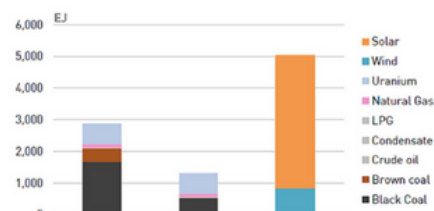
Renewable energy superpowers like Australia will be the global industrial powerhouses of the future with a fundamental economic advantage derived from abundant low cost clean energy.

Renewable Energy Superpowers will be the nations with not only exceptional renewable energy resources, but also the space for harvesting, industrial capacity, resources, foresight and skills to convert it into valuable production.

Australia has one of the largest and highest quality renewable energy resources in the world and is therefore in the box seat to be a superpower in the renewable energy era.

Australia's economically demonstrated solar and wind energy resources are estimated at over 5000 exajoules; 75% greater than Australia's coal, gas, oil and uranium resources combined.

Only when successfully paired with grid reform, effective policy and Australia's abundant mineral wealth will the renewable energy advantage be realised.



Comparison of non-renewable (fossil and nuclear) and renewable energy Economically Demonstrated Resources
Also includes energy production corresponding to the International Energy Agency's 450ppm scenario



Zero Carbon Australia FACT SHEET

BZE.ORG.AU

LAND USE

In the land use sector, Australia's cropping and herding activities together emit more than 50% of Australia's total CO₂-e. Yet with several simple changes agriculture can achieve net zero emissions within 10 years - expanding revegetation would result in net carbon capture.

Context

Australian cropping and animal agriculture is a major part of Australian and global food and fibre supply chains.

Yet, the fact is that these land use activities, and animal agriculture in particular, was found to contribute more than any other sector to driving near-term climate change.

When short-lived climate pollutants and emissions from land clearing and re-clearing are included, agricultural emissions increase from 18% to one third of Australia's total.

Allowing for both the added potency of methane generated from cattle and sheep herding and accounting for the effects on near-term climate change, the sector's share of Australia's total emissions rises to over 50% and sees Australia's emissions total more than double to 1497 Mt CO₂-e per year.

However, a genuinely zero carbon land use sector is possible. It can be achieved by:

1. **Restoring** 13% - 55 million hectares - of Australia's most exposed cleared land at an opportunity cost of approximately \$5.3 billion per year, adding to income diversity for regional businesses.
2. **Cease** clearing and re-clearing land for agriculture.
3. **Reduce** excessive emissions from beef through improved management across the industry and decreasing beef-cattle stock by 20%.
4. **Sequester** 7,500 million tonnes of carbon dioxide through biological recovery of the eucalyptus forests of South-East Australia. .



1. Beyond Zero Emissions April 2017



BUILDINGS

All of Australia's existing residential and commercial buildings can reduce annual energy consumption by 53 and 44% respectively, and cut the use of gas in all buildings by 100%.

Context

Australia's residential and commercial buildings sector is very energy intensive - households currently spend approximately \$15 billion *per year* on electricity and gas bills.

However, with enough solar exposed roof space on residential buildings to install 31 GW of rooftop solar photovoltaics, homes can become renewable energy power stations. This installation will allow the average Australian home to generate more electricity than it uses over a year.

The use of fossil gas (conventional fossil gas, coal seam gas, shale gas & others) can and must be completely removed from the buildings sector.

Fossil gas appliances can be replaced with higher efficiency electric alternatives such as heat pumps and

induction cooking, eliminating gas bills and leading to significant reductions in energy use while avoiding the climate and environmental damage caused by gas.

The full national upgrade - for commercial as well as residential buildings - can be completed within 10 years and save \$40 billion over the next 30 years and in the residential sector alone the task of fixing Australia's buildings will create around fifty thousand jobs in the trades sector.





ELECTRIC VEHICLES

Shifting all of Australia's urban car and bus fleets to be powered by 100% renewable electricity has been modelled and found to potentially cost no more than business as usual and save around 50% of Australia's ongoing transport emissions.

Context

A reliable, secure national electricity grid supplied by 100% renewable energy sources is technically feasible and affordable in Australia and in addition could be used to power a fleet of 20+million cars and tens of thousands of buses.

With the price of battery technology falling faster than projected the transition to all-electric passenger fleet could be achieved within ten years, and may have a total scenario cost to the economy of just over a trillion dollars over 20 years to 2036 - the same as business-as-usual.

Detailed modelling of hourly electricity demand shows that the existing transmission system is sufficient to supply the power needed for charging these vehicles at the time it is required.

Trials of Evs in Victoria Australia show that most EVs available have

sufficient range to cover the vast majority of trips taken by typical urban users and that, in a trial situation, EVs often become Australian's 'vehicle of choice'.

A dedicated rapid charging and charging infrastructure for a national electric car and bus fleet is included in the projected costs as is the cost of new-build renewable electricity on the grid.



1. Beyond Zero Emissions November 2016



High Speed Rail

Electrification of long distance transport sees high speed rail replace the majority of flights and cut emissions within the east-coast corridor by 28% by 2030.

Context

Many countries in the world, including Japan, Germany and France, have had High Speed Rail for several decades. China is now building the most extensive High Speed Rail (HSR) network in the world.

Travelling long distances is an unavoidable part of living in Australia, with the country's (approximate) 1800 towns spread thinly over an enormous 7.7 million square kilometers.

There is enormous demand for travel in Australia. Travel is so much a part of Australian's lifestyles it accounts for one quarter of Australia's total energy consumption, and 15% of greenhouse gas emissions.

80 per cent of Australia's population lives in a corridor along the eastern coastline and Australia's passenger movements are heavily concentrated within a corridor in the south east of the country, between Melbourne and Brisbane.

Travel within this corridor represents 65% of journeys, 45% of kilometres and 44% of emissions accumulated by passengers across all of regional Australia.

