

West Gate Tunnel Project

Report of Will Symons

1 Introduction

My firm **AECOM** prepared the technical report titled West Gate Tunnel Project Greenhouse Gas Assessment (**Technical Report**) which is included as Technical Report Q to the Environment Effects Statement (**EES**) for the West Gate Tunnel Project (**Project**).

The role that I had in preparing the Technical Report was Technical lead supporting the development of the methodology and review of the initial Reference Design Impact Assessment. Other significant contributors to the Technical Report and their expertise are set out as follows:

- Katrina O'Mara, Associate Director, Environment and Sustainability AECOM: Katrina is one of Australia's leading infrastructure sustainability professionals having over 20 years of experience. Katrina regularly works with the Infrastructure Sustainability Council of Australia (ISCA), as both a verifier for projects seeking a rating and to deliver foundation training for individuals seeking to become Accredited Professionals.
- Allan Klindworth, Principal Consultant, Sustainability and Resilience, AECOM: Allan has fourteen years of experience in business management and sustainability consulting. He has worked with the government, corporate, and tertiary sectors to deliver projects covering a broad range of issues including climate risk and adaptation, environmental management and energy efficiency. Allan is an Infrastructure Sustainability Accredited Professional (ISAP).

I adopt the Technical Report, in combination with this document, as my written expert evidence for the purposes of the West Gate Tunnel Project Inquiry and Advisory Committee's review of the EES, draft planning scheme amendment and works approval application.

2 Qualifications and experience

Appendix A contains a statement setting out my qualifications and experience, and the other matters raised by Planning Panels Victoria 'Guide to Expert Evidence'.

A copy of my curriculum vitae is provided in Appendix B.

3 Further work since preparation of the Technical Report

Since the Technical Report was finalised, I have not undertaken any further work in relation to the matters addressed in the Technical Report relevant to the Project.

4 Written Submissions

4.1 Submissions Received

I have read the public submissions to the EES, draft planning scheme amendment and works approval application and identified those that are relevant to the Technical Report and my area of expertise. These include the following submissions: 26, 27, 29, 106, 145, 146, 162, 169, 184, 190, 203, 221, 223, 245, 247, 248, 294, 325, 326, 327, 337, 357, 374, 378, 387, 416, 420, 422, 430, 454, 486, 502 and 504.

4.2 Summary of Issues Raised

The submissions have raised the following issues relevant to my area of expertise:

Inadequacies of the assessment of operational greenhouse gas emissions from vehicle traffic

- Inadequacies of the traffic modelling which was the basis for estimating operational greenhouse gas emissions from vehicle traffic (Submissions 184 – City of Melbourne, 190 – Planning Institute of Australia (Vic.), 326, 357 – Moreland City Council, 374, 422 – Senator Janet Rice and 430 – Public Transport Users Association).
- The assessment estimated the impact of the Project on vehicle traffic at the metropolitan Melbourne scale rather than the for the western suburbs (Submission 422 – Senator Janet Rice).
- The estimate of greenhouse gas emissions from vehicle traffic make assumptions related to anticipated future improvements in fuel efficiency (Submission 504 – Environment Victoria).

Challenging the significance of the vehicle traffic emissions

- Disagree with the risk matrix consequence ratings (i.e. a 1% increase in greenhouse emissions is major and a 10% increase is severe) (Submission 422 – Senator Janet Rice).
- Disagree that a 0.23% increase in vehicle traffic emissions in 2031 is considered marginal (Submission 422 – Senator Janet Rice).
- There is no Environmental Performance Requirement (EPR) specified for vehicle traffic greenhouse gas emissions (Submission 422 – Senator Janet Rice).

Inadequate assessment against the requirements of the Transport Integration Act 2010

- The Project is not adequately assessed against sections 10(b) (c) and (e) of the Transport Integration Act (TIA) in that its contribution to increased greenhouse gas emissions is downplayed and determined to be insignificant (Submissions 420 and 422 – Senator Janet Rice).

The assessment has not considered the impacts in comparison to alternative public transport based projects

- The Project will lead to an increase in greenhouse gas emissions as a result of the construction and operation activities (including vehicle traffic) and therefore should not be supported (Submissions 26, 29, 145, 162, 203, 221, 245, 248, 294, 374, 387, 416, 420, 422 – Senator Janet Rice, 430 – Public Transport Users Association, 486, 502 and 504).
- There is no assessment of the Project's greenhouse gas emissions relative to alternative projects that have a greater focus on public transport rather than private vehicle use (Submissions 422 – Senator Janet Rice, 430 – Public Transport Users Association and 486).

4.3 Response to Issues Raised

Set out below are my comments and response to the issues raised by the written submissions relevant to the area of my expertise.

Inadequacies of the assessment of operational greenhouse gas emissions from vehicle traffic

To maintain consistency with other impact assessments undertaken for the EES, the assessment of greenhouse gas emissions from vehicle traffic was based on the traffic modelling undertaken by Veitch

Lister Consulting (VLC) to support the Project (refer to Technical Report A – Transport). Separate traffic modelling was not undertaken for the greenhouse gas assessment.

The limitations related to how the traffic modelling considers induced demand are acknowledged in the greenhouse gas assessment report (Section 3.7) and the supporting methodological appendix prepared by VLC (Appendix D).

In determining the boundary for the assessment of vehicle traffic related greenhouse gas emissions, data was available at three scales:

- 1) Victoria-wide
- 2) the metropolitan Melbourne road network
- 3) select roads affected by the Project.

Traffic modelling data for only the western suburbs was not available to inform the greenhouse assessment.

Assessing the impact at the metropolitan Melbourne scale was chosen as it provided a broad scale that captured potential for changes in traffic routes associated with the Project. It was determined that using an approach that assessed the impact of the Project on select roads would have the potential to exclude emissions associated with changes in traffic movements caused by the Project but occurring outside of the selected roads. This approach may have affected the results of the greenhouse gas assessment and left the Project open for criticism as to which roads were included and excluded from the assessment. It was determined that assessing the impact at a Victoria-wide level would be too large a scale to enable the potential influence of the Project to be seen in the results of the modelling.

The estimation of greenhouse gas emissions from vehicle traffic assumed that there is no change in fuel efficiency of vehicles. This approach was taken as the Project will not affect the fuel efficiency of vehicles – i.e. fuel efficiency will be the same with or without the Project and hence irrelevant for the purposes of the impact assessment. The fuel efficiency of vehicles is likely to increase over the assessed period. As such if the assessment had included consideration of fuel efficiency, it is likely that the absolute vehicle emissions would be lower than that estimated in 2031, while the percentage difference in emissions as a result of the Project, in comparison with a ‘no project’ scenario, would be the same. Therefore, the approach applied represents a conservative estimate (i.e. it is likely that actual vehicle emissions will be lower than we predicted).

Challenging the significance of the vehicle traffic emissions

The risk assessment process outlined in the greenhouse gas assessment was used to prioritise the impacts that were to be the focus for the impact assessment. The risk matrix that was applied included the following consequence criteria (p20):

- Major: “Construction or operation energy use and GHG emissions p.a. is substantial that is, the project increases Victoria’s annual transportation sector’s GHG emissions by more than 1%”
- Severe: Construction or operation energy use and GHG emissions p.a. is significant that is, the project increases Victoria’s annual transportation sector’s GHG emissions by more than 10%.

While the thresholds used to determine the consequences ratings could be debated and are inherently subjective, the outcome of the risk assessment process was that operational emissions from vehicle traffic were included in the assessment.

In response to the issue of the relative significance of the increase in greenhouse gas emissions as a result of the Project (compared to a ‘no project’ scenario), it does highlight the challenge in assessing a global scale issue using a method (i.e. the EES process) that is designed for assessing impacts at a local (up to state level) scale. It is acknowledged (in the Technical Report, p40) that “Cumulative greenhouse gas

emissions from multiple sources are a key contributor to climate change impacts such as greater frequency and intensity of extreme weather.”

It is also acknowledged that global scale climate change is caused by a multiplicity of relatively small emissions sources, such as the Project. However, this is not, in itself, a convincing argument against the Project – by this logic, public transport infrastructure investments also should not proceed as they also result in a net increase in greenhouse gas emissions, both in construction and operation. The pertinent question is rather how, society wide, to minimise greenhouse gas emissions, now and into the future, whilst also maintaining quality of life and access to opportunity for our communities. The answer to this question is well beyond the scope of this greenhouse gas assessment.

The greenhouse gas report is not engaged in broader transport related discussions including the demand for road infrastructure for personal and business mobility, the need for a second Maribyrnong River crossing or the relative benefits of investment in public transport versus roads. The assessment is merely assessing the Project against a ‘no-project’ scenario, and it is only in this context that the findings are presented.

In relation to the estimated increase in vehicle traffic emissions, the use of the word marginal was to indicate the size of the increase was small in relation to the ‘no project’ scenario (i.e. 40 kt (+ 0.23%) difference in 2021 and 8 kt (+0.04%) difference in 2031). Due to the many assumptions that are included in the modelling process, it is possible for the estimated increase to be within the margin of error of the modelling. The assessment did estimate an (marginal) improvement in the relative efficiency of the road network (kg CO₂-e/vehicle kilometres travelled (vkt) in 2021 and 2031 (approximately 0.24% and 0.31% less respectively).

There is not an Environmental Performance Requirement (EPR) that specifically addresses vehicle traffic greenhouse gas emissions. However, EPR GGP1 requires the design to minimise, to the extent practicable, greenhouse gas emissions arising from construction, operation and maintenance of the Project. In addition, the material and energy consumption related ISCA credits referred to in GGP2 require consideration of the whole project lifecycle (including operation).

Inadequate assessment against the requirements of the Transport Integration Act 2010

An assessment of the Project against the *Transport Integration Act 2010* was not part of the scope of the greenhouse gas assessment. Multiple submissions referred to Section 10 (Environmental Sustainability) of the *Transport Integration Act 2010* (Submissions 420 and 422 – Senator Janet Rice). Specific references were made to sections 10 (b), (c) and (e).

“10. Environmental Sustainability

The transport system should actively contribute to environmental sustainability by:

- (a) protecting, conserving and improving the natural environment;
- (b) avoiding, minimising and offsetting harm to the local and global environment, including through transport-related emissions and pollutants and the loss of biodiversity;
- (c) promoting forms of transport and the use of forms of energy and transport technologies which have the least impact on the natural environment and reduce the overall contribution of transport-related greenhouse gas emissions;
- (d) improving the environmental performance of all forms of transport and the forms of energy used in transport;
- (e) preparing for and adapting to the challenges presented by climate change.” (p27)

In recognition of the requirements of section 10 (b), the greenhouse gas related EPRs for the Project include requirements that seek to avoid or minimise emissions associated with the Project, for example:

- GGP1 requires the design to minimise, to the extent practicable, greenhouse gas emissions arising from construction, operation and maintenance of the Project (p37 of the Technical Report)
- GGP2 requires the achievement of energy and material consumption related targets under the Infrastructure Sustainability (IS) rating tool (Ene-1 (Level 2) and Mat-1 (Level 2) respectively). The IS tool requires consideration of the whole project lifecycle (including operation) (p37 of the Technical Report).

In reference to Section 10 (c), to assess the Project against this criterion would require the definition and assessment of alternative projects to enable a comparison of their relative emissions profile. This is beyond the scope of the greenhouse gas assessment.

In reference to section 10 (e), the report acknowledges greenhouse gas emissions as a key contributor to the changing climate (Section 1.2). However, consideration of the impact of the changing climate on the Project is also beyond the scope of the greenhouse gas assessment.

The findings of the greenhouse gas assessment may help to inform an assessment against *Transport Integration Act 2010*.

The assessment has not considered the impacts in comparison to alternative public transport based projects

The scope of the greenhouse gas assessment was to estimate the emissions associated with the construction and operation of the Project relative to a 'no project' case. Estimation of the emissions of alternative projects (e.g. projects with a different mix of public transport versus private vehicle use) was beyond the scope of this assessment. The estimation and consideration of the cumulative emissions from other transport projects were also beyond the scope of the assessment.

Response to IAC Questions and Further Information Request

I have not been asked to respond to any IAC questions or further requests for information.

Declaration

I have made all the inquiries that I believe are desirable and appropriate and that no matters of significance which I regard as relevant have to my knowledge been withheld from the Inquiry and Advisory Committee.



.. ..
Signed

Date: 1 August, 2017

Appendix A Matters Raised by PPV Guide to Expert Evidence

(a) the name and address of the expert;

Will Symons

Collins Square, Level 10, Tower Two, 727 Collins Street, Melbourne, VIC 3008

(b) the expert's qualifications and experience;

Technical Director leading AECOM's Australia/New Zealand Sustainability and Resilience Practice, with specific experience in:

- **Greenhouse gas assessments**
- **Climate change risk and adaptation planning**
- **Resilience planning and strategies**
- **Change management and behavioural change for sustainability.**

Will has 17 years' experience in the delivery of greenhouse gas assessments for organisations and infrastructure projects. Will has led the compilation and delivery of hundreds of greenhouse gas assessments over his career, including as part of complex Environment Effects Statements (EES) processes.

(c) a statement identifying the expert's area of expertise to make the report;

Will is an expert in greenhouse gas emissions assessments, having completed hundreds of such assessments during his career. His experience includes but extends beyond transport infrastructure projects to provide a broad, cross-sectoral understanding of the key issues pertaining to the identification, collation and assessment of greenhouse gas emissions.

(d) a statement identifying all other significant contributors to the report and where necessary outlining their expertise;

Allan Klindworth, Principal Consultant, Sustainability and Resilience, AECOM: Allan has fourteen years of experience in business management and sustainability consulting. He has worked with the government, corporate, and tertiary sectors to deliver projects covering a broad range of issues including climate risk and adaptation, environmental management and energy efficiency. Allan is an Infrastructure Sustainability Accredited Professional (ISAP).

(e) all instructions that define the scope of the report (original and supplementary and whether in writing or oral);

In a letter from Sallyanne Everett and Chris Wiseman of Clayton UTZ dated 21 July 2017 I was requested to undertake the following work:

- 1. Review the public submissions and identify those relevant to my area of expertise.**
- 2. Review my Previous Report and identify whether there are any changes to the conclusion of the report arising out of the issues raised by the public submissions or as a consequence of any other relevant matter.**
- 3. Prepare an expert report that:**

(a) responds to the public submissions relevant to my area of expertise;

**(b) addresses my Previous Report and any changes to the conclusions reached;
and**

(c) any other matter that I consider relevant to my area of expertise.

To provide consistency of format for the IAC, in preparing my report I was encouraged to use the template provided with the letter.

4. Prepare a short (no more than 20 minutes) power point presentation for presenting at the hearing.

5. Attend the hearing to give evidence in relation to my report.

(f) the identity of the person who carried out any tests or experiments upon which the expert relied in making this report and the qualifications of that person;

(N/A)

(g) a statement setting out the key assumptions made in preparing the report;

I have assumed that all submissions relevant to my area of expertise were allocated to me on 24 July, 2017.

(h) a statement setting out any questions falling outside the expert's expertise and also a statement indicating whether the report is incomplete or inaccurate in any respect.

In my report I have responded to the greenhouse gas related issues identified in the submissions provided. I acknowledge that the assessment of greenhouse gas emissions from vehicle traffic in Technical Report Q were based on the traffic modelling undertaken by Veitch Lister Consulting (VLC).

Appendix B CV

Will Symons

Practice Leader, Sustainability & Resilience

Qualifications

Monash University, Bachelor of Science

Monash University, Bachelor of Arts

Certificate 4 in Assessment and Workplace Training

Certificate 3 in Change Management

Affiliations

Member of the Environment Institute of Australia and New Zealand (EIANZ).

Publications and Technical Papers

Kaufman, S., Symons, W., & Bachar, Z., The Green Steps Program: fostering environmental change agents, chapter in; Carpenter, D.B., and W. Leal Filho, Advances in Sustainability in the Tertiary Sector, Amsterdam: Peter Lang Publishers.

Career History

Technical Director leading AECOM's Australia/New Zealand Sustainability and Resilience Practice, with specific experience in:

- Greenhouse gas assessments
- Climate change risk and adaptation planning
- Resilience planning and strategies
- Change management and behavioural change for sustainability

Will is a Technical Director with 17 years' experience in the delivery of greenhouse gas assessments for organisations and infrastructure projects. Will has led the compilation and delivery of hundreds of greenhouse gas assessments over his career, including as part of complex Environment Effects Statements (EES) processes.

Recently, Will led the delivery of the greenhouse gas assessment for Independence Group's Stockman Mine as part of their EES process, and has led similar studies for the South Morang Rail Extension, Regional Rail link, Hutchison Ports, PD Ports and Melbourne City Council. Will was also recently engaged by the Singapore Government to review all of their sectoral climate adaptation strategies, feeding into their national climate adaptation plan.

Will recently delivered a multi-million dollar climate risk and adaptation study for the Australian Department of Defence, covering several of their large port facilities around Australia, in addition to many other significant bases. He is currently supporting the cities of Melbourne, Sydney, Wellington, Christchurch, Jakarta, Singapore and Bangkok to develop resilience strategies under the auspices of the Rockefeller Foundation's '100 Resilient Cities' (100RC) programme. Additionally, Will led the development of the risk assessment and asset scanning tool to be used by all 100 of their cities globally and led the development of the capacity building programme being rolled out for all of their staff and Chief Resilience Officers.

Detailed Experience*Carbon Management*

- Sustainability lead for Regional Rail Link Work Package B, the South Morang Rail Extension Alliance and the Level Crossing Removal Authority.
- Facilitated a greenhouse gas scoping exercise for the Western Alliance for Greenhouse Action, including successfully engaging a diverse group of 40 people in identifying scope, inventory, stakeholder and action planning issues.
- Project Director for a significant behavioural change and environmental management project for the Department of Defence.
- Delivered a Site Energy Management Plan (SEMP) for a significant training base for the Department of Defence.
- Led the compilation of Melbourne Metro 1's greenhouse gas inventory for its Environmental Effects Statement.
- Led the compilation of two significant mining developments' greenhouse gas inventory for its Environmental Effects Statements.
- Project managed the delivery of carbon management services for Oxford University, establishing a range of baselines (including greenhouse gas, water, waste and procurement), embedding a system for ongoing monitoring and reporting and developing a strategic framework for environmental management appropriate to their unique context. Significant engagement with a variety of stakeholders was required to ensure that the sustainability strategy reflects and is able to deliver the university's sustainability aspirations. Following board and Congregation sign-off, AECOM will develop a range of practical implementation tools, which will collectively move the institution towards its objectives and targets.
- Project managed the delivery of carbon management services to Transdev Ltd (UK), with a key element being the design of an auditable data collection system for greenhouse gas emissions. Will also designed a behaviour change programme aimed at improving the energy efficiency of bus and tram drivers through interventions for more fuel efficient driving. Additionally, site energy surveys were completed and executive management were engaged with to provide recommendations regarding embedding proactive carbon management in corporate policies, strategies and systems, including recommendations regarding appropriate targets, KPIs and marketing strategies.

- Audited and provided advice regarding Yarra Valley Water's target tracking and action planning for greenhouse gas emissions, including providing greenhouse amelioration, offsetting, mitigation and adaptation advice.
- Project managed the delivery of strategic greenhouse gas inventory advice to Transdev's Group Executive Management, based in Lyon, France. This project involved in-person advisory services, the generation of various formal advisory memos and researching relevant carbon emission factors from different jurisdictions, globally, in support of Transdev creating their first public group carbon emissions disclosure.

Impact Assessment

- Project managed the impact assessment process for a major, controversial wind farm development on the Great Ocean Road in South East Australia.
- Department of Defence – Assisted in the delivery of a scoping study for the Department of Defence's "Kapooka Base Master Plan".
- Project managed the delivery of internal environmental auditing services for Yarra Valley Water (2006-2009).
- Project managed the delivery of environmental auditing services for Port of Melbourne Corporation for the rehabilitation of port infrastructure
- Peer review of numerous EMS auditing reports, including a substantial EPA audit of Yallorn Energy.
- Redeveloped United Energy's Environmental Management System.

Resilience, Risk and Adaptation

- Project Director for the development of a coral reef resilience programme, partnering with the Great Barrier Reef Foundation
- Project Manager and workshop designer for dozens of 100 Resilient Cities workshops in Melbourne, Christchurch, Wellington, Sydney, Bangkok, Singapore, Jakarta and Rome and leading strategy development projects for Melbourne, Christchurch, Wellington, Sydney, Jakarta, Singapore and Bangkok.
- Project Director for the development of an Urban Cooling Strategy for Melbourne Water.
- Project Director for a study which mapped Melbourne Water's intersection with Melbourne's resilience challenges.
- Project Director for the development of the Monitoring and Evaluation Framework of the

- Victorian State Government's Climate Change Adaptation Plan.
- Engaged by the Singapore Government to review all of their sectoral climate adaptation plans, including for coastal protection and ports and harbours, feeding into the publication of their national adaptation plan. This included participating in a series of workshops and providing detailed technical and strategic feedback.
 - Project managed the delivery of carbon management services for Hutchison Ports (UK). This Carbon Trust co-funded, complex programme of works has involved the compilation of a full greenhouse gas inventory, executive and senior management interviews, union engagement and several site visits.
 - Project managed the delivery of carbon management services for PD Ports (UK), covering their operations at Teesport, Hartlepool and a River Conservancy operation. This programme of works resulted in significant carbon savings being identified, through the generation of their first greenhouse gas inventory and recommending enhancements to management processes, strategies and systems.
 - Project Director for the development of the 100RC 'Assets and Risks Tool', which is being used by all 100 of their cities to analyse and prioritise their key shocks and stresses, and to also analyse the condition, criticality and vulnerability of the city's assets to its priority shocks.
 - Project Director for a current Department of Defence project, delivering detailed risk assessments and adaptation plans for a number of significant training bases.
 - Project Director for a Department of Defence project which assessed climate risk due to sea level rise and storm surge to significant national bases.
 - Project Director for a Department of Defence project which is delivering detailed climate risk assessments and adaptation plans for 14 significant sites nationally. This project is focussing on risks associated with sea level rise, coastal erosion, inland inundation and storm surge.
 - Project Director for a climate change risk assessment for a significant mining project as part of their regulatory approvals process.
 - Project Director for a project for the Department of Sustainability and Environment (VIC) which assessed the risk imposed by climate change on Melbourne's Peri-Urban region.
 - Project Director for a Department of Sustainability and Environment (VIC) project which developed climate risk and adaptation communication tools.
 - Project Director for a Department of Transport (VIC) project which developed and delivered a climate risk and adaptation planning training package for all DoT and other transport agency staff and contractors.
 - Assisted in the delivery of a major study into the vulnerability of Victorian infrastructure to climate change for the Department of Infrastructure.
 - Brief profiles of many other climate risk/adaptation projects led by Will are available on request.
- Climate Change*
- Project managed a low carbon energy study for Coventry City Council, including the identification of potential heat demand 'nodes', heat supply points, delivery network infrastructure and energy centre locations. Project financial stakeholders include both Coventry based universities and Advantage West Midlands.
 - Project managed the delivery of Climate Change Feasibility Studies for Coventry City Council, covering the Canley and WEHM areas. These studies involved low to zero carbon energy options, investigation of energy efficiency opportunities for domestic and non-domestic buildings and investigations into opportunities for SUDS, enhancing ecological outcomes, sustainable transport and waste management.
 - Assisted Coventry City Council with a successful HCA funding application (granted mid 2009) for a renewable energy system for the WEHM area.
- Change Management and Behaviour Change*
- Delivered specialist change management and behavioural change services for a Department of Defence waste management reform project.
 - Researched and wrote "Influencing Business to Change", a 'Thinkpiece' for the UK Department for Transport's Directors, analysing effective policy tools for changing business practices. To be published in 2010.
 - Designed and delivered 6 energy and waste management workshops for Network Rail staff across the UK, focusing on providing training into infrastructural and behavioural opportunities for waste avoidance and energy efficiency.
 - Delivered behavioural change training and advisory services as part of a carbon

- management programme for UNITE, aimed at reducing energy use in their student residences.
- Delivered behavioural change training advice to Superdrug as part of a broader carbon management project, aimed at reducing carbon emissions whilst enhancing/protecting corporate brands.
 - Delivered strategic advice and a full specification for tender for an automated metering and targeting system, covering Hutchison Ports' (UK) stationary and transport energy and water use, as part of a broader Carbon Management Programme (see below).
 - Lead author for the delivery of "Low Carbon Refurbishment of Buildings: A guide to achieving carbon savings from refurbishment of non-domestic buildings", a change management guide for low carbon refurbishment projects for the Carbon Trust.
 - Advisory Board member for the creation of the Confederation of British Industry's (CBI) 'Enabling a Greener Workforce – a Guide on Employee Engagement and Sustainability', including Chairing a workshop for the CBI on this theme.
 - Provided change management and process advisory for the UK Government's Market Transformation Programme, editing public consultation documents and advising on communication for change and innovation for the Domestic Heating Consultation document.
 - Provided expert input into numerous Freight Best Practice Programme publications, including the change management and carbon footprinting guides.
 - Project managed the delivery of the Commissioner for Environmental Sustainability's 2006 Strategic Audit, including engaging across all agency's executives and providing EMS audits for 12 Victorian Government agencies. Also assisted in the delivery of the 2004 Strategic Audit. This annual review is the primary method for the Victorian Government to assess its progress towards meeting its targets and the key driver for action across government.
 - Provision of change management advisory services to Sustainability Victoria and the Office of the Commissioner for Environmental Sustainability (OCES).
- Education and Training*
- Facilitation of dozens of workshops over the last 12 years, including most recently the stakeholder engagement, value engineering and sustainability opportunity identification workshops for the South Morang Rail Extension Alliance.
- Developed and delivered 'Change Agent Training' package to the Department of Sustainability and Environment (Vic) for delivery across government under a licensing arrangement.
 - Developed and delivered training for key managers across Victorian tertiary education institutions in change management, strategic sustainability and behavioural change.
 - The delivery of environmental change management training to all Victorian State Government EMS Managers through a program arranged by the Department of Innovation, Industry and Regional Development.
 - The delivery of this Change Management training packages to dozens of organisations, on both a subscription basis and customised basis.
 - The development and delivery of a range of environmental training modules for the City of Boroondara (LGA), utilising an innovative online delivery format.
 - Developed and managed a national change management training program for university students for three years. This role included the development and delivery of training materials, engagement with host universities and internship hosts and sourcing significant grant funding.
 - Provided staff from Green Collect (a community based Social-Environmental Enterprise) auditing training on a pro bono basis. Green Collect delivers waste and energy auditing and recycling collections whilst providing new opportunities for people facing barriers to employment including homelessness, health conditions and social isolation.
 - Designed and delivered a full day training session for Origin Energy staff covering general environmental awareness, waste and energy auditing methodologies and environmental behavioural change techniques.
 - Designed and delivered a half day training session for 50 environmental professionals from ReBATE (Regional Business and the Environment network) covering environmentally responsible procurement, behavioural change techniques and Green Office Program structure and design.
- Other*
- Researched and delivered a private sector engagement strategy for the Secretariat of the Pacific Regional Environment Program (SPREP), based in Apia, Samoa.

- Aviva Group – Provided verification services for Aviva Australia’s first corporate social responsibility report.
- Oxfam Community Aid Abroad – Delivered Environmental Impact Assessments of Oxfam’s “Trailwalker” events in 2003, 2004 and 2005.
- Melbourne City Council – Delivered paper to Melbourne City Council’s “Council House 2” design group entitled “How to Design Buildings to Best Facilitate Best Practice Environmental Behaviours”.

Professional History

AECOM Australia
2010 - present

AECOM Europe
2007-2010

Maunsell AECOM Australia
2005-2007

Monash Environment Institute
2002-2005

United Energy
2001-2002

Monash University Student Association
2000-2001