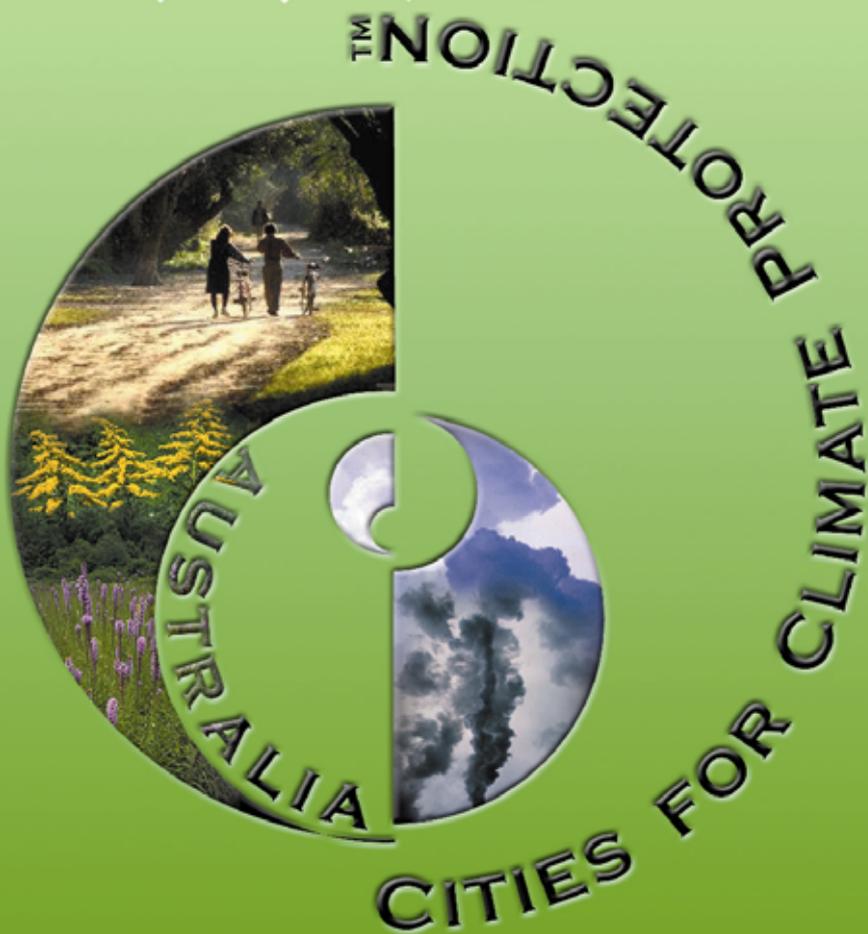


Council Emission Inventory & Greenhouse Opportunity Feedback

FINAL REPORT - June 2003



MILESTONE 5



BAULKHAM HILLS SHIRE COUNCIL



MAYOR'S STATEMENT

Baulkham Hills Shire Council is dedicated to ensuring a sustainable future for its residents. This vision is linked to an understanding that we are dependent on a healthy environment - for air to breathe, water to drink and soil in which to grow our food – therefore damaging the living systems that support us will damage ourselves.

As a community we must therefore be aware of the potential consequences of global warming and climate change and the need, to take collective action on greenhouse gas emissions. Joining the Cities for Climate Protection™ (CCP) Program, which encourages local government to take a lead role in the reduction of greenhouse gas emissions, is just one way this Council is making a positive commitment to sustaining our natural environment.

Baulkham Hills Shire was one of the first Councils in Western Sydney to join the CCP program in 1999, and is leading the way in respect to meeting its five milestone targets. In achieving Milestone 3, Council developed a comprehensive Greenhouse Local Action Plan - *'Opportunities for Greenhouse Gas Reduction'*. This document provided a comprehensive strategy to direct effective on-ground action to reduce the Shire's energy demands and reliance on greenhouse emitting fossil fuels.

It was important that Council lead the way in implementing the actions identified in the Local Action Plan, consequently a number of greenhouse reduction projects were undertaken to reduce emissions in our own operations. These have included a substantial lighting retrofit program, the purchase of alternative fuel cars, an in-house sustainable waste avoidance program and the establishment of an Energy Performance Contract to drive future energy efficient initiatives.

In addition, Council has undertaken a substantial review of its Development Control Plans to ensure they facilitate the vision of a sustainable future, including energy efficient principles and standards, and the encouragement of solar passive design and function. Council is keen to use its own new development, a library and apartment complex to illustrate good building design. At the same time, the community have been encouraged to partner Council in its greenhouse reduction program through education programs and the promotion of energy efficient appliances to existing residents.

These actions have been evaluated and measured against the greenhouse emissions reduction goal for Council operations of a 20% reduction on 1998-99 emission levels by 2011. In monitoring the results of its initiatives in this report, Council is meeting its final CCP™ Milestone requirements and providing a new baseline to measure future actions against.

While the achievements of Council's Cities for Climate Protection are demonstrable, there is still a way to go before Baulkham Hills Shire will achieve its greenhouse gas community and corporate reduction goals. We are committed to achieving our goals through continuing our in-house energy efficiency program as well as promoting our community education program. We will also encourage our residents and industry to take a more active role in the Cities for Climate Protection program and implement sustainable abatement actions.

By working together to reduce greenhouse gas emissions locally we will be able to make a positive difference to the Shire's environment and to the health of the world we all live in.

Councillor John Griffiths
Mayor

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EXECUTIVE SUMMARY

The Cities for Climate Protection program provides a framework for local government action to reduce greenhouse gas emissions from the community and Council's corporate sector. Baulkham Hills Shire Council made a commitment to contribute to the global reduction of greenhouse gases when it joined the CCP™ Program in July 1999. Since that time, Council has completed an inventory measuring greenhouse emissions in 1998-99 and 2001-02, adopted a community and corporate emissions reduction goal as well as prepared and implemented a Local Greenhouse Action Plan. To determine the progression of Council's greenhouse abatement program, local action plan measures have been reviewed and monitored on an annual basis.

This report is the final submission to the Cities for Climate Protection (CCP)™ Program, following the completion of Milestones 1 to 5. It includes an evaluation of the 1998-99 Base year and 2001-02 Reinventory year corporate emissions data, a reconciliation of abatement measures undertaken and a review of progress towards the 2011 reduction goal.

Baulkham Hills Shire Council has set a target of reducing its own 1998-99 greenhouse gas emissions by 20% by the year 2011. The target was identified through the CCP™ Program and resolved by Council as a commitment to this program. Extension of the target year to 2011 will assist in achieving the reduction goal within a measurable ten-year period.

For this report the 2001-02 greenhouse gas emissions associated with Baulkham Hills Shire Council's building, fleet, streetlighting and waste sector were quantified and analysed. The largest contributor to Council's greenhouse gas emissions is the streetlighting sector (49.63 %), followed by the buildings sector (26.71 %), vehicle fleet (21.66 %), and waste (0.11 %). Employee commute was not included in the Base year data, and now accounts for 1.89 % of the total emissions. In 1998-99, Council's greenhouse gas emissions were 7,234 tonnes, whilst the emissions in 2001-02 were 10,489. This is an increase of 3,255 CO₂e tonnes or 45 %.

Three sub-sectors in the Corporate division showed increases in greenhouse gas emissions over the three-year period. The largest increase was reported in the buildings subsector, with a 121 % rise in emissions due to the inclusion of additional Council-owned and operated centres, and differences in data calculations from Base to Reinventory years. Vehicle fleet emissions rose by 33 % due to a change in the number and type of vehicles, while Streetlighting emissions increased by 23 %, attributable to a rising population and demand for services within the Shire. The waste subsector decreased in emissions by 81 % below Base year levels. Recycling, composting and reducing waste to landfill have been attributed to the reduction in greenhouse gas emission levels.

Despite the increase in Greenhouse Gas emissions over the Base year, Council has successfully implemented abatement measures that have reduced potential greenhouse gas emissions. Abatement measures have been applied in the Waste, Building and Vehicle Fleet divisions of the Corporate sector, and decreased "Business as Usual" emissions by 54 %, 5 % and 4 % respectively. These reductions have come from the introduction of recycling and diverting waste to landfill to earthworks sites within the Waste subsector, upgrading lighting efficiency and utilisation of energy efficient equipment in the Buildings subsector, and change in fuel and vehicle type within the Vehicle Fleet.

Despite the somewhat disappointing results, Council remains committed to continuing its Cities for Climate Protection™ Program and implementing further measures to reduce greenhouse gas emissions. Measures such as the establishment of an Energy Performance Contract for Council owned buildings and the purchase of green power would be assessed in respect for their effectiveness at assisting Council to reach its corporate reduction goal of 20% by 2011. In addition Council will continue to maintain its environmental education and community action program to facilitate greenhouse awareness and energy reduction at the local level.

INTRODUCTION

1.1 Status

Baulkham Hills Shire Council (BHSC) joined the Cities for Climate Protection (CCP™) Program in December 1999. This program is designed to assist local governments reduce corporate and community greenhouse gas emissions through the achievement of five project Milestones. Since joining, Council has achieved the first four Cities for Climate Protection Milestones and this report outlines the steps taken to satisfy requirements for the final Milestone.

A timeline of Council's progression through the CCP™ Program is shown below.

July 12, 1999

Baulkham Hills Shire Council joined CCP™.

June 30, 2000

Milestone 1: Completed an inventory and forecast for key sources of greenhouse gas emissions by Council and the community.

May 12, 2001

Milestone 2: BHSC commits to reducing Corporate greenhouse gas emissions by 20% below 1997 levels by 2010 and caps Community greenhouse gas emissions to a 2.1% increase above 1996 levels in 2010.

August 08, 2001

Milestone 3: Developed and adopted a local greenhouse action plan – '*Opportunities for Greenhouse Gas Reduction*'- to achieve the Corporate and Community emissions reduction goals.

January 16, 2003

Milestone 4: Implemented the local greenhouse action plan.

May 2003

Milestone 5: Monitor and report greenhouse emissions and implementation of actions and measures.

1.2 General Program Hurdles

Although Baulkham Hills Shire Council has quickly progressed through the CCP™ program, there have been a number of obstacles in achieving Milestone 1 to Milestone 5. Chief among these has been the difficulty in ensuring CCP™ remains a 'whole of organisation' program rather than pigeonholed within Council's Environmental team. Despite the establishment of an internal CCP™ Management Team, awareness of the program remains limited, and progress largely driven through individual efforts.

Another issue has been the retention of a dedicated CCP™ Project Officer. This is not a permanent position within Council and has been funded largely through Australian Greenhouse Office and University grants. Only being able to employ a part-time CCP™ Project Officer on a sporadic basis has limited the progression of greenhouse gas reduction initiatives. This is not simply due to the limited time that can be spent on advancing initiatives but also because the temporary nature of the position has meant a fairly rapid turnover of staff. Hopefully the continued success of Council's Greenhouse Gas Reduction will convince the organisation of the benefit of maintaining a permanent Project Officer position.

Currently, implementation of Council's CCP™ Program relies on the ability of officers to stretch grant monies and the limited funding available through the internal Environmental Management Plan reserve budget. It is anticipated that the introduction of an Energy Performance Contract will act as a vehicle to establish an energy rollover fund. Setting up an

energy fund would commence once the initial capital outlay for energy efficiency measures had been recovered.

MILESTONE 5

2.1 Setting the Scene

Council's Milestone 5 report compares Base and Reinventory year emission totals and explains emission changes in the light of current abatement measures, possible emission input factors and differences in data methodology. The report concludes with future projections and the measures to be implemented in order to meet the 2011 emissions reduction target.

Data from the 1998-99 financial year was used to determine Council's Baseline greenhouse gas emissions for its corporate sector. The Milestone 5 Reinventory uses data gathered in respect to the 2001-02 financial year. Over these few years the Council has grown in staff and infrastructure to service the Shire's growing population, for example new community facilities have been built and added to the CCPTM building subsector. In addition, a number of new entries have been included within the inventory such as the Employee Commute subsector.

Baulkham Hills Shire, as detailed in the Milestone 3 - Local Action Plan, is one of the fastest developing local government areas in the State. Over the last few years the population has increased from 130,302 in 1998 (BHSC State of the Environment 1998) to 139,900 in 2001 (BHSC State of the Environment 2001). An additional 9,600 residents represent a 7% increase in the local population.

Council has made a number of attempts to minimise the associated environmental and social costs of fringe urban development. Council's Residential Strategy promotes in-fill high and medium density dwellings around existing town centres and central transport nodes. It is expected that this will impact the use and quality of public transport, and also encourage increased pedestrian and bicycle trips, thereby decreasing the number of vehicle trips. However, in general, more people and houses lead to further demands on energy and waste services and ultimately to increased greenhouse gas emissions. For example, community waste clean up for garbage and recycling within rural areas was extended in 2000 to include 2,200 properties (Waste Coordinator: source document-Tender for extension to clean-up, November 1999). Therefore, despite encouraging recycling and introducing green waste measures, waste to landfill totals have risen since 2000, a result both of increased population and increased services to the local government area.

2.2 Surviving Milestone 5

Under the Australian Greenhouse Office Module 5 grant, Council undertook to achieve Milestone 5 by the end of the 2002-03 financial year. This meant that much of the data collation and report development would need to be completed by the second week of May 2003. What made this task all the greater was the fact that Council's casual Cities for Climate Protection Project Officer resigned in January 2002 and a suitable replacement was not found until March 2003. It is a credit to the staff involved that the Reinventory was achieved in the required time frame.

Aside from these staffing issues there were a number of other hurdles to be overcome in achieving Milestone 5 of the CCPTM program.

Hurdle 1 -Lack of consistency between data sets

Figures for the Baseline year are not compatible with current information and have made a comparison of greenhouse emissions extremely difficult. This is not simply due to differences in how information was collected, as different officers have been responsible from Milestone 1 to 5, but is related to fundamental discrepancies in the scale of baseline data reporting.

In order to provide a basis of comparison Council's CCP Project Officer is attempting to correct some of these former inaccuracies however information is in some cases nearly impossible to obtain. In any case, the Milestone 5 Reinventory, which meets CCP™ data requirements, can be used as benchmark to measure future abatement measures against. Extension of the target year to 2011 will assist in achieving the reduction goal within a measurable ten-year period.

Although three staff members have worked on the CCP™ Program, the CCP™ Coordinator has remained throughout the progression through Milestones 1 –5 and this has reduced potential discrepancies in CCP™ reporting.

Hurdle 2 – Access to data

The format and level of information required for the CCP™ program is not necessarily similar to how it is reported in Council, either by staff or by outside agencies. New processes to deliver data of a type, breakdown and frequency of that required for the CCP™ software would be of great assistance in future inventories.

Hurdle 3 – Data gaps

Extrapolation for energy consumption and tonnages was applied in some subsectors (Streetlighting and Waste) where precise data records were not available. Accuracy confidence limits of these figures are less than those subsectors where detailed data records were available.

2.3 Key Abatement Measures

Over the last three years, a number of key actions, resulting from the Council's commitment to the CCP™ Program, have been identified and applied in order to reduce corporate and community greenhouse gas emissions. Measures marked with a "\$" are quantifiable, indicating that there are direct costs and savings calculated.

Corporate Abatement Measures:

Increasing energy efficiency in Council buildings \$.

This includes upgrading lighting efficiency, application of a power correction factor within Council's administration building and the installation of energy efficient office equipment. An Energy Performance Contract is currently being considered by Council, which, if approved, will lead to further energy efficiency improvements and contribute significantly to achieving a twenty per cent reduction in Corporate Energy expenditure.

Purchasing alternative fuel cars \$

Council's vehicle fleet has been upgraded and now includes a significant percentage of 4 cylinder vehicles as well as a couple of pilot electric hybrid vehicles and several operating on LPG.

Development of a Sustainable Waste Avoidance & Purchasing Policy (SWAPP) \$

The first stage of the SWAPP program has seen the introduction of mixed recycling and organic bins within all Administration kitchenettes. Council's waste contractor picks up the recycling material while organic material is processed by an on-site composting bin and utilised on Council grounds.

The second stage of the SWAPP program is still in progress and involves establishing guidelines to direct Council's purchasing program. Specific elements within the guidelines include purchasing equipment that is energy efficient and minimises greenhouse gas emissions.

Community Abatement Measures:

 *Becoming a SEDA corporate energy partner and being involved in the Energy Smart Homes program.*

Council joined as a SEDA corporate energy partner in 1999. This has meant that energy efficient practices have become more attractive to residents within the Shire, both for energy reductions and financial gains. For example, BHSC is able to offer a \$500 rebate to residents who purchase a solar hot water system, because of Council's partnership with SEDA.

Through involvement in the Energy Smart Homes project, Council developed an energy smart DCP, specifying that all new homes were to meet 3.5 star energy rating. Recently, DCP guidelines have been altered requiring new residents to meet the tougher standard of 4 star energy rating. All of Council's development control officers have undertaken NATHERS training to ensure appropriate assessment of developments.

 *Implementation of a Cycleway network*

Over the last few years, Council has been undertaking a major expansion of its bicycle pathways` network to encourage residents to utilise bicycles for commuting, recreation and to attend schools (also a Corporate measure).

 *'Education for Sustainability' program*

In 2001 Council employed a part-time Environmental Education Officer to encourage sustainable environmental practices within the community. An integral aspect of this job is the promotion of the Cities for Climate Protection Program, energy efficiency measures and waste education (also a Corporate measure).

 *Council's Waste Program*

There have been a number of initiatives introduced within Council's waste management program, all designed to reduce waste to land fill, These have included the provision of recycling bins for all residents, provision of a bi-yearly clean up service incorporating white goods and green waste recycling, a monthly free mulch program and the initiation of Second-hand Saturday swap meets.

 *Residential Energy Audits*

The latest initiative to encourage residents to think about reducing greenhouse gas emissions has been to offer community members energy audits at a discounted rate. In addition to the cheap consultancy, residents also have the option of purchasing an energy saver kit, again at a discounted rate.

CALCULATIONS

3.1 Calculation Methodology & Measurement

Council's greenhouse gas emissions were calculated using the current Cities for Climate Protection software. Collecting all energy consumption and waste data derived council's emissions, and then applying Australian Greenhouse Office approved models and coefficients.

Council energy expenditure for the Building subsector was calculated from accounts from relevant energy providers. Administration equipment emissions were calculated using the SEDA calculator (http://www.seda.nsw.gov.au/estar_calculator_body.asp).

Streetlighting emissions were determined mostly from physical accounts; however, some extrapolation was required due to lack of physical records for 2001. Upon ICLEI's recommendation, Council's streetlight bills were calculated by comparing an inventory of Council-operated streetlights, with ICLEI data that formulated energy consumption from each type of light.

The vehicle fleet data was from tabulated fuel consumption data for all vehicles from the Plant and Depot Operations Manager, who receives regular records of fuel usage per Council vehicle.

Waste data was obtained from an internal waste audit conducted in 2001, which identified proportions of waste products within the corporate sector. Tabulated data of waste costs and tonnages compiled by the Waste Coordinator, and extrapolation of tonnages and bin capacity data provided by our Waste Management Service were also used to determine Waste to Landfill totals. Estimations of street sweeping data were made from physical observations of the composition of the waste.

Employee commute data was gained from a Council survey, and then tabulated using the travel assistant within the CCP™ software.

3.2 Base-line & Reinventory Results and Analysis:

Table 1 shows the Base and Reinventory year comparison for CO₂e tonnages within the corporate sector. Operational changes and quantified abatement measures are also included in relation to each subsector to provide explanation for variations in emissions between the Base and Reinventory years.

Table 1: Base and Reinventory year CO₂e emissions

Energy Use Subsector	Base line Year 1998	Business as Usual Year 2002 (% change)	With Abatement Measures Year 2001	Operational Changes	Quantified Abatement Measures
Corporate Buildings Subsector	1265	2965 (134% increase)	2801 (121% increase)	<ul style="list-style-type: none"> • Inclusion of facilities previously not accounted for in Base year • Increased energy usage at existing facilities • Discrepancies between Baseline and Reinventory data. 	<ul style="list-style-type: none"> • Lighting upgrade • Power correction factor • Energy efficient office computers, printers and photocopiers.
Vehicle Fleet	1700	2273 (34% increase)	2266 (33% increase)	<ul style="list-style-type: none"> • Change in make-up of fleet • Change and increase in the configuration of vehicles • Higher utilisation of vehicles due to increased road construction. 	<ul style="list-style-type: none"> • LPG, hybrid & 4 cylinder cars. • Cycleways program.
Street Lighting	4207	5205 (24 % increase)	5205 (24% increase)	<ul style="list-style-type: none"> • Increasing demand for street lighting 	No abatements applied.
Waste	62	26 (58 % decrease)	12 (81 % decrease)	<ul style="list-style-type: none"> • General increase in facilities & services • Differences in Baseline and Reinventory data. 	<ul style="list-style-type: none"> • SWAPP program.
Employee Commute	0	198 (100% increase)	198 (100% increase)	Not previously included in Base year.	<ul style="list-style-type: none"> • Cycleways program.
Total	7,234	10,662 (+ 48 %)	10,475 (+ 45 %)		

The above table demonstrates the potential emissions if Council had not implemented any abatement, and the resulting emission levels following the effects of abatement measures. "Business as Usual" predictions for 2001/02 identifies that emissions would have increased 48 % without any abatement measures. However, following the implementation of abatement

measures between 1998 and 2001, emission levels have reduced by 3%, and resulted in an increase of 45 % from Base year emissions. The increase is attributed to growth in several subsectors including buildings, vehicle fleet and streetlighting.

Table 2: Reconciliation of Base & Reinventory year emissions with abatement measures having effect in the Reinventory year

	Tonnes CO ₂ e	Tonnes CO ₂ e
1998 Inventory		7,234
2001 Inventory		10,489
Increase		3,255
2001 Abatement Actions		
Buildings - Lighting efficiency in Admin Building	59	
Buildings – Energy efficient equipment	105	
Vehicles – Fuel change to LPG	2	
Vehicles – Fuel efficiency Prius purchase	5	
Waste recycling and composting	16	
Total abatement	187	
<i>2.1. Summary</i>		
Total abatement		187
Increase without abatement (BAU)		3,442
% Decrease in 2001emissions from abatement		5 %
% Overall increase in emissions		45 %

Figure 1 below indicates Council's progress toward the corporate reduction goal of 20% for 2011 from 2001 emission values. Emissions have increased approximately 10% based on the Base year recalculated figures, and are considered to be a result of the annual 2.3% growth in the Shire's population, causing an increased demand for facilities and services. Target year emissions are calculated as a total of a 2% reduction in 2001/02 emissions per year. Currently, Council achieved a reduction of 187 CO₂e tonnes in 2001-2002. Increasing this to 209.5 CO₂e tonnes reduction per year will enable BHSC to meet its emission goal in 2011.

CO₂e emissions and abatements for Base, Reinventory and Target years

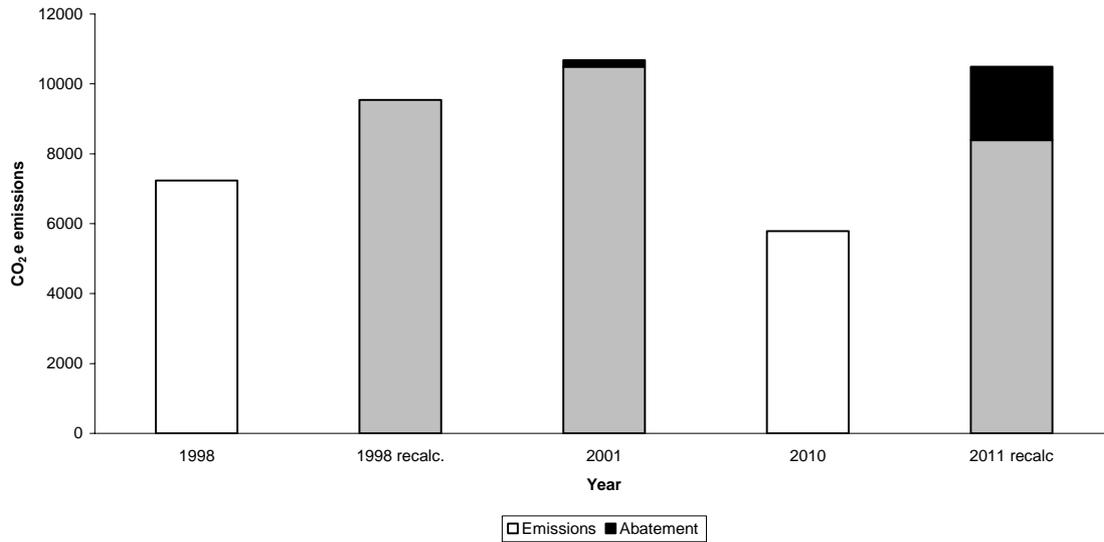


Figure 1: Base, Reinventory and Forecast years' Corporate CO₂e emissions. Years 1998 and 2011 have been recalculated with 1998 emissions calculated from a median of 1992, 1993 and 2001 data, and 2011 estimations calculated from 2001/02 data. The target emission level is 20% less than Reinventory year totals. These columns are named "RECALC", and were included to demonstrate a more achievable goal following the possibility of large discrepancies between Base and Reinventory year data. The patterned bars represent the "RECALC" and Reinventory figures that Council are using to forecast future emission totals and calculate the abatement required.

3.3 Summary of Greenhouse Gas Abatement Measures

Abatement measures in the Buildings, Vehicle fleet and Waste subsectors have contributed to the total of 187 CO₂e Tonnes reduction. These are detailed in Table 3 and 4 below. Quantifiable and non-quantifiable abatement measures, including measure descriptions, budget details and annual emission reductions are given.

Table 3: Summary of major quantifiable measures within the corporate sector.

2001 Abatement Actions – Quantitative Assessment	Description	Annual Budget Allocation	Annual Emission reduction
Lighting efficiency in Administration building	Fluorescent light fittings using 38-watt lamps were replaced by single 36-watt tri-phosphor fittings fitted with electronic starters. Significant reductions in corporate emissions are expected to be observed in forthcoming reinventories due to installation in June 2002.	\$20,055	59 CO ₂ e tonnes
Equipment upgrade	Energy efficient equipment was installed in 2002 within the Administration building. Council leased 265 computers, 29 printers and 9 photocopiers.	\$ 707,750	105 CO ₂ e tonnes
Fuel efficiency	Two Toyota Prius' passenger vehicles were purchased and used as pilots for future fleet vehicles. They are also used for car-pooling.	\$ 30,000	5 CO ₂ e tonnes
Change in fuel	The Vehicle Fleet converted its make-up to include several LPG dedicated vehicles. They are also being utilised in heavy operations.	\$1,300	2 CO ₂ e tonnes
Waste management	Introduction of recycling and composting were applied to the Corporate sector. Council has provided all staff access to desk side paper recycling systems, recycling resources at all major usage points, such as kitchenettes, and an on-site composting system.	\$3,000	16 CO ₂ e tonnes

Table 4: Summary of major non-quantifiable measures within the corporate sector.

Additional 200X Abatement Actions – Qualitative Assessment	Description	Budget Allocation	Annual Emission reduction
Energy Performance Contracting	Major buildings are targeted for improved energy efficient systems, and upgrades to present HVAC and lighting systems.	Up to \$446,263	Up to 469.1 CO ₂ e tonnes
Energy Audits	Energy audits are to be performed in both the corporate and community sector.	Up to \$4,500	Up to 200 CO ₂ e tonnes
Environmental Education Officer	Corporate education has increased through awareness of the CCP™ Program.	\$5,000	N/A
Cycleway expansion	Castle Hill bikeways project links major community facilities and commuter destinations with residential areas. In coordination with the employee commute subsector, its success in reducing emissions can be quantified in future reinventories.	\$50,000	N/A

Council have identified further potential opportunities for Greenhouse Gas reduction within both the Corporate and Community sectors, and have designated time frames and responsible departments to action their implementation.

Some examples include:

- Lobbying the Department of Transport to fast track implementation of *Action Transport 2010* and to specify alternative fuel buses in tenders for major transport routes,
- Encouraging businesses to become involved in the Greenhouse Challenge and/or the Greenhouse Allies (small businesses) programs,
- Specifying that Council's contracted garbage fleet run on reduced emission energy fuels,
- Lobbying the Federal Government to modify FBT requirements that promote increased vehicle usage, and
- Review lights and fixtures used in streetlights and provide direction to service providers.

Up to 37.5% reduction in emissions and costs are achievable with the implementation of any one of the above actions.

DISCUSSION

4.1 Statement of Emissions

Overall, compared to the Base year, Council's emissions are 45 % higher. Abatement in the Reinventory year is 187 tonnes CO₂e. The waste sector has decreased in total emissions by 81 %. The other three subsectors of the corporate sector have increased emissions, with a large variance in increases, ranging from 23 % in the Streetlighting sector to 121 % in the Buildings sector.

The greater contributor to increased CO₂ emissions has been the Streetlighting sector. The figure of 5,205 CO₂e tonnes relates to a 50 % increase in corporate emissions from the Base to Reinventory year. Although the 1998/99 figure is unaccountably small, a majority of the increase in emissions can be accounted for by the increase in Shire area, and in light of the fact that no abatement measures have been applied from the Base to Reinventory years.

Although Streetlighting has increased markedly, the proportion that streetlights contribute to total emissions has decreased since the Base year. In 1998, Streetlighting contributed 58% of total emissions in 1998 but in 2001 they compose 50% of total corporate emissions. The reduction may be attributed to increases in other sub-sectors, such as buildings.

The building sub-sector is the second largest contributor to 2001 CO₂ emissions, with 2,801 CO₂e tonnes and the second largest increase in Base to Reinventory year results. They have significantly increased to be 121% greater than Base year emissions. This large increase in emissions can be attributed to a number of factors; the acquisition of a number of significant new facilities; expansion of services and increased energy usage of existing facilities; and data errors in the baseline year. A number of facilities operating in 1998 were not observed in the 1998 inventory, and baseline figures appear to be monthly rather than annual. The quantity of greenhouse emitted per unit of electricity generated remained consistent between 1998 and 2001, therefore this does not account for any increase.

There was a 33% increase in the vehicles sub-sector, contributing 2,266 tonnes of CO₂e. Increases and changes to vehicle make-up, configuration and utilisation of corporate vehicles may explain emission increases. However, the increase is considered above expectations, and incomplete depot records for the Base year prevent further explanation of this.

Emissions from waste have decreased 81 % from 62 to 12 CO₂e tonnes. This is the only sub sector to decrease overall emissions from Base to Reinventory years. These results have come from implementation of recycling and composting services within Council, reducing food waste from the general waste stream, and from dedicating 90% of street sweeping waste to Council Earthworks sites. The organic waste was previously sent to landfill, but now acts as fill in recreational zones, such as ovals, within the Shire.

Employee commute is a new sub-sector included in the 2001 Reinventory, and accounts for 2% or 198 CO₂e tonnes of the Corporate sector emissions. This figure also accounts for 5% of CO₂ emission increases from the Base to Reinventory year. It has been included on the recommendation from ICLEI, and is expected to become a key indicator of local corporate greenhouse gas emissions in future reinventories.

4.1 Future Abatements

Future abatement actions are also in the process of implementation in order to meet Council's Corporate and Community 2011 target. These measures have been included in Council's Local Action Plan and marked for implementation within the next 2 to 3 years. They are found in Table 5 below, along with status of their progression, budget and estimated emission reductions.

Table 5: Future Corporate Abatement actions and Action plan progress

Abatement Action	Description	Progress	Annual Budget	Estimated annual emission reduction
Continued implementation of in-house energy efficient technologies and practices	<ul style="list-style-type: none"> - Sustainable waste, eco-purchasing policy, and green purchasing policy - Staff training and education campaign on energy efficient actions 	Ongoing to 2004	\$5,000, and existing resources and funding through the ARC SPIRT grant	20 %
Establish corporate Energy Management Fund	Reinvestment of energy savings for future implementation of energy innovations	In progress until 2004	Estimated to use existing resources up to \$500,000	N/A
Incorporate energy efficient guidelines into Council's community building contracts	<ul style="list-style-type: none"> - Buildings to include bike facilities, passive solar energy designs, and natural ventilation designs - Increase use of competitive pricing policies and reinvest savings for green energy provision 	In progress until 2004	Estimated to use existing resources and external funding	39 %
Installation of renewable energy on public buildings	- Hybrid solar turbine generator system in the Administration building and swimming centre	In progress to 2004	~ \$380,000 sourced from grants and payback agreements	28 %
Energy Performance Contracting on all major buildings	Energy audits, HVAC upgrades, Lighting replacements and/or upgrades, Power correction factors, PV solar power	Pending Council approval	\$446, 263	20 %
Green power purchase	10% Green power purchase on 5 major Council buildings and Streetlighting	Ongoing to 2006	Over \$17,000 using existing resources and offsetting against energy cost savings	Up to 23 %
Establishment of a prominent Council reserve as a Greenhouse Park	Allow for the promotion of Cities for Climate Protection™ and sustainable energy practices	Ongoing to 2005	Existing resources, Landcare, Greenfleet, AGO resources and grants	2 %

Investigate renewable energy technologies for lighting of public open space	- Solar energy for public recreational land and cycleway routes	On-going to 2011	Existing resources and AGO grants and funding	5 %
Greenfleet	Tree planting in order to sequester Council's fleet emissions	In progress	3640 (130 vehicles)	41 %
Use of alternative fuels within light and heavy vehicle fleet	Increase LPG vehicles and other green fuels	Ongoing to 2011	Existing resources offset by fuel price/litre savings	46 %
Promote and support alternative fuels within a regional context	Provision of infrastructure and fuel technologies in local areas	Ongoing to 2004	Existing resources and support from WSROC	N/A

Table 5: Future Community Abatement Actions and Action Plan Progress

Abatement Action	Description	Progress	Annual Budget	Estimated annual emission reduction
Compliance with SEDA's energy rating scheme in all residential developments	All new residential sectors to meet 3 ½ star rating	Ongoing to 2004	Existing building control and environmental education resources	46 % if 70% of houses meet 5 star rating, 20 % if they meet compliance level
Encourage innovative energy efficiency construction and building practices	- Council to join PATHE Greensmart Village - Home and commercial energy audits	Ongoing to 2005	\$10,000 plus AGO Household Greenhouse Action Program and Greenhouse Challenge	20 %
Implementation of an energy consultation and awareness program	-Encourage residential PV system -Provide energy efficient light bulbs to residents	Ongoing to 2004	\$20,000 plus AGO Household Greenhouse Action funds	14 %
Promote and support school greenhouse programs	-Installation of PV systems in schools - Encourage schools to adopt Greenhouse Action	Ongoing to 2004	\$20,000	20 %

Implement an energy rating system for all new commercial and industrial developments	Incorporate standard energy efficiency requirements Based on size and emission levels	Ongoing to 2004	Existing resources	> 20 %
Promote community sustainable waste	Reduce waste to landfill through education of green waste removal and Earthworks program	Current and ongoing	Existing resources	20 %
Remove organic waste from waste stream	Implementation of portable vegetable mulcher for hire, green waste and recycling service provision	Current and ongoing to 2005	Existing resources, and State/Regional funding	100 % reduction in organic waste to landfill by 2010
Promote consideration of a regional co-generational waste collection and recycling facility	- Returns green energy to the grid through waste incineration processes - Minimises emissions from waste transport	2004 – 2007	Existing resources and regional funding	N/A

4.3 Progress Towards Reduction Goal

Baulkham Hills Shire Council progress toward meeting the set reduction goal is demonstrated in Figure 2. In 2001, BHSC reduced potential increases by 187 CO₂e tonnes. Reductions will need to continue to be at least 209.5 CO₂e tonnes/year in future years to meet the target year emission level in 2011 at the current rate of population growth and Shire expansion.

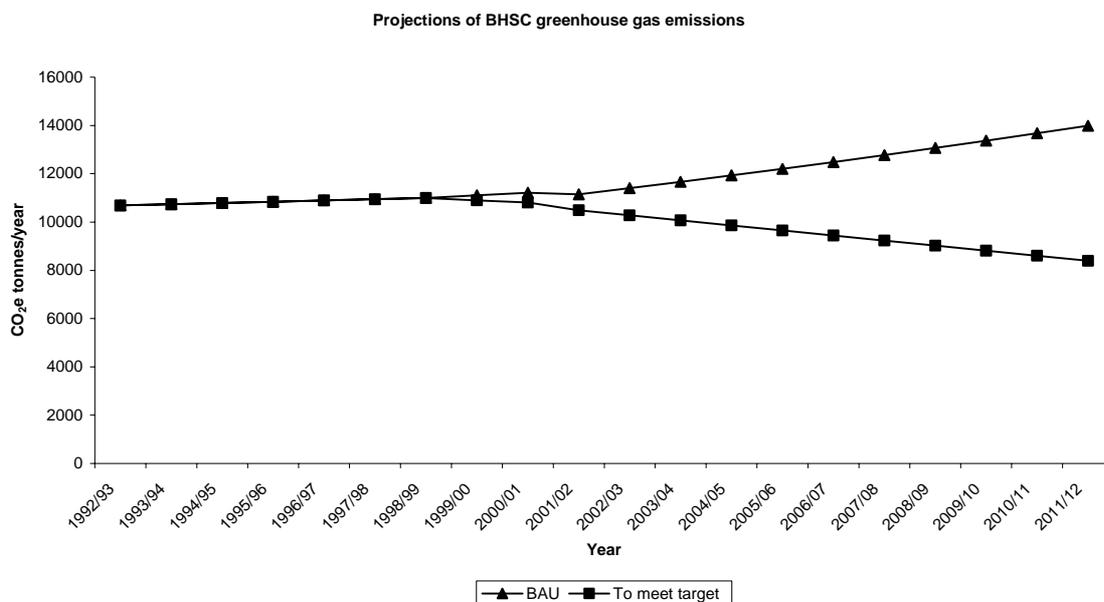


Figure 2: BHSC CO₂e emissions for Business as Usual (BAU) and target years. BAU figures are based on an average increase of 2% population increase per year 1998 – 2001 using “without abatement” increases. The target year emission goal was calculated as 20% reduction from the 2001/02 figures and extended to be achieved in 2011.

Council anticipates that abatements will show greater reductions in greenhouse gas emissions in future inventories, as current measures applied late in the Reinventory year become increasingly apparent, and more effective measures are applied including the EPC, energy efficient guidelines in Corporate and Community sectors, the establishment of Greenfleet and the use of alternative fuels. Council also proposes to join the CCP™ Plus Program for continued assistance to reduce energy consumption and greenhouse gas emissions.

CONCLUSION

This report of Baulkham Hills Shire Council's progression toward reducing greenhouse gas emissions highlights a major level of activity on greenhouse projects within Council. Despite the success of these projects, Council has recorded a 45 % increase in emissions between 1998 and 2001.

Council recognises that following Milestone 5, there are still a number of areas that remain key contributors to greenhouse gas emissions, and targeting prominent emission zones is an ongoing priority that can be combated through implementation of specific abatement measures. Greater emphasis will need to be placed on those areas that are Council's largest greenhouse contributors, along with continual assessment of the range of measures so that they will sufficiently contribute to meeting the greenhouse gas reduction target.

It is hoped that through continued abatement activity within the community there will be both recognised achievement in a sustainable reduction in greenhouse gas emissions and in stimulation of cultural change both within Council and within the community.

Council's commitment beyond Milestone 5 will be to continue to remain dedicated to developing new projects and programs that will contribute to local and global greenhouse gas emission reductions, and at the same time, demonstrating environmental leadership and providing a range of positive benefits to both the Shire's corporate and community members.



2.2. *Memorandum*

TO: JULIE WEBB - ICLEI
 FROM: CARA PETERIE – ENVIRONMENTAL PROJECTS OFFICER
 SUBJECT: AMENDMENT TO MILESTONE 5 FINAL REPORT
 DATE: 30 JUNE 2003
 COPIES TO: VICTORIA CRITCHLEY

AMENDMENT TO MILESTONE 5: REINVENTORY AND ACTION REPORT

Following the final report submission for Milestone 5, later adjustments to Baulkham Hills Shire Council data were required. These are detailed as follows:

Street lighting: Increase in 12 CO₂ e tonnes. The Energy Australia street lighting data was recalculated using an inventory provided by Energy Australia. This was upon ICLEI's recommendation and assumed to more accurately represent the energy consumption in terms of \$/kWh. Based on the inventory calculations, the Energy Australia street lighting component consists of:

- 164 250W Mercury Vapour shared lights,
- 82 250W High Pressure Sodium lights - 4 non-shared, 78 shared,
- 15 400W Mercury Vapour shared lights,
- 2 100W High pressure Sodium Plain lights of which all are non-shared,
- 5 400W High pressure sodium shared lights,
- 13 4*40 Fluorescent lights - All non-shared. Of the fluorescent lights, there are four 40-watt tubes in each of the 13 fittings.

Method for calculation:

Shared lights - The kWh are calculated and halved because the costs and emissions are distributed between both Baulkham Hills Shire Council and Hornsby Council.

Non-shared - Total kWh were added to shared lights total. These are not halved because they exist wholly within the Baulkham Hills Shire.

Total = 173787.5 kWh / yr

Waste: Increase in 2 CO₂ e tonnes. This was changed because components of street sweeping were redistributed. Gravel and sand were removed as organic waste products and added to "other" waste products. Of the total 300 tonnes/year street sweeping waste, estimations conclude that 198 tonnes consists of organic material, 57 tonnes is rubbish or other waste, and 45 tonnes is gravel and sand.

Therefore, final calculations determined that the total waste of 353 tonnes is distributed between 9% of paper products, 1% of food waste, 69% plant debris, 1% of wood and textiles and 20% containing all other waste.

Total increase = 14 CO₂ e tonnes.

Adjusted Reinventory year total = 10,489 CO₂ e tonnes.

