Sustainable Energy Strategy 2006-2010

September 2006

Hornsby earthwise

HORNSBY SHIRE COUNCIL

It appears that at least one out of every five living things on this planet is committed to extinction by the existing levels of greenhouse gases…if we act now it lies within our power to save two species for every one that is currently doomed.

If we carry on with business as usual, in all likelihood three out of every five species will not be with us at the dawn of the next century.

Tim Flannery (2005)

Internationally acclaimed scientist, and part-time resident of the Hornsby Shire.

Sustainable Energy Strategy 2006-2010

Executive Summary 5

Introduction 8

- Objectives 8
- Overview 8
- Greenhouse Effect and Climate Change 9
- Climate Change Predictions 10
- International & National Perspective 11
  - Kyoto Protocol 11
  - Contraction and Convergence 11
  - Asia-Pacific Partnership on Clean Development and Climate 11
  - NSW Greenhouse Plan 12
- Greenhouse Gas Emission Trends 13
- Cities for Climate Protection Program 14
- Council's Vision for Sustainability 14
- Greenhouse Reduction Targets 14
- Hornsby's Greenhouse Emissions & Energy Consumption 2000-2005 15
  - Corporate 15
  - Community 15

Greenhouse Reduction Actions 2000-2005 16

- Overall Emissions Reduction 16
- Recognition and Awards 16
- Performance & Evaluation 17
- Revolving Energy Fund 17
- Corporate Emission Reduction Measures 17
  - Council Assets 17
    - Energy Performance Contract Stage 1 17
    - Cogeneration System (TrigenAir) 18
    - Purchase of Green Power 19
    - Energy Efficient Office Equipment and Paper Recycling 19
    - Sustainable Energy Management Policy for New Council Buildings 19
  - Public Lighting 20
    - Purchase of Green Power 20
    - Street Lighting Improvement Program 20
    - Energy Efficient and Solar External Lighting (Non-EPC) 21

Fleet Management & Public Transport 21
Fuel Substitution 21
Vehicle Downsizing 21
Walk to Work Day 21
Travel Demand Management 21
Green Procurement 22
CCP Plus Greenhouse Purchasing Project 22
Organisational Management 22
Energy Management Review 22
CCP Plus Renewables Alliance 22
CCP Plus Organisational Management Review 22
Green Waste Recycling 22
Community Reduction Measures 23
Residential Sector 23
Waste Diversion 23
Hornsby Earth*wise* Day 23
Solar Day 23
CCP Plus Residential Pilot – Home & Garden Improvement Workshop 23
Earth*wise* @ Home Program 23
CCP Plus Regional Schools Energy Pilot Program 23
Energy Efficient Housing Policy 24
Business Sector 24
Sustainable Business Program 24
CCP Plus Industry Pilot 24

Greenhouse Reduction Actions 2006-2010 25
Revised Emission Targets 25
Corporate 26
Community 26

Conclusion 30

References 31

Additional Information 31

Executive Summary

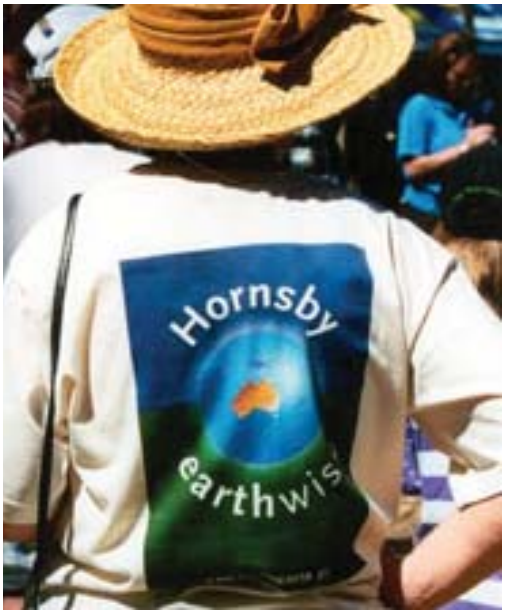
Unless significant and sustainable global action is taken to forestall projected climate change trends, large-scale, irreversible damage to societies across the planet is likely to occur.

Australia is not exempt from this process or its consequences and climate changes based on current trends are likely to have significant adverse impacts for future generations. We are therefore looking at a "carbon-constrained future" in which the global production of greenhouse gas emissions will have to be limited. As a consequence, people will need to change the nature and patterns of energy generation and energy use, and alter transport usage and some agricultural and land use practices. This will require greater understanding and knowledge of the impacts of climate change, and leadership by example by Commonwealth, State and Local Governments, business, and community leaders.

Local government is very proactive in implementing programs and actions in an effort to reduce greenhouse emissions in the local community. This is primarily driven by ICLEI's Cities for Climate Protection (CCP™) program. CCP™ Australia councils commit to reaching milestones to achieve sustainable, long-term reductions in their greenhouse gas emissions, with the majority of councils focussing on reducing their own corporate emissions as a first step.

As part of CCP™, Hornsby Shire Council has implemented both Australia's most comprehensive local government energy performance contract and an Australian first cogeneration air conditioning system. These innovative programs contribute to Council's strategic intent to reduce 20% of its own and the local communities' greenhouse gases by 2010. Independent verification shows that Council's innovation has reduced its own greenhouse gas emissions by 23% since 2000. If no reduction measures had been implemented (business as usual), then the total emissions for 2004-2005 would have been 55% greater than the base year.

This Strategy is a revision of Council's Greenhouse Gas Reduction Strategy adopted in 2000. With 2010 in mind this Strategy outlines Council's intent on continuing its local greenhouse reduction actions in order to manage the threat from the anticipated increase in energy demand resulting from the increase in the number and size of Council assets and the Shire's growth. Therefore to tackle climate change beyond 2010 Council has committed to revising its greenhouse reduction



Hornsby earthwise, Council's program for sustainability initiatives

targets for 2012 and 2050 to ensure there is a significant effect in reducing the impacts on the sustainability of the Shire.

With regard to community reduction, Council is keenly aware of the challenges of not only bringing about reductions, but maintaining that change over time particularly for the residential sector. While State Government legislative frameworks (for example, BASIX) make a major contribution to mitigating emissions for the built environment, and new technologies are constantly becoming available in the market, changing household practices is the role of individual community members. Council has identified a number of programs that can contribute to a shift in attitudes and practices within the broader community and will be actively seeking partners from both the business and residential sectors to support and promulgate that change. Apart from bringing about reductions, the other significant challenge associated with community emissions reduction is measurement and verification. Council will address this by investigating innovative monitoring techniques.

Due to the fact that most greenhouse gases linger in the atmosphere for many decades and their cumulative effect increases, many nations and states are committing to greenhouse gas reductions of up to 60% by 2050 to have a significant effect in reducing climate change impacts. In keeping with the NSW Greenhouse Office, Council is also adopting this long-range target. Council realises that although it is already on track to achieve this target for its own activities, the progress to achieve it through behavioural changes in the community will be slower.

A summary of Council's progression of emissions, achieved reductions and emission reduction targets since joining CCP™ is presented in the following tables.

	Year	Corporate (Council Assets)	Community (Residential & Business Sectors)
Total Emissions (tCO_2-e)	1995-96	10,101	1,669,831
Reduction Target (adopted 2000) (tCO_2-e)	2010	2,020 (20%)	333,966 (20%)
Actual Achieved Reduction (tCO_2-e)	2004-05	2,344 (23%)	11,290 (1%)
Estimated Total Emissions for Business as Usual case (tCO_2-e)	2004-05	15,657 (55% increase)	1,911,300[a] (12% increase)
Reduction Target (revised 2006) (tCO_2-e)	2010 2012 2050	3,030 (30%) 3,535 (35%) 6060 (60%)	83,491 (5%) 166,983 (10%) 1,001,899 (60%)

	Emissions per Capita (tCO_2-e)
Australia (2003)	28
NSW (2002)	23
Hornsby Shire (2004/2005)	12.0*

Note: (tCO_2-e) – tonnes of carbon dioxide emissions
[a] - projected figure from 1995-96 levels using population growth as predictor
* Comparatively low figure due to few greenhouse intensive industries and agricultural activities in the Shire

Although the community target has been decreased to what Council believes to be a realistic and achievable one, this is not accompanied by a decrease in effort. On the contrary, Council will increase its efforts to bring about effective change through education, workshops and assistance with audits and retrofits. Council is confident in achieving its own revised target whilst at the same time generating cost savings, particularly through initiatives in street lighting and expanding on its existing Energy Performance Contract.

Council also believes that it can achieve the stretch targets for 2050 if it continues keeping on the trend we are currently achieving and if new foreshadowed state and federal legislative and policy frameworks such as extending carbon trading schemes, new rebates for the uptake of low emission and renewable technology, and strict reduction targets for major organisations are introduced in the coming years.

Whilst Council is committed to achieving the new revised greenhouse gas reduction targets, it must be made clear that Council has no mandatory powers to regulate energy consumption within the community; this is the role of State Government. At this stage Council is only able to use educational tools to try and change the Shire's behaviours to bring about a reduction in their dependence on fossil fuels.

Please refer to pages 27 to 29 for a complete list of proposed emission reduction actions for 2006/2010.

Solar street lights at Brickpitt Park, Thornleigh

Introduction

Objectives

Council has a strong history of leading its community by example to progress sustainability. To this end Council developed Hornsby earthwise, Council's program for corporate and community sustainability initiatives. Sustainable Energy Management is one of these initiatives.

This Strategy has been developed as a revision of Council's Greenhouse Gas Reduction Strategy adopted in 2000. With 2010 in mind this Strategy outlines Council's intent on continuing its local greenhouse reduction actions in order to manage the threat from the anticipated increase in energy demand resulting from the increase in the number and size of Council assets and the Shire's growth. Overall the objectives of the Strategy are to:

- Provide an overview of the issue of the greenhouse effect and climate change, along with the need for sustainable energy management at a corporate and community level.
- Report on the greenhouse gas reduction achieved to date against Council's reduction targets.
- Outline the greenhouse gas reduction actions proposed to achieve Council's revised reduction targets.

Overview

The broader scientific community now accepts that increasing levels of greenhouse gases emitted into the atmosphere have the potential to induce adverse long-term changes to the environment. This problem has lead to the development of the United Nations Framework Convention on Climate Change, to which Australia is a signatory. Under the Kyoto Protocol to the convention, developed countries have collectively made commitments to reduce their greenhouse gas emissions by at least 5% below their 1990 levels by 2008-2012. Australia's commitment is to limit the growth of its emissions to 108% of 1990 levels by 2012.

Local governments are collectively responding to climate change by joining ICLEI's Cities for Climate Protection (CCP™) program. This program empowers councils to establish their actual greenhouse emissions as a consequence of their activities and implement measures that will abate those emissions in the future.

Council's CCP™ program was built upon the foundations of existing internal energy efficiency programs, such as the Code for Energy Efficiency Housing, put in place prior to joining the program. Council, through its Local Agenda 21 Committee (now Sustainable Action Committee), joined the CCP™ program in 1999 and has resolved to reduce its greenhouse gas emissions generated by Council activities, local households, business, waste disposal, land use change and transport. This document replaces Council's *Greenhouse Gas Reduction Strategy* (2000) and represents a revised local action plan developed to provide Council with a strategic framework for meeting the draft emissions reduction target adopted by Council of 20% from 1996 to 2010.

Council was one of the first ten councils in Australia to implement its *Greenhouse Gas Reduction Strategy* as part of the CCP™ program. It contained a corporate and a community action plan outlining abatement measures to achieve Council's 20% reduction target by 2010. The strategy has been widely recognised for the innovative projects that have been implemented.

Greenhouse Effect & Climate Change

A natural blanket of 'greenhouse gases' (primarily water vapour, carbon dioxide, methane and nitrous oxide) in the atmosphere traps heat and keeps the Earth's temperature stable and life sustaining. Up until the industrial revolution, atmospheric levels of these gases have remained relatively constant through natural cycles that remove as much gas as they release.

The 'enhanced' greenhouse effect refers to the additional, unnatural warming caused by extra quantities of greenhouse gases emitted into the atmosphere resulting from human activity (Refer to figure 1). Global warming can lead to climate change, which may have such a large effect on rainfall, drought and raising sea levels that will cause widespread economic, social and environmental changes. The enhanced greenhouse effect (or global warming) is mainly caused by the release of:

- carbon dioxide (CO_2) (73% of Australia's emissions) from:
  - fossil-fuel burning for electricity generation and cooking, space heating, transportation and industry
  - cement manufacture
  - land clearing and forest harvesting and changes in agricultural practices
- methane (CH_4) (23% of Australia's emissions) from:
  - decomposing wastes in landfills
  - land clearing
  - biomass burning
  - leaks from natural gas pipelines, coal mines, and oil and gas extraction
  - rice cultivation and agricultural activities
  - domestic grazing animals and termites
- nitrous oxide (N_2O) (3% of Australia's emissions) from:
  - fossil fuel combustion
  - biomass (vegetation) burning
  - deforestation and land-use conversion
  - soil fertilisation
  - some industrial processes.

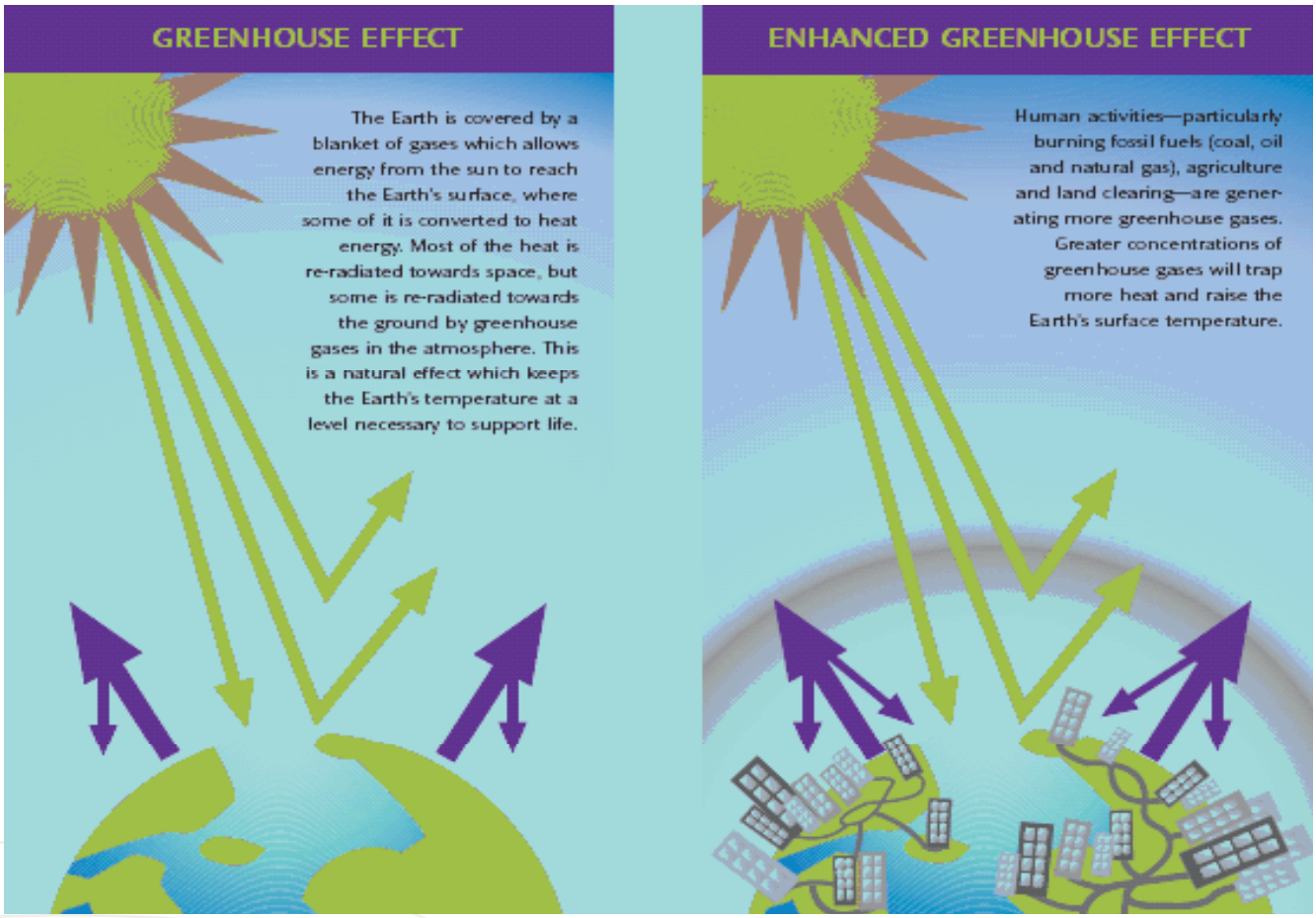


Figure 1: Comparison of the greenhouse effect and enhanced greenhouse effect (Source: Australian Greenhouse Office (2005) Climate Change Q&A)

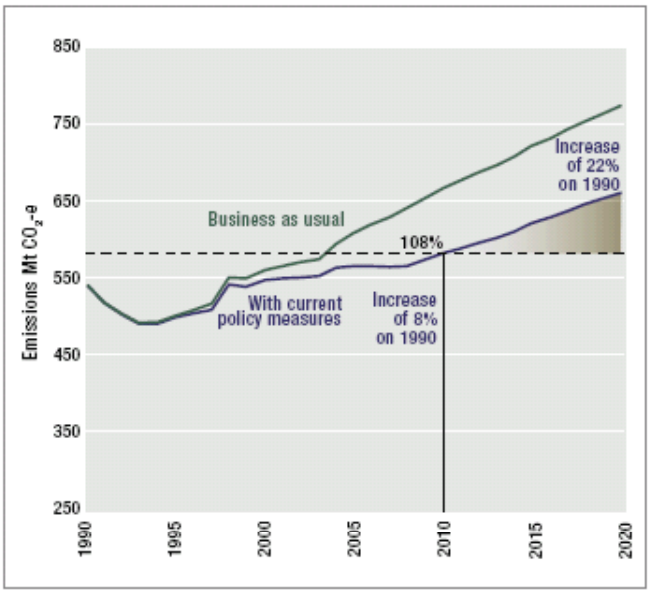


Figure 2: Australia's greenhouse gas emissions projected to 2020. (Source: Australian Greenhouse Office (2005), Tracking to the Kyoto Target)

A nation's total emissions are expressed in tonnes of CO_2 equivalent (tCO_2-e), with each non-CO_2 gas assigned a conversion factor determined by its relative warming potential.

The Intergovernmental Panel on Climate Change (IPCC), a consortium of several thousand independent scientists, has warned all nations that, in order to avoid dangerous climate changes, global warming must be kept less than 2°C, (we have already reached 0.6°C above pre-industrial levels). To do this, the atmospheric concentration of CO_2 must stay below 450-550ppm, but because greenhouse gases linger in the atmosphere for at least 100 years, this requires drastic cuts in annual global emissions of at least 60% by 2050 and possibly 80% by 2100[1].

Climate Change Predictions

In 1998, CSIRO ran a regional climate model for south-eastern Australia using the range of global emissions scenarios generated by the IPCC. The simulation shows that by the year 2050, NSW is predicted to become 0.5 to 2.7°C warmer with 10-50% more summer days over 35°C and 20-100% fewer winter days below 0°C. Despite small changes in average rainfall, the number of spring droughts will double in all regions except the southeast, and the number of extremely wet summers, autumns and winters will double in some regions. Extreme daily rainfall intensity and frequency increases in many parts of NSW are predicted particularly in summer and autumn. CSIRO advises that these results should not be regarded as actual forecasts but rather as indications of possible directions and scale of change and used to assess the potential risks to life, biodiversity and economic interests.

The global warming trend is clearly reflected in Australia, whereby 2005 was the warmest year on record for Australia (refer to figure 3). The annual mean temperature was 1.09°C above the 1961-1990 average, and the average daily maximum temperature was 1.21°C above average, making for exceptionally warm daytime conditions[2].

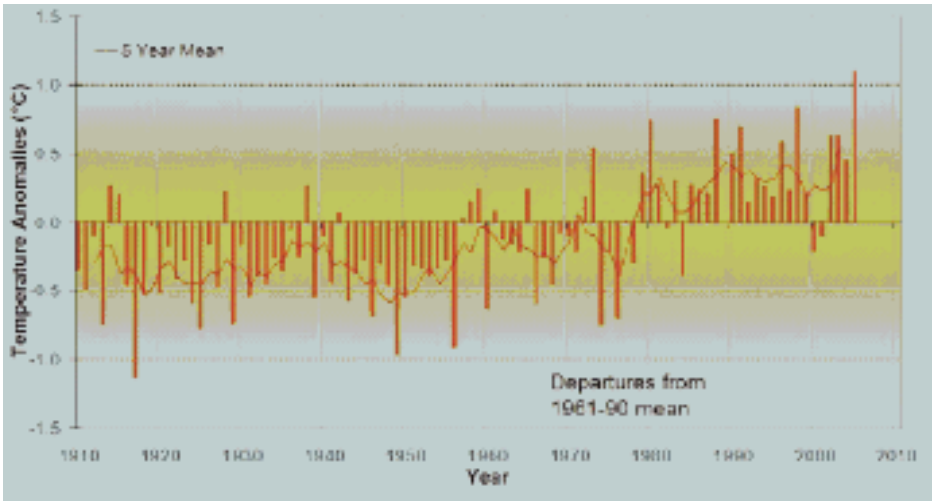


Figure 3: Australian mean temperature anomalies for Australia (Source: Steffen (2006) Stronger Evidence but New Challenges: Climate Change Science 2001-2005)

International & National Perspective

Kyoto Protocol

In 1993 the United Nations developed the Framework Convention on Climate Change (UNFCCC). In March of 1994 Australia ratified the convention and is now bound to comply with its obligations. The ultimate objective of the convention was to *"achieve stabilisation of greenhouse concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system"*. Such a level should be achieved within a time frame sufficient:

- to allow ecosystems to adopt natural defences to climate change.
- to ensure that food production is not threatened.
- to enable economic development to proceed in a sustainable manner.

The Kyoto Protocol to the Convention came into force on 16 February 2005, and sets legally binding targets for ratifying industrialised countries to reduce emissions over the period 2008-2012.

Australia agreed to the Kyoto Protocol, and is committed to adhere to its internationally agreed target of no more than an 8% increase in greenhouse gas emissions from 1990 to the period of 2008-2012. However, like the United States, Croatia and Monaco, Australia has not ratified the Protocol. The Australian Government believes the Protocol does not provide a comprehensive or environmentally effective long-term response to climate change.

The latest national forecasts show that Australia that contributes only 1.4% to world emissions is on track to meeting the Kyoto target, largely due to a significant reduction in rates of land clearing since the 1990 base year. Ratifying countries, including the European Union (EU), are implementing individual policies to meet their own emission reduction targets. For example in 2005, the EU introduced an international emissions trading scheme that is eligible only to ratifying countries.

Contraction and Convergence

The Global Commons Institute in the UK has devised an alternative proposal to Kyoto for allocating quotas called "Contraction and Convergence" (C&C), in which each person in the world is entitled to emit an equal amount of greenhouse gases. The features of this flexible framework are:

- Total global emissions gradually contracts towards a stable and safe level.
- Each country's allocation of this resulting global budget gradually converges towards equal per capita levels by a fixed date (for example 2050) [3].

As some nations will find it harder to achieve than others, C&C allows for trading emission permits. Increases in national budgets in response to rising populations would not be permitted after an agreed set date. This solution may be a more welcomed approach than the Kyoto Protocol which is seen by various countries as unworkable and unfair because:

- Allocated emission targets are perceived as unachievable within the allotted time.
- Allocating reductions proportional to previous emissions levels gives a higher quota to high emitting countries.
- Developing countries are excluded even though they increasingly contribute to a global problem.

Asia-Pacific Partnership on Clean Development and Climate

In July 2005, Australia and five other nations – United States, South Korea, Japan, India and China – formed the Asia-Pacific Partnership on Clean Development and Climate (AP6) to address the challenges of climate change, energy security and air pollution in a way that promotes economic development. While Australia contributes only 1.4% to world emissions, collectively the group

One of Council's hybrid vehicles

represents around half of the world's greenhouse emissions, population and energy consumption.

The AP6 partnership is consistent with the efforts under the UNFCCC, however, unlike the Kyoto Protocol, the agreement does not set specific, legally binding targets for reducing emissions. According to the vision statement the countries will work together to:

- Develop, deploy and transfer existing and emerging clean technology.
- Meet increased energy needs and explore ways to reduce the greenhouse intensity of economies.
- Build human and institutional capacity to strengthen cooperative efforts.
- Seek ways to engage the private sector.

AP6 differs from the Kyoto Protocol in that it is voluntary and it relies on private sector action with the incentive of government grants that support the development & demonstration of emerging technologies. The Kyoto Protocol sets legally binding targets limited to the 2012 timeframe and has a market based approach (such as emissions trading) that supports the deployment of existing technologies[4].

NSW Greenhouse Plan

The NSW Greenhouse Office was established to promote and facilitate strategic greenhouse action to combat climate change and secure long-term economic, social and environmental benefits for NSW. A NSW Greenhouse Plan was developed with the objectives of increasing awareness of the impacts of climate change, developing adaptation strategies for those impacts that cannot be avoided, and providing the impetus for emission reduction activities. In June 2005, NSW committed to the long term reduction targets of:

- 60% cut in greenhouse emissions by 2050.
- Return to 2000 emission levels by 2025[5].

Some of the major programs that NSW has initiated include:

- NSW Greenhouse Gas Abatement Scheme (a local market for emissions reductions and greenhouse credits).

Solar collectors at Hornsby Aquatic Centre

- Building Sustainability Index (BASIX) (new & renovated dwellings to achieve greenhouse emissions and water savings).
- Green Power (accreditation for green electricity products).
- Carbon Legislation (trading of carbon credits due to carbon sequestration by forests).
- Australian Building Greenhouse Rating Scheme (allows benchmarking of the greenhouse rating of commercial buildings).
- Energy Savings Fund (providing large businesses and councils funding opportunities to implement energy efficient measures.

Under the Energy Savings Fund scheme, larger businesses and local governments (including Hornsby Shire) are required to develop Energy Savings Plans. The Fund will provide a contestable pool of grant money over five years to assist with the implementation of the energy saving measures within the Plans.

Greenhouse Gas Emission Trends

International, national and local CO_2 equivalent emission inventory figures (in million tonnes, $MtCO_2$-e) in the table below generally show an increase since 1990 levels. As in the case for Hornsby Shire, this can be attributed to increases in population, assets and standards of living.

Source	Greenhouse Gas Emissions ($MtCO_2$-e)					
	1990	1995	2001	2002	2003	2005
World[a]	21,563	22,036	23,899	24,102	25,162	-
Australia[b]	544	502	551	558	550	-
NSW[c]	156	147	-	151	-	-
Hornsby (corporate)[d]	-	0.0101	0.011	-	-	0.013
Hornsby (community)[d]	-	1.7	-	-	-	1.9[e]

Table 1: International, national and local CO_2 equivalent emission inventory figures. (Sources: a. Infoplease (www.Infoplease.com). b. Australian Greenhouse Emissions Information system (AGEIS) (www.ageis.greenhouse.gov.au). c. NSW Greenhouse Office (www.greenhouseinfo.nsw.gov.au) d. Council's CCP inventory of emissions due to Council activities (corporate) and due to Community activities (residents, industry and business). e. Due to incomplete data, calculated value based on population increase of 13.5% from 1995-96 levels.

Australia's total emissions estimate is 550 million tCO_2-e[6], which makes it about the fifteenth largest emitter of greenhouse gases globally. Australia is the highest emitter per capita (approximately 28 tonnes per capita) in the world.

Australia's high emissions per capita figure is due to:

- Great abundance of cheap fossil fuels.
- High dependence (91%) on coal-fired power generation.
- High carbon intensity of our exports (such as aluminium, steel, coal and meat).
- Long distances between cities.
- High standard of living.

The significant greenhouse gas emissions that are embodied in export products are, under the Kyoto accounting system, attributed to the country of production, not consumption. The sectors using the most energy are manufacturing (42%), residential (23%), commercial (18%) and mining (14%).

Energy is the largest and one of the fastest growing emission-generating sectors and by 2010 Australia's energy-related emissions are projected to be 41% higher than 1990 levels.

Between 1990 and 2002, NSW's emissions due to energy use grew by 25% and accounted for around 47% of its total. NSW has 34% of Australia's population of 20.2 million and is responsible for just over a quarter of Australia's emissions. This reflects the lower emission-intensity of NSW industry compared to other Australian states5. However, NSW's emissions per capita are 23 tonnes per person compared to an average of 13 tonnes for industrialised nations. Hornsby Shire's emissions per capita are 12 tonnes, a low figure due to the relatively few high energy industries in the area.

Construction of Cogeneration System at Hornsby Central Library

Cities for Climate Protection Program

Cities for Climate Protection (CCP™) is an international program of ICLEI – Local Governments for Sustainability that is funded nationally by the Australian Greenhouse Office (AGO) with an aim of empowering local governments to cut greenhouse gas emissions. It provides local governments with a structured program with the following five milestones:

1. Analyse the key sources of greenhouse emissions in your council and community, and forecast future emissions growth.
2. Set an emissions reduction goal.
3. Develop and adopt a local greenhouse action plan to achieve those reductions.
4. Implement a local greenhouse action plan.
5. Monitor and report on greenhouse gas emissions and implementation of actions and measures.

Council joined the CCP™ program in 1999 in recognition of its responsibility in the worldwide campaign to curb the greenhouse effect and global warming. It has been recognised for its efforts to cut greenhouse gases under the CCP™ program with its *Greenhouse Gas Reduction Strategy* (2000). Council was the first of the participating councils in NSW to complete a strategy and was one of the first ten councils in Australia to start implementing it in 2000. Council was also one of the first councils in Australia to complete the CCP™ program in June 2002 and join CCP™ Plus as a leading member.

Council's Vision for Sustainability

Council's Management Plan has a strategic intent of "creating a living environment". This strategic intent is achieved through a Triple Bottom Line (TBL) framework that is aligned to six strategic themes, one of which is "Conserving our natural environment", which is measured by performance indicators, one of which relates to the tonnage of CO_2-e reduction achieved by Council.

The primary focus of Council's greenhouse gas reduction program is to reduce its greenhouse gas emissions in innovative ways that not only highlight the environmental benefits of energy efficiency but also the economic and social benefits that are achieved through education, research and policy direction.

Greenhouse Reduction Targets

In 2000 after extensive community consultation through Council's Local Agenda 21 Committee, Council adopted the following greenhouse gas reduction targets (based on 1995 /1996 emission levels) to be achieved by 2010 as part of Council's *Greenhouse Gas Reduction Strategy:*

Sector	Reduction Target 2010	Emission Reduction Target (tCO_2-e)	Actual Achieved Reduction (tCO_2-e)*
Corporate (Council Assets)	20%	2,020	2,344 (23%)
Community (Residential & Business Sectors)	20%	333,966	11,290 (1%)

Table 2: Council's greenhouse gas reduction targets for 2010 adopted in 2000
Note: The targets do not account for increases in population and assets
** Figures are for financial year 2004/2005*

Hornsby's Greenhouse Emissions & Energy Consumption 2000-2005

Council carried out inventories of greenhouse gas emissions of the Shire for the financial year 1995-1996 as part of CCP™ Milestone 1. An inventory was also carried out for corporate emissions only for Council activities in 2000-2001 as part of CCP™ Milestone 5. In order to verify Council's performance at the half-way mark in respect to the 2010 target an additional inventory was undertaken for 2004-2005.

Emissions reduction attributed to carbon sinks, such as tree planting, are not incorporated as they are not included in the CCP™ inventory procedure.

Corporate

In 1995-1996, greenhouse gas emission resulting from the activities of Council totalled 10,101 tCO_2-e. The inventory predicted emissions would likely increase by 25% for the period 1996 to 2010, in a business-as-usual scenario, based on the trends. In actual fact, re-inventories revealed a 10% increase in 2000-2001 to 11,108 tCO_2-e and a 33% increase in 2004-2005 to 13,313 tCO_2-e on 1995/96 figures.

Emission Source	Emissions (tCO_2-e)		
	'95-'96	'00-'01	'04-'05
Buildings	3,307	3,335	5,717
Vehicle Fleet	1,863	2,283	2,443
Street Lighting	4,894	5,488	5,151
Waste	36	1	1
Other	1	1	1
Total	10,101	11,108	13,313
Total emissions if no actions taken	-	12,803	15,657

Table 3: Council's corporate greenhouse gas emissions

The emissions due to street lighting peaked in 2000-2001 due to an increasing number of lamps and EnergyAustralia's replacement policy using higher energy technology. This was substantially reversed by Council's decision to purchase 10% green power. The emissions due to waste decreased due to diligent recycling of green waste and other materials. The greatest increases in greenhouse gas emissions are due to Council's buildings and the vehicle fleet. The key reasons for these divergences are basically due to the increased number of the assets (construction of a child care centre and indoor sports facility) and higher staff numbers.

If no reduction measures had been implemented (business as usual), then the total emissions for 2000-2001 would have been 12,803 tCO_2-e (27% greater than the base year) and 15,657 tCO_2-e for 2005-2006 (55% greater than the base year).

Community

In 1995-1996 greenhouse emissions resulting from the residential and business sectors of the community within the Shire totalled 1,669,831 tCO^2-e. Using population growth as a forecasting tool, the inventory work predicted a business as usual increase of 21% between the years 1996 and 2010.

	1995/96 Emissions (tCO_2-e)	2004/05 Emissions (tCO_2-e)
Residential	307,533 [a]	822,627 [a]
Business	284,821[a]	410,220 [a]
Transport	230,000 [b]	245,000 [b]
Waste	21,217	23,007
Total	843,571	1,500,854

Table 4: Hornsby Shire community greenhouse gas emissions
Note: [a] – electricity only, [b] – due to residents only. (Slow growth of transport emissions partially due to improvements in fuel efficiencies of vehicles)

What is of concern in Table 4 is that for the residential sector energy consumption has increased by approximately 250% in the past 10 years. This is attributed to the new subdivisions that were released in the late 1990's around Cherrybrook and Castle Hill, along with the construction of numerous multi unit dwellings through Hornsby CBD that are considered the largest consumers of energy in the residential sector in NSW.

Energy efficient office lighting and controls

Greenhouse Reduction Actions 2000-2005

Community tree planting

Solar panels on the Hornsby Community Nursery

Overall Emissions Reduction

As part of the CCP™ program's regular measures reporting procedure the following sources of emissions reduction have been identified up until 2004/5:

Reduction measures by Council	Annual Emission Reduction (tCO_2-e)
Community	
Residential waste recycling	11,272
Residential education program	11
Business education program	7
Total	11,290 (1%)
Corporate	
Energy Performance Contract (EPC)	307
10% Green Power – streetlights	572
10% Green Power – buildings	337
Energy efficient office equipment	333
Office paper recycling	75
Cogeneration system	28
Fleet management initiatives	27
External renewable energy & energy efficient lighting	5
Green waste recycling (mulching)	660
Total	2,344 (23%)

Table 5: Council's greenhouse gas emissions reduction for 2004-2005

Initially Council focussed its efforts on reducing the emissions due to its own activities to set an example to its community. Council could not direct its community members to reduce their emissions without attempting to do it first and prove that it is possible. In doing so, Council has gained much valuable knowledge and experience that can now be passed on to its residents and the Shire's businesses.

Recognition and Awards

In recognition of achievements in its greenhouse program, Council has received the following awards and acknowledgements since 2002:

- United Nations Association of World Environment Day Awards (2005), Finalist Local Government Awards Category Best Specific Environmental Initiative – 'Hornsby Earthwise – Sustainable Energy Management'.
- ICLEI Cities for Climate Protection Recognition – CCP™ Plus (2003 & 2005).
- DEUS Green Globe Awards (2004) – Winner Work Energy Smart Champion – Government.
- Excellence in the Environment Awards (2004), Division C Winner and Overall Category Winner – Energy Efficiency / Greenhouse Award: 'Hornsby Earthwise – Sustainable Energy Management'.
- Excellence in the Environment Awards (2003), Highly Commended Division – Energy Efficiency / Greenhouse Award, 'Cogeneration Project at Hornsby Library'.
- ICLEI Cities for Climate Protection Recognition (2002) – CCP™ Milestone 5.

These awards have increased Council's credibility in the sustainability field, increasing opportunities for obtaining project partners such as CSIRO and securing external funds for future projects.

Performance & Evaluation

Data management is key to Council effectively managing greenhouse emissions as it allows monitoring of progress toward reduction goals and identifies areas that Council needs to focus on. Council receives monitoring and verification reports from its EPC contractor who analyses energy and water savings at the 150 sites covered by the EPC. Energy and water use is analysed using regression analysis tools, normalising for variables such as weather, so that an accurate account of project savings are generated.

Council has also engaged an external agent to collect data from all utility bills and compile quarterly reports and benchmark information. In order to streamline this and obtain better data, Council is investigating installing sub-meters at large energy sites to allow downloading of energy, water, and gas data at any time. Within two years, Council anticipates developing more collaborative relationships with energy and water suppliers with the intent of facilitating improved data management.

Revolving Energy Fund

Council has been able to achieve the requirements of the CCP™ programs and achieve considerable reduction so far through its commitment of resources. In 2000/2001, Council committed surplus funds of $450,000 to energy efficient projects and, in 1999 carried a resolution to establish a Revolving Energy Fund (REF). Council's REF is a mechanism of reinvesting any available short-term energy cost savings into additional greenhouse gas saving projects. It was created in 1999 with the following guidelines:

- Funds should not be used for 'business as usual' activities.
- Eligibility is restricted to energy efficiency, renewable energy and other greenhouse gas reduction projects.
- Funds should only be allocated to sustainable projects, i.e. those that themselves generate savings in the future.
- Funds should only be made available for projects that would not be able to be implemented without the aid of this reserve.

This REF is still funding Council's greenhouse reduction measures and is supplemented by state and federal government grants and internal loans from within Council.

Corporate Emission Reduction Measures

The innovative programs that contribute to Council's strategic intent to reduce 20% of its greenhouse gases by 2010 were delivered at a cost of over $1.5 million between 2001 and 2004. By 2004/2005 Council reduced its greenhouse gas emissions by approximately 23% (2,344 tCO_2-e) through the implementation of the measures outlined below.

Council Assets

Energy Performance Contract Stage 1

An Energy Performance Contract (EPC) is a convenient and streamlined way of implementing and financing renewable energy and energy efficiency upgrades whereby future energy savings pay for the cost of upgrades. A key feature of an EPC is that it delivers guaranteed savings. When the equipment or facilities are replaced or upgraded to more energy efficient or renewable energy technologies under an EPC, the contractor guarantees the energy savings for the term of the contract. If they fall short, the contractor makes up the difference. However, the contractors have a financial incentive to make sure savings are achieved throughout the contract term.

To launch its Greenhouse Gas Reduction Strategy, Council began implementing Australia's most comprehensive local government energy performance contract at a time when the EPC industry was in its infancy. The contract was developed in conjunction with Energy Conservation Systems Pty Ltd and the Australian Energy Performance Contracting Association. The EPC was funded by an internal loan of $1.3 million. It included approximately 250 Council maintained building and park sites, including the Council Chambers, aquatic centres, community centres, libraries, administration buildings and major sporting fields.

The main aims of the project were achieving guaranteed reductions in energy use and operating costs, and, most importantly, reductions in greenhouse gas emissions and improvements in internal management processes to ensure reductions are sustained over the long-term.

Cogeneration System (TrigenAir)

Guaranteed outcomes of the EPC since its implementation in 2002 are as follows:

- Energy savings: 4,572,555 MJ per annum.
- CO_2 savings: 307 tCO_2-e per annum.
- Water savings: 27,957 kL per annum.
- Internal rate of return: 15.1%.
- Simple pay back period: 7 years.
- Cost savings: $136,685 per annum.

The EPC involved a variety of energy and water conservation measures including:

- Modifying air conditioning systems for optimum performance.
- Upgrading light fixtures to more efficient luminaries.
- Lighting controls to manage the lighting.
- Power factor correction equipment to reduce demand charges.
- Photovoltaic systems for renewable energy generation.
- Solar and high efficiency gas boiler systems for efficient water heating at aquatic centres.
- Water saving systems for building and parks.
- Rain water collection and storage to reduce consumption of pumped water for park irrigation.

Social benefits including improvements in occupational health and safety due to improvements in comfort levels and meeting of Australian Standards in lighting and air conditioning were also achieved.

Cogeneration System (TrigenAir)

In partnership with CSIRO and the Australian Greenhouse Office, Council researched and installed an Australian first cogeneration system called TrigenAir in Hornsby Central Library. This project demonstrates that innovative and environmentally friendly approaches can be employed for the purpose of efficient power generation and air conditioning.

Cogeneration refers to the simultaneous production of electricity and heat. The library system takes advantage of this process and of distributed generation, which is the practice of generating electricity near where it is needed so that the by-product heat from the process can be used and not wasted. Waste heat from this process has been employed to provide cooling and heating, and this approach will, over time, reduce Council's electricity usage and the generation of greenhouse gases.

The TrigenAir system was commissioned in early 2004 through funding from the AGO's Emissions Reduction Incentive Program, with a contribution from CSIRO and Council's Revolving Energy Fund (REF). The TrigenAir system is calculated to save 270MWh/yr of electricity and 400MWH/yr of heating and cooling (CO_2 savings: 250 tCO_2-e) per annum.

The TrigenAir system consists of two major components – a microturbine, and a drying unit called a desiccant dehumidifier (refer to figure 4). The microturbine is powered by natural gas, and generates 60kW of power used mainly to provide electricity to the library. Any excess electricity can be transferred back to the main electricity supply grid.

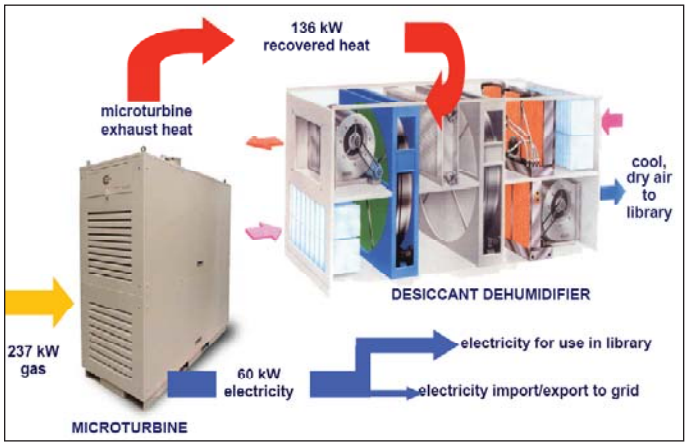


Figure 4: Layout of the TrigenAir cogeneration system

The operation of the microturbine produces 136 kW of excess or 'waste' heat. This excess heat is used in the desiccant dehumidifier to dry the fresh air entering the library's air-conditioning system. The air is then indirectly cooled through a rotary heat exchanger using the library exhaust air that has been evaporative cooled. Depending on the required humidity, the cool, dry air is then further cooled with either a direct evaporative cooling stage, or with the existing conventional air-conditioning plant, before being delivered through the ventilation system into the library. Removing the moisture from the incoming air and exchanging energy with the exhaust air reduces the energy required for cooling the library.

The heating of the library in winter follows the same process as cooling; except the exhaust from the microturbine is used to indirectly heat the incoming air through the rotary heat exchanger.

Purchase of Green Power

Green Power is a form of electricity that can be purchased from the electricity supplier that is produced from renewable energy sources and therefore incurs no CO_2 emissions. The purchase of Green Power is the most expedient and simplest way of reducing greenhouse gas emissions. Cost savings in energy bills due to the implementation of energy efficiency measures or achieved through contract negotiation funds this activity. Council purchases 10% of its electricity supply for twelve buildings and parks, including the top ten major energy using sites, in the form of Green Power.

Energy Efficient Office Equipment and Paper Recycling

To date Council has replaced old computers and monitors with more efficient models and Energystar-enabled monitors and has purchased energy efficient printers and other office equipment to save approximately 333 tCO_2-e annually. Council collects and recycles its discarded office paper to save 75 tCO_2-e per annum.

Sustainable Energy Management Policy for New Council Buildings

The major threat to the achievement of the emmission reduction target is the growth in the number and size of new Council facilities. Additional greenhouse gas emissions due to new facilities need to be addressed if Council is to maintain its greenhouse gas reduction target.

In a study carried out in 2004 of the predicted emissions from proposed additional facilities built by 2010 based on the capital works outlined in the Council's Management Plan and the Section 94 Contributions Plan it was determined that Council would need to abate a further 2,572 tCO_2-e p.a. in addition to the 199 tonnes p.a. required for its existing assets by 2010.

In order to achieve the reduction target in corporate greenhouse gas emissions by 2010, at least 30% reduction is required for all new assets. This equates to a 4-5% increase in capital costs for new assets with a Net Present Value (NPV) of around $200,000 over 15 years and in excess of $400,000 over the life of the assets.

In order to facilitate this approach a Sustainable Energy Policy for New Council Assets has been adopted, covering all new Council buildings and retrofit projects within existing buildings regardless of value. The Policy has been developed to integrate sustainable energy management principles into the planning, design and construction processes of all new Council assets that consume electricity and / or gas regardless of value, including:

- New office buildings and refurbishments.
- New assets other than office buildings (e.g. aquatic centres, parks, libraries, child care centres etc).
- New plant and equipment (e.g. air conditioning, outdoor lighting etc).

The Policy provides a flexible framework within standard financial criteria for the inclusion of sustainable energy management principles into the building design and construction process of all new assets. The aim is to create buildings that minimise energy consumption, promote renewable energy alternatives, lower running costs and improve amenity. The main aspects of the Policy are:

- All new projects shall have an annual greenhouse gas emission reduction of at least 30% of total emissions.

Solar collectors at Hornsby Aquatic Centre

- Designers may use any methods to achieve this reduction in emissions.
- Projects that yield a 15 year Internal Rate of Return (IRR) greater than 12% will be approved automatically (an IRR of 12% is the accepted benchmark for energy conservation measures and was used for Council's energy performance contract).

For any new proposal, approval is conditional on the plans passing an Energy Efficiency Design Review carried out by an independent design reviewer and/or emission reduction verifiers.

Another approach to maintain the set reduction target is to offset the new emissions by considering alternate sustainable energy management opportunities. Greenhouse gas neutrality is feasible for new assets and would equate to an additional increase in capital costs in the order of 5 to 10% and pay for itself in 15 years. Given that the life of an asset is generally 30 years this would equate to overall savings in excess of $140,000. To progress this, further investigations on other sustainable energy management opportunities would be required, particularly in respect to sequestration (tree plantations), and wind generation.

Public Lighting

Purchase of Green Power

Street lighting is responsible for approximately 50% of the Shire's corporate emissions and totals approximately 5,500 tCO_2-e per annum. Council is now purchasing 10% Green Power for all of the Shire's street lighting.

Street Lighting Improvement Program

There are approximately 10,780 public lights within the Shire that costs approximately $1,720,000 per annum (2004/05) in energy and maintenance costs. Public lighting electricity consumption has grown by 45% over the past 14 years in Australia, and is expected to grow by 1.5-2% per annum.

High pressure sodium (HPS) lanterns and mercury vapour (MV) are the most common technologies used for major roads. On minor roads, the 80W MV lamp has become the standard lamp because it has been assessed as meeting Australian Standards, is relatively inexpensive and reliable, with a service life of four years. However, the problems with 80W MVs are that they:

- Have a typical low light output per unit of power consumption (efficacy of less than 40 lumens/watt compared with up to 100 lumens/watt for high efficiency fluorescent), which decreases as the lamps age.
- Contain a large amount of mercury, which is a cumulative, heavy metal toxin.

It is possible to improve lighting quality while reducing energy use and greenhouse gas emissions and lowering costs by switching to some of the alternative technologies emerging for minor roads, namely:

- Long life T5 fluorescent lamps.
- Compact fluorescent lamps.

Council carried out an extensive audit of its streetlamps in 2001 with the intent of improving the energy efficiency of the lanterns however EnergyAustralia was unwilling to partner with Council to carry out a lamp replacement project. Subsequently, Council joined the Southern Sydney Regional Organisation of Councils' (SSROC) Street Lighting Improvement Program, which has been successful in securing a grant from the Department of Energy, Utilities and Sustainability (DEUS) Energy Savings Fund to replace high energy consuming street lamps with more energy efficient ones.

It is proposed that Council will receive over 2000 replacement lamps. Some of these will replace the inefficient mercury vapour lights on main roads before the end of their design lives over the next four years, and the rest will replace MV lights on residential roads with high efficiency electronically ballasted fluorescent lights over the next year. This will result in a greenhouse savings of at least 530 tCO_2-e per annum.

Solar street lights at Brickpitt Park, Thornleigh

Energy Efficient and Solar External Lighting (Non-EPC)
Energy efficient public lighting has been installed in McKell Park, Brooklyn. The light emitting diodes (DIO lights) reduce energy consumption and greenhouse gas emissions by up to 80% (5.5 tCO_2-e /year) compared to normal public lighting lamps. Light spillage and therefore light pollution is also reduced.

Solar street lighting is expensive; however it is economically justified if lighting is required in a remote area or park that would otherwise incur a high cost to connect the facility to the power grid. The solar light at Rofe Park, Hornsby Heights saves approximately 1 tCO_2-e p.a.

Fleet Management & Public Transport

Fuel Substitution
Substituting petrol with liquid petroleum gas (LPG) potentially reduces greenhouse gas emissions by 13-15%. Council has trialled a dedicated LPG sedan and a dual fuel (petrol, LPG) converted sedan. The emissions reduction for this measure was 4 tCO_2-e. Council did not proceed with this initiative due to ongoing engine problems and the inconvenience of reduced boot space which was considered a barrier to staff uptake.

Hybrid petrol/electric vehicles reduce the amount of petrol used by capturing the kinetic energy during braking through the use of a regenerative braking system and storing it in a battery. As a result they reduce the emission of pollutants and greenhouse gases by up to 50%. Council purchased two hybrid vehicles and the emissions reduction has been estimated as approximately 0.5 tCO_2-e per annum.

Vehicle Downsizing
Substituting larger (6 cylinder) vehicles for smaller (4 cylinder), more fuel-efficient vehicles is an effective method of reducing greenhouse gas emissions. For instance, a six cylinder sedan produces 5.19 tCO_2-e per year compared to a four cylinder sedan that produces 4.29 tCO_2-e per year operating in the same conditions. Council is encouraging staff to choose smaller cars (1.8 litre rather than 3.8 litre) to reduce vehicle emissions by up to 45%. Several have been purchased to date with an estimated emissions reduction of 27 tCO_2-e per annum.

Walk to Work Days
Walk to Work Days are yearly events sponsored by the Pedestrian Council of Australia to encourage people to leave their cars at home. Council staff were encouraged to walk, car pool, take public transport or bicycle to work and participants were provided with breakfast or morning tea. This event was run in 2001, 2002 and 2006. The event averages 0.26 tCO_2-e saved on the day.

Community tree plantings

Travel Demand Management
Council was one of the first councils in Australia to complete all milestones of the CCP™ program and to join CCP™ Plus. Councils that commit to CCP™ Plus are eligible to participate in any number of CCP™ Plus elements. The first element in the Community Sector Initiatives is designed to assist councils to achieve greater emissions reduction in the community sector. This sits under transport and was made possible due to funding provided by the Australian Greenhouse Office's Travel Demand Management Program. Council provided details of its Integrated Land Use and Transport Strategy to fulfil its obligations under this program.

Concerned by an historical increase in motor vehicle traffic, Council developed an Integrated Land Use and Transport Strategy (ILUTS) with the objective of promoting other sustainable modes of transport. The Strategy has to deal with several issues, including:

- High car ownership in some areas of the Shire.
- A perception that trips cannot be made by any other means than the car.
- Lack of awareness of existing public transport options and other travel alternatives.
- Lack of travel demand management measures designed to encourage the use of alternative transport modes.

Existing sustainable transport activities currently being implemented within Council operations include:

- Town centre areas with easy access to essential facilities and services, such as shops, health, education and employment.
- Urban places that encourage community interaction through neighbourhood events, increased walking and cycling, and increased safety from traffic and crime.

Cycling map, an initiative of the Sustainable Action Committee

- Car parking management.
- A Cycling Map that forms the basis for a cycling network within the Shire.

Green Procurement

CCP™ Plus Greenhouse Purchasing Project

The aim of the Greenhouse Purchasing Project is to provide systems and tools for councils to accelerate greenhouse gas reduction and progression towards their CCP™ reduction goals through the strategic purchasing of greenhouse preferable goods and services (such as energy efficient equipment, green electricians/plumbers). The five-milestone framework assists local governments to identify gaps, set goals, plan priority actions, implement and review their action plans. Council is currently participating in a pilot with a regional group of leading CCP™ Plus councils in NSW and New Zealand to deliver this capacity building process.

Organisational Management

Energy Management Review

Sustainable energy management in many organisations is hampered or totally prevented by existing policies and procedures that have developed over time without consideration of energy matters. In 2003 an Energy Management Review of Council was conducted and highlighted where some of the more significant barriers existed and identified ways to overcome them. A gap analysis process was used to reveal significant differences between the way in which Council currently managed a number of issues, and the way that it believed it should be managing them. From this process a plan of action was developed that focussed on:

- Improving performance measurement (i.e. the verification of progress against reduction targets which necessitates timely, accurate and readily accessed data for community and corporate emission sources).
- Providing a clear and concise internal energy policy as an empowering tool for managers to implement change (the Sustainable Energy Management Policy for New Council Buildings was developed as a result).
- Developing a commercial and industrial energy policy (i.e. estimating probable future emission levels of these sectors and, if substantial, setting targets and mandatory requirements).

CCP™ Plus Renewables Alliance

With Hornsby Shire Council as the lead council, the Renewables Alliance consisted of representatives from City of Melville, Gold Coast City Council, Adelaide City Council, Frankston City Council and Moreland City Council.

Together with ICLEI the Alliance designed the web-based CCP™ Renewable Energy Resource to assist CCP™ councils to deliver greenhouse reduction through renewable energy. The format of the resource is based on a "Frequently Asked Questions" (FAQ) approach. This approach is an effective method to assist councils dealing with the challenges of researching, project managing and delivering a renewable energy project.

CCP™ Plus Organisational Management Review

The Organisational Management Review and subsequent report is designed for use as a management tool that enables Council staff to identify the elements of Council's CCP™ program that are being implemented effectively while also detailing elements, in the form of key recommendations by ICLEI that require further improvement. Each of these elements aim to inform planning, decision making and reporting directions that Council can implement to reinforce current practices or establish new practices with the aim to add significant value to the organisation and its CCP™ program.

Following this review, Council completed a work plan that has been incorporated within the Action Plan of this Strategy.

Green Waste Recycling

The green waste collected during Council garden and street maintenance activities is collected and mulched and reused to save approximately 660 tCO_2-e annually.

Green waste, recycling and garbage bins of Hornsby Shire

Community Reduction Measures

Operation Greenhouse Education Action Plan was developed in 2002 as an accompaniment to Council's Greenhouse Reduction Strategy outlining approaches to educate the community and Council staff regarding greenhouse friendly practices for the home, work and office.

This action plan, has since been replaced by the Environment Division Education Strategy 2005-2009, it addresses environmental issues relevant to the Shire and engages community groups, industry and business associations, council staff and councillors, government departments and schools.

Residential Sector

Waste Diversion

Council has improved its curb side waste collection to include bins for commingled recyclable wastes, such as plastic, glass bottles and paper waste, as well as green waste (garden clippings). Over 50% of the community's waste is being diverted away from landfill and therefore reducing methane emissions.

Hornsby Earth*wise* Day

The Sustainable Action Committee (formerly Local Agenda 21 Committee) organised an Earth*wise* Day for the community in September 2002 held at the Hornsby Earth*wise* Cottage, Pennant Hills. The Day demonstrated resource conservation practices, including reuse, composting, energy efficient technology, solar design of homes and water friendly gardening. Since then, rainwater tanks have been installed at the site.

Solar Day

Council participated in Solar Month, which was initiated by the Sustainable Energy Development Authority (SEDA) to highlight the benefits of solar power, by holding a Solar Day event in May 2003 at Hornsby Park, Hornsby. Displays of solar technology were demonstrated, Hornsby Aquatic Centre's solar water heating for the pools was showcased and lectures were presented explaining ways to implement solar technology in the home.

Hornsby Shire Council Earth*wise* at home solar visit and workshop 2006

CCP™ Plus Residential home and garden improvement workshop

CCP™ Plus Residential Pilot – Home and Garden Improvement Workshop

A pilot, half day workshop for residents, designed to provide information tailored to participants needs was held in April 2005. The event attracted 78 households, and local and state partners for delivery. As well as specific information on heating and cooling, energy and water management and grey water systems, participants received a free retrofit kit. ICLEI suggest savings of 1058 tonnes of carbon dioxide emissions a year from the project. The evaluation of this workshop led to the establishment of a year long residential workshop series.

Earth*wise* @ Home Program

Earth*wise* @ Home was a twelve-month, workshop-style program which trialled information delivery methods suited to interest- and place-based approaches. It was designed using the principles of learning for sustainability in the context of the United Nations Decade for Education for Sustainable Development. The series, which covers multiple aspects of sustainable living, is to be extended across the Shire in the coming years.

CCP™ Plus Regional Schools Energy Pilot Program

Council worked in partnership with three Northern Sydney councils and eight schools to develop a project model for school energy

retrofits. Undertaking detailed energy audits for each school along with provision of in-school education the pilot project weaved together infrastructure changes and learning for sustainability. Behavioural changes alone in schools are anticipated to reduce demand by between 5-10%. The energy audits will assist schools with applying for funding to undertake building and equipment upgrades and the project has highlighted opportunities for integrating learning for staff and students into the day to day operations of the school.

Energy Efficient Housing Policy

Council's existing Code for Energy Efficient Housing (adopted in February 1998) was replaced by the SEDA-informed EnergySmart Homes Policy. This has now been superseded by BASIX, which is a NSW Government initiative to ensure all new residential housing conform to environmentally sustainable design principles.

Each development application for a residential dwelling must be submitted with a BASIX Certificate. A Certificate is issued once a BASIX assessment has been satisfactorily completed, using the on-line tool which allows the user to select from a range of options in order to meet the NSW Government's targets of at least a 25% (the target varies with the building type and location) reduction in greenhouse gas emissions, compared with the average home. These targets also apply to new multi-unit residents and from July 2006 to alterations and additions to homes. Over ten years, these conditions are expected to result in savings 9.5 million tonnes of greenhouse emissions in NSW.

Business Sector

Sustainable Business Program

For the past eight years Council has been running a successful Sustainable Business Program to generate environmental awareness within the business community as well as encouraging businesses to take action to improve their environmental performance, increase production efficiencies and reduce consumption. An integral part of this Program is an environmental review with an energy conservation component. The energy conservation component identifies if businesses maintain an energy management/conservation program for the facility that:

- Investigates usage of energy.
- Determines and implements opportunities to conserve energy.
- Monitors the performance of the program.

CSIRO installing the cogeneration system at Hornsby Central Library

Investigations into energy conservation found during the environmental reviews often included:

- Conventional and alternative energy sources.
- Lighting management.
- More efficient electric motors and equipment.
- Alternate transport fuels.
- Upgrading heating, air conditioning and ventilation equipment.
- Compressed air management.
- Heat recovery.
- Upgrading of boilers.
- Upgrading furnaces, kilns and ovens.
- Steam utilisation.
- Management of fuel storage systems.

To date over 1000 businesses have been reviewed with 45% of participants identified as having investigated or implemented energy conservation measures. Council is currently looking to expand the Program in the future to include full energy audits and the establishment of sustainable energy partnerships.

CCP™ Plus Industry Pilot

This pilot aimed to reduce energy use by local businesses using a tested energy audit methodology developed by an energy conservation consultancy. Four large businesses in the Thornleigh Industrial area participated in the pilot, each implementing energy conservation measures contributing to the overall reduction of 73.3 tCO_2-e per annum. It is envisaged that it will now form part of the existing Sustainable Business Program being delivered.

Greenhouse Reduction Actions 2006-2010

Revised Emission Targets

Due to the fact that most greenhouse gases linger in the atmosphere for many decades and their cumulative effect increases, many scientists believe that countries need to commit to drastic cuts in greenhouse emissions to have a significant effect in reducing climate change impacts.

Renowned Australian scientist and part-time resident of Hornsby Shire Tim Flannery believes that we still have got "one to two decades" to address the global warming issue. He also believes that there have already been significant changes to the world's climate raising the temperature of the planet by between 0.6 - 0.7 of a degree. He suggests a 70% reduction is required by 2050, which is achievable on an individual scale by swapping a four-wheel drive with a hybrid electric-petrol car or buying green power for your home[7].

The British government has adopted a national emissions reduction target of 60% by 2050 (and perhaps of 80% by 2100) to achieve convergence[1]. Australia might be expected to do the same. A 60% decrease in Australia's total 1999 emissions by 2050 would correspond to a decrease in per capita emissions from the 1999 level of 27.9 to 11.2 tCO_2-e per annum. This is equal to the UK's current level and very much greater than those of developing countries such as China with 3 tCO_2-e per person, and India below 1. Therefore, requiring Australia to cut its emissions by 60% by 2050 does not seem unreasonable. As noted above it is regarded as achievable using currently available energy efficient and renewable energy technologies[8].

If Council was to adopt the above reduction targets, while keeping on the trend we are currently achieving, Council has the potential to achieve 35% reduction by 2012. Council realises that although these targets are achievable for its own activities, the progress to achieve behavioural changes in the community will be slower and more difficult to maintain and monitor.

Council has only achieved a measurable reduction of 1% for community emissions in four years due to high energy usage and high car dependence. For these reasons the 2010 emissions target has been revised to a more realistic 5%. However, through a more intense suite of education and awareness programs on climate change and an increase in energy costs, steady, albeit slow, changes in energy use patterns, transportation modes and vehicle choice will occur. These behavioural changes which are only just being seen in the last year will be complimented with inevitable improvements in cars and appliances, such as fridges, washers, and computers, which are generally, replaced every five to thirty years[9].

Tim Flannery briefing Council's managers on climate change

Taking these considerations into account, the revised emissions reduction targets and completion dates are as follows:

Sector	Greenhouse Gas Reduction Target		
	2010	2012	2050
Corporate (Council assets)	30%	35%	60%
Community (Residential & Business Sectors)	5%	10%	60%

Table 6: Council's revised greenhouse gas reduction targets

Council intends to meet its revised emission reduction target using a mix of approaches, including energy efficient and renewable energy measures and education and awareness raising, to cover all greenhouse gas contributing sectors within short-, medium- and long-term timeframes. Council will foster partnerships to provide opportunities for co-operative approaches.

The measures must be cost-effective and achieve additional social or environmental benefits wherever possible. As such Council is confident in achieving these revised targets whilst at the same time generating cost savings, particularly through initiatives in street lighting and expanding on its existing Energy Performance Contract, where combined Council will save over $120,000 per annum. Council also believes that it can achieve the stretch targets for 2050 if it continues keeping on the trend we are currently achieving and if new foreshadowed legislative and policy frameworks (as seen in Europe) are introduced allowing greater uptake of renewables and the mandating of strict reduction targets for all major organisations.

The proposed corporate and community actions will be funded by savings made through the introduction of previous technologies as part of Council's Revolving Energy Fund, and through grant funding such as the State Government's Environmental Trust funding, Climate Action Grants and Energy Savings Grants.

Earth*wise @ home community members planning session*

Corporate

Although Council has already achieved its 20% reduction goal, challenges still remain such as:

- Overcoming the threat of increased energy demand from new Council assets.
- Poor performance of existing assets where reduction measures have not yet been implemented.
- Ongoing measurement and verification of 'actual' savings.
- Rising costs and dependence on fuel.

To overcome these challenges Council has adopted its Sustainable Energy Management Policy for new assets. It is also collecting utility data to allow asset managers to monitor energy and water consumption and has appointed independent consultants to annually monitor and verify actual savings. These measures will ensure that the 23% reduction already achieved is not lost over the coming years and that Council continues to be a leader in energy management for local government.

Community

Council faces many challenges to reach its greenhouse gas reduction target for the community, including attitude and behavioural change barriers and the difficulty of monitoring and measuring the effectiveness of community reduction programs. Council's role is to encourage change through awareness-raising and to make behavioural change more accessible and understandable.

The approach taken will be to engage community through the use of information and technical workshops, demonstration days and giveaway packs all underpinned by education. Furthermore, effective data collection with suppliers and state agencies will provide indicators of changes in use (for example green power use).

Proposed corporate and community actions for 2006 to 2010 are listed in the following tables. All of these actions will be coordinated by the Environmental Health & Protection Team and will be funded through the Revolving Energy Fund and external grants.

Corporate Actions 2006-2010	Estimated Annual Reduction (tCO_2-e)	Timeframe
Council Assets		
Implement Stage 2 of Energy Performance Contract across Council's major assets.	239	Short
Investigate the installation of renewable energy measures for Council's Administration Building.	3	Medium
Ongoing implementation of Council's existing Sustainable Energy Policy for all new Council assets.	2,572	Ongoing
Continue to purchase 10% green power for Council assets.	350-500	Medium
Promote in conjunction with CSIRO the commercial uptake of the Trigen system.	-	Ongoing
Climate Change		
Undertake research into the local impacts of climate change and develop program for adaptation.	-	Short
Climate change forum in conjunction with other councils.	-	Short
Fleet Management & Public Transport		
Investigate the feasibility of alternative fuels for Council's vehicle fleet	-	Short
Review Council's fleet management practices in respect to size and type of vehicles purchased and develop a policy.	150	Short
Investigate travel alternatives and incentives for staff.	70	Medium
Examine the issues surrounding peak oil and the Oil Depletion Protocol in relation to Council's fuel dependence.	-	Short
Public Lighting		
Street lighting lamp replacement as part of Street Lighting Improvement Program.	530	Medium
Investigate renewable / efficient lighting options for public areas.	-	Medium
Continue to purchase 10% green power for street lighting.	580	Medium
Greenhouse Procurement		
Implement a Greenhouse Purchasing Policy.	-	Short
Complete ICLEI's Greenhouse Purchasing pilot program.	-	Short
Waste Management		
Implementation of corporate initiatives within Council's Waste Minimisation Strategy.	-	Ongoing
Overall Management		
Investigate feasibility of carbon emissions trading (NGAC's).	-	Short
Prepare Energy Savings Actions Plan for NSW Department of Energy, Utilities & Sustainability.	-	Short

Corporate Actions 2006-2010	Estimated Annual Reduction (tCO_2-e)	Timeframe
Prepare CCP Plus Measures Report for ICLEI along with ongoing program requirements.	-	Ongoing
Prepare and distribute internally quarterly energy consumption reports for all major Council assets.	50-100	Ongoing
Prepare annual Measurement and Verification Reports for energy conservation measures already implemented within Council assets.	-	Ongoing
Ongoing promotion of corporate greenhouse reduction achievements.	-	Ongoing
Lobby state and federal government on legislative changes to encourage uptake of renewables.	-	Short

Note:

- Short (1-2 years)
- Medium (3-4 years)
- Long (5-6 years)
- Ongoing (current initiative to continue)

Community Actions 2006-2010	Timeframe
Residential Sector	
Undertake community research and extend the existing Earth*wise* @ Home – learning based change program on energy management in the home.	Short-Medium
Research opportunities for bulk residential deals on energy conservation measure installations (eg. Solar hot water & insulation).	Short-Medium
Develop a climate change community awareness and adaptation program.	Short
Explore potential for greenhouse levy for residential solar energy fit-outs.	Medium
Investigate feasibility of a community-owned solar farm.	Long
Facilitate workshops on BASIX and passive solar design options.	Short
Implementation of community initiatives within Council's Waste Minimisation Strategy.	Ongoing
Business Sector	
Continue Sustainable Business Program with sustainable energy component (energy audits).	Ongoing
Encourage construction of sustainable buildings as part of the draft Economic Development Strategy and the draft Hornsby Town Centre DCP.	Short
Undertake research into microclimate – agricultural diversification for rural businesses.	Short
Investigate the establishment of a greenhouse offset program for businesses and developers.	Short-Medium
Transport Sector	
Implement a Travel Smart program for transport options and travel demand management.	Short
Explore feasibility of car share, taxi subsidies and mini buses initiatives.	Medium
Education Sector	
Continue programs within schools, including energy audits of school buildings.	Ongoing
Overall Management	
Develop an Earthwise Greenhouse Meter for web-based monitoring and reporting of emissions and consumption within the Shire.	Short
Investigate monitoring the number of completed BASIX approved developments to measure savings achieved.	Ongoing
Develop in conjunction with CSIRO an innovative and efficient method of measuring / calculating greenhouse reduction within the community.	Short-Medium
Utilise the expertise of the Sustainable Action Committee to promote community-based actions.	Ongoing

Note:

- Short (1-2 years)
- Medium (3-4 years)
- Long (5-6 years)
- Ongoing (current initiative to continue)

Conclusion

This Strategy seeks to compliment Australia's greenhouse commitments through effective corporate and community action in a way that not only contributes to delivering Council's strategic intent of 'creating a living environment…' but also advances Council's interests in terms of:

- practising sustainability
- contributing to global action
- promoting Council's experiences within the community, and
- Increasing awareness of and requiring actions from the community that will contribute to overall emissions reduction.

Council's progression to its nominated reduction targets will be monitored on an annual basis. During this process the measures will be assessed for their effectiveness and the Strategy will be reviewed to ensure the appropriate areas for greenhouse gas reduction are targeted. The level of actual emissions reduction achieved and their proportional contribution to meeting Council's strategic direction will be critical elements in the feedback loop.

An important aspect in this Strategy is the raising of the community's level of awareness and a shift in community attitude. Their response to Council's efforts and their ownership of their role is a vital aspect of the Strategy's implementation and ultimate success. Council has the responsibility to act as a professional community-binding organisation in demonstrating and guiding the community's efforts with respect to community greenhouse gas reduction and energy efficiency in the home and within the business sector.

References

1. UK Royal Commission on Environmental Pollution (http://www.rcep.org.uk/pdf/ar-summary.pdf).
2. Steffen, W (2006) *Stronger Evidence but New Challenges: Climate Change Science 2001-2005,* Australian Greenhouse Office, Department of the Environment & Heritage, Australian Government, Canberra.
3. Global Commons Institute (www.gci.org.uk).
4. Australian Business Council for Sustainable Energy, Phillips Fox, ABN AMRO, Pacific Hydro (2006), *Show me the money: An assessment of the opportunities for sustainable energy businesses created by current international mechanisms designed to fund projects that reduce greenhouse gas emissions,* Australian Business Council for Sustainable Energy, Carlton, Victoria.
5. The NSW Greenhouse Office (2005), *NSW Greenhouse Plan,* NSW Government, Sydney.
6. Australian Greenhouse Office (2003), *National Greenhouse Gas Inventory,* Department of the Environment & Heritage, Australian Government, Canberra.
7. Flannery, T (2005), *The Weather Makers,* Text Publishing, Melbourne.
8. Turton, H, Ma, J, Saddler H, & Hamilton C (2002), *Long-Term Greenhouse Gas Scenarios - A pilot study of how Australia can achieve deep cuts in emissions,* The Australia Institute, Canberra.
9. Smith, M & Hargroves, K, (2006) *The First Cut Must Be the Deepest,* Ecos, Vol. 128 Dec-Jan, p. 8-11.

Additional Information

- Australian Greenhouse Office (2005) *Tracking the Kyoto Target,* Department of the Environment & Heritage, Australian Government, Canberra.
- Australian Greenhouse Office (2005) *Climate Change Science Q&A,* Department of the Environment & Heritage, Australian Government, Canberra.
- Australian Greenhouse Emissions Information System (AGEIS) (www.ageis.greenhouse.gov.au).
- ICLEI (www.iclei.org).
- Preston BL & Jones RN (2006) *Climate Change Impacts on Australia and the Benefits of Early Action to Reduce Global Greenhouse Gas Emissions,* CSIRO Marine & Atmospheric Research, Victoria.

Hornsby Shire Council
296 Pacific Highway
Hornsby NSW 2077

Telephone 9847 6666
8.30am – 5.00pm Monday to Friday
www.hornsby.nsw.gov.au

Prepared by
Environmental Health &
Protection Team