

EMAIL
admin@kinesis.org

OFFICE
02 8005 4290
FACSIMILE
02 9280 0953

MAIL
PO BOX 411 DARLINGHURST
NSW 1300 SYDNEY AUSTRALIA

kinesis

	REPORT	
PROGRAM	Woollahra Council Carbon Reduction Strategy and Action Plan 2010 - 2025	
PROJECT	Greenhouse Gas Emissions Inventory and Management Strategy	
PREPARED FOR	Woollahra Council	
VERSION	FINAL	
AUTHORS	<i>Bruce Taper, Director Lachlan Kranz, Sustainability Consultant Liz Helstroom, Economic Analyst David Holden, Climate Strategist – Urban Planning Rob Helstroom, Principal Scientist Matthew Sander, Policy Analyst</i>	<i>2nd June, 2010</i>

Contents

Executive Summary	3
Introduction	6
1. Background and Policy Review	7
The Emission Reduction Potential of Local Communities	9
Woollahra Climate Change Policy Review	10
2. Greenhouse Gas Emissions Inventory.....	12
3. Carbon Strategy and Action Plan	15
Recommended Greenhouse Gas Emission Reduction Target	15
Appendix.....	25

Executive Summary

Woollahra Council can significantly reduce the greenhouse emissions of its Council operations by planning and deploying a range of technologies to improve efficiency in a cost effective manner.

The following report uses an integrated sustainability modelling framework to establish Woollahra Council's current and baseline emission profile and assesses progress towards the 2010 greenhouse emission reduction target. The report also provides a revised emission reduction target based on a costed action plan which is measurable, reportable and achievable by 2025.

The report has considered the potential for Woollahra Council's current policies to affect meaningful emission reduction and proposes an alternative policy framework to improve effectiveness and measurability of future actions.

Woollahra Council's greenhouse gas emissions have increased from 5,475 tonnes of CO₂-e in 1999/2000 to 6,530 tonnes of CO₂-e in 2008/2009. The report has concluded that based on current projections Woollahra Council will fall short of complying with its established emission reduction target of 30% below 1999/2000 levels for Council operations by 2010.

Considering Council's carbon management progress to date, the recommended emission reduction strategy for 2010 onwards involves:

- aligning Council's greenhouse gas emission reduction target with the Community Strategic Plan for target delivery in 2025
- adjusting the baseline year to 2003/04 to better represent Council's current operational characteristics compared to the original 1999/2000 baseline.

Recommended greenhouse gas emission reduction target:

Reduce greenhouse gas emissions for Council operations to 30% below 2003/2004 base year levels by 2025.

List of recommended actions to achieve this target shown in Table 1.

Table 1: Recommended emission reduction actions.

Action	Cost/tonne	Capital costs	On-going net costs*	Tonnes saved/year	% of Total Reduction
Monitoring and Reporting	NA	\$50,000 - \$100,00	\$30,000 - \$50,000	NA	NA
Project Implementation					
a) Establish benchmark emissions from Council operations – COMPLETE.					
b) Set an emission reduction target –COMPLETE.					
a) Procure a system which centralises emissions tracking, target setting and reporting for all sectors of Council, as per key policy recommendation					
c) Implement a data collection protocol to ensure necessary data is collected consistently and accurately for input to the management system.					
Street lighting	-\$17	\$0	Year 1 -\$8,690 Year 2 -\$18,385 Year 3 -\$27,891 Year 4 -\$28,211	470 950 1400 1400	22%
Project Implementation					
a) Request street lighting audit, inventory and remaining life assessment from Energy Australia.					
b) Request lamp changes to efficient models as shown at Appendix B for future lamp replacements.					
c) Monitor streetlight inventory, emissions and annual network and demand charges.					
Co-gen (Chambers)	\$98	\$525,000	\$65,000	314	5%
Project Implementation					
a) Feasibility study for co-generation installation at Council Chambers;					
b) If feasible tender for co-generation installation at Council Chambers.					
Energy Performance Contract Base Projects	Unknown	\$250,000	Unknown	244	4%
Project Implementation					
a) Project is being implemented by third party provider – COMPLETE.					
Energy Performance Contract Optional Projects	Unknown	Unknown	Unknown	23	0.3%
Project Implementation					
a) Project already costed by third party provider.					
Rationalized Vehicle Fleet	-\$1,051	-\$97,000	-\$38,000	83	1%
Project Implementation					
a) Review vehicle fleet fuel consumption for 2008/2009 to verify baseline data.					
b) Establish a data management system to track future fuel consumption.					
c) Review Council's fleet policy to include quantifiable consumption and emission reduction targets and change the process governing vehicle choice to include more efficient models.					
d) Explore efficiency and fuel switching opportunities for both the heavy and passenger fleet vehicles.					
Solar PV Council properties	\$315	\$240,000	\$0	35	0.5%
Project Implementation					
a) Tender for the installation of solar photovoltaics on Council facilities.					
Solar PV Council properties (tenanted)	-\$34	\$280,000	0	59	0.9%

Action	Cost/tonne	Capital costs	On-going net costs*	Tonnes saved/year	% of Total Reduction
Project Implementation					
a) Tender for the installation of solar photovoltaics on Council facilities which are leased to community organisations which qualify for the NSW Solar Bonus Scheme.					
b) Work with community organizations to apply for the NSW Solar Bonus Scheme solar generation tariff.					
Additional Green Power	\$63	\$0	\$16,000	240	4%
Project Implementation					
a) Procure an additional 226,000 kWh of Green Power per year.					
Small facilities efficiency retrofitting	Unknown	Unknown	Unknown	~50	NA
Project Description					
<p>This project is included as an additional action which relates to 'All other facilities' as shown at Figure 3. It was not included as a full scale action as it relates to many smaller actions which are best achieved through strategic maintenance rather than dedicated works. These smaller buildings will possess varied opportunities for improved energy efficiency and it is Kinesis's view that a 10% emission reduction would be readily achievable. Small building retrofit actions can be expensive in terms of dollars per tonne; however, by integrating energy efficiency into ongoing maintenance programs Council could achieve cost effective savings. External factors will also assist this aim, for example, the Federal Government legislation to phase out incandescent light bulbs by 2010 is expected to reduce commercial building electricity consumption by approximately 6% as efficient alternatives are installed through necessity.</p>					

*Note: On-going net costs have been calculated using best available knowledge on current and future electricity and network tariffs. The street lighting 777 tariff includes the NSW Government Procurement Offices estimated network tariff increases 2009-10 to 2012-13.

Introduction

The following report has been prepared by Kinesis on behalf of Woollahra Council to:

- Assess current Council policies for their ability to promote emission reduction
- Provide a greenhouse gas re-inventory for financial year 2008/09 and review previous inventory years
- Provide a definitive greenhouse gas reduction target
- Provide a logical emission reduction plan for Council operations.

The report describes a strategy by which Woollahra Council can achieve significant reductions in greenhouse gas emissions through an intelligent, staged delivery of energy efficiency and fuel switching actions. The report also documents the requirements to establish a long term emissions tracking and assessment system which Kinesis considers the key policy recommendation to enhance Council's carbon management performance.

The Carbon Strategy and Action Plan has been prepared to provide 'least cost' actions which, if combined with the proposed quantitative evidence based tracking and assessment system, will verifiably achieve the recommended emission reduction target.

1. Background and Policy Review

In March of 2009 approximately 2500 scientists and researchers attended an international scientific congress in Copenhagen titled Climate Change, Global Risks, Challenges and Decisions. The purpose of this congress was to bring together new knowledge and findings into the “impacts of human influence on the climate” that had emerged since the publication of the most recent Intergovernmental Panel on Climate Change’s (IPCC) Assessment Report which had been released in 2007.¹

The IPCC had concluded in 2007 that warming of the earth’s climate is unequivocal and that there is a very high confidence (defined as a 90% certainty) that it is being driven by human activity.² However, the 2009 Copenhagen Congress concluded that since the publication of the IPCC’s Assessment Report the observed effects of climate change are occurring at a rate that is near the upper end of the IPCC’s previous projections. These trends include:

Ocean warming – Current estimates indicate that the ocean is warming at a rate 50% faster than had been previously reported by the IPCC.

Arctic ice loss – Since the most recent IPCC report the Arctic has seen a dramatic loss of summer sea ice. In 2007, the minimum area covered by ice decreased by about 2 million square kilometres as compared to previous years. In 2008, the decrease was almost as large.

Sea level rises – New observation techniques have enabled more accurate measurements of the ice loss being observed across the world’s glaciers and ice sheets. These new observations of the increasing loss of ice mass have led to a revised prediction of expected sea level rises. The congress has projected global mean sea level rises of 1 metre over the next century; double the IPCC’s 2007 projection.

The above predictions on the likely impact of climate change are widely communicated and most often interpreted by Australians as a major concern.³ The predicted effects of climate change are likely to impact upon the quality of life experienced within our cities. 80% of Australians live within the coastal zone and there are approximately 710,000 addresses within 3 kilometres and less than six metres above sea level making Australia particularly vulnerable to the threat of sea level rise.⁴ Increased damage from more intense and frequent storms could also threaten Australia’s built environment. Between 1960 and 1999, 87% of insured losses were the result of weather related events. Research by insurer IAG has shown that a 25% increase in peak wind gusts can cause a 650% increase in building damages.⁵

Climate change poses an immediate and increasing risk, making the challenge of avoiding dangerous climate change even more difficult. In July this year world leaders at the G8 recognised “the broad scientific view that the increase in global average temperature above pre-industrial levels ought not to exceed 2°C”.⁶ This target was also included in the Copenhagen Accord.⁷ Any warming beyond two degrees will prove to be much more difficult to adapt to, creating a greater risk of social disruption due to food and water shortages and health implications.⁸

¹ Climate Change, Global Risks, Challenges and Decisions (2009), *Synthesis Report*

² IPCC (2007), *Climate Change 2007: Synthesis Report, Summary for Policy Makers*

³ Climate Intelligence (2009), *March 2009 Survey*

⁴ IPCC (2007), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*

⁵ Tony Coleman (2002), *The Impact of Climate Change on Insurance Against Catastrophes*

⁶ G8 Declaration (2009), *Responsible Leadership for a Sustainable Future*, Available:

http://www.g8italia2009.it/static/G8_Allegato/G8_Declaration_08_07_09_final.o.pdf

⁷ UNFCCC (2009), *Copenhagen Accord*, Available: <http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf>

⁸ Climate Change, Global Risks, Challenges and Decisions (2009), *Synthesis Report*

Restricting warming to two degrees will be a difficult task. The world has already experienced 0.7 degrees of warming over the last century. The IPCC 4th Assessment Report argues that inertia in the climate system means that warming of 1.4 degrees above pre-industrial levels is inevitable.⁹ To restrict warming to between 2 and 2.4 degrees the IPCC argues that atmospheric concentrations of greenhouse gasses will need to be restricted to between 445-490 parts per million (ppm) of CO₂-equivalent (CO₂-e).¹⁰ Meeting this target will require significant reductions in greenhouse gas emissions. According to the IPCC atmospheric concentrations are already above 380 ppm.

The IPCC argues that to restrict atmospheric concentrations of CO₂-e to 450 ppm, and therefore restrict warming to approximately two degrees, developed nations will need to reduce their greenhouse gas emissions by between 25% and 40% by 2020 and by 80% – 90% by 2050.¹¹

The Stern Review into The Economics of Climate Change showed that the cost of reducing emissions and mitigating the effects of dangerous climate change is far less than the potential cost of un-mitigated climate change. The Review found that stabilising global emissions at a level necessary to avoid dangerous climate change would have an annual cost of around 1% of GDP by 2050.¹² If climate change is left unchecked, then the resulting 5-6 degrees of warming will cost between 5 – 10% of GDP, with the costs far higher for developing nations.¹³

Since the publication of his initial review in 2006, Stern has doubled his estimate of the cost of mitigation, arguing 2% of GDP will need to be spent annually by 2050. He has stated that the reason for his revisions is that:

...looking back - the targets that were proposed in the Stern Review were not ambitious enough, given the kinds of risk we are now seeing. The risks are actually still worse than we saw in the Stern Review because greenhouse gases are growing faster than we assumed, the absorptive capacity of the planet - particular the oceans - to absorb greenhouse gases is less than we thought, and some of the effects - for example Greenland ice melting - are coming through faster than we thought.¹⁴

Given that:

- the scientific evidence shows that climate change is happening faster than expected,
- the economic analysis shows that the costs of mitigation is increasing, and
- the G8 has recognised the need to limit warming to two degrees,

there is an urgent need for developed nations to make immediate cuts in their greenhouse gas emissions. Despite this, developed nations have committed to targets that are well below what the science tells us is needed. In Australia, the Federal Government has committed to a 2020 emissions reduction target of 5% to 15% or 25% against 2000 levels.

The emission reductions currently proposed by the following developed nations: Australia, Canada, the EU, Japan, New Zealand, Norway, Switzerland, Ukraine, USA and Russia, when measured against the same base year, equate to a cumulative emission reduction of between 5% and 17% from 1990 levels by 2020.¹⁵ This is well short of the IPCC analysis that suggests

⁹ IPCC (2007), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*

¹⁰ IPCC (2007), *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*

¹¹ IPCC (2007), *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*

¹² Nicholas Stern (2006), *The Economics of Climate Change*, 267

¹³ Nicholas Stern (2006), *The Economics of Climate Change*, 161

¹⁴ Dateline (2009), Interview with Nicholas Stern, Available:

<http://www.sbs.com.au/dateline/story/transcript/id/600050/n/Interview-with-Nicholas-Stern>

¹⁵ International Institute for Applied Systems Analysis (2009), *Analysis of the Proposals for GHG Reductions in 2020 made by UNFCCC Annex I Countries by mid-August 2009*

developed nations are required to reduce emissions by 25% to 40% to limit warming to 2 degrees.

In the Author's opinion, the failure at Copenhagen to achieve a legally binding international treaty that includes emissions reduction commitments commensurate with limiting global warming to two degrees only places more emphasis on the need for local government to strive for ambitious emissions reductions.

The Emission Reduction Potential of Local Communities

Globally, more than 50% of people live in urban environments making urban environments a significant contributor to greenhouse gas emissions.¹⁶ The Clinton Climate Initiative has stated that cities produce up to 75% of the world's total greenhouse emissions.¹⁷ A report by the Centre for International Economics estimates that commercial and residential buildings are responsible for 23% of Australia's total emissions.¹⁸ Studies often refer to the built environment as providing considerable emissions abatement opportunities.¹⁹ The challenge is to develop policies and practices that can leverage and realise those potential reductions.

With this in mind we asked if Woollahra Council is doing enough to manage the emissions of its own operations and support abatement action in the community. Woollahra Council endorsed a greenhouse gas emissions reduction target in 2001 as part of the ICLEI Cities for Climate Protection (CCPTM) program. As shown in Figure 1 this target represents a 30% emissions reduction from Council's 1999 inventory level of 5,475 tonnes CO₂-e.

Since establishing this reduction target a range of greenhouse emission reduction actions have been implemented by Council. These have had a positive reported impact through improved building energy efficiency, purchasing renewable energy and fleet downsizing.

Although Woollahra Council is not on track to meet its target, Kinesis found that the Council has demonstrated a willingness to recognise and respond to the climate change issue. By accepting climate science and engaging in early action, Woollahra Council has assumed a role of leadership in local government.

This paints a stark contrast to the ongoing climate change debate at international and national Government levels which largely remains at odds with community expectations for responsible environmental management and positive action to reduce emissions.

Provocations for Woollahra Council

- To avoid dangerous climate change global warming must be limited to a 2 degree rise from pre-industrial levels.
- Emissions reductions proposed by developing nations fall well short of what is needed to meet this 2 degree target.
- Cities are a major contributor to Australia's emissions as well as being a major source of potential abatement.
- This report and strategy demonstrates that significant emissions can be achieved by Woollahra Council using available technology if appropriate strategies for achieving them are put in place.

¹⁶ International Institute for Applied Systems Analysis (2009), Analysis of the Proposals for GHG Reductions in 2020 made by UNFCCC Annex I Countries by mid-August 2009

¹⁷ Clinton Climate Initiative (2009), C40 Cities: An Introduction, Available: <http://www.c40cities.org/>

¹⁸ Centre for International Economics (2007), Capitalising on the Building Sector's Potential to Lessen the Costs of a Broad Based GHG Emissions Cut

¹⁹ McKinsey & Company (2008), An Australian Cost Curve for Greenhouse Gas Reduction

Woollahra Climate Change Policy Review

Kinesis has undertaken a qualitative review of Woollahra Council's emissions reduction policies, specifically policies listed within the Delivery Program and Operational Plan (DPOP) and draft Sustainability Plan. The purpose of this review is not to assess all aspects, actions and benefits of each document but to review only their specific climate change and emissions reduction measures.

Kinesis understands the draft nature of the Sustainability Plan and Woollahra's intentions to develop an Environmental Management Plan in the near future. The key findings of this review stress that integrated planning is important and applicable to all future environmental policy development at Woollahra Council.

The review considers the emissions reduction related components of each document against the following criteria:

- 1. Emissions reduction program elements:** What are the specific emissions reduction elements contained in each document?
- 2. Interaction with Sustainability Plan or DPOP:** Is each document complimentary to the other's goals, aims, objectives and actions?
- 3. Appropriateness in relation to State and Federal policy:** Are the emissions reduction actions contained in each document appropriate in regards to State and Federal policy?

The findings and recommendations of this review are summarised below. Detailed analysis of this review is contained within Appendix A.

Key Findings

1. Both documents contain goals of adopting ecologically sustainable design (ESD) principles in planning and regulatory mechanisms and express intent to reduce emissions. However, there is a noticeable lack of specific commitments or targets. This includes a lack of emissions reduction targets, for either the Council or the community, and what each action or policy seeks to achieve.
2. Both documents lack actions that will result in direct emissions reductions. They do contain a number of provisions to amend planning mechanisms, investigate sustainable policies and encourage sustainable practices. However, they lack actions that will result in direct interventions to reduce emissions such as building retrofits or low emissions funding and incentive programs. Such actions are contained in the draft Energy Savings Action Plan (ESAP), however, this document lacks interdepartmental acknowledgement and is limited in scope. Specific key goals and actions of stand-alone documents such as the ESAP should be contained within the DPOP to both broaden their scope and enhance organisational ownership of emission reduction goals.
3. Mechanisms and/or policies to determine and track the effectiveness of the actions were missing. In addition, there were no performance criteria or key performance indicators against which various actions' effectiveness could be measured. Both documents also failed to emphasise the importance of data collection necessary to determine how effective each document or action has been (Appendix D).
4. City of Sydney Council offers an example of best practice emissions reduction strategy and planning. The City of Sydney has established a vision for what they want to achieve in their

2030 Sustainability Vision which included a quantifiable target and a clear implementation strategy to achieve this goal. The City of Sydney is now progressing to apply the actions contained in the strategy by awarding tenders for the delivery of the infrastructure master plans necessary to effect broad emission reduction.

Key Policy Recommendation

Australia's ratification of the Kyoto Protocol in December 2007 has provided a sound basis for establishing the criteria for a robust monitoring and reporting framework. The Bali Action Plan requires developed nations to adopt:

measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives.²⁰

Kinesis recommends that Woollahra Council should endeavour to meet the above criteria by implementing a monitoring framework which is integrated with, and supports, evidence based targets. Woollahra should implement a system that is able to establish a benchmark, set targets and act as the mechanism for tracking and reporting.

Such a system could overcome some of the data and tracking limitations that were uncovered over the course of this project. Access to data was a significant limitation of this project with valuable time used by Kinesis and Council staff in locating and interpreting data. Automation of data collection and manipulation is a desirable and a cost effective method of freeing up staff time for projects which are outcome orientated.

The author's recommend a system in which data and information is centrally housed, manipulation of data is transparent and all systems are readily available for independent auditing. Council should also break down and report on data according to relevant sub-categories such as assets and business units. Management and reporting of data should also be made accountable to individual Council officers as a target inherent in any activity or program.

Al Gore, in his latest book, addresses the need for policy makers to implement such a system:

Heads of state, governors, other regional leaders and mayors of cities and towns could benefit by developing computerized statistics on each of the major challenges they face and integrate them and display them visually for groups that include department heads and other stakeholders in a shared effort to discover what really works and what does not. The task confronting policy makers in the historic effort to solve the climate crisis will require the innovative use of every new tool available.²¹

²⁰ UNFCCC (2007), Ad Hoc Working Group on Long Term Cooperative Action Under the Convention, Available: http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_act_p.pdf

²¹ Al Gore (2009), *Our Choice – A plan to solve the climate crisis*

2. Greenhouse Gas Emissions Inventory

Woollahra Council endorsed a greenhouse gas emissions reduction target in 2001 as part of the ICLEI Cities for Climate Protection (CCPTM) program. As shown in figure 1 this target represents a 30% emissions reduction from Council's 1999/2000 baseline of 5,475 tonnes of CO₂-e to 3,833 tonnes of CO₂-e by 2010. Having reviewed Council's historic and current data collections Kinesis recommends revising the baseline to 2003/04 in order to account for Local Government Area boundary and other operational changes that occurred between 1999 and 2003/04. Regardless of the baseline it is the current (2008/09) emissions profile which sets the starting point for actual emissions reduction and Kinesis have now established a verifiable current emissions profile from which progress can be measured.

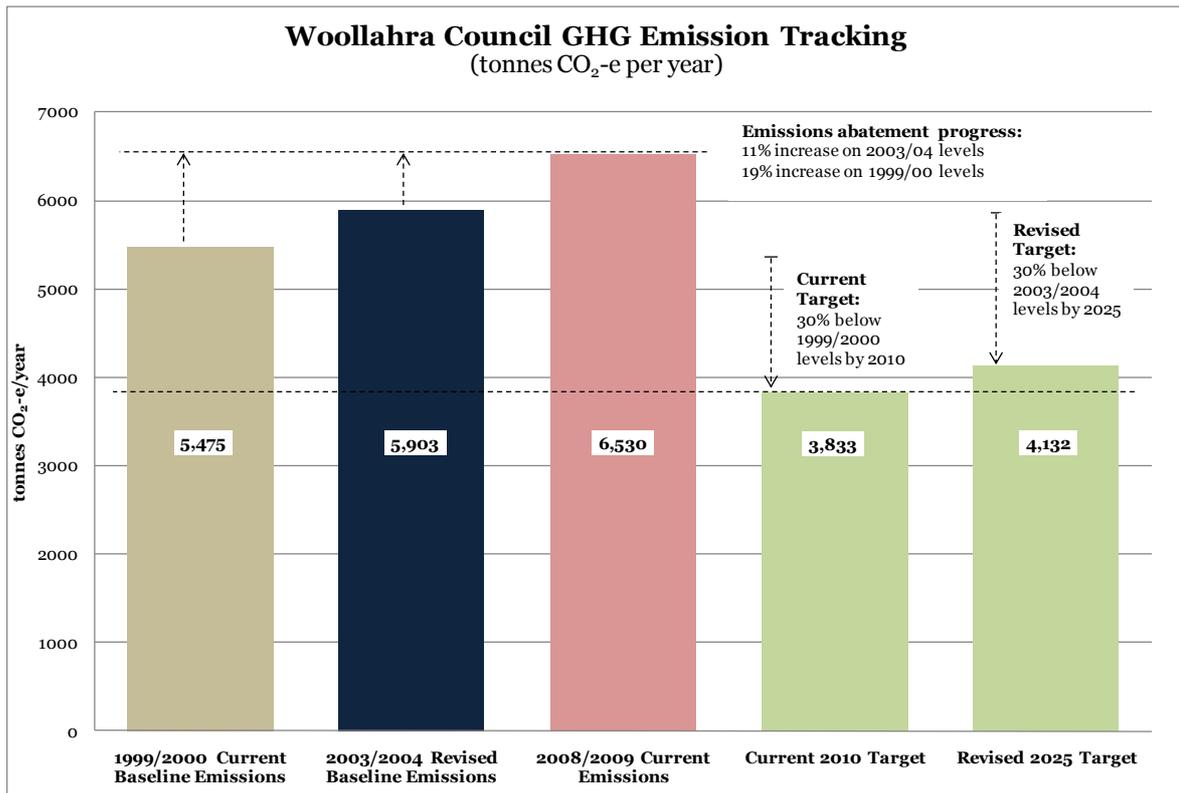


Figure 1: Woollahra Council Emissions 1999/2000 – 2008/2009

Since establishing their reduction target, Woollahra Council have intensified their use of assets and expanded their services. The result of this increased activity has been an associated increase in greenhouse gas emissions; as shown in figure 1 by 11% and 19% respectively, from 1999/00 and 2003/04 to 2008/09.

Figure 2 shows that these increases have occurred across all sectors of Council over the three analysed years. In 2008/09 progress was made in limiting the growth in building emissions and reducing street-lighting emissions. However, these improvements have been overshadowed by a significant increase in fleet emissions. Council's commitment to purchase Green Power is included in the 2008/09 profile and reduced emissions by 393 tonnes of CO₂-e.

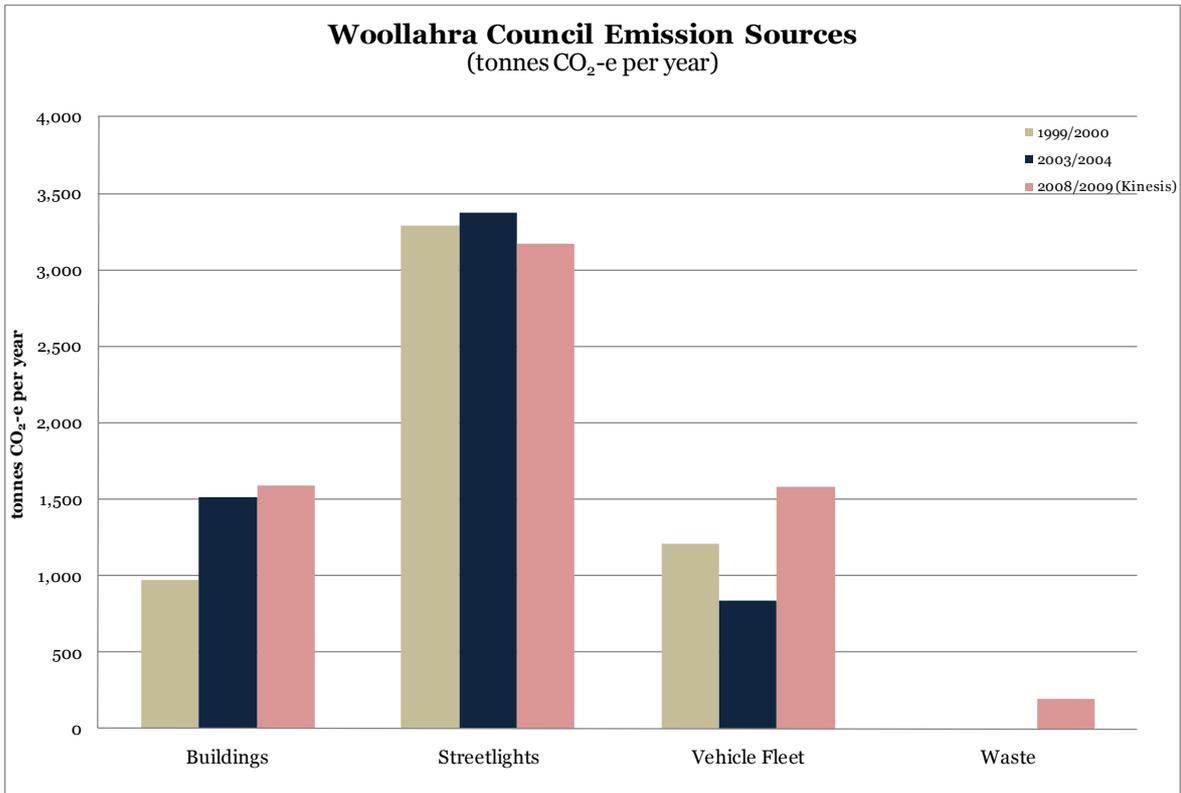


Figure 2: Woollahra Council Emissions Growth by Source

Figure 2 shows minimal emissions growth in Council’s building assets and a reduction in emissions from street lighting. This is a good performance relative to Australia’s emissions and that of peer organisations over the same period. Kinesis has included Council’s declared fleet fuel consumption for 2008/09; however, we maintain a degree of uncertainty in this figure and consider it likely to be over-reported. The 89% growth experienced from 2003/04 to 2008/09 is inconsistent with the intention of Council’s Fleet Policy and the interim reported outcomes from Council’s Fleet Policy Review 2008. Waste has a small contribution to the overall emissions profile and no reliable data was available for the baseline or current years. The reported waste emissions were estimated by Kinesis based on waste generation rates recorded for NSW office buildings and through comparison with other Council organisations.

Figure 3 identifies those assets and services contributing to Woollahra Council’s greenhouse gas emission profile in 2008/2009. The street lighting sector is responsible for 49% of Council emissions. Buildings collectively account for 24%, with key facilities being Council Chambers and Cross Street Carpark. There is a significant difference in emissions output between these two main facilities and Council’s remaining building assets. The remaining sectors of Fleet and Waste contribute 24% and 3% respectively to Council’s total emissions. ‘All other facilities’ includes the full suite of Councils properties besides those specifically identified in Figure 3.

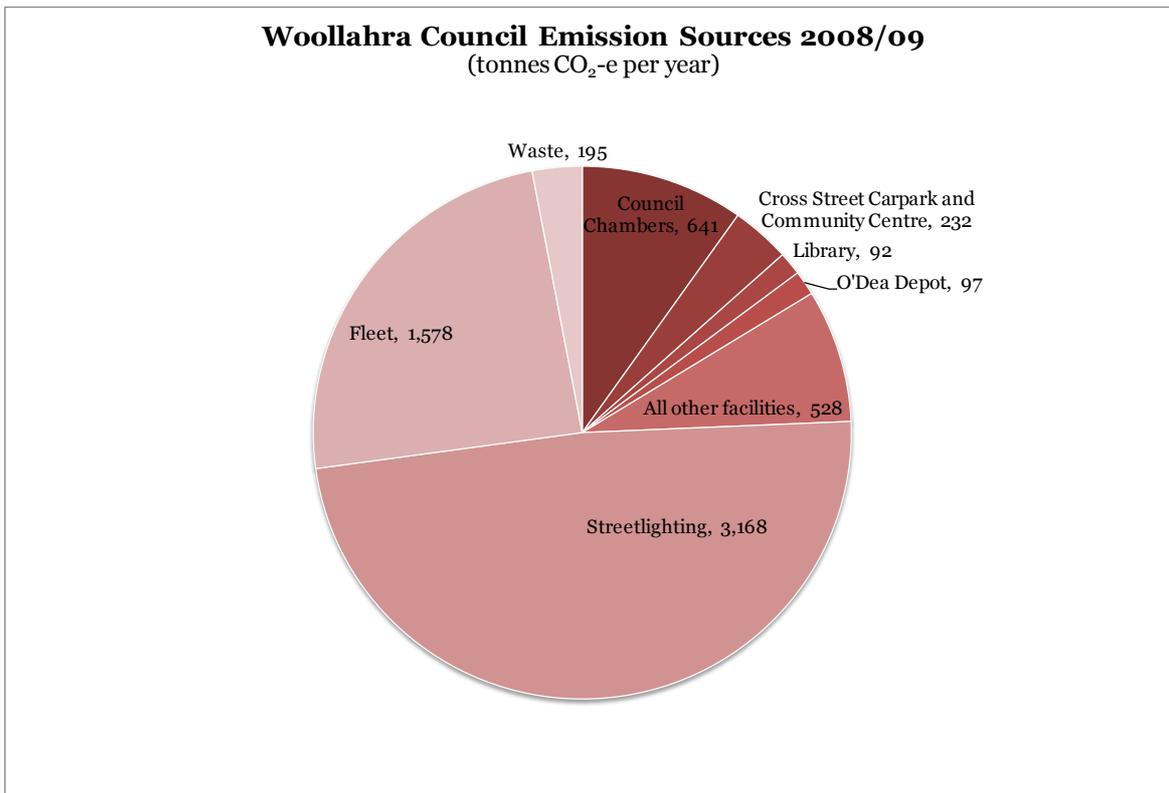


Figure 3: Woollahra Council Greenhouse Gas Emission Sources

In undertaking the greenhouse gas inventory, Kinesis and Council staff experienced difficulty in accessing the necessary resource consumption data. Problems were encountered in a) accessing raw data and b) identifying individual assets responsible for resource consumption. Kinesis wish to stress that the reported emissions inventory was as rigorous in its approach as possible; however, it does contain some unavoidable estimates and assumptions.

The following data sources were used to analyse Woollahra Council's greenhouse gas emissions in the 2008/09 financial year:

1. Electricity consumption provided by Council sourced through Planet Footprint Pty Ltd
2. Gas consumption provided by Council sourced through Woollahra Council Energy Savings Action Plan
3. Fleet fuel consumption provided by Woollahra Council
4. Waste data estimated by Kinesis
5. Street light inventory provided by Energy Australia.

Key assumptions used to calculate greenhouse gas emissions are provided at Appendix A.

3. Carbon Strategy and Action Plan

Recommended Greenhouse Gas Emission Reduction Target

Woollahra Council's greenhouse gas emissions have increased by 11% between 1999/2000 and 2008/09. It is therefore not considered feasible for Council to reach the current 30% target by 2010. Based on the strategies investigated for the Woollahra asset portfolio and on discussions with Council staff it is recommended that Woollahra extend the targeted timeframe to 2025 while maintaining the existing Council greenhouse gas emission reduction figure of 30%.

Recommended Target: 30% reduction of Council's greenhouse gas emissions below 2003/2004 levels by 2025

Kinesis analysed Woollahra Council's emission profile and modelled greenhouse gas emission reduction potential from a suite of strategies and actions. This was based on a breakdown by emission source and feedback from Councillor's and Council staff following a presentation to by Kinesis to Woollahra Council's Ecological Sustainable Taskforce.

Each action was customised to the local context of the Woollahra LGA and assessed to be feasible within the boundaries of technology and finance available to Woollahra Council. The annual greenhouse abatement already committed by Woollahra's Green Power purchase and the establishment of the Energy Performance Contract was also accounted for.

The emission reduction strategies investigated include:

1. Installation of efficient street lighting
2. Co-generation systems for key Council buildings
3. Existing Energy Performance Contract (EPC)
4. Additional EPC measures
5. Rationalised Council vehicle fleet
6. Solar photovoltaic's on Council properties
7. Solar photovoltaic's on Council properties which are leased
8. Additional Green Power purchase.

Figure 4 documents the step-by-step action plan for Council to reach the 30% by 2025 target by quantifying how the proposed strategic actions will individually work towards and collectively achieve the emission reductions. Actions are arranged from left to right in order of cost effectiveness (\$/tonne) of abatement.

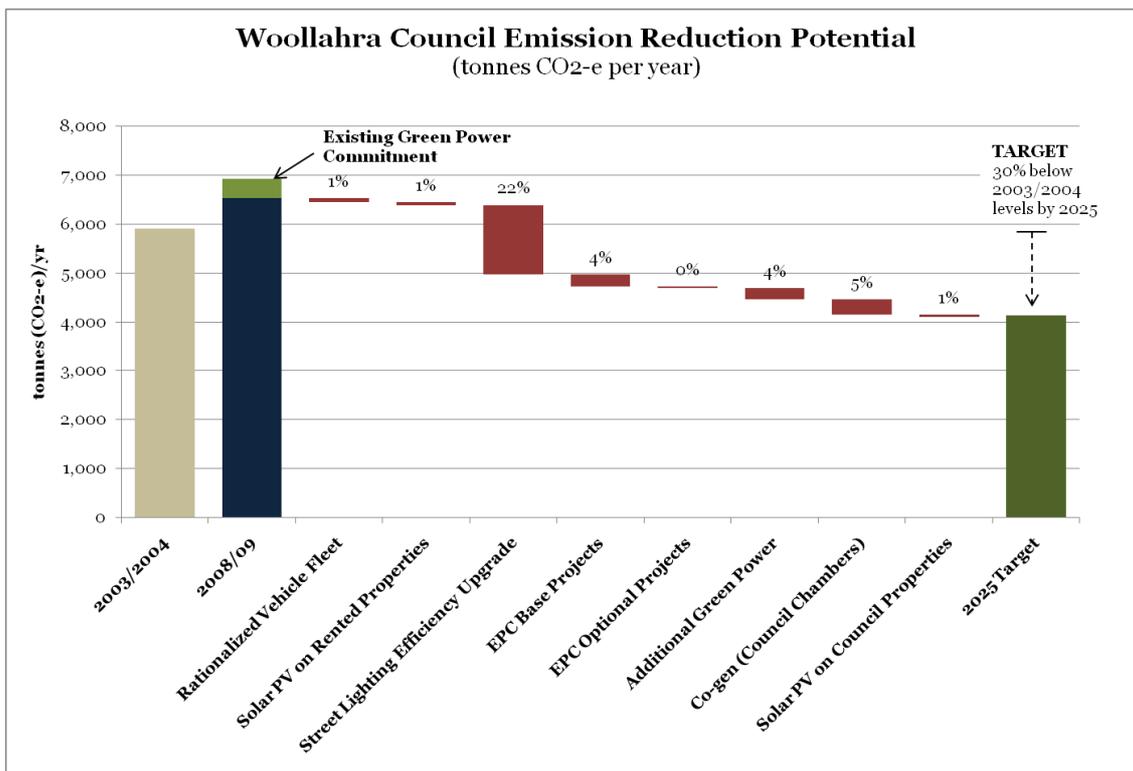


Figure 4: Woollahra Council Emission Reduction Potential

Driven primarily through street lighting efficiency improvement and a co-generation system for Council Chambers; this suite of actions, if implemented from now to 2025, could deliver a 30% reduction from the baseline year.

Additional actions were also investigated and, while not included in figure 4, these findings are discussed in tables 1 and 6.

Points to note:

- a) Council’s existing purchase of Green Power is included in the 2008/2009 emissions profile and is therefore assumed to be an ongoing commitment.
- b) Due to the uncertainty of fleet vehicle and fuel use data the Rationalised Vehicle Fleet action was modelled within a subset of Council’s fleet which comprised 73 passenger and light commercial vehicles. Within this subset the action delivered a 27% reduction in annual emissions.
- c) No actions were modelled for waste abatement given uncertainty in total waste emissions and in savings achieved through Council’s diversion of waste from landfill.
- d) Additional smaller actions and emission savings are available to Council on an asset by asset basis however these individual contributions are too small in scale to include in this modelling.

Action Descriptions and Modelling

Each action shown in Figure 4 is described in further detail and costed below.

1. Street lighting.

Street lighting accounts for 49% of Woollahra Council’s overall carbon emissions and therefore represents a significant abatement opportunity. Energy Australia now includes energy efficient streetlight options on its list of approved public lighting in the form of T5 fluorescents and 42 watt compact fluorescent (CFL). Of these, the T5 2x14 watt fluorescent presents the most cost efficient solution. The potential of light emitting diode (LED) lamps, a rapidly developing technology has also been considered. However, this technology is currently not approved by Energy Australia for street lighting applications.

The premise of the street lighting analysis is that improved streetlight technology has a lighting efficiency of 70 to 100 lumens per watt which compares to 52 lumens per watt for mercury vapour lamps and 19 lumens per watt for ‘twin 20’ fluorescent streetlights. This significantly reduces the watts required to achieve the same lighting levels. Kinesis used pricing information from Energy Australia²², the Australian Energy Regulator (AER)²³ and Woollahra Council to compare the relative real costs of streetlight types under Council’s 777 contract rates of \$0.0508 per kWh in 2009/10 increasing to and remaining stable at \$0.0517 per kWh in 2010/11 (see Appendix A for more information). Costs were calculated within the Energy Australia street lighting tariff class whereby Energy Australia installs, owns and operates street lights and charge’s Council an annual ‘network charge’ for capital and maintenance costs.

The key message for Council is that efficient streetlight technology is already available and will deliver significant emission reduction and operational cost savings relative to maintaining existing lighting. At an average cost of –\$17 per tonne it is recommended that Woollahra Council request an updated streetlight inventory from Energy Australia and seek to replace outdated lamps at the end of their working lives with the efficient alternatives identified in this report.

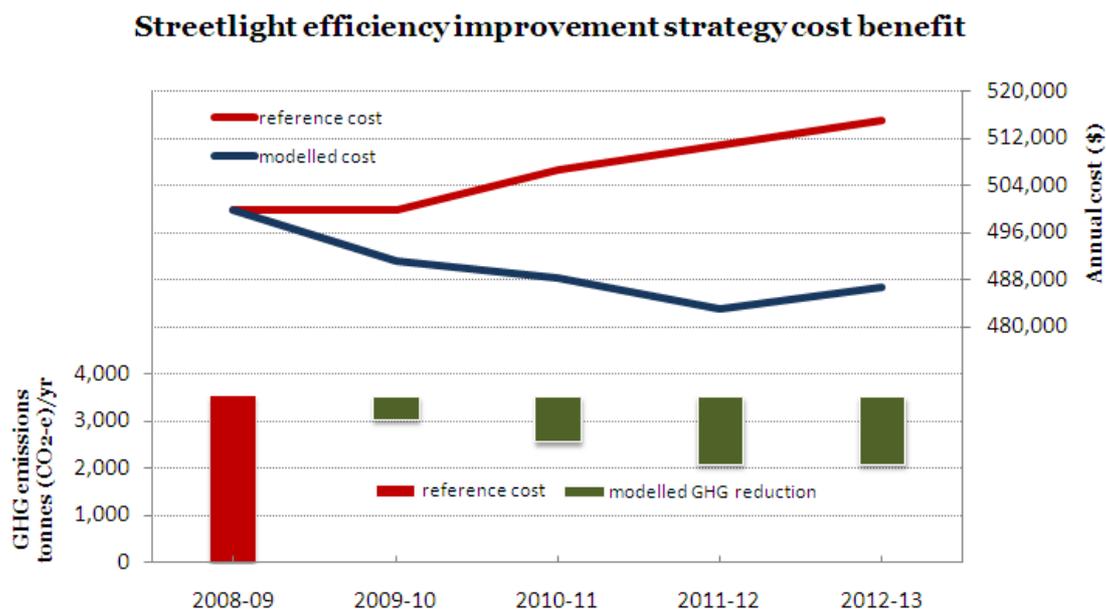


Figure 5: Streetlight efficiency improvement strategy cost benefit

²² Energy Australia (2009), Public Lighting Prices For New Components.

²³ Australian Energy Regulator (2009), Final Decision, New South Wales distribution determination 2009–10 to 2013–14.

The recommended strategy replaces mercury vapour and tubular fluorescent street lights with more efficient T5 fluorescents and high pressure sodium technology. The strategy maintains or improves existing light levels and when fully implemented delivers an annual emission saving of 1400 tonnes at an average cost of $-\$17$ per tonne of CO₂-e.

Figure 5 demonstrates the projected implementation path for this strategy starting at the reference cost and GHG emissions from operating streetlights in 2008-09. Kinesis used a simple assumption that one third of the targeted lights are replaced annually over 3 years as existing lamps are due for replacement. The current lamps identified for replacement have duty lives of 3-4 years meaning by adhering to this methodical replacement strategy by the end of three years all of the existing lamps could be replaced. Figure 5 shows annual abatement increasing and operational costs decreasing over time as more efficient lights are added to the portfolio.

The strategy delivers substantial emission reductions as well as cost savings.

- Annual GHG emission reduction projected from year one equates to 470 (13%), 950 (27%), 1,400 (41%), 1,400 (41%) tonnes of CO₂-e respectively.
- Annual costs (savings) from year one equate to $-\$8,690$, $-\$18,385$, $-\$27,891$, $-\$28,211$ respectively.
- Total cost saving of $\$83,177$ after 4 years

Appendix B identifies the abatement potential and cost specific to each lamp technology type highlighting the range of potential and associated costs. In order to achieve the outcome of this strategy Council would have to nominate the use of these improved technology lamps at the end of the existing lamps' life.

All assumptions used for streetlight modelling are included at Appendix A. The cost per tonne reflects the cost of proposed lights (the cost of abatement) relative to the price of currently installed technology and takes into account the cost savings from reduced energy and maintenance bills over the lifetime of the contrasted technology types.

An important consideration examined but not included in this modelling is the remaining life of existing streetlight assets. Kinesis examined Woollahra Council's streetlight register and found that of the 4283 lights recommended for replacement 320 had been installed less than 20 years. 20 years is the critical time for light replacement as the entire fixture, lamp and luminaire rather than just the lamp is due for replacement by Energy Australia. In seeking this abatement opportunity Woollahra Council would need to negotiate with Energy Australia to cost the remaining life of any streetlight assets where early (before 20 years) replacement is requested.

2. Co-generation system at Woollahra Council Chambers.

Co-generation is the process of generating electricity from natural gas. The heat produced during this process is captured and used for heating, cooling and to generate hot water. Woollahra Council Chambers is the largest energy user among Council's assets and possesses a significant thermal load which is ideal for co-generation.

Kinesis, in discussion with commercial providers of co-generation systems, established that a 175kW plant would provide sufficient exhaust heat to meet the thermal load of heating and cooling Council Chambers and additionally produce approximately 500,000 kWh of electricity per year. The annual contribution of this system is a greenhouse gas saving of 314 tonnes, or 5% of Council's total emissions, at a cost of $\$98$ per tonne.

Co-generation system costs were calculated over their expected 20 year lifetime assuming 8% annual electricity price increase and 2% annual gas price increase. Projected annual operational

costs of each plant are inclusive of maintenance costs, gas costs and electricity savings (both displaced operational energy demand and income from grid exported electricity).

The feasibility of the Cross Street Carpark and Community Centre as a host for a co-generation site was considered. This was ultimately deemed unfeasible as there is insufficient thermal load from the community centre. Council staff highlighted the close proximity of this site to upcoming commercial developments which may present future opportunities for public-private partnerships. By installing a co-generation plant on Council land, the Council may sell heating and cooling to neighbouring developments. Such projects, known as district heating and cooling, have proven to be successful in many installations internationally and can present a significant community wide emissions abatement opportunity.

It is important to note that there are several methods which providers of co-generation technology may use to size, cost and install co-generation systems. The method by which Kinesis has conducted analysis for each of the described systems is designed to maximise greenhouse gas reduction for the asset; however, it is possible to install systems of larger or smaller capacity for various prices and emission reduction potential.

3. Energy Performance Contract Base Projects

Kinesis included this previously committed work to acknowledge its contribution towards targeted emissions reduction and as a reference against recommended additional actions. The EPC comprises a suite of smaller individual building retrofitting actions.

4. Energy Performance Contract Optional Projects

Kinesis included this optional EPC work to acknowledge its potential contribution towards targeted emissions reduction and as a reference against recommended additional actions. The EPC comprises a suite of smaller individual building retrofitting actions.

5. Rationalised Vehicle Fleet.

The Rationalised Vehicle Fleet action was modelled within a subset of Council's fleet which comprised of 73 passenger and light commercial vehicles. While Kinesis and Council officers understood this number of vehicles to be the full list of vehicles of these types, Kinesis was unable to reconcile the annual fuel consumption of this number of vehicles with the total reported annual fuel use. Nonetheless Kinesis believe the action presented is representative of the passenger and light commercial fleet and is therefore scalable to the higher reported annual fuel consumption.

According to the reported annual fleet fuel consumption figures, passenger and light commercial vehicles would contribute approximately 43% of total fleet emissions. If the modelled subset is extrapolated to meet the much higher annual fuel use this action could achieve approximately 187 tonnes of CO₂-e: an additional 104 tonnes of CO₂-e compared to the reported 83 tonnes achievable.

The action to reduce emissions through rationalising the vehicle fleet was designed to maintain the current level of staff amenity and vehicle choice. Recognising the issues surrounding the provision of leaseback vehicles, not least being staff retention, Kinesis has not investigated policy actions such as reducing vehicle sizes or restricting access to leaseback vehicles. It should be acknowledged however that by providing and financing fuel use for leaseback vehicles Council is accepting ownership of employees' private CO₂-e emissions under the corporate umbrella. Greater emission reduction than that presented here is therefore possible through downsizing the fleet or providing vehicles for business use only. Such policy actions have not

been costed due to the variety of potential alternatives, such as providing subsidised staff travel passes, which Council may wish to explore in offsetting the loss of leaseback vehicles.

The most cost effective strategy to maintain current staff amenity is achieved through fuel switching from the current fleet of predominantly 4 cylinder petrol engine vehicles to 4 cylinder diesel engines. This means parity of vehicle types and sizes is maintained while fuel efficiency is significantly enhanced (see tables 2, 3 and 4). Upfront purchase costs are higher for diesel variants of the same car models; however, Council would recoup this higher capital cost over the two year lease period through reduced operational costs resulting in an operational saving of \$1,000 per tonne of CO₂-e abatement.

Table 2: Existing fleet average vehicle by class

Vehicle Class	% of Fleet	Average Fuel Consumption l/100km	Average Fuel Consumption Cost \$/100km	Average Purchase Cost \$	Average CO ₂ g/km
SMALL	7%	7.0	\$8.09	\$20,000	167
MEDIUM	14%	8.0	\$9.14	\$24,000	189
LARGE	11%	9.5	\$10.93	\$40,000	225
SUV	45%	10.9	\$12.56	\$45,000	259
UTILITY	23%	12.5	\$11.30	\$31,000	265
TOTAL	100%	10.7	\$11.31	\$36,500	241

Table 3: Proposed fleet average vehicle by class

Vehicle Class	% of Fleet	Average Fuel Consumption l/100km	Average Fuel Consumption Cost \$/100km	Average Purchase Cost \$	Average CO ₂ g/km	Average CO ₂ g/km % Change
SMALL	7%	4.3	\$5.22	\$24,000	110	-34%
MEDIUM	14%	4.4	\$5.38	\$33,000	113	-40%
LARGE	11%	5.6	\$7.02	\$35,500	148	-34%
SUV	45%	7.2	\$9.00	\$40,000	192	-26%
UTILITY	23%	7.9	\$9.88	\$30,500	208	-22%
TOTAL	100%	6.6	\$8.23	\$35,000	174	-28%

Table 4: Potential annual fleet emission and cost reductions

Annual Fleet CO₂ Reduction (tonnes)	83
Annual Fleet Fuel Cost Reduction	\$38,000
Total Purchase Price Reduction	\$97,000
Total abatement cost (\$/tonne)	-\$1,000

Table 4 shows that the proposed strategy, if implemented, would deliver both emission reduction and reduced fleet operational costs. Current and proposed vehicle purchase costs were taken from RedBook;²⁴ however, they have not been adjusted to factor fleet purchase arrangements that may be available to Council. Operational costs are based on rated fuel

²⁴ <http://www.redbook.com.au>

consumption figures published by the Australian Government in the Green Vehicle Guide²⁵ and assume an average of 17,000km per annum travelled per vehicle.

Kinesis also undertook a comparison of hybrid vehicles (table 5), investigating the option of replacing all small and medium vehicles with hybrid alternatives. Our finding was that hybrids maintain a significant price premium and do not present the same cost effective opportunity in terms of dollars per tonne of carbon abatement as modern diesel engine vehicles.

Table 5: Alternative hybrid fleet (replaces all small and medium vehicles)

Vehicle Class	% of Fleet	Average Fuel Consumption l/100km	Average Fuel Consumption Cost \$/100km	Average Purchase Cost \$	Average CO2 g/km	Average CO2 g/km % Change
HYBRID (small/medium)	21%	5.2	\$5.94	\$39,000	120	-33%
Prius (small/medium)	21%	3.9	\$4.49	\$45,000	89	-50%

Based on the current 15 vehicles in the small and medium passenger fleet replacing all of these vehicles with a mix of the Toyota Prius, Honda Civic Hybrid and Toyota Camry Hybrid would attract a 37% price increase (at end of the standard 2 year lease period) for a 33% reduction in greenhouse emissions. Replacing this fleet component only with the Prius for a 50% reduction in emissions would attract a price increase of 45%.

Council's passenger vehicle fleet represents an ongoing opportunity for emission reduction if increased vehicle efficiency is sought at the start of each new two (2) year leaseback period. The most cost effective efficient vehicles are currently the latest generation European diesel vehicles while hybrids continue to get more affordable. The availability and potential of plug in electric vehicles are currently being explored by policy makers at federal, state and city levels. The expectation is that such vehicles will be commercially available and viable in Australia by 2013. Woollahra Council should establish an ongoing mechanism to track performance and cost of vehicles on the market making this information readily available during fleet procurement.

6. 24 kW of solar photovoltaic capacity installed on Council owned and occupied facilities

This action represents the installation of 24kW of solar photovoltaic (PV) panels installed on Council owned and occupied assets. Solar is a tried and tested technology which, if installed at the scale modelled, would abate 35 tonnes per year. Solar PV was costed assuming \$10,000 per installed kW of capacity with each panel generating 1382 kWh per year over a 15 year lifetime. 8% annual electricity Solar PV as a high cost, low output action would cost council \$315 per tonne. However, its installation on visible buildings may provide a clear leadership example to the community.

7. 40 kW of solar photovoltaic capacity installed on Council owned, tenanted facilities.

This action represents the installation of 40kW of solar photovoltaic (PV) panels installed on Council owned assets which are tenanted by community groups. The action entails 10kW solar PV systems installed on each of Cross Street and Holdsworthy Community Centres the EJ Ward

²⁵ <http://www.greenvehicleguide.gov.au>

Welfare Centre and Sherbrooke Hall. This has the potential to abate 59 tonnes per annum or 1% of Council's total greenhouse gas emissions.

The financial analysis of this action differs greatly from solar PV on Council occupied properties as community groups consuming less than 160MWh of electricity are eligible to receive the NSW Solar Bonus Scheme.²⁶ Kinesis believe each of the identified sites host tenants who will or could be eligible for this scheme which pays a gross feed in tariff of \$0.60 for each kWh generated from 1 January 2010. Our modelling showed this action would provide Council and or the tenant with cost savings (a positive return) of \$34 per tonne of abatement over the life of the project. After the 15 year guaranteed lifetime of the solar system this means Council has earned \$7,500 however systems can be expected to continue producing power and generating cost savings long after 15 years.

Table 6: Prioritised Action List and Marginal Cost of Abatement

Table 6 summarises and shows the costs associated with each of the recommended abatement actions. Included are two actions which will yield additional savings and an action to establish a monitoring and reporting framework from which to plan and track all other actions. Costs have been provided for Council's budgeting purposes and are designed to allow appropriate financial allocation. These indicative costs will also allow Woollahra Council to assess the relative value of actions and conduct educated tendering processes for any or all of the described actions to ensure the delivery of effective carbon abatement at least cost.

Table 6: Prioritised Action List and Marginal Cost of Abatement

Action	Cost/tonne	Capital costs	On-going net costs*	Tonnes saved/year	% of Total Reduction
Monitoring and Reporting	NA	\$50,000 - \$100,00	\$30,000 - \$50,000	NA	NA
Project Implementation					
<ul style="list-style-type: none"> a) Establish benchmark emissions from Council operations – COMPLETE. b) Set an emission reduction target –COMPLETE. c) Procure a system which centralises emissions tracking, target setting and reporting for all sectors of Council, as per key policy recommendation d) Implement a data collection protocol to ensure necessary data is collected consistently and accurately for input to the management system. 					
Street lighting	-\$17	\$0	Year 1 -\$8,690 Year 2 -\$18,385 Year 3 -\$27,891 Year 4 -\$28,211	470 950 1400 1400	22%
Project Implementation					
<ul style="list-style-type: none"> a) Request street lighting audit, inventory and remaining life assessment from Energy Australia. b) Request lamp changes to efficient models as shown at Appendix B for future lamp replacements. c) Monitor streetlight inventory, emissions and annual network and demand charges. 					
Co-gen (Chambers)	\$98	\$525,000	\$65,000	314	5%
Project Implementation					
<ul style="list-style-type: none"> a) Feasibility study for co-generation installation at Council Chambers; b) If feasible tender for co-generation installation at Council Chambers. 					

²⁶ <http://www.industry.nsw.gov.au/energy/sustainable/renewable/solar/solar-scheme/faq>

Action	Cost/tonne	Capital costs	On-going net costs*	Tonnes saved/year	% of Total Reduction
Energy Performance Contract Base Projects	Unknown	\$250,000	Unknown	244	4%
Project Implementation					
a) Project is being implemented by third party provider – COMPLETE.					
Energy Performance Contract Optional Projects	Unknown	Unknown	Unknown	23	0.3%
Project Implementation					
a) Project already costed by third party provider.					
Rationalized Vehicle Fleet	-\$1,051	-\$97,000	-\$38,000	83	1%
Project Implementation					
a) Review vehicle fleet fuel consumption for 2008/2009 to verify baseline data.					
b) Establish a data management system to track future fuel consumption.					
c) Review Council's fleet policy to include quantifiable consumption and emission reduction targets and change the process governing vehicle choice to include more efficient models.					
d) Explore efficiency and fuel switching opportunities for both the heavy and passenger fleet vehicles.					
Solar PV Council properties	\$315	\$240,000	\$0	35	0.5%
Project Implementation					
a) Tender for the installation of solar photovoltaics on Council facilities.					
Solar PV Council properties (tenanted)	-\$34	\$280,000	0	59	0.9%
Project Implementation					
a) Tender for the installation of solar photovoltaics on Council facilities which are leased to community organisations which qualify for the NSW Solar Bonus Scheme.					
b) Work with community organizations to apply for the NSW Solar Bonus Scheme solar generation tariff.					
Additional Green Power	\$63	\$0	\$16,000	240	4%
Project Implementation					
a) Procure an additional 226,000 kWh of Green Power per year.					
Small facilities efficiency retrofitting	Unknown	Unknown	Unknown	~50	NA
Project Description					
<p>This project is included as an additional action which relates to 'All other facilities' as shown at Figure 3. It was not included as a full scale action as it relates to many smaller actions which are best achieved through strategic maintenance rather than dedicated works. These smaller buildings will possess varied opportunities for improved energy efficiency and it is Kinesis's view that a 10% emission reduction would be readily achievable. Small building retrofit actions can be expensive in terms of dollars per tonne; however, by integrating energy efficiency into ongoing maintenance programs Council could achieve cost effective savings. External factors will also assist this aim, for example, the Federal Government legislation to phase out incandescent light bulbs by 2010 is expected to reduce commercial building electricity consumption by approximately 6% as efficient alternatives are installed through necessity.</p>					

*Note: On-going net costs have been calculated using best available knowledge on current and future electricity and network tariffs. The street lighting 777 tariff includes the NSW Government Procurement Offices estimated network tariff increases 2009-10 to 2012-13.

Cost figures which are provided in dollars per tonne, rely on annualising the cost of the project over its lifetime. To determine this figure Kinesis calculated the net present value (NPV) to

define the present value of the projects cash flow over the project lifetime. In this way we are able to meaningfully contrast the costs of projects with different timescales.

A discount rate of 7% was used on all costings with a timescale greater than one year to reflect opportunity cost. A 5% interest rate is included for all projects with capital repayments.

Appendix

Appendix A: Source Data & Analysis

Data used to determine the resource consumption and greenhouse gas emissions for Woollahra Council were sourced from the most recently available electricity, gas, fleet and waste consumption data.

The majority of data sources are provided throughout the report, details of additional data and key assumptions used in the analysis are documented below.

Streetlighting

- The cost of a streetlight replacement strategy is compared relative to a reference case where the current stock of streetlights persists. Costs are only modelled on lights that are replaced. The analysis spans four years, using a real discount rate of 7%.
- The replacement strategy for a given light is determined by the bulk replacement period for that light. If the bulk replacement period is N years, $1/N$ of the stock is replaced each year. Once N years have elapsed, all lights of that type have been replaced by the proposed lights.
- Total cost is calculated as the sum of tariffs based on streetlighting assets, and costs of electricity consumption.
- The tariff for each streetlighting asset is comprised of annualised installation, capital (lamp, luminaire, bracket, PE cell), and maintenance costs. These costs are based on the tariffs determined by Energy Australia. Installation and capital real costs are held constant over time (nominal costs increase at the rate of inflation); real maintenance costs are increased by approximately 2.3% per annum—the rate specified in AER final decision, report p.360 which reflects real annual labour rate increases.
- The total electricity tariff in the first year (2009-10) is set as 5.0842c/kWh as paid under council's current 777 contract. This is comprised of a 3.37c/kWh electricity component, and a 1.7142c/kWh network component. The electricity component will decrease by a nominal rate of 13.35% in year 2010-11 in line with the electricity contract provided by Momentum Energy Pty Ltd. The network component increases by a nominal rate of 39% in year 2010-11 in line with NSW Government Procurement offices estimated increase in 777 contracts. This higher total electricity tariff of 5.1734c/kWh is applied each year thereafter to 2012-13 (indexed by inflation), as such contracts are fixed price for the contract term.
- Constant emissions intensity of the electricity grid, at 1.06t/MWh.

Co-generation

- Capital cost amortisation period – 20 years
- Yearly maintenance costs - \$0.02/kWh electricity generated
- Electricity costs – \$0.09/kWh
- Gas usage costs – \$0.012/MJ
- Green electricity costs – \$0.066/kWh

Council Chambers Co-generation Plant

- Capital cost – \$3.00 per watt
- Plant size – 175 kW
- Approx. thermal load – 1,133,200 MJ/yr

Greenhouse Gas Emission Intensity

Greenhouse gas emission intensities were sourced from the Australian Greenhouse Office National Greenhouse Accounts (NGA) Factors November 2008. Fleet vehicle emissions were sourced from green vehicle guide.²⁷

Greenhouse Gas Emission Intensities	Emission Factor		
	Scope 1	Scope 2	Scope 3
Electricity (kgCO ₂ -e/kWh)	0	0.89	0.17
Gas (kgCO ₂ -e/MJ)	0.05133	0	0.0148
Municipal Solid Waste (tCO ₂ -e/tonne)	0	0	1.3
Fleet Vehicle Fuel (tCO ₂ -e/L)			
Unleaded	2.38	0	0.181
Unleaded e10	2.1	0	0.2
Diesel	2.698	0	0.205
LPG	1.593	0	0.136

²⁷ <http://www.greenvehicleguide.gov.au>

Appendix B: Street Lighting Replacement Strategy

Current lamp type	2008 inventory count	Current lamp wattage	Proposed lamp type	Proposed lamp wattage	Current lamp annual ghg	Proposed lamp annual ghg	Tonnes of GHG abatement (total for type)	Reference 4 year cost (\$)	Modelled 4 year cost (\$)	4 year net cost (\$)
Incandescent 100w	53	100	Nil	Nil	24	24	Nil			
Incandescent 200w	1	200	Nil	Nil	1	1	Nil			
Incandescent 300w	1	300	Nil	Nil	1	1	Nil			
Incandescent 60w	9	60	Nil	Nil	2	2	Nil			
Mercury Vapour 1000w	6	1170	Nil	Nil	32	32	Nil			
Mercury Vapour 125w	170	146.25	100w SON	117	115	92	23	73,105	79,976	6,871
Mercury Vapour 250w	1311	292.5	150W SON	175.5	1771	1063	708	788,967	724,507	-64,460
Mercury Vapour 400w	380	468	250W SON	292.5	821	513	308	301,795	256,514	-45,281
Mercury Vapour 50w	36	58.5	2x14w T5	37.8	10	7	3	14,102	13,489	-613
Mercury Vapour 700w	7	819	Nil	Nil	26	26	Nil			
Mercury Vapour 80w	1093	93.6	2x14w T5	37.8	472	212	260	398,952	402,187	3,235
Mercury Vapour 800w	1	936	Nil	Nil	4	4	Nil			
Mercury Vapour 3x 80w	5	280.8	2x14w T5	151.2	6	3	4	4,232	2,817	-1,415
Mercury Vapour 6x 160w	1	1123.2	Nil	Nil	5	5	Nil			
Mercury Vapour 7x 80w	1	655.2	2x14w T5	302.4	3	1	2	1,809	903	-906
Metal Halide 1000w	1	1350	Nil	Nil	6	6	Nil			
Metal Halide 400w	1	540	Nil	Nil	2	2	Nil			
High Pressure Sodium 100w	3	117	Nil	Nil	2	2	Nil			
High Pressure Sodium 150w	129	175.5	Nil	Nil	105	105	Nil			
High Pressure Sodium 250w	116	292.5	Nil	Nil	157	157	Nil			
High Pressure Sodium 400w	12	468	Nil	Nil	26	26	Nil			
High Pressure Sodium 50w	150	58.5	Nil	Nil	41	41	Nil			
High Pressure Sodium 70w	166	81.9	Nil	Nil	63	63	Nil			
Tubular Fluorescent 20w	1	27	Nil	Nil	0	0	Nil			
Tubular Fluorescent 40w	4	54	Nil	Nil	1	1	Nil			

Current lamp type	2008 inventory count	Current lamp wattage	Proposed lamp type	Proposed lamp wattage	Current lamp annual ghg	Proposed lamp annual ghg	Tonnes of GHG abatement (total for type)	Reference 4 year cost (\$)	Modelled 4 year cost (\$)	4 year net cost (\$)
Tubular Flourescent 80w	1	108	Nil	Nil	0	0	Nil			
Tubular Flourescent 2x 20w	1280	54	2x14w T5	37.8	319	223	95	443,208	465,078	21,871
Tubular Flourescent 4x 20w	4	108	2x14w T5	75.6	2	1	1	3,288	2,027	-1,262
Tubular Flourescent 4x 40w	3	216	2x14w T5	113.4	3	2	1	2,926	1,711	-1,215
Tubular Flourescent 5x 80w	1	540	Nil	Nil	2	2	Nil			
Tubular Flourescent 6x 36w	1	291.6	Nil	Nil	1	1	Nil			
750w	4	750	Nil	Nil	14	14	Nil			
				TOTAL	4041	2614	1426	2,032,386	1,949,210	-83,177

Appendix C: Delivery Program and Operational Plan (DPOP) Review

Policy or Action	Emissions Reduction Program Elements	Interaction with Sustainability Plan	Appropriateness in relation to existing State and Federal policy	Comments
Goal 4 Sustainable Built Form	<p>Goal 4 contains four separate 2025 strategies with set delivery timelines and actions.</p> <p>Strategy 4.2 specifically relates to the promotion of sustainable design in public and private developments. This strategy requires the inclusion of sustainability principals within the Local Environmental Plan and consolidated Development Control Plans.</p> <p>Because these actions relate only to encouraging sustainable or environmentally friendly design it is not possible to quantify their emissions reduction potential.</p>	<p>Goal 4 of the DPOP overlaps with the 2025 built environment targets of the Sustainability Plan.</p> <p>Both documents support the incorporation of environmentally sustainable design features in the local environment plan. Both have a similar short (less than 5 years) timeframe for implementing these actions.</p>	<p>As planning controls fall under local government jurisdiction it is appropriate for Woollahra Council to implement policies to support and implement environmentally sustainable design principles and goals in its planning controls and regulations.</p> <p>Goal 4 does overlap with some existing State legislation. The NSW Government's BASIX scheme requires all new homes to achieve a 40% reduction in emissions below the state average.</p>	<p>Goal 4 of the DPOP contains strategies to encourage more environmentally friendly design.</p> <p>These strategies once implemented could result in an improved planning process that encourages the development of buildings and infrastructure that produce fewer emissions.</p> <p>However, each strategy lacks specific detail on what sustainability principles will be implemented and how these principles will result in fewer emissions and an improved sustainability outcome.</p>
Goal 5 A Liveable Space	<p>Goal 5 contains strategies aimed at ensuring the Woollahra community has access to accessible, integrated and well maintained public places and open spaces.</p> <p>The strategies do not have a specific climate change or sustainability component and therefore their emissions reduction potential cannot be quantified.</p>	Not applicable.	As Goal 5 does not consist of climate change related strategies there is no overlap with existing State or Federal policy or legislation.	<p>Maintaining accessible open and public spaces with well maintained vegetation could ameliorate some of the effects of climate change by providing shade and reducing the urban heat island effect.</p> <p>However, the strategies contained in Goal 5 do not appear to be tailored to meet this specific purpose.</p>
Goal 6 Moving Around	<p>Goal 6 aims to ensure Woollahra is connected by a range of transport and public transport options and is a convenient place to more around in. It also aims to increase cycling and walking as a form of alternative transport.</p> <p>Strategy 6.2 specifically includes providing for sustainable, safe, convenient and efficient local movement of pedestrians and vehicles. If implemented, these actions could result in fewer transport emissions within Woollahra.</p> <p>However, it is not possible to quantify the emissions reduction potential of these actions as they lack specific provisions and implementable actions that would help determine their net effect.</p>	<p>The Sustainability Plan features similar targets to Goal 6 by aiming to increase public transport, cycling and walking and reducing car use within the Woollahra community.</p> <p>It contains a number of specific provisions and actions which would support both these aims and the aims of Goal 6 of the DPOP.</p> <p>The actions contained within the Sustainability Plan are therefore complimentary to the aims outlined in Goal 6.</p>	<p>There are no climate change specific policies or legislation at the State or Federal level that replicate the aims of Goal 6.</p> <p>However, transport policy including roads and public transport is administered by the NSW Government and Woollahra Council may seek to ensure that its actions are complimentary to State Government action.</p>	<p>Sustainable and efficient transport infrastructure could result in reduced car dependence and reduced greenhouse emissions.</p> <p>However, there is a lack of specific, quantifiable targets for how Woollahra will achieve its aims outlined in Goal 6. This makes it difficult to determine the emissions abatement potential of the Goal.</p>

Policy or Action	Emissions Reduction Program Elements	Interaction with Sustainability Plan	Appropriateness in relation to existing State and Federal policy	Comments
<p>Goal 7 Protecting Our Environment</p>	<p>Goal 7 relates to the protection of natural vegetation, bushland and wildlife corridors and supporting clean and healthy creeks and waterways.</p> <p>These actions do not have a specific emissions reduction component. However, maintaining bushland and vegetation can help to sequester greenhouse emissions, although creating an accurate estimate of bio-sequestration potential is difficult.</p> <p>The main benefits of Goal 7 would be realised through improved amenity and the protection of vegetation and wildlife, rather than sequestration of greenhouse gasses.</p>	<p>The Sustainability Plan contains a substantial list of specific actions that are complimentary to the aims and targets of Goal 7.</p>	<p>It is appropriate for Woollahra Council to undertake actions to protect its natural environment and these actions can be complimentary to both State and Federal action.</p>	<p>Woollahra Council could consider investigating the incorporation of risk management and adaptation measures into its environmental protection policies.</p> <p>Climate change could have a detrimental effect on</p> <p>Woollahra's natural environment and these potential impacts may need to be considered in any environmental protection plans with a long term outlook.</p>
<p>Goal 8 Sustainable Use of Resources</p>	<p>Goal 8 aims to reduce Woollahra's energy and water use and greenhouse gas emissions and develop adaptation actions to reduce the impact of climate change. It also aims to minimise waste generation and encourage resource recycling.</p> <p>Strategy 8.1 has the specific aim of reducing greenhouse emissions and ecological footprint. Strategies such as the Council's energy saving action plan, sustainability street program and Three Council Ecological Footprint program could result in quantifiable emissions reduction.</p> <p>However, data to track and measures the emissions reduction effectiveness of these strategies was not available.</p>	<p>The Sustainability Plan has a number of emissions reduction actions. However the main emissions reduction category in the sustainability plan is based on improving the sustainability of the built environment and its actions are primarily targeted at improved planning and building regulations to incorporate sustainability considerations.</p> <p>These actions could be complimentary to the targets outlined in Goal 8. However, they may not be comprehensive enough to achieve the comprehensive reductions in emissions and resource use articulated by Goal 8.</p>	<p>The State and Federal Governments both have a number of emissions reduction policies designed to improve energy efficiency and reduce emissions.</p> <p>Many of these policies would be complimentary to Woollahra's strategies and actions. However, Woollahra may need to consider how best to ensure its programs can operate in conjunction with State and Federal policy to avoid unnecessary duplication.</p> <p>For example, Woollahra could consider how their energy saving action plan can work in conjunction with Federal rebates for solar water heaters and insulation as well as the NSW Government's Energy Saving Scheme and Greenhouse Gas Abatement Scheme.</p>	<p>Goal 8 aims to promote sustainable use of resources and reduce greenhouse emissions.</p> <p>However, it lacks specific targets that quantify the extent of the emissions reductions it seeks to achieve.</p> <p>By setting specific targets Woollahra would be in a position to tailor its emissions reduction strategies around these specific targets to ensure the efficient use of its resources.</p> <p>Woollahra also currently lacks the means and mechanism to track the effectiveness of its emissions reduction strategies. This makes it difficult to determine which strategies are most effective and should therefore receive the most support.</p>

Sustainability Plan Review

Policy or Action	Emissions Reduction Program Elements	Interaction with Delivery Program and Operational Plan (DPOP)	Appropriateness in relation to existing State and Federal policy	Comments
<p>1.5 Built Environment Goals, Objectives and Actions</p>	<p>The goal of section 1.5 of the draft Sustainability Plan is a “high quality built environment with sustainable development”.</p> <p>The section contains four objectives and a series of supporting actions. Two of the four objectives are directly linked to emissions reduction measures. The first objective is for “sustainable development through the integration of landuse, transport, environmental, social and infrastructure planning”.</p> <p>It has a target of 100% of new plans incorporating “the principles of ESD including, landuse, transport, environmental, social and infrastructure planning” and a performance measure based on the number of new plans incorporating ESD principles and the number of developments based on these plans.</p> <p>The fourth objective is high quality sustainable design in the public and private domains. Its target is 100% new buildings and public works include sustainable design. Its performance measure is the “number of development approvals with sustainable design in addition to minimum BASIX requirements, measured over time”.</p> <p>These objectives are supported by a number of specific actions. Most of these actions focus on the incorporation of ESD principles in Council planning mechanisms.</p>	<p>The aims of the Sustainability Plan are largely in line with the goals of the DPOP.</p> <p>Strategy 4.2 of the DPOP is to “promote sustainable design in future private and public development”. The objectives and actions of the Sustainability Plan appear complimentary to this goal.</p>	<p>Like the DPOP, it is appropriate for Woollahra Council to implement policies to support and implement environmentally sustainable design principles and goals in its planning controls and regulations as planning controls fall under local government jurisdiction.</p>	<p>The actions and objectives of section 1.5 relate primarily to changes in building planning and regulations through the incorporation of ecologically sustainable design principles.</p> <p>The section lacks specific targets for what the incorporation of these principles is designed to achieve. There are no specific emissions reduction targets. The section also lacks programs or actions designed to reduce emissions through more direct intervention such as building retrofits or incentives for low emissions technology.</p>
<p>1.9 Roads, traffic and transport goals, objectives and actions</p>	<p>Section 1.9 has a goal of “an accessible, pedestrian friendly network of roads and paths with efficient and diverse forms of</p>	<p>Section 1.9 of the draft Sustainability Plan has similar aims to Goal 6 of the DPOP: Moving Around.</p>	<p>As with Goal 6 of the DPOP, there are no climate change specific policies or legislation at the State or Federal level</p>	<p>Section 1.9 focuses primarily on actions which aim to investigate different methods for encouraging alternative</p>

Policy or Action	Emissions Reduction Program Elements	Interaction with Delivery Program and Operational Plan (DPOP)	Appropriateness in relation to existing State and Federal policy	Comments
	<p>public transport which encourages reduced car usage and non-motorised transport”.</p> <p>Supporting this goal are a number of objectives, many of which could result in reduced greenhouse emissions including:</p> <ul style="list-style-type: none"> • increased use and efficiency of public transport • reduced reliance on private vehicles and reduced car emissions • improved facilities for the use by cyclists • sustainable techniques, methods and materials used in <p style="padding-left: 40px;">maintenance and construction of infrastructure and public domain works</p> <p>There are, however, no targets or performance measures linked to these objectives as yet.</p> <p>The goal is supported by a number of specific actions. These actions range from the incorporation of ESD principles in tenders and strategy, planning and policy documents, through to trialling bike storage facilities and investigating “opportunities for developer incentives for providing public and non-motorised transport infrastructure in lieu of car parking in centres”.</p>	<p>The specific actions outlined in section 1.9 both complimentary and supportive of the aims of Goal 6.</p>	<p>that replicate the aims of section 1.9.</p> <p>However, transport policy including roads and public transport is administered by the NSW Government and</p> <p>Woollahra Council may seek to ensure that its actions are complimentary to State Government action.</p>	<p>and low emissions transport. It also includes a number of actions designed to lobby the State government to support alternative transport measures in Woollahra.</p> <p>However, like section 1.5, section 1.9 lacks specific targets for what these actions are designed to achieve beyond encouraging more sustainable forms of transport.</p>
<p>1.13 Corporate environment goals, objectives and actions.</p>	<p>1.13 does not, as yet, have any stated goals, objectives, targets or performance measures.</p> <p>It does, however, have a substantial list of actions; some of which could result in reduced greenhouse emissions across Woollahra Council’s corporate operations such as continue to purchase products with a high energy efficiency rating and continue to use low energy lighting devices.</p>	<p>The climate change specific components of section 1.13 do not have a direct equivalent within the DPOP.</p>	<p>Not applicable.</p>	<p>To be completed.</p>

Appendix D: Private Use Fleet Policy Review

The Private Use Fleet Policy, changed in January 2008, was intentioned to save Council capital and operational costs as well as reduce greenhouse gas emissions. Kinesis chose this policy to demonstrate the importance of data management in enabling effective monitoring and reporting and ultimately achieving emission reduction policy aims.

Based on the Fleet Policy Review memorandum (July 2008) the policy appears from early estimates to have met its objectives. More information will be required to ascertain the eventual cost to Council. Environmental benefits of the policy are claimed; however, they are based on generalised data.

Kinesis, in undertaking the greenhouse gas emissions inventory, found fleet data was difficult for Council staff to obtain and key metrics. For example, annual kilometres travelled and fuel consumption per vehicle are not collected. Such information is considered a minimum for understanding fleet performance, without which it becomes very difficult to accurately quantify emission reductions. Furthermore, when Council's total annual fuel consumption was accessed Kinesis found an 89% increase in vehicle fleet emissions which is in stark contrast to the reductions expected to be achieved through the Fleet Policy.

The point we seek to make is that data is the only means through which benchmarks can be set and progress monitored. As previously discussed, Kinesis feel that the total annual fuel use figures are over reported; meaning that it is likely that the Fleet Policy has achieved its aims. However, the lack of data management means that Council will be unable to quantify this achievement or report on any positive outcomes of its policy.

EMAIL
admin@kinesis.org

OFFICE
02 8005 4290
FACSIMILE
02 9280 0953

MAIL
PO BOX 411 DARLINGHURST
NSW 1300 SYDNEY AUSTRALIA

kinesis