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Application Report

Application Details

Grant Opportunity: 2023 Global Alliance for Chronic Diseases

Application ID: 2027451

Application Title: Air pollution and non-communicable disease: City-wide implementation to reduce transport emissions.

Chief Investigator A: Prof Mark Stevenson

Administering Institution: University of Melbourne

Grant Duration: 3 years

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Participating Institutions

Participating Institutions	
Participating Institution	Department
University of Melbourne	Transport, Health and Urban Design Research Lab
Hanoi University of Public Health	Epidemiology and Biostatistics
University of Medicine and Pharmacy at HCMC	Environmental Health

Is this application using services provided by a research facility? No

If yes, see separate attachment for details

Does this research proposal include an Aboriginal and/or Torres Strait Islander health research or capacity building component? No

Synopsis

Synopsis

Air pollution is a significant population health problem, causing 4.2 million premature deaths worldwide per year. Populations living in low- and middle-income countries (LMICs) are disproportionately exposed to the burden of air pollution with 89% (of the 4.2 million premature deaths) occurring in the South-East Asia (SEA) and Western Pacific Regions (WPR). Vietnam, a LMIC in SEA, is struggling to respond to the rising prevalence of air pollution, ranking 36th out of 118 countries with the most polluted air and its two largest cities, Hanoi and Ho Chi Minh City (HCMC), are among the most polluted cities in SEA with road transport a leading cause of the air pollution. Air pollution in Vietnam leads to numerous non-communicable diseases, resulting in 60,000 deaths per year. We propose to implement in two large urban areas namely, Hanoi and HCMC, an implementation trial in which personalised feedback and smart financial incentives are delivered targeting reduced motor vehicle emissions. The technology, developed by scientists from the University of Melbourne in collaboration with industry partners, has been robustly evaluated (using randomised control trials) highlighting the significant utility of the intervention in influencing driver behaviours.

The aim of this innovative implementation research project is to assess the effects of personalised feedback and financial incentives relative to personalised feedback only, to reduce motor vehicle emissions, assess the fidelity and sustainability of the intervention. The implementation of intervention is critical to facilitating changes in driver behaviour leading to reduced transport emissions in these cities. Emission reduction strategies are urgently needed in Vietnam to mitigate the burden of non-communicable diseases attributed to air pollution and to respond to the urgent climate implications arising from the fossil fuelled motor vehicles that are exclusively used in both Hanoi and HCMC.

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Research Team

Research Team

Role	Investigator	Primary Institution	Will CI be based in Australia?
CIA	Prof Mark Stevenson	University of Melbourne	Yes

Relevant Background and Expertise:

Prof Stevenson is the most esteemed researcher in transport and public health both nationally and internationally. He is an international authority having published seminal methodological papers related to epidemiological approaches in transport and public health research and continues to provide strategic direction both academically and to government and non-government agencies, fostering excellence in science and developing research that links to policy and practice.

Over the past 20 years, he has led landmark studies that have influenced the transport and public health fields. His research has examined the causes and management of road trauma, the interplay between city design, transport and population health, research on non-communicable diseases, climate change and health, and urban air pollution. He has recently developed telematics technology that measures a drivers' 'DNA' thereby understanding a driver's behaviour to prevent road injury and reduce vehicle emissions. His research has influenced public policy, providing empirical evidence leading to legislative change across the globe.

He has attained more than \$47m in research funding (including funding from the National Health and Medical Research Council (NHMRC), the Australian Research Council (ARC), the United States National Institutes of Health and the Chinese Government and published over 380 peer-reviewed publications on epidemiologic methods applied to public and urban health. Prof Stevenson's current research extends his focus on transport systems and how cities can be redesigned to enhance population health; this work is highly acclaimed as acknowledged by the Editor of the Lancet, Dr Horton, asking Prof Stevenson to lead a recent series of research papers on Urban Design, Transport and Health reflecting his innovative, trans-disciplinary research capability.

CIA-Stevenson will direct the project and will have oversight across all elements including budgeting, recruitment of staff, delivery of EmITS.

CIB	Assoc Prof Cuong Pham	Hanoi University of Public Health	N/A
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Relevant Background and Expertise:

Associate Professor Cuong Pham is the senior researcher in road injury prevention and public health both nationally and internationally. In more than 25 years working at the Public Health University, he has been involved in the development of public health training programs and provide strategic direction both academically and to government and non-government agencies, fostering excellence in science and developing research that links to policy and practice.

Assoc. Prof. Pham has led many studies that have had a great impact on injury prevention policies in Vietnam as well as other Low and Middle income countries. Assoc. Prof. Pham has examined the causes and pattern of injury in Vietnam (National Survey), alcohol-related road injury, helmet use, helmet quality, seat belt and child restraint system. Assoc. Prof. Pham's research has influenced public policy, providing the empirical evidence leading to legislative change in Vietnam. Assoc. Prof. Pham has attained more than \$4m in research funding (including funding from the National Institute of Health (NIH) US, Bloomberg Philanthropies, the Vietnamese Government and published over 100 peer-reviewed journal articles, books, book chapters, technical reports and applied to road injury, injury prevention and public health.

Assoc. Prof. Pham's current research extends his focus on road safety, transport systems, digital health to minimize road injury and enhance population health in sustainable way.

CIB-Pham will oversee the project in Hanoi and Ho Chi Minh City and contribute his expertise of public health and non-communicable diseases prevention as well as his thorough understanding of Vietnam's context.

CIC	Dr Jason Thompson	University of Melbourne	N/A
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Relevant Background and Expertise:

Dr. Thompson is an Associate Professor at the University of Melbourne, is a previous Australian Research Council Discovery Early Career Research Award (DECRA) recipient and is a current Australian Research Council Future Fellowship awardee. He holds a Bachelor of Science with Honours, a Masters in Clinical Psychology, and a PhD in

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Medicine. As an early to mid-career researcher whose professional career prior to Academia was spent in public health policy, and service design, his work reflects a strong translational approach. CI Thompson's work blends qualitative and quantitative skills across applied statistics and methods of computational social science across health, transport and urban design. CI Thompson has published more than 50 peer-reviewed articles and book chapters in the past 5 years and has an h-index of 20 (Google Scholar). CI Thompson has jointly attracted \$4.6 million in funding since 2015. This includes a joint NHMRC / MRC project of \$1.2million as CIA for the development of computational methods in the study of urban form and health (NHMRC ID 1194959) as well as other NHMRC funding (NHMRC IDs 2002905 and 2007062). CI Thompson maintains close connection and research partnerships with industry stakeholders in the transport sector including the Victorian Department of Transport, and Transport Accident Commission. Statistical analyses and computational social modelling he conducted for Victorian Transport Accident Commission has contributed to tens of millions of dollars in savings for the Victorian community.

Assoc. Prof. Thompson has an existing collaborative relationship with Prof Stevenson. Of relevance to the proposed project, Ass. Prof. Thompson has extensive experience in psychology, applied statistics, urban and transport systems, and modelling transport networks and mode change.

CIC-Thompson will contribute his expertise in relation to public health urban modelling and implementation science to the delivery of EmITs.

CID	Dr Dang Tran	University of Medicine and Pharmacy at HCMC	N/A
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Relevant Background and Expertise:

Dr. Tran Ngoc Dang, is currently a lecturer and Associate Professor in Department of Environmental Health, University of Medicine and Pharmacy, Ho Chi Minh City (UMP HCMC). He obtained his bachelor degree in Public Health from UMP HCMC in 2010. He got the Japanese Government scholarship (MEXT) to pursue his master of Public Health degree, majoring in molecular epidemiology; and the doctoral degree majoring in environmental epidemiology at the university of Tsukuba in 2014, and 2017 respectively. Assoc.Prof Tran is a public health researcher, with his interest in investigating the effects of air pollution, climate change, and health as well as the interaction between environmental and genetic factors in disease's mechanism. So far he has published about 60 peer-reviewed publications in ISI/Scopus journals, including prestigious journals such as Nature Climate Change, Lancet Planetary Health, Environmental Health Perspective, American Journal of Public Health, Plos Neglected Tropical Diseases, Antimicrobial Agents and Chemotherapy, International journal of epidemiology, Environment International. He won several awards and scholarships, such as the first ranking award in the National conference for young researchers in medical science in Vietnam in 2016, and 2018 respectively. Assoc.Prof Tran has the expertise and solid skills in biostatistics, environmental health risk assessment, environmental epidemiology. He is involved in several projects funded by Vietnam (NAFOSTED, Ho Chi Minh City Department of Science), Australia (NHMRC), Europe (HORIZON 2020), America (USAID), in which he plays a role as a main investigator. To response to COVID 19, he is doing research and innovative solutions in preventing COVID 19 in Viet Nam.

CID-Tran will lead the proposed project in Ho Chi Minh City and contribute his expertise in relation to environmental health in general and air pollution and emission reduction, in particular.

CIE	Dr Kerry Nice	University of Melbourne	N/A
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Relevant Background and Expertise:

Dr. Kerry Nice is a research fellow at the University of Melbourne in the Transport, Health and Urban Design Research Lab (THUD). His research areas include urban climate modelling and urban analytics and modelling of urban design and transportation systems and their impacts on public health using machine learning and computer vision techniques, publishing 25 peer reviewed papers across these subject areas. Following a 13 year career as a senior level software engineer, he completed a PhD at Monash University, developing one of the first models, VTUF-3D, to examine the cooling benefits of urban vegetation at a micro-climate scale.

His research has also expanded to include the utilisation of computer vision techniques and neural networks to take advantage of large amounts of imagery and other data to study and plan the transformation of urban areas for better public health outcomes. This has included designing methodologies to derive urban morphology information from big data imagery data sets. Generative adversarial networks were used to transform street level and satellite imagery into visions of better health. Safe intersection design was identified through unsupervised feature extraction from satellite imagery of all the intersections in Australia. Machine learning was used to determine the impact of COVID-19 lockdowns on air pollution levels across 700 global cities.

He has attracted more than \$2m in research funding (including the National Health and Medical Research Council,

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the Australian Research Council, CRC for Water Sensitive Cities, and the Swiss National Science Foundation) to examine cycling traffic risk exposure, the impacts of urban design on public health, spatial inequities in access to services, and modelling urban cooling potentials of urban vegetation and water.

CIE-Nice will contribute his expertise in relation to air pollution, urban modelling and estimates around emission reductions arising from delivery of EmlTs

CIF	Dr Nhung Nguyen	Hanoi University of Public Health	N/A
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Relevant Background and Expertise:

Dr Nguyen Thi Trang Nhung holds an engineering degree with a major in Applied Mathematics from the Hanoi University of Science and Technology, Hanoi, Vietnam. She also has a Masters degree in Public Health from the School of Public Health at the Université Libre De Bruxelles, Belgium and a PhD in Epidemiology from the University of Basel, Switzerland. Dr Nguyen is a lecturer and researcher in the Department of Epidemiology and Biostatistics at the Hanoi University of Public Health (HUPH). She has worked as a data analyst for many studies throughout the HUPH (e.g. Vietnam National Injury Survey 2002, Vietnam National Injury Survey 2010 and the Vietnam Evidence for Health policy). More recently, her research has focused on health impact assessment of air pollution and environmental factors. She has 20 published papers in international journals, and 30 Vietnam national papers. She is a leader on the health effects of ambient air pollution in Vietnam.

CIF-Nguyen will contribute her expertise in relation to air pollution and will work closely with stakeholders in Hanoi to ensure the successful implementation of the project.

CIG	Dr Dominika Kwasnicka	University of Melbourne	N/A
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Relevant Background and Expertise:

Dr. Kwasnicka is an implementation scientist and an expert in applying health behaviour change in the design and implementation of digital health interventions. Dr Kwasnicka has rigorously developed innovative health promotion studies including RCTs testing the efficacy, effectiveness and implementation of health interventions targeting diet, physical activity, smoking, alcohol consumption, and mental health. She trained in Health Psychology and Behavioural Medicine (PhD) and in Public Health and Health Services Research (MSc). She is currently a Senior Research Fellow in the Melbourne School of Population and Global Health at the University of Melbourne.

Dr. Kwasnicka's research program focuses on implementation science, digital health, and improving non-communicable disease prevention, self-management, and health outcomes. 23.33% of her publications are in the top 10% most cited publications worldwide (InCites). Dr. Kwasnicka is a leader and co-founder of the Open Digital Health not-for-profit organisation that aims to implement digital health tools and interventions (including members from 50+ countries), encouraging health scientists, practitioners, and technology developers to share evidence-based digital health tools and interventions. They also undertake several science dissemination activities, they lead the Practical Health Psychology, online publication informing healthcare professionals (220,000 annual users; translated to 30 languages) about topical behavioural science and how to best apply it in practice. They are actively involved in boards (e.g., European Health Psychology Society Executive) and committees (e.g., Society of Behavioral Medicine Council).

CIG- Kwasnicka will take on a leading role coordinating and overseeing the implementation science aspects. She will work with the relevant stakeholders to progress through the project stages and to ensure that the project results in system change.

CIH	Dr Thanh Ho	University of Melbourne	N/A
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Relevant Background and Expertise:

Dr. Thanh Ho is an early career researcher and one of the key members of the Transport, Health and Urban Design Research Lab at the University of Melbourne since 2018. He obtained his Bachelor's degree from Hanoi Architectural University, Vietnam, his Master of Science degree in Sustainable Architecture and Urban Design from Politecnico di Milano, Italy, and his Doctor of Philosophy degree from the University of Melbourne, Australia. His doctoral degree and current research focuses on the relationship between urban design, active transport and public health, urban air and noise pollution, and physical activities (particularly walking) in cities of low- and middle-income countries in Asia. Dr Ho has published various peer-reviewed articles and book chapters in international journals and publishers including The Lancet Global Health and Urban Science. Dr Ho's research has been also acknowledged and enhanced through his presentations at international conferences, as well as his participation in international research networks. Dr Ho is a regular peer reviewer for high-quality academic international journals such as Sustainability and Land. In addition to his research, Dr Ho is also involved in teaching architecture, urban design, urban science and research method courses at undergraduate and postgraduate levels, and practising

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professionally as an architect and urban designer in both Vietnam, Italy and Australia.

CIH-Ho will be integral to the delivery of the project. His ability to engage with researchers from both countries , his knowledge of the field based on his research experience attained from his doctoral studies places him as the ideal researcher to have oversight of the day-to-day operations in Vietnam in collaboration with CIB-Pham

Associate Investigators		
Name	Primary Institution	Position

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Total Budget Summary

Total Budget Summary						
Summary of Total 'Salary' per year						
Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Year 4 (\$)	Year 5 (\$)	Total Salary (\$)	
\$320,641	\$320,641	\$320,641			\$961,923	
Summary of total 'Other Research Costs' (ORC) per year						
Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Year 4 (\$)	Year 5 (\$)	Total ORC (\$)	
\$215,196	\$114,200	\$71,400			\$400,796	
Summary of total 'Equipment' per year						
Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Year 4 (\$)	Year 5 (\$)	Total Equipment (\$)	
\$15,120	\$15,120	\$15,120			\$45,360	
Total Requested Budget						
Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Year 4 (\$)	Year 5 (\$)	Total Budget (\$)	
\$550,957	\$449,961	\$407,161			\$1,408,079	

Salary Request Summary

Salary Request Summary						
Position Function	Year 1	Year 2	Year 3	Year 4	Year 5	Total
CIA-Stevenson <u>PSP5</u>	\$52,399	\$52,399	\$52,399			\$157,196
	50%	50%	50%			
CIE-Nice <u>PSP3</u>	\$16,482	\$16,482	\$16,482			\$49,445
	20%	20%	20%			
CIH-Ho <u>PSP3</u>	\$82,408	\$82,408	\$82,408			\$247,224
	100%	100%	100%			
CIG-Kwasnicka <u>PSP4</u>	\$19,467	\$19,467	\$19,467			\$58,400
	20%	20%	20%			
Project Manager - HCMC <u>PSP2</u>	\$74,943	\$74,943	\$74,943			\$224,829
	100%	100%	100%			
Project Manager - Hanoi <u>PSP2</u>	\$74,943	\$74,943	\$74,943			\$224,829
	100%	100%	100%			
	\$320,641	\$320,641	\$320,641			\$961,923

Salary Request

Salary Request

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Position Function	Justification
CIA-Stevenson <u>PSP5</u>	CIA-Stevenson is currently seeking NHMRC Leadership funding. If the application is not successful, he will require partial salary support to conduct this research as he is a full-time researcher funded through research grants. CIA-Stevenson will oversee the project and will have insight across all elements including budgeting, recruitment of staff, delivery of EmITS,
CIE-Nice <u>PSP3</u>	CIE-Nice is a full-time research fellow in the Transport Health and Urban Design Research Lab. He attains all salary support from research grants. His time on the grant reflects the salary requested. CIE-Nice will contribute his expertise in relation to air pollution, urban modelling and estimates around emission reductions arising from delivery of EmITs
CIH-Ho <u>PSP3</u>	CIH-Ho is a postdoctoral fellow who will work full-time on this grant. He has no salary cover aside from the funding from the grant. CIH-Ho will be integral to the delivery of the project. His ability to engage with researchers from both countries , his knowledge of the field based on his research experience attained from his doctoral studies places him as the ideal researcher to have oversight of the day-to-day operations
CIG-Kwasnicka <u>PSP4</u>	CIG-Kwasnicka is a full-time Senior Research Fellow and attains salary funding from research grants. Who contribution to the grant will be covered by this salary fraction. CIG-Kwasnicka is a leading implementation scientist and she will lead activities related to all elements of the AIFs and Re-AIM ensuring we are capturing the important components to ensure the sustainability of the intervention
Project Manager - HCMC <u>PSP2</u>	These funds are required to support delivery of the project in HCMC. This yet to be appointed candidate will work closely with CID-Dang and CIH-Ho to ensure the logistics, communications, relationships and data capture are being undertaken.
Project Manager - Hanoi <u>PSP2</u>	These funds are required to support delivery of the project in Hanoi. This yet to be appointed candidate will work closely with CIB-Cuong, CIF-Nhung and CIH-Ho to ensure the logistics, communications, relationships and data capture are being undertaken.

Other Research Costs Summary

Other Research Costs Summary						
Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
IT Services - Urban Analytica	\$139,000	\$42,000	\$42,000			\$223,000
4 iPads	\$3,996	\$0	\$0			\$3,996
Funds to cover financial incentive/penalty(\$50 pp)	\$37,800	\$37,800	\$0			\$75,600
Survey prize	\$5,000	\$5,000	\$0			\$10,000
Travel for team meetings and other activities	\$10,900	\$10,900	\$10,900			\$32,700
Accommodation and Per Diem for team meetings	\$6,000	\$6,000	\$6,000			\$18,000
Travel for GACD Annual Scientific Meetings	\$8,000	\$8,000	\$8,000			\$24,000

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Other Research Costs Summary

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Accommodation and Per Diem GACD Annual Meetings	\$4,500	\$4,500	\$4,500			\$13,500
	\$215,196	\$114,200	\$71,400			\$400,796

Other Research Costs

Other Research Costs

Item	Justification
IT Services - Urban Analytica	This cost covers 20% time for an IT staff member at Urban Analytica (UA) to maintain the system for the project dealing with queries arising from EmIT: Cost - \$30,000 pa - \$90,000 Mapping changes to the UA smartphone app - using Open Street View - \$10,000 Smartphone App changes to Vietnamese -Rapid Circle software company quote - \$10,000 Clone of current smartphone app - \$23,000 Software programming and beta testing in Vietnam - \$ 54,000 Ongoing AWS storage over the 3 years \$1000 per month - \$36,000
4 iPads	To facilitate the face-to-face meetings and focus group research in Hanoi and HCMC 4 iPads (2 in each city) will be purchased for fieldworkers to use. Cost of iPads from Telstra Shop are \$999.
Funds to cover financial incentive/penalty(\$50 pp)	This funding includes the \$50 per person provided as the personalised financial incentive for participants allocated to Implementation Group 1. The incentive is structured as a penalty for increased emissions, which is described in detail in the research proposal. The financial incentive delivered as a penalty has been shown in our previous randomised trials to changes behaviour.
Survey prize	The monthly survey prize to all participants has been shown to maintain active engagement in the trial and importantly completion of post-trial surveys
Travel for team meetings and other activities	An estimated 11 return economy flights between Melbourne and Vietnam are needed at a cost of \$2700 per flight. This cost also includes the cost of paying for carbon offsets. These trips are for CIA-Stevenson and CIF-Ho to attend the annual face-to-face meetings and for CIC-Thompson, CIC-Nice and CIH-Kwasnicka to also attend one meeting (Over three years - \$29,700). We also budgeted for 6 domestic flights for CID-Dang and CIF-HO between HCMC to Hanoi at \$500 return (Over three years - \$3000).
Accommodation and Per Diem for team meetings	Accommodation in Hanoi for 6 people x 4 days per annum; hotel \$150 per day, per diem \$100 per day (transport, food)
Travel for GACD Annual Scientific Meetings	Return economy international flights (2 per annum x 3 years) with the assumed destinations are Melbourne & London (GACD Annual Scientific Meeting 2022) and flight cost at AUD \$4000 per flight.
Accommodation and Per Diem GACD Annual Meetings	Accommodation in the same assumed location that is London for two team (10 days per annum x 3 years) members with hotel cost at AUD \$300 per day and per diem cost at \$150 per day (transport, food)

Equipment Request Summary

Equipment Request Summary

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
iBeacon	\$15,120	\$15,120	\$15,120			\$45,360
	\$15,120	\$15,120	\$15,120			\$45,360

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Equipment Request

Equipment Request	
Item	Justification
iBeacon	iBeacons will be purchased and provided to drivers recruited in to the EmITs (n=3024) at a cost of \$15 per iBeacon. This is a device the size of a credit card that will be paired to the drivers phone to ensure we attain the most robust data from the smartphone of the driver. Basically, it will indicate when the EmIT participant is driving the vehicle and when a non participant might be driving.

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Call Specific Information

Call Specific Information

Call Topic: Non-communicable disease (NCD) prevention in cities**Project Title:**

Air pollution and non-communicable disease: City-wide implementation to reduce transport emissions.

Application Upload:

2027451 Stevenson GACD application.pdf

Benefit to Australia:

Randomised control trials undertaken by the Investigators in Australia, have shown significant benefit from implementing personalised feedback and financial incentives in influencing driving behaviours: with 61% greater improvement in driving behaviours when feedback and incentives are combined, compared with feedback alone. The findings from the proposed study extend this finding to a low- and middle-income country context. Having an understanding that this innovative intervention applies in urban settings from high to low-income country settings and across varying cultural settings, paves the way for global dissemination of the intervention that addresses reductions in greenhouse gas emissions and particulate emissions, especially PM2.5 and PM10 arising from exhaust and brake dust. Successful implementation and emissions reduction in Vietnam, will provide the basis for significant scale-up of the intervention in Australia and the region thereby, playing an important role in responding to the climate crisis associated with greenhouse gas emissions and mitigating the prevalence of fine particulate matter associated with premature mortality and the increased risk of cardio-respiratory morbidity and mortality.

International Budget:

\$1,013,817.00