The largest international study on vehicle air pollution and health research, carried out by the US-based Health Effects Institute, looked at 700 worldwide health-pollution studies. It found that while there were some gaps in research of traffic-related pollution, there was a clear health risk for those living near arterial roads or highways. It also found that traffic pollution within a 500-metre radius of a major thoroughfare was likely to exacerbate asthma in children, trigger new asthma cases across all ages, impair lung function in adults, and could cause cardiovascular illness and death[8].

There are no relevant standards in Australia for separation levels between roads and sensitive use facilities. Hundreds of thousands of Victorians live within 500 metres of major roads. (Age 2010)[9]. Most of these studies were carried out before the proliferation of diesel cars on our roads.

Clearly, a major short-coming of planning controls is their failure to address vehicle traffic corridors and proximity of sensitive land uses. Some jurisdictions have identified the issues and enacted amendments to their planning schemes to restrict the impact. Most have not and some actually encourage facilities, such as childcare centres, to be located adjacent to main roads.

It is time to introduce not only a Clean Truck program but also a Clean Air Zone (CAZ) in the most traffic-affected areas of Melbourne, just as other cities around the world are starting to do. They have recognised how important clean air is to their citizens and are willing to take big steps to protect their health. Also removing the proposed road tax on electric vehicles (EVs) will fast-track the uptake of cleaner vehicles and remove the polluting ones.

We have more freeways traversing our cities bringing with it more cars and trucks on our roads, which has a tendency to wipe out any air quality improvements brought about by improved emission standards. The EPA acknowledge this in their *Future Air Quality in Victoria* report, stating that ozone and particulate matter will worsen in the future[10].

The link between transport corridors and air pollution has been neglected in Victoria when it comes to protecting the health of the community.

According to the Federal Government Review in 2011, current air quality standards are not meeting the requirement for the protection of human health and there is a statistically significant and measurable health risk to the Australian population[11]. In 2012 the World Health Organisation upgraded the cancer risk from diesel exhaust from 'probably carcinogenic to humans' to 'carcinogenic to humans'[12].

[8] https://www.healtheffects.org/publication/traffic-related-air-pollution-critical-review-literature-emissions-exposure-and-health

[9] https://www.theage.com.au/national/victoria/health-risks-for-those-living-within-500m-of-main-roads-20100619-yo2h.html

[10] http://www.epa.vic.gov.au/our-work/publications/publication/2013/july/1535

[11] Australian Air Quality Group (3sc.net)

[12] pr213_E.pdf (who.int)

Indoor air monitoring for diesel emissions is currently non-existent and there is no workplace exposure standard. In February 2020 Safe Work Australia called for public comment to evaluate the workplace exposure standards for airborne contaminants, including diesel emissions[13].

Studies have demonstrated that an acute inflammatory response takes place in the airways and peripheral blood of humans after short-term exposure to high levels of particulate matter (PM) and a consistent increased risk for cardiovascular events occurring after both short and long-term exposure to PM air pollution from diesel exhaust[14].

The California Air Resources Board responded to growing concern over near-roadway pollution by recommending that new 'sensitive land use' such as residences, schools, day care centres, playgrounds, and medical facilities not be sited within 500ft of heavily travelled roadways[15].

Sensitive land uses deserve special attention because children, the elderly, and those with existing health problems are especially vulnerable to the effects of air pollution. As space for further development becomes limited and truck movements increase, this will continue to have implications for planning decisions, indoor air quality and the health of workers inside the exposed buildings.

Ultrafine particles (UFPs)
UFPs are so small they can bypass the lungs and enter the bloodstream. They are comprised of very small specks of sooty carbon from burnt fuel, coated with an assorted number of chemical cocktails, many of them carcinogenic. Their ability to get deep inside cells makes these particulates the most potent part of air pollution. They are up to fifty times more damaging than the larger particles and they make up 80-95% of diesel soot pollution[16].

Ultrafine particles are the main constituent of airborne particulate matter and due to their sheer numbers and ability to penetrate deep within the lungs and many other major organs, they are regarded as a prime concern for respiratory exposure and health.

The most recent review by the WHO stated that there is a small but increasing body of epidemiological research showing an association between short-term exposures to ultrafine particles and cardio-respiratory health, as well as adverse effects to the central nervous system. The review indicates that the toxicity of these particulates is well known, and clinical and toxicological studies have shown that they can act aggressively through physiological mechanisms not shared with larger particulates[17].

[13] safeworkaustralia.cmail19.com/t/ViewEmail/j/6E7CF6961825375E2540EF23F30FEDED/E05CDC1512BD9958A29558A201773426
[14] Acute Blood Pressure Responses in Healthy Adults During Controlled Air Pollution Exposures | Environmental Health Perspectives | Vol. 113, No. 8 (nih.gov)
[15] pub-health-and-hi-traf-roadways.pdf (ourair.org)
[16] Respiratory health effects of diesel particulate matter | Request PDF (researchgate.net)
[17] (Microsoft Word - AMA submission Inquiry into health impacts of air quality \205)

Fifteen years ago a desktop literature review and analysis on the *Health Impacts of Ultrafine Particles* , funded by the Australian Government[18], found that people living and working in close proximity to urban arterial roads are likely to be exposed to levels of ultrafine particles well above 'normal' ambient levels and only to somewhat elevated PM10 and PM2.5 levels. One of the recommendations of the Review was that:

Health outcome studies would be conducted in selected places in Australia to quantify the relationship between exposure to ultrafine particles and health outcomes in an Australian setting. The outcomes of such studies would provide an adequate guidance to the decision makers on the most desirable steps in controlling exposure to ultrafine particles in Australia.

It is not known if the studies have been conducted.

The World Health Organisation (WHO) has also concluded that there is compelling evidence that exposure to ultrafine particulates poses a significant threat to human health. However, it is currently not possible to precisely quantify the exposure levels that may result in specific health effects due to a lack of research data.

As previously discussed, there is growing concern internationally about the health impacts of ultrafine particles. The 2011 NEPM Review noted that there was not enough data to make a standard for ultrafine particles. The AMA has advocated for a precautionary approach to ultrafine particles stating that:

'There is compelling evidence that exposure to ultrafine particulates poses a significant threat to human health, however it is currently not possible to precisely quantify the exposure levels that may result in specific health effects.'

There is no mention of UFP pollution in the EPA *Final Report for Future Air Quality in Victoria 2013*[19].

Because there is no reporting mechanism for PM1, authorities have very little knowledge of the impacts of particles in this range. In response to the *Discussion Paper Examining the future task of the Victorian EPA*[20], Clare Walter (honorary research fellow from the University of Melbourne school of biomedical sciences**)** and Professor Lou Irving (Clinical Director Lung Health Research Centre, School of Biomedical Sciences, University of *Melbourne)* state:

'It is widely acknowledged and accepted that the SEPP (AQM) standards are not commensurate to protection of public health and are outdated by over a decade. Health impacts occur at levels below our current advisory threshold of fine particulate matter PM2.5. By failing to account for particle characterisation and significantly underestimating background air pollution, the EPA report misrepresented the risks to the public."

[18] (PDF) Desktop literature review and analysis: health impacts of ultrafine particles (researchgate.net)
[19] 1535: Future air quality in Victoria – Final report | Environment Protection Authority Victoria (epa.vic.gov.au)
[20] EPA_Inquiry_Discussion_Paper_2015.pdf (epa-inquiry.vic.gov.au)

Southern Cross Station is a prime example of workers being exposed to high levels of diesel emissions from the trains that sit idling at the station for long periods. The station's log book, where employees report incidents at the station, is replete with entries concerning exposure to diesel emissions affecting their health and performance. The station is considered to be an 'indoor environment'.

Indoor air monitoring for diesel emissions is currently non-existent and there is no workplace exposure standard. In January 2020, Safe Work Australia called for a review of workplace exposure standards for diesel engine emissions, public comments closed in February 2020. This initiative to introduce indoor standards will be of paramount importance to not only station staff and others who work there in shops and food services, but also other workers exposed to diesel emissions whilst at work. Other areas that will benefit from the introduction of standards will be staff at schools, hospitals, childcare centres and other buildings situated on main roads carrying large numbers of truck traffic.

As the number and increased percentage of diesel vehicles on the road, it is clear that diesel engine emissions are becoming a major source of indoor air pollutants for workers in buildings close to main roads, railway tracks carrying diesel trains and covered railway stations. The National Construction Code[21] for ventilation requirements do not protect workers from diesel emissions, as there is an assumption that the air quality in Australia is good and, as previously noted, there is currently no mandatory requirement to measure diesel emissions inside a building. The Victorian government must work with Federal authorities to address this lack of awareness in the building regulation system.

Anti-idling

Introduce a state-wide vehicle anti-idling program to discourage vehicle idling outside schools, railway stations, shopping centres and hospitals. This can be achieved through an education campaign to demonstrate the benefits of switching off their engines while waiting to pick up their children around schools, not only for their children's health but also for their own wellbeing.

Bus terminals at shopping centres and railway stations also need to be targeted for an anti-idling campaign. The buses at present are mainly diesel and emit high levels of PM2.5 and PM1, which have been associated with causing adverse health effects in healthy people, as well as children and the aged.

Inner West Air Quality Community Reference Group (IWAQCRG) report

The IWAQCRG's report made a number of recommendations to improve the air quality in the inner west of Melbourne. Some of these recommendations can be applied to other areas of Melbourne where poor air quality is commonplace, particularly where residential areas are impacted by the widening of existing freeways and areas of exposure to dust and odour pollution from industrial areas.

[21] NCC | Australian Building Codes Board (abcb.gov.au)

Conclusion

The State government has a major role to play in improving the quality of air in Victoria. Changes in how air quality is measured; the inclusion of UFPs in the standards; changes to planning regulations; no road tax for EVs; anti-idling campaigns; Clean Air Zones (CAZ); freight on rail; incorporation of the IWAQCRG recommendations and a Clean Ports program, are all critical changes and initiatives to ensure that the health of all Victorians is better protected, and that the recommendations made in this submission will assist significantly in securing a clean air future for the State of Victoria.