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To whom it may concern,

RE: ClimateWorks submission to the Inquiry into Renewable Energy in Victoria

ClimateWorks Australia welcomes the opportunity to provide input to the *Inquiry into Renewable Energy in Victoria*. ClimateWorks develops expert, independent solutions to assist the transition to net zero emissions for Australia, Southeast Asia and the Pacific. A non-profit organisation, it was co-founded in 2009 by The Myer Foundation and Monash University and works within Monash Sustainable Development Institute.

ClimateWorks supports transitioning Victoria to 100 per cent renewable energy.¹ Achieving 100 per cent renewable energy is central to reducing emissions in Victoria in line with the state's climate change ambitions. Doing so rapidly will ensure Victoria capitalises on the export opportunities available from industries being powered by renewable energy, as well as capturing co-benefits related to lower energy prices, better health outcomes, and improved energy reliability and security.

ClimateWorks (2020) has modelled a scenario of the Australian economy that is aligned to the goal of the Paris Agreement to keep global temperature rise to below 1.5 degrees. In this scenario, Victoria reaches 100 per cent renewable electricity by 2030. This is possible in Victoria through a combination of investments in renewable electricity generation and storage (such as within Renewable Energy Zones), combined with the retirement of existing fossil fuel generation assets. Doing this will also support substantial emissions reductions in other sectors of the economy, such as transport and buildings, as these are electrified. Within this scenario the electrification of processes using other fuels results in higher electricity demand. ClimateWorks would therefore highlight that as well as an increase in share of renewables, the increase in renewable generation will also need to meet the increased demand for electricity.

A transition to 100 per cent renewable energy in Victoria at a pace and scale aligned to 1.5 degrees reduces economic risks for Victorian business and the state. Delaying action on reducing emissions will mean a sharper, more disruptive and costly transition in the future. Also, as Victoria's domestic and international trading partners seek to reduce the supply chain emissions of the products they purchase, Victorian industries and businesses that remain

¹In this submission, renewable energy refers to renewable electricity, specifically. Other energy sources, such as natural gas and transport fuels, are discussed in our response to Terms of Reference D only.



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powered by high emissions electricity may face lower competitiveness and demand.

ClimateWorks modelling shows that 100 per cent renewable energy is only one element of achieving net zero emissions in Victoria. Other key actions include improving energy efficiency in all sectors, transitioning the vehicle stock to zero emissions vehicles, phasing out fossil fuel gas use in buildings and industry, and reducing non-energy emissions in agriculture and industry. Access to renewable energy is also central to achieving maximum emissions reductions for many of these actions.

Further information on these opportunities for Victoria, as well as detailed responses to the Inquiry's Terms of Reference are set out overleaf. We would welcome an opportunity to brief your team if you would like to explore our responses in further detail.

Yours sincerely,

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ClimateWorks' responses to the Inquiry into Renewable Energy in Victoria Terms of Reference

(A) Measures to enable Victoria to transition its energy supply to 100 per cent renewable energy

In ClimateWorks' (2020) modelled scenario of Australia's economy that is aligned to 1.5 degrees of warming, Victoria reaches 100 per cent renewable electricity by 2030. Within this scenario, the electrification of processes using emissions intensive fuels also results in approximately a 16 per cent increase in electricity demand in 2030 as compared to 2020 levels. This figure would be substantially higher in the absence of the extensive energy efficiency improvements that also occur in the scenario.

Victoria has the opportunity to enable an accelerated transition to renewable electricity in line with the goals of the Paris Agreement, and should undertake detailed analysis of the implications of the transition for all stakeholders.

This should include:

- Consultation with the owners/operators of existing fossil fuel assets to agree appropriate retirement dates including engagement with impacted regions and communities to understand the implications
- The level of generation and storage capacity that will be required to meet projected levels of demand through 100 per cent renewables (see response to Terms of Reference C for capacity and storage in ClimateWorks' modelled scenario in which Victoria reaches 100 per cent renewables by 2030). Analysis of capacity requirements should be conducted in concert with analysis of plans to improve energy efficiency in Victoria, as energy productivity will have a significant influence on overall electricity demand
- The electricity network upgrades required to facilitate the onboarding of generation and storage assets to meet projected levels of demand through 100 per cent renewables
- The workforce required to construct and operate the transmission, generation and storage assets in the pipeline to reach 100 per cent renewables

The above would enable Victoria to begin undertaking the actions needed for the transition, underpinned by clear evidence of its feasibility and an understanding of its implications for all involved. The time required to plan and build electricity infrastructure means there is no time for delay if Victoria is to achieve a transition to 100 per cent renewables that is aligned to 1.5 degrees of warming.

Actions that can be taken to accelerate the transition include:

- Updating the Victorian Renewable Energy Target to 100 per cent renewables by 2030
- Further rounds of the Victorian Renewable Energy Target Auction to support the target set
- Further funding for, and coordination of, existing and new Renewable Energy Zones
- Further support for the development of off-shore wind projects in Victoria
- The establishment of Renewable Energy Industrial Precincts (see response to the Terms of Reference B for further information)
- Streamlining planning processes and approvals for new generation developments, as well as processes for connecting them to the network
- Collaboration with the market operator and other states and territories on the National Electricity Market about potential co-benefits or consequences of Victoria's transition to 100 per cent renewables
- Renewable energy workforce development programs (see response to Terms of Reference B for further information)
- Community and stakeholder engagement processes to understand the implications of Victoria's plans
- Transition support programs for communities currently supported by coal mining and coal-fired power generation (see response to Terms of Reference E for further information)
- Further support for distributed energy resources like rooftop solar and storage for residential and commercial buildings, as well as community energy, microgrids, and virtual power plants
- Greater efforts to improve economy-wide energy efficiency to reduce total demand and enable a swifter and easier transition to 100 per cent renewable energy (see response to Terms of Reference D for further information)

(B) Jobs and economic benefits and implications of Victoria transitioning to 100 per cent renewable energy

The transition to 100 per cent renewable energy in Victoria has the potential to create substantial jobs and economic benefits. Recent analysis shows that for every \$1 of public spending on renewables, \$3 of private spending can be leveraged, increasing economic output (Climate Council 2020). There is also a high job multiplier for investments in renewables. AlphaBeta and the Climate Council (2020) found that utility scale renewable investments in solar and wind have a job multiplier of 6.7 jobs per \$1m spent, which include jobs in specialised occupations (such as large-haul drivers and grid design engineers) as well as in construction. A high number of these jobs are in regional areas. Furthermore, McKinsey analysis (2020) finds a job multiple of 9-12 jobs per \$1m spent on grid-scale storage and transmission network upgrades. Additional job creation and economic benefits can be found

in investments in community energy projects, the build-out of rooftop solar, and in the research and development of clean energy technologies.

The direct and indirect job creation from renewable energy is estimated to be more than two and a half times that of fossil fuel generation investment (McKinsey 2020). Transgrid's recent Energy Vision (2021) for the National Electricity Market models two scenarios with high renewable uptake: a *Deep Decarbonisation* scenario and a *Clean Energy Superpower* scenario. In these pathways, there are 45 per cent and more than 50 per cent more jobs, respectively, over the next ten years than in their *Current Trends* scenario.

Transitioning to 100 per cent renewable energy will not only generate jobs in the renewables sector, but also support and grow jobs in manufacturing and industry as well. Renewable Energy Zones will enable the establishment of Renewable Energy Industrial Precincts, where multiple businesses co-locate in close proximity to renewable energy supply. These precincts will enable Victoria to maintain existing energy dependent businesses and industries and ensure a future for existing jobs by providing them access to low cost, low emissions energy and making them resilient to the global shift towards decarbonising supply chains. The precincts will also attract emerging industries that offer new opportunities to future generations of workers, such as through the production of renewable hydrogen.

(C) Investment, both public and private, required to achieve 100 per cent renewable energy generation in Victoria, including investment in grid infrastructure and energy storage

In ClimateWorks' (2020) modelled scenario of Australia's economy that is aligned to 1.5 degrees of warming, Victoria reaches 100 per cent renewable energy by 2030. This decade, 5 GW of new renewable generation is brought online, which means approximately doubling the 2020 levels of renewable generation on the Victorian grid. In the 1.5 degrees scenario, this is combined with 1.73 GW of storage and a 139 per cent increase in rooftop solar output in Victoria. The total renewable capacity needed is likely to be even higher once peak load requirements are considered.

These increases in generation are combined with significant improvements in energy efficiency, to do more with the electricity that is generated. For example, the energy performance of residential buildings improves by 49 per cent this decade. Improvements in energy efficiency assist in achieving 100 per cent renewable electricity quickly; without them, the required generation and storage capacity to meet total demand will be substantially higher than the figures quoted in the previous paragraph.

The Clean Energy Council's most recent *Clean Energy Outlook Confidence Index* (2021) highlights that investor confidence in renewable energy in Australia has declined due to concerns about grid connection processes, transmission concerns, the lack of Federal energy

policies, and future market design.

Victoria can improve confidence and facilitate the needed generation and storage investments through the actions discussed in our response to Term of Reference A. This includes improving approval and connection processes, as well as funding for off-shore wind projects, Renewable Energy Zones, Renewable Energy Industrial Precincts, and future rounds of the VRET auction. Victoria could also take a co-investment partnership approach, partnering with the Commonwealth to increase the level of public funding available and leveraging greater private sector investment in the process.

(D) Further opportunities for Victoria to reduce emissions, including through finding alternatives to industrial and household gas consumption

100 per cent renewable electricity is one of four key pillars of achieving net zero emissions economy-wide in Victoria (ClimateWorks 2020). The other three key pillars are:

- Energy waste reduction (including through energy productivity and a shift away from energy-intensive products and services)
- Electrification and a shift away from fossil fuels to zero- or near-zero emissions alternatives
- Non-energy emissions reductions and offsetting of residual emissions

There are substantial opportunities across these three pillars to reduce emissions this decade in Victoria.

Energy waste reduction

Energy demand can be reduced through: energy efficiency upgrades and new energy efficient buildings and assets; material efficiencies through circular economy and changes in business practices; and a shift away from energy-intensive products and services. In ClimateWorks' 1.5 degree aligned scenario, energy productivity doubles in residential buildings and improves by 28 per cent in commercial buildings this decade. In industry, total energy use reduces by 15 per cent. Technology and behavioural change can achieve these improvements in Victoria, and in doing so reduce the demand for electricity, making the transition to 100 per cent renewable electricity easier. It will also allow for increased electricity demand related to electrification in transport, industry, buildings and other sectors.

Opportunities to reduce energy waste reduction in Victoria include:

- Building new energy efficient, zero emissions homes and commercial buildings
- Undertaking large-scale energy efficiency upgrade programs for residential and commercial buildings
- Installing the most efficient equipment in buildings, including LED lighting, efficient

HVAC systems, solar hot water systems, efficient appliances, and building optimisation systems

- Improved behaviour, process design, controls, and equipment in industry
- Mode shifting transport kilometres to more efficient modes, including public transport for passengers and rail for freight
- Higher rates of metal and plastic recycling
- Energy-efficient equipment on farms

Electrification and a shift away from fossil fuels to zero- or near-zero emissions alternatives

To capitalise on the full potential of transitioning to 100 per cent renewable energy, Victoria can electrify much of its economy. The emissions reductions from electrifying Victoria's vehicle fleet, buildings, and industries will be larger the greater the share of renewables on the grid. As mentioned previously, these fuel shifts will also result in a 16 per cent increase in electricity demand in 2030 as compared to 2020.

In ClimateWorks' 1.5 degree aligned scenario, three in four new car sales are electric by 2030 Australia-wide. In Victoria, the electricity share of energy use increases from 24 per cent to 59 per cent by 2030, and 100 per cent by 2040. Victoria has begun establishing policies to achieve these changes, including the Zero Emissions Roadmap and the forthcoming Gas Substitution Roadmap. Victoria has the opportunity to build on these policies, and accelerate the deployment of technologies to capture the emissions reductions available.

There is also a significant opportunity to reduce emissions through increased use of zero emissions fuels like renewable hydrogen in sectors such as freight transport and industries like aluminium production.

Opportunities to electrify and fuel-switch to zero emissions fuels in Victoria include:

- Heat pumps, electric heating systems, and induction cooking in residential and commercial buildings
- Increasing the uptake of zero emissions vehicles in passenger and freight transport, through actions such as transitioning the government vehicle fleet, subsidies and other incentives for community uptake, and interventions to address supply side barriers like working with vehicle manufacturers to increase model availability and advocating for national vehicle emissions standards
- Electrify heat in industrial processes and switch remaining fossil fuel use in industry to zero emissions options like renewable hydrogen. This can largely be achieved through the establishment of Renewable Energy Industrial Precincts where renewable hydrogen can be produced and used, and businesses can access cheap, reliable renewable electricity
- Electrify mining processes
- Electrify farming machinery and processes

Non-energy emissions reductions and offsetting of residual emissions

The majority of Victoria's emissions come from energy use, but approximately one fifth come from non-energy sources. These sources include agriculture, industrial processes and product use, and waste. Agriculture alone accounts for 17 per cent of Victoria's emissions, with the majority of these emissions coming from enteric fermentation of livestock (Victorian Government 2021). Victoria has begun to address this source of emissions, through the *Agriculture sector emissions reduction pledge*, and the planned *Victorian Agriculture and Climate Change Statement*. There is an opportunity for Victoria to meet the level of ambition held by the industry; Meat & Livestock Australia (2020), for example, has targeted carbon neutrality by 2030.

Opportunities to reduce agriculture non-energy emissions in Victoria include:

- Sustainable agriculture practices
- Precision agriculture
- Supporting novel alternative protein production and consumption
- Supporting research, development and deployment of anti-methane solutions such as vaccines and algae feeds

Opportunities to reduce other non-energy emissions in Victoria include:

- Improvement in managing of large refrigeration and cooling systems and safe disposal of refrigerant gases
- Reducing organic waste generation and increasing the use of 'waste-to-energy' facilities
- Reducing land use, land use change, and forestry emissions through carbon sequestration efforts like forestry and blue carbon; developing transparent measuring, valuing and tracking of natural capital; and the protection of natural ecosystems

(E) Government investment or action that would be needed to support workers in impacted industries to facilitate a just transition and ensure workers and communities are not left behind as Victoria transitions to 100 per cent renewable energy

Victoria can implement policies to ensure communities supported by fossil fuel generation are not negatively impacted by the transition to 100 per cent renewable energy. By consulting early with the owners/operators of existing fossil fuel assets and with impacted regions and communities, affected workers and companies can be given the necessary time to adjust and adapt.

Specific programs and investments targeting coal communities will assist with the transition to 100 per cent renewable energy. These programs could include voluntary redundancy schemes for coal-fired power station workers, funding for retraining workers, funding to support the

diversification of regional economies, and funding for power station site rehabilitation programs.

Victoria has supported the transition through the Back to Work Scheme for the Hazelwood Power Station, the Latrobe Valley Authority and Economic Development Program, and the establishment of a Clean Economy Skills and Jobs Taskforce and Capacity Building Fund. Other programs in Australia to support just transitions include the Queensland Just Transition Group and New South Wales' Royalties for Rejuvenation fund.

Lessons for Victoria can be taken from experiences overseas. Germany has put in place a long term, legislated plan for the phase out of coal generation, which includes regular reviews of progress and expert commission providing oversight (Wettengel, H 2020). Analysis of coal closures in specific regions of Germany have highlighted the importance of: external advice on the process; diversification of actions to support the transition; the involvement of local stakeholders in the development of just transition policies and programs; and refraining from subsidising existing coal generation (Oei, P., Brauers, H., and Herpich, P 2020).

Another case study is Spain, where the full shut down of coal-fired power plants is almost complete. This has been supported by a Just Transition Strategy that is to be updated every five years. Funding has been provided for early retirement packages for workers, local re-employment in environmental restoration work, and reskilling programs for green industries (World Resources Institute 2020).

The other central aspect to facilitating a just transition is planning for, and investing in, future industries that can provide long term economic security for Victorian regions. This could involve extensions to initiatives like the Latrobe Valley New Energy Jobs and Investment Prospectus, as well as funding for the development of Renewable Energy Industrial Precincts in affected regions, where new industries like renewable hydrogen can create long term employment opportunities.

Victoria can also support secure, long term jobs in clean energy as part of the transition to 100 per cent renewable energy. These include jobs in construction and operation, as well as in the local manufacturing of clean energy technologies. Victoria can support these employment opportunities through grants and other funding for workforce training in relevant regions, especially those targeting certain populations and skills. For example, apprenticeships for Aboriginal and Torres Strait Islander people and programs to support training of technicians for solar and wind. Victoria can also support the matching of employers with employees, such as through a state-wide register of available opportunities.

(F) The economic risks of not urgently reducing emissions by transitioning to 100 per cent renewable energy

There are a variety of economic risks associated with a slow transition to 100 per cent

renewable energy in Victoria. These risks including:

- Communities supported by coal mining and coal fired power plants will face steeper, more disruptive change if phase outs of coal assets are not planned soon with clear lead times of when assets will be decommissioned
- Households and businesses will gain less of the benefits of renewable energy, including lower energy prices and improved air quality and other health outcomes that have economic implications
- Victoria may miss the opportunity to develop low-carbon industries such as renewable hydrogen production and export, which Victorian is actively supporting (see, for example, the Renewable Hydrogen Industry Development Plan). Renewable hydrogen production relies on a cheap and reliable supply of zero emissions electricity. Other states and territories in Australia, and other nations, who transition faster will have greater opportunity to develop their competitive and comparative advantages in these industries
- The renewable energy industry is facing challenges in recruiting skilled and experienced staff (Clean Energy Council 2020). If other states and territories transition to renewable energy faster, there is the potential for this human capital shortage to worsen in Victoria, as workers move elsewhere where there is greater investment, making the transition more difficult in the future
- Countries around the world, and states and territories in Australia, are beginning to target reductions in the supply chain emissions of their imported goods.² If Victoria's electricity grid continues to have high emissions associated with it, there is the potential for Victorian businesses and industries powered by electricity from the grid to have lower demand due to the emissions associated with their products

Victoria can minimise the state's exposure to these risks and capture the opportunities of the renewable energy transition. It can do this by setting a clear near-term date for achieving 100 per cent renewable energy, preferably by 2030, and pairing this with a clear, transparent strategy for achieving this target that consults stakeholders from across the economy, including workers, businesses, communities and trading partners.

² For example, the Australian Capital Territory has recently pledged to work to reduce the emissions related to products and services imported to the territory, including those from Victoria. In the report *Scope 3 Greenhouse Gas Emissions in the ACT (2021)* commissioned by the ACT Government, it is identified that, "Queensland, Victoria and NSW are all dependent on black and brown coal-fired power so any products originating from these states will have significant embodied emissions attached to them...The ACT will need to be selective choosing products produced by renewable energy sources to reduce the embodied emissions of products imported to the Territory."



(G) Any other related matters

In ClimateWorks' scenario that is aligned to 1.5 degrees of warming, net zero emissions is achieved Australia-wide by 2035. A swift transition to 100 per cent renewable energy is critical to Australia meeting its commitments under the Paris Agreement, and critical to Victoria achieving its emissions targets and facilitating emissions reductions across all sectors. By acting now, Victoria can capture a range of long-term economic benefits, and avoid the risks of delay.

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