Submission to the Inquiry into Health Impacts of Air Pollution in Victoria April 2021



Introduction

The Public Transport Users Association (PTUA) welcomes this opportunity to contribute to the Inquiry into Health Impacts of Air Pollution in Victoria and commends the Committee for its consideration of this subject.

Sources and effects of air pollution

Air pollution is a pervasive problem with serious acute and long-term impacts on the health of Victorians. In addition to links between particulate matter (PM) pollution and cardiovascular diseases identified over half a century ago¹, air pollution is now implicated in harmful effects on many body systems. For example:

- exposure to PM₁₀, NO₂ and CO is associated with increased risk of kidney disease²;
- air pollution nanoparticles are linked to increased risk of brain tumours³;
- both PM_{2.5} and PM₁₀ exposure have linked linked to poor mental health including depression, anxiety and suicide⁴;
- short-term exposure to PM_{2.5} is linked to hospital admissions for septicemia, fluid and electrolyte disorders, acute and unspecified renal failure, cardiovascular and respiratory diseases, Parkinson's disease, diabetes, phlebitis, thrombophlebitis, and thromboembolism⁵;
- cardiovascular and respiratory mortality increases rapidly with rising PM concentrations at relatively low levels⁶;

² Bowe, Benjamin, Yan Xie, Tingting Li, Yan Yan, Hong Xian, and Ziyad Al-Aly. "Associations of ambient coarse particulate matter, nitrogen dioxide, and carbon monoxide with the risk of kidney disease: a cohort study." *The Lancet Planetary Health* 1, no. 7 (2017): e267-e276.

https://www.nejm.org/doi/full/10.1056/NEJMoa1817364

¹ Lelieveld, Jos, Klaus Klingmüller, Andrea Pozzer, Ulrich Pöschl, Mohammed Fnais, Andreas Daiber, and Thomas Münzel. "Cardiovascular disease burden from ambient air pollution in Europe reassessed using novel hazard ratio functions." *European Heart Journal* 40, no. 20 (2019): 1590-1596. https://academic.oup.com/eurheartj/article/40/20/1590/5372326

https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(17)30117-1/fulltext

 ³ "Åir pollution nanoparticles linked to brain cancer," McGill University, published November 2019, https://www.mcgill.ca/newsroom/channels/news/air-pollution-nanoparticles-linked-brain-cancer-302590
⁴ Braithwaite, Isobel, Shuo Zhang, James B. Kirkbride, David PJ Osborn, and Joseph F. Hayes. "Air pollution (particulate matter) exposure and associations with depression, anxiety, bipolar, psychosis and suicide risk: a systematic review and meta-analysis." *Environmental Health Perspectives* 127, no. 12 (2019): 126002. https://ehp.niehs.nih.gov/doi/full/10.1289/EHP4595

⁵ Wei, Yaguang, Yan Wang, Qian Di, Christine Choirat, Yun Wang, Petros Koutrakis, Antonella Zanobetti, Francesca Dominici, and Joel D. Schwartz. "Short term exposure to fine particulate matter and hospital admission risks and costs in the Medicare population: time stratified, case crossover study." *BMJ* 367 (2019). https://www.bmj.com/content/367/bmj.l6258

⁶ Liu, Cong, Renjie Chen, Francesco Sera, Ana M. Vicedo-Cabrera, Yuming Guo, Shilu Tong, Micheline SZS Coelho et al. "Ambient particulate air pollution and daily mortality in 652 cities." *New England Journal of Medicine* 381, no. 8 (2019): 705-715.

- all-cause mortality is associated with levels of PM_{2.5} and NO₂, even at relatively low levels⁷;
- maternal exposure to PM and NO₂ is associated with congenital heart defects in children⁸;
- ambient CO is associated with mortality at levels below current air quality guidelines⁹.

As research such as that listed above shows, even relatively low levels of pollution traditionally considered "safe" are now linked to a range of diseases¹⁰ ¹¹. Particularly topical are findings that air pollution increased deaths from COVID-19 by compromising immune systems and making respiratory systems more vulnerable to the virus¹² ¹³. In contrast, reduced traffic pollution due to COVID lockdowns is believed to have reduced pollution-related morbidity and mortality in cities around the world¹⁴ ¹⁵. However a subsequent rebound in traffic could result in worsening pollution unless active and public transport systems respond to changing travel patterns and provide a realistic alternative for more journeys¹⁶.

Motor vehicles and roads are leading sources of air pollution in urban areas.

⁷ Hanigan, Ivan C., Margaret I. Rolfe, Luke D. Knibbs, Farhad Salimi, Christine T. Cowie, Jane Heyworth, Guy B. Marks et al. "All-cause mortality and long-term exposure to low level air pollution in the '45 and up study' cohort, Sydney, Australia, 2006–2015." *Environment International* 126 (2019): 762-770. https://www.sciencedirect.com/science/article/pii/S0160412018329635

⁸ Bo-Yi Yang, Yanji Qu, Yuming Guo, Iana Markevych, Joachim Heinrich, Michael S. Bloom, Zhipeng Bai, Luke C. Knibbs, et al. "Maternal exposure to ambient air pollution and congenital heart defects in China," *Environment International* 153 (2021): 106548. doi: 10.1016/j.envint.2021.106548. https://www.sciencedirect.com/science/article/pii/S0160412021001732

⁹ Ana M Vicedo-Cabrera, Yuming Guo, Shilu Tong, Eric Lavigne, Patricia Matus, Nicolás Valdés, Haidong Kan, Jouni J K Jaakkola, Niilo R I Ryti, Veronika Huber et al. "Ambient carbon monoxide and daily mortality: a global time-series study in 337 cities," *The Lancet Planetary Health* 5, (April 2021): e191-e199, doi: 10.1016/S2542-5196(21)00026-7. https://doi.org/10.1016/S2542-5196(21)00026-7 ¹⁰ Adrian G. Barnett, "It's safe to say there is no safe level of air pollution," *Australian and New Zealand Journal of Public Health* 38, no. 5 (Sep 2014): 407-408, doi: 10.1111/1753-6405.12264. http://onlinelibrary.wiley.com/doi/10.1111/1753-6405.12264/full

¹¹ Vohra, Karn, Alina Vodonos, Joel Schwartz, Eloise A. Marais, Melissa P. Sulprizio, and Loretta J. Mickley. "Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem." *Environmental Research* 195 (2021): 110754. https://www.sciencedirect.com/science/article/pii/S0013935121000487

¹² Anastasia Tsirtsakis, "Air pollution may have increased COVID-19 deaths by 15%," Royal Australian College of General Practitioners, 27 October 2020,

https://www1.racgp.org.au/newsgp/clinical/air-pollution-may-have-increased-covid-19-deaths-b¹³ Bourdrel, Thomas, Isabella Annesi-Maesano, Barrak Alahmad, Cara N. Maesano, and Marie-Abèle Bind. "The impact of outdoor air pollution on COVID-19: a review of evidence from *in vitro*, animal, and human studies." *European Respiratory Review* 30, no. 159 (2021). https://err.ersiournals.com/content/30/159/200242

¹⁴ Bao, Rui, and Acheng Zhang. "Does lockdown reduce air pollution? Evidence from 44 cities in northern China." *Science of the Total Environment* 731 (2020): 139052.

https://www.sciencedirect.com/science/article/pii/S0048969720325699

¹⁵ Berman, Jesse D., and Keita Ebisu. "Changes in US air pollution during the COVID-19 pandemic." *Science of the Total Environment* 739 (2020): 139864.

https://www.sciencedirect.com/science/article/pii/S0048969720333842

¹⁶ Iain Lawrie & John Stone, "How to avoid cars clogging our cities during coronavirus recovery," *The Conversation*, 22 June 2020,

https://theconversation.com/how-to-avoid-cars-clogging-our-cities-during-coronavirus-recovery-140744

Acetaldehyde	Ammonia	Antimony & compounds	Arsenic & compounds
Benzene	1,3-Butadiene	Cadmium & compounds	Carbon monoxide
Chromium (III) compounds	Chromium (VI) compounds	Cobalt & compounds	Copper & compounds
Cyanide (inorganic) compounds	Cyclohexane	Ethylbenzene	Formaldehyde (methyl aldehyde)
n-Hexane	Lead & compounds	Manganese & compounds	Mercury & compounds
Oxides of Nitrogen	Particulate Matter 10.0 um	Polycyclic aromatic hydrocarbons (B[a]Peq)	Styrene (ethenylbenzene)
Toluene (methylbenzene)	Total Volatile Organic Compounds	Xylenes (individual or mixed isomers)	Zinc and compounds
	Source Motor Vehicle	s Paved/ Unpaved Roads	Service stations Other

Figure 1: Sources of key air pollutants in Stonnington Local Government Area, considered the "geographic centre" of greater Melbourne. Source: National Pollutant Inventory.

The significance of motor vehicle pollution is highlighted by a range of studies with findings including:

- living near a busy road is associated with increased risk of dementia¹⁷;
- NO₂ from traffic pollution is implicated in millions of cases of childhood asthma around the world each year¹⁸;
- childrens' lung growth is stunted and the risk of lung cancer is increased when living near a busy road¹⁹;
- traffic pollution is associated with reduced birth weights, even at relatively low concentrations²⁰;
- exposure to traffic pollution is associated with increased risk of leukemia and other childhood cancers²¹;
- exposure to traffic pollution is associated with increased risk of heart attack²².

Anthropogenic climate change is also set to cause widespread and serious harms to the health, welfare and safety of Victorians through effects including increased frequency of extreme weather events such as heat waves and flooding, reducing food security and expanding the range of communicable diseases^{23 24 25}. This clearly fits the description of pollution of the atmosphere covered by Section 41 of the Environment Protection Act 1970 (Vic). Furthermore, global warming may worsen the effects of localised air pollution by

https://www.sciencedirect.com/science/article/pii/S2542519619300464

https://pubmed.ncbi.nlm.nih.gov/10680346/

¹⁷ Hong Chen, Jeffrey C Kwong, Ray Copes, Karen Tu, Paul J Villeneuve, Aaron van Donkelaar, Perry Hystad, Randall V Martin, Brian J Murray, Barry Jessiman, Andrew S Wilton, Alexander Kopp, Richard T Burnett, "Living near major roads and the incidence of dementia, Parkinson's disease, and multiple sclerosis: a population-based cohort study," *The Lancet* 389, no. 10070: P718-726. doi: 10.1016/S0140-6736(16)32399-6.

http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)32399-6/fulltext

¹⁸ Achakulwisut, Pattanun, Michael Brauer, Perry Hystad, and Susan C. Anenberg. "Global, national, and urban burdens of paediatric asthma incidence attributable to ambient NO2 pollution: estimates from global datasets." *The Lancet Planetary Health* 3, no. 4 (2019): e166-e178.

¹⁹ Sandra Laville, "Living near busy road stunts children's lung growth, study says," *The Guardian*, 25 November 2019,

https://www.theguardian.com/environment/2019/nov/25/living-near-busy-road-stunts-childrens-lung-gr owth-study-says

²⁰ Brauer, Michael, Cornel Lencar, Lillian Tamburic, Mieke Koehoorn, Paul Demers, and Catherine Karr. "A cohort study of traffic-related air pollution impacts on birth outcomes." *Environmental Health Perspectives* 116, no. 5 (2008): 680-686. https://pubmed.ncbi.nlm.nih.gov/18470315/

²¹ Pearson, Robert L., Howard Wachtel, and Kristie L. Ebi. "Distance-weighted traffic density in proximity to a home is a risk factor for leukemia and other childhood cancers." *Journal of the Air & Waste Management Association* 50, no. 2 (2000): 175-180.

²² Tonne, Cathryn, Steve Melly, Murray Mittleman, Brent Coull, Robert Goldberg, and Joel Schwartz. "A case–control analysis of exposure to traffic and acute myocardial infarction." *Environmental Health Perspectives* 115, no. 1 (2007): 53-57. https://pubmed.ncbi.nlm.nih.gov/17366819/

²³ Australian Academy of Science, "The risks to Australia of a 3°C warmer world" (2021). https://www.science.org.au/supporting-science/science-policy-and-analysis/reports-and-publications/ri sks-australia-three-degrees-c-warmer-world

²⁴ "Climate Change and Human Health," Australian Medical Association, published August 2015, https://ama.com.au/position-statement/ama-position-statement-climate-change-and-human-health-20 04-revised-2015

²⁵ Catherine Taylor & Bridget Judd, "Climate change is wreaking havoc on Australians' health. What's our plan to fix things?," ABC News, 5 December 2020,

https://www.abc.net.au/news/2020-12-05/climate-change-wreaking-havoc-australians-health-national-plan/12950018

increasing pollution levels, for example by increasing production of photochemical smog, and making a given level of pollution more harmful to human health^{26 27}.

Transport is one of the largest and fastest growing sources of GHG emissions in Victoria. Significant reductions in GHG emissions within the operating life of most cars on the road today will be required to avoid the more serious effects of climate change²⁸.



Figure 2: The pace of decarbonisation has a major impact on the amount of additional greenhouse gas that accumulates in the atmosphere and the ensuing damage²⁹.

Reducing transport pollution

Electric vehicles gain a great deal of attention as a potential solution to transport pollution. Norway has the highest market penetration of pure electric vehicles in the world with EVs making up the majority of new cars sold. However despite years of generous subsidies for EVs³⁰, other vehicles still account for more than 8 in 10 vehicles on Norway's roads. Most

²⁶ Dean, Annika, and Donna Green. "Climate change, air pollution and human health in Sydney, Australia: A review of the literature." *Environmental Research Letters* 13, no. 5 (2018): 053003. https://iopscience.iop.org/article/10.1088/1748-9326/aac02a/meta

²⁷ Kinney, Patrick L. "Interactions of climate change, air pollution, and human health." *Current Environmental Health Reports* 5, no. 1 (2018): 179-186.

https://link.springer.com/article/10.1007/s40572-018-0188-x

²⁸ John Hewson, Will Steffen, Lesley Hughes and Malte Meinshausen, *Shifting the Burden: Australia's emissions reduction tasks over coming decades* (Melbourne: Climate Targets Panel, March 2021), https://www.climatecollege.unimelb.edu.au/files/site1/docs/%5Bmi7%3Ami7uid%5D/Climate%20Targe ts%20Panel%20Report%20-%20March%202021.pdf

²⁹ Ketan Joshi on Twitter https://twitter.com/KetanJ0/status/1360310004729999367

³⁰ Bjart Holtsmark & Anders Skonhoft, "The Norwegian support and subsidy policy of electric cars. Should it be adopted by other countries?," *Environmental Science & Policy* 42, (October 2014): 160-168, doi: 10.1016/j.envsci.2014.06.006.

https://www.sciencedirect.com/science/article/abs/pii/S1462901114001208

countries are starting from a much lower base than Norway, so ICE vehicles can be expected to make up the bulk of vehicles on Victoria's roads for some time to come³¹. Reducing private motor vehicle use by enabling mode shift to active and public transport offers faster pollution reductions^{32 33 34} and a wide range of positive co-benefits that enhance overall cost-effectiveness such as reduced congestion, improved mobility for non-drivers and increased physical activity^{35 36 37 38 39 40}. For example, numerous cities have shown that prioritising active transport during the COVID-19 pandemic can result in rapid growth in people walking and riding bikes^{41 42 43 44}.

³⁸ Gössling, Stefan, Jessica Nicolosi, and Todd Litman. "The health cost of transport in cities." *Current Environmental Health Reports* (2021): 1-6.

https://link.springer.com/article/10.1007/s40572-021-00308-6

³⁹ Klanjčić, Marina, Laetitia Gauvin, Michele Tizzoni, and Michael Szell. 2021. "Identifying Urban Features for Vulnerable Road User Safety in Europe." SocArXiv. April 14. doi:10.31235/osf.io/89cyu.
⁴⁰ Jones, Sarah J. "If electric cars are the answer, what was the question?." *British Medical Bulletin*

129, no. 1 (2019): 13-23. https://academic.oup.com/bmb/article/129/1/13/5274656

https://www.theguardian.com/lifeandstyle/2021/mar/12/europe-cycling-post-covid-recovery-plans ⁴² Veronica Penney, "If You Build It, They Will Bike: Pop-Up Lanes Increased Cycling During Pandemic," The New York Times, 1 April 2021,

https://www.nytimes.com/2021/04/01/climate/bikes-climate-change.html

⁴³ Kraus, Sebastian, and Nicolas Koch. "Provisional COVID-19 infrastructure induces large, rapid increases in cycling." *Proceedings of the National Academy of Sciences* 118, no. 15 (2021). https://www.pnas.org/content/118/15/e2024399118

⁴⁴ Pearson, Lauren K., Joanna Dipnall, Belinda Gabbe, Sandy Braaf, Shelley White, Melissa Backhouse, and Ben Beck. "The potential for bike riding across entire cities: quantifying spatial variation in interest in bike riding." *medRxiv* (2021).

https://www.medrxiv.org/content/10.1101/2021.03.14.21253340v1

³¹ Brad Plumer, Nadja Popovich and Blacki Migliozzi, "Electric Cars Are Coming. How Long Until They Rule the Road?," *The New York Times*, 10 March 2021,

https://www.nytimes.com/interactive/2021/03/10/climate/electric-vehicle-fleet-turnover.html ³² Alexandre Milovanoff, I. Daniel Posen & Heather L. MacLean, "Electrification of light-duty vehicle fleet alone will not meet mitigation targets," *Nature Climate Change* 11: 1102-1107, https://www.nature.com/articles/s41558-020-00921-7.epdf

³³ Pierpaolo Cazzola & Philippe Crist, "Good to Go? Assessing the Environmental Performance of New Mobility," International Transport Forum, published September 2020,

https://www.itf-oecd.org/sites/default/files/docs/environmental-performance-new-mobility.pdf ³⁴ John MacArthur & Mike McQueen, "Can Incentivizing E-bikes Support GHG Goals? Launching the New EV Incentive Cost and Impact Tool," Transportation Research and Education Center, Portland State University, published 25 June 2020,

https://trec.pdx.edu/news/can-incentivizing-e-bikes-support-ghg-goals-launching-new-ev-incentive-cos t-and-impact-tool

³⁵ Christian Brand, "Cycling is ten times more important than electric cars for reaching net-zero cities," *The Conversation*, 30 March 2021,

https://theconversation.com/cycling-is-ten-times-more-important-than-electric-cars-for-reaching-net-ze ro-cities-157163

³⁶ Brown, Vicki, Alison Barr, Jan Scheurer, Anne Magnus, Belen Zapata-Diomedi, and Rebecca Bentley. "Better transport accessibility, better health: a health economic impact assessment study for Melbourne, Australia." *International Journal of Behavioral Nutrition and Physical Activity* 16, no. 1 (2019): 1-10. https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-019-0853-y

³⁷ Xia, Ting, Monika Nitschke, Ying Zhang, Pushan Shah, Shona Crabb, and Alana Hansen. "Traffic-related air pollution and health co-benefits of alternative transport in Adelaide, South Australia." *Environment International* 74 (2015): 281-290.

https://www.sciencedirect.com/science/article/pii/S0160412014002980

⁴¹ Laura Laker, "Europe doubles down on cycling in post-Covid recovery plans," *The Guardian*, 12 March 20021,

While tailpipe emissions have generally attracted most attention, electrification of the vehicle fleet will require greater focus on pollution from brake, tyre and road wear⁴⁵. Pollution from tyre and road wear is already a significant source of particulate matter^{46 47} and makes up a large proportion of marine microplastic pollution⁴⁸. In addition, plastics are now being incorporated into road construction which may expose workers to harmful chemicals and increase leaching of microplastics⁴⁹. The increased weight of EVs due to onboard batteries, along with the growing popularity of heavier conventional vehicles such as SUVs, could also increase pollution from tyre and road wear⁵⁰.

Electric vehicles are reported to offer substantial operating cost savings and to be on the cusp of reaching parity on purchase or "sticker" price⁵¹. In this context, an appropriate role for government is regulating harmful emissions and overseeing charging infrastructure^{52 53} rather than offering taxpayer-funded incentives for the purchase of private assets that would impose negative externalities on others^{54 55 56}. With savings on the overall cost of ownership already available to EV buyers and purchase prices falling, the additionality of emissions

https://austroads.com.au/latest-news/the-benefits-and-challenges-of-using-recycled-plastics-in-asphal t-and-sprayed-seals

⁵⁰ "Pollution From Tyre Wear 1,000 Times Worse Than Exhaust Emissions," Emissions Analytics, published March 2020,

https://www.emissionsanalytics.com/news/pollution-tyre-wear-worse-exhaust-emissions

⁵¹ Venkat Viswanathan, Alexander Bills & Shashank Sripad, "The road to electric vehicles with lower sticker prices than gas cars - battery costs explained," The Conversation, 27 July 2020,

https://theconversation.com/the-road-to-electric-vehicles-with-lower-sticker-prices-than-gas-cars-batte ry-costs-explained-137196

⁵⁵ PTUA, "Submission to the Select Committee on Electric Vehicles," July 2018,

https://www.aph.gov.au/DocumentStore.ashx?id=2ff4b441-0420-4f51-9b2c-6a1f1500a727&subId=613747, pp.1-6

⁵⁶ "Electric vehicles are negative externalities," Jim Pagels, published March 2021, https://jpagels.medium.com/electric-vehicles-are-negative-externalities-869423ddcd35

⁴⁵ Damian Carrington, "Electric cars are not the answer to air pollution, says top UK adviser," The Guardian, 4 August 2017,

https://www.theguardian.com/environment/2017/aug/04/fewer-cars-not-electric-cars-beat-air-pollutionsays-top-uk-adviser-prof-frank-kelly

⁴⁶ "Measures needed to curb particulate matter emitted by wear of car parts and road surfaces." OECD, published December 2020,

http://www.oecd.org/environment/measures-needed-to-curb-particulate-matter-emitted-by-wear-of-car -parts-and-road-surfaces.htm ⁴⁷ Damian Carrington, "Airborne plastic pollution 'spiralling around the globe', study finds," *The*

Guardian, 13 April 2021,

https://www.theguardian.com/environment/2021/apr/12/airborne-plastic-pollution-spiralling-around-the-globe-stud y-finds

⁴⁸ Claire Gwinnet, "How your car sheds microplastics into the ocean thousands of miles away," *The* Conversation.

https://theconversation.com/how-your-car-sheds-microplastics-into-the-ocean-thousands-of-miles-away-142614 ⁴⁹ "The benefits and challenges of using recycled plastics in asphalt and sprayed seals," Austroads, published October 2019,

⁵² Lee, Seungtaek, Yeowon Kim, and Wai K. Chong. "A statistical analysis of effectiveness of energy policy in the United States: Incentives vs. regulations." Procedia Engineering 118 (2015): 1282-1287. https://www.sciencedirect.com/science/article/pii/S1877705815021384

⁵³ Graciela Metternicht & Danielle Drozdzewski, "Negative charge: why is Australia so slow at adopting electric cars?," The Conversation, 9 November 2017,

https://theconversation.com/negative-charge-why-is-australia-so-slow-at-adopting-electric-cars-86478 ⁵⁴ Hirte, Georg, and Stefan Tscharaktschiew. "The optimal subsidy on electric vehicles in German metropolitan areas: A spatial general equilibrium analysis." Energy Economics 40 (2013): 515-528. https://www.sciencedirect.com/science/article/pii/S0140988313001734

reductions from EV purchases that benefit from incentives would be questionable⁵⁷. Furthermore, generous government incentives for private EVs, whether cash outlays or tax expenditures, would potentially increase private vehicle use and associated non-exhaust emissions, along with exacerbating congestion and other social costs such as road trauma⁵⁸.

Although EVs will be a vital feature of a cleaner transport system, electrification of existing travel patterns will be inadequate for achieving required emissions reductions^{59 60}. Government support for EV uptake should focus on expanding and renewing public transport fleets with electric vehicles that are each driven orders of magnitude more kilometres each year than typical private vehicles and that have the capacity to serve dozens or hundreds of zero-emissions journeys each day⁶¹.

The PTUA also supports increasing the proportion of EVs in the Victorian private vehicle fleet and increasing the proportion of motorised travel undertaken by EV. However we emphasise that substantial contributions to these goals can be achieved by retiring ICE vehicles from the fleet without replacement and by replacing a proportion of private ICE vehicle journeys with journeys by active transport and/or electric public transport (whether or not the traveller's own ICE vehicle is retired)⁶². This reduces the volume of new EVs that must be imported to achieve a given fleet share and can provide a much more affordable clean mobility option for Victorians. In contrast a focus on increasing the number of EVs may be costly to buyers⁶³ - and taxpayers in the case of incentives - yet have little impact on pollution if overall motor vehicle traffic climbs and new non-electric vehicles also continue to be added to the state's vehicle fleet⁶⁴.

The task of reducing air pollution would be thwarted by expansion of the road network. Expansion of road capacity is now well-understood to encourage additional private motor

⁵⁷ Chandra, Ambarish, Sumeet Gulati, and Milind Kandlikar. "Green drivers or free riders? An analysis of tax rebates for hybrid vehicles." *Journal of Environmental Economics and Management* 60, no. 2 (2010): 78-93. https://www.sciencedirect.com/science/article/abs/pii/S0095069610000598

 ⁵⁸ Langbroek, Joram HM, Joel P. Franklin, and Yusak O. Susilo. "Electric vehicle users and their travel patterns in Greater Stockholm." *Transportation Research Part D: Transport and Environment* 52 (2017): 98-111. https://www.sciencedirect.com/science/article/abs/pii/S1361920915302315
⁵⁹ Alarfaj, Abdullah F., W. Michael Griffin, and Constantine Samaras. "Decarbonizing US passenger

vehicle transport under electrification and automation uncertainty has a travel budget." *Environmental Research Letters* 15, no. 9 (2020): 0940c2.

https://iopscience.iop.org/article/10.1088/1748-9326/ab7c89/meta

⁶⁰ Christian Brand, "Cycling is ten times more important than electric cars for reaching net-zero cities," *The Conversation*, 30 March 2021,

https://theconversation.com/cycling-is-ten-times-more-important-than-electric-cars-for-reaching-net-zero-cities-15 7163

 ⁶¹ Alexandre Milovanoff, "Electrification of light-duty vehicle fleet alone will not meet mitigation targets"
⁶² Carlton Reid, "Reducing Number Of Cars Better For Planet Than Making Them Green, Decides French Parliament," *Forbes*, 14 April 2021,

https://www.forbes.com/sites/carltonreid/2021/04/14/reducing-number-of-cars-better-for-planet-than-m aking-them-green-decides-french-parliament/

⁶³ Walks, Alan. "Driving the poor into debt? Automobile loans, transport disadvantage, and automobile dependence." *Transport Policy* 65 (2018): 137-149.

https://www.sciencedirect.com/science/article/abs/pii/S0967070X17300112

⁶⁴ Rajeev Syal, "SUVs and extra traffic cancelling out electric car gains in Britain," The Guardian, 26 February 2021,

https://www.theguardian.com/environment/2021/feb/26/suvs-and-extra-traffic-cancelling-out-electric-c ar-gains-in-britain

vehicle use - which will be overwhelmingly ICE vehicles for years to come⁶⁵ - without providing any lasting reduction in congestion⁶⁶. The established evidence clearly contradicts claims that boosting road capacity can reduce pollution by allowing traffic to flow more smoothly⁶⁷ ⁶⁸ ⁶⁹.



Figure 3: Vehicular NOx Emissions Per Capita Versus Major Highway Lane-Miles Per Capita, 1999, US Metro Areas⁷⁰.

https://archive.curbed.com/2020/3/6/21166655/highway-traffic-congestion-induced-demand ⁶⁷ Clark Williams-Derry, "Increases in greenhouse-gas emissions from highway-widening projects," Sightline Institute, published October 2007, http://www.itc.sala.ubc.ca/reports/analysis-ghg-roads.pdf

⁶⁵ Brad Plumer et al, "Electric Cars Are Coming. How Long Until They Rule the Road?"

⁶⁶ Patrick Sisson, "Expanding highways and building more roads actually makes traffic worse," *Curbed*, published March 2020,

 ⁶⁸ Alison Cassady, Tony Dutzik & Emily Figdor, "More Highways, More Pollution: Road-Building and Air Pollution in America's Cities," Environment California Research & Policy Center, published March 2004,

http://cdn.publicinterestnetwork.org/assets/DTxtE1628jWJvtqR5OkNng/More_Highways_More_Pollution.pdf ⁶⁹ "Myth: Freeways reduce pollution," Public Transport Users Association, accessed April 2021, https://www.ptua.org.au/myths/pollution/

⁷⁰ Alison Cassady et al "More Highways, More Pollution: Road-Building and Air Pollution in America's Cities"



Figure 4: Vehicular VOC Emissions Per Capita Versus Major Highway Lane-Miles Per Capita, 1999, US Metro Areas⁷¹.

The PTUA also supports the electrification of Victoria's regional and freight rail networks, with overhead line electrification of the busier sections (the V-Line commuter network, Seymour-Shepparton and busier freight lines) and battery and/or hydrogen powered trains for the quieter sections. This would both improve the overall emissions situation for regional and freight trains in Victoria but also improve the passenger and rail employee environment at the stations regional and freight trains run through and stop at, particularly enclosed stations like Southern Cross.

Recommendations

- 1. Rapidly expand and renew the public transport fleet, including DDA-compliant trams and electric buses, to provide fast, frequent public transport services that better serve emerging travel patterns;
- The electrification of Victoria's regional and freight rail networks, with overhead line electrification of the busier sections (the V-Line commuter network, Seymour-Shepparton and busier freight lines) and battery or hydrogen powered trains for the quieter sections;
- 3. Expand heavy and light rail networks where needed to enhance network effect⁷²;
- 4. Rapidly expand safe active transport networks to better serve local journeys and access to public transport^{73 74};

⁷¹ ibid.

⁷² "Extending Melbourne's network," Public Transport Users Association, published January 2016, https://www.ptua.org.au/policy/network/

⁷³ "Streets are for everyone: A consensus statement to support more walking and bike riding for Victorians," published March 2021,

https://www.victoriawalks.org.au/Assets/Files/Walking%20and%20bike%20riding%20consensus%20s tatement%20FINAL%20VERSION%2012%20March%2021.pdf

⁷⁴ Lauren K. Pearson et al, "The potential for bike riding across entire cities: quantifying spatial variation in interest in bike riding."

- 5. Consistent with Recommendation 53 of the Environment and Planning Committee's Inquiry into Tackling Climate Change in Victorian Communities, impose vehicle emissions and fuel quality standards to European standards to encourage supply of cleaner vehicles and fuels to the Victorian market^{75 76 77};
- 6. Introduce periodic emissions testing for vehicles older than 10 years;
- 7. Establish technical and open access standards for EV charging infrastructure, preferably on a national level;
- 8. Place moratorium on new major road construction and expansion due to induced traffic that would be largely undertaken by ICE vehicles for the foreseeable future.

⁷⁵ Lee, Seungtaek et al "A statistical analysis of effectiveness of energy policy in the United States: Incentives vs. regulations."

⁷⁶ Royce Kurmelovs, "NSW to go it alone on vehicle emissions standards to avoid becoming 'dumping ground'," *The Guardian*, 11 March 2021,

https://www.theguardian.com/environment/2021/mar/11/nsw-to-go-it-alone-on-vehicle-emissions-stan dard-to-avoid-becoming-dumping-ground

⁷⁷ James Purtill, "Australians want to buy electric cars, but car makers say government policy blocks supply," ABC Science, published 20 April 2021,

https://www.abc.net.au/news/science/2021-04-20/australians-want-to-buy-electric-cars-what-is-stopping-us/1000 71550