



# Towards a climate-positive Tasmania

## A DISCUSSION PAPER

Prepared by the  
**Tasmanian Policy Exchange**  
with contributions from staff and students  
from across the University

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[www.utas.edu.au/tpe](http://www.utas.edu.au/tpe)

## **ACKNOWLEDGEMENT OF COUNTRY**

The University of Tasmania pays its respects to elders past and present and to the many Aboriginal people that did not make elder status and to the Tasmanian Aboriginal community that continues to care for Country. We acknowledge the profound effect of climate change on this Country and seek to work alongside Tasmanian Aboriginal communities, with their deep wisdom and knowledge, to address climate change and its impacts.

The Palawa people belong to one of the world's oldest living cultures, continually resident on this Country for over 65,000 years. They have survived and adapted to significant climate changes over this time, such as sea-level rise and extreme rainfall variability, and as such embody thousands of generations of intimate place-based knowledge.

We acknowledge with deep respect that this knowledge represents a range of cultural practices, wisdom, traditions, and ways of knowing the world that provide accurate and useful climate change information, observations, and solutions.

The University of Tasmania likewise recognises a history of truth that acknowledges the impacts of invasion and colonisation upon Aboriginal people, resulting in forcible removal from their lands.

Our island is deeply unique, with cities and towns surrounded by spectacular landscapes of bushland, waterways, mountain ranges, and beaches.

The University of Tasmania stands for a future that profoundly respects and acknowledges Aboriginal perspectives, culture, language, and history, and a continued effort to fight for Aboriginal justice and rights paving the way for a strong future.

## ACKNOWLEDGEMENTS

This *Discussion Paper* has been prepared by the Tasmanian Policy Exchange (TPE) at the University of Tasmania.

The TPE has been established to enable the University of Tasmania to make timely and informed contributions to key policy debates occurring in Tasmania, and thereby making a positive contribution to the future of our state and its people.

This paper provides evidence-based policy options to inform comprehensive and ambitious climate action in order to maximise the long-term benefits for the Tasmanian community and environment.

The TPE is grateful to the many researchers and staff across the University who contributed their time and expertise to the preparation of this paper.

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## A note on language

The following terms are used throughout this *Discussion Paper*.

### **Adaptation**

One of the three pillars of the climate-positive approach is adaptation to the inevitable effects of climate change. While the *Independent Review* uses the term 'resilience' to express the same concept, this *Discussion Paper* uses 'adaptation' to denote and emphasise the active approach that will need to be undertaken.

### **Climate action**

'Climate action' refers to the implementation of strategies and policies that will reduce emissions as well as help to adapt human and natural systems to a changing climate.

### **Climate positive**

A wide range of terms and concepts are used to describe the objectives of climate policy. While there is currently a strong focus on achieving 'net zero', this is not particularly relevant to Tasmania because we have already achieved net zero and first achieved a 'net-negative' emissions profile in 2013. Tasmania does produce significant greenhouse gas emissions (8,361 kt CO<sub>2</sub>-e in 2019); these are negated by the 10,043 kt CO<sub>2</sub>-e of emissions which are removed or sequestered from the atmosphere and stored in our forests and soils, resulting in net emissions of negative 1683 kt CO<sub>2</sub>-e. This *Discussion Paper* proposes a holistic and ambitious approach to achieving a 'climate-positive' Tasmania. This entails:

1. Maintaining Tasmania's current net-negative emissions profile to 2030 and beyond
2. Supporting adaptation and mitigating the risks associated with unavoidable climate change
3. Developing and deploying low-carbon technologies and processes and supporting the decarbonisation of industries in Tasmanian and beyond.

Because the land use change offsets underpinning Tasmania's current negative emissions profile are expected to decline over time, Tasmania must strive to cut gross emissions across the entire economy. This will require a reduction in 'gross sectoral emissions' from transport, agriculture, heavy industry and stationary energy over time. We outline the quantum of emissions reduction required in Part 7.1.

### **Climate emergency**

'Climate emergency' refers to "a situation in which urgent action is required to reduce or halt climate change and avoid potentially irreversible environmental damage resulting from it".<sup>1</sup> In this respect, responding to the climate emergency requires the urgent real-world application of mitigation and adaptation thinking, policies, and technology (climate action). In other words, it entails a response of scale and urgency proportionate to the reality that climate change is the greatest threat currently faced by society and the planet.

### **Net negative**

'Net-negative' emissions describes a situation wherein more greenhouse gases are removed from the atmosphere than are emitted into it. Net-negative status is part of a climate-positive approach, as described above.

### **Net zero**

'Net-zero' emissions are achieved when the amount of greenhouse gases being emitted into the atmosphere is balanced by the amount being taken out.

## Part 1:

### Introduction

We are facing a climate emergency that demands urgent global and local action.

The recently published *Sixth Assessment Report* of the Intergovernmental Panel on Climate Change (IPCC) highlighted the magnitude and seriousness of the challenge ahead. According to the IPCC, warming of the planet is on track to exceed 3°C on average – with some regions likely to experience greater levels of warming – and will experience increased frequency and intensity of heat extremes and heavy precipitation and droughts in some regions<sup>1</sup>.

This is a line in the sand for humanity.

The need for aggressive climate action is clear and compelling. While confronting, this is a challenge that we must embrace with a sense of hope rather than despair. The radical climate action the world needs is possible and there may be no better place in the world where that can be demonstrated than here in Tasmania.

*Although there is much to be done, Tasmania can be an example to the world on climate action*

Tasmania is one of the few places on the planet that has already achieved a net-zero emissions profile (Figure 5) which, when combined with abundant renewable energy assets and a deep commitment to sustainability, provides an opportunity to embrace and promote a truly climate-positive strategy.

Tasmania can be an example to the world on climate action, but much more needs to be done.

In the wake of the IPCC *Sixth Assessment Report*, and given the international climate conference in Glasgow in November, momentum is building for climate action around the world. In Tasmania too, there is a clear focus on adopting a more ambitious approach to addressing climate change, with the State Government having completed a review of climate policy and the release of a new *Climate Change Act* for consultation.

The University of Tasmania is deeply committed to climate action in all its activities and operations, from its internationally recognised climate research and teaching through to working with communities and industry on responding to climate-related risks while developing and promoting low- and zero-carbon innovations, technologies, and lifestyles.

Given the depth and breadth of the University's climate change expertise, we have prepared this *Discussion Paper* as a contribution to the development of Tasmania's next *Climate Action Plan*. The Paper outlines a framework and policy options designed to establish Tasmania as a global exemplar of effective and ambitious climate action.

The *Discussion Paper* both distils and builds upon analysis presented in the University of Tasmania's April 2021 submission to the Climate Change Review (hence forward referred to as the *Blueprint*). The analysis also draws upon the *Independent Review of Tasmania's Climate Change Act* (henceforward referred to as the *Independent Review*), released in August 2021, as well economic modelling by Point Advisory, and submissions made to the *Independent Review*.

The vision for a climate-positive Tasmania presented in this paper has three key elements:

1. Making a clear commitment to maintaining Tasmania's current net-negative emissions profile over the medium term by reducing gross carbon emissions across all industry sectors, and thereby reducing the current reliance on land use change offsets. Analysis presented in this *Discussion Paper* suggests a gross emissions reduction target (excluding land use) of 37% by 2030 should be included in the next iteration of the *Climate Change Act* and *Climate Action Plan*. This target should ensure that Tasmania can maintain its 2019 net-negative profile through 2030 and beyond (even under a high emissions scenario, as outlined in the *Independent Review*) and continue to have one of the lowest emissions profiles in the developed world.<sup>2</sup>
2. Continuing to develop and deploy low- and zero-carbon technologies and practices to further reduce emissions in key Tasmanian industry sectors while contributing to and capitalising on the accelerating decarbonisation of the global economy.
3. Working with communities and partners to develop and implement comprehensive sectoral climate risk assessments and adaptation plans to prepare for and minimise the social, environmental, and economic impacts of unavoidable climate change in Tasmania.

The need for urgent climate action may be clear but a comprehensive climate strategy requires a deep commitment to systemic change established by working with communities and developing evidence-based options. This *Discussion Paper* aims to contribute to that process. Specifically, the paper highlights the need for Tasmania to maintain its current net-negative emissions profile, as well as detailing options for specific sectoral emissions abatement strategies required to achieve that goal. The *Discussion Paper* then outlines the need for comprehensive state-level adaptation planning to build community resilience and minimise climate risk. Discussion questions are presented throughout; these are by no means exhaustive but rather are intended to

outline options to achieve practical, achievable climate action. Lastly, given that effective climate action requires a holistic, community-wide response, we discuss the future of climate governance and education in Tasmania.

Addressing climate change will transform how we live as a society and how our economy operates. This will be challenging but we believe that, with an ambitious and pro-active approach drawing on Tasmania's assets, expertise, and growing community-wide awareness of and commitment to change, Tasmania can become an example to the world on climate action and sustainability. Our hope is that this *Discussion Paper* contributes to achieving that goal.

## Part 2:

### The climate emergency

In August 2021 the IPCC published its latest analysis of climate change (AR6, Working Group I), which found that climate change is unequivocally caused by humans and is already having a profound impact on the environment and society.

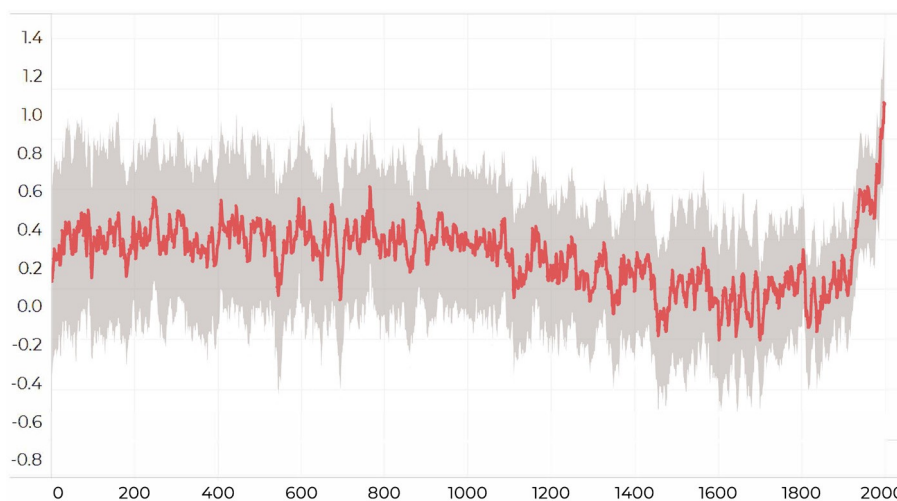


Figure 1: 2000 years of global temperature change (0-2000 CE, degrees celsius)  
(Source: PAGES2k Consortium, 2019)

*Concerted, aggressive action on climate change can help avert future social and ecological catastrophe*

The scientific consensus outlined in the report, and the much greater certainty in relation to the likelihood and consequences of climate impacts, confirms that the current course and speed of global warming will lead to catastrophic outcomes. The United Nations concluded that the report was a 'code red for humanity' and that greenhouse gas emissions were 'choking our planet and putting billions of people at immediate risk'.<sup>3</sup>

As a result of these changes, humans and ecosystems will face increasing danger both from warming itself and from its associated impacts, such as increasing frequency and intensity of extreme weather events. The IPCC projects that in the future, we will experience a one in 50-year extreme heat event roughly:

- every six years with a 1.5°C increase
- every three to four years with a 2°C increase
- nearly every year with a 4°C increase (see Figure 2 below).

The key findings from the first part (Working Group I) of the *Sixth Assessment Report* include:

- The global climate is now warmer than at any time in the past 100,000 years
- Natural variation accounts for only 0.3°C of the 1.1°C warming experienced since pre-industrial times
- On the current trajectory, average global temperatures will be 1.5°C above pre-industrial levels by 2030 and will be approaching 3°C by 2050.

While the outlook may be bleak, the IPCC finds that concerted aggressive action that results in cumulative global CO<sub>2</sub>-e emissions peaking by 2040 can reduce climate impacts and help avert social and ecological catastrophe.

The need for urgent global action in the face of a catastrophic climate future has led countless governments, communities, and organisations (including the University of Tasmania) to declare a climate emergency. We now have to commit to evidence-based action.



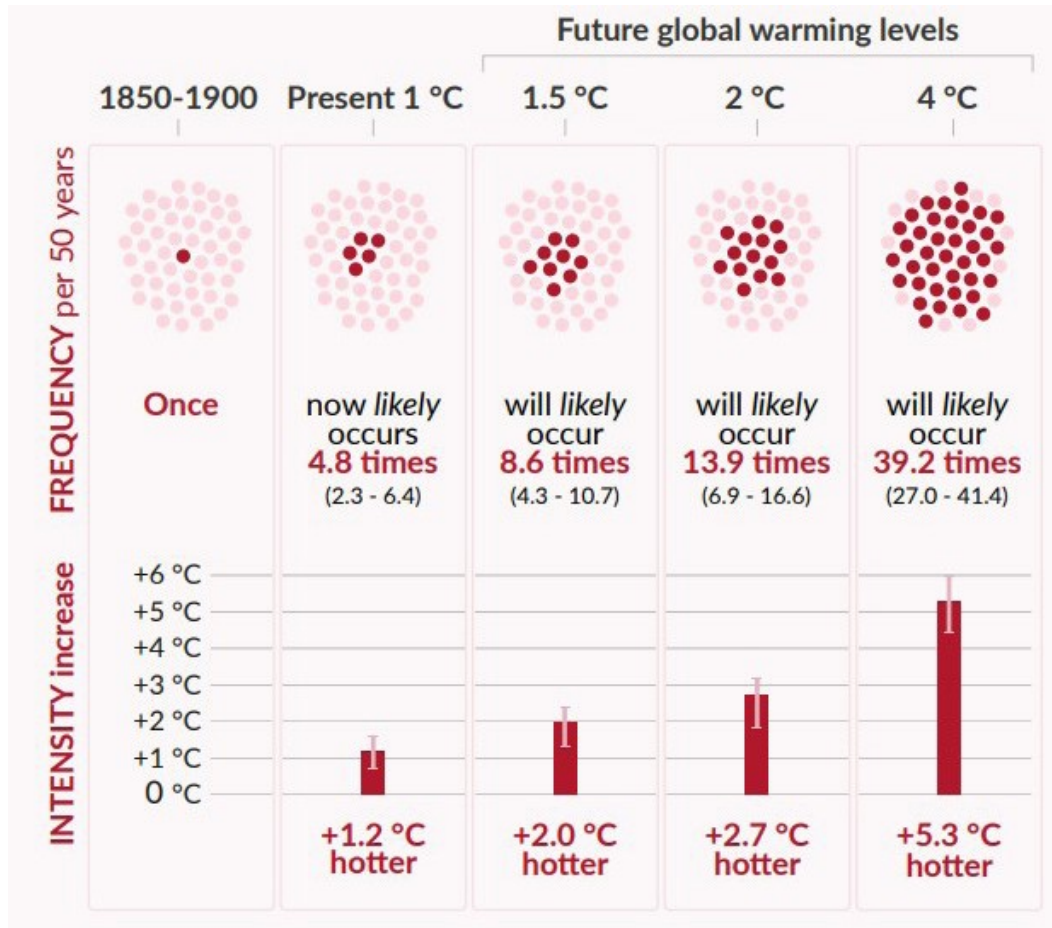








Figure 2: The frequency and intensity of extreme weather events will increase exponentially with warming  
 (Source: IPCC, 2021)

## The climate outlook for Tasmania

Tasmania, with its cool temperate climate, is relatively well placed to adapt to the impacts of global warming. Nonetheless, detailed downscaled modelling undertaken by Climate Futures and the Fire Centre Research Hub at the University of Tasmania and other research groups

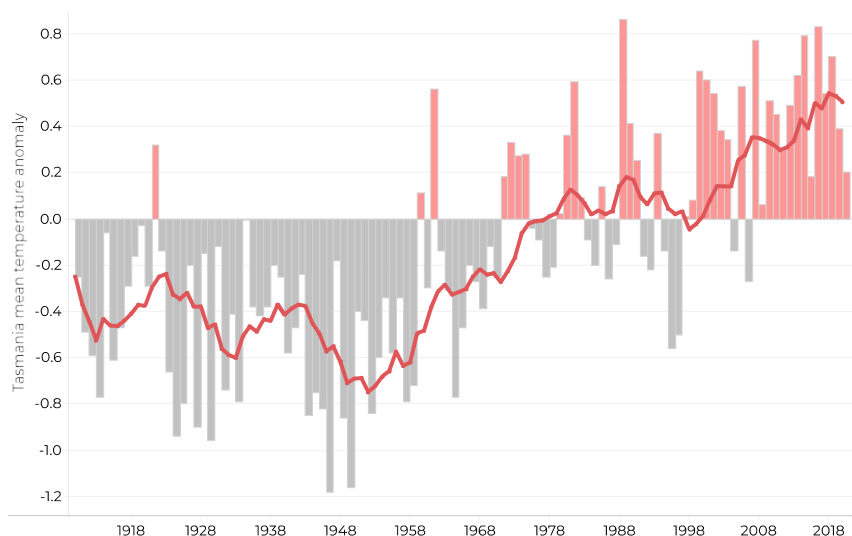
has identified significant state-level risks including the ongoing and escalating bushfire risk (see Table 1).<sup>4</sup> These risks are broadly consistent with the global trends as described by the IPCC AR6 WGI report but are mediated by local geographic and social factors.

<p><b>Fire danger</b></p> 	<p>Tasmania will see a steady increase in fire danger with an increase in the length of the fire season and an increase in the number of days at the highest range of fire danger. By the end of this century an 8-fold increase in fire risk is expected. Many Tasmanian communities are vulnerable to extreme bushfire events.</p>
<p><b>Rainfall</b></p> 	<p>Tasmania will likely experience slightly less annual rainfall into the future, though extreme rainfall events will become more common. Overall rainfall in Western Tasmania will decline as will autumn and spring rainfalls in Eastern and Central Tasmania with significant implications for agriculture.</p>
<p><b>Marine heatwaves</b></p> 	<p>The Tasman Sea, east of Tasmania, is a global ocean warming hotspot. Intense marine heatwaves will become more common and under a high-emissions scenario are expected to occur almost every year in Tasmania, with significant implications for marine ecosystems and fisheries.</p>
<p><b>Drought</b></p> 	<p>In Tasmania, the episodic and regional nature of droughts will continue, with the East Coast remaining especially drought prone. When combined with higher evaporation from warming the landscape will become dryer.</p>
<p><b>Sea level rise</b></p> 	<p>Sea level rise is now irreversible and will continue over the next century. In Tasmania, exposed locations are projected to experience what was formerly a 1-in-100-year coastal inundation event almost every year (during the annual high tide).</p>
<p><b>Temperature</b></p> 	<p>Even under a low-emissions scenario, Tasmania is projected to experience an increase of at least 1.5°C by 2050 compared to historical temperatures. All scenario assessments indicate an increase in all types of high temperature extremes.</p>

**Table 1: Climate change impacts in Tasmania**

(Source: ARC Centre of Excellence for Climate Extremes and UTAS)

*The climate outlook for Tasmania is consistent with the global outlook, with fire danger classified as an extreme risk*



**Figure 3: Tasmanian mean temperature anomaly, 1910-2020**

(Source: Bureau of Meteorology)

## Part 3:

### Community demands for climate action

Reflecting the scientific consensus in relation to the dangerous impacts of climate change, there are growing and broad-based demands for climate action among citizens globally, including in Australia.

Polling on climate change indicates consistently high levels (70-80%) of support for more aggressive climate action (e.g., YouGov, Australia Talks, Australia Institute). The 2019 UTAS-ABC Curious Climate collaboration likewise revealed that Tasmanians want more information about the underlying causes of climate change, associated impacts, and how they can act to address them.<sup>5</sup> Data from the Lowy Institute survey (the longest-running survey on climate change opinion) shows that since 2015 Tasmanians have consistently supported the view that “global warming is a serious and pressing problem” and that “we should begin taking steps now even if this involves significant costs”.<sup>6</sup> This view reached a high of 80 per cent of respondents in 2018 (Figure 4). In terms of

appropriate policy responses, a 2021 survey undertaken by YouGov found that 61 per cent of Australians support the federal government increasing its emissions reduction target to between 50-75 per cent below 2005 levels by 2030.<sup>7</sup>

Opinion polls are often an imperfect measure of community preferences in relation to complex issues such as climate change but detailed interview-based research conducted by Brand Tasmania across a broad cross-section of the community has also identified a strong commitment to climate action. This research also identified a strong alignment with widely held Tasmanian values, including being innovative and using natural resources in respectful and sustainable ways.

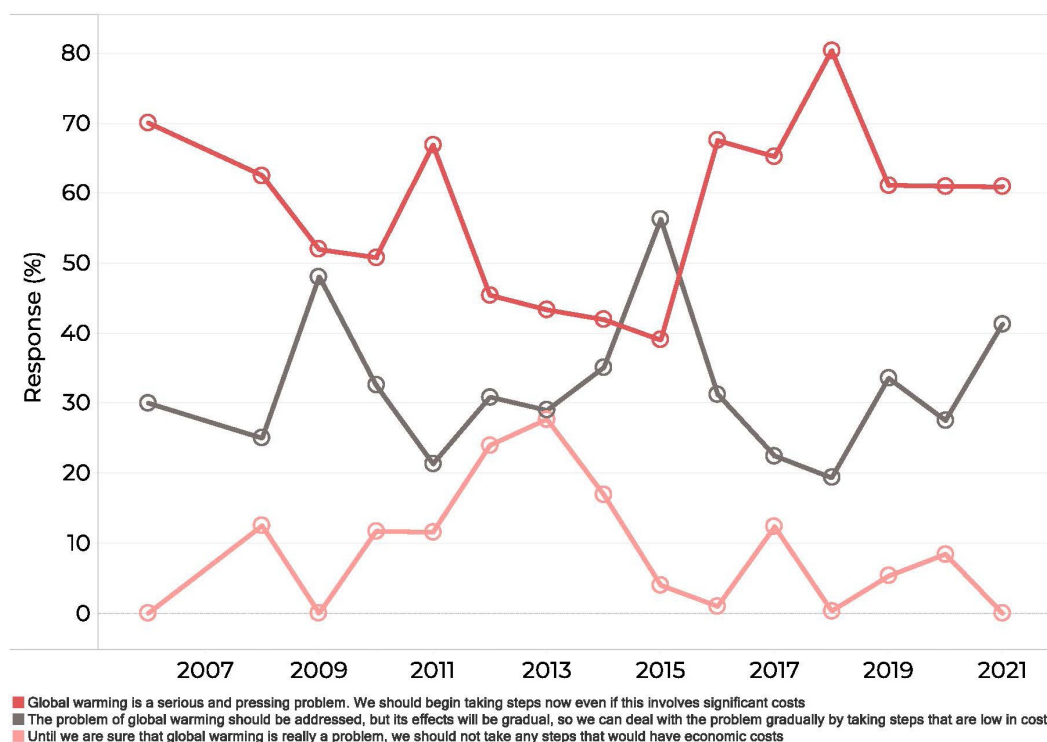


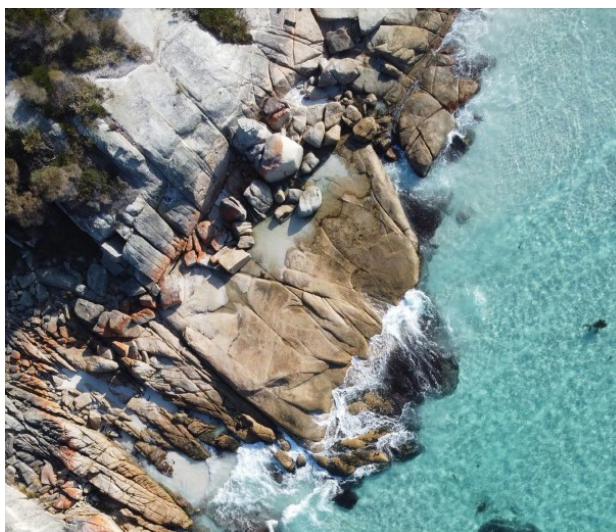
Figure 4: Lowy Institute Poll, Attitudes to global warming in Tasmania 2006-2021 (Source: Lowy Institute)

## Submissions to the Tasmanian Climate Change Reviews

A thematic analysis of the 34 public submissions to the review of the Tasmanian *Climate Change Act*, and the 22 submissions to the review of the *Climate Action Plan*, identified the following key concerns:

1. **Threats** – Strong concern was conveyed across the submissions about the threat posed by unmitigated global warming.
2. **Principles** – Four major principles/approaches featured in the submissions: the importance of disclosure, the need for strong leadership and vision, the need for mainstreaming climate change and the importance of intergenerational equity when responding to climate change.
3. **Priorities for emissions reduction** – Transport emission reduction opportunities attracted significant attention, as did hydrogen (under industry/energy), with strong and widespread criticism conveyed about relying on land-use offsets without lowering emissions in other sectors (for a detailed discussion see Part 7.1).
4. **Sectoral targets** – The submissions overwhelmingly supported a sector-based approach to emissions reduction in Tasmania, however, there were different views as to whether targets should be legislated.

The available evidence suggests that the vast majority of Tasmanians from a broad cross-section of society support more aggressive and strategic climate action, although the distributional impacts of solutions must be fully considered to ensure climate action is equitable and consistent with the principles of climate justice (see Part 6).



Department of Premier and Cabinet  
Tasmanian Climate Change Office

### Independent Review of the *Climate Change (State Action) Act 2008*

Final Report

June 2021



## Part 4:

# The transition to a zero-carbon future

## 4.1 TASMANIA'S OPPORTUNITY TO CAPITALISE ON THE GLOBAL ENERGY TRANSITION

The transition to a zero-carbon future will require significant investment and commitment to innovation from governments, business and communities although the cost, to both the economy and environment, of failing to promote decarbonisation is likely to be much greater. Emissions reduction can deliver benefits to Tasmania, including enhancing our climate-positive brand and the opportunity to engage in the global economic transition driven by decarbonisation, with its significant opportunities for growth, investment, and innovation. Failing to act may threaten the long-term viability of many Tasmanian industries as consumers, investors and shareholders increasingly demand low- and zero-carbon products. Tasmania effectively has a choice: we can embrace ambitious emissions reduction and develop new technologies and industries; or risk being left behind and pay the price

The decarbonisation of the global economy is inevitable and Australia's major trading partners and allies are committed to transitioning their economies to a zero-carbon future via a variety of measures, from sector-based targets to more focused policies such as the UK's ban on the sale of internal combustion engine (ICE) vehicles by 2030. Economy-wide emissions reduction targets, such as the United States' commitment to a 50% reduction below 2005 levels by 2030, and longer-term goals such as the 124 nations that have committed to net-zero by 2050 (China by 2060), are now widely established with profound implications for investment and trade.

The likely costs of failing to decarbonise are becoming increasingly apparent. There are now expectations that developed economies will begin to adopt carbon tariffs on imported goods. The EU's proposed Carbon Border Adjustment Mechanism (CBAM), which will affect EU-based businesses importing carbon-intensive products such as cement, iron, steel, aluminium, and fertiliser, is one example of possible carbon tariffs. Canada and Japan are actively considering similar measures.<sup>8</sup>

Beyond the risk of tariffs on carbon-intensive products, investors and consumers the world over are looking to innovative zero-carbon technologies and products in what is likely to be the most significant structural shift in the global economy since the development of the internet in the 1990s. The Australian Treasurer Josh Frydenberg recently highlighted the economic risks of 'not transitioning in line with the rest of the world', including the real prospect of higher domestic interest rates if foreign investors shun Australian government and corporate bonds due to a lack of climate action.<sup>9</sup>

Tasmania's renewable energy assets and world-leading emissions profile stand us in good stead to capitalise upon the development of niche zero-emissions technology, infrastructure, and processes both to grow our economy and make a meaningful contribution to decarbonisation in other parts of the Australian economy. Modelling commissioned by the Tasmanian Government has found that a sectoral emissions reduction strategy would deliver modest economic benefits across all sectors of the Tasmanian economy and increase real Gross State Product (GSP) by 0.19% by 2030 and 0.92% by 2050.<sup>10</sup>

*Tasmania effectively has a choice: we can embrace ambitious emissions reduction or risk being left behind and pay the price*

Growing awareness of climate impacts, combined with the inevitability of a transition to low- or zero-carbon technologies, is having a profound impact on business strategy and investment decisions around the world. Increasingly the private sector response to climate change has been more significant and strategic than the policy response of many national governments, in part because major companies and investors are more focused on the longer-term impacts and opportunities associated with climate change. Recently the Business Council of Australia, with the support of 127 member companies, argued that a 46% to 50% emissions reduction target by 2030 (relative to 2005) was both ambitious and necessary to send clear investment signals to industry.<sup>11</sup>

Leading Tasmanian businesses are already responding to changing market conditions and opportunities. For example, Elphinstone recently announced that it will be diversifying into the development and production

of electric mining vehicles given that demand for diesel-powered vehicles in key international markets is expected to decline significantly in coming years.<sup>12</sup> In terms of investor-driven change, the world's largest fund managers now acknowledge that climate change and our response to it are transforming investment decisions and that the most profitable firms in the next generation will be those who lead in the transition to a low-carbon future.<sup>13</sup>

As with any significant socio-economic transformation, it will be important to promote a just transition in which decision making is inclusive and impacts on communities, existing businesses, workers, and the environment are minimised.<sup>14</sup>

*Decarbonisation is central to Australia's economy meeting the challenges of a rapidly changing world*

## 42 2 CLIMATE ACTION AND THE TASMANIAN BRAND OPPORTUNITY

Building a reputation as an innovative, sustainable, 'climate-positive' state will greatly enhance Tasmania's 'place brand' - an authentic and widely held vision of our core values and aspirations that can be used to build a more prosperous, inclusive, and sustainable community. Building a community-wide vision for Tasmania's long-term climate ambitions will also deliver significant social, economic, and lifestyle benefits to all Tasmanians. The challenge is to create a connection between the high-level policy objectives and commercial and social imperatives central to Tasmania's *Climate Action Plan* and the day-to-day concerns of members of the Tasmanian community.

Establishing an authentic climate-positive brand can be a powerful marketing tool, potentially delivering significant economic and social benefits. Tasmania already has an international reputation for its natural environment and cultural experiences, as well as its enviable lifestyle – a reputation which, in recent years, has underpinned our strong tourism and export performance and migration-led population growth. The *Climate Action Plan* and establishing Tasmania as a climate-positive economy have the potential to build on this existing brand and enhance Tasmania's reputation as a:

- Place to visit and to live, whether for sustainable, carbon-neutral tourism, education, or for longer-term migration
- Producer and supplier of sustainable, low-carbon products
- Place to invest and innovate in renewable energy and low-emissions technologies, systems, and products.

Achieving a credible and effective brand as a leading climate-positive state requires more than marketing and formal recognition and certification; it demands deep engagement from across the Tasmanian community and commitment to changing a wide range of practices over time.



## Part 5:

# The 2021 Independent Review of the Climate Change (State Action) Act 2008 (the Independent Review)

The Tasmanian Government is required to commission an independent review of Tasmania's *Climate Change (State Action) Act 2008* every four years. The most recent review was undertaken by Jacobs Consulting and released in August 2021.

The *Independent Review* involved consultation with representatives from business, research, and environmental organisations as well as the Tasmanian public. Over 200 individuals were directly consulted, and 54 submissions were received in response to the *Independent Review's Discussion Paper*.

## 5.1 THE RECOMMENDATIONS OF THE INDEPENDENT REVIEW

The *Independent Review* draws on and aligns with the analysis presented in the University of Tasmania's submission to the review process and made the following seven recommendations relating to the *Climate Change Act* and the associated *Climate Action Plan*.

Independent Review recommendations	Further considerations
<p><b>1. Net zero emissions:</b> Amend the Act to legislate net emissions (gross emissions less any carbon removals) are not to exceed net-zero beyond 31 December 2030.</p>	<p>The <i>Independent Review</i> concluded that the current net-zero by 2050 target is not sufficiently ambitious and has not produced sufficient climate action.</p> <p>The Review considered three targets:</p> <ul style="list-style-type: none"> <li>• net-zero from 2021</li> <li>• net-zero from 2030</li> <li>• Maintaining the status quo – leaving it at net-zero by 2050</li> </ul> <p>The Review recommends adopting a legislated commitment to achieving a net-zero target by 2030 and maintaining a 'below-zero' profile thereafter. This target is considered to be a strong incentive to explore low-carbon opportunities and consistent with Tasmania's brand.</p>
<p><b>2. Consolidation of the Objects of the Act:</b> Simplify the Act to replace the Act's 10 objects with the following four priorities:</p> <ul style="list-style-type: none"> <li>• Set a target to reduce greenhouse gas emissions</li> <li>• Monitor, evaluate and report on progress made in relation to the target</li> <li>• Respond and adapt to the impacts and projected impacts of climate change</li> <li>• Complement national and international climate change initiatives.</li> </ul>	<p>The <i>Independent Review</i> advises that this restructuring and simplification of the objects of the Act will provide clear direction, support a coordinated approach, and ensure accountability.</p>
<p><b>3. Principles in the Act:</b> Amend the Act to include a set of principles to guide climate action. The Review identified the following principles: Sustainable development and social equity; Transparency and reporting; Science-based approach; Integrated decision making; Risk management; Community engagement; and Complementarity with national and international climate change developments.</p>	<p>The UTAS <i>Blueprint</i> argued for the inclusion of similar principles (see 3.2 of the <i>Blueprint</i> and Part 6 below).</p>

<p><b>4. Whole of Government approach:</b> Amend the Act to include consideration of climate change in the development of relevant government policies, planning, and strategies.</p>	<p>While the Review noted that stakeholders ‘comprehensively’ expressed the need for government to consider climate change in all decision-making, it considered that this was neither feasible nor conducive to effective climate action. ‘Mainstreaming’ climate change considerations is a key aspect of the UTAS climate-positive strategy – see Part 8 below.</p>
<p><b>5. Climate Action Plan a legislative requirement:</b> Amend the Act to make the development of a <i>Climate Action Plan</i> (CAP) a statutory requirement. The CAP should be developed on a 5-yearly basis and take into account the legislated emissions target, key objectives and targets of the latest available Decarbonisation and Resilience Plans, the revised objects and principles in the Act and the latest available State-wide climate change risk assessment.</p>	<p>The Review advises that such a requirement will provide a consolidated approach to climate action, providing visibility and confidence to Tasmanians.</p>
<p><b>6. Climate change risk assessment:</b> Amend the Act to require a 5-yearly state-wide risk assessment, incorporating the latest and best climate science and consideration of the economic, social, and environmental implications of climate change.</p>	<p>The Review notes that this risk assessment can then be responded to with the <i>Climate Action Plan</i>.</p>
<p><b>7. Sector-based decarbonisation and resilience plans:</b> Amend the Act to include the completion of sector-based Decarbonisation and Resilience Plans.</p>	<p>The Review does not prescribe specific emissions reduction targets for the proposed sectoral decarbonisation plans. However, meaningful emissions reduction will be required in order to meet the overarching goal of maintaining (or going below) net-zero emissions in 2030, as recommended in the Review.</p> <p>Establishing formal sectoral targets (or at least a target for gross emissions before LULUCF<sup>16</sup> removals) is a critical mechanism to inform the scale and focus of emissions abatement efforts necessary to maintain a climate-positive status. Part 6 of the <i>Discussion Paper</i> outlines the scale of industry-level mitigation required for Tasmania to maintain net-zero status through to 2030, based on independent modelling prepared for the Tasmanian Government. Ambitious sectoral emissions reduction targets accompanied by decarbonisation plans will help ensure that Tasmanian industries are well positioned to capitalise on the growing demand for zero-emissions technologies and products.</p>

Table 2: The Independent Review recommendations



## 5.2 2 THE TASMANIAN GOVERNMENT'S RESPONSE TO THE INDEPENDENT REVIEW

On 13 October 2021 the Tasmanian Government published its response to the *Independent Review* and released a draft of the next proposed *Climate Change Act*. The headline commitment to be legislated in the new Act is to achieve net-zero carbon emissions by 2030.

The Tasmanian Government supported the seven key recommendations made by the Review either in whole or in principle.

This response and the associated draft Act incorporates many of the elements and recommendations from the University of Tasmania's April 2021 submission (the *Blueprint*) to the Review process.

One key point of difference relates to the benefits of identifying and legislating a specific emissions reduction target for Tasmania (excluding land use) designed to ensure Tasmania can maintain its current net-negative emissions profile to 2030 and beyond. These issues and options for sectoral targets are analysed in greater detail in Part 6.

The Government's draft *Climate Change Act* makes a clear commitment to maintaining Tasmania's world-leading emissions profile into the future while acknowledging that this will require significant emissions cuts across the Tasmanian economy to 2030 and beyond. The Act also provides the foundations for a systematic approach to climate action in Tasmania. While this framework represents a first step to achieving a sustainable and prosperous climate-positive Tasmania, an ongoing commitment from the Tasmanian Government and the wider community is required.

Independent Review recommendations	Tasmanian Government response
1. Amend the Act to legislate an emissions reduction target of net-zero emissions from 2030	Support
2. Amend the Act to consolidate the existing objects of the Act around five themes	Support
3. Amend the Act to include a set of principles to guide climate action	Support in principle
4. Amend the Act to include the consideration of climate change in the development of relevant government policies, plans and strategies	Support in principle
5. Amend the Act to make the development of a Climate Action Plan a statutory requirement	Support
6. Amend the Act to require a five-yearly state-wide climate risk assessment to be completed	Support
7. Amend the Act to include the completion of sector-based Decarbonisation (emissions reduction) and Resilience Plans	Support

*Table 3: The Independent Review recommendations and the Tasmanian Government's responses*

## Part 6.

### A vision for a climate-positive Tasmania

Tasmania has an opportunity to provide leadership on climate action, an opportunity that the Tasmanian community is increasingly determined to embrace.

*The Independent Review* (summarised above), the University of Tasmania's *Climate Blueprint* and submissions from a wide range of actors and individuals have outlined the specific climate challenges we face as a community and how they might be addressed

These challenges are significant, but by developing a comprehensive and ambitious 'climate-positive' strategy, Tasmania can provide leadership on climate action while building a resilient, competitive, just and prosperous low-carbon economy

*Tasmania has one of the lowest emissions profiles in the world*

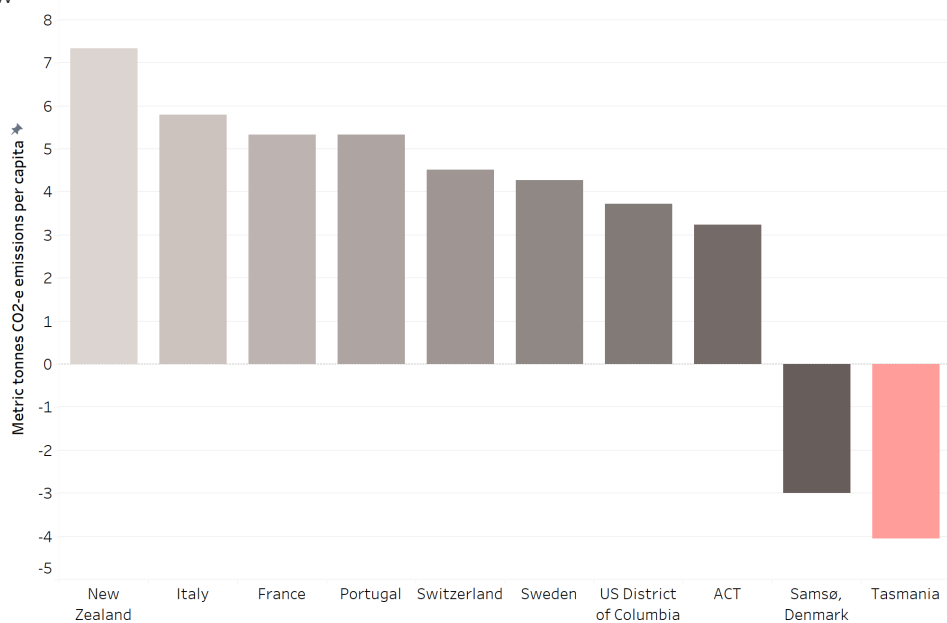


Figure 5: Tasmania's and other select jurisdictions' per capita net emissions profiles (source: UTAS Blueprint)

### The three key pillars of the UTAS climate-positive agenda for Tasmania

- |  |   |
|--|---|
| <p><b>1. Maintaining a 'net-negative' emissions profile</b></p>                    | <p>Tasmania needs to develop strategies and clear medium-term targets to maintain its net-negative emissions profile over time. This will require increasing renewable electricity generation, careful management of our land and forests, and a clear commitment to reduce real, gross emissions across all sectors of the Tasmanian economy.</p>  |
| <p><b>2. Low-emissions innovation and sectoral emission reduction pathways</b></p> | <p>Investment and innovation in low-carbon technologies, industries, infrastructure, and practices will ensure that Tasmania can contribute to and capture economic dividends from the rapid decarbonisation of the global economy over the coming decades. The development of sector-specific emissions reduction plans, with clear reporting, will provide certainty for planning and will demonstrate this state's commitment to authentic climate action.</p> |
| <p><b>3. Comprehensive risk assessment and adaptation planning</b></p>             | <p>The development and implementation of sectoral adaptation plans, underpinned by evidence-based climate modelling, risk assessment and ongoing collaboration with communities, will build resilience and capacity across Tasmania to adapt to the impacts of unavoidable climate change while supporting those who are most vulnerable to climate change.</p>   |

Table 3: The key pillars of a climate-positive Tasmania

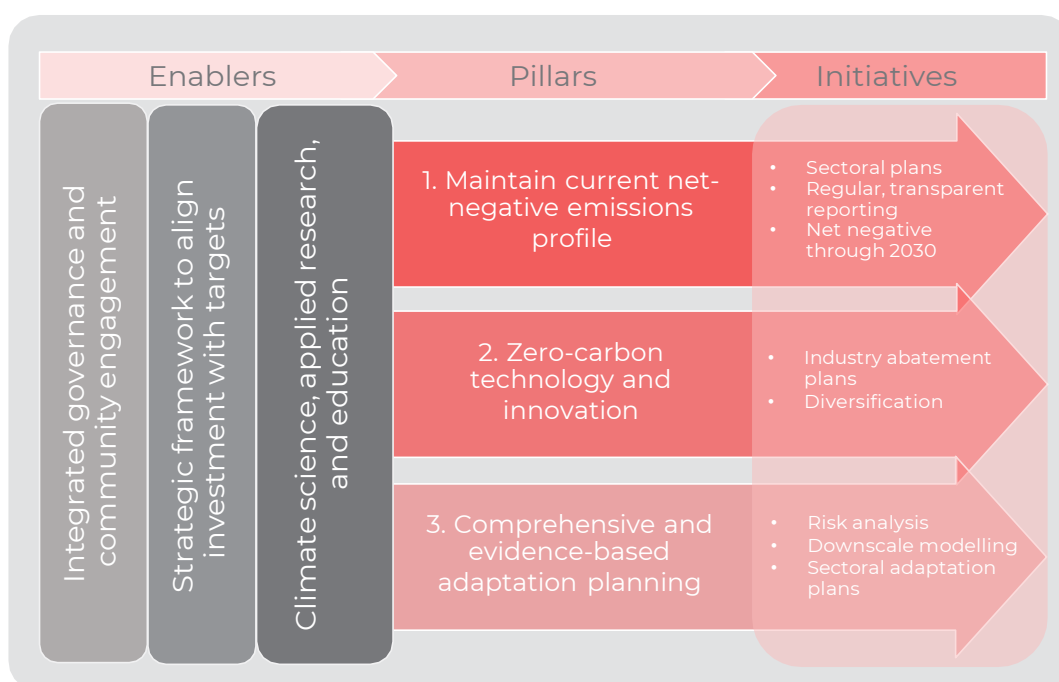


Figure 6: The elements of a climate-positive strategy

Beyond reducing emissions, protecting communities from the impacts of unavoidable climate change and contributing to new low-carbon industries and practices, a climate-positive strategy will help Tasmania build its reputation as an authentic global exemplar of climate action and sustainability.

### Principles of a climate-positive strategy

Comprehensive climate change strategies should be informed by key principles to help guide the design and implementation of specific provisions. For instance, the Victorian *Climate Change Act 2017* requires Ministers to consider the principles of that Act (as well as the science of climate change and policy objectives), when preparing mitigation or adaptation plans. Reflecting international best practice and the recommendations of the *Independent Review*, consideration should be given to including the guiding principles in the next Tasmanian *Climate Change Act*. The following principles were proposed in the *UTAS Blueprint*:

1. **No harm** – Where possible, new policies should not increase emissions or exposure to climate impacts and at the same time should promote innovation and economic competitiveness.
2. **Equity** – The promotion of intra- and inter-generational and distributive equity should be paramount, with all care taken to minimise financial burdens associated with emissions reduction on low-income households and communities. This commitment to equity in climate action is referred to as ‘climate justice’ or a ‘just transition’.
3. **Leadership and collaboration** – Tasmania should lead on climate policy and action both through providing a climate-positive example and by contributing to technical and policy innovation that showcases how to reduce emissions across Australia and beyond.
4. **Accountability** – The outcomes of decisions and actions should be measurable and reported. All significant emissions should be recorded in the correct category of the State and Territory Greenhouse Gas Inventories. While commercial confidentiality in emissions reporting is sometimes necessary, it ought to be balanced against the public’s right to know about the environmental impacts of industry.
5. **Integrity in carbon accounting** – The use of offsets and credits to reduce emissions is by no means a permanent or sustainable long-term strategy for dealing with climate change, but will be necessary as economies undergo the difficult process of decarbonisation. However, in order to be confident that offsets are genuinely removing CO<sub>2</sub>-e from the atmosphere, they must be employed according to the principles of additionality and permanency. In other words, offsets should be removing CO<sub>2</sub>-e that would not otherwise have been removed, and they should sequester that CO<sub>2</sub>-e permanently.

The Tasmanian Government is required to report its on-island emissions according to the United Nations Framework Convention on Climate Change (UNFCCC) framework embodied in the State and Territory Greenhouse Gas Inventories (STGGI) Full Carbon Accounting Method (FullCAM). This does not mean, however, that the Tasmanian government could not also calculate and report scope two and three emissions resulting from interstate and international trade and electricity transmission independently of the inventories. Increasingly Tasmanian businesses, and exporters in particular, will have to report on their scope 2 emissions under National Greenhouse and Energy (NGER) standards.

## Part 7.

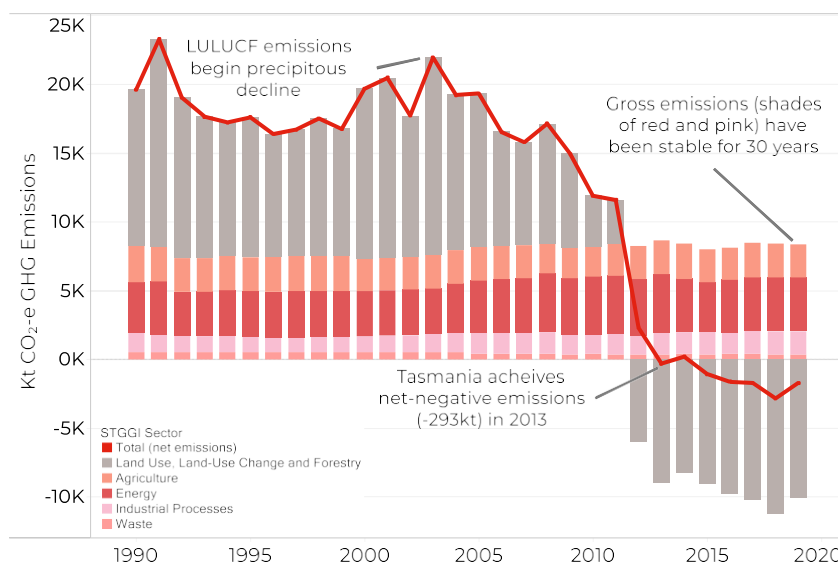
### Realising a climate-positive Tasmania

The first pillar of a climate-positive strategy for Tasmania (Part 6) is maintaining Tasmania’s current net-negative emissions profile based on National Greenhouse Accounts through to 2030 and beyond. In this way, Tasmania can credibly claim as a state to be reducing its emissions over time and making a valuable contribution to addressing climate change by continuing to remove atmospheric CO<sub>2</sub>-e from the atmosphere.

#### 7.1 THE CHALLENGE OF MAINTAINING TASMANIA’S NET-NEGATIVE EMISSIONS PROFILE

Tasmania’s net-negative emissions profile (-1683 kt CO<sub>2</sub>-e in 2019) and substantial renewable electricity assets provide a strong foundation upon which to build a reputation as a leader on climate action. The state’s net emissions per capita rank among the lowest in the developed world (Figure 5 above), and Tasmania can currently claim to be Australia’s only net-negative emissions jurisdiction. Most jurisdictions globally are grappling with the challenge of decarbonising electricity generation; Tasmania, with its renewable energy, can focus on increasing renewable generation over time to decarbonise the wider economy.

However, this net-negative status is heavily dependent on land-use offsets, or what are technically defined as negative ‘land use, land-use change and forestry’ (LULUCF) emissions, associated with the increase in plantation forestry and decline in harvesting since 2005.<sup>16</sup> While storing carbon in forests and soils is an important strategy for carbon dioxide removals (see Table 6 below), maintaining Tasmania’s current ‘climate-positive’ emissions profile over the longer term will require a stronger commitment to reducing gross emissions in other sectors such as transport, agriculture and heavy industry.



*Maintaining Tasmania’s current emissions profile will require a reduction in emissions from transport, agriculture, stationary energy and industrial processes*

**Figure 7: Tasmania’s Greenhouse Gas emissions by sector, 1990-2019.**  
(source: Department of Industry, Science, Energy and Resources, State and Territory Greenhouse Gas Inventories)

### The role of land-use change offsets in Tasmania's future emissions profile

The *Emissions Pathway Review* highlighted how future emissions reduction from land-use change in Tasmania is uncertain and likely to decline over time, posing considerable risk to the state's net-negative profile over the longer term.<sup>17</sup> In essence, the rate at which CO<sub>2</sub>-e can be removed from the atmosphere and stored in forests and soil in Tasmania is likely to decrease and must be balanced by reducing emissions in other sectors (see Figure 8 below). *The Independent Review* argues that land use credits are vulnerable to both changing forestry practices and markets and increasing bushfire risk. Bushfires pose a particular risk to carbon sequestration in Tasmania's forest estate because as 'climate change leads to increased bushfire intensity and frequency, particularly in carbon-dense tall, wet eucalypt forests, Tasmania's carbon stocks could be eroded and emissions in the LULUCF sector could rise'.<sup>18</sup>

Reflecting the uncertainty about the rate at which land-use offsets will decline in Tasmania, the *Independent Review* prepared three scenarios and analysed their implications for Tasmania's future emissions profile. The medium reference scenario is the most likely and reflects current land-use policies combined with a growing bushfire risk. However, given the importance of maintaining or improving Tasmania's current emissions profile, combined with the real possibility that land-use offsets may decline more quickly than anticipated, a more aggressive approach to emissions reduction should be considered, which would maintain Tasmania's net-negative emissions profile under the high emissions scenario presented in the *Independent Review*.

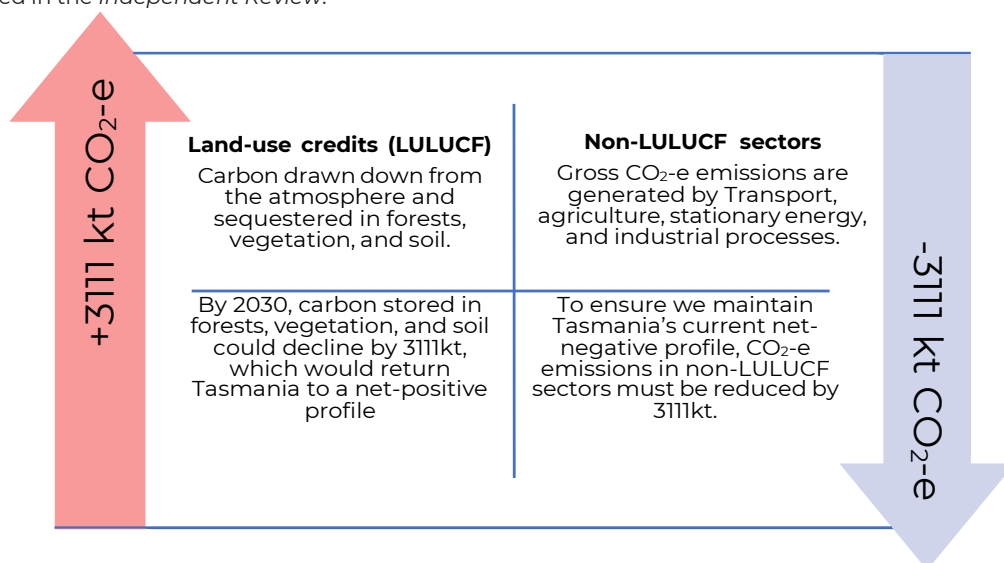
In order to sustain our current net-negative profile, Tasmania's future climate strategy must commit to reducing gross CO<sub>2</sub>-e emissions across the entire economy while also managing land and forests to maximise land use-based carbon storage.

### The role of sectoral targets

Given Tasmania's important ambition of providing global leadership on climate action and commitment to a net-zero target by 2030, Tasmania's next *Climate Change Act* should include both legislated targets and practical actions that reflect this objective.

In addition to making a clear commitment to maintaining a net-zero emissions target through to 2030 and beyond, consideration should be given to establishing a legislated target for reducing gross emissions across key industries and sectors.

There is growing recognition that medium-term sectoral targets can provide a clear signal to business and investors. The Victorian Government argues that such targets drive policy to reduce emissions through energy efficiency, renewable energy, industry policy and urban and public transport planning to name but a few areas.<sup>19</sup> Similarly, the Business Council of Australia has argued for an ambitious 2030 emissions reduction target of 46 to 50 per cent (relative to 2005) with an abatement cost approach being used to determine specific sectoral targets.<sup>20</sup>



*Figure 8: Maintaining Tasmania's negative emissions profile: To counteract declining land-use credits we must reduce emissions across the economy<sup>20</sup> (source: Department of Industry, Science, Energy and Resources, State and Territory Greenhouse Gas Inventories)*

A clear commitment to reducing gross emissions from transport, agriculture, stationary energy, and industrial processes would help ensure that Tasmania maintains a world-leading net-negative emissions profile as land-use emissions credits decline over time.

Ambitious sectoral targets would also drive decarbonisation and innovation across the economy and provide a foundation for building Tasmania as an innovative and sustainable climate-positive community. There are a number of possible emissions reduction targets Tasmania could adopt (Table 4 below).

### Options for Tasmania's next emissions reduction target

Tasmania rightly aspires to provide global leadership on climate action but there are a number of options when it comes to setting the state's next emissions reduction target.

The UTAS *Blueprint*, as well as other submissions to the Independent Review, highlighted the need to establish ambitious medium-term emissions reduction targets to drive climate action. These submissions also outlined a range of possible targets that should be considered for the next iteration of the *Climate Change Act* and *Climate Action Plan*. Some possible options for legislated targets include:

Target	Notes
1. 50% emissions reduction across gross emitting industries, based on 2005 levels, by 2030.	In line with South Australia's and Victoria's nation-leading 50% sectoral targets and advocated in the UTAS <i>Blueprint</i> . Does not include a specific commitment to achieve and sustain net zero
2. Higher rate of annual emissions reduction in gross emitting sectors relative to other states and territories through to 2030	If achieved, this would support Tasmania's claim to being a leader in climate action in Australia. Can only be assessed retrospectively and does not provide a clear target for planning and to guide investment.
3. Sufficient reduction in gross emissions to remain below net zero through 2030 and beyond, assuming Point Advisory's medium emissions reference case	Essentially the recommendation of the <i>Independent Review</i> . There is a real risk that net emissions may rise above zero as LULUCF offsets decline (i.e., the Point Advisory high emissions scenario). Would allow net emissions to increase by 1683kt pa which is not consistent with world-leading climate action.
4. Reduction in gross emissions sufficient to maintain (if not improve upon) our current -1683 kt net-negative profile under Point Advisory's high emissions scenario	Sets a clear objective of continuing to reduce net emissions as LULUCF offsets decline. Unlike Option 3 it includes a contingency to help maintain a net-zero profile to 2030 and beyond. Would involve clear sectoral targets marginally lower than Option 1.

Table 4: Options for sectoral emissions targets

## What specific sectoral emissions target should Tasmania set?

The risks associated with Tasmania's current reliance on land-use (LULUCF) offsets described above are further exacerbated by the fact that gross emissions in other sectors have been essentially stable since 1990 (see Figure 7 above). Despite some reduction in total emissions from waste and a more recent (post-2010) decline in transport emissions, successive plans and years of climate policy have not reduced the state's gross emissions in other sectors (shown in shades of red and pink in Figure 7). This was highlighted in the *Independent Review*, which found that "emissions from the energy, agriculture, waste, and industrial processes sectors have been more or less stable since 1990".<sup>22</sup> Even despite the state's net-negative status, gross emissions in 2019 were actually slightly higher than in 1990.

Modelling commissioned by the Tasmanian Government, and conducted by Point Advisory for the *Independent Review*, quantifies the likely decline in land-use offsets and the subsequent scale of emissions reduction required across the wider Tasmanian economy over time.<sup>23</sup> As Figure 9 below illustrates, Point Advisory's medium emissions (orange) scenario expects Tasmania to exceed net-zero as early as 2030 before declining in later years even after incorporating its 'best fit' suite of emissions reduction interventions.

In order to be confident of maintaining or improving on Tasmania's current net-negative emissions profile (option 4 in Table 4 above), it will be necessary to commit to reducing gross emissions from other sources sufficient to ensure that Tasmania remains below net-zero under Point Advisory's worst case high emissions scenario. This scenario anticipates a 30 per cent increase in average annual level of impact of bushfires and prescribed burning, and the return of 2% of plantation estates annually to pastures. While the medium emissions scenario is the most likely pathway, given the clear, climate-induced increase in bushfire risk combined with developments in the forestry sector, it would be prudent to base Tasmania's future emissions targets on Point Advisory's high emissions case scenario (red line in Figure 9).

Under the high emissions reference scenario, Tasmania would need to reduce gross emissions in all other emitting sectors by 37% (based on the most recent 2019 data – this would equate to a 38% reduction on Tasmania's 2005 gross emissions) to retain its current level of net-negative emissions (-1683 kt CO<sub>2</sub>-e GHG) through to 2030.



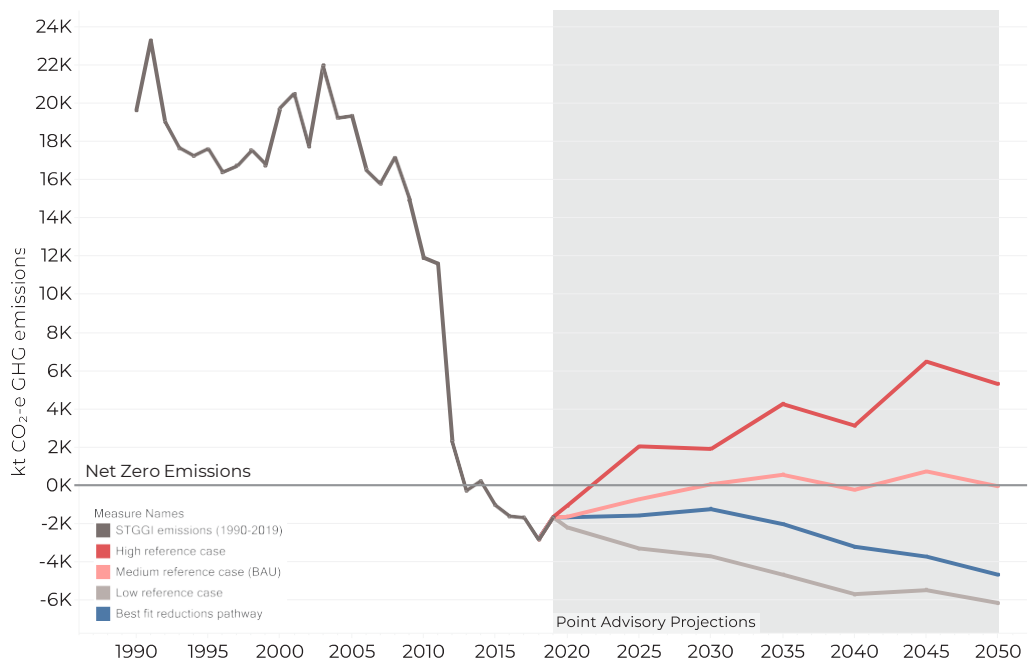


Figure 9: Tasmanian net Co2-e emissions and Point Advisory modelled emissions trajectories, 1990-2050

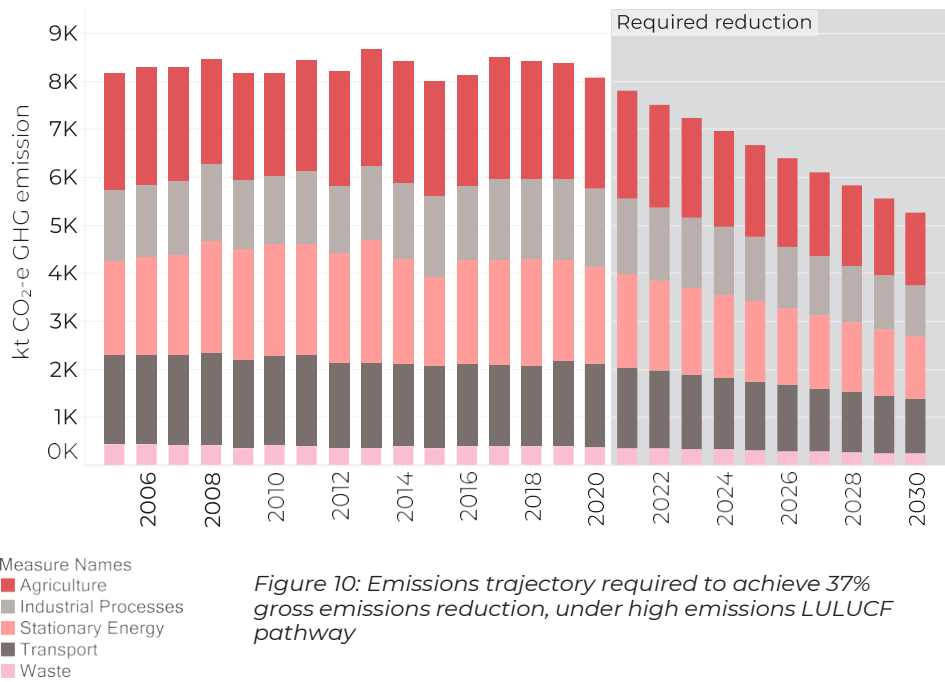


Figure 10: Emissions trajectory required to achieve 37% gross emissions reduction, under high emissions LULUCF pathway

### **The National Electricity Market and its implications for Tasmania's emissions profile**

Estimates of emissions that occur within each state or territory, including from electricity generation, are compiled in state-level greenhouse gas inventories, using an internationally recognised methodology developed under the United Nations Framework Convention on Climate Change (UNFCCC). However, this approach does not include emissions from electricity generated interstate but consumed in Tasmania (although these 'Scope 2' emissions are recorded in the jurisdiction of generation). Other methodologies – such as the National Greenhouse and Energy Reporting (NGER) method – do account in part for energy trading between states and highlight how increasing demand for electricity in Tasmania can affect national emissions in the National Energy Market (NEM).

Tasmania joined the NEM when the Basslink interconnector became operational in 2006 and this has had significant implications for our electricity system over the intervening years. In essence, this has meant Tasmania can sell electricity into the national grid or purchase electricity from it. This also means, however, that the state's renewable electricity is not all consumed on-island and that, at times, the state utilises more carbon-intensive power generated interstate.

The implications of this situation for Tasmania's (and the rest of the country's) emissions profile are complex but some important elements of relevance to the state's next Climate Action Plan include that:

- As long as Tasmania imports electricity from the NEM, a percentage of emissions from interstate electricity generation are, at least under the NGER accounting framework, attributable to Tasmanian businesses and consumers (but are not attributed to Tasmania in the National Inventory).
- In the absence of additional renewable generation, the marginal emissions associated with new electricity demand in Tasmania (e.g., from increased uptake of electric vehicles or hydrogen production) would in reality be higher than currently reported. While these emissions are not attributed to Tasmania in the STGGI, they do form part of Australia's national emissions profile.

States and Territories should continue to report emissions in accordance with the UNFCCC guidelines, but should remain mindful of the fact that it does not fully account for the complexities of states' and territories' integration in the NEM.

In practice, given that Tasmania's electricity system is connected to the NEM, it will be necessary to add new renewable generation – in other words, generation that would not otherwise have been added – to meet new electricity demand resulting from the decarbonisation of the Tasmanian economy without increasing national emissions. Owing to the storage capacity and flexibility of Tasmania's hydroelectric system, the emissions benefit of doing so will be more easily realised than elsewhere, both now and into the future. This goal of increasing renewable electricity generation in Tasmania over coming decades is a key objective of the *Tasmanian Renewable Energy Action Plan*.

## Pathways to decarbonisation: Options for Tasmania

To be confident of maintaining Tasmania's net-zero emissions profile over the longer term, it will be necessary to reduce gross emissions by 37% by 2030 across each of Tasmania's four major gross emitting sectors: agriculture, industrial processes, energy, and transport.<sup>25</sup> All industry sectors must make a significant contribution to emissions reduction over time. As the Grattan Institute points out, exempting any sector merely pushes more of the burden onto others.<sup>26</sup> However, as is discussed in greater detail below, it is also important to acknowledge that some industries may be able to cut emissions more quickly, at lower cost and with less support than others, due to the availability of technology or through other viable strategies.

There are three broad approaches or pathways for maintaining a net-negative profile at Tasmania's current emissions level (-1683kt CO<sub>2</sub>-e):

1. a headline net target that relies upon land-use change to do the heavy lifting and the extent of emissions reduction in other sectors is unclear
2. a set of uniform sectoral gross abatement targets, or
3. a suite of weighted sectoral targets reflecting different industries' abatement costs.

The first option involves focusing on a headline net-zero target by 2030. While this would be the most ambitious target in Australia, in the absence of complementary sectoral targets it would lead to an unacceptably high level of reliance on uncertain land-use offsets, creating few explicit incentives to decarbonise other sectors.

The emissions pathway modelling undertaken by Point Advisory for the *Independent Review* presents three credible scenarios: a medium emissions 'reference case', a low emissions scenario, and a high emissions scenario. The variable responsible for the greater proportion of the difference between these three possible pathways is the volume of CO<sub>2</sub>-e drawn down and sequestered in forests and soils. The assumptions underlying each scenario can be found in the *Pathway Review* starting on page 31.

The seriousness of the threat posed by climate change, as discussed in Parts 2 and 3, demands a cautious approach commensurate to the enormous risks and irreversible damage that are potentially at stake. For this reason, and taking into account the high level of uncertainty around LULUCF removals over the long term, we argue that proposed emissions targets should be high enough to maintain Tasmania's current net-negative emissions status even under a high LULUCF emissions scenario. Options 2 and 3 below reflect this cautious approach.

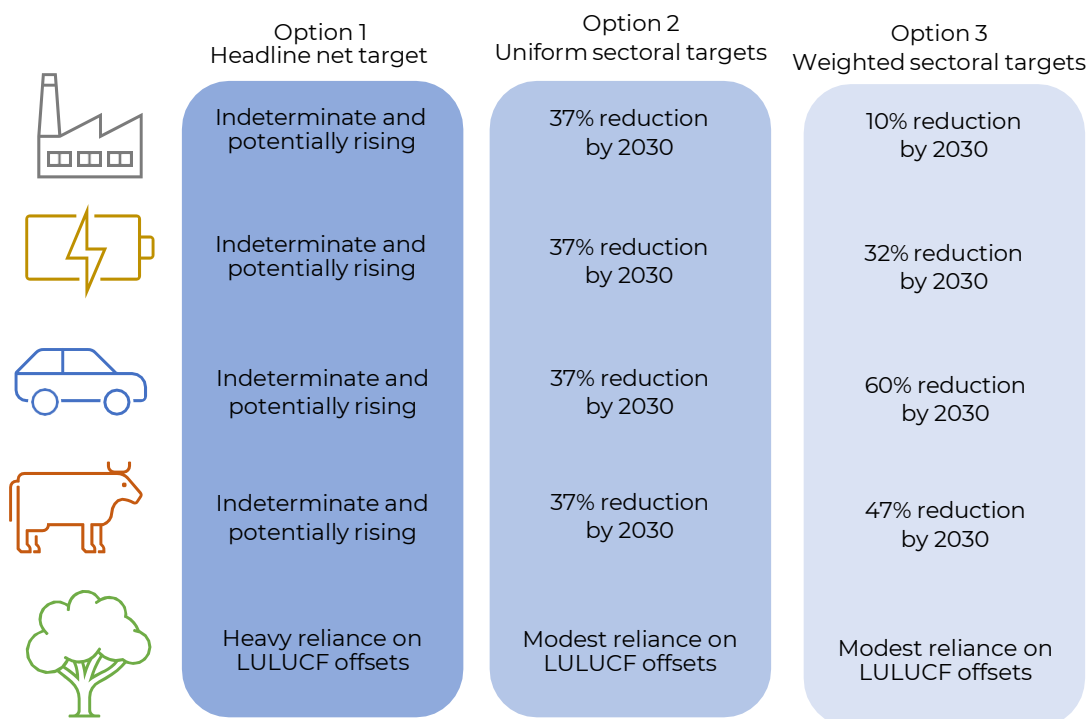


Figure 11: sectoral reductions required under each target option

Options two and three are based on a legislated target of reducing gross emissions across Tasmanian industry sectors by 37% by 2030. This target is based on analysis presented above and is designed to maintain Tasmania's current net-negative emissions profile as land-use offsets decline over time (Point Advisory high emissions scenario).

Option two outlines a pathway whereby all major gross emitting sectors make an equal contribution to emissions reduction. Option three, which is based on sectoral emissions abatement analysis conducted by Point Advisory for the Tasmanian Government, considers the relative costs and opportunities for different sectors of the Tasmanian economy to reduce emissions. This analysis suggests that the transport and agricultural sectors should shoulder a relatively greater burden of emissions reduction than the stationary energy and industrial processes sectors over the next 10 years due to relatively lower cost of abatement. Industrial processes and stationary energy will make a greater contribution to emissions reduction as new technologies, such as green hydrogen, are widely deployed after 2030.

Rather than prescribe detailed sector-specific targets, an approach recommended by *the Independent Review* and adopted in the Tasmanian Government's response, is a commitment to the development of collaborative sectoral emissions reduction plans whereby government, industry and communities come together to identify, develop, and apply new technologies, processes, and practices to deliver emissions reduction while ensuring accountability in relation to who is responsible for reducing emissions over time.

Given that the global energy system and economy remain largely dependent on fossil fuels, the task of decarbonisation is complex and requires commitment and collaboration. There is no single best approach to reducing sector-level emissions but rather a range of different pathways shaped by local circumstances and the development and deployment of new technologies together with changing behaviours and informed consumer preferences. As noted above, the economic cost of emissions abatement varies across different industries and processes, and emissions reduction plans could initially focus on lowest cost abatement options. The *Emissions Pathway Review* (EPR) prepared by Point Advisory for the Tasmanian Government (see Table 5 below) sets out priority abatement opportunities for Tasmanian sectors.<sup>27</sup>

The challenge of decarbonising the Tasmanian economy must be embraced in a pragmatic, equitable and determined way. The only real choice is whether we approach the decarbonisation challenge proactively or whether we are dragged reluctantly towards an inevitable low-emissions future. Market, regulatory, and community pressures will ensure that decarbonisation will happen either way. As noted above and in *the Independent Review*, businesses and industry need to transition to avoid a loss of investment, reduced demand for carbon-intensive products or services and the growing risk of stranded assets. A clear commitment to a climate-positive Tasmania will secure co-benefits including increased investment and innovation in Tasmania, employment opportunities in future industries, improved resilience, and a wide range of other social and environmental benefits. Being an early mover will maximise these advantages, while delay could see them evaporate.

*The challenge of decarbonising the Tasmanian economy must be embraced in a pragmatic, equitable and determined way*

	Abatement opportunity	Emissions sector	Advantages, cost savings, and other co-benefits	Abatement estimate (kt CO <sub>2</sub> -e/yr in 2050)
Next 5 years	Increase low emission vehicle uptake	Transport	Capitalise on renewable electricity generation and reduce harmful carbon monoxide emissions	550
	Reduce conversion of forests and private plantations to other uses	LULUCF	Enable increased volume and value of plantation timber harvest, supporting a larger and more sustainable forestry industry	810
	Increase soil carbon sequestration through regenerative agriculture	Agriculture	Generate ACCU revenue for farmers while increasing soil quality and productivity	32
	Electrify domestic heating or replace inefficient wood stoves with pellet fires	Stationary energy	Reduce harmful particulate matter and associated respiratory disease	100
5-10 years	Decarbonise/electrify heavy transport fleet	Transport	Capitalise on renewable electricity generation and reduce harmful carbon monoxide emissions	690
	Reduce methane emissions from ruminating livestock (including via Asparagopsis feed supplements)	Agriculture	Improve productivity by increasing livestock growth rate with no extra feed input	1700
	Drive uptake of bioenergy in high-temperature heating applications	Stationary energy	Generate revenue, both from ACCUs and sale of forest residue biomass that might otherwise simply be burned	370
10-20 years	Low-emissions ferromanganese	Industrial processes	Cost savings associated with use of forest residues/biomass rather than metallurgical coal	390
	Increase uptake of cement substitutes and low-emissions cement production	Industrial processes	Reduced energy input for geopolymer versus Portland cement	19
	Low- or no-carbon aluminium smelting	Industrial processes	Possible future market demand for certified 'green' aluminium	310

Table 5: Priority emissions reduction opportunities for Tasmania identified by Point Advisory

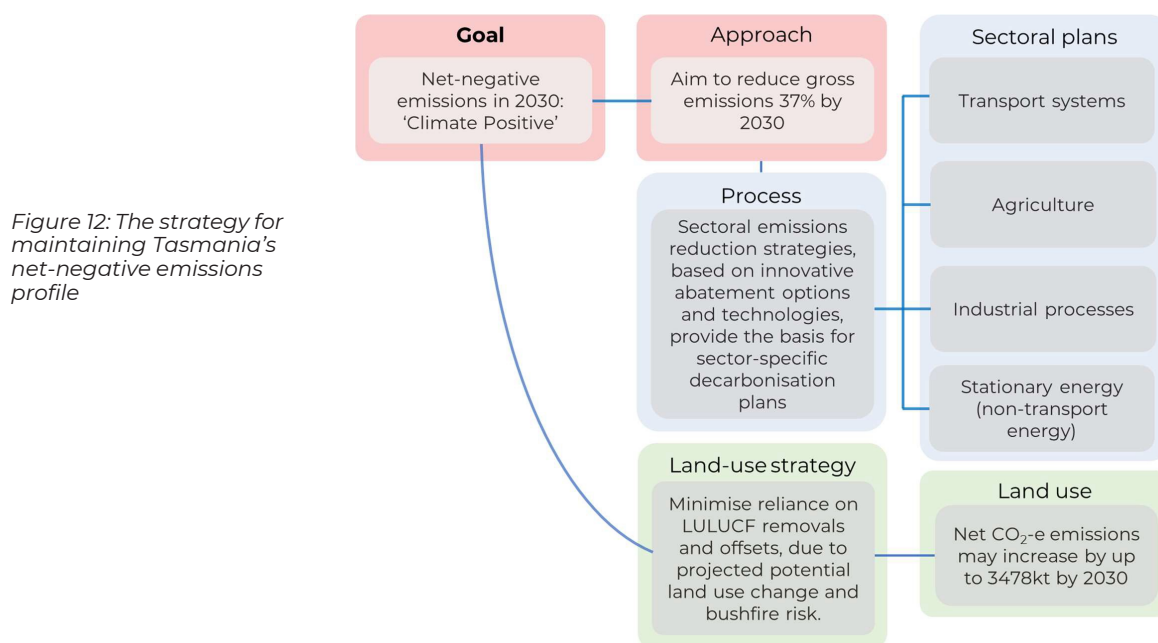


Figure 12: The strategy for maintaining Tasmania's net-negative emissions profile

## 7.2 2 SECTORAL PRIORITIES FOR EMISSIONS REDUCTION ACROSS THE TASMANIAN ECONOMY

The most efficient way to support economy-wide emissions reduction would be the introduction of a nationally consistent price on carbon with targeted support for research and innovation. However, due to the absence of a carbon price it is necessary to focus on state-level, industry-specific emissions reduction plans.<sup>28</sup> Ambitious sector-level decarbonisation targets and plans will maximise our contribution to reducing atmospheric CO<sub>2</sub>-e and support the transition of the Tasmanian economy towards a sustainable post-carbon future. As noted above, it will be necessary to ensure that the increased demand for electricity in Tasmania associated with this transition is met with increased new renewable generation to ensure that Tasmanian emissions are not transferred to other states in the NEM.

This section of the *Discussion Paper* outlines issues, options, and questions for the development of Tasmania-specific decarbonisation plans in the key emitting sectors of transport, agriculture, non-transport energy and heavy industry.

### 7.2.1 Transport

Tasmania's transport sector is almost entirely dependent on imported fossil fuels and accounts for approximately 19% of total state emissions, having declined only marginally since peaking in 2011. Tasmanian transport emissions are determined by two factors:

1. Tasmania's high level of dependence on private vehicles for transport
2. The carbon intensity of available passenger and heavy transport options

Tasmania's renewable electricity system, combined with the rapid development of battery and hydrogen fuel-cell powered vehicles (henceforth zero emissions vehicles - ZEVs), provides an opportunity for Tasmania to lead the transition to a low- or zero-emissions transport system, and support a climate-positive target in 2030.<sup>29</sup> Electrifying transport in Tasmania and nationally would also improve Australia's energy security and balance of trade by reducing our dependence on imported fossil fuels. The *Emissions Pathway Review* identified increasing the uptake of low-emissions vehicles as the largest short-term abatement opportunity, which could reduce emissions by 550 kt pa by 2050 (see Table 5 above). Most submissions to the reviews of the Tasmanian *Climate Change Act* and *Climate Action Plan* also highlighted this opportunity.





### Aims of a climate-positive transport strategy

Given that reducing transport-related emissions has been identified as a priority short-term abatement opportunity (see Table 6 above), Tasmania's next *Climate Action Plan* should seek to achieve an emissions reduction target of at least 37% (and up to 60% under a weighted sectoral target approach) by 2030.

This will require a combination of strategies including:

1. Ensuring Tasmania exceeds AEMO's most optimistic ZEV uptake scenario (described below - see Figure 14). This would contribute 32% to emissions reduction required
2. Reducing private vehicle use
3. Policies to progressively reduce the carbon intensity of heavy vehicles

4. Strategies to reduce emissions from marine transport, which accounts for 7% of Tasmania's transport emissions
5. Ensuring that the electrification of the state's transport system is achieved with the addition of increased on-island renewable electricity generation.

Modelling conducted for the University's *Blueprint* and updated for this *Discussion Paper* estimated the rate of ZEV uptake and decreased private vehicle use required to reduce Tasmania's emissions from light vehicles by 37% (the target outlined above) by 2030 (Figure 14 and Table 6 below). In practice, there are multiple pathways to reducing transport-based emissions – the higher the level of ZEV uptake the greater the transport-related emissions savings.

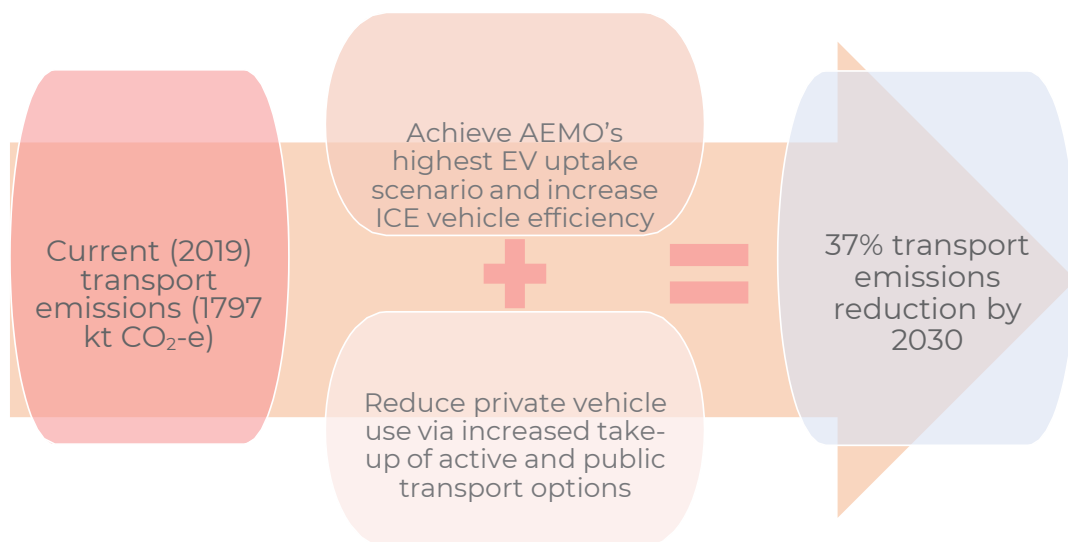


Figure 13: A pathway to a 37% reduction in transport emissions by 2030

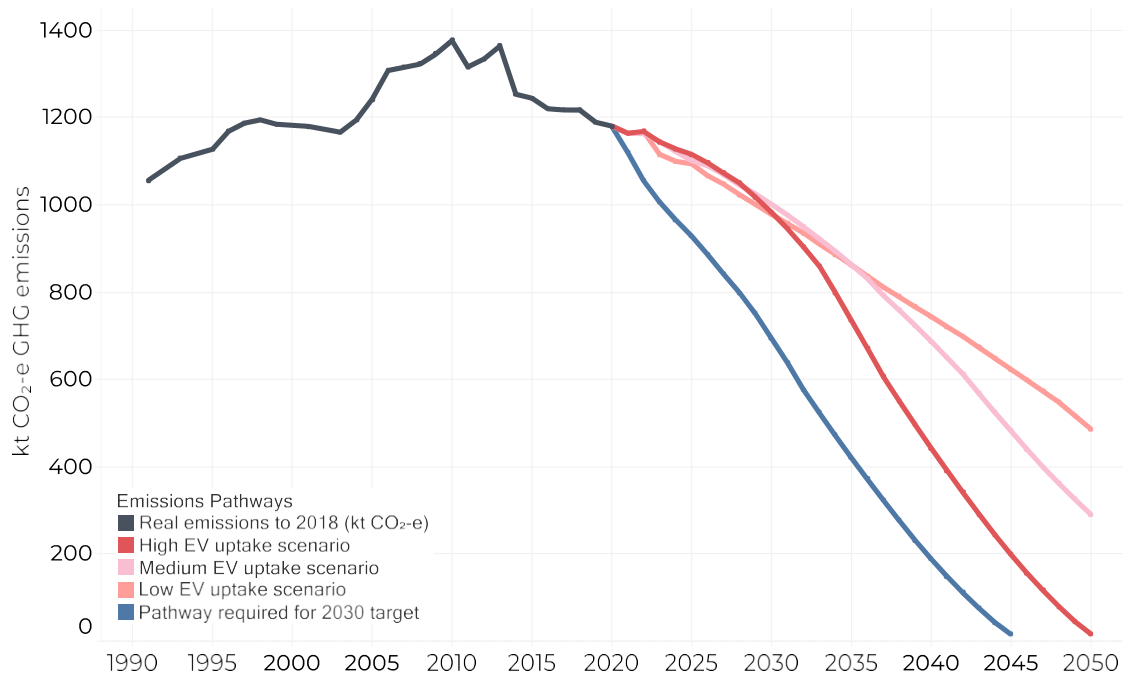


Figure 14: Transport emissions trajectory under three different EV uptake scenarios  
(Source: Energeia/AEMO; calculations authors' own)

	2020	2025	2030	2035	2040	2050
Sales	644	3121	12069	30477	37398	54931
Market share	0.23%	1.78%	9.36%	28.69%	54.69%	98.08%

Table 6: ZEV annual sales and market share under AEMO high uptake scenario  
(Source: Energeia/AEMO)



### (A) Reducing dependence on private vehicles

A broad range of strategies can be used to reduce the demand for private vehicle use, contributing to a reduction in transport-related emissions while delivering a range of co-benefits. Most importantly, these include improved health and wellbeing, stronger communities, reduced congestion, and more effective long-term demand management for road infrastructure. Because of the time required to phase out the current stock of ICE powered vehicles on Tasmanian roads reducing private vehicle use will be an extremely important element of any strategy to reduce transport emissions over the next decade.

Tasmania has the highest level of private car reliance in Australia, with 90% of homes owning two or more registered vehicles and 84% of Greater Hobart residents taking a private vehicle to work each day (the highest in Australia). This suggests there is significant scope to reduce private vehicle use over time.

The following strategies, drawing on a wide range of research, can reduce dependence on private vehicle use, and should be considered during the development of Tasmania's transport decarbonisation plan:

- Prioritise technologies and behavioural solutions that facilitate reduced travel and commuting, such as remote work (working from home) where possible.
- Improve the availability/use of public or active transport and ridesharing options.
- Rethink planning and urban design strategies to reduce Tasmania's high dependence on private cars for access to employment and services.
- Promote low-cost transport options such as e-bikes and car pooling to reduce individual private car use.
- Address underlying cultural and social factors that shape preferences for private vehicle use over other transport options.

### (B) Promoting the uptake of zero-emissions passenger vehicles

Private cars, buses, trucks, ferries, and other transport options will continue to play a critically important role in our society and economy. Given the centrality of transport, both private and public, to our daily lives (as well as our emissions profile) replacing internal combustion engine (ICE) vehicles with zero-emissions battery electric vehicles (BEVs) and hydrogen fuel cell options will be critical to decarbonising our transport sector and our economy.

BEV technology is now well established and demand for electric vehicles is growing. Over 10% of new cars sold in Germany are now BEVs, and the UK has recently committed to phasing out the sale of all ICE cars by 2030, suggesting significant change is only just around the corner.

Demand for electric vehicles in Tasmania is strong. For example, a 2018 survey conducted by the Good Car Company, with support from industry partners RACT, TCCO, and TasNetworks, found that "over 81% of survey participants stated they would consider purchasing an EV, 18% of those within the next two years".<sup>30</sup>

While zero-emissions vehicles are becoming widely available and increasingly cost-competitive in Europe, North America, and East Asia, a number of barriers to higher uptake of ZEVs in Australia remain (Table 7)

Promoting the uptake of ZEVs requires coordinated action using a range of policy instruments at the national, state, and local levels.

As with any complex policy issue, decision making around increasing access to ZEVs should be informed by principles such as the following:

1. Subsidies should be equitable and sustainable. Where possible subsidies should be means tested and not disproportionately benefit high income households
2. Subsidies should be phased out once ZEVs reach price parity with ICE-powered vehicles (or subsidies should be transitioned to taxes on high-emissions vehicles)
3. New road user charges should only be phased in once ZEVs reach price parity with ICE-powered vehicles
4. Improve access to and cost of transport for low-income households

Barrier	National strategies	State strategies	Local strategies
Limited vehicle supply and choice	<ul style="list-style-type: none"> <li>National CO2-e targets on new sales</li> </ul>	<ul style="list-style-type: none"> <li>Procurement policies</li> <li>Lobby Commonwealth on CO2-e targets</li> <li>Partner to promote imports</li> </ul>	<ul style="list-style-type: none"> <li>Procurement policies (public and private sector)</li> </ul>
Vehicle costs	<ul style="list-style-type: none"> <li>Luxury car tax</li> <li>Price on carbon</li> <li>Fringe benefits tax</li> <li>Direct subsidies (means tested)</li> </ul>	<ul style="list-style-type: none"> <li>Registration and stamp duty concessions</li> <li>Direct subsidies (means tested)</li> <li>Subsidised loans</li> </ul>	<ul style="list-style-type: none"> <li>Parking concessions</li> </ul>
Infrastructure and range	<ul style="list-style-type: none"> <li>National charging infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Charging infrastructure</li> <li>Home charging and smart grids</li> <li>Increased renewable electricity generation</li> </ul>	<ul style="list-style-type: none"> <li>Charging infrastructure</li> <li>Planning rules</li> </ul>
Awareness and education	<ul style="list-style-type: none"> <li>National commitment to promote ZEVs</li> <li>Promote solutions to barriers</li> </ul>	<ul style="list-style-type: none"> <li>Promote solutions to barriers</li> <li>Dealer education</li> <li>Distinguishable EV numberplates</li> </ul>	<ul style="list-style-type: none"> <li>'Try and Drive' EV days</li> <li>Prominent EV free parking</li> </ul>
Life cycle and longevity	<ul style="list-style-type: none"> <li>'Cash for clunkers' buyback scheme</li> <li>Enhanced subsidies for low-income households</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle safety tests and emissions standards</li> </ul>	

Table 7: Barriers and strategies to encourage EV uptake

### (C) Decarbonising heavy transport

Emissions from heavy transport applications such as trucks and buses represent 32% of Tasmania's transport emissions (7% of total emissions). Whereas BEVs are likely to become the dominant technology for light vehicles (especially in a state with almost 100% renewable electricity), hydrogen fuel cell technology has numerous advantages for most heavy transport applications although metropolitan bus services may be provided by either battery- or hydrogen-fuelled vehicles, depending on the specific application. Moreover, the development of hydrogen solutions to reduce heavy transport emissions will complement Tasmania's emerging renewable hydrogen industry and is a focus of the *Tasmanian Renewable Hydrogen Strategy*.<sup>31</sup>

The Tasmanian Government should continue to work with heavy transport operators to trial and deploy hydrogen-powered vehicles in Tasmania. The current trial of zero emissions buses (both BEV and hydrogen) by Metro Tasmania is an important initiative that should be scaled as soon as possible. Where possible, hydrogen conversion and vehicle manufacturing work should be conducted in Tasmania. For example, Elphinstone currently manufactures Bustech designed diesel buses in Tasmania and Bustech is currently developing hydrogen models. Developing technology and manufacturing capability to apply hydrogen to heavy vehicle applications could become a program within the emerging Tasmanian Green Hydrogen Development Hub.

### (D) Decarbonising marine transport

Although intrastate maritime emissions are relatively modest, Tasmania also has an opportunity to be a leader in the development and construction of low emissions marine transport options including hydrogen- and ammonia-fuelled vessels. Tasmania's renewable energy assets and innovative maritime manufacturing sector may give the state an advantage in the development and use of low-emissions marine transport options.

The International Transport Federation's solutions for lowering carbon emissions in the marine transport sector into three areas: technological innovation, operational improvements, and alternative fuels/energy sources.<sup>32</sup> Tasmania is particularly well-placed to contribute to emissions reductions in the maritime transport sector via the use of alternative fuels or energy sources. The replacement of marine heavy fuel oil, as well as various types of marine diesel or other distillate fuels, with hydrogen, ammonia, advanced biofuels, or even solar energy can offer anywhere between 20% and 100% emissions abatement potential.<sup>33</sup> Tasmania's emerging potential as a producer of renewable green hydrogen means that we could be well-placed to become a leader in maritime fuel replacement technologies and uptake given the right mix of investment, research, and industry support.

**Questions for further consideration - Reducing emissions in transport**

1. Are the targets for uptake of ZEVs in Tasmania presented above sufficiently ambitious?
2. What additional measures should the Tasmanian government consider to accelerate the uptake of ZEVs in Tasmania?
3. What policies can encourage the installation of EV chargers in homes, both owner-occupied and rented?
4. How can Tasmanians be encouraged to travel by public transport or by bicycle or e-bike?
5. How can an expanded and permanent Derwent River ferry service be a viable public transport option for Greater Hobart?
6. Which of the above strategies to promote active and public transport should be prioritised? Are there other options that should be considered?
7. What additional measures should the Tasmanian government adopt to support use of Green Hydrogen in the heavy vehicle sector in Tasmania?
8. Is there potential for the development and manufacture green hydrogen heavy vehicles and technologies in Tasmania?
9. Can Tasmania's maritime industry build the capability to develop and deploy zero emissions technologies for marine and offshore applications?



## 7.2.2 Agriculture

Agriculture (including aquaculture) is a key sector in the Tasmanian economy and, given Tasmania's temperate climate, natural assets, expertise, and infrastructure, has the capacity to experience strong growth in the future. The most important segments of Tasmanian agriculture in terms of economic output are dairy and beef, followed by aquaculture. In a median rainfall year, agriculture accounts for around 28% of state-wide emissions. Significantly, 76% of total agricultural emissions are generated by enteric fermentation (EF) in ruminating livestock, highlighting the need to prioritise the development and deployment of innovative and sustainable approaches to reducing greenhouse gas emissions associated with livestock production systems as well as increasing the production of cereals, vegetables and fruit.<sup>34</sup> Addressing livestock emissions will be important but continuing to improve land and production management while reducing fossil fuel use in agricultural applications can also make significant contributions to emissions abatement along with the promise of significant co-benefits.

Point Advisory's analysis of emissions reduction opportunities for Tasmanian industries (Table 6 above) identified increasing soil carbon sequestration through regenerative agriculture as a significant short-term abatement opportunity. The same analysis also found that scaling up the production and use of livestock feed supplements such as *Asparagopsis* seaweed by 2030 could reduce enteric methane emissions for ruminating livestock by 90%, representing the greatest single opportunity for emissions reduction in the Tasmanian economy. Not only could this type of transformative innovation make a major contribution to achieving Tasmania's emissions reduction goals, depending on economic viability, the development and use of seaweed and other marine bioproducts is an example of potential new growth industries that can capitalise on and contribute to the accelerating decarbonisation of the global economy. Several other feed supplements also have methane removal potential, including 3-nitrooxypropanol (also known as 3-NOP, now in widespread use in the New Zealand dairy industry), grape

marc (or solid grape waste), cotton seed and various dietary oils. However, these supplements are only just being applied at scale and it will be important to carefully assess the implications of this technology on farm business profitability, ecosystems services and animal and human health. The Tasmanian Government is supporting climate change action with landholders, for example with recent funding programs for Carbon Farming Advice Rebates, Carbon + Biodiversity Pilots and the Landcare Action Grants program.

Submissions to the reviews of the *Climate Change Act* and *Climate Action Plan* identified the need to invest in research and innovation as a priority in the fight to reduce emissions in the agriculture sector (relevant submissions include those from Farmers for Climate Action, the Tasmanian Farmers and Graziers Association, the AMA, and Doctors for the Environment). The pressing need for innovative approaches to reducing methane emissions in the livestock industry noted above was a strong and consistent theme of these submissions. The key suggestion was the further development and commercialisation of feed supplements derived from *Asparagopsis* seaweed. Further research in pasture species, such as gene-edited ryegrasses, that reduce methane emissions, was also mentioned (Tasmanian Farmers and Graziers Association). As noted above, further opportunities to reduce emissions in the near-term include the prevention of agricultural soil emissions through efficient farm management and technologies and soil carbon sequestration through improved land management practices and the further adoption of precision agricultural practices.

Given that biological sequestration is one of the most economical pathways of removing greenhouse gases from the atmosphere, farmers should be supported in revegetating and restoring marginal land and to prepare for increasing bushfire risks. 'Shelter-belts', reforestation and afforestation can provide significant co-benefits to livestock, including reduced wind-chill and/or heat stress, improving animal welfare, and increasing whole farm productivity and profitability.<sup>35</sup>

As in other areas of climate action, Tasmanian agricultural producers and researchers are at the forefront of global sustainability thinking. Recently, Tasmanian Farmers for Climate Action and the Tasmanian Institute of Agriculture committed to Tasmanian agriculture achieving net-zero emissions by 2030, with the Tasmanian Farmers and

Graziers Association agreeing that the target should be moved from 2050 to 2030.<sup>36</sup> The challenge is to implement and scale these strategies with the aim of positioning Tasmania to become a leader in sustainable, low-emissions agricultural production.

### **Questions for further consideration - Reducing emissions in agriculture**

1. Which land management practices should be promoted to maximise land and soil-based carbon storage on Tasmanian farms?
2. What precision agricultural practices should be adopted to improve the productivity of the sector while reducing emissions?
3. How can fossil fuels be replaced and/or displaced with renewable energy options in land-based and marine agricultural processes?
4. How can Tasmania balance its land usage to ensure it supports necessary agricultural production while maintaining or even increasing the volume of carbon stored in its forest estate?
5. How can Tasmania support sustainable diversification and adaptation to ensure that farms are better prepared for climate change and extreme climatic events?
6. Can the Tasmanian agricultural sector adapt to produce less carbon intensive foods and products?
7. How can we rapidly scale and deploy transformative methane reduction technologies such as feed supplements to drive down emissions in Tasmania and beyond?
8. How can Tasmanian agricultural producers capture the branding benefits of Tasmania's emerging climate-positive strategy?
9. Which natural capital management approaches maximise ecosystems services, natural capital and co-benefits to agricultural productivity?





### 7.2.3 Industrial processes

Tasmania's industrial sector – namely, manufacturing and minerals processing – makes a significant contribution to the Tasmanian economy, but is also a substantial CO<sub>2</sub>-e emitter, accounting for 36% of total emissions in 2019. While facility-specific emissions data is not available (unlike, for example, in the US), Tasmania's highest emitters are a small number of major operators in minerals processing, cement, pulp and paper, and manufacturing. While these businesses benefit from access to renewable electricity, many still produce significant quantities of greenhouse gases in industrial processes including agents and by-products in chemical processes.

Reducing emissions from industrial processes is challenging but necessary and many innovative firms are developing technology and processes for reducing emissions in industrial processes, such as minerals processing, smelting and pulp production. Given the technical challenges and costs associated with decarbonising industrial processes, Point Advisory's pathways analysis suggests that most of the emissions reduction from this sector, even with a clear commitment and planning, is likely to occur after 2030.

Tasmania is in a strong position to respond to the challenges of reducing emissions from industrial processes. The relatively small number of well-established industrial operations in Tasmania is also an advantage as its conducive to establishing a collaborative approach to emissions reduction and the development of firm-specific decarbonisation plans. As noted above (see text box on 25), in order to reduce national emissions, electricity for green hydrogen production should be sourced from new renewable energy projects.

As with all aspects of the energy transition, developing and adopting low- and zero-carbon technologies and processes will be essential to maintain and grow long-term export markets and will be a major source of competitive advantage to underpin Tasmanian industries in the zero-carbon economy of the future.

#### Questions for further consideration - Reducing emissions in industrial processes

1. What energy efficiency strategies could be applied to Tasmanian industries to reduce emissions and increase productivity?
2. What is the best approach for establishing and supporting research collaborations to help decarbonise Tasmanian industry?
3. Would low or zero carbon industrial products attract price premiums and brand and market access benefits?
4. What new industries and renewable energy clusters can be established in Tasmania given our renewable energy assets and negative emissions status?
5. How will Tasmanian communities be affected by industry's transition to a low-emissions future? What strategies can be implemented to assist these communities?



## 7.2.4 Stationary energy

Tasmanian electricity generation has been almost 100 per cent renewable since the closure of the Bell Bay power station in 2009. Due to our renewable energy generation assets, energy-related emissions (excluding transport) are significantly below the national average (see Figure 15 below). However, coal, natural gas and other fossil fuels are still used in a number of residential and industrial applications as well as for off-grid electricity generation and now represent a major source of Tasmanian CO<sub>2</sub>-e greenhouse gas emissions.

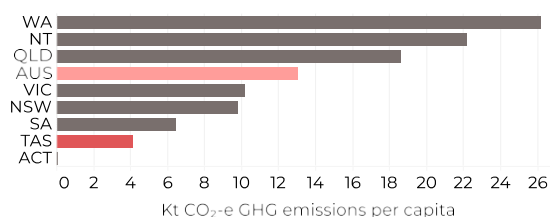


Figure 15: Non-transport energy emissions per capita by state and territory, 2018  
(source: State and Territory Greenhouse Gas Inventory 2020)

Tasmanian energy emissions (excluding transport) contribute 2082 kt of CO<sub>2</sub>-e greenhouse gases to the state's gross emissions – an increase of 6.7% since 2005. This accounts for roughly a quarter of the state's total (gross) CO<sub>2</sub>-e emissions. The major sources of these non-transport energy emissions are coal and natural gas.

Gas has been imported via the Tasmanian Gas Pipeline across Bass Strait since 2002. This natural gas services some 12,000 residential customers (for heating and cooking) in addition to use in a wide variety of industrial applications.

Natural gas abatement opportunities are beginning to show considerable promise, with many jurisdictions and industries focusing on the development of technologies to transition from natural gas to green hydrogen. Given the potential to increase renewable electricity

generation, and in light of recent policy efforts, Tasmania is in a strong position to become a leading producer of green hydrogen. The development of green hydrogen production can ensure that Tasmanian industries have access to green hydrogen for use in industrial processes while the proposed Bell Bay Green Hydrogen Hub can support the innovation required to apply hydrogen in Tasmanian industries.

Submissions to the review of the *Climate Change Act* and *Climate Action Plan* identified several opportunities for reducing industrial process emissions including through the establishment of a Renewable Energy Industrial Precinct in Bell Bay and broader R&D investment to help accelerate the use of renewable green hydrogen in traditionally 'hard to abate' industrial and manufacturing processes as well as in low-carbon freight or other heavy transportation options, including shipping.

Beyond hydrogen, there is also scope to use biofuels in some industrial and stationary energy processes especially if these fuels are sourced from sustainable plantation forests.

Wood combustion represents an estimated 30% of Tasmania's residential heating mix and is a significant contributor to emissions.<sup>37</sup> However, due to a lack of detailed data and research, the greenhouse impact of inefficient wood stoves is under-stated in the state and territory inventories. Further research is necessary to properly account for the CO<sub>2</sub>-e impact of wood heaters and better understand their long-term climate impact, not to mention their adverse respiratory and cardiovascular health impacts.

Lastly, as has been noted above, Tasmania does draw on electricity generated on the mainland via non-renewable methods at peak times when needed. It will be important to increase renewable electricity generation on island to provide the additional energy required to decarbonise the Tasmanian economy over time (see text box on p. 26).



**Questions for further consideration - Reducing emissions in stationary energy**

1. How can we transition Tasmania's stationary energy systems from fossil fuels to green hydrogen and associated products?
2. How can we improve the energy efficiency of homes, other buildings, and industrial processes to reduce demand for stationary energy?
3. Can Tasmania become a leader in the development of zero emissions remote and offshore energy systems and micro-grids (which have traditionally relied on diesel fuel)?
4. What is the role of bioenergy as a diesel and natural gas alternative in Tasmania?
5. How much additional renewable generation will be required to decarbonise stationary energy (and transport and industrial processes) in Tasmania?
6. How can Tasmanian industries transition from using natural gas and other fossil fuels in their processes to using renewable energy sources such as green hydrogen?

### 7.3 3 RISK ASSESSMENT AND ADAPTATION PLANNING

The second pillar of a climate-positive approach is the development and adoption of comprehensive adaptation (or ‘resilience’ in *the Independent Review*) planning, underpinned by a thorough risk assessment process and deep collaboration. Even under best-case emissions-reduction scenarios, there will be continued warming caused by greenhouse gas emissions. It is important that Tasmania be well-prepared for the consequences of climate change. Reflecting recommendation 6 of the *Independent Review*, a systematic state-wide climate risk assessment informed by updated state-level climate modelling should be undertaken to inform the development and implementation of comprehensive sectoral adaptation plans for health and emergency management, ecosystems and habitat, agriculture and aquaculture, and the built environment and transport. Given Tasmania’s circumstances, and the increasing climate risks, bushfire preparedness will be particularly important for our state.

#### 7.3.1 Bushfire preparedness

The number and intensity of bushfires driven by anthropogenic climate change will increase. Modelling shows a steady increase in fire danger in Tasmania throughout the current century, with increased acceleration in the latter half of the century. This will result in a longer fire season and an increase in the number of days at the highest range of fire danger.

The risk for human settlements is ever increasing, including directly from a drier landscape, more propensity to ignite, and due to smoke being transported into settlements from fires burning in remote areas. Across the natural landscapes, some areas, including parts of the Tasmanian World Heritage Wilderness Area, are projected to become so much drier that they will experience fire risk for the first time in thousands of years (if ever). Notwithstanding the need to manage forests to mitigate fire risks, inevitably increasingly intense fire events will also reduce the carbon storage capacity of forests, thereby exacerbating further climate change.

*The Independent Review* acknowledges that bushfire risk for communities and environments will increase into the future in Tasmania. Adaptation strategies that should be considered include integrated approaches to land management, including methods drawing on indigenous knowledge and cultural practices.

Tasmania has bushfire management strategies in place. These strategies include advising communities about taking personal responsibility in preparing for and responding to bushfire hazard. They also set out the role, responsibilities, capacities, and functions of Tasmania’s emergency services in preparing for and responding to these emergencies. Bushfire risk is increasingly being factored into building codes and planning decisions but there is also recognition that many existing suburbs and settlements are exposed to growing fire risk which have a number of consequences including uncertainty around future access to affordable and adequate insurance. Collaboration between all levels of government and non-government agencies and organisations will also be increasingly important (as discussed below – see ‘Health and emergency management’).



**Questions for further consideration - Bushfire preparedness**

1. Are existing planning and fire management provisions appropriate given rising fire risks?
2. What forms of fuel and forest management can maximise carbon storage and biodiversity values?
3. What practical and best-practice land and fire risk management strategies should be used to reduce the vulnerability of communities and key infrastructure?
4. How can Tasmania best draw on the traditional land management practices and knowledge of its Aboriginal traditional owners?
5. What would best-practice community education and engagement on emergency management look like in Tasmania?
6. Are major settlements/cities and emergency services prepared for inevitable extreme fire events? If not, how could they be better prepared?



### 7.3.2 Agriculture (and terrestrial water systems) and aquaculture

The increasing frequency of climate extremes, changing rainfall patterns, more intense and protracted drought events, and reduced soil moisture all have the potential to fundamentally reshape Tasmanian agriculture over the coming decades. Likewise, in the oceans, warming waters, marine heatwaves, acidification, and species decline will bring drastic change to Tasmanian wild fisheries and aquaculture.

Regions that are productive in 2021 may not be productive, or may have to be used in different ways, in 2030, 2040 and 2050 and beyond. Crops or practices that have sustained agricultural properties for generations may quickly become unviable, creating a need for rapid adjustment in longstanding practices. Sustaining and growing Tasmania's agricultural and aquacultural economy, particularly in relation to livestock and fisheries production, while also responsibly managing the natural resource base upon which it depends – including the soil, water, air, and biodiversity – is one of the foremost adaptation challenges posed by a changing climate.

Extensive research conducted as part of the TasAgFutures project in 2019 found that climate change and the increasing variability of rainfall in particular was a major and growing concern among Tasmanian farmers.<sup>38</sup>

While profitable farming businesses will have greater capacity to adapt and innovate to a changing Tasmanian climate, enterprises with marginal profitability will likely require government support to transition to new industries, products, locations, or endeavours.

Adaptation strategies which will have to be developed further include changing crop and stock choices to cope with a drier warmer climate, building the resilience of agricultural systems through improved land management and continuing to use increasingly scarce water resources and irrigation systems more efficiently and sustainably.

Government will need to play an active role in preparing communities and businesses that rely on agriculture for their livelihoods for the unavoidable impacts of climate change. *The Independent Review* expresses similar concern about the risks to Tasmania's agriculture and aquaculture enterprises and the communities they support, acknowledging that "the State government needs to focus on supporting the development of long-term resilience and preparedness initiatives in rural communities, rather than reactively providing recovery assistance during or following extreme events such as drought".<sup>39</sup> Significant climate, health and social benefits can be also be achieved through embracing a sustainable food systems approach which considers the whole food supply chain and encourages local production, consumption and waste disposal.

The submissions are consistent with the Independent Review, with support for a sectoral approach to agriculture, with irrigation, investment and subsidies identified as key strategies of adaptation planning for agriculture.

**Questions for further consideration - Agriculture and aquaculture**

1. What do you consider to be the priorities that the Government should pursue to ready Tasmania's agricultural sector for climate change?
2. What innovative approaches to water management and conservation can be strategically pursued to support the agricultural sector during extended drought periods into the future?
3. How can income diversification for producers be supported as a key adaptation strategy to climate variability?
4. What should be the division of responsibility between government intervention and personal choice on climate adaptation?
5. What data can be collected and shared to help agricultural and aquacultural operators plan with a better sense of future risks?
6. How can a sustainable food systems approach be supported and scaled in Tasmania?





### 7.3.3 Health and emergency management

Climate-related impacts will increasingly pose serious risks to human health and community safety, while placing additional pressure on Tasmania's health system and emergency services. There is a window of opportunity (during development of the next iteration of the *Climate Change Act* and *Climate Action Plan*) to begin enhanced scenario planning for climate-related emergencies and build flexible health system capacity to minimise the impacts of large one-off, or multi-staged, events that could overwhelm Tasmania's health and emergency services system and impose a heavy financial and social burden on the state and community. Scenario planning is critically important as it is the link between future thinking and strategic action.

Collaboration, too, will be an important part of adaptation planning. The 2021 *Independent Review of the Tasmanian State Service* pointed out that the Tasmanian State Service (TSS) does not have the internal resources to deal with large-scale emergencies, but instead must rely on others for 'essential inputs' and 'surge capacity'. This was the case with the response to COVID-19, where the TSS relied heavily on the resources of industry and the non-government sector, including the University of

Tasmania.<sup>40</sup> *The Independent Review* highlighted the growing risk of Tasmania's health and emergency services being overrun, advising the Government to develop "long-term health and emergency planning informed through scenario planning".

Acute health risks associated with climate change fall disproportionately on the poor, elderly and those living with chronic illness, highlighting the need to identify and support individuals, households and communities at high risk of climate-related health impacts and to develop long-term public health and social support programs to mitigate this risk.

Many submissions to the *Climate Change Act* and *Climate Action Plan* reviews expressed concern regarding climate change impacts on human health. Chief among the list of concerns were the capacity of Tasmania's infrastructure to keep pace with the projected influx of climate-forced migrants; the need for an expanded program of climate-related mental health services; and the need for the Tasmanian Government to develop an integrated approach to climate, healthcare, and emergency services.

#### Questions for further consideration - Health and emergency management

1. What practical near-term actions could the Government take to prepare Tasmania's health and emergency system for climate change impacts and events?
2. What would be the best-practice risk assessment methodology for developing a clear understanding of both acute and systemic health and community risks posed by climate change?
3. How can we support vulnerable communities and cohorts for the growing health risks associated with climate change?
4. Are our emergency services and infrastructure sufficiently resourced and prepared for increasing climate change risk?
5. What is the best way for communities to manage mental health challenges associated with climate change, especially among young people?



### 7.3.4 Ecosystems and habitat

Tasmanian biodiversity will be heavily impacted by a changing climate. Furthermore, Tasmania is literally the 'last stop' for many species – there is nowhere further south for them to retreat. Tasmanian Government policies increasingly acknowledge the likely impact of current and future climate change on biodiversity, and the need to facilitate adaptation and promote resilience, including in the Tasmanian Wilderness World Heritage Area.<sup>41</sup> However, a more proactive approach will be required to enhance the resilience of our ecosystems and integrate climate considerations across conservation laws without the need for detailed, instrument-by-instrument reforms.

*The Independent Review* identifies a significant risk and concern that climate will impact heavily on Tasmania's natural systems and biodiversity, and as such it identifies several initiatives to reduce risk. These include expanding Tasmania's conservation estate, identifying and protecting refugia, restoring connectivity in degraded landscapes, and expanding private land conservation.

There was strong concern across the submissions that bushfires particularly, but also other climate-related impacts such as drought and flood, will have a profound and negative impact on human settlements, ecosystems, and biodiversity in Tasmania. Solutions proposed highlight the need for more detailed impact data and stronger response, reaction, and recovery capabilities across relevant government agencies and in the wider Tasmanian community.

#### Questions for further consideration - Ecosystems and habitat

1. How should the Government prioritise what habitats to save and/or restore in the event of ecological disaster? And how can such actions be supported?
2. How should we best plan for emergency interventions for conservation and ecological restoration purposes?
3. How should we implement the recommendations of the TWWHA Climate Change Adaptation Strategy?





### 7.3.5 Built environment and transport

Tasmania's cities, towns, and infrastructure, regardless of their location, will feel the impacts of climate change in some way. Extreme weather events such as storm surges and inundation can damage or destroy low-lying coastal buildings and properties. Higher maximum temperatures and more frequent heatwaves will likewise pose an extreme bushfire risk to peri-urban and rural homes, schools, hospitals, businesses, and communities across the state. Incremental impacts such as sea-level rise pose serious challenges to infrastructure such as ports, roads, footpaths, stormwater systems, and bridges, as well as, in some locations, their ongoing habitability. Moreover, the devastating financial impact of these risks will be felt before an extreme event driven by climate change even occurs, as properties in at-risk locations begin to become too risky for commercial insurers to underwrite. Whole communities might soon face the financial impact of being forced to abandon unsafe, unsaleable, or uninsurable stranded assets in low-lying, bushfire-prone, or otherwise at-risk areas.

The cost of addressing these challenges will be significant, but pales in comparison to the costs of taking no action. Conservative estimates indicate that US\$1 invested today in disaster preparedness of the built environment can avoid US\$4 in post-disaster reconstruction.<sup>42</sup> Tasmania has a short window of opportunity to integrate climate adaptation into planning and policy approaches for managing disaster preparedness in our built environment and transport systems.

Similarly, the *Independent Review* advises that urban and land-use planning will need to continue to consider climate change impacts to manage risks to the built environment, infrastructure, and communities. Many submissions emphasised the importance of the State Government working closely with local authorities to develop and implement adaptation strategies, particularly regarding urban planning.

#### Questions for further consideration - Built environment and transport

1. What are the best models to incorporate climate-change consideration and risk assessment into the infrastructure and planning processes?
2. Are our current processes for assessing the vulnerability of existing infrastructure to climate risk adequate? Do we have the resources to ensure this infrastructure is climate change-ready?
3. How could we ensure that there is a strategic focus on incorporating nature-based solutions (in place of artificial solutions) to protect communities and infrastructure as well as to restore and sustainably manage natural ecosystems?

## Part 8

### Enabling climate action

Climate action demands coordinated and committed whole of community effort and a strategic approach to climate governance, policy and education.

The challenge of governing for climate action stems from four interrelated factors:

1. The multiple scales and levels of political decision-making involved;
2. The need for coordination and collaboration between state and non-state actors;
3. The deeply embedded nature of greenhouse gas emissions in everyday processes of production and consumption.
4. The need for education about climate change that provides communities with accurate and reliable information while also empowering individuals to take action to address climate change.

#### 8.1 CLIMATE GOVERNANCE

A review of the submissions to the *Climate Change Act* and *Climate Change Plan* shows that several terms were used to articulate the need for more widespread and coordinated action on climate change considerations, including a “whole-of-government” approach, an “integrated” approach, a “non-siloed” approach, and “mainstreaming” (see Table 8).

The UTAS *Blueprint* used the term ‘mainstreaming’ because policy decision-making at all levels of government should take into account climate change mitigation and adaptation considerations. Indeed, climate adaptation and mitigation considerations should be mainstreamed across all the Tasmanian Government’s policy domains and objectives, including budgeting, as well as when working with non-government actors such as civil society and community groups, universities, and businesses.

<b>Governance</b>	<i>Governance</i> refers to multiple processes and strategies used to coordinate and support the activities of individuals and community, government and business actors operating at a number of levels from local to international.
<b>Whole-of-government</b>	<i>Whole-of-government</i> decision making involves input and coordination across one level of government and its agencies but often fails to acknowledge the importance of intergovernmental coordination and broader input from non-government actors.
<b>Integrated</b>	<i>Integrated</i> approach can refer to a governance or a whole-of-government approach, depending on the term’s context
<b>Mainstreaming</b>	<i>Mainstreaming</i> was first used to refer to the consideration of adaptation issues across government decision making, but also now commonly includes mitigation as well. It can refer to decision-making across a government and its agencies or more broadly across a collaborative governance structure and the non-government sector.

Table 8: Terms used to describe the approach to climate change considerations

*The Independent Review* explains that “stakeholders comprehensively expressed the need for government to consider climate change in all government decision-making”.<sup>43</sup> In August 2021, Premier Peter Gutwein announced that his government would take a “whole-of-government” approach to developing the next Climate Action Plan.<sup>43</sup> An early and important example of this approach is to merge Renewables Tasmania and the Tasmanian Climate Change Office to form a new authority — Renewables, Climate and Future Industries Tasmania.

Despite the enthusiasm for this whole-of-government approach, *the Independent Review* takes a cautious position, stating that it is ‘not feasible, or conducive to effective climate action, to consider climate change in all government decision-making but rather in the development of policies, strategies, or planning that hold relevance, or may give effect, to climate change mitigation and adaptation’.<sup>45</sup>

Given the fundamental importance of climate change to the work of practically every Tasmanian government department and agency as well as broader Tasmanian community, mainstreaming climate action (or what could also be referred to as “good climate governance”) should be pursued as a priority. The aim of a holistic approach to climate governance is to enhance the government’s ability to support climate action goals and achieve climate-positive status. A conceptual framework outlining the elements of good climate governance approach is provided below (Figure 16).

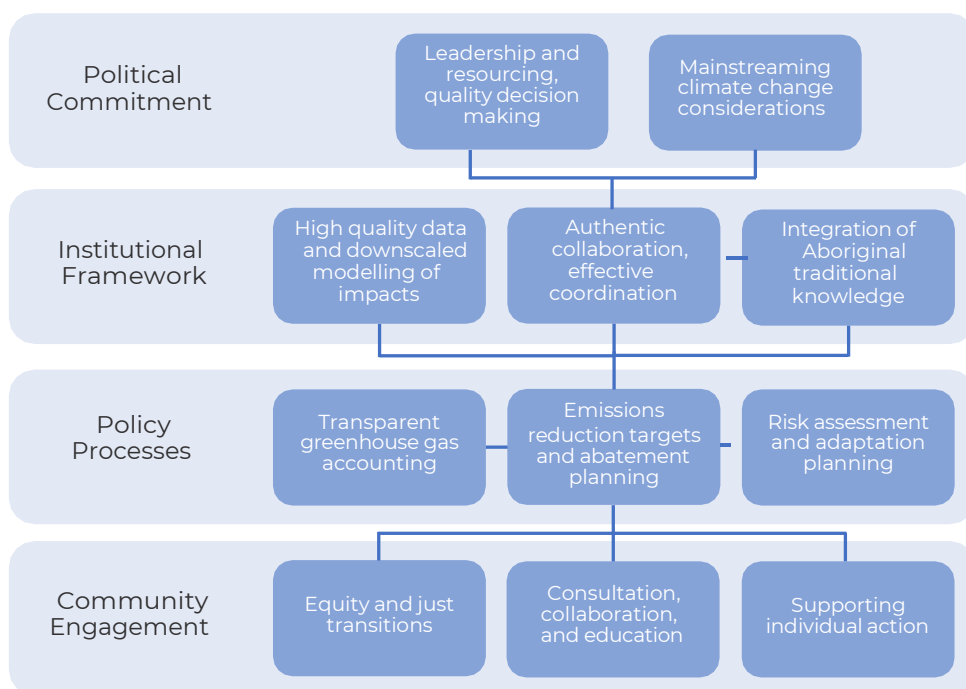


Figure 16: Good climate governance framework (adapted from the Climate Action Tracker Assessment Framework)

## 82 2 A STRATEGIC FRAMEWORK FOR SUPPORTING EMISSIONS REDUCTION

The task of phasing out fossil fuels and decarbonising the economy is complex and will require a strategic policy framework that includes targets and sends strong investment signals to support a transition to low-carbon technologies while promoting economic competitiveness and efficiency. Intergovernmental coordination and advocacy will also be essential, as state-level frameworks must work alongside Commonwealth policies and programs.

Significant investment will be required to support the rapid transition to low- and zero-carbon technologies. Initially this will require public investment, but one of the aims of a climate policy must be to provide certainty and create incentives to support increased private investment in decarbonisation over time.

In order to send the required market and financial signals, a strategic climate policy framework should adhere to a set of core principles. These principles include:

- subsidies should be limited to the initial stages of the energy transition, phasing out as renewable energy and technology reach price parity with existing, carbon-intensive processes and products
- policy should maintain neutrality between low-emissions technologies and providers, rather than 'picking winners'
- public investment should be allocated through an open and transparent process based on the emissions reduction (abatement return) and public value
- policies should be consistent with the broader principles that inform a climate-positive Tasmania (see p. 19).

The overarching goal of climate policy is to support the rapid decarbonisation of the economy and decisions about when to phase out public investment and support should be contingent on making significant progress towards emissions reduction targets.

### Policy Instruments to promote emissions reduction

The high-level emissions reduction goals or targets should be established in legislation (or if unachievable, in regulation) but, in the absence of appropriate market design and incentives, there is a significant risk that targets will not be met or will be detrimental to economic competitiveness and community welfare. An emissions trading scheme or a carbon tax are the most efficient and effective economy-wide policy instruments to drive emissions reduction. However, given this approach is unlikely to be adopted nationally in the immediate future, state and federal governments should consider using combinations of the policy instruments listed below to support emissions reduction efforts.

#### 1. Subsidies

Subsidies can be an effective way to support economic and behavioural change. However, subsidies can distort markets and are politically difficult to withdraw once policy objectives have been met, as well as coming at the expense of other public programs. The cost of subsidies can be offset by increasing taxes (or removing and reallocating existing large-scale subsidies for fossil fuels)<sup>46</sup> on carbon-intensive products and processes with revenue from these sources being invested through a decarbonisation fund.

#### 2. Financing innovation

Developing technology to reduce emissions and deploying it at scale will require a significant and sustained research and innovation effort. In the early stages of the energy transition this requires (and in some instances is receiving) significant public investment and public-private partnerships. As technologies and markets become more mature and the associated financial risks decline over time, less public investment will be required

#### 3. Financing new capital

Decarbonisation requires considerable investment in new capital equipment and products by business, governments and consumers. While the longer-term environmental and economic return on investment in new technologies might be high, many firms and households lack access to (or the ability to service) the required capital. Innovative green-finance models are emerging and could be pursued at a state level, using a combination of state subsidies, guarantees and underwriting. The scale of these partnerships could

range from new manufacturing processes and facilities all the way down to supporting individual or household purchases of ZEVs and e-bikes. Broadening the existing Tasmanian Energy Efficiency Loan Scheme, and possibly even expanding it to include households, could assist with the transition.

**4. Funding infrastructure and networks.**

Many networks and shared infrastructure will also have to be updated or overhauled, including ZEV charging stations and hydrogen transport and distribution, to give just two examples. TasNetworks may similarly need to pursue grid upgrades to facilitate more renewable generation and, in particular, to enable more widespread take-up of rooftop solar. Given that such networks are key enablers of other low-carbon technologies, state government has a key role to ensure their provision with funding to be determined depending on the specific public and private return on a particular network.

In place of more holistic market mechanisms like carbon taxes or emissions trading schemes, the Commonwealth and other states are using different combinations of the policy instruments outlined above as part of their climate strategies. Models include grants-based approaches like the Commonwealth’s Clean Energy Finance Corporation. At a state level, Queensland’s Clean Co, as well as the Climate Change Fund and Manufacturing Renewables Taskforce in NSW, represents models that could be emulated in Tasmania.

The new Renewables, Climate, and Future Industries Tasmania (ReCFIT) authority should draw on these principles and interstate examples to develop a strategic approach to supporting emissions reduction across the Tasmanian economy.

Significant public investment in emissions reduction is required, but can phase out over time

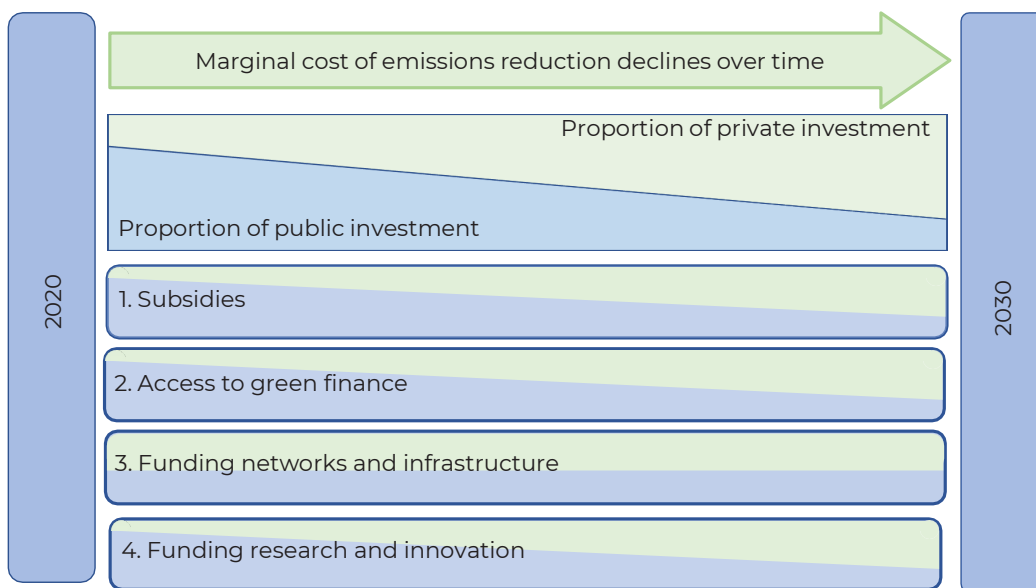


Figure 17: Policy instruments to support state-level emissions reduction

## 83 3 EDUCATION AND COMMUNITY AWARENESS

Educating Tasmanians, promoting community awareness and supporting individual empowerment and agency in relation to climate action, are crucial for effective climate governance. Education providers and community education networks will need to be engaged to deliver a climate-positive Tasmania. Developing community awareness about climate change itself, as well as ways of positively contributing to climate change mitigation and adaptation, depends upon effective communication and education strategies.

Young people can be active contributors in creating a climate-positive Tasmania, but need opportunities to showcase leadership and for their ideas to be viewed as valid and legitimate. Projects that emphasise student-led enquiry about climate change and harness UTAS climate expertise to answer students' climate questions should be encouraged.

Professional learning to support educators and a stronger policy mandate to teach about climate change and for climate action is needed. In Australia broadly, there is little mention of climate change in the National Curriculum. Nor are climate change issues adequately addressed in existing professional development opportunities or in-service and pre-service teacher education.

Enhancing climate literacy through higher education requires specialist study of climate change as well as embedding learning on climate change more broadly throughout university programs. Climate change study at a tertiary level should, like school climate education, take into account the mental health implications of climate change.

While there is no one-size-fits-all approach to public engagement with climate change issues, Tasmanians want more information about climate change; creating opportunities wherein researchers and members of the public can listen and learn from each other can inform climate action. However, not all adults are interested or engaged in climate change issues, and initiatives that are aimed at this unengaged group are also needed.

The University of Tasmania excels in climate research, hosting many IPCC authors, and was ranked ninth globally for climate action by the Times Higher Education Global University Rankings 2021. The broader Tasmanian public as well as stakeholders in industry also regard the University as a source of expertise on climate change. The University is well placed to build on its current position both in climate literacy education and sector-specific climate research to drive adaptation.

### Questions for further consideration - Enabling climate action

1. What additional measures might be adopted in Tasmania to enhance coordination and engagement in relation to climate governance and action? Specific strategies and instruments which could be used to enhance climate governance include:
  - Establishing climate action as a central priority in the *Climate Change Plan*
  - Embedding climate considerations in the State Policies Framework under the *State Policies and Projects Act 1993*
  - Legislating a 'mainstreaming' approach in the *Climate Change Act*
  - Explicitly including climate considerations in the state planning framework
  - Incorporating the OECD's 'green budgeting' principles into budgetary processes
2. What is the most appropriate approach to establish a strategic framework for promoting emissions reduction?
3. How can we improve community engagement and the involvement of and collaboration with local government in relation to climate action in Tasmania?
4. How can we incorporate traditional knowledge and acknowledge and respect the traditional ownership and perspective of the Tasmanian Aboriginal people as the custodians of lutruwita for thousands of years?
5. How can we further leverage our internationally recognised climate expertise to improve climate change awareness and education in Tasmania?
6. How can we engage with Tasmanians (and young Tasmanians in particular) to support individual and community level climate action to promote a sense of agency and empowerment as well as making a substantive contribution to addressing climate change?.



## Endnotes

- i. Oxford Languages (2019). 'Word of the Year 2019', Oxford University Press, <https://languages.oup.com/word-of-the-year/2019/>
1. Intergovernmental Panel on Climate Change (2021). *Climate Change 2021: The Physical Science Basis - Summary for Policymakers*, Working Group I contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, <https://www.ipcc.ch/report/ar6/wg1/>
2. Due to the *Discussion Paper's* emphasis on the importance of sustaining net-negative emissions, this 37% reduction relates to gross emissions at their 2019 level rather than the 2005 baseline discussed in the *Blueprint*. However, Tasmania's gross emissions have been so stable over the past 30 years that the selection of one baseline year over another makes almost no material difference to the calculation of required abatement targets.
3. United Nations (2021). 'Secretary-General Calls Latest IPCC Climate Report 'Code Red for Humanity', Stressing 'Irrefutable' Evidence of Human Influence', Press release, 9 August 2021, <https://www.un.org/press/en/2021/sgsm20847.doc.htm>
4. Risk here has been estimated qualitatively across human health, environmental, infrastructure, and industry costs.
5. See <https://curiousclimate.org.au/> for more information
6. Lowy Institute (2021). 'Climate Poll 2021', <https://www.lowyinstitute.org/publications/climatepoll-2021>
7. Yougov (2021). *Australia's biggest climate poll*, <https://election-data.s3.ap-southeast-2.amazonaws.com/PollingReport.pdf>
8. See Lapham, J. (2021), 'European Union carbon tariffs could spell trouble for Australian commodities, experts say', *ABC News*, 16/07/2021, <https://www.abc.net.au/news/2021-07-16/experts-say-eu-carbon-tariffs-spell-trouble-australian-commodity/100298028>; European Commission (2021). 'Carbon Border Adjustment Mechanism: Questions and Answers', 14/07/2021, [https://ec.europa.eu/commission/presscorner/detail/en/qanda\\_21\\_3661](https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661)
9. Frydenberg, J. (2021). 'Capital markets and the transition to a low emissions future', Australian Industry Group Speech, 24 September 2021, <https://joshfrydenberg.com.au/wp-content/uploads/2021/09/Treasurer-Speech-Capital-markets-and-the-transition-to-a-low-emissions-future-Australian-Industry-Group-24-September-2021.pdf>
10. Point Advisory (2021a). *2021 Economic Impact Analysis - Emissions Pathway Review, Final report*, Prepared for the Tasmanian Government, [https://www.dpac.tas.gov.au/\\_data/assets/pdf\\_file/0003/587343/Economic\\_Impact\\_Analysis\\_-\\_Emissions\\_Pathway\\_Review.pdf](https://www.dpac.tas.gov.au/_data/assets/pdf_file/0003/587343/Economic_Impact_Analysis_-_Emissions_Pathway_Review.pdf), p. 5
11. Business Council of Australia (2021). *Achieving a net zero economy*, October 2021, [https://www.bca.com.au/achieving\\_net\\_zero\\_with\\_more\\_jobs\\_and\\_stronger\\_regions](https://www.bca.com.au/achieving_net_zero_with_more_jobs_and_stronger_regions)
12. Ford, S. (2021). Elphinstone targets carbon dioxide emissions with vehicles plan, *The Advocate*, 6 October 2021, <https://www.theadvocate.com.au/story/7458167/elecric-elphinstone-targets-emissions-with-battery-project/>
13. Fink, L. (2021). 'A Fundamental Reshaping of Finance', BlackRock, <https://www.blackrock.com/au/individual/larry-fink-ceo-letter>
14. For more information, definitions, and frameworks regarding 'just transition' see Just Transition Centre (2017). *Just Transition: A Report for the OECD*, May 2017, <https://www.oecd.org/environment/cc/g20-climate/collapsecontents/Just-Transition-Centre-report-just-transition.pdf>
15. 'Permanency' should mean a minimum of one hundred years and not shorter time spans as have been variously applied at the national level.
16. United Nations (2021). 'Glossary of climate change acronyms and terms', <https://unfccc.int/process-and-meetings/the-convention/glossary-of-climate-change-acronyms-and-terms#1>
17. Point Advisory (2021b). *2021 Update of Tasmania's Emissions Pathway Review - technical report: Final Report*, Prepared for the Tasmanian Climate Change Office, [https://www.dpac.tas.gov.au/\\_data/assets/pdf\\_file/0010/587341/Update\\_of\\_Tasmania\\_s\\_Emissions\\_Pathway\\_Review\\_-\\_technical\\_report.pdf](https://www.dpac.tas.gov.au/_data/assets/pdf_file/0010/587341/Update_of_Tasmania_s_Emissions_Pathway_Review_-_technical_report.pdf), pp. 30-32; Cf. Jacobs Consulting (2021). *Independent Review*



- of Tasmania's Climate Change Act, [https://www.dpac.tas.gov.au/\\_data/assets/pdf\\_file/0008/586403/Independent\\_Review\\_of\\_the\\_Climate\\_Change\\_State\\_Action\\_Act\\_2008\\_-\\_Final\\_Report\\_2021.PDF](https://www.dpac.tas.gov.au/_data/assets/pdf_file/0008/586403/Independent_Review_of_the_Climate_Change_State_Action_Act_2008_-_Final_Report_2021.PDF), pp. 43-44
18. Jacobs Consulting (2021). p. 46
  19. Independent Expert Panel on Interim Emissions Reduction Targets for Victoria (2019). *Interim Emissions Reduction Targets for Victoria (2021-2030), Final Report*, [https://www.climatechange.vic.gov.au/\\_data/assets/pdf\\_file/0016/420370/Final-Report\\_Interim-Emissions-Reduction-Targets.pdf](https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0016/420370/Final-Report_Interim-Emissions-Reduction-Targets.pdf), p6
  20. Business Council of Australia (2021)
  21. Figure 8 assumes present climatic conditions – if rainfall declines and the rate of carbon sequestration falls, we will see an increase in net greenhouse gas emissions.
  22. Jacobs Consulting (2021), p.3
  23. see Point Advisory (2021a)
  24. Clean Energy Regulator (2021). Measurement Determination, National Greenhouse and Energy Reporting, 1 July 2021, <http://www.cleanenergyregulator.gov.au/NGER/Legislation/Measurement-Determination>
  25. Due to its importance and discrete policy context, we treat transport separately from other 'energy' sector emissions, as does Point Advisory.
  26. Wood, T., Reeve, A. and Ha, J. (2021). *Towards net zero: Practical policies to reduce industrial emissions*, Grattan Institute Report No. 2021-10, August 2021, <https://grattan.edu.au/wp-content/uploads/2021/08/Towards-net-zero-Practical-policies-to-reduce-industrial-emissions-Grattan-report.pdf>
  27. Point Advisory (2021b), pp. 30-32
  28. Wood, T., Reeve, A. and Ha, J. (2021). *Towards net zero: Practical policies to reduce agricultural emissions*, Grattan Institute Report No. 2021-12, September 2021, <https://grattan.edu.au/wp-content/uploads/2021/08/Towards-net-zero-Practical-policies-to-reduce-agricultural-emissions.pdf>
  29. To maximise the national emissions benefit of increased ZEV uptake in Tasmania it will be necessary to increase new renewable generation to meet demand associated with transport decarbonisation – see Text Box on p. 26
  30. Good Car Company (2021). *EV Uptake Survey*
  31. Department of State Growth (2019). *Tasmanian Renewable Hydrogen Strategy* (draft), [https://www.stategrowth.tas.gov.au/\\_data/assets/pdf\\_file/0003/207705/Draft\\_Tasmanian\\_Hydrogen\\_Action\\_Plan\\_-\\_November\\_2019.pdf](https://www.stategrowth.tas.gov.au/_data/assets/pdf_file/0003/207705/Draft_Tasmanian_Hydrogen_Action_Plan_-_November_2019.pdf)
  32. International Transport Forum/OECD (2018). *Decarbonising Maritime Transport: Pathways to zero-carbon shipping by 2035*, <https://www.itf-oecd.org/sites/default/files/docs/decarbonising-maritime-transport-2035.pdf>, p. 26
  33. Ibid., pp. 30-42
  34. It is important to note that while methane is a powerful greenhouse gas, it has a shorter atmospheric life than both carbon and nitrous oxide, with some calling for a change in the way that the equivalence of greenhouse gases is measured - see Harrison, M., Cullen, B., Mayberry, D., Cowie, A., Bilotto, F., Badgery, W., Liu, K., Davison, T., Christie, K., Muleke, A. and Eckard, R. (2021). Carbon myopia: The urgent need for integrated social, economic and environmental action in the livestock sector, *Glob. Change Biology*, 27 July 2021, DOI:, 10.1111/gcb.
  35. Ibid.
  36. Chounding, A. (2021). Farmers come together to address climate change, *The Advocate*, 1 September 2021, <https://www.examiner.com.au/story/7412614/farmers-fight-source-of-climate-change/>
  37. Department of Health and Human Services (2020). *Report on the Tasmanian Population Health Survey 2019*, Tasmanian Government, [https://www.dhhs.tas.gov.au/\\_data/assets/pdf\\_file/0005/398174/Report\\_on\\_the\\_Tasmanian\\_Population\\_Health\\_Survey\\_2019.pdf](https://www.dhhs.tas.gov.au/_data/assets/pdf_file/0005/398174/Report_on_the_Tasmanian_Population_Health_Survey_2019.pdf)
  38. Leith, P. Garcia, C. Kumar, S. Adhikari, R. Baker, C. Cumbo, B. and Evans, K. (2019). *Aspirations for Food and Agriculture: Final Research Report and Discussion Paper for TasAgFuture*, University of Tasmania, Hobart, Australia, [https://www.utas.edu.au/tia/research/research-projects/projects/tas-ag-future/TasAgFuture\\_Final\\_Research\\_Report\\_ALLAPP\\_S.pdf](https://www.utas.edu.au/tia/research/research-projects/projects/tas-ag-future/TasAgFuture_Final_Research_Report_ALLAPP_S.pdf), p. 13
  39. Jacobs Consulting (2021), p. 62
  40. Watt, I. (2021). *Independent Review of the Tasmanian State Service: Final Report*, July 2021, Department of Premier and Cabinet, [https://www.dpac.tas.gov.au/\\_data/assets/pdf\\_file/0004/587515/TSSR\\_Final\\_Report.pdf](https://www.dpac.tas.gov.au/_data/assets/pdf_file/0004/587515/TSSR_Final_Report.pdf), p. 46
  41. See for example the recently published DPIPWE (2021). *Tasmanian Wilderness World Heritage Area*

Natural Values Climate Change Adaptation Strategy 2021-2031. Department of Primary Industries, Parks, Water and Environment, Hobart, <https://dpiwpe.tas.gov.au/Documents/TWWHA%20Natural%20Values%20Climate%20Change%20Adaptation%20Strategy.pdf>, World Bank (2010). *Development and ClimateChange: Stepping Up Support to Developing Countries*. Washington DC

42. Jacobs Consulting (2021), p. 71
43. Gutwein, P. (2021). 'Next Climate Change action plan and review of Act', 4 August 2021, [http://www.premier.tas.gov.au/site\\_resources\\_2015/additional\\_releases/tasmanias\\_electric\\_vehicle\\_future\\_charging\\_ahead/next\\_climate\\_change\\_action\\_plan\\_and\\_review\\_of\\_act](http://www.premier.tas.gov.au/site_resources_2015/additional_releases/tasmanias_electric_vehicle_future_charging_ahead/next_climate_change_action_plan_and_review_of_act)
44. Jacobs Consulting (2021), p. 71
45. Analysis undertaken by the International Monetary Fund in 2021 shows that the global fossil fuel industry benefits from subsidies of 11 million every minute while many of these large companies achieve record profits. See Carrington, D. (2021). Fossil fuel industry gets subsidies of \$11m a minute, IMF finds, *The Guardian*, 6 October 2021, <https://www.theguardian.com/environment/2021/oct/06/fossil-fuel-industry-subsidies-of-11m-dollars-a-minute-imf-finds>

## References

- Bureau of Meteorology (2021). 'Climate Change – trends and extremes', <http://www.bom.gov.au/climate/change/#tabs=Tracker&tracker=timeseries>
- Climate Action Tracker (2021). *Climate Governance: Assessing governments' ability and readiness to transform their countries into zero emissions societies*, August 2021, [https://climateactiontracker.org/documents/865/2021-08\\_CAT\\_ClimateGovernance\\_MethodologyNote.pdf](https://climateactiontracker.org/documents/865/2021-08_CAT_ClimateGovernance_MethodologyNote.pdf)
- Chounding, A. (2021). Farmers come together to address climate change, *The Advocate*, 1 September 2021, <https://www.examiner.com.au/story/7412614/farmers-fight-source-of-climate-change/>
- Department of Health and Human Services (2020). *Report on the Tasmanian Population Health Survey 2019*, Tasmanian Government, [https://www.dhhs.tas.gov.au/\\_data/assets/pdf\\_file/0005/398174/Report\\_on\\_the\\_Tasmanian\\_Population\\_Health\\_Survey\\_2019.pdf](https://www.dhhs.tas.gov.au/_data/assets/pdf_file/0005/398174/Report_on_the_Tasmanian_Population_Health_Survey_2019.pdf)
- Department of Industry, Science, Energy and Resources (2019). 'State and territory greenhouse gas inventories: data tables and methodology', <https://www.industry.gov.au/sites/default/files/April%202021/document/state-and-territory-greenhouse-gas-inventories-2019-time-series-data-tables.xlsx>
- Department of State Growth (2019). *Tasmanian Renewable Hydrogen Strategy* (draft), [https://www.stategrowth.tas.gov.au/\\_data/assets/pdf\\_file/0003/207705/Draft\\_Tasmanian\\_Hydrogen\\_Action\\_Plan\\_-\\_November\\_2019.pdf](https://www.stategrowth.tas.gov.au/_data/assets/pdf_file/0003/207705/Draft_Tasmanian_Hydrogen_Action_Plan_-_November_2019.pdf)
- Energeia (2017). *Electric Vehicles Insights*, Prepared by Energeia for the Australian Energy Market Operator's 2017 Electricity Forecast Insights, September 2017, [https://aemo.com.au/-/media/files/electricity/nem/planning\\_and\\_forecasting/demand-forecasts/efi/2018/final---aemo-ev-insights---september-2017.pdf](https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/demand-forecasts/efi/2018/final---aemo-ev-insights---september-2017.pdf)
- European Commission (2021). 'Carbon Border Adjustment Mechanism: Questions and Answers', 14/07/2021, [https://ec.europa.eu/commission/presscorner/detail/en/qanda\\_21\\_3661](https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661)
- Harrison, M., Cullen, B., Mayberry, D., Cowie, A., Bilotto, F., Badgery, W., Liu, K., Davison, T., Christie, K., Muleke, A. and Eckard, R. (2021). Carbon myopia: The urgent need for integrated social, economic and environmental action in the livestock sector, *Glob. Change Biology*, 27 July 2021, DOI: 10.1111/gcb.15816
- Fink, L. (2021). A Fundamental Reshaping of Finance, BlackRock, <https://www.blackrock.com/au/individual/larry-fink-ceo-letter>
- Good Car Company (2021). *EV Uptake Survey*
- Gutwein, P. (2021). 'Next Climate Change action plan and review of Act', 4 August 2021, [https://www.premier.tas.gov.au/site\\_resources\\_2015/additional\\_releases/tasmanias\\_electric\\_vehicle\\_future\\_charging\\_ahead/next\\_climate\\_change\\_action\\_plan\\_and\\_review\\_of\\_act](https://www.premier.tas.gov.au/site_resources_2015/additional_releases/tasmanias_electric_vehicle_future_charging_ahead/next_climate_change_action_plan_and_review_of_act)
- Independent Expert Panel on Interim Emissions Reduction Targets for Victoria (2019). *Interim Emissions Reduction Targets for Victoria (2021-2030), Final Report*, [https://www.climatechange.vic.gov.au/\\_data/assets/pdf\\_file/0016/420370/Final-Report-Interim-Emissions-Reduction-Targets.pdf](https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0016/420370/Final-Report-Interim-Emissions-Reduction-Targets.pdf)
- Intergovernmental Panel on Climate Change (2021). *Climate Change 2021: The Physical Science Basis – Summary for Policymakers*, Working Group I contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, <https://www.ipcc.ch/report/ar6/wg1/#SPM>
- Jacobs Consulting (2021). *Independent Review of Tasmania's Climate Change Act*
- Just Transition Centre (2017). *Just Transition: A Report for the OECD*, May 2017, <https://www.oecd.org/environment/cc/g20-climate/collapsecontents/Just-Transition-Centre-report-just-transition.pdf>
- Lapham, J. (2021), 'European Union carbon tariffs could spell trouble for Australian commodities, experts say', *ABC News*, 16/07/2021, <https://www.abc.net.au/news/2021-07-16/experts-say-eu-carbon-tariffs-spell-trouble-australian-commodity/100298028>
- Lowy Institute (2021). 'Climate Poll 2021', <https://www.lowyinstitute.org/publications/climatepoll-2021>
- Organisation for Economic Co-operation and Development/International Transport Forum (2018). *Decarbonising Maritime Transport: Pathways to zero-carbon shipping by 2035*, <https://www.itf-oecd.org/sites/default/files/docs/decarbonising-maritime-transport-2035.pdf>

Oxford Languages (2019). 'Word of the Year 2019', Oxford University Press, <https://languages.oup.com/word-of-the-year/2019/>

PAGES 2k Consortium (2019). Consistent multidecadal variability in global temperature reconstructions and simulations over the Common Era, *Nature Geoscience* 12, 643-649, <https://www.nature.com/articles/s41561-019-0400-0>

Point Advisory (2021a). *2021 Economic Impact Analysis - Emissions Pathway Review, Final report*, Prepared for the Tasmanian Government, [https://www.dpac.tas.gov.au/\\_data/assets/pdf\\_file/0003/587343/Economic\\_Impact\\_Analysis\\_-\\_Emissions\\_Pathway\\_Review.pdf](https://www.dpac.tas.gov.au/_data/assets/pdf_file/0003/587343/Economic_Impact_Analysis_-_Emissions_Pathway_Review.pdf)

Point Advisory (2021b). *2021 Update of Tasmania's Emissions Pathway Review – technical report; Final report*, Prepared for the Tasmanian Climate Change Office, [https://www.dpac.tas.gov.au/\\_data/assets/pdf\\_file/0010/587341/Update\\_of\\_Tasmania\\_s\\_Emissions\\_Pathway\\_Review\\_-\\_technical\\_report.pdf](https://www.dpac.tas.gov.au/_data/assets/pdf_file/0010/587341/Update_of_Tasmania_s_Emissions_Pathway_Review_-_technical_report.pdf)

Point Advisory (2021c). *Tasmania: Net Zero by 2030, Emissions Pathway Review Summary Report*, Prepared for the Tasmanian Government, [https://www.dpac.tas.gov.au/\\_data/assets/pdf\\_file/0003/587343/Economic\\_Impact\\_Analysis\\_-\\_Emissions\\_Pathway\\_Review.pdf](https://www.dpac.tas.gov.au/_data/assets/pdf_file/0003/587343/Economic_Impact_Analysis_-_Emissions_Pathway_Review.pdf)

United Nations (2021). 'Glossary of climate change acronyms and terms', <https://unfccc.int/process-and-meetings/the-convention/glossary-of-climate-change-acronyms-and-terms#>

University of Tasmania (2020). *A blueprint for a climate-positive Tasmania: A submission to the review of Tasmania's Climate Change Act and Climate Action Plan*, <https://www.utas.edu.au/community-and-industry/tpe/current-projects>

Watt, I. (2021). *Independent Review of the Tasmanian State Service: Final Report*, July 2021, Department of Premier and Cabinet, [https://www.dpac.tas.gov.au/\\_data/assets/pdf\\_file/0004/587515/TS\\_SR\\_Final\\_Report.pdf](https://www.dpac.tas.gov.au/_data/assets/pdf_file/0004/587515/TS_SR_Final_Report.pdf)

Wood, T., Reeve, A. and Ha, J. (2021). *Towards net zero: Practical policies to reduce agricultural emissions*, Grattan Institute Report No. 2021-12, September 2021, <https://grattan.edu.au/wp-content/uploads/2021/08/Towards-net-zero-Practical-policies-to-reduce-agricultural-emissions.pdf>

Wood, T., Reeve, A. and Ha, J. (2021). *Towards net zero: Practical policies to reduce industrial emissions*, Grattan Institute Report No. 2021-10, August 2021, <https://grattan.edu.au/wp-content/uploads/2021/08/Towards-net-zero-Practical-policies-to-reduce-industrial-emissions-Grattan-report.pdf>

World Bank (2010). *Development and Climate Change: Stepping Up Support to Developing Countries*. Washington DC, <https://documents1.worldbank.org/curated/en/246541468162567542/pdf/556890W10SFDCC1box0349464B01PUBLIC1.pdf>

Yougov (2021). *Australia's biggest climate poll*, <https://election-data.s3.ap-southeast-2.amazonaws.com/PollingReport.pdf>