



A FUTURE FOR ALL OF US

MAKING TASMANIA A GLOBAL CLIMATE LEADER BY 2030

The legislative opportunities and policies identified in this Discussion Paper provide a basis for action and are an introduction to a much broader and profound suite on offer. The aim of this Paper is to start a 12 month discussion with the Tasmanian community about what we can do to address global warming and create a new role for Tasmania in a warming world.

A Discussion Paper prepared for Senator Nick McKim
by Dr Ben L. Parr
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**THE
GREENS**



PREFACE

TASMANIA IS UNIQUELY POSITIONED TO BE A GLOBAL CLIMATE LEADER.

We already have a global reputation as a clean, green, wilderness island in the Southern Hemisphere. As a place where human potential knows no bounds and from which magnificent food and beverages are distributed world-wide.

But as extreme weather events destroy food security, lives and livelihoods across the planet, people everywhere are now focussing beyond where they might travel or the foods they might like to enjoy. They are also changing their mindsets and lifestyles to accommodate urgent action on climate change.

Our wild, clean, uncontaminated environment, largely powered by renewable energy, combined with the global focus on climate action gives Tasmania a unique opportunity to lead, to be a beacon of light to a world in crisis.

But it also means we need to change. Instead of passively hoping Tasmania will continue to benefit, we need to be proactive. It is not enough to make ad hoc changes. We need to work strategically towards systemic change.

By leading by example on the global stage we can help shape international climate frameworks to ensure that they protect and advance the interests and well-being of all Tasmanians, as well as attracting new industries and employment opportunities to Tasmania.

Tasmania is already impacted by the changing climate and the global responses to it. Tourism dropped as the bushfires took hold over the summer of 2019 and threatened some of our core wilderness areas. The pressure for people to eat less red meat and fly less will only increase. Wild fisheries are less productive because of changes to ocean currents bringing invasive species. Rainfall patterns are changing here and around the world such that China, Qatar, Saudi Arabia and South Korea are buying agricultural land and water wherever they can in anticipation of insecure food supply chains in the future.

Business as usual will not secure Tasmania's future. Tourism, migration, population and consumer patterns are increasing pressures on wilderness protection, urban expansion, terrestrial land and water ownership, and marine ecosystem health.

All Tasmanians want a good quality of life in a liveable environment. So, we need to start talking as a community about how to maintain that quality of life in a climate emergency and how to do it to advantage all Tasmanians. How do we protect our wilderness, our clean air and clean water, deploy our renewable energy, grow our food, and manage our urban environment in climate friendly ways? How do we benefit all Tasmanians young and old, rural and urban? How do we do it in a way that captures the imagination of people all around the world?

By publishing this discussion paper, the Greens are making a start. Underpinned by the latest climate science, and in consultation with local experts, the Greens have developed this solutions-focused discussion paper which identifies key, future focussed policies and initiatives that will reduce emissions, anticipate a rapidly changing world and take the action required to reposition Tasmania as a global leader in a world experiencing a climate and biodiversity emergency.

We are committed to lead a 12 month process of community consultation to strengthen this discussion paper and transform it into a plan that Tasmanians own and are excited about.

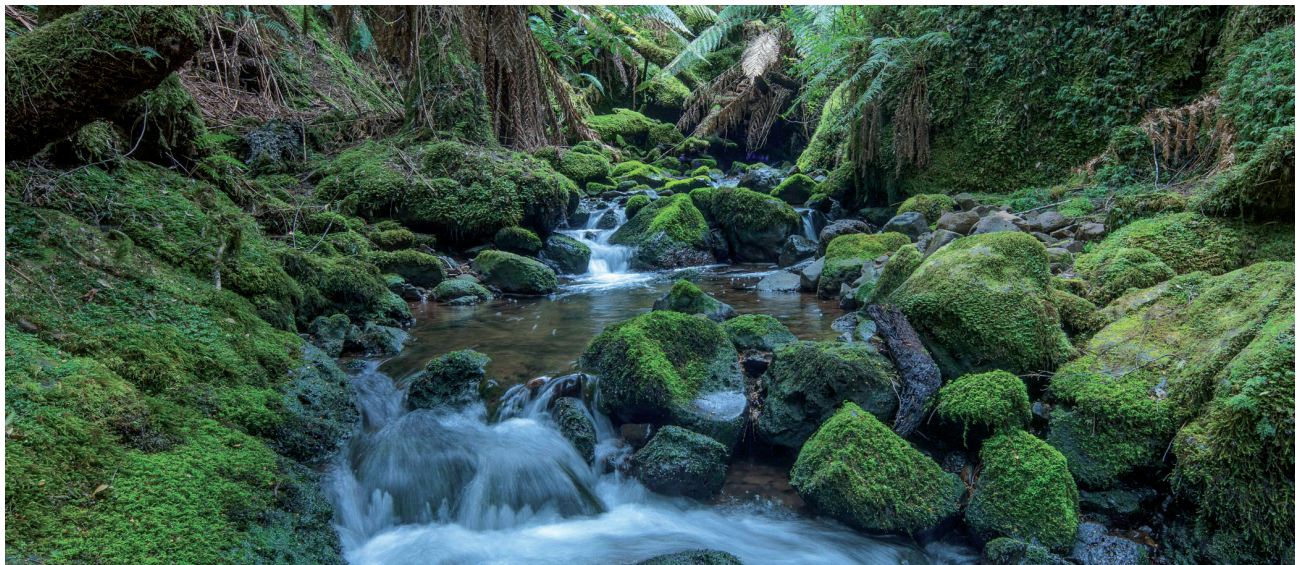
We need to hear from with Aboriginal Tasmanians, and from those who manage our much loved wild places. We need to hear from farmers and landholders about regenerative agriculture and restoration forestry.

We need to talk with people who love the sea, who dive or fish commercially and recreationally about marine protected areas and pollution and sustainable practices. The Arts has always been the key to transforming Tasmania, so we want to talk with Tasmania's creative community about how to reimagine our future. Teachers, nurses, medical professionals, firefighters and academics are everyday identifying better ways of looking after us all and helping us to be healthier, better informed, safer and more resilient. Architects, builders, town planners, transport engineers transform our lived environment.

From young people on the streets in the climate strikes, to local government, to small and big business and our senior citizens, we need to discuss what Tasmania needs to do to lead and be better prepared for this changed future.

The Greens stand ready to lead the discussion, and help make Tasmania a global climate leader.

Senator Nick McKim
Australian Greens Senator for Tasmania
May 2019



EXECUTIVE SUMMARY

TASMANIA'S PLACE AND OPPORTUNITY IN A WARMING WORLD

Nation-states have collectively failed us on protecting our climate. The world is searching for leadership to go beyond the Paris Agreement and is looking to subnational entities like Tasmania to step up and deliver climate action commensurate with the urgency that the world's leading scientists have said is necessary to avoid runaway climate change. We have eleven years.

By taking a leadership role, Tasmania will give our wild island home, all our unique fellow species and ourselves our best chance in the climate and biodiversity emergency.

Excitingly and strategically, we will also put ourselves up in lights as a global place of interest adding depth, greater authenticity and a futuristic focus to our brand: Tasmania Clean and Green.

Not only that, we will enhance our sense of well being, by reducing anxiety about what the future holds. The greatest uncertainty in all the climate projections still remains our choice of emissions pathways. It is the choices we make, not the uncertainty in climate models, that leads to good or bad climate outcomes. Being proactive instead of passive makes a difference to our mental health.

Many Tasmanians already recognise the seriousness and urgency of the climate emergency and the need for action to minimise future catastrophic impacts. Yet the Tasmanian Government does not have a climate policy plan beyond 2021. This has to change.

Part One of this paper outlines how our island has already suffered potentially irreversible changes from the existing 1°C of warming. Our environment, our society and our economy have been adversely impacted as has our global reputation. In the future Tasmania is likely to have higher temperatures, less summer rainfall, fewer frosts, more heatwaves and more extreme weather. This is not good news for a state with its wilderness being the 'must visit' trigger for tourism and a third of its employment and a quarter of its overseas exports in agricultural industries.

Already marine heat waves and the invasive sea urchin (*Centrostephanus rodgersii*) have destroyed our kelp forests. Vast wildfires in the last 6 years, have burnt over 10% of our World Heritage Area and threatened homes and livelihoods.

So far we have failed to respond adequately to climate change threats and impacts such as:

- Changed seasonal and regional rainfall patterns with increased drought, floods and drying soils impacting dairying and crop productivity.
- Changed ocean warming, acidification and the prospect that with the East Australian Current heading further south there will be a faster warming in the east coast waters for the next 50 to 100 years and bringing more invasive species impacting the marine ecosystem and fisheries.

- Rising sea-level, storm surge and an identified 1140kms of coastline vulnerable to flooding with associated impacts on homes, infrastructure and insurance.
- Rising temperatures projected to increase by 1.6 - 2.9 degrees with greater number of extreme bushfire days and dry lightning strikes with adverse impacts on TWWHA, National Parks and our 685 Tasmanian threatened species.
- Rising community losses, respiratory illness and anxiety from bushfire impacts on people and industries such as viticulture, honey and tourism.
- The collapse of insects and pollination services.
- Damaged natural ecosystem resilience from increased threat of invasive species, and existing degradation from logging, mining, roads and urban expansion.

Nor have we thought through what the changing global geopolitics of food, water and energy mean for Tasmania. As American environmentalist, Lester Brown points out, whereas the 20th century was dominated by oil, in this century, food is the new oil and land and water are the new gold. Maintaining control of our land, water, food and energy assets - as wholly owned subsidiaries of foreign Governments seek to buy them - is critical to Tasmania's future in a heating world.

Environmental Analyst Lester R. Brown's book Full Planet, Empty Plates: The New Geopolitics of Food Scarcity provides a look into our future of food scarcity, falling water tables, eroding soils and rising temperatures where 'food is the new oil and land is the new gold'.

To survive and thrive in the 21st century, we need to prevent further damage and rapidly adapt to the global warming impacts already locked in.

But to lead we need to go further. We need to build on our existing strengths, develop resilience and reposition ourselves globally.

TASMANIA'S EXISTING STRENGTHS ON WHICH TO BUILD A LEADERSHIP POSITION

Tasmania has natural and cultural strengths giving us a head start in developing a leadership position on global warming. But do we have the imagination and political will to do it?

- We are an island and can therefore take initiatives towards self-sufficiency.
- We have a temperate climate at 42 degrees south and a Tasmanian Wilderness World Heritage Area of universal value to humankind.
- We are a small, interconnected and flexible, community which means that we can respond rapidly to great challenges.

- We have some of the cleanest air in the world and an extensive system of streams, rivers and lakes.
- We have a diverse and rich variety of topography, rainfall patterns and microclimates.
- We have uncontaminated soils with productive agricultural land for a diversity of crops and growing conditions.
- We have abundant renewable energy resources with wind, solar, existing hydro and potential for pumped hydro storage.
- We have an ancient Aboriginal culture which continues to embed the importance of place in our psyche.
- We are the birthplace of the global Green political movement.
- We have a renowned clean, green brand and are GMO free.
- We have an inspiring reputation for people powered environmental wins.
- We are the home of the world's most democratic electoral system, the Hare Clark system.
- We have a politically engaged community with a comparatively strong sense of well being and engagement with nature.
- We are becoming more culturally diverse.
- We have changed our Tasmanian narrative. We have moved from a 'resource extraction', 'low socio-economic return' story to one which values a sense of place, quality, creativity, and diverse opportunities with high quality products and a nature based edge.
- We have a critical mass of high level expertise in renewable energy, marine and climate science, agriculture, boutique produce, advanced manufacturing and the arts.

WORLD LEADING SOLUTIONS

With all these advantages, we have the capacity to implement system wide transformation underpinned by a comprehensive political framework. The Clean Energy Package nationally delivered such a template in 2011 and Tasmania could do the same now.

Part Two of this report outlines the solutions based package of world leading climate laws and climate policies Tasmania could develop, legislate and implement to drive this whole of society transformation.

To meet and beat world leaders, Tasmania could legislate for:

- sectoral emissions reduction targets for stationary energy, transport, and agriculture by 2025 and 2030, with the aim to decarbonise our economy as soon as possible;

- at least 100% of our net electricity needs from renewable energy and be a net exporter of renewable energy by 2022;
- specific and strong targets for the penetration of electric vehicles (buses, cars and trucks) and for charging infrastructure (public and home) by 2025 and 2030;
- a certification scheme for farmers using regenerative farming techniques;
- a comprehensive system of no-take Marine Protected Areas in Tasmanian waters;
- protection of all remaining high conservation value forests, including by declaring takayna/Tarkine a National Park.
- In the absence of any national carbon pricing embedding 'the polluter pays principle', and driving down emissions, Tasmania could investigate whether a state based price on carbon pollution is possible. The revenue streams could be redirected to rolling out renewable energy, energy efficiency and ecological restoration.

To underpin and accelerate the legislated systemic change Tasmania could move immediately to:

- commission independent modelling that identifies sectoral emission reduction targets;
- ensure that all new buildings and infrastructure are assessed for sustainability against the Infrastructure Sustainability Council of Australia rating scheme;
- commence construction on a Light Rail, initially linking Hobart CBD to Brighton;
- investigate other modes of mass public transport, including trackless trams and ferries;
- plan for the rapid conversion of Tasmania's diesel bus fleet to renewable energy powered electric, with trial routes for electric buses to commence immediately;
- transition the state and local Government vehicle fleet to 100% electric, and encourage the adoption of electric vehicles in the tourism/ hire car sector;
- invest in a comprehensive network of pedestrian linkages and safe, dedicated cycling lanes in urban areas, with incentives for e-bikes and charging infrastructure;
- introduce a sliding scale of registration fees so that it is cheaper to register vehicles that are more fuel efficient, and as an incentive for electric vehicles;
- introduce a new environmental law based on the principle of no extinctions, consistent with the 2019 IPBES Global Assessment on Biodiversity and Ecosystem Services;
- end the industrial scale logging of all native forest and end logging in high conservation value forests;

- establish small and large scale restoration forestry programs and ecological rehabilitation programmes for wetlands, riparian and coastal zones and previously logged and mined areas;
- begin large scale rewilding initiatives with associated skills training including the restoration of Lake Pedder;
- fund marine restoration projects;
- strengthen biosecurity and response;
- establish a comprehensive up-skilling and education program for young people, existing workers and those transitioning to new opportunities;
- convene regular meetings to consult with stakeholders (land managers, Aboriginal community, farmers, fishers, small businesses, builders, eco-tourism, health, transport, education and energy sectors) to develop an agreed way forward;
- support the implementation of the United Nations Sustainable Development Goals in Tasmania and undertake to report on progress through the Council of Australian Governments.

CONCLUSION

Tasmania is at a crossroads where we can recognise and run with our advantages and our opportunity to lead on the climate emergency, or we can continue with business as usual losing our own quality of life and precious places season by season.

Tasmanians care too much about the planet and about our own island home and each other to let this moment pass. Let's together develop and implement a world leading climate action template that can be scaled up and replicated globally. What a gift to the planet and our children and grandchildren and all who come after them: A future for all of us.

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INTRODUCTION

NATION-STATES HAVE COLLECTIVELY FAILED US ON CLIMATE. THE TIME IS RIGHT FOR SUBNATIONAL ENTITIES TO STEP UP AND LEAD.

Since the late 1980s, when global warming first emerged as an issue for international policy makers, the build-up of dangerous greenhouse gases in our atmosphere has risen and along with them so to have global temperatures. Looking forward, the aggregate mitigation pledges by the countries to the 2015 United Nations Paris Agreement on climate change puts the world on a trajectory that would result in between 2.7°C and 3.7°C of warming by 2100.¹ Fortunately, for the first time in international climate agreements, the Paris Agreement has drawn attention to the role that subnational governments can and must play in securing a low-carbon future.

Subnational governments around the world including in Germany, China, and North America are responding, realising the benefits that cleaner economies can offer. This new subnational focus presents an historic opportunity for a state or province to emerge as the global policy leader on climate change - the issue that will define this century and beyond. Tasmania should and could position itself as that leader.

This Discussion Paper argues that there are three key reasons why Tasmania should ascend to global climate leader by 2030.

The first reason is because Tasmania is significantly vulnerable to a range of climate impacts across a range of key sectors, including agriculture, fisheries, tourism, and our urban environment in towns and cities across the state.

The second reason is because Tasmania does have existing strengths and the fundamental policy requirements already in place to ratchet-up its policy ambition and actions over time, and in so doing, position itself amongst current world leading states and provinces.

The third reason is that our reputation, our Clean Green Brand depends on it. It is in the interests of all Tasmanians for our state to become a global climate leader. Tasmania can continue to be an international rule taker, or become a global leader and become an international rule maker. It is within our reach. Tasmania can lead by example and be that shining light for others to follow.

Tasmania is perfectly positioned to be a global leader for urgent action on climate change. In fact, we have a unique opportunity to be a beacon of light to a world in crisis. Together as a community, we can act now to rescue nature and our children's future.

With the latest climate science and in consultation with local experts, the Greens have developed this solutions-focused pathway. It identifies key, constructive policies and initiatives that will reduce emissions and prepare Tasmanian for a rapidly changing world. The Greens are committed to lead a 12 month process of community consultation to finalise the plan.

WHY TASMANIA SHOULD STRIVE FOR GLOBAL CLIMATE LEADERSHIP BY 2030

INTERNATIONAL, NATIONAL AND LOCAL CONTEXT

Restricting global warming to 1.5°C above pre-industrial levels will be safer than 2°C.

In October 2018, The Special Report on Global Warming of 1.5°C was published by the Intergovernmental Panel on Climate Change (IPCC) - the chief international body tasked with synthesising the science of climate change.² Among other things, the report found that to date, 'human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels'; while looking forward, 'global warming is likely to reach 1.5°C' by the middle of this century or sooner. Some climate modellers project that warming could reach almost 5°C by end of this century.³ The climate-related impacts associated with a 1.5°C warming scenario still include further land and ocean temperature increases, sea-level rise, increases in ocean acidity and decreases in ocean oxygen levels, further loss of biodiversity and species extinction, more hot extremes periods and droughts in some regions while in other regions heavier precipitation is expected, and increases in risk to human health, livelihoods, food security, water supply, and economic growth. The report makes the critical point that 'climate-related risks for natural and human systems (as just mentioned above) are higher for global warming of 1.5°C than at present, but lower than at 2°C'.⁴ To curb the impacts of a changing climate and ensure that we can successfully adapt, humanity must rapidly reduce greenhouse gas emissions and limit the warming to the safer 1.5°C target. Even if we restrict the warming to the lower level, the report clearly states that there are 'limits to adaptation and adaptive capacity for some human and natural systems'.⁵ Some 2019 climate models have predicted that doubling atmospheric carbon dioxide over preindustrial levels would result in '5°C or warmer', whereas earlier models predicted somewhere between 2°C and 4.5°C.⁶

Carbon dioxide is the main driver (but other heat-trapping emissions from human activity also contribute).

Cape Grim, on the north west coast of Tasmania, is one of the three premier Baseline Air Pollution Stations for the World Meteorological Organization.⁷ While Cape Grim measures all important heat-trapping gases, measurements there show that atmospheric concentrations of 'carbon dioxide has increased from about 330 parts per million (ppm) in 1976 to more than 400 ppm today, an average increase of 1.9 ppm per year since 1976. Since 2010 the rate has been 2.3 ppm per year'.⁸ Today's concentration of carbon dioxide represents a 43% increase from pre-industrial levels - 'likely to be the highest concentration in at least 2 million years'.⁹ Carbon dioxide levels are rising mainly because of the burning of fossil fuels such as coal, oil and natural gas as well as emissions from land clearing and deforestation.¹⁰ Other heat-trapping emissions from agricultural sources such as methane and nitrous oxide are also contributing to a changing climate. The CSIRO explains that Cape Grim's measurements of these heat-trapping emissions have 'demonstrated the impact of human activity on the atmosphere'.¹¹

The Australian continent is unequivocally heating up. In 2018, Australians sweltered through their third-warmest year on record (only 2005 and 2013 were warmer). The 11-year mean temperature for 2008–2018 was the highest on record at 0.77°C above average. Only one of Australia’s warmest ten years occurred before 2005, and nine of the last ten years have been warmer than average. January 2019 was Australia’s hottest month on record (since 1910), with the country’s mean temperature exceeding 30°C.¹² The IPCC and the CSIRO have consistently reported that Australia is highly vulnerable to the climate-related impacts and environmental emergencies including increasingly frequent bushfires, heatwaves, droughts, storms, and floods. As Australians, we are now living through climate change. The evidence is all around us.

Tasmania’s climate is changing. According to the Bureau of Meteorology, January 2019 was ‘Tasmania’s warmest and driest [month] on record, with many warm, dry days and very few cool or wet days’.¹³ In that month the ‘mean daily maximum temperature for Hobart was a record warm 25.9°C, which was 4.2°C above the long-term average’. In 2018, Tasmanian’s mean temperature was 0.71°C above average.¹⁴ Heatwaves during January 2018 resulted in record high temperatures at Larapuna and Bridport, and record warm-nights at over a dozen sites across the north. In 2018 Hobart’s mean temperature was more than a degree warmer than the long-term average. Indeed, the year 2018 was the 42nd consecutive year with global land and ocean temperatures above the 20th century average. That means that anyone under the age of 42 has never experienced an average year on this planet. Young people today are simply living in a different climate than the one their parents and grandparents grew up in. Around Tasmania, sea surface temperatures have increased markedly over the last 50 years. Records at Maria Island show that the ocean is warming faster than the global average rate and sea-level rise is bringing greater risk of storm surges and coastal flooding.

Tasmania’s climate is projected to change further as warming continues. It has been more than 30 years since the first climate model projections were produced for Australia by the CSIRO.¹⁵ Climate models now simulate the key drivers in our climate system exceptionally well and can use possible future scenarios to give a range of outcomes for temperature, sea-level rise and other climate indicators. However, the greatest uncertainty in all the climate projections remains our choice of emissions pathway. In other words: it is our emissions choices not the uncertainty in climate models that leads to the spread of outcomes. In the future Tasmania is likely to have higher temperatures, less summer rainfall, fewer frosts, more heatwaves and more extreme weather. The Climate Futures research project – developed and published under the auspices of the Antarctic Climate & Ecosystems Cooperative Research Centre (ACE CRC) – has found that over the 21st century Tasmania’s temperature is projected to rise by between 1.6°C and 2.9°C, depending on global emissions scenarios.¹⁶ Based on these findings, the Tasmania Government itself concedes that; ‘Tasmania’s terrestrial environments are projected to experience a rise in annual average temperatures, significant changes in seasonal and regional rainfall patterns, an increase in rainfall intensity and associated flooding, and longer, more intense fire seasons’.¹⁷ The main contributors to sea-level rise are the melting of glaciers and ice sheets as well as thermal expansion of sea water (i.e. ocean water simply expanding as it heats up). The Climate Futures report on Extreme-Tide and Sea-Level Events shows that by the end of this century global sea-level may be up to 88cm higher than 1990 levels.¹⁸ A recent CSIRO report shows that by the end of this century sea-level rise in Tasmania under a high emission pathway could increase by up to 80-90 cm above 2010 levels, putting much of our coast at risk of regular tidal flooding and damage from increased storm surges.¹⁹

CLIMATE CHANGE THREATENS TASMANIA'S INTERESTS

1. ENVIRONMENTAL INTERESTS

TASMANIAN WILDERNESS WORLD HERITAGE AREA

The Tasmanian Wilderness World Heritage Area (TWWHA) is one of the world's greatest natural marvels. It covers approximately 1,584,000 hectares and represents more than 1/5 of the area of Tasmania. It comprises 'vast tracts of high quality wilderness, which harbours a wealth of outstanding natural and cultural heritage'.²⁰ The core area of the TWWHA was inscribed on the World Heritage List in 1982 on the basis that it satisfied all four natural criteria and three cultural criteria, 'at the time fulfilling more criteria than any other World Heritage property on Earth'.²¹ While the number of World Heritage properties world-wide have increased since then, the TWWHA still sits above the pack, as Tasmania's Parks and Wildlife Department attest: 'The Tasmanian Wilderness World Heritage Area satisfies seven of a possible 10 criteria - more than any other World Heritage Site. To date, only one other World Heritage Site, Mt Taishan in China, listed in 1987, has satisfied as many criteria for inclusion on the World Heritage List (1 natural and 6 cultural)'.²²

Yet this globally significant site is under threat. As recently as January 2019 (accompanying Tasmania's 2016 wildfire disaster), uncontrolled bushfires burnt though the TWWHA, including Gell River, Riveaux-Pedder, and Southwest. While great effort was made by firefighters to protect the TWWHA, including installing a sprinkler system, the fires nonetheless incinerated endemic and ancient forests which included King Billy Pines, Pencil Pines, and Huon Pines. Some King Billy Pines have been estimated to be around 2,000 years old.²³ The 2019 bushfires also threatened to burn other fragile alpine communities such as cushion plants and tracts of Tasmania's Eucalyptus regnans, which are the tallest flowering plant on Earth. The Gell River fire burnt up to the freshwater beach at Lake Rhona, while the Riveaux-Pedder fire burnt to the Eastern Arthurs where Tasmania's iconic rocky tower, Federation Peak, stands. The final assessment of the fires confirmed that a massive 6% of the TWWHA was burnt in the bushfires, with 16% of that unlikely to ever recover.²⁴ Both the 2016 and 2019 bushfires threatened Tasmania's ancient Gondwanic vegetation.

Tasmania's native wildlife is also under threat. The bushfires themselves displaced or killed countless native animals and birds. The subsequent habitat loss will push some of Tasmania's threatened species, which are already suffering as a result of rapid climate change, further toward the extinction, including the orange-bellied parrot, swift parrot, hooded plover, Eastern curlew, Australasian bittern, the Eastern quoll and Eastern barred bandicoot.

FARMLANDS

Tasmania's farmlands may be compromised by climate change. Essential to Tasmania's rural landscape is the rich brown earth that characterises the farming areas in the state's north west, together with the orchards and vineyards that typify the east and south and the dry rolling hills of the midlands.²⁵ Farmers and their families have a strong connection to the land and environment by way of the very nature of their day-to-day work. Weather patterns are studied and discussed year-round. There is a keen sense of stewardship of the farm in Tasmania. Farmers want to pass-on their farm

to sons and daughters in as good, or better, condition than it was passed-on to them. In many instances, the farm is not simply understood in productive terms, but as a family asset, a provider, a home and a thing of beauty as well as of hardship. Tasmanian farmers want to preserve the environmental integrity of their land. Such is the centrality of Tasmanian farming and agriculture to the state's identity and economic well-being, the ACE CRC project published a report specifically addressing the impacts of climate change on Tasmanian agriculture.²⁶ Among the many findings, the report explains that temperatures across Tasmania are projected to increase by around 1.6 - 2.9°C, which is important because 'small changes in average temperature can have large impacts on agricultural production'.²⁷ And while the report states that 'the incidence of drought is projected to be similar to historical experience in most of the agricultural regions', concerning for Tasmania's dairy farmers in the north west, it also writes that this region can expect 'a slight increase' in drought.²⁸

MARINE ECOSYSTEMS

Tasmania's marine ecosystems are changing due to warming sea surface temperatures and ocean currents. The south east region of Australia is one of the fastest warming regions globally. Direct observations since the 1940s indicate that this region is warming almost four times the global average. Sea surface temperatures are 'warming faster than 90% of the global ocean'.²⁹ Currently the oceans are absorbing over 90% of the excess heat that is trapped by the atmosphere and more than a quarter of the carbon dioxide that humans are emitting into the atmosphere. As a result, seawater is becoming both warmer and more acidic. In addition, increases in ocean temperature and acidification can push species to the limit of their physical functions. Tasmania's ocean warming is largely the result of the intensification of the East Australian Current (EAC). Over the past 50 years the EAC 'extension' has stretched about 350km further south. Leading climate scientist at Hobart's CSIRO, Dr Alistair Hobday, has explained that Tasmania's east coast waters are now 2.5°C above average at 18°C, and in January 2019, temperatures reached 4.5°C above average because of a 130-day marine heatwave.³⁰ In terms of future warming, Dr Hobday explains that 'with the East Australian Current heading further south there will be a faster warming in the east coast waters for the next 50 to 100 years'. The Tasmanian Government acknowledges this: 'Ocean temperatures are projected to increase further as the warm East Australian Current is expected to extend south along the Tasmanian coast....Tasmanian waters could warm by another 2 to 3°C by 2070.'³¹ Warming of east coast waters is impacting on marine life, including on Tasmania's iconic underwater forests - the Giant Kelp Marine Forests. Professor Craig Johnson, from the Institute of Marine and Antarctic Studies (IMAS), explains that 'giant kelp forests once dominated Tasmania's east coast, but 95 per cent has been lost (to climate change) over the past few decades'.³² The IMAS researcher, Dr Cayne Layton, describes the loss as 'staggering'. While efforts have been made to restore the kelp forests, Dr Layton continues, 'We really need to get a handle on carbon emissions and ocean warming to have some long-term effects in the ecosystems'.³³ Climate change is unequivocally one of the most urgent issues facing Tasmania's marine environment and the industries and communities that it supports.

2. ECONOMIC INTERESTS

SMALL BUSINESS

Tasmania's small business owners are the indirect victims of the 2019 bushfires. While the direct financial burden of fighting the 2019 Tasmanian bushfires is expected to run into tens of millions of dollars,³⁴ and could reach A\$100 million, the indirect cost could be much greater and more enduring. For example, the Southwest fire destroyed the Huon Valley's major tourist attraction, The Tahune Air Walk, which brings more than 100,000 visitors to the region each year. Some locals have expressed concern that local cafes, eateries and shop owners will suffer as the result of the diminished tourist numbers.³⁵ In addition, the smoke from the bushfires raised alarm bells for many southern viticulturalists. When vineyards and grapes are exposed to smoke it can result in wines with undesirable sensory characters, such as smoky, burnt, ashy or medicinal, usually described as 'smoke taint'.³⁶ If grapes are proven to be tainted, then viticulturalists will have to make the tough decision to strip and bury their vines.³⁷ The Tasmanian wine sector contributes more than A\$115 million annually to the Tasmanian economy, placing it in the state's top ten sectors,³⁸ and it sustains 1,839 full-time equivalent jobs.³⁹ The bushfires also decimated Tasmania leatherwood trees. About 70% of Tasmania's honey is produced using leatherwood. In the aftermath of the fires, Tasmanian Beekeepers Association (TBA) Vice President, Peter Norris, explained: 'Leatherwood doesn't handle fire, it takes a couple of hundred years to come back,' affecting generations of honey producers.⁴⁰ Subsequently, TBA President, Lindsay Bourke, has added: 'I always thought that climate change wouldn't make any difference to us [in Tasmania]. I welcomed a bit more heat, but it dried everything out ...It's really disastrous'.⁴¹ In March one of the state's biggest honey producers, apiarists R. Stevens, started laying off staff at its Mole Creek processing plant as the fires and drier conditions caused bees to starve.⁴²

AGRICULTURAL INDUSTRY

Tasmania's agricultural industry relies on dependable ecosystem services. But important factors like fresh air, clean water, nutrients for crop growth and pollination of crops will no doubt be compromised by changes in climate. Research shows that rising temperatures may lower milk yields in dairy cows; cause changes in the timing and severity of frosts, which may affect plants requiring cold for budding; drive more frequent summer storms and higher temperatures that may damage fruit trees; cause an increase in winter temperatures that may damage fruit trees and may enable pests and weeds to survive; while heavier rainfall events in summer and higher winter rainfall may lead to dam overtopping or failure. Tasmanian farmers, while less impacted at present than their mainland colleagues, are in the firing line. In March 2019, southern Tasmania farmer and Farmers for Climate Action member, Anthony Houston wrote: 'while we may be lucky, we are not immune ... back-to-back extreme weather should be a wakeup call for Tasmanians, especially farmers'.⁴³ Mr Houston added that 'we only need to see what's happening on the mainland to know what awaits us if nothing is done to rapidly bring down greenhouse gas emissions...the fate of our farm businesses and communities and the planet depend upon it'. In 2016–17, the gross value of agricultural production in Tasmania was A\$1.5 billion.⁴⁴ The most important individual commodities in Tasmania, based on the gross value of agricultural production, were milk (A\$326 million), followed by cattle and calves (A\$295 million) and potatoes (A\$111 million). These commodities together contributed 50% of the total value of agricultural production in the state.⁴⁵ The Tasmanian agricultural sector directly employs around 10,000 people.⁴⁶ When primary production is combined with dependent downstream processing, it delivers around a

third of the state's Gross State Product, and about a third of employment and a quarter of all overseas exports.⁴⁷ Tasmania's regional communities rely heavily on the jobs that agriculture provides.

FISHING INDUSTRY

Tasmania's distinct marine environment provides a stunning backdrop for our commercial and recreational fishing industries. In the period 2015-16, 'the gross value of Tasmanian fisheries production was estimated to be around A\$913 million, an increase of 11% (A\$879 million) from 2014-15'.⁴⁸ In value terms, the wild-catch sector - dominated by two main products, abalone and southern rock lobster - accounted for 20% (A\$182.3 million) of the state's total production, with the aquaculture sector accounting for the remaining 80%. In 2015-16, Tasmanian fisheries product exports were valued at A\$186.9 million. An estimated 2,595 full time equivalent jobs are provided by the Tasmanian aquaculture sector (inclusive of salmonid processing). But warmer waters threaten this industry. Dr Hobday's research has found that temperature increases were contributing to the mass death of oysters, abalone deaths and a drop in the salmon harvest.⁴⁹ Dr Gretta Pecl from the IMAS adds that 'almost no aspect will be unaffected'.⁵⁰ Indeed, as shallow parts of Tasmania's estuary's systems continue to warm, salmonid pens will become increasingly vulnerable to localised algal blooms, resulting in the relocation of pens. This is already occurring, for example pens in North West Bay (off Coningham Beach) are moving to Norfolk Bay (on the Tasman Peninsula). Further, the salmonid industry is vulnerable to large storm events, such as the 2018 storm in Southern Tasmania that wreaked havoc on salmonid infrastructure and caused a massive loss of product. Warming waters will also affect Tasmania's recreational fishing, and the indirect jobs and local businesses and economies (e.g. cafes, takeaway shops, service stations, and fishing shops) that this popular activity supports. An estimated 98,000 Tasmanian residents (5 years old and over) participate in recreational fishing in Tasmania in a 12 month period.

One of the greatest and most shocking threats to Tasmania's fishing industry (including recreational) is the increasingly present and invasive long-spined sea urchin (*Centrostephanus rodgersii*). The EAC is extending south and creating ideal warmer conditions for the long-spined invader. Urchin barrens form when urchins overgraze the rocky reefs, removing most of the underwater kelp beds and other marine life that is normally associated with this habitat. Numbers of long-spined sea urchins have exploded on Tasmania's east coast. First recorded on 1978, there are now estimated to be more than 20 million long-spined sea urchins in residence. Extensive research undertaken by the IMAS has found that; 'The presence of *Centrostephanus* in Tasmanian waters is a result of warming waters along the east coast and represents a range extension for this species from mainland Australia. The urchin can have devastating impacts on reefs due to overgrazing which creates expansive urchin barrens. This results in negative impacts on kelp beds and reef dependent species such as abalone, rock lobster and fish.'⁵¹ Other underwater creatures heading south due to warming waters include sea nettles (*Chrysaora*), which are usually found in Sydney.⁵² And in 2013, a manta ray, a tropical cartilaginous fish, was sighted off the north eastern coast of Tasmania - previously the southern-most sighting of a manta ray was just south of Sydney. Marine creatures also have to deal with increasing acidification as excess carbon dioxide is absorbed and lowers the pH level of the oceans. Ocean acidification has the effect, among other things, of thinning and ultimately dissolving shells, which has a range of negative consequences for the entire marine food chain.

3. SOCIAL INTERESTS

HEALTH AND WELLBEING

Personal and community health can be severely impacted by climate change. Tasmania's climate-enhanced bushfires of 2019 blanketed parts of southern Tasmania in thick smoke for several weeks. Such was the density of the smoke in Cygnet and surrounding areas that on 31 January, Tasmania's Director of Public Health, Dr Mark Veitch, issued a warning to southern residents: 'Bushfire smoke is harmful and can trigger fatal health conditions. Acting to reduce your exposure to smoke will reduce your chances of becoming seriously ill. People vulnerable to smoke should leave for a place with cleaner air.'⁵³ Dr Veitch's list of health conditions most affected by smoke included: 'heart and lung diseases, including asthma and emphysema, and other chronic diseases such as diabetes'. The most at-risk people included those 'aged over 65, children aged five and under, and pregnant women'.⁵⁴ At times during this smoke event air quality in Hobart was worse than in Beijing causing southern Tasmanian pharmacies to be inundated by customers seeking asthma medication. Helen Pollard from the Asthma Foundation of Tasmania explained that 'Tasmania has got the highest number of people per head of population with asthma, so we would expect there would be at least hundreds, if not thousands of people that are affected by the smoke.'⁵⁵ Ms Pollard suggested having relievers on hand and staying indoors for people in risk categories. 'I'd be suggesting people not be doing vigorous exercise', she added. Mental health is another serious social cost associated with climate change. In September 2018, the NSW Government announced A\$6.3 million for mental health services for farmers in severe drought, covering 20 new farmgate councillors and frontline mental health workers.⁵⁶ In Tasmania, mental health group Rural Alive and Well have met with east coast farmers to discuss the stress that years of abnormally dry conditions can cause.⁵⁷

INFRASTRUCTURE

Functional infrastructure is essential to protecting and advancing Tasmania's social and economic interests. Roads, bridges, canals, railways and ports are often parts of our infrastructure that we take for granted. But many of these structures may be at risk with changes in climate. For places such as Lauderdale, Cremorne, Clifton Beach, and Kingston Beach in southern Tasmania; and Ulverstone, East Devonport, Stanley, Burnie, and Port Sorell in the north, the future may bring more frequent flooding during storms and subsequent erosion of sandy foreshores.⁵⁸ The implications of climate change for Tasmania's coastal areas are serious: Over 70% of Tasmania's population lives in coastal local government areas. More frequent storms and higher storm surges associated with higher sea-levels may impact coastal developments like walkways, roads, bridges, canals and ports. Other community infrastructure like water supplies and electricity transmission may be affected by flooding and high winds associated with storm activity. Storms, strong winds, and floods could affect shipping, pipelines, and transport and distribution systems in Tasmania. Sea-level rise could also result in routine flooding at high tide regardless of storm activity. Tasmania has more than 975km of shoreline at risk of eroding and more than 1140km at risk of coastal flooding.⁵⁹ All of these low-lying areas contain vital assets including natural ecosystems, community infrastructure and both commercial and private property.

PERSONAL ASSET PROTECTION

The insurance industry is acutely aware of the economic impacts that damage from climate change represents. Global reinsurance companies (such as Munich Re, Swiss Re and QBE) have been taking climate change seriously for decades. And it has not just been a PR exercise – the bottom line for them is the financial management of risk.⁶⁰ In March this

year the Reserve Bank of Australia deputy governor, Guy Debelle, delivered a speech that - in a first time for the institution - publicly warned of the economic dangers of climate change. Among his key points was a warning about the future of the insurance industry for insurers and customers: 'we need to reassess our assumptions about the severity and longevity of the climate events. For example, the insurance industry has recognised that the frequency and severity of tropical cyclones has changed. This has caused the insurance sector to reprice how they insure (and reinsure) against such events...insurers may face large, unanticipated payouts because of climate change-related property damage and business losses. In some cases, businesses and households could lose access to insurance.'⁶¹ In Tasmania, insuring personal assets against bushfire may become challenging in fire zones. Similarly, approving new developments in coastal communities and other areas knowingly exposed to sea-level rise and inundation may prove problematic in terms of discerning responsibility for insurance payouts and clean-up costs.

4. REPUTATIONAL INTERESTS

TWWHA AND NATURE-BASED EXPERIENCES

The Tasmanian Government's tourism strategy, nicknamed 'T21', acknowledges that Tasmania's environment and its 'clean, green' brand, is the preeminent driver of the tourism industry and is what attracts tourists to the island. The T21 strategy asserts, as all conservationists have long known that 'Tasmania's globally renowned natural environment is one of the state's most valuable assets and underpins the state's reputation as a must-visit destination'. However, while Tasmania's environment - National Parks, coastal and aquatic experiences and unique wildlife – has been acknowledged the single biggest drawcard driving our state's multi-billion-dollar tourism industry, the shining jewel in the crown is the TWWHA.⁶² In a submission as part of the drafting of the TWWHA's Management Plan, the Tourism Industry Council Tasmania (TICT) explained that: 'The Tasmanian Wilderness is a major [tourist] attraction and source of destination brand and appeal underpinning the Tasmanian tourism industry'.⁶³ The same TICT report goes into more detail about the potency and value of the World Heritage Area to the tourist industry: 'The economic value of the Tasmanian Wilderness World Heritage Area, from the impact of visitor spending alone, was estimated at A\$721.8 million in the year ending June 2007 – supporting approximately 5,300 jobs in the state. Tourism Tasmania research has also shown that 'wilderness' is integral to Tasmania's brand and appeal as a total tourism destination: 'wilderness' is the greatest trigger to influence intention to visit Tasmania, and respondents across market segments consistently rank 'wilderness' as having the highest appeal and being a uniquely Tasmanian experience.'⁶⁴ But, as Adjunct Professor at the ACE CRC Tony Press, explains: 'there's one other potentially huge future cost of these Tasmanian bushfires: the damage to the Tasmanian 'clean and green' brand, when its wilderness world heritage area has suffered two major bushfire events in six years'(2016 and 2019).⁶⁵

HISTORICAL SITES

Tasmania's world-class historical sites are also threatened by climate change. Measurement of sea-level rise taken at the Port Arthur Historic Site has shown that the sea-level has risen by over 13cm between 1841 and 2006. Although this does not sound like much, this change increases the potential damage from storms. In 2011, for instance, a major storm event occurred concurrently with a high tide, flooding the Port

Arthur Penitentiary. The debris generated by the storm damaged the building, and the salt water soaked into the fragile brick and sandstone walls. The 2011 storm triggered a reassessment of the structural integrity of the Penitentiary and confirmed the requirement for a major stabilisation project.⁶⁶ Based on this flooding event, in April 2017, the New York Times ran a story highlighting the impacts of sea-level rise and coastal inundation on what the newspaper described as 'one of the country's premier tourist attractions'.⁶⁷ David Roe from the Port Arthur Historic Site Management Authority has explained that the historic site has spent A\$5 million reinforcing old prison buildings. But with sea-level in Tasmania expected to rise by a further 17cm - and the average shoreline expected to recede by 20cm - by the middle of this century, Mr Roe has said: 'We can't retreat. We can't elevate. We can't rebuild. Perhaps all we can do is manage loss.'⁶⁸

EXPORTS

Tasmania's food and beverage export industry relies heavily, perhaps like no other industry in Tasmania, on the maintenance and promotion of the state's 'clean and green' brand. Brand Tasmania, the state's marketing entity operating as a statutory authority, explains this in the following terms: 'Tasmania has consolidated its reputation over recent decades as Australia's gourmet island. Outstanding seafood, a range of more than 100 specialty cheeses, world-famous honey, including organic leatherwood honey from the rainforest, excellent meat and crisp, fresh vegetables and tasty fruit attract buyers and fastidious consumers to the islands in the Southern Ocean. Food has become a key motivator in the state's tourism industry and the availability of quality produce has attracted a constellation of outstanding chefs.'⁶⁹

Tasmania's produce is exported all over the world. Tasmanian vegetables accounts for about 25% of national exports. Tasmanian cherries are sold to 31 countries, mostly in Asia, but new markets are emerging in the Middle East.⁷⁰ Black truffles are sold to France; buckwheat to Japan, walnuts to Germany, and Tasmania's apple export industry is regaining its past strength. Tasmania's grass-fed and grain-fed beef and lamb 'are firmly established in niche markets around the world where quality is more important than price', Brand Tasmania explains.⁷¹ More than 95% of Tasmania's wool production is exported to Japan, China, Germany, and Italy. In 2015–16, Tasmania's fisheries exports were valued at A\$186.9 million with China, Vietnam, Hong Kong and Japan the major destinations.⁷² Tasmania's sparkling wines are finest in the southern hemisphere. The Tasmanian Government is investing in the wine industry in Tasmania 'to develop export and visitor markets, and build our wine's growing global reputation'.⁷³ Whisky, cider and beer producers are also growing their businesses largely based on export opportunities.⁷⁴

PART TWO: OPPORTUNITIES FOR TASMANIA TO ACHIEVE GLOBAL CLIMATE LEADERSHIP BY 2030

INTERNATIONAL, NATIONAL AND LOCAL CONTEXT

Nation-states are collectively failing to reduce greenhouse gas emissions consistent with the United Nations Sustainable Development Goals and the United Nations Framework Convention on Climate Change which seeks to limit warming to 1.5°C or 2°C. The historic Paris Agreement, which entered into force on 4 November 2016, aims to strengthen the global response to the threat of climate change including by 'holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels', and achieve net zero emissions in the second half of the century.⁷⁵ However, the Parties (countries) to the Agreement emphasise 'with serious concern the urgent need to address the significant gap' between the aggregate mitigation pledges by the countries to the Agreement (called Nationally Determined Contributions, or "NDC") and the above temperature goals.⁷⁶ The next few years are therefore absolutely crucial to closing the gap between where we are currently heading (an increase of 2.7-3.7°C) and where we need to be to achieve the Paris Agreement temperature goals.⁷⁷

Australia's emissions reduction target is 'not consistent with holding warming to below 2°C let alone with the Paris Agreement's stronger 1.5°C limit'.⁷⁸ Australia's current commitment under the Paris Agreement is to reduce greenhouse gas emissions by 26-28% below 2005 level by 2030.⁷⁹ This means that Australia has agreed to reduce a total of 695 million tonnes of carbon dioxide-equivalent between 2021 and 2030. In February 2019, the Morrison Government conceded that Australia plans to use credits earned during the current Kyoto Protocol period to count against its Paris target. By booking these credits, Australia's 695 million tonnes is reduced to just 328, cutting Australia's Paris target to 12.25%.⁸⁰ Further, the Australian government's own figures have repeatedly shown that Australia's emissions are rising, not declining.⁸¹ Several independent analyses support this finding.⁸²

The Paris Agreement calls on state and provincial governments to increase their emissions reduction ambition. For the first time in international climate agreements, the Paris Agreement identifies 'subnational' entities, including state and provincial governments, as playing a stronger role in the fight to limit warming to 1.5 - 2°C.⁸³ Subnational governments around the world including in Germany, China, and North America are responding to this call. In some instance subnational governments are collaborating to reduce emissions, for example, west coast North American states and provinces - California, Oregon, Washington, and British Columbia - are seeking to collectively reduce their emissions through a Pacific North America Climate Leadership Agreement.⁸⁴

Responses by Australian mainland State and Territory governments are mixed. Queensland, New South Wales, Victoria, South Australia, and the ACT have agreed to support a target of achieving 'net-zero emissions by 2050', consistent with the long-term goal of the Paris Agreement.⁸⁵ South Australia and the ACT are on track to meet the target, and are clear mainland leaders on a range of climate policies. New South Wales and Victoria are not on track. Western Australia and the Northern Territory are yet to support the target.

Tasmania's main achievement to date, net zero emissions, owes far more to the conservation movement and Tasmanians who have supported it than it does to the major political parties. Under Tasmania's Climate Change Act 2008, Tasmania has a legislated target of reducing greenhouse gas emissions to 60% below 1990 levels by 2050. However, in April 2018, the Tasmanian Government announced that 'Tasmania has become the first jurisdiction in Australia to achieve net zero emissions', 30 years ahead of schedule.⁸⁶ Net zero emissions means that the emissions produced in an economy are balanced out by an equivalent amount of emissions being sequestered (drawn out of the atmosphere and stored in forests for instance). Tasmania's net zero emissions statement is the consequence of two key historical factors: first, the early protection of large tracts of Tasmania's forests, which sequester carbon; and second, the more recent rapid and wide-scale down-sizing of Tasmania's high-emitting forestry industry. Neither of Tasmania's major political parties consistently supported these actions. In addition, one contemporary factor remains highly controversial: the potentially suspect and opaque accounting methodology used to measure forest emissions, which obfuscates on emissions generated by major bushfires, regeneration burns, and is unable to capture the diversity of the native forest landscapes in Tasmania. A final future concern arises, which is that some of these forests will release their locked-up emissions through bushfires or a future return to high rates of logging. So, while net zero emissions on paper is a positive achievement, it is really not indicative of a move to decarbonise the economy of the state at all. Indeed, emissions from all other sectors in Tasmania including transport, agriculture, and stationary energy, have remained the same or have increased over time.

The Tasmanian Government does not have a climate policy plan beyond 2021. The Government's central climate policy document is titled: Climate Action 21: Tasmania's Climate Change Action Plan 2017-2021. It expires in 2021. This means that Tasmania does not have a plan to reduce emissions, or adapt to climate change, for the Paris Agreement period between 2020-2030, or a plan that covers Australia's emissions reduction commitment period to 2030. Further, Climate Action 21 is an adaptation focused plan with "actions" to reduce greenhouse gases as scarce as they are unambitious. This means that there is much room to ratchet-up emissions reduction ambition out to 2030. A great place to start when seeking to increase emissions reduction ambition is to strengthen an existing emission reduction target or create new ones. As mentioned above, Tasmania has a legislated emissions reduction target. But the Act and the target are currently under review. Climate Action 21 asserts: 'The (Climate Change) Act will be amended to establish a legislated target of zero net emissions by 2050. This aspirational long-term target signals the Tasmanian Government's commitment to action on climate change and is consistent with the Paris Agreement.'⁸⁷ Given that this target has already been achieved (using questionable accounting) at this present time, **the Tasmanian Government can legislate for sectoral emissions reduction targets for stationary energy,⁸⁸ transport,⁸⁹ and agriculture⁹⁰ by 2025 and 2030, with the aim to decarbonise our economy as soon as possible.** A good first step might be to commission independent modelling that identifies sectoral emission reduction targets. But targets alone will not reduce emissions. Rather, emissions reduction targets are achieved through the operationalisation of an accompanying suite of policies that drive the economy towards cleaner processes and activities.

INCREASING TASMANIA'S EMISSIONS REDUCTION AMBITION

1. INVESTIGATE A PRICE ON CARBON POLLUTION

GLOBAL ACTION

Counties and states/provinces across the globe can see the benefits of establishing a price on carbon to bring down emissions. Many foreign jurisdictions (regions and countries, as well as states and provinces) have a price on carbon pollution. The EU emissions trading scheme (ETS) has been in operation since 2005. China has an ETS operating in 7 provinces. The US has some kind of emissions trading operating in 22 states. Canada has an ETS operating in 2 provinces; while Alberta and British Columbia have a carbon tax. As of 1 January 2017, Alberta levied a tax of A\$32 per tonne on large emitters. BC's carbon tax commenced in 2008, and as of 1 April 2018, its carbon tax rate is A\$36 per tonne of carbon dioxide equivalent emissions. BC's tax will increase by A\$6 per tonne per year until it reaches A\$51 per tonne in 2021. Between 2008 and 2015, the BC Government reports that provincial real GDP grew more than 17%, while net emissions declined by 4.7%, 'proving that it is possible to reduce emissions while growing the economy'.⁹¹ Revenue raised by the tax was redistributed to low income families to assist them with cost increases.

Indeed, it appears that global momentum for broad-base revenue-neutral carbon taxes' is increasing, particularly among Australia's close allies. In October 2018, the Government of Canada announced that it will implement a nation-wide carbon tax in 2019, with a starting price of A\$20 per tonne, rising A\$10 per tonne per year until reaching A\$50 per tonne in 2022.⁹² In January 2019, a collection of eminent European historians and economists - led by Professor Thomas Piketty - proposed that the EU adopt a carbon tax with starting price of A\$47 per tonne.⁹³ The following month, in February 2019, a collection of eminent US economists - including Alan Greenspan, Ben Bernanke, Janet L. Yellen and Paul Volcker - proposed that the US adopt a carbon tax with a starting price of A\$55 per tonne.⁹⁴ These policy responses were justified on the basis that they would be the most effective mechanism to both rapidly reduce carbon emissions and help minimise climate impacts, as well as protect vulnerable members of the community from any associated cost increases via revenue redistribution.

MAINLAND AUSTRALIA

Australia and its mainland states/territories are massively underachieving on carbon pricing. Federally, pricing carbon has a long and fraught history. In 2007, an election year, the Howard Coalition Government established the Prime Minister's Task Group on Emissions Trading, which would later become Australia's Emissions Trading Scheme (ETS). But the Coalition lost the election and it was not implemented. Following this, Labor's Prime Minister Kevin Rudd sought to establish an ETS, the Carbon Pollution Reduction Scheme. This policy was abandoned in 2010. In December 2016, the Turnbull Coalition Government dropped the idea of establishing an Emissions Intensity Scheme for electricity generators after only two days. By far the most successful attempt to price carbon in Australia was during the minority Gillard Labor Government. In 2011, the Gillard Government along with the Australian Greens and several Independents agreed to establish a fixed price on carbon pollution (the so-called 'carbon tax') in the period 2012-2015. The starting price would be A\$23 per tonne from July 2012, rising to A\$24.15 per tonne from July 2013, and A\$25.40 from July 2014. In 2015, it would become a fully flexible ETS. During the fixed price period (2012-2014) Australia's emissions plummeted

while the economy continued to grow in line with expectations. It was unquestionably the most successful emissions reduction policy in Australia's history. In spite of the windfall gain of A\$70 million per annum to Tasmania, in 2014 the Abbott Coalition Government repealed it with the support of all Tasmanian Liberal Party Senators and Palmer United Party Senator Jacqui Lambie.

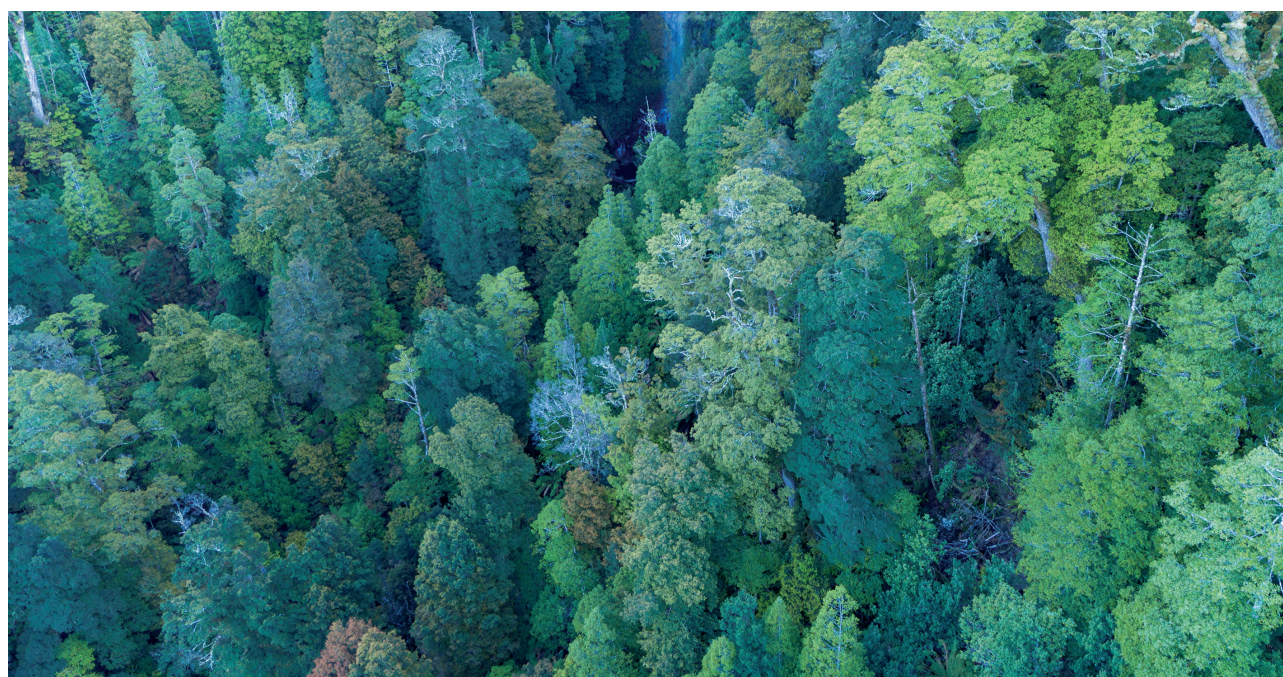
The Australian Greens are proposing a national price on carbon pollution with a starting price of A\$32 per tonne in 2019-20, indexed according to the consumer price index for the next two years, before rising to A\$43 per tonne in 2022-23. The carbon price would grow at 4% per year from 2023-24.

In terms of Australian states and territories, in August 2006, the Labor states and territories released a proposal to introduce a National Emissions Trading Taskforce. But this process collapsed. At present, no Australia state or territory has an ETS or carbon tax in operation. NSW and the ACT have a baseline and credit scheme in place for the electricity sector (they effectively operate as one scheme). These schemes are exceeding narrow and weak in terms of emissions reductions.

OPPORTUNITIES FOR TASMANIA

Nationally, Australia should implement a carbon pricing mechanism consistent with its obligations under the Paris Agreement and in the face of the global climate emergency. However, in the absence of any national carbon pricing embedding 'the polluter pays principle', Tasmania could investigate whether a state based price on carbon pollution is possible. Revenue streams could be redirected to rolling out renewable energy, energy efficiency and ecological restoration.

The establishment of a state-wide price on carbon pollution would require community consultation and carefully drafted legislation to ensure constitutional compliance, but could help us bring down emissions, transform our society, and become a global climate leader. It could either take the form of a sectoral emissions intensity scheme, emissions trading scheme, or fixed price on carbon. It's time to seriously talk about it.



GLOBAL CLIMATE LEADERSHIP OPPORTUNITY:

GLOBAL LEADER: British Columbia (Canada) – carbon tax at A\$36 per tonne

TASMANIA TODAY: no price on carbon

TASMANIA TO GLOBAL LEADER: Tasmania could look at options to price carbon pollution

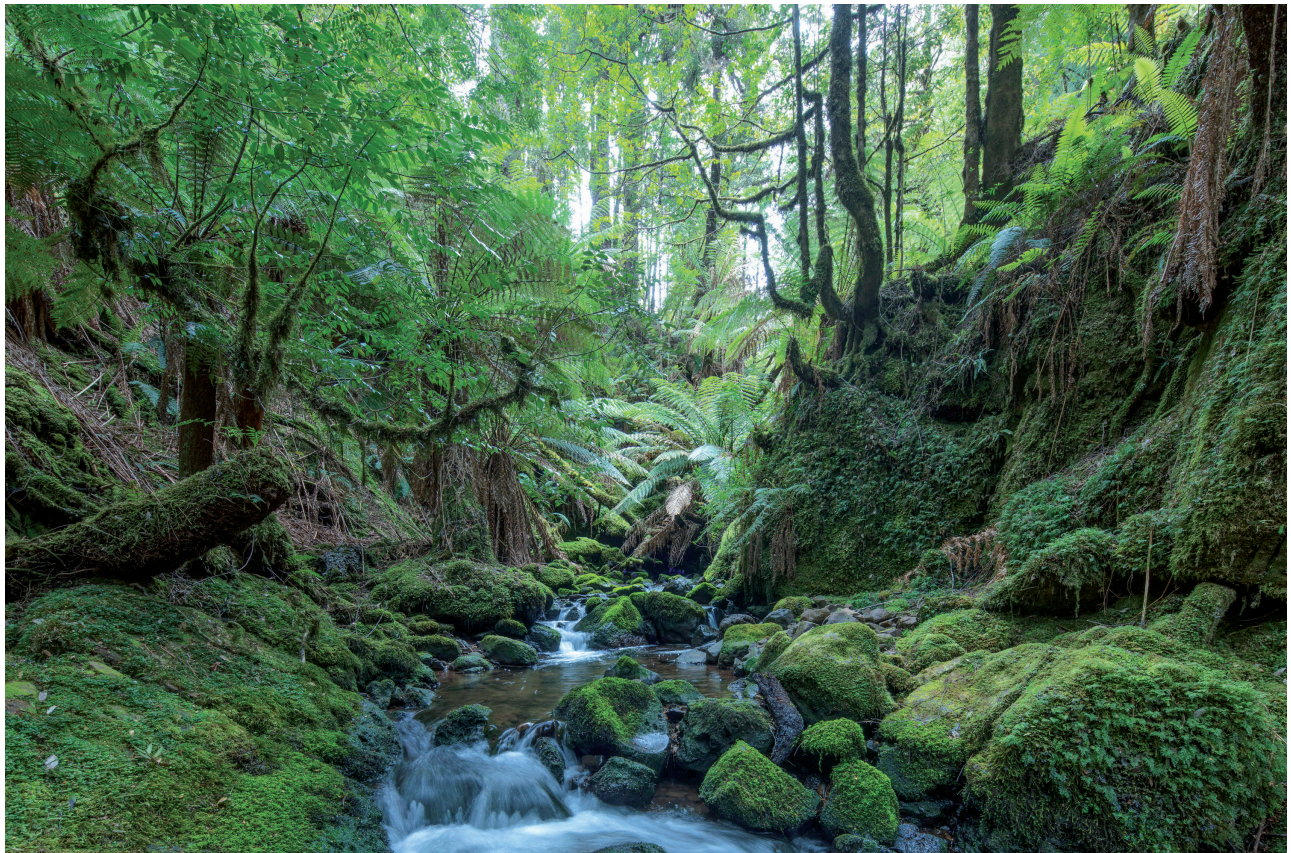


IMPORTANT ACCOMPANYING MEASURES:

- Infrastructure: Make all new buildings consistent with the highest rating developed by the Infrastructure Sustainability Council of Australia especially because construction materials like cement are already high emissions; and or energy-intensive building materials could be included under a price on carbon.
- Investigate carbon pricing options for cruise ship emissions, in the absence of the Federal Transport Minister setting cruise ships' bunker fuel emissions in line with what's allowed in Sydney Harbour.⁹⁵ The number of cruise ships coming to Hobart has doubled in the space of 2 years. Some of the 60 cruise ships visiting our beautiful city burn the most harmful bunker fuel emissions, containing sulphurs, toluene, benzene and other toxins. These pollutants are being emitted in levels 35 times higher in Hobart than what is allowed in Sydney Harbour. Permitting the use of bunker fuel is profoundly inconsistent with Tasmania's clean and green image and ranks the Hobart experience second class to the Sydney experience.
- Air traffic emissions could be examined for their inclusion under a price on carbon.
- Waste emissions need to be regulated. These could be included under a price on carbon, and or introduce container deposit legislation and ban single use plastics. Recycling is a climate change issue. When something is thrown into landfill, all of the energy that goes into making a product is wasted. Throwing away materials that could have been recycled is a form of greenhouse pollution. Alternatively, when waste materials are recycled into new products this replaces the need to use more energy extracting and refining virgin materials. In effect, recycling 'sequesters' the greenhouse gases that are 'embodied' in the products we buy.
- Convene meetings to consult with stakeholders (farmers, small businesses, construction, aviation, waste management, eco-tourism, health, transport, education and energy) to develop an agreed way forward.
- Support the implementation of the United Nations Sustainable Development Goals in Tasmania and undertake to report on progress through the Council of Australian Governments.⁹⁶

BENEFITS:

- A price on carbon would undoubtedly reduce emissions across Tasmania's polluting sectors.
- The revenue collected could be redistributed to a range of low-pollution projects including restoration ecology and regenerative agriculture and incentivising low pollution transport.
- Revenue could also be allocated toward just transitions programs for impacted workers and toward a 'carbon dividend' for Tasmanian households.
- A price on carbon would contribute to our international brand and reputation as a clean and green destination.



2. 100% RENEWABLES IN ELECTRICITY GENERATION

GLOBAL ACTION

Countries and states/provinces are increasingly running their economies on 100% renewable electricity. According to the US Energy Information Administration Iceland, Paraguay, Norway, Austria, Brazil, and Denmark have managed to have an electricity grid running on 100% renewable sources for short periods of time.⁹⁷ Other countries have achieved this task over consecutive days. For instance, in 2016, Portugal ran on 100% renewable electricity (generated by solar, wind and hydropower) for four consecutive days.⁹⁸ However, Costa Rica is undeniably the world leader. In 2017, Costa Rica set a new world record when it ran on 100% renewable electricity for 300 consecutive days, beating its 2016 record of 299 days.⁹⁹ This was achieved through a combination of hydropower 78%, wind 10%, geothermal 10%, and solar electricity 1%. During this period, the country did not burn any oil, coal, or natural gas to power the country. In February 2019, the Government of Costa Rica released its 'National Decarbonization Plan 2018-2050'. The Plan includes a commitment to ensure that 'by 2030 the electrical grid is capable of operating at 100% with renewable energies'.¹⁰⁰ President of Costa Rica, Carlos Alvarado, has explained that while his country represents only a small percentage of the world's climate-changing emissions, the Plan could be a model for other nations to follow: 'We can be that example – we have to inspire people'.¹⁰¹ The United Nations' top climate official, Christiana Figueres, said the 100% renewable electricity goal was 'unprecedented' in international politics. States and provinces are also transitioning their economies. In June 2017, Northwest China's Qinghai Province ran for seven straight days entirely on renewable electricity. In this instance, hydro-power plants supplied 72% of the electricity, with wind and solar supplying the remainder for the province, which is home to 5.8 million people.¹⁰² In September 2018, a study found that Germany's states of Mecklenburg-Vorpommern and Schleswig-Holstein, New Zealand's South Island, and Denmark's Samsø Island are 'at or above 100%'.¹⁰³ In 2018 California passed a bill to require 100% renewable electricity by 2045.¹⁰⁴ In Canada, both Quebec and British Columbia are at nearly 100% renewable power. British Columbia's electricity supply mix is dominated by hydro-electric at 84%, followed by biomass, natural gas, wind, and oil.¹⁰⁵ Most leading countries, states and provinces have a very high percentage of hydro-power in their electricity mix.

MAINLAND AUSTRALIA

Australia's national targets are lagging renewable expansion, while mainland states and territories have mixed ambition. Australia has had a series of federal renewable energy targets in the last two decades. The Howard Government committed to a Clean Energy Target of 15% clean energy production by 2020, which included wind and solar as well as carbon capture and storage, but excluded gas/LNG. The Rudd Labor Government set-forth a target to ensure that 41,000 gigawatt-hours (GWh) of Australia's electricity came from renewable sources by 2020. The Abbott Government campaigned to abolish the scheme, but in 2015 settled to legislate a reduced target of 33,000 GWh (or 23.5%) of Australia's electricity supplied by renewable sources by 2020. The Turnbull Government's committed to the 23.5% renewable energy target by 2020. Fortunately, Australia is on track to exceed the original 41,000 GWh by 2020.¹⁰⁶ According the Federal Government, Australia generated 18.9% of its electricity from renewable energy technologies in 2018, mainly from wind, solar and hydro, up from 15.2% in 2017. Australia's state and territories have had mixed performance on renewable sources in their electricity, but most are a significant improvement on successive federal governments. Victoria has a target of generating 25% of its electricity from renewable energy by 2020, and 40% by 2025. South Australia has a

target of sourcing 50% of its electricity from renewable energy by 2025 – it has already exceeded 40% and is on track for 73% by 2020. Queensland has committed to generating 50% of its energy from renewable sources by 2030. Northern Territory has a target of 50% by 2030. NSW and WA do not have targets.

OPPORTUNITIES FOR TASMANIA

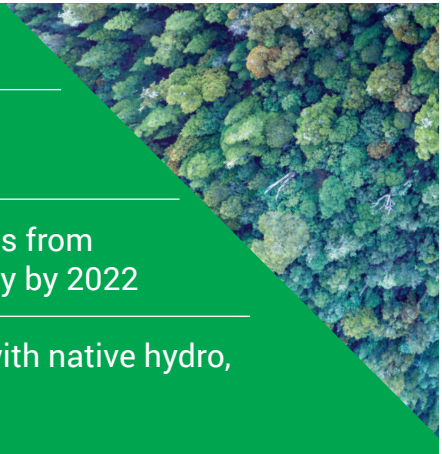
Tasmania has an opportunity to establish a world-leading zero-emissions electricity grid akin to global leaders. Climate Action 21 plans for ‘continued investment in hydro’, including flagging that several billions may be spent on renovating existing dams, building new ones (pumped hydro), and for a second interconnector to the mainland to export the power. The Climate Council describes Tasmania, the ACT, and SA as ‘equal winners’ in Australia’s renewable race.¹⁰⁷ Tasmania’s national leadership status is premised on the historical role of hydro dams. In 2017, 87% of Tasmania’s renewable energy was hydro, while 11% combined was wind and solar (approximately 10% and 1% respectively).¹⁰⁸ By contrast in the ACT 46% was hydro while 43% was wind and solar. Similarly in South Australia 43% was hydro, while 42% was wind and solar. Tasmania’s overreliance on hydro power could prove problematic. From year-to-year Tasmania’s share of renewable electricity fluctuates as a result of rainfall in hydro catchments. Low rainfall results in increased energy from the burning of coal and gas being imported from the mainland to make up the difference. However, Tasmania has commenced the construction of two new wind farms to help the state reach its target of 100% renewable energy by 2022. Given that climate models predict that rainfall in Tasmania is moving toward the north east of the state, and away from the catchments, it may prove prudent to diversify away from hydro toward solar and wind to ensure Tasmania can retain its national leadership status. Tasmania can legislate to produce at least 100% of our net electricity needs from renewable energy and be a net exporter of renewable energy by 2022. This would require a rapid and massive rollout of solar PV capability on residential and commercial building across the state and an accompanying rollout of decentralised battery storage. In term of the treatment of fossil fuels, the Tasmanian Government could commission a multi-stakeholder taskforce to plan for the gradual phase out of gas in Tasmania by 2025, which is mostly used in industrial processes (barring the establishment of a carbon price); and it could legislate for zero new fossil fuel developments – including expansions of existing coal and coal seam methane.

GLOBAL CLIMATE LEADERSHIP OPPORTUNITY:

GLOBAL LEADER: Costa Rica (country) – grid at 100% renewable (hydro, wind solar) by 2030

TASMANIA TODAY: at least 100% of our net electricity needs from renewable energy and be a net exporter of renewable energy by 2022

TASMANIA TO GLOBAL LEADER: grid at 100% exclusively with native hydro, wind and solar by 2022



IMPORTANT ACCOMPANYING MEASURES:

- Tasmania should end coal power imports via Basslink.
- The installation of domestic battery storage should be incentivised. The Australian Greens have a policy of introducing a A\$2.2 billion battery storage fund from July 1, 2019, providing household battery storage incentives of up to A\$7000 per battery (tapering down annually to July 1, 2023). Each quarter, A\$137.5 million will be made available for use from the fund.¹⁰⁹
- Energy efficiency: Energy efficient building mandates for compulsory insulation. Funding for energy efficiency upgrades for low income households, and work towards setting 7-star minimum standard under the Nationwide House Energy Rating Scheme for new dwellings. Implement strategies to reduce electricity use and the money Tasmanians spend on power by introducing an energy saving scheme and educating communities about energy efficiency.
- Education: Develop a workforce skills plan to make sure Tasmanians can take up the opportunities of the dramatic expansion in renewable energy generation.
- Pumped hydro: Pumped hydro is not an energy source - it is an energy storage mechanism. It is questionable whether pumped hydro as proposed by Hydro Tasmania is necessary or economic as a contribution to energy security in Tasmania. A blind focus on this singular project may put a brake on the state's ability to attract finance and political leadership in a much more cost-effective and practical energy future. Indeed, the business case for the battery-of-the-nation is generally accepted to be uncertain in the absence of major national fiscal intervention that is highly unlikely to eventuate. Even if it were hypothetically possible to achieve, Tasmania would still be pinning its hopes on being able to profitably compete in an ever changing national energy market that is dominated by very large corporates. Tasmania would be competing in that competitive market against all other mainland power storage enterprises that will have been developed in that same time frame. There needs to be an analysis into whether the battery-of-the-nation project (pumped-hydro and Bass Link2) serves the best interest of Tasmanians.

- Gas: Gas generated electricity should be phased out in Tasmania over a period of time. The ACT is already designing a managed phase out of gas consumption. With gas prices now uncompetitive, and its status as a fossil fuel, other jurisdictions are likely to follow. It would represent 'carbon lock-in' to make a major commitment to gas at this time in Tasmania.
- Convene meetings to consult with stakeholders (farmers, small businesses, eco-tourism, health, transport, education and energy) to develop an agreed way forward.

BENEFITS:

Tasmania needs additional renewable electricity generation to:

- become a net exporter of renewable energy;
- increase the security of our energy supply;
- make up for losses in the existing hydro-electric system caused by declining water inflows (climate related);
- avoid relying on gas fired power station for energy security;
- attract 21st Century industries that require 100% renewable energy to make their green brand claims authentic;
- cope with potential increased demand due to population increase; and
- move to electricity for transport and to replace gas and coal in industrial processes.
- Costa Rica's Plan to ensure that its electrical grid is capable of operating at 100% with renewable energies by 2030 is principally to allow its transport system, once transitioned to electric vehicles, to be capable of being 'nourished by energy that is renewable and not of fossil origin'. ¹¹⁰ Tasmania can do the same.

3. POWER TRANSPORT WITH ELECTRICITY

GLOBAL ACTION

Countries and state/provinces globally are setting targets for the rollout of electric vehicles. Electric vehicles (EV)¹ are on the march across the world.¹¹¹ China is leading the global charge with more than 300,000 electric buses on the road at the end of 2017. The City of Shenzhen (population 11.9 million) in Guangdong province, has quite remarkably switched its entire 16,000-strong bus fleet to electric. Other major global cities including Paris, Los Angeles, London, Copenhagen, Barcelona, Vancouver, Milan, Auckland and Cape Town, have all pledged to transition their bus fleets to full electric. In terms of targets, Costa Rica's decarbonisation plan for transport states that 'By 2035, 70% of the buses and taxis will be zero emissions...and 25% of the light fleet vehicles - private and government - will be electric'.¹¹² In October 2018, British Columbia's Metro Vancouver's transit agency, TransLink, approved a new target for 100% renewable energy by 2050. TransLink's fleet contains 2,000 transit vehicles, including buses, trains and SeaBus, among other things.¹¹³ China has the world's largest stock of light-duty EV's on the road, at more than 2 million. Indeed, EV's make up almost 5% of China's enormous automobile market, and the Government wants EV's to account for 20% of new cars sold by 2025. Norway has the highest market penetration of EV light-vehicles in the world, and has the world's highest plug-in EV new sales at 49% in 2018.

Subnational actors are also moving. In November 2018, British Columbia announced plans to legislate targets for the sale of new Zero-Emissions Vehicles (batteries or hydrogen fuel cells driven) in the province would be 10% ZEV by 2025, 30% by 2030, and 100% by 2040.¹¹⁴ In the US, California is leading on electric cars. In 2018, Governor Jerry Brown signed an Executive Order to increase the state's goals to 5 million ZEVs on the road by 2030, and 250,000 EV chargers installed by 2025.¹¹⁵ In March 2019, Shenzhen officials announced that 99% of the city's more than 21,000 cabs are now powered by batteries.¹¹⁶ The International Energy Agency's Global EV Outlook 2018 reports that 'The number of electric and plug-in hybrid cars on the world's roads exceeded 3 million in 2017, a 54% increase compared with 2016'.¹¹⁷ The IEA forecast that 'the number of electric vehicles on the road around the world will hit 125 million by 2030...and could be as high as 220 million in 2030' with increasingly ambitious global climate goals.¹¹⁸ An important accompanying point is that China, France, Germany, India, Ireland, Israel, the Netherlands, Norway, Scotland, Taiwan, and the UK have announced their intention to ban the sale of petrol and diesel vehicles.¹¹⁹

MAINLAND AUSTRALIA

Australia has vacillating targets, while mainland states and territories are cautiously embracing EVs. Conjecture surrounds the Coalition Government's target for the sale of new electric vehicles in Australia. The Department of Environment suggests that it is between 25% and 50% by 2030, the Prime Minister says it is more like 16% up to 50%.¹²⁰ The Australian Labor Party in the lead up to the 2019 election announced that 50% of new car sales in Australia will be electric by 2030. Most mainland states and territories are growing their electric vehicle capacity, including buses and cars. In March 2019, ClimateWorks Australia released a report that explained: 'Transport is one of the fastest growing sources of emissions in Australia, and electric vehicles fuelled by renewable energy can help to drastically reduce the sector's emissions.'¹²¹ Fortunately, some mainland Australia's states and territories are responding. The ACT is currently trialling three leased electric buses on public transport routes in Canberra, with the city aiming to be 100% renewable energy

by 2020, it is ultimately planning to transition its ageing bus fleet to electric. The South Australian Government has commissioned the build of two Australian-made buses for Adelaide's transit network. In 2013 Adelaide was the first city in Australia to introduce a solar-charged bus operating on the city's free connector service.¹²² New South Wales is currently running an electric bus from Sydney airport to the inner-city.

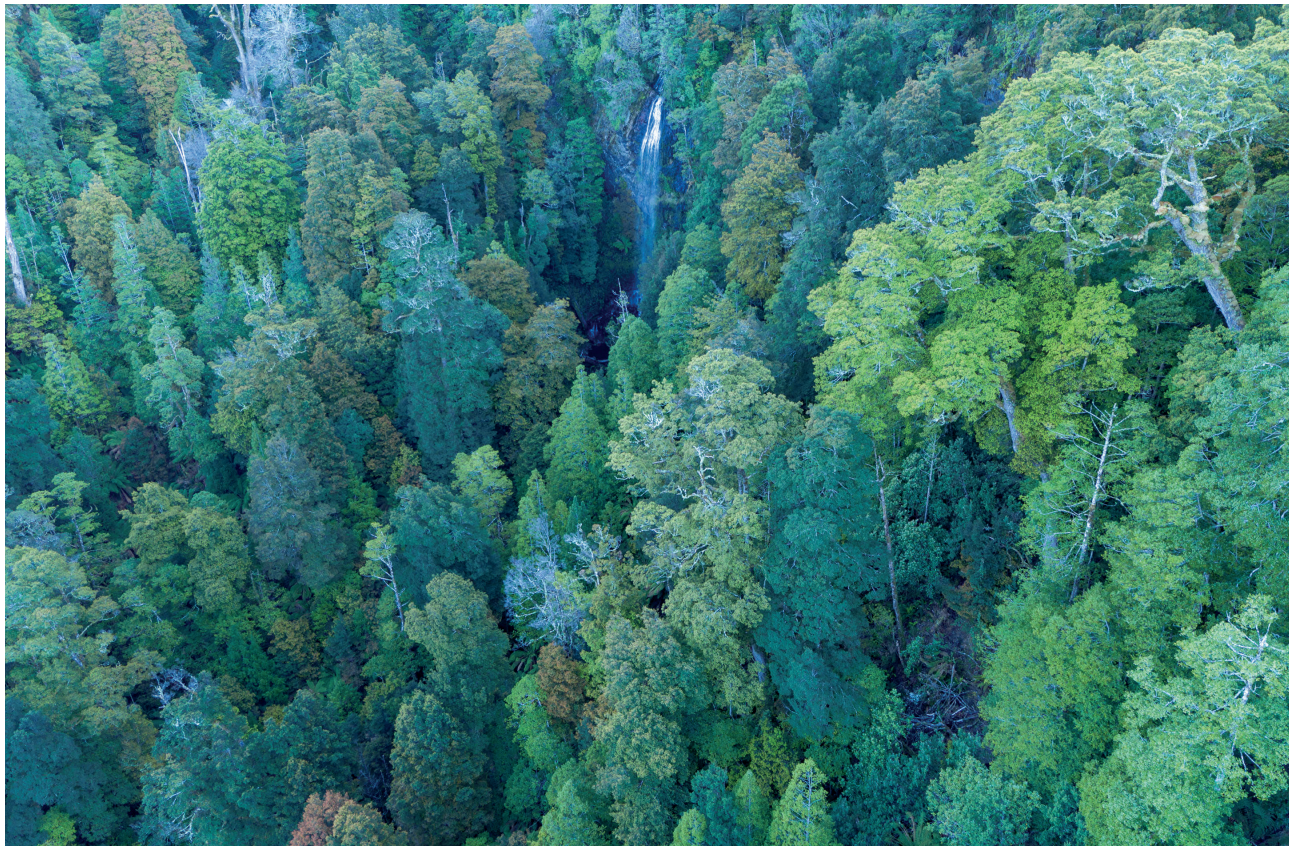
More broadly speaking, Australia is showing consistency with the uptick in global electric vehicles sales. A June 2018 Climate Works Australia report found that there were '2,284 electric vehicles sold in Australia in 2017, representing a 67% increase from the previous year'.¹²³ However, the report also found that 'Australia's states and territories differ in their rate of electric vehicle uptake'. In the last seven years, Victorians purchased the highest number of electric vehicles, with 1,324 vehicles purchased between 2011 and 2017 (excluding Tesla vehicle numbers). But when taking into account market size, the ACT continues to outperform other jurisdictions: in 2017, ACT residents purchased 21 electric vehicles for every 10,000 vehicles sold.¹²⁴ ClimateWorks also found that the number of charging stations in Australia has substantially increased, with a 64% increase from 2017 to 2018.¹²⁵ There are currently 476 dedicated AC electric vehicle public charging stations in Australia (AC chargers),¹²⁶ and 47 DC charging stations available in Australia. ClimateWorks assert that 'AC charging is generally considerably slower than DC'. The trouble is the mainland's electricity supply is dominated by coal and gas.

OPPORTUNITIES FOR TASMANIA

Tasmania has the opportunity to achieve a world-leading low emissions transport system.

Emissions from Tasmania's transport sector have increased by 8% between 1989-90 and 2015-16.¹²⁷ Emissions generated by the combustion of road transport fuel (diesel, petrol and LNG) contribute about 90% to this percentage figure, with cars being the largest contributor.¹²⁸ Climate Action 21 acknowledges that 'in 2015 Tasmania's transport sector had the highest emissions out of all the reported sectors of our economy'. In response, Climate Action 21 outlines a plan to increase bus routes and connectedness; and to deliver 100 new Metro Tasmania buses that allow conversion from Internal Combustion Engine (ICE) to electric.¹²⁹ This means that the buses will operate on 'Euro 6 standard diesel engines, which are the lowest emitting diesel engines available'.¹³⁰ The Government's plan therefore, at least in the immediate term, is to simply replace high-polluting diesel buses with lower polluting diesel buses – none were ordered to be immediately electric for testing or familiarisation purposes. In terms of electric cars, Climate Action 21 explains that the future of electric cars in Tasmania will be in part the result of market forces - which appears a signal that the Government intends to be a follower rather than leader. In terms of EV charging stations, Tasmania has 16 dedicated AC chargers and no DC charges.¹³¹ The Government has committed only A\$250,000 over three years to support the rollout of a state-wide electric vehicle charging network, again, 'consistent with market trends'.

Ambition could be increased on electric buses, cars and charging infrastructure. **The Tasmanian Government can legislate for specific and strong targets for the penetration of electric vehicles (buses, cars and trucks) and for charging infrastructure (public and home) by 2025 and 2030.** Targets could include percentage change and dates - proportional to world leading states/provinces - for the Metro bus fleet to be connected to electricity, new electric car sales, and the deployment of charging stations for home and public. Legislating targets for the electrification of Tasmania's urban transport system, as well as operationalising a suite of accompanying measures - such a significant infrastructure funding over time - to achieve these targets, would diminish the emissions from Tasmania's most outstanding source. Additional benefits to Tasmania include greater energy security from less reliance on imported fossil fuel; approximately A\$1 billion a year not spent on overseas fuel supplies available for spending locally.



GLOBAL CLIMATE LEADERSHIP OPPORTUNITY:



GLOBAL LEADER:

Guangdong–Shenzhen City (China) – full conversion of bus fleet, high penetration of electric vehicles

TASMANIA TODAY:

several committees in operation

TASMANIA TO GLOBAL LEADER:

Plan for the rapid conversion of Tasmania’s diesel bus fleet to renewable energy powered electric, with trial routes for electric buses to commence immediately; and strong targets for light vehicle sales and charging infrastructure is required

IMPORTANT ACCOMPANYING MEASURES:

- Hobart should commence construction on a Light Rail, initially linking Hobart CBD to Brighton.
- Other modes of mass public transport should also be seriously considered, including trackless trams.
- Establish ferries from Hobart to the Eastern Shore and other hubs.
- Hobart, Launceston and other urban centres should invest in a comprehensive network of pedestrian linkages and safe, dedicated cycling lanes.
- E-bike usage should be incentivised, and e-bike charging infrastructure should be rolled out.
- Transition the state and local Government vehicle fleet to 100% electric, and encourage the adoption of electric vehicles in the tourism/ hire car sector, see for example Kangaroo Island fleet. These changes would enhance the up-take of electric vehicles via the second hand market.
- Introduce a sliding scale of registration fees so that it cheaper to register vehicles that are more fuel efficient, and as an incentive for electric vehicles.
- Work with the RACT to develop programmes and partnerships - Support the Hobart Mobility Strategy and the City of Hobart Plan.
- Establish a target to reduce liquid fuels.
- Increase public transport options from Hobart and Launceston.
- Develop a workforce up-skills plan to make sure Tasmanians can take up the opportunities on offer in low pollution transport systems, including TAFE courses for electric engine mechanics.

- Convene meetings to consult with stakeholders (farmers, small businesses, eco-tourism, health, transport, education and energy) to develop an agreed way forward.

BENEFITS:

- Transitioning Tasmania's public and private transportation to electric would dramatically reduce emissions from our transport sector, our largest emitting sector.
- Increasing mass public transport options would also serve to ease the growing congestion problems in the south of the state.
- It would equip our young people with the knowledge and skills of tomorrow, so that they may work in modern low pollution economies in Tasmania, on the mainland and abroad.

4. RESTORE ECOSYSTEMS ON LAND AND SEA

GLOBAL ACTION

Counties and states/provinces across the globe can see the benefits of establishing low-pollution agricultural systems. Since the 1950-1960s, the dominant approach to global food production, in developed countries particularly, has been to apply increasing quantities of nitrogen, phosphorus and potassium fertiliser per hectare as well as add chemicals (all mostly derived from oil), and establish mechanised oil-powered farming equipment and irrigation systems. This approach has been referred to as the 'high external input' approach (HEI). The HEI approach tends to atomise natural processes and seeks to remedy them individually (i.e. by applying a particular chemical). A February 2019 study published by UN Food and Agriculture Organisation (FAO) explained that the HEI approach to agriculture has precipitated the global deterioration of the complex and interlinked eco-systems that make food production possible, including biodiversity, soils, water, climates, nutrient cycles, and pollination.¹³² 'This places the future of our food and the environment under severe threat', the FAO report states. An alternative is called the agro-ecological approach. This approach advocates a holistic understanding of the complex interactions between ecological and social systems. At its core, the agro-ecological approach draws on traditional farming methods as well as today's technically advanced knowledge-intensive systems referred to as 'sustainable', 'organic', 'biodynamic', 'biological', 'permaculture', 'holistic', and 'natural sequence' farming systems. A core, and actionable, component of this approach involves the regeneration of previously arable lands that now suffer from eco-system degradation.

The certification of organic farming is now commonplace in most developed countries. In some instances, the Government itself is prepared to provide organic certification, oversight and enforcement. For example, in 1990, the US Congress passed the Organic Foods Production Act, which required the US Department of Agriculture to develop national standards for organic products. The integrity of the subsequent 'the USDA organic seal', launched in 2002, is administered and protected by the US Federal Government.¹³³ According to PEW, in 2015, US organic retail sales reached US\$43 billion, 'representing double-digit growth in most years since 2000, when the USDA established national organic standards'.¹³⁴ In 2016, there were more than 14,000 certified organic farms in the US.¹³⁵ The US State of Vermont leads the US with 134,000 certified organic acres accounting for 11% of its total 1.25 million farm acres. But Vermont is stepping it up a notch. In a first for the US, in 2018 Vermont moved to legislate a certification scheme for farmers using regenerative farming techniques, justified on the basis that this style of farming is resilient

to climate shocks.¹³⁶ The bill asserts: 'Regenerative agriculture describes farming and grazing practices that, among other benefits, reverse climate change by rebuilding organic matter in soil and restoring degraded soil biodiversity, resulting in carbon drawdown, improved retention of water in the soil, and improved water quality...Many farmers have adopted regenerative farming practices to benefit from reduced input costs, improved yields, and better resilience to climatic extremes.'¹³⁷ This bill has passed the Vermont House of Representatives and awaits passage through the Senate.

MAINLAND AUSTRALIA

Australia and its mainland states/territories are largely committed to industrialised agriculture. Australia's food production system is highly vulnerable to the physical impacts of climate change.¹³⁸ The 2008 Garnaut climate change review explains that 'If global development continues without effective mitigation...By mid-century, there would be major declines in agricultural production across much of the country'.¹³⁹ Similarly, a 2015 report by the Australia's Climate Council found: 'Climate change is making weather patterns more extreme and unpredictable, with serious consequences for Australia's agricultural production'.¹⁴⁰ In 2018, the National Farmers Federation President, Fiona Simson, conceded that farmers 'are at the front line of climate change, increasingly erratic seasons, out of season rainfall or no rain at all and longer, hotter summers'.¹⁴¹ Yet, despite this, the HEI approach dominates mainland farming systems. This approach underpins the Federal Government's plans for Australian agriculture to feed an 'increasingly wealthy and hungry Asia'; as explained in its central policy document: Agricultural Competitiveness, White Paper of 2015.¹⁴² Troubling for those concerned about climate change however (unlike Tony Abbott and Barnaby Joyce – the two key ministers behind the White Paper), research has found that fertiliser use in Australian agriculture has 'increased seven fold over the past four decades'.¹⁴³ This is problematic because fertiliser is highly energy-intensive to produce: '1 kg of nitrogen-based fertiliser, for example, requires 1 kg oil'.¹⁴⁴ In addition, Australia's fertiliser is largely imported, adding an extra 'embedded carbon dimension'. ABARES reports that 'in 2001-2009, 56% of phosphorus fertiliser, 77% of nitrogen and 100% of potassium was imported'.¹⁴⁵ Imported pesticides, herbicides, and fuels, oil-driven machinery, and other carbon intensive practices such as heavy soil tillage, are the stock-and-trade of Australian agriculture. The HEI approach has contributed to the degradation of Australia's ecosystems services. Natural Resource Management assert that: 'Across Australia, landscapes and waterways have become degraded after decades of unsustainable practices; from loss of topsoil and nutrients, excess nutrients and turbidity in waterways, salination of soils, drought, lack of groundcover and vegetation leading to erosion, and loss of biodiversity'.¹⁴⁶

Australia's organic market is booming, estimated to be worth A\$2.4 billion in 2018, 'having grown by almost 88% since 2012'.¹⁴⁷ Australia has several privately owned and administered organic and biodynamic certification schemes.¹⁴⁸ But Australia is yet to establish a Government run organic certification scheme (federally or by any state or territory government), or a certification scheme to recognise the work of Australia's burgeoning regenerative farming enterprises.¹⁴⁹ Regenerative Australian Farmers explain that: 'regenerative agriculture is one of the best kept secrets in our collective response to climate change, widespread land degradation, water retention, loss of diversity and declining regional economic growth, and our desire for food security that is clean and non-toxic'.¹⁵⁰

OPPORTUNITIES FOR TASMANIA

Tasmania has the opportunity to become a global leader in low pollution agricultural systems, for example regenerative farming. Climate Action 21 focuses on educating agribusinesses how to adapt to climate risks and impacts. Very few measures are devoted to mitigation – central is educating dairy farmers on fertiliser usage impacts and educating agribusinesses on energy efficiency. This leaves much room to increase ambition. To date, Tasmania has largely adopted the HEI farming system. Fertilisers and chemicals are deployed in significant quantities across the state. Mechanised farming equipment and irrigators are replete. In 2016, a survey found that less than 4% of Tasmanian dairy paddocks are in ideal health.¹⁵¹ The Tasmanian Government's Agricultural White Paper of 2017 outlines plans for Tasmania's agricultural sector to 'grow at more than double the growth rate experienced over the past 20 years'.¹⁵² Driving this growth will be increasing quantities of high external input. But growth can be based on agro-ecological farming systems. A study by the University of Michigan has found that 'organic production has the potential to support a substantially larger human population than currently exists... (and) the agricultural land base could eventually be reduced if organic production methods were employed' due to the reversal of soil degradation and subsequent increase in yield resulting from eliminating fertiliser and chemical inputs. While Tasmania already has a vibrant agro-ecological farming community in operation (and indeed Tasmania was the birthplace of the now global permaculture movement), to further encourage the expansion of agro-ecological enterprises, and for Tasmania to move into a global leadership position, the Tasmania Government can legislate for a certification scheme for farmers using regenerative farming techniques. This change - which involves a Tasmanian Government certification stamp on products - would generate reputational dividends, particularly for agricultural exporters, as well as help reduce Tasmania's emissions from the agricultural sector. A regeneration agenda would involve reforestation plans on agricultural lands, including along fence-lines for example.

RESTORING MARINE ECOSYSTEMS

Climate Action 21 does not comprise a single "action" for the marine environment. Marine is only mentioned under 'what we have done so far', and it is this: 'adopted an adaptive management approach to managing our marine resources through Fisheries Management Plans and Marine Farming Development Plans that take climate change impacts into account'. In short, climate change has been outsourced to industrial affairs, and is understood principally in terms of its potential impact on industry.

Policies to strengthen ambition include:

- First, maintaining the integrity of marine ecosystems. This can be achieved through **the Tasmanian Government legislating for a comprehensive system of no-take Marine Protected Areas (MPAs) in Tasmanian waters**. Among other advantages, MPAs would build rock lobster stock which are the natural predator of the insidious long-spine urchin.
- Second, restore damaged marine ecosystems. Tasmania was the second place to be colonised in Australia and has serious legacy impacts from human activities. It is possible to transplant reef communities, revegetate areas, and protect species and habitats that are currently under pressure. Funding for marine restoration projects should be a high priority of the Government. Giant Kelp Marine Forest restoration programs should be funded, as should programs to restore biodiversity to rocky reefs on Tasmania's east coast.

- Third, current pollution levels entering marine ecosystems need to be reduced. On-farm fertilisers and chemicals should be reduced or used only in areas away from water catchments and coasts. This is critical in order to maintain biodiversity, strengthen climate resilience in the marine environment and improve the sustainability of fisheries.
- Fourth, when expanding into new areas, development should learn from past mistakes, and adopt improved technologies for dealing with wastes, recycling excess nutrients on land, and setting well-defined limits for impacts.
- Fifth, opportunities exist for seaweed farming with the express purpose to sequester carbon from the atmosphere. But the seaweed species should be endemic to Tasmania (or low impact to Tasmania), and farming enterprises would need to be located outside fragile estuarine systems.



GLOBAL CLIMATE LEADERSHIP OPPORTUNITY:



GLOBAL LEADER: Vermont (USA) – regenerative farming certification bill passed lower house of State Parliament

TASMANIA TODAY: no regenerative certification

TASMANIA TO GLOBAL LEADER: pass law to certify regenerative farming activities

IMPORTANT ACCOMPANYING MEASURES:

- Establish strong overarching frameworks for the sector by strengthening the relationship between climate scientists, peak bodies, government, and farmers to support practices which take into account, and adapt to, the causes and impacts of climate change.
- Strengthen biosecurity and response.
- Support the increasingly diversified jobs and skills with specialist training in the agriculture sector.
- Regulation on food security and stocktake our production, markets and diversification
- Indefinite ban on GMOs.
- Convene meetings to consult with stakeholders (farmers, small businesses, eco-tourism, health, transport, education and energy) to develop an agreed way forward.

FOREST MANAGEMENT:

- End the industrial scale logging of all native forest and end logging in high conservation value forests.
- Use locally grown and certified timber in construction. Support the establishment of a cross laminated timber research and manufacturing facility based on plantation timber.
- Commitment to carbon drawdown through reforestation.
- Begin large scale rewilding initiatives with associated skills training including the restoration of Lake Pedder and logged and mined areas.
- The Tasmanian Government could legislate for the protection of all remaining high conservation value forests, including by declaring takayna/Tarkine a National Park.
- Introduce a new environmental law based on the principle of no extinctions, consistent with the 2019 IPBES Global Assessment on Biodiversity and Ecosystem Services.153

- Establish small and large scale restoration forestry programs and ecological rehabilitation programmes for wetlands, riparian and coastal zones and previously logged and mined areas.
- No private infrastructure development / helicopters in reserves.
- Assess the impact of visitor numbers on all Tasmanian National Parks to consider whether caps should be established, and if so in which National Parks.
- Strengthen Tasmania's rapid response remote firefighting capacity, including by purchasing aerial assets and training more remote area firefighters. This would ensure that climate-related dry lightning fires are hit hard and early before extensive permanent damage is done to Tasmanian communities and wilderness assets.
- Ensure adequate resourcing to map and plan for the impacts of climate change on significant economic, social, environmental and heritage natural assets. Make those maps publicly available.
- Support the shift from low value, high volume extractive industries, to high value low volume produce. We have moved from being price takers to price setters in our high quality produce and needs to be extended to all our resources including plantations, energy and minerals.

BENEFITS:

- The certification scheme if widely adopted would help encourage environmental restoration and carbon sequestration projects on both public and private land; protect and increase valuable soil carbon stocks and maintain and increase carbon sequestration in the landscapes.
- Regenerative farming implies low or no fertilisers and chemicals, as well as prioritising small-scale agricultural enterprises, which is consistent with the Green principle of prioritising local growers and decentralising power. It also implies a revitalisation of rural communities, which is critically important for a number of reasons - including slowing urbanisation.
- This change would significantly enhance our international reputation in the food and beverage industry.
- It would equip young farmers with the skills to manage their land and enterprises under Tasmania's changing climate in the decades to come.

AUTHOR'S NOTE AND THANKS

This Discussion Paper follows that of a number of previous Tasmanian Greens reports and policy papers over the last two decades that themselves have made unquestionable contributions to the climate debate in our State. Notable among them, The Impacts of a Changing Climate on Industry Sectors in Tasmania (2006); Tasmania 2030: A Vision for a Green, Dynamic & Prosperous Tasmanian Economy (2013); Climate Smart Tasmania: A 2020 Climate Change Strategy led by Cassy O'Connor as Minister for Climate Change (2013); and A Climate Plan for Tasmania (2018). While the present Discussion Paper draws heavily on these documents, it also seeks to add value by not only bringing information, analysis and argument together in a way that policymakers may find useful, but break some new ground. It is hoped that the Discussion Paper adds real value by offering a two-part justification for why Tasmania should ratchet-up its emissions reduction ambition, and in doing so, move into a climate leadership position comparable to high-performing states and provinces around the world.

While my brief in researching and writing this Paper was to investigate the opportunities and pathways for Tasmania to ascend to global climate leader by 2030, it is important to note that the legislative and policies opportunities identified, as well as the threatened interests and their examples for that matter, are only meant to act as a sample of a much broader and profound suite on offer. The ultimate aim of this Paper is to start the conversation.

Indeed, it is envisaged that this Discussion Paper is not an end in itself, but as contributing in a continuing process in which all relevant sectors of Tasmania's community will need to be, and stay, engaged.

Finally, I would like to thank the following people and places for their support and feedback on earlier drafts of the paper: Deputy Lord Mayor Cr Helen Burnet, Dr Mel Fitzpatrick, Jack Gilding, Chris Harries, Cr Bill Harvey, Dr Damien Irving, Geoff Law, The Office of Senator Nick McKim, Christine Milne, The Office of Cassy O'Connor MP, Amanda Sully, The Office of Senator Peter Whish-Wilson, and Dr Rosalie Woodruff MP.

Dr Ben L. Parr, Hobart, 2019

All images used in this report courtesy of Rob Blakers.

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