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# Submission
# Victoria's 2026-30 Climate Change Strategy

## Executive summary

If the Climate Change Strategy is to achieve its goal of helping to limit global warming to 1.5°C the transport sector must be significantly transformed, and a switch to electric vehicles alone will not be sufficient.

Preliminary analysis from Victoria Walks indicates that if 50% of short vehicle trips (under 2 km) in Melbourne were replaced by walking, the emissions reduction would be approximately 300 tonnes per day, or 110,000 tonnes per year. This is a very conservative estimate because it does not account for the fact that short car trips tend to have disproportionately high emissions due to factors like cold starts, stop-and-go driving, and congestion. As a result, it has been estimated that every 1% of car travel replaced by walking cuts total vehicle emissions by 2–4%.

Walking is highly interconnected with public transport – most train trips and nearly all bus and tram trips in Melbourne are accessed by walking. People spend a substantial proportion of their time in a public transport trip walking to or from the stop, and they value that time more greatly than their time in-vehicle. Poor walking conditions can therefore be a major physical or psychological barrier to public transport use.

Victoria Walks have also undertaken preliminary analysis of a scenario where investment in walking infrastructure and increased walking activity would facilitate the transfer of 10% of vehicle trips longer than 2 kilometres to combined walking and public transport trips. Victoria Walks estimates that this shift could avoid 2,174 tonnes of emissions per day, or 793,510 tonnes per annum.

Total emissions reductions from the two scenarios considered are almost 2,500 tonnes per day or 900,000 tonnes per annum.

Land use planning that facilitates more dense city structures – bringing destinations closer to people and allowing more trips to be walked, would reduce car ownership rates and lower emissions even further.

While electric vehicles (EVs) offer certain advantages, EVs alone are insufficiently able to address the greenhouse gas (GHG) emissions from the transport sector. Issues include:

- Currently only 37% of Victoria's electricity has a renewable source.
- While EVs typically produce lower direct emissions during operation, over their lifecycle they still significantly contribute to GHG emissions.

- The materials used in the construction and maintenance of roads and parking lots, such as concrete, are emissions-intensive.
- Global warming potential is sensitive to vehicle weight, with battery electric vehicles generally being 20-24% heavier than internal combustion engine vehicles.

Walking is therefore an essential component of decarbonising the transport sector and this is acknowledged by a broad range of Australian and international climate organisations and experts. These include the World Bank, International Transport Forum, Intergovernmental Panel on Climate Change (IPCC), World Economic Forum, Australian Government Climate Change Authority and Infrastructure Sustainability Council.

# Recommendations

Victoria Walks recommends that the Climate Change Strategy:

1. Acknowledges the key role of walking in reducing emissions from the transport sector
2. Retains a commitment to 25% active transport mode share by 2030
3. Commits to increased investment in walking infrastructure. Victoria Walks analysis in 2022 indicated that around $235 million per annum is required to meet the demand for walking investment.

# Introduction

Victoria's Climate Change 2026-2030 Strategy (the Strategy) is an important step forward in addressing the urgent need for a transition to a sustainable future.

Climate change demands urgent action, and the transport sector remains one of the most stubborn sources of emissions.

The Transport Sector Pledge in 2021 outlined a promising vision, with a commitment to 25% active transport mode share by 2030. However, Victoria is not on track to reach this goal without the necessary investment or strategic momentum to achieve its targets. We strongly support these targets but the Government should demonstrate a real commitment through tangible investments and actions. It is crucial to recognise that the target set will not be met unless there is a clear, actionable commitment to policies and investments that prioritise walking.

Victoria Walks welcomes the suggestion in the Summary Paper that "The Victorian Government is committed to taking strong and lasting action to play our part in limiting global warming to 1.5°C and adapting to the impacts of climate change."

If the Climate Change Strategy is to achieve this goal, the transport sector must be significantly transformed and a switch to electric vehicles will be insufficient. Climate Works modelling from last year indicates that a 'technology only' pathway for decarbonising the transport sector with a realistic projection of electric vehicle technology uptake is likely to exceed the 1.5 target by 275 $MtCO_2e$ by 2050, requiring more drastic reductions in other sectors (Rau, Rowe, & Powell, 2024).

Walking will play a crucial role in the climate response to transport, by reducing the emissions from driving. Walking will require investment to remain viable in the face of climate adaptation.

While not the focus of this submission, Victoria Walks notes that walking is not only crucial for achieving Victoria's transport goals, but it also brings a multitude of additional benefits, particularly improved public health and enhanced quality of life. Moving towards a more multi-modal transport system with an increasing proportion of trips by walking and public transport would also have significant benefits for road safety.

In the context of Victoria's Climate Change Strategy, this submission calls for urgent action and investment to fulfill the promise of a walkable, sustainable future.

# Short trips and emissions

Short car trips, which walking can often easily replace, tend to have disproportionately high emissions due to factors like cold starts, stop-and-go driving, and congestion. These conditions increase fuel consumption per kilometre.

One study estimated that every 1% of car travel replaced by walking cut total vehicle emissions by 2–4% Evaluating Active Travel Benefits and Costs 2004).

## Cold starts

Cold-start inefficiencies make these trips highly polluting, as catalytic converters take time to reach full effectiveness. Cold starts—when a vehicle's engine is started after being off for several hours—significantly increase emissions due to inefficient engine operation during initial warm-up.

A study conducted on Melbourne roads between May 2016 and June 2017 found that vehicles exhibited higher emissions during cold starts, particularly concerning nitrogen oxides (NOx) and particulate matter. For short trips, the emissions from cold starts can constitute a significant portion of the total trip emissions.

## Stop-start travel

Acceleration and deceleration are major drivers of fuel consumption and emissions. Short trips typically involve more frequent stops and starts, meaning they generate disproportionately high emissions relative to their distance. Because short trips typically occur on local roads rather than freeways, they experience slower speeds, more traffic lights, and more time spent at origins and destinations.

Studies have shown that stop-go driving results in far greater emissions than steady-speed travel. Smit and McBroom (2009) found that emissions models significantly underestimate the pollution from stop-go driving, with real-world emissions greatly exceeding model predictions.

## Parking emissions

Beyond the trip itself, short car journeys often include time spent searching for parking—a process described as "cruising." Parking related emissions are spread across all car trips, but their relative impact is much greater for shorter journeys. For short trips, emissions from searching for a space, idling, and manoeuvring into a spot can make up a significant portion of total trip emissions.

Rates of cruising are highly variable with respect to driver characteristics, time of day or week or destination characteristics. This feature makes it hard to estimate accurately the significance of parking on the emissions for any trip. However, there is considerable evidence that the issue is significant:

- Australian research has identified significant rates of parking-related cruising (Lee & Agdas, 2017).
- A study in Sweden estimated that $CO_2$ emissions from parking-related cruising in a 320 $m^2$ car park over a workday could reach 37 kg, or the equivalent of driving 122 km in an average passenger vehicle— (Vijay, Håkansson, Fleyeh, & Nyberg, 2022).
- In Los Angeles, parking-related cruising accounts for an estimated 1.61 million extra VKT annually, consuming 47,000 gallons of fuel and emitting 730 tons of $CO_2$ (Shoup, 2006).

Whether due to congestion or naturally lower speeds, or time spent looking for parking – all those factors contribute to significantly higher per-kilometre emissions for short trips, and suggest the trips that walking could replace produce a relatively high level of emissions.

# Replacing car trips with walking and public transport

Walking is a critical component of an effective public transport system. In Melbourne:

- 94% of trips to and from bus and tram stops are made on foot.
- Two-thirds of train passengers access the system by walking (Eady & Burtt, 2019).

That walking is integral to PT systems is often overlooked. However, people spend a lot of their time walking as part of a public transport trip and also value that time more greatly than their time in vehicle. Poor walking conditions can therefore be a major physical or (perhaps more commonly) psychological barrier to public transport use. By improving non-motorised (including walking) conditions, public transport ridership can increase significantly, with one report estimating a 10-50% rise in public transport usage from the improvements (Litman, 2024, p. 92).

> "Public transit – whether trains, trams, or buses – relies on well-designed pedestrian connections. Even the fastest, highest-capacity bus systems cannot serve an optimal number of people if their hubs or stations are not in dense, walkable, and transit-oriented neighborhoods. Each transit trip starts and ends with a walking trip, so an investment in walkability in the communities near transit stations is also an investment in the mobility overall." (IDTP, 2024)

By investing in pedestrian infrastructure, we can create environments that make public transport a more attractive travel option. Evidence for this includes:

- One study found that the quality of the walking environment can influence perceptions of what constitutes an acceptable walking distance to public transport by as much as 70% (Hillnhütter, 2016).
- According to the OECD "…there is no doubt that a premium should be attached to walking and waiting time relative to IVT, and one could interpret the results as indicating that multipliers of 2 in normal conditions can be regarded to be upper bounds." (OECD/ITF, 2014).
- An overview of mostly Australian studies (largely Sydney) suggested a value multiplier for access walk time of 1.5 for most conditions ( ATAP, 2021).
- A Chicago study found that access time, safety, and sidewalk availability affect walking to transit (Tilahun & Li, 2015). It highlights that improving these factors can significantly increase transit ridership and may be more cost-effective than expanding transit service alone.
- A case study in California showed that microlevel walkability improvements improve the radius of transit accessibility (Park, 2019).

This evidence demonstrates that walking is not simply a supplementary activity, it is a critical part of the public transport experience. As such, walking infrastructure that is well integrated with the public transport network can encourage more people to shift vehicle trips to walking and public transport for distances that cannot feasibly be walked alone.

Of course, climate change action should also involve direct investment in public transport infrastructure and services. Other organisations are better placed to make the important case for that investment.

# Estimating the potential impact of walking on emissions

Victoria Walks is currently undertaking analysis of scenarios where walking, alone or in combination with public transport, could contribute to emissions reduction. Preliminary results are set out below.

It should be noted:

- The analysis uses publicly available data from the Victorian Integrated Survey of Travel and Activity (VISTA) for metropolitan Melbourne. No comparable data is available for regional Victoria.
- The analysis uses current estimates of emissions per km from private vehicles and public transport. It does not attempt to model future scenarios as the composition of the vehicle fleet and the electricity grid, or the proportion of trips made by different transport modes, evolve over time. As such it should be considered only as an indicative snapshot of the emissions reductions that could reasonably be achieved.

## Converting short trips to walking

Using VISTA data, we conducted a weighted analysis of the total distance of trips, based on an average day of the week from the combined 2012-2020 dataset. This methodology allowed us to estimate the emissions associated with short trips using emissions factors per kilometre from the Institute for Sensible Transport (Institute for Sensible Transport, 2018).

The analysis revealed that if 50% of short vehicle trips (under 2 km) in Melbourne were replaced by walking, the immediate emissions reduction would be approximately 302 tonnes per day, or 110,223 tonnes per year.

It should be noted that this is a highly conservative analysis, that does not allow for the factors previously discussed indicating that short vehicle trips have high per kilometre emissions compared to longer trips. Applying the factors suggested by VTPI 2004 would give emissions reductions 2-4 times higher than this estimate.

## Converting longer trips to walking and public transport

The objective of this analysis was to explore how walking and public transport can contribute to reductions in emissions. The key assumption underlying this work is that a shift from vehicle use to public transport (and associated walking) is necessary to achieve emissions reductions. However, the exact impact of walking on increasing public transport mode share cannot be definitively quantified within the scope of this analysis. While walking itself supports and enables the use of public transport, the specific contribution of walking infrastructure and investments in walking to the overall mode shift remains uncertain.

For the purposes of this study, we consider a scenario where investment in walking infrastructure and increased walking activity would facilitate the transfer of 10% of vehicle trips longer than 2 kilometres to combined walking and public transport trips. We then used emissions data to estimate the emissions per kilometre for public transport, finding that the typical emissions for PT are 52.4g per kilometre (Transport and Climate Change, 2018).

We calculated the total weighted distance of vehicle trips longer than 2 kilometres. We then calculated 10% of the weighted total distance of these longer vehicle trips and multiplying it by the difference in emissions between private vehicle trips and public transport from our above step, we estimated that this shift could avoid 2,174 tonnes of emissions per day, or 793,510 tonnes per annum.

In practice, such a change would involve a shift of specific types of trips to public transport, but this analysis does not attempt to distinguish which specific trips would be impacted. Ideally, more detailed research would refine estimates of the precise contribution of walking infrastructure and investments to the overall shift in mode share.

Total emissions reductions from the two scenarios considered above are almost 2,500 tonnes per day or 900,000 tonnes per annum.

# Land use, walking and emissions

Land use planning that facilitates more dense city structures – bringing destinations closer to people and allowing more trips to be walked, will thus lower emissions even further. Evidence around this includes:

- Residents and employees in walkable, transit-oriented communities drive 20-35% less and use nonmotorized transport two to four times more than those in automobile-dependent areas ("Land Use Impacts on Transportation," VTPI, 2004).
- Transit-oriented developments reduce single-occupant vehicle commuting by 15-30% (Cervero et al. 2004)
- Higher-density areas consistently show lower per capita transport emissions, and compact development leads to 20-35% reductions in VKT (Krizek, 2003b; Cervero, 2007).
- Higher-density areas show 20-35% reductions in vehicle kilometres travelled (Krizek 2003).
- "Cities can reduce their transport-related fuel consumption by around 25% through combinations of more compact land use and the provision of less car-dependent transport infrastructure" (Jaramillo, 2022).
- A 5% increase in walkability (factoring in density, street connectivity, and land use mix) led to a 6.5% reduction in vehicle miles travelled (VMT) and a significant decrease in air pollution emissions (Frank et al. 2006)

## Walking can encourage/allow people to give up a car

One of the most profound impacts of increased walking is the decline in car ownership. As cities become more walkable, the need for private cars diminishes. This reduction in car ownership doesn't only lower emissions from fewer cars on the road - it also means fewer resources are used to manufacture and maintain those vehicles. As walking (and other modes) become more central modes of transportation, fewer people need to own cars. This leads to fewer vehicles on the road, reducing emissions, and lowering demand for parking and infrastructure dedicated to cars.

Improved walkability and enhanced public transit infrastructure have been linked to lower levels of car ownership in various cities (Van Acker & Witlox, 2010). The research in Australia indicates that urban structure plays a significant role in influencing car ownership decisions (Soltani & Somenahalli, 2005).

A significant part of the whole of life-cycle emissions from car usage comes from the manufacturing and disposal of vehicles (especially in the case of EVs). Decreasing personal vehicle ownership by increasing the mode share of walking for viable trips has the potential to reduce total carbon emissions significantly. With walking as the primary transport mode and complementary occasional use of ride share technologies for instances such as extreme

weather or when hauling equipment – a reduction in the car ownership is theoretically more and more feasible.

### Policy response

As part of the climate change strategy, the Victorian government should prioritise an approach to urban design that recognises the importance of walking and shifts investment priorities, fostering active, low-carbon urban environments. The way Melbourne grows now will largely determine its future emissions trajectory, and transport infrastructure decisions will create long-term "lock-in" effects. Once a city is built around cars, reversing course is difficult. However, prioritising walking in urban development offers an alternative path - one that avoids emissions-intensive sprawl and fosters a more sustainable, low-carbon urban form.

Victoria Walks acknowledges and applauds the fact that the Government has shown a willingness to better integrate transport land use, particularly with increased housing development around higher frequency public transport.

## Investing in and planning for walking

Given all of the factors above, an effective climate strategy will require increased investment in walking in order to reduce transport emissions.

Determining the full extent that investing in any pedestrian infrastructure will increase walking, reduce driving or reduce total emissions is a complex task that is very difficult to quantify. However, investing in pedestrian infrastructure has been shown to increase walking for transportation purposes which undoubtably has climate benefits. A considered policy response that includes a significant increase in funding dedicated to walking and a cohesive strategy will be essential to realising these benefits.

Evidence that investing in walking can have a positive effect on emissions reductions include:

- **"**… completing the sidewalk network in typical U.S. towns would increase average per capita non-motorized travel 16% (from 0.6 to 0.7 miles per day) and reduce automobile travel 5% (from 22.0 to 20.9 vehicle-miles).**"** (Guo and Gandavarapu 2010)
- One study found that increasing sidewalk coverage from 30% to 70% of streets could reduce vehicle travel by 3.4% and carbon emissions by 4.9%. (Frank 2011)
- A survey (Yu, 2024) found that the quality of walking conditions affects people's propensity to walk to local stores more than personal conditions (such as car ownership) and attitudes.

In the lead up to the 2022 Victorian election, Victoria Walks developed detailed proposals for investment in walking. This included inviting Victorian councils to put forward projects requiring funding. Just over half responded, along with two water authorities, to provide 522 walking projects worth $469 million. This analysis indicated that around $235 million per annum is required to meet the demand for walking investment.

# The solution is not (only) EVs

Addressing greenhouse gas (GHG) emissions from transportation remains a complex challenge, and while electric vehicles (EVs) offer certain advantages, they are not a panacea. EVs alone are insufficiently able to address the GHG emissions from the transport sector. A transition to EVs retains many of the problem factors from the current car dependent system and to some extent also bring about new environmental risks.

## EVs require energy and ours is not clean

The environmental benefits of EVs heavily depend on the source of electricity used for charging. Factors such as the carbon intensity of the electricity grid and the efficiency of the battery can dramatically alter the GHG emissions per km for an EV. If the electricity grid relies heavily on fossil fuels, the emissions savings from switching to EVs will be limited, although likely still an improvement on ICE. Transitioning to a renewable energy-dominated grid is essential to maximise the environmental benefits of EVs. However, in Victoria, the current grid mix consists of 37.2% renewable with the rest being predominantly coal (DELWP, 2024).

Victoria is expanding its supply of renewable energy. However, transitioning to EVs will substantially increase electricity demand and thus apply significant pressure to the National Energy Market – making it harder (and slower) to replace current energy sources with sustainable ones. Australian modelling has predicted that by 2050, there will be a 40% increase in energy demand, largely driven by a transition to more EVs (Transgrid, 2021). Additionally, some research suggests that this "may delay efforts to decarbonise electric grids" (Henderson, 2022). This will limit the potential for EVs alone to decarbonise transport and limit the accuracy of any estimates of GHG emissions reductions from transitioning the vehicle fleet in the short term.

## Manufacture and recycling or disposal

While EVs typically produce lower direct emissions during operation compared to internal combustion engine vehicles (ICEVs), over their lifecycle they still significantly contribute to GHG emissions.

Their overall lifecycle emissions include those from manufacturing, battery production, electricity generation, end-of-life disposal and construction and maintenance of infrastructure of road infrastructure can contribute to emissions.

The production of EV batteries requires significant amounts of raw materials, such as lithium, cobalt, and nickel. Mining these materials can have adverse environmental impacts, including habitat destruction, water pollution, and carbon emissions from extraction and processing. An additional challenge is that while p/km emissions are likely lower for EV than ICE, even if the grid is not clean, it is too modern of an invention to adequately estimate the lifetime of a battery, and we don't know yet how effective battery recycling programs will become.
"Manufacturing contributes up to 37% of life cycle GHG emissions of battery electric vehicles due to the emissions intensity of battery manufacturing."

## Infrastructure related to car-dependency highly emitting

EVs do not address other issues of car-dependent urban planning, such as sprawling developments, low-density housing, and extensive dedication of land to roads. These urban forms contribute increased vehicle kms travelled (VKT) which in turn leads to higher overall emissions, regardless of the vehicle's propulsion system. Additionally, the emissions from

buildings themselves in an urban form categorised by sprawling development are greater (Borck & Brueckner, 2018).

Private vehicles require substantial infrastructure, including extensive networks of roads and parking facilities. In Victoria, there are approximately 150,000 kilometres of roads (Transport Victoria). Since private cars are parked around 95% of the time (UN Habitat III, 2016), this creates a significant demand for parking spaces. Analysis indicates that 9% of off-road space in the City of Melbourne was dedicated to car parking (Chwasta, 2024).

The materials used in the construction and maintenance of roads and parking lots, such as concrete, are emissions-intensive and contribute to greenhouse gas (GHG) emissions. These emissions are often not accounted for in standard transport emission assessments, despite being significant. For instance, a study in Western Australia found that the life cycle global warming potential (GWP) of road infrastructure is approximately 589.5 tons of CO2-equivalent per kilometre (Jiang, Wu, Song, & Wu, 2020).

This GWP is sensitive to vehicle weight, with battery electric vehicles generally being 20-24% heavier than internal combustion engine vehicles (Faria, Moura, Delgado, & Almeida, 2012) (Victor & Achten, 2016) (David CS & Harrison, 2021). As the proportion of EVs in the vehicle fleet increases, the GWP associated with road infrastructure is likely to rise as well.

### Collateral environmental degradation

Roads and car parks have other environmental hazards, such as polluting the water systems, exacerbating urban heat island effect and worsening susceptibility to natural disasters (Vera Lúcia S., Isidoro, & LMP de Lima, 2017) (Bryant & Westerling, 2014).

### It will be well past the deadline for climate targets before the entire vehicle fleet has transitioned to EVs

The proportion of EVs in the on-road fleet adapts slowly to the sale of new vehicles, as vehicles stay on the road for 10-15 years. Factors such as battery range, charging times, and cost parity with ICEVs influence consumer adoption rates. While the proportion of new vehicles sold that are electric has been increasing in recent years, they are still rare – making up approximately 1% of the on-road fleet (Electric Vehicle Council, 2023, p. 5). During this transition period, achieving significant reductions in transportation emissions may be challenging.

## Alignment with key organisations

Walking is especially compelling as a sustainable mode of transport given its immediate potential for implementation. It is often the most accessible option for many people and can be easily adopted without the need for extensive infrastructure changes.

Walking (or walking and PT) and active transport more broadly is an essential component of decarbonising the transport sector and this is acknowledged by a broad range of Australian and international climate organisations and experts:

- **International Transport Forum (associated with OECD):** “Improving the pedestrian environment can contribute significantly to meeting the challenges of climate change, air pollution and health” (ITF, 2012).
- **Intergovernmental Panel on Climate Change (IPCC)**: “[the necessary reduction in carbon emissions] requires, in addition to technological changes, a paradigm shift that ensures prioritisation of high-accessibility transport solutions … and favours transit and active transport modes” (Jaramillo, 2022).

- **Climate Council:** “To decarbonise the transport sector, the way we get around must transform from the majority of trips occurring via private vehicle to most happening on public transport or in an active way.” (Cheung, Bradshaw, Rayner, & Arndt, 2023).
- **Australian Government Climate Change Authority**: “Travel by active transport can provide immediate emissions reduction not dependent on electricity decarbonisation” (Climate Change Authority, 2024, p. 6).
- **World Bank**: to reduce GHG emissions from transport, an approach should seek to [among other things] “promote the use of “low-emission” transport modes such as walking…”
- **Infrastructure Sustainability Council (ISC):** “But decarbonising individual private transport is not enough. These vehicles will still consume three times more energy per passenger-km than public transport and produce three times more $CO_2$ per passenger. Only a reduction policy for car journeys will reduce pollution, health risks and global GHG emissions. A modal shift to collective public transport and active mobility is needed and can be achieved over a shorter period of time.” (Fulton, 2022)
- **World Economic Forum**: “Promoting active mobility is a core element of decarbonizing urban mobility.”

It should be noted in this context that walking is effectively downplayed when grouped with cycling under the term "active transport." In Australia, walking vastly outweighs cycling as the primary form of active transport. In Melbourne, for example, 90% of active transport trips are walked (Eady, Walking and Transport in Melbourne: 2023 Update, 2023).

*Victoria Walks would welcome the opportunity to answer any questions in relation to this submission. Please contact Duane Burtt, Principal Policy Advisor, dburtt@victoriawalks.org.au*

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