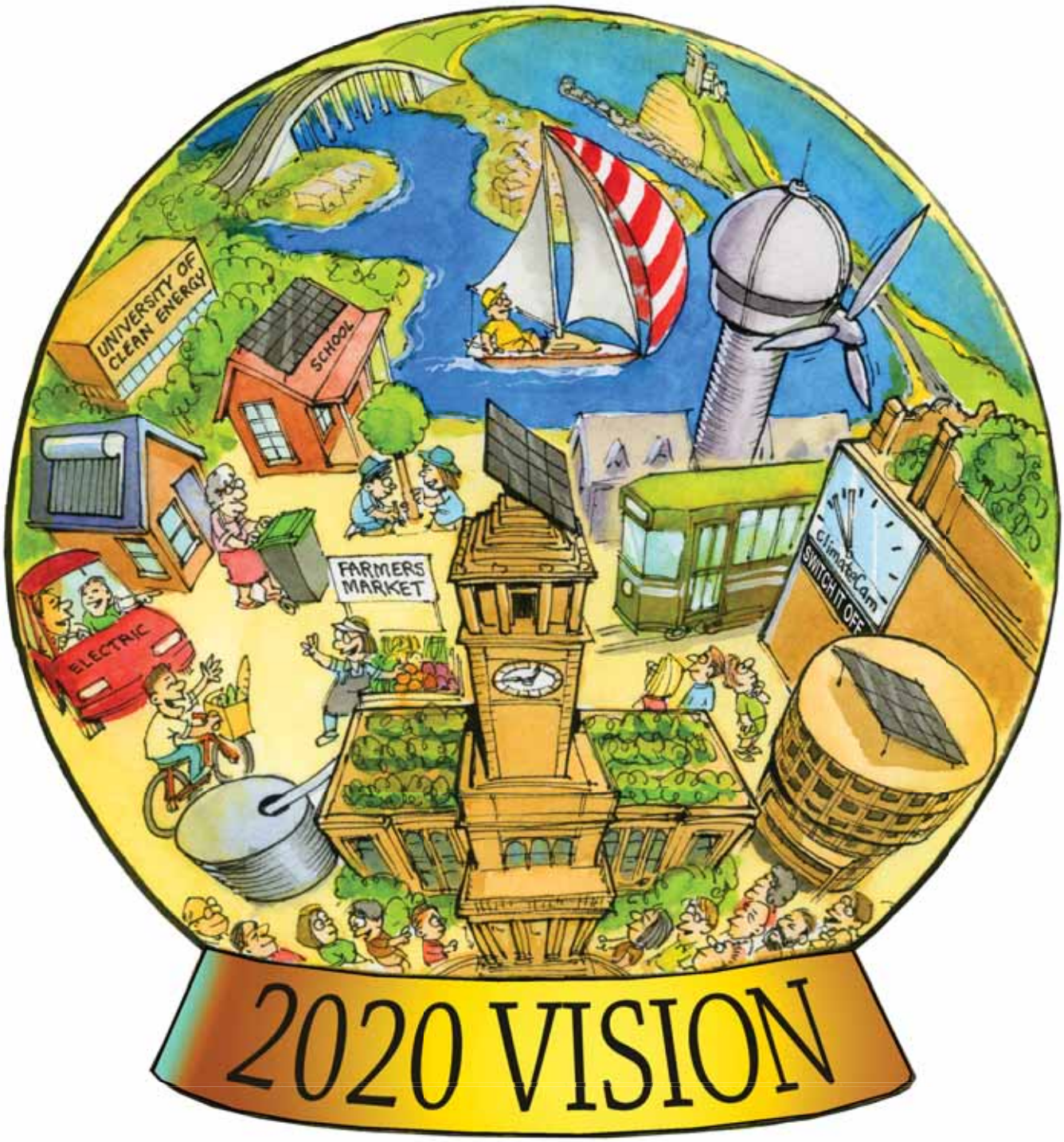
NEWCASTLE 2020

Carbon and Water Management Action Plan



The City of Newcastle

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A message from the Lord Mayor

The City of Newcastle has been actively involved in carbon reduction initiatives for 15 years. During this time the scientific certainty surrounding climate change has grown, such that there is now overwhelming international consensus among scientists and governments on three key points:

1. Climate change is real and is already happening.
2. Most of the observed increase in global average temperatures since the mid-20th century is very likely due to human activities.
3. Urgent action is required to curtail further warming in order to avoid dangerous and largely irreversible consequences.

Climate change will bear serious physical, ecological, economic and social costs, including sea level and temperature rise, more extreme weather events, threats to food and water security, impacts on human settlements and infrastructure, as well as implications for human health, natural ecosystems and biodiversity. On a local level, we have already witnessed our vulnerability to sudden and severe climatic events, from the major storm that ran a bulk carrier aground at Nobbys Beach in June 2007 to the dust storms that swept across the region in late 2009.

The challenge herein is two-fold. We need to build our resilience to the projected impacts of an already changing climate, while drastically reducing our emissions to lessen the extent of further climate change. This Newcastle 2020 Carbon and Water Management Action Plan has been developed to lead our carbon mitigation response into the next decade. A separate strategy has been prepared simultaneously to address how our organisation will plan for the projected and unavoidable changes to our climate.

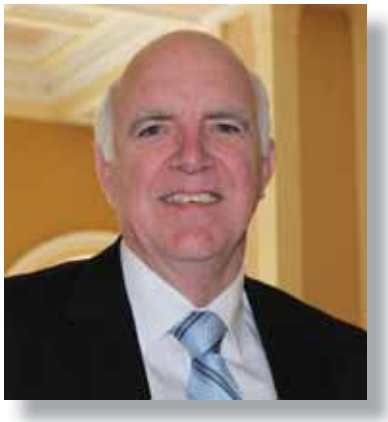
Newcastle's capability to respond seriously to climate change is demonstrated in the results achieved through Council's former Greenhouse Action in Newcastle (GAIN) 2001-08 Plan. As an organisation, we reduced our emissions by 13.6% below 1995 levels through a range of resource efficiency measures, including lighting and water retrofits and biofuel use. During the final year of the GAIN Plan, the Newcastle community's projected business-as-usual emissions returned to 2000 levels. It was a wonderful achievement that was supported by our ClimateCam suite of programs for households, schools and businesses.

We must now, however, intensify our efforts. We must set ambitious goals consistent with the level of action required to stabilise carbon emissions at safe concentrations. We must commit ourselves to undertaking the necessary action to achieve them.

A key objective of this new plan is to lead the transition to a low carbon economy, by positioning our city as a global testing ground for innovative technologies and behavioural change programs that have the capacity to be adopted into the mainstream. Such an approach will not only enable our local community to explore all opportunities to slash our own carbon footprints but also has the potential to facilitate emissions reductions worldwide. This is a much needed step if we are to join together to combat the most critical challenge of our era.

Cr John S Tate
Lord Mayor of Newcastle

A message from the General Manager



As the sphere of government that most closely interacts with the people, local councils wear a number of important hats when it comes to community climate change action. These include the roles of:

- **educator**, by raising awareness and engaging the community in sustainable practices.
- **advocate**, by calling for policy changes and programs that assist the community to lower their carbon footprint.
- **coordinator**, by collaborating with other organisations or brokering partnerships between key players to deliver programs and to support sustainable products and services at the local level.

The City of Newcastle has also long recognised the importance of the role of leader. As an organisation, we have a proud history of actively seeking out opportunities to improve our resource efficiency and save on operating costs. Our electricity consumption is now almost 40% lower than it was in 1995 and we have saved over $8 million on business-as-usual by investing in a number of straightforward technologies and work practices. More importantly, we have acknowledged the value in sharing our experiences with others, so that they too may utilise this knowledge to improve the sustainability of their own operations.

Global climate change science suggests that if we are to avoid irreversible catastrophic effects we must now cut our emissions even more. The good news is that there is still much more, as an organisation and as a community, that we can do!

The journey ahead must not focus on incremental improvements in carbon reductions, but rather on re-envisaging a new way that we wish to live, work and play in a low carbon future. It will involve re-defining our ideas of prosperity and what we consider to be a sustainable lifestyle. It will also entail scouring all opportunities for local renewable energy generation, revisiting how and where we source our food and products, being much smarter in our use of energy and water, re-thinking our waste streams, and identifying avenues for sequestering our emissions, such as local revegetation.

Such measures will also help to safeguard our economic and resource security, by reducing our reliance on finite fossil fuels and our exposure to escalating utility prices. Furthermore, they will help to diversify our local economy and create new jobs.

These aspirations will not be achieved by Council working in isolation or by preaching a path to sustainability. By showing people how to live sustainably and engaging them in that journey, we can secure their long-term future and that of generations to come.

It's this premise that lies at the heart of this action plan. By working together to provide the tools, share the knowledge and experiences and develop and strengthen networks, this plan aims to enable all members of our local community to take lasting action towards climate change in their homes and in their places of work, education and recreation.

Climate change is a challenge facing everyone and the level by which we limit further temperature increases depends on the actions of *every one*. I encourage you to become actively involved in the implementation of this plan and be part of making a difference.

Phil Pearce
General Manager

Introduction

Climate change is a critical issue facing the global community. International scientific research indicates that we must substantially reduce our carbon emissions in order to avoid dangerous and possibly irreversible impacts.

Globally, 2010 was the warmest year on record, with the ten years from 2001 to 2010 constituting the warmest decade on record since instrumental climate records began in 1850 (WMO, 2011). In Australia, each decade over the last seventy years has been consecutively warmer than the preceding decade, with 2010 marking the end of Australia's warmest decade since high-quality records commenced a century ago (BOM, 2011).

Due to the sensitive and interdependent nature of the Earth's climate system, changes to one aspect of climate (such as increases in global average surface temperatures) can influence other elements (such as precipitation and winds) and bring about long-term climate change. In its Fourth Assessment Report in 1997, the Intergovernmental Panel on Climate Change (IPCC) —a leading scientific body of thousands of international scientists that reviews and assesses climate change information produced worldwide—stated that discernible human influences have extended beyond increases in average temperature to other aspects of climate. These have included sea level rise, increased temperature extremes, increased frequency of heavy precipitation events and increases in area affected by drought.

Scientists warn us that we can expect to see increases in the severity and frequency of such climatic events. The environmental consequences of these will translate into a range of social and economic costs, from impacts on coastal settlements, industries, infrastructure and health, to social upheavals, famine and disease.

Many climate experts believe that we must work quickly to substantially reduce the concentrations of greenhouse gases in our atmosphere if we are to avoid catastrophic consequences. Some assert that reaching safe concentrations will require emissions to average less than 2 tonnes per person annually by 2050 (Baer and Mastrandrea, 2006). With Australia's per capita emissions sitting at around 27 tonnes per person in 2010, the challenge ahead is clear, however it is not beyond us.

A challenge of this magnitude requires a united international response, with strong action from all spheres of government, business, industry, individuals and community groups. Local government has a social and economic responsibility and can play a key role in facilitating a sustainable future for our city.

The Newcastle 2020 Carbon and Water Management Action Plan (CWMAP) has been put together to guide The City of Newcastle's response into the next decade. It has been developed by firstly attaining a detailed understanding of our community's carbon emissions and water consumption, and then by establishing a range of aspirational goals and accompanying actions that will serve as a roadmap towards reducing our carbon and water footprints. The aspirational goals outlined within the CWMAP target the areas in which The City of Newcastle believes it has the greatest capacity, as a local government body, to drive emissions and water reductions across the municipality. This process has involved collaborating with key partners and stakeholders to identify rational goals as well as opportunities where we can work together towards a collective vision for our city.

Newcastle has long held the vision to reinvent itself from a heavily industrial steel city to a centre of excellence for low-carbon solutions. This vision was established at the Pathways to Sustainability International Conference in 1997, following an announcement that BHP would cease its steel making operations in Newcastle. This provided the city with an opportunity to begin the journey of reinvention towards a sustainable low-carbon economy.

The City of Newcastle has a 15-year history of taking mitigatory action on climate change. Through the delivery of Council's Greenhouse Action in Newcastle (GAIN) 2001-08 Plan, organisational carbon emissions were reduced by 13.6% (3,200 tonnes carbon dioxide equivalent (t-CO2e)) below 1995 year levels. This was achieved despite the inclusion of additional facilities and operations during the implementation period, including the three-storey Frederick Ash Administration Building, the new Wallsend District Library, the electric heating of the Lambton Pool and the extended operational hours of Beresfield and Stockton pools.

Through Council's innovative ClimateCam online monitoring system, a reduction of 20.2% (621,489 t-CO2e) below the projected 2008 business-as-usual scenario was recorded for community emissions between 2001 and 2008, despite a population growth of 9.5%. This achievement was supported in part by a range of community actions undertaken through the GAIN Plan.

The path ahead will involve moving beyond the 'low hanging fruit' to exploring innovative solutions and technologies and making fundamental behavioural changes. It will entail a drastic move away from fossil fuel dependency and substantial improvements in energy and water efficiency.

While delivery of the CWMAP will involve community education regarding alternative transport and fuel efficiency, the key issues of public transport, cycleways and the transport network are being addressed through the implementation of the Newcastle 2030 Community Strategic Plan.

To assist with the facilitation of a global solution to climate change, the CWMAP will also involve sharing knowledge, research and experiences in order to help drive emissions reductions both within the Newcastle municipality and beyond.

In fulfilling its core objectives of reducing carbon pollution and using water more wisely, the CWMAP will also assist the Newcastle community to transition to an economy of greater self-sufficiency and resilience. This will help to reduce our exposure to resource scarcity, peak oil and oil supply vulnerability, escalating energy and water prices and water supply shortages.

While the CWMAP will address the mitigation (i.e. reduction) of carbon emissions, it is crucial that The City of Newcastle is also prepared for the impacts of climate change projected to occur. A separate adaptation action plan is being developed in response to this.

Links to the Newcastle 2030 Community Plan

A long-term community vision for the Newcastle Local Government Area (LGA) was established through the Newcastle 2030 Community Strategic Plan. Following consultation, the Newcastle community defined its shared vision as:

> "In 2030 Newcastle will be a Smart, Liveable and Sustainable City. We will celebrate our unique city and protect our natural assets. We will build resilience in the face of future challenges and encourage innovation and creativity. As an inclusive community, we will embrace new residents and foster a culture of care. We will be a leading lifestyle city with vibrant public places, connected transport networks and a distinctive built environment. And as we make our way toward 2030, we will achieve all this within a framework of open and collaborative leadership."

Newcastle 2030 Community Strategic Plan

Seven strategic directions emerged from the shared planning process, each with a set of objectives identifying what is to be achieved through the delivery of the 10-year Community Strategic Plan. These are:

- Connected City
- Protected and Enhanced Environment
- Vibrant and Activated Public Places
- Caring and Inclusive Community
- Liveable and Distinctive Built Environment
- Smart and Innovative City
- Open and Collaborative Leadership

The CWMAP will assist us to work towards the strategic directions and several objectives outlined in Newcastle 2030 (Figure 1). The key objectives that the CWMAP will help to deliver are highlighted in blue font.

Our Strategic Directions for Newcastle	Our Objectives
Connected City Transport networks and services will be well connected and convenient. Walking, cycling and public transport will be viable options for the majority of our trips.	• Effective and integrated public transport • Linked networks of cycle and pedestrian paths • **A transport network that encourages energy and resource efficiency**
Protected and Enhanced Environment Our unique environment will be understood, maintained and protected.	• **Greater efficiency in the use of resources** • Our unique natural environment is maintained, enhanced and connected • **Environment and climate change risks and impacts are understood and managed**
Vibrant and Activated Public Places A city of great public places and neighbourhoods promoting people's health, happiness and wellbeing.	• Public places that provide for diverse activity and strengthen our social connections • Culture, heritage and place are valued, shared and celebrated • **Safe and activated places that are used by people day and night**
Caring and Inclusive Community A thriving community where diversity is embraced, everyone is valued and has the opportunity to contribute and belong.	• A welcoming community that cares and looks after each other • Active and healthy communities with physical, mental and spiritual wellbeing • A creative, culturally rich and vibrant community
Liveable and Distinctive Built Environment An attractive city that is built around people and reflects our sense of identity.	• A built environment that maintains and enhances our sense of identity • Mixed-use urban villages supported by integrated transport networks • Greater diversity of quality housing for current and future community needs • **Best practice energy and water efficient buildings and infrastructure**
Smart and Innovative City A leader in smart innovations with a healthy, diverse and resilient economy.	• **A vibrant diverse and resilient green economy built on educational excellence and research** • **A culture that supports and encourages innovation and creativity at all levels** • A thriving city that attracts people to live, work, invest and visit
Open and Collaborative Leadership A strong local democracy with an actively engaged community and effective partnerships.	• **Integrated, sustainable long-term planning for Newcastle and the Region** • **Considered decision-making based on collaborative, transparent and accountable leadership** • **Active citizen engagement in local planning and decision-making processes and a shared responsibility for achieving our goals** • **The City of Newcastle: a local government organisation of excellence**

Figure 1: Links between Newcastle 2030 and the CWMAP

Vision

The vision of the Newcastle 2020 Carbon and Water Management Action Plan is to position Newcastle as a leader in carbon and water management solutions that contribute to addressing the global challenge of climate change and that provide resource security for current and future generations.

Strategic Objectives

The CWMAP has three strategic objectives. These are to:

1. Minimise carbon emissions–both within Council's operations and across the Newcastle community–to levels required to avoid dangerous climate change.

2. Use water more wisely within the organisation and across the Newcastle community, to assist in future water security.

3. Position Newcastle as an innovation centre and a global showcase for carbon and water management.

Mission

The vision and strategic objectives of the CWMAP will be achieved by:

Providing leadership: Council will demonstrate its commitment to reducing organisational carbon emissions and water consumption and will share its knowledge and experiences to inspire the community to take mitigation action.

Driving innovation: Council, in conjunction with its strategic partners, will identify, test and deploy innovative carbon and water management technologies and behavioural change programs, and will strive to generate uptake of proven products and programs within the wider community.

Enabling action: Council will develop collaborative partnerships with a range of business, industry, government, education and community groups, in order to work effectively and efficiently to inform, educate, motivate and empower the community to adopt sustainable behaviours, practices and technologies targeting resource use and carbon pollution.

Key Partnerships and Stakeholders

The preparation of the CWMAP has involved input from partners and stakeholders who share a vision for an innovative and resource-smart city. These partners will be engaged in the delivery of the CWMAP and include:

- Ausgrid
- Catholic Schools Office (CSO)
- Community groups
- CSIRO
- Department of Education and Communities NSW (DEC)
- Hunter Business Chamber
- Hunter Valley Research Foundation
- Hunter Water
- Office of Environment and Heritage
- TAFE NSW Hunter Institute (Hunter TAFE)
- Together Today
- Tom Farrell Institute
- University of Newcastle (UoN).

The successful implementation of the CWMAP will also rely upon the active participation of key stakeholders, including Newcastle residents, Council staff, education staff and students and local business and industry.

Target Sectors

The City of Newcastle has considerable experience in climate change mitigation program delivery. This work includes the suite of ClimateCam programs that support schools, businesses, households and other local councils. The segmentation of the program delivery into these four sectors has shown significant benefits for both the service provider and the customer. Market segmentation allows for the customisation of the product to better suit the needs of the target audience.

A market segmentation approach has been adopted for the CWMAP. The four target sectors are:

- Council Operations
- Residential Sector
- Education Sector
- Business Sector

Business Sector

The Business Sector comprises approximately 11,000 individual enterprises, with 84% of these businesses employing 1 to 10 employees.

For the purpose of effective development and delivery of the CWMAP, the Business Sector has been split into two distinct categories:

1. **Top 20 Businesses**
   These represent the 20 highest energy and/or water consuming businesses within the Newcastle LGA. These businesses have a significant impact on the city's carbon emissions and possess the opportunity to take a leadership role in the business sector by taking collective action to achieve carbon reductions.
2. **Business Sector (excluding Top 20 Businesses)**
   These represent all businesses in the Newcastle LGA who are not captured in the Top 20 Businesses.

Council Operations

The City of Newcastle owns and operates a vast range of facilities, including administration buildings, libraries, aquatic centres, parks, childcare centres, community halls, and a works depot, together with the Civic Precinct, Newcastle Regional Museum and Summerhill Waste Management Centre.

Council provides more than 150 services, such as town planning, waste management and recycling, and construction and maintenance of local roads, streets and bridges. Council also funds the provision of street lighting throughout the Newcastle LGA.

Residential Sector

The Residential Sector is made up of over 140,000 individuals living within the Newcastle LGA.

There are over 63,000 private dwellings, with over 90% of these privately occupied and an average of 2.41 persons per household.

Education Sector

The Education Sector covers government and non-government primary and secondary schools, early education centres, the TAFE NSW Hunter Institute (Hamilton, Hunter Street and Newcastle campuses) and the University of Newcastle (Callaghan Campus). It does not include the administrative operations of the CSO and DEC.

These educational institutions provide training and education for over 70,000 students each year and employ approximately 7,000 individuals, who reside both within and outside the Newcastle LGA.

Our Carbon and Water Footprint

The objectives of the CWMAP are to minimise carbon emissions and to use water more wisely, both within Council's operations and across the residential, education and business sectors of the Newcastle community. In order to set aspirational goals and actions supporting their achievement, it is essential to begin with an understanding of each sector's contribution to the total Newcastle LGA carbon and water footprints, and furthermore, the activities that have the highest carbon emissions and water consumption within each of those sectors[1].

Carbon Emissions

A carbon footprint study conducted by The City of Newcastle estimated that emissions across the Newcastle LGA totalled 3.42 million tonnes carbon dioxide equivalent (t CO_2-e) in 2008[2]. The emissions were calculated using methodologies that measure the emissions generated directly within the Newcastle LGA and that avoid the potential for double-counting of emissions. For instance, they do not take into account the carbon emissions embodied in products and services brought into the Newcastle LGA from other areas, such as the emissions that arise from the growing and transportation of food or in the manufacture of plastics produced in offshore factories. The importance of taking action in other key areas not reflected in the carbon footprint is explained further in the Residential Sector section on page 37.

The level of contribution the four sectors make to the total Newcastle LGA carbon footprint and the breakdown of the calculated emissions sources are shown respectively in Figures 2 and 3. The Business Sector, inclusive of commercial and industrial activities, accounts for the majority (83%) of Newcastle's emissions.

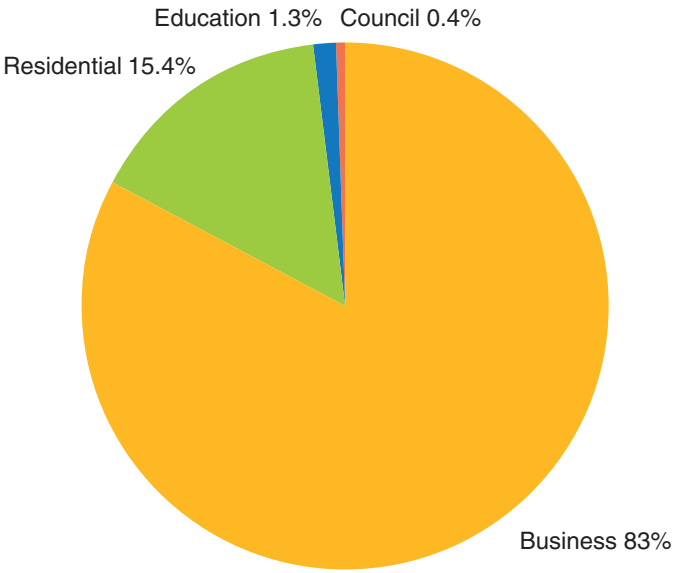


Figure 2: Newcastle LGA - (Scope 1 & 2) Carbon Emissions by Sector in 2008

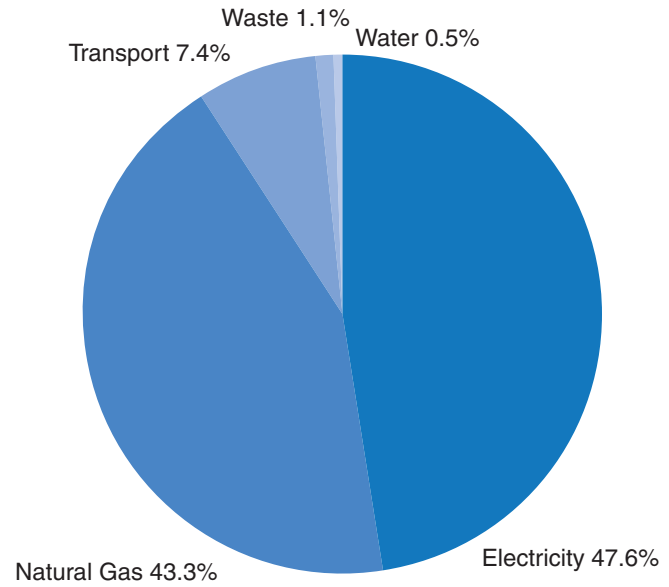


Figure 3: Newcastle LGA - (Scope 1 & 2) Carbon Emissions by Source in 2008

The consumption of water generates carbon emissions from the input of electricity and transport fuels used by the local water supply authority to treat and pump the water consumed and wastewater generated, as well as the methane and nitrous oxide emissions arising from the decomposition of wastewater in sewage treatment plants. Approximately 14,753 t CO_2-e were generated from this process in the water year of 21 April 2008 to 20 April 2009. This accounted for less than 1% of the total carbon footprint for the Newcastle LGA (Figure 3).

The carbon footprint includes high levels of emissions from natural gas use by industrial firms, which are estimated by Council to be around 1.46 million t CO_2-e annually. The sectoral and emissions source breakdowns, exclusive of industrial natural gas emissions, are provided in Figures 4 and 5.

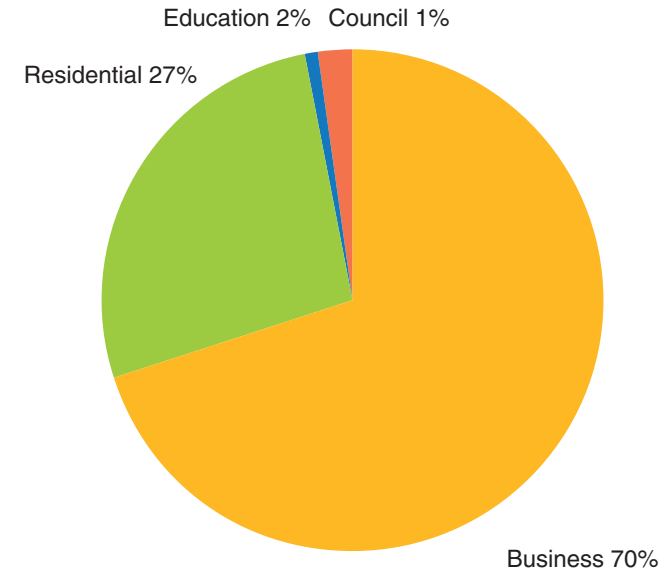


Figure 4: Newcastle LGA - (Scope 1 & 2) Carbon Emissions by Sector (excluding industrial natural gas) in 2008

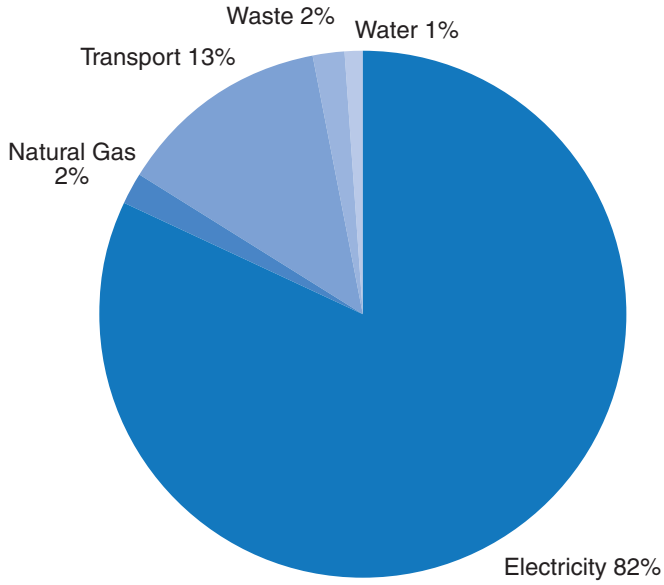


Figure 5: Newcastle LGA - (Scope 1 & 2) Carbon Emissions by Source (excluding industrial natural gas) in 2008

Removing industrial natural gas from the analysis shows that the majority (82%) of emissions arising from the remainder of the Newcastle community are attributable to electricity use.

Being part of the largest regional business community in Australia, with activities ranging from traditional mining and industrial operations to new growth in the commercial and retail sectors, the high proportion of the Business Sector's emissions to the total community emissions across the Newcastle LGA is expected. However, there are a number of fundamental reasons why this must not diminish the importance of taking action in the other three sectors, namely:

- Products and services generated by the Business Sector occur in response to demand from other sectors of the local, national and international community. Both the amount of resources consumed and the level of demand

for environmentally preferable products and services by these sectors can influence sustainable production methods and the level of carbon emissions in the Business Sector.

- Environmental knowledge and skills gained by children and youth through the education system can help shape thoughts and values on sustainable lifestyles (both directly in the child being educated and in the families to which these skills and attitudes are transferred). This in turn can translate into the adoption of enduring sustainable behaviours in both the home and work environments.

- It is imperative that Council makes responsible and ethical use of public monies when providing services to the community and in its endeavours to encourage and assist others to live, work and learn sustainably. In addition, Council should lead by example by applying best practice sustainability principles when conducting its own operations and activities.

- Innovative carbon and water technologies and behavioural change programs proven to be successful through the implementation of the CWMAP, have the potential to contribute towards carbon emissions reductions beyond the municipality, from the transfer of local knowledge, research and experiences to the regional, national and international communities.

Water Consumption

In the 12 months leading up to April 2009, a total of 19,781 million litres (ML) of mains water was used across the Newcastle LGA. Just over half (53%) of this water was used by the Residential Sector, as illustrated in Figure 6.

Water consumption for the Business Sector is broken down into Industrial and Commercial/ Municipal use. Municipal consumption includes public uses such as schools, hospitals, utility installations and power generation (water consumed by The City of Newcastle, while a municipal use, is illustrated separately). At the time of publication, individual water data was not available for the Education Sector.

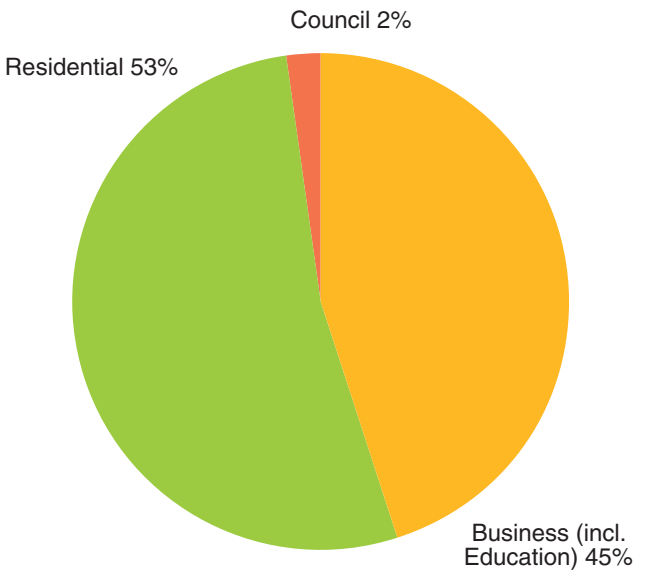


Figure 6: Newcastle LGA - Mains Water Consumption by Sector in 2008

Notes

[1] Information on sector-specific carbon emissions and water consumption, including emissions and usage sources, are provided in the individual sections of this document for the Council Operations and residential, education and business sectors.

[2] 2008 is the baseline year established for measuring progress against 2020 targets. All data sources are for the 2008 calendar year unless otherwise specified (for example, Hunter Water reports on annual consumption from the 12 months preceding 20 April each year). The calculated emissions take into account Scope 1 and Scope 2 emissions, as defined in The National Greenhouse and Energy Reporting (NGER) legislation and the internationally recognised *Greenhouse Gas Protocol: a corporate accounting and reporting standard*. When Scope 3 emissions are taken into consideration for the calculated emission sources, the total emissions were 4.16 million t CO_2-e. Industrial natural gas use has been estimated. Emissions for the Education Sector have been extrapolated from known datasets. Excluded from the carbon footprint are emissions from LPG used for stationary energy purposes (except for The City of Newcastle) and emissions from industrial fuels and petroleum-derived and gaseous feed stocks other than electricity and natural gas, as this data was not available at the time of publication.

ClimateCam Delivery Framework

The ClimateCam Delivery Framework (the Framework) has its origins in the 14-step Financial Loss Control (FLC) process designed by Council in 2002. The FLC process was designed retrospectively and was based on the early experiences and successes of Council in energy and resource management.

The Framework provides a whole-of-organisation approach incorporating continuous improvement aimed at delivering more efficient, effective and long-lasting changes in sustainability management. It provides:

- a consistent, objective methodology for measuring performance within key areas of operation
- a tool to simplify reporting of performance and aid transparency in key areas of operation
- a 'road map' for driving innovation and change within an organisation
- an objective method for comparing performance of organisations against each other, similar operations and against industry benchmarks.

The structure of the Framework (illustrated in Figure 9) ensures that every step is given equal emphasis and that important elements such as policies, communication channels and monitoring systems are established prior to the identification (and implementation) of actions. This concept helps to manage the risk of low performance associated with an ad hoc approach to carbon and water management.

The Framework includes a rating system to allow for accurate assessments of performance against each step. This system provides a star rating – where 0 to 10 stars are awarded, based on objective assessment criteria – as is illustrated in the sample provided in Figure 7. This will highlight areas requiring improvement and will assist with the formulation of tailored action plans.

	Liquid Fuels Performance Rating	1 Poor	2	3	4	5	6	7	8	9	10 Best Practice
1	Commitment	★	★	★	★	★					
2	Policy	★	★	★	★						
3	Communication	★	★	★	★						
4	Baseline Information	★	★	★	★	★	★	★	★	★	
5	Monitoring & Reporting	★	★	★	★	★					
6	Teamwork & Partnerships	★	★	★	★						
7	Knowledge & Capacity	★	★	★	★	★					
8	Target Setting	★	★	★	★	★	★				
9	Innovation & New Ideas	★	★	★							
10	Research & Piloting	★	★	★	★	★					
11	Low Hanging Fruit	★	★	★	★	★	★				
12	Implementation	★	★	★	★						
13	Project Evaluation	★	★	★	★	★					
14	Case Studies	★	★	★	★	★	★				

Figure 7: Performance Rating Sample

Innovation Matrix

To support the achievement of Council's strategic objectives, the ClimateCam Delivery Framework embodies an Innovation Matrix (Figure 8) to identify and prioritise new and emerging technologies and practices during the delivery of the CWMAP.

The Innovation Matrix is applied on an ongoing basis to identify the best possible water, waste and carbon management opportunities (i.e. programs and technologies) for the four target sectors that, in time, may be brought from trial through to commercialisation and widespread adoption.

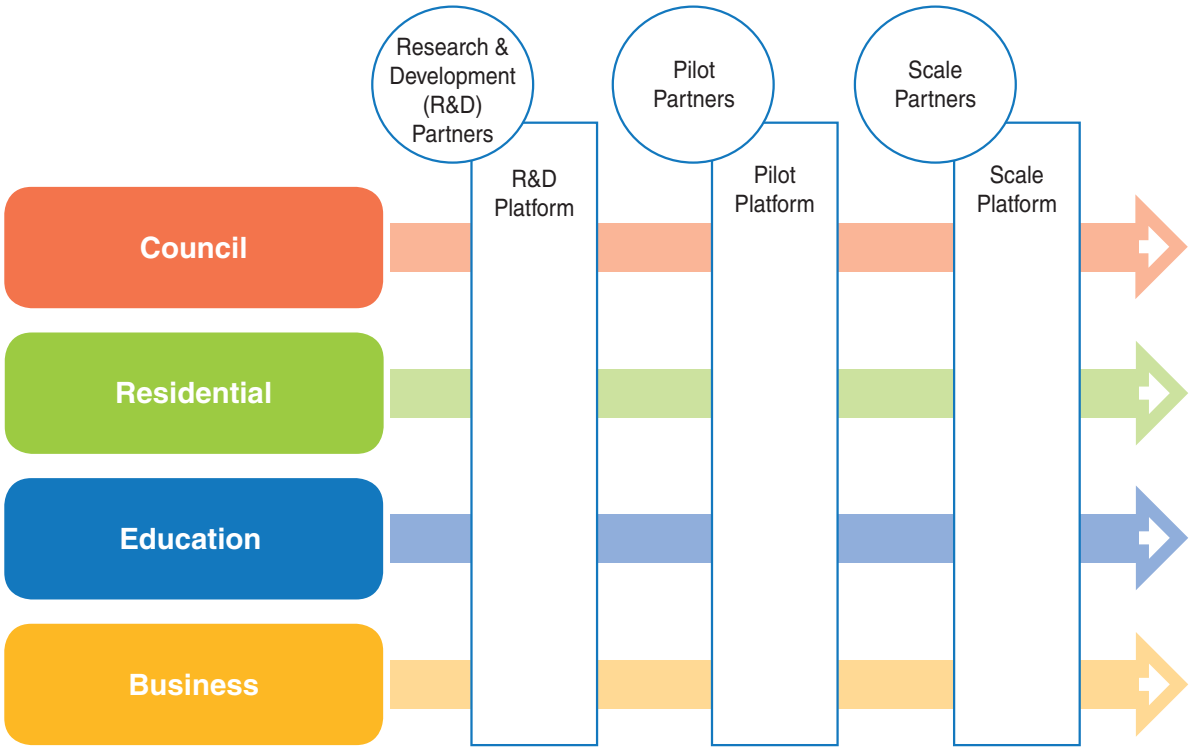


Figure 8: The Innovation Matrix

ClimateCam Delivery Framework

1. Commitment

Commitment is shown from key stakeholders to:

1. Undertake the steps and methodologies outlined in the Framework.

2. Implement projects which will improve overall environmental sustainability and reduce subsequent carbon emissions and/or water usage.

2. Policy

A policy is developed which aims at setting the direction for, and supports carbon and water minimisation action. The policy also outlines a commitment to establishing, meeting and reviewing targets.

3. Communication

A communication plan is developed clearly defining deliverables, audiences, messages, timelines, etc.

Existing mediums are used for communications and the development of stand-alone interactive communications systems i.e. portals occur to provide two-way communication and engagement.

4. Baseline Information

Baseline data has been gathered, collated, reviewed and validated. This provides an established baseline which identifies emissions and water consumption by source, end use profiles and demographic data.

5. Monitoring & Reporting

A robust centralised monitoring and reporting system is established which collects and presents the data associated with carbon emissions and water consumption.

All data is effectively communicated as outlined within the communications plan.

6. Teamwork & Partnerships

A team is established for the development, implementation and review of activities. This team is made up by key stakeholders and is open to expressions of interest from individuals.

Partnerships are developed with organisations and industry bodies to implement the three stages of the Innovation Matrix. Through these partnerships innovation is captured and accelerated.

7. Knowledge & Capacity

Methods and guidelines are in place that identify the capacity to develop and deliver actions that can reduce carbon emissions and water use.

Action is taken to develop and maintain knowledge in the management of carbon emissions and water use.

Figure 9: The ClimateCam Delivery Framework

8. Target Setting

Targets are established based upon the analysis of information collected in the form of baseline data and the consideration of market drivers, financial viability and consultation.

9. Innovation & New Ideas

A system is developed to seek, collect and review ideas and proposals regarding the use of new and existing technologies, systems and methodologies, which have the potential to reduce carbon emissions and water use.

Ideas are reviewed and if deemed viable are put through the process identified in the Innovation Matrix. Proposals are credited to the originator, who is included in the progression of the proposal.

10. Research & Piloting

Projects and programs which are deemed viable for implementation are progressed to the research and development and piloting stages of the Innovation Matrix.

Piloting of these projects and programs enables the development of support for scaling the project or program, minimises the associated risks, and allows for refinement, testing and analysis of actual versus expected outcomes and outputs.

11. Low Hanging Fruit

When implementing projects, priority is given from an assessment of return on investment, strategic objectives, potential effectiveness as well as carbon emissions and water usage reductions.

Projects and programs which are most likely to achieve the greatest results across these parameters are given priority.

12. Implementation

Projects and programs that have been identified through the Framework are actioned.

Trial projects proven viable through the Innovation Matrix are moved to full-scale implementation.

13. Project Evaluation

Whilst in progress, projects and programs are monitored and evaluated regarding effectiveness and outputs.

Upon completion, final evaluation and reporting is undertaken. This identifies the actual outcomes and outputs of the activity and compares these against those identified in the planning stages, including actual performance results, costs, savings and lessons learned.

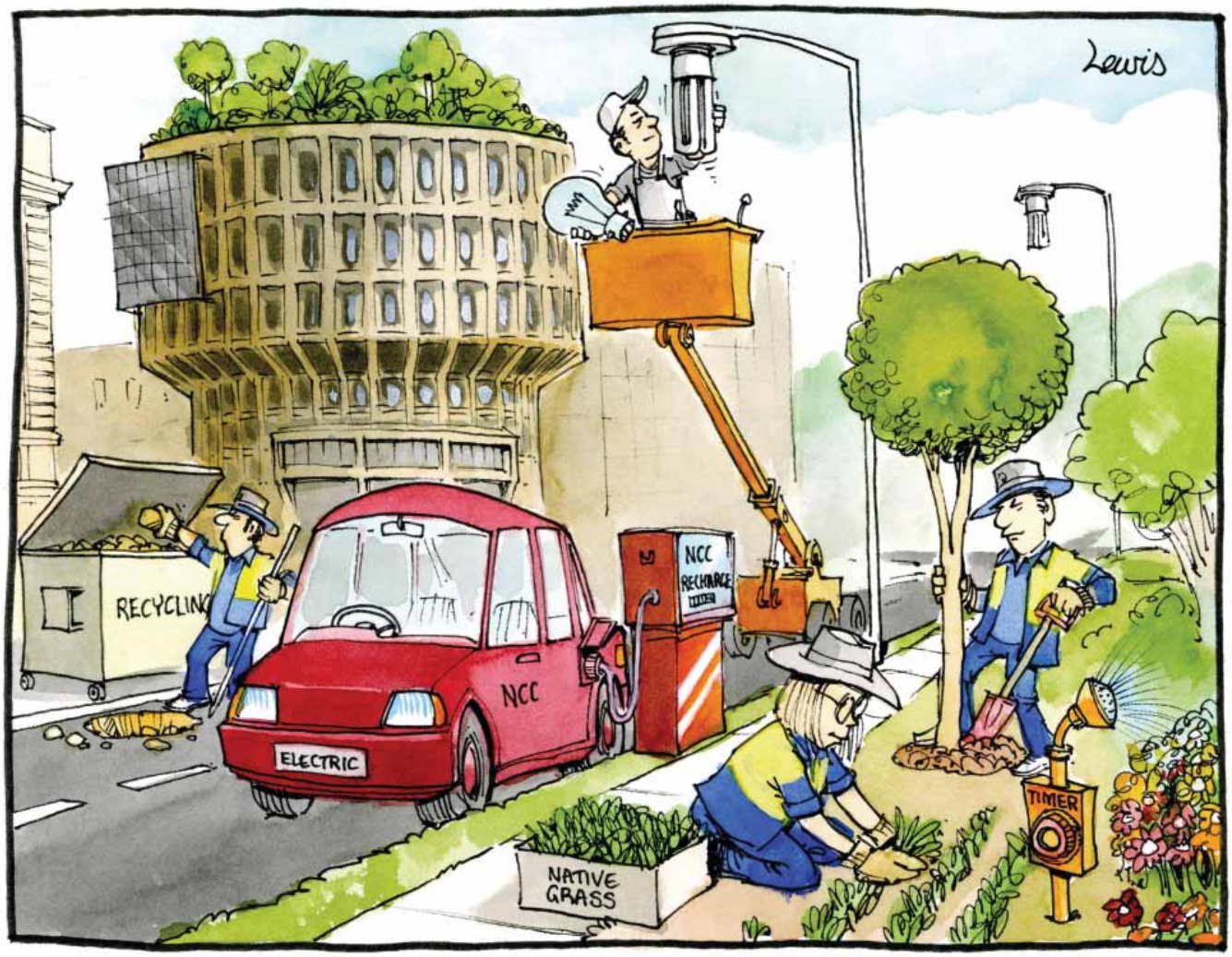
14. Case Studies

Key projects and programs have case studies developed for public access and reporting purposes.

These are used to transfer knowledge to others on methodologies employed, key outcomes, stakeholder involvement and technologies used.

Council Sector

The City of Newcastle owns and operates a vast range of facilities, including administration buildings, libraries, aquatic centres, parks, childcare centres, community halls and a works depot, together with the Civic Precinct, Newcastle Regional Museum and Summerhill Waste Management Centre. Council provides more than 150 services, such as town planning, waste management and recycling, and construction and maintenance of local roads, streets and bridges. Council also funds the provision of street lighting throughout the Newcastle LGA.



Council Operations Footprint

Carbon Emissions

To prepare Council for future carbon accounting and reporting requirements, a carbon footprint was compiled in accordance with the National Greenhouse and Energy Reporting (NGER) guidelines (DCC 2008) and emissions factors stipulated in the Australian Government's National Greenhouse Account Factors (DCCEE 2010). This approach involved the identification of emissions under three categories or 'scopes' based on their source.

Scope 1 Emissions: 43,339 t CO_2-e in 2008/09 — the direct emissions that occur from the combustion of fuels used by Council's plant and vehicle fleet and of natural gas and liquid petroleum gas (LPG) for space-heating and hot water. Scope 1 emissions also include fugitive emissions from Council's landfill operations at Summerhill Waste Management Centre (Summerhill WMC) and refrigerants in air conditioning equipment and vehicles.

Scope 2 Emissions: 7,982 t CO_2-e in 2008/09 — the indirect greenhouse gas emissions associated with Council's purchase of electricity generated by off-site power stations, in order to operate lighting, appliances and other Council infrastructure. This includes public lighting installed, owned and maintained by Council.

Scope 3 Emissions: 10,242 t CO_2-e in 2008/09 — other indirect greenhouse gas emissions that are a consequence of Council's activities but occur from sources not owned or operated by Council. These include the full lifecycle emissions associated with the extraction and production of Scope 1 and 2 fuels, emissions from transport-related activities in vehicles not owned or controlled by Council (such as air travel), emissions from waste generated by Council activities and emissions associated with the manufacture of products and services used by Council, such as office paper and water consumption. Also included is electricity purchased for community street lighting not owned or operated by Council, as while Council pays for this community asset, the infrastructure is installed and maintained by a third party street lighting provider.

Council's Scope 1 and 2 emissions, at 51,321 t CO_2-e in 2008/09, are relatively straightforward to quantify, with the exception of refrigerant gases, which have not been included at the time of publication. The contribution of refrigerant emissions to the Scope 1 footprint is considered to be extremely minor, with limited opportunity for emissions abatement. The emissions arising from waste deposited at Summerhill WMC dwarf all other Scope 1 and 2 emissions associated with Council operations (Figure 10).

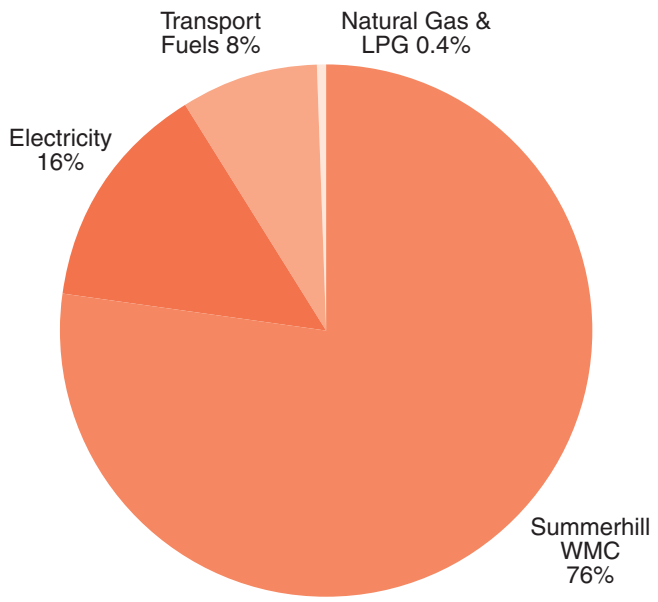


Figure 10: The City of Newcastle - Scope 1 & 2 Emissions in 2008/09

Emissions from Summerhill WMC have been included in Council's Scope 1 footprint because it is likely that Council will be required to report on, and be financially accountable for them in the future. However, emissions from landfill could be considered a community emission, in that the majority of waste received at Summerhill WMC is from non-Council sources. While Council has control over the waste generated from its corporate activities (such as park maintenance and road construction), it deposits around just one-third of the waste received at Summerhill WMC each year, with approximately two-thirds of this waste arising from residential sources (such as kerbside garbage collections and green waste drop-off days).

Council can influence the amount of landfill waste from municipal sources through measures such as the introduction of alternative collection systems (for example, green waste bins), with limited capacity to influence commercial/industrial sources via the introduction of pricing mechanisms that encourage sorted loads. The amount of waste received, however, relies largely upon the behaviours and actions of those generating and diverting the waste.

Council's Scope 1 and 2 emissions, excluding those from Summerhill WMC, are presented in Figure 11. Excluding landfill emissions from the analysis shows that electricity consumption constitutes two-thirds of Council's corporate emissions. The majority of this electricity is used in buildings (65%), followed by beaches and pools (15%), parks and amenities blocks (7%) and the Council-owned caravan park (6%) in Stockton (Figure 12).

The reporting of Scope 3 emissions is not mandatory under the NGER legislation. The boundary of this scope is determined by organisations on an individual basis and is generally best limited to activities that can be

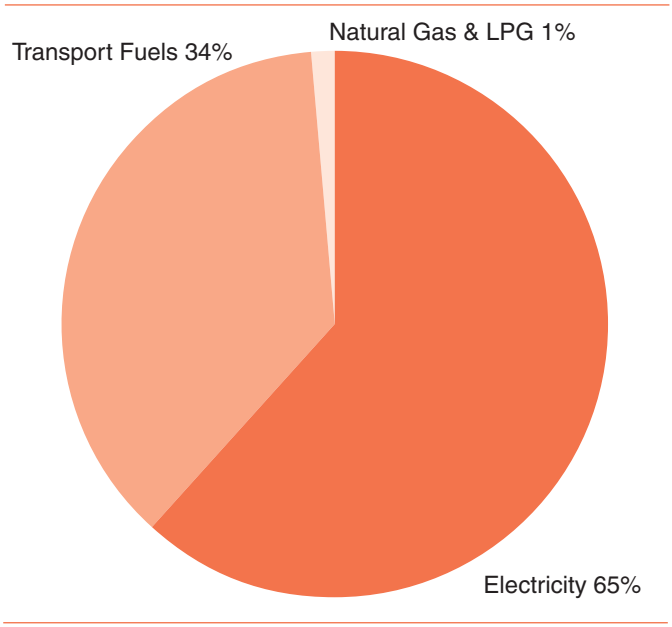


Figure 11: The City of Newcastle - Scope 1 & 2 Emissions in 2008/09 excluding Summerhill WMC

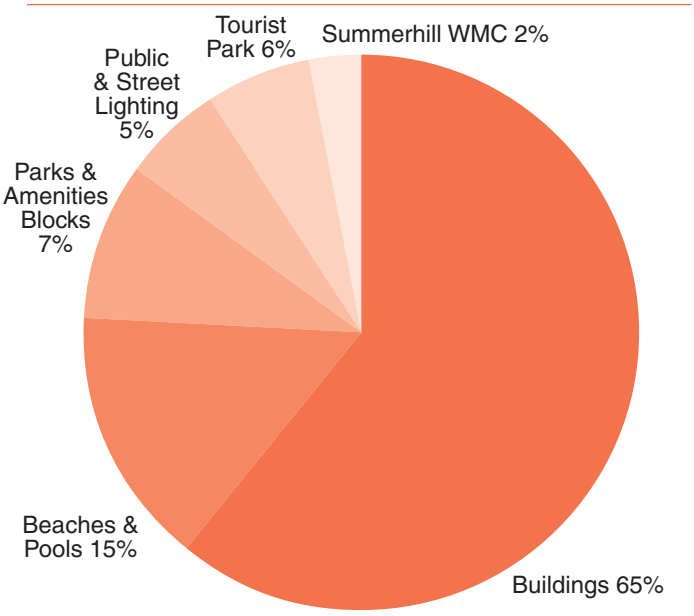


Figure 12: The City of Newcastle - Electricity Use by Facility Type

quantified and influenced. Council has commenced work in this area, including calculating upstream fuel emissions, emissions associated with paper and water consumption, and emissions attributable to community street lighting. The contribution of these emissions to Council's total carbon footprint is illustrated in Figure 13.

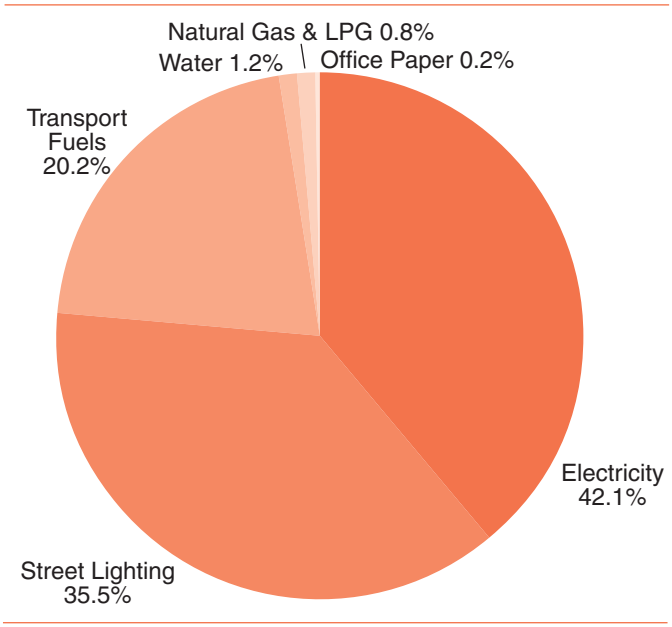


Figure 13: The City of Newcastle- Scope 1, 2 & 3 Emissions in 2008/09 excluding Summerhill WMC

Council recognises its ability to reduce emissions from air (and road) travel by exploring opportunities such as video conferencing and will endeavour to include air travel emissions in its future Scope 3 emissions reporting. Council does not currently have data on emissions arising from waste generated through corporate activities. However, an assessment of the waste stream has been undertaken to identify reduction, reuse and recycling opportunities.

Although Council is financially responsible for the operation and maintenance of street lighting infrastructure and the electricity consumed, it has no control over its efficiency. However, with emissions from street lighting comparable to those from corporate electricity consumption (Figure 13), it is essential that Council actively engages in programs and partnerships which have the ability to realise increased efficiency in both electricity consumption and maintenance practices, through the upgrade of street lighting and adoption of new technology. It is for this reason that street lighting is included as a key focus area in this plan.

Water Consumption

With an annual usage of over 350 ML of mains water, Council accounts for just 2% of the Newcastle LGA water footprint. Almost two-thirds of this consumption is for irrigation of parks, sporting fields and open spaces and the operation of swimming pools and beach facilities (Figure 14). Water used in Council buildings, accounting for one-fifth of the total usage, is another opportunity for water efficiency improvements.

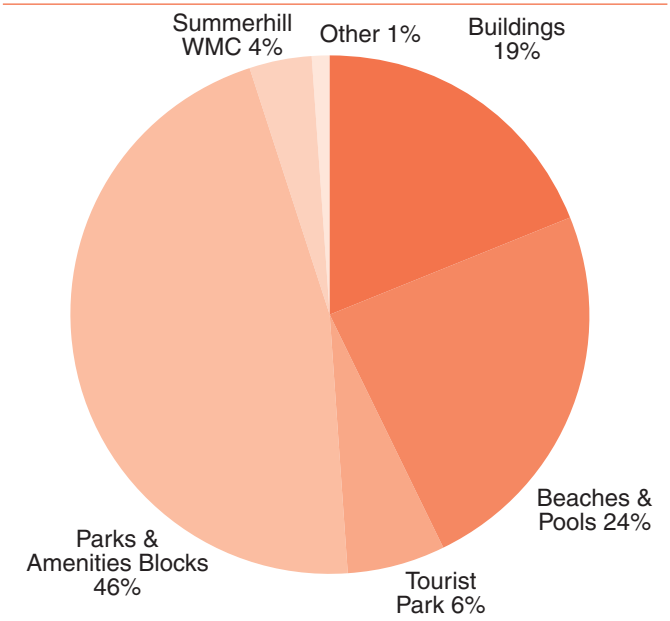


Figure 14: The City of Newcastle - Mains Water Use by Facility Type

Council Operations Aspirational Goals

By 2020, The City of Newcastle is aiming for:

- 30% reduction* in Council's carbon footprint
- 50% reduction* in Council's potable water usage
- 30% reduction* in Council's electricity usage
- 20% reduction* in Council's fossil-based liquid fuels usage
- 80% reduction# in Council's operational waste going to landfill
- 30% of Council's electricity supplied from low carbon sources
- 80% of Newcastle's streetlights using best practice energy technology
- 15,000 new street and park trees planted throughout the city.

* over 2008-09 levels
# over 2010 levels

Council Operations Actions

Refer Table Key on page 68 and Acronyms on page 69.

Step	Ref	Action	By Whom	By When
Commitment	NCC-01	Endorse the development and implementation of the CWMAP using the ClimateCam Delivery Framework.	Council	Complete (2010)
	NCC-02	Take all necessary action to ensure that the required funding and resources are afforded to the implementation of actions based upon an internal rate of return of 10% (10-year pay back), or following consideration of other drivers such as alignment with strategic objectives, contribution to achieving carbon and water targets.	ELT	Complete (2010)
Policy	NCC-03 	Develop and adopt an Electricity and Gas Usage and Management Policy for the organisation, that includes specific references to: › electricity and gas allocations and budgets for individual service units › the assignment of responsibility to Service Unit Managers to monitor and report on their unit's performance in achieving allocations and budgets › project funding allocation parameters › hours of operation › minimum performance standards for all new buildings, structures and major renovations › minimum star-rating of appliances › the provision and operation of heating and cooling systems › the heating of outdoor swimming pools › the progressive switch to low-carbon energy sources and generation › staff education.	ECCS, SPS, GCS	2012
	NCC-04 	Develop and adopt a Water Usage and Management Policy for the organisation, that includes specific references to: › times of use › water allocations and budgets for individual service units › the assignment of responsibility to Service Unit Managers to monitor and report on their unit's performance in achieving allocations and budgets	ECCS, PMS, SPS, GCS	2012

Step	Ref	Action	By Whom	By When
Policy		› project funding allocation parameters › minimum performance standards for all new buildings, structures and major renovations › minimum star-rating of appliances, fittings and buildings › water reuse and harvesting › irrigation system usage and installation › staff education.		
	NCC-05 	Develop and adopt a Liquid Fuels Policy for the organisation, that includes specific references to sustainable fuel selection and driver education.	SPFMS, CPS, ECCS, SPS, GCS	2012
	NCC-06 	Develop and adopt a Waste Avoidance and Resource Recovery (WARR) Policy to provide a strategic framework for the development of a sustainable waste management and resource recovery strategy for the Newcastle community and Council operations, with specific reference to: › legislative and statutory drivers, including the NSW Government's waste standards and landfill diversion targets › the NSW Waste Hierarchy (as defined by the WARR Act 2001) of avoidance, resource recovery and safe disposal › best practice waste avoidance, resource recovery and landfilling operations › Council's Business Excellence Framework, incorporating a systems-based approach and continual improvement, to waste and resource management › staff education.	CPS, CES, ECCS, SPS, GCS	Complete (2010) Review every two years
	NCC-07 	Develop and adopt a Street Lighting Management Policy for the organisation, that includes specific references to: › project funding allocation parameters › operation controls and preferred technology › the option to transition to a model where council owns and operates street lighting systems wherever possible › the progressive switch to energy efficient, long-life luminaires and lamps and alternative energy e.g. LED › the progressive switch to low-carbon energy sources and generation.	ECCS, InfraMS, SPS, GCS	2012

Step	Ref	Action	By Whom	By When
Communication	NCC-08	Develop a communication strategy to engage Council staff in the implementation of the CWMAP.	CSCCS, ECCS	2012
	NCC-09	Develop a communication plan for all major programs and projects to ensure the engagement of all key stakeholders and adequate reporting.	CSCCS, ECCS	Ongoing
Baseline Information	NCC-10	Complete a detailed footprint that documents the consumption and carbon pollution data for all Council operational activities at a site-based level, including electricity, gas, liquid fuels and water.	ECCS	Complete (2011)
	NCC-11	**Lighting -** Undertake an audit of Council lighting systems to identify opportunities for efficiency improvements.	RAMS, ECCS, SPFMS, InfraMS	In Progress
	NCC-12	**Heating, Ventilation and Cooling (HVAC) -** Undertake an audit of Council HVAC systems in regard to efficiency, rationalisation and appropriateness.	RAMS, ECCS, SPFMS, InfraMS	In Progress
	NCC-13	**Out of Hours Consumption -** Undertake an audit of Council facilities to identify all unnecessary use of electricity and gas, specifically at times when facilities are not occupied or fully utilised.	RAMS, ECCS, SPFMS, InfraMS	Complete (2011)
	NCC-14	**Low Carbon/Renewable Energy Generation -** Undertake an audit and feasibility study of Council facilities to identify the potential for on-site low-carbon electricity generation, including solar photovoltaic (PV), wind and gas-fired sources.	RAMS, ECCS, SPFMS, InfraMS	2013
	NCC-15	**Aquatic Facilities -** Undertake an audit and review of mechanical services at all Council-owned aquatic facilities.	RAMS, ECCS, SPFMS, InfraMS	2014
	NCC-16	**Street lighting -** Undertake an audit and establish a database that validates and documents the luminaries and lamp type, maintenance and consumables for street lighting, in order to identify opportunities for efficiency improvements and upgrades.	InfraMS, ECCS, RAMS, SPFMS	2013
	NCC-17	**Water Management -** Undertake an audit of Council sites to identify water reduction opportunities such as leak detection, upgrades to appliances and fittings, water harvesting and reuse.	ECCS, PMS, SPFMS, InfraMS, RAMS	2013

Step	Ref	Action	By Whom	By When
Baseline Information	NCC-18	**Irrigation -** Undertake an audit of Council irrigation systems in regards to efficiency, appropriateness and opportunities to access alternatives to mains water.	ECCS, PMS, SPFMS, InfraMS, RAMS	2013
	NCC-19	**Aquatic Facilities -** Undertake a review of all Council-owned aquatic facilities to identify opportunities to reduce water consumption including leak detection and backwash reuse.	ECCS, PMS, SPFMS, InfraMS, RAMS	2013
	NCC-20	**Waste -** Undertake a baseline waste assessment for representative Council facilities and operations to determine waste volumes and compositions, current levels of source separation and recycling and opportunities for application of the NSW Waste Hierarchy. This information will set the reference points for all future targets. Representative facilities and operations to be assessed are: › road construction and assets operations (civil construction) › Turton Road Depot › City Administration Centre (office facility) › Lambton Pool (aquatic facility) › Wallsend District Library (community facility) › Civic Precinct venues (commercial enterprise).	CPS, CES, ECCS	2012
	NCC-21	**Carbon Sequestration -** Undertake a review of all tree planting programs within the organisation with the view to publicly report the number of new trees planted in the city each year.	ECCS	2012
Monitoring & Reporting	NCC-22	Undertake improvements to Council's electricity, gas, water and liquid fuels account management and monitoring process in order to: › provide better access to site-level consumption and cost data for all Service Unit Managers › enable Service Unit Managers to track and report on their performance against established targets › maintain a current account listing for each asset and ensure that accounts are promptly cancelled when properties/assets are disposed › consolidate billing and obtain electronic usage and billing summaries for all accounts › include account data within Council's Asset Register › provide staff with access to consumption data on the ClimateCam portal on Council's intranet › improve recording practices for mobile fuel dispensing.	InfoMS, FS, ECCS, InfraMS, GCS	2012

Step	Ref	Action	By Whom	By When
Monitoring & Reporting	NCC-23	Partner with energy and water utilities, service providers and hardware vendors to work towards the provision of real-time incremental energy and water consumption data for Council sites to assist in ongoing consumption reduction.	ECCS	Ongoing
	NCC-24	Establish a star rating system for Council's 20 largest energy and water consuming sites to report on the progressive improvements of each facility.	ECCS	2011
	NCC-25	Undertake improvements to Council's street lighting account management and monitoring process in order to: › provide better access to consumption and cost data › maintain a current account listing and ensure that accounts are promptly cancelled when street lights are removed or changed.	ECCS, InfraMS, FS	2013
	NCC-26	Establish a waste monitoring system to provide Service Unit Managers and staff members with access to: › the findings of baseline waste assessments › the results of waste assessments following the implementation of sustainable waste management systems and resource recovery initiatives › information on the performance of the organisation and individual service units in waste reduction and resource recovery.	ECCS, InfoMS, CPS, CES	2012
	NCC-27	Provide a quarterly carbon and water management performance report to ELT, Council and the Environment Advisory Committee.	ECCS, GCS	Ongoing
	NCC-28	Report the number of trees planted by Council on the ClimateCam monitoring system.	ECCS	Ongoing
Team Work & Partnerships	NCC-29	Establish a Carbon and Water Management Team to oversee the implementation of the CWMAP pertaining to Council operations. This team shall have representation from all Council service units and an Executive Leadership Team member.	ECCS	Complete (2011)
	NCC-30	Establish a short-term Street Lighting Working Group within Council to oversee the progressive implementation of actions identified through the CWMAP process.	ECCS, InfraMS, RAMS	2011

Step	Ref	Action	By Whom	By When
Team Work & Partnerships	NCC-31	Explore alternative options for the provision of street lighting, including possibilities to transfer ownership and operations from third party providers to Council.	InfraMS, ECCS	Ongoing
	NCC-32	Form strategic partnerships with organisations that can add value to the CWMAP implementation process, such as educational institutions, research organisations, local utilities, government and non-government bodies and community groups.	ECCS	Ongoing
	NCC-33	Ensure strong links are formed between those within the organisation working on climate change mitigation and climate change adaptation to improve Council's overall capacity to understand and respond to climate change in a consistent manner.	ECCS, SPS	Ongoing
	NCC-34	Investigate the feasibility of establishing a user-pays system with Park Committees, Section 355 Committees and other relevant community groups to ensure a greater commitment and accountability to ongoing energy and water conservation at Council's parks, sporting and community facilities. This would be accompanied by technical support and advice to assist in achieving mutually-beneficial efficiency improvements.	PMS, LS, GCS, FS, SPFMS, ECCS	2012
Knowledge & Capacity	NCC-35	Provide staff members with information and tools that support a whole-of-organisation approach to carbon and water management.	ECCS, InfoMS, CSCCS	2013
	NCC-36	Produce a learning and development plan for all staff and Councillors, in order to grow the corporate knowledge and capability to meet carbon and water targets and review annually. It is envisaged that this plan will fall under the broader framework of Ecologically Sustainable Development and Climate Change Mitigation and Adaptation in order to provide staff with a holistic understanding of environmental and climate change issues and management responses.	HRS, ECCS, SPS	Ongoing with annual review
	NCC-37	Meet regularly with neighbouring councils to share current thinking and ideas and identify opportunities to work collaboratively with the view to maximising the positive effect of a regional approach to carbon and water management.	ECCS	Ongoing

Step	Ref	Action	By Whom	By When
Target Setting	NCC-38	Establish and adopt electricity, gas, liquid fuels and water consumption and carbon pollution targets, based upon the analysis of information collected in the form of baseline data, the consideration of market drivers, financial viability and available technologies.	Carbon & Water Management Team	Complete
	NCC-39	Establish and adopt waste reduction and resource recovery targets, based upon the analysis of information collected in the form of baseline data, the consideration of market drivers, financial viability and available technologies.	Carbon & Water Management Team	Complete
	NCC-40	Establish and adopt street lighting expenditure and related electricity consumption targets, based upon the analysis of information collected in the form of baseline data, the consideration of market drivers, financial viability and available technologies.	Street Lighting Working Group	2012
	NCC-41	Establish and adopt a water capture target as part of the establishment of the Water Sensitive City Vision.	Whole of Organisation	2013
	NCC-42	Establish and adopt a tree canopy target for the Newcastle LGA. This will need to take into consideration the net balance achieved through the planting and removal of trees.	SPS	2013
	NCC-43	Assign responsibilities to relevant Service Unit Managers for the monitoring and reporting of progress against established targets for each focus area.	ELT	Ongoing
Innovation & New Ideas	NCC-44	Establish a process to actively gather and review ideas and concepts from Council staff members to reduce carbon pollution and water usage.	ECCS, InfoMS, CSCCS	2011
	NCC-45	Actively promote Newcastle as an international test laboratory for best practice carbon and water reduction technology and services for the national and international markets.	TEDS, ECCS	Ongoing
	NCC-46	Establish and adopt a Water Sensitive City Vision for the Newcastle LGA in consultation with the community and relevant utilities/agencies.	Whole of Organisation	2014

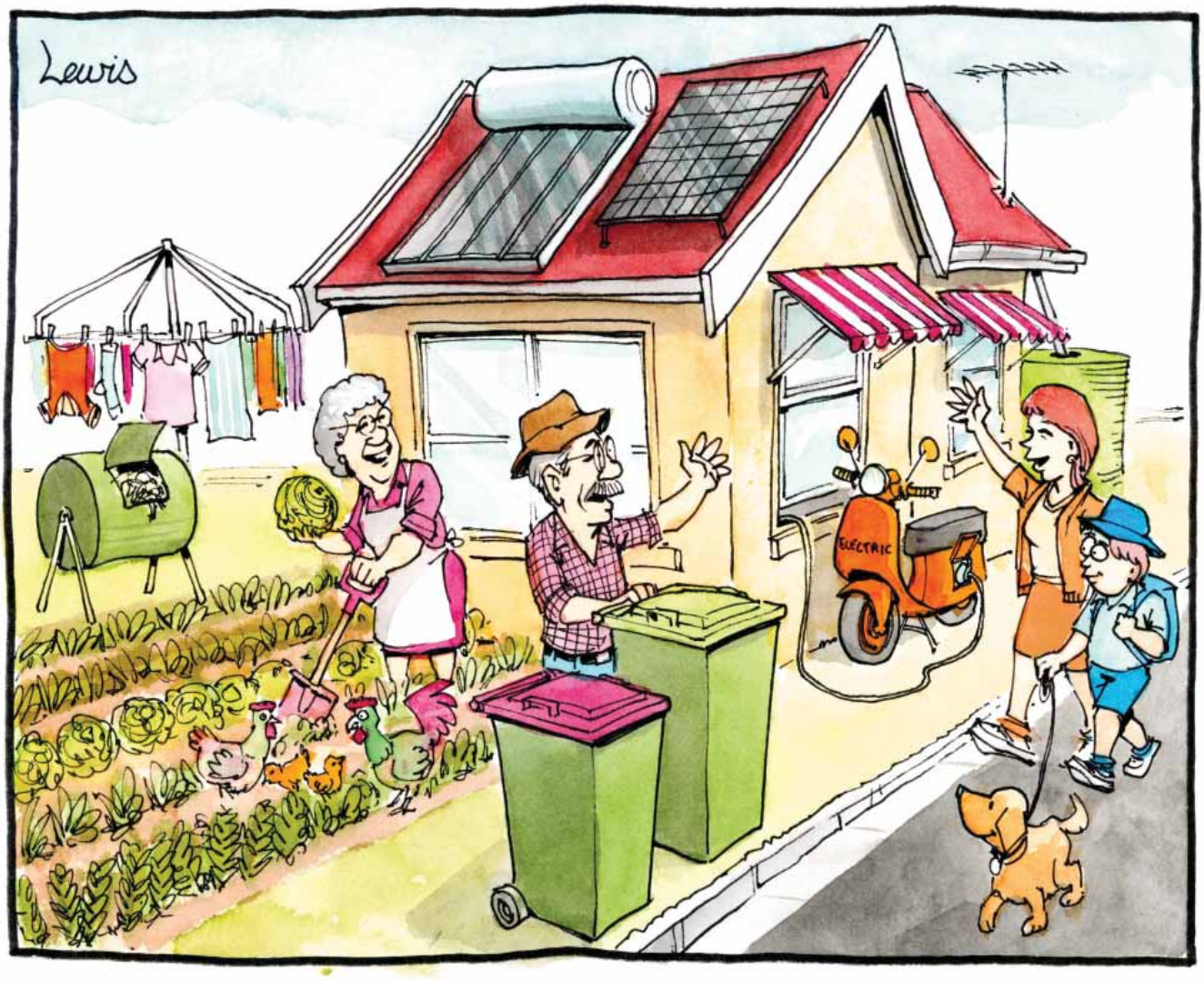
Step	Ref	Action	By Whom	By When
Research & Piloting	NCC-47	Develop the Innovation Matrix process to clearly define the steps for identifying and prioritising new and emerging technologies and processes to be researched and piloted as part of the CWMAP.	ECCS	2012
	NCC-48	Utilise the Innovation Matrix process to engage with product and service providers to test the economic and environmental performance of new and emerging technologies and services within Council's facilities and operations, with a view to progress successful pilot projects to full-scale implementation. Ensure wherever possible that local research partners have access to performance results and technical data.	ECCS, Carbon & Water Management Team	Ongoing
	NCC-49	Utilise the Newcastle Regional Museum in Honeysuckle as Council's leading showcase and test platform for new and emerging clean technologies, ensuring that the showcase elements are clearly communicated to visitors of the facility.	ECCS, NRM	Ongoing
	NCC-50	Pilot water-harvesting options identified through the Water Sensitive City Vision, with the view of progressing to full-scale implementation if viable.	ECCS, InfraMS, RAMS	2013
	NCC-51	Plan and implement, if viable, a Council-owned and operated street lighting solution in the proposed Hunter Street Revitalisation project, to test current LED technology and Solar PV power systems.	ECCS, InfraMS, SPS, RAMS, TEDS	TBD
	NCC-52	Plan and implement, if viable, a Council-owned and operated street lighting solution in the proposed Merewether Precinct Revitalisation project, to test current LED technology and Solar PV power systems.	ECCS, InfraMS, SPS, RAMS, TEDS	2012
Low Hanging Fruit	NCC-53	Identify and prioritise carbon and water actions based upon their internal rate of return, alignment with strategic objectives and/or potential for resource efficiency improvements and carbon reductions.	TBD	Ongoing
Implementation	NCC-54	Promote the findings of all pilot studies and research on Council's intranet and seek implementation partners to take these pilots through to full-scale deployment.	TBD	Ongoing
	NCC-55	Implement priority actions identified as Low Hanging Fruit and verified through Research & Piloting.	TBD	Ongoing

Step	Ref	Action	By Whom	By When
Implementation	NCC-56	Implement carbon and water reduction projects and programs that assist in meeting aspirational goals.	ECCS	Ongoing
	NCC-57	Continue to implement measures identified in the Newcastle Energy and Water Savings Action Plan 2007 (review date 2011).	ECCS	Ongoing, review in 2015 and 2019
	NCC-58	Implement low-carbon energy-generation technologies at Council sites proven through the Innovation Matrix.	ECCS, RAMS, InfraMS	Ongoing
	NCC-59	Implement actions identified as part of the Water Sensitive City Vision process.	ECCS, RAMS, InfraMS	Ongoing from 2013
	NCC-60	Implement actions identified in Council's Waste Avoidance and Resource Recovery Strategy.	ECCS, RAMS, InfraMS	Ongoing from 2012
	NCC-61	Continue the implementation of street tree planting as identified in the Street Tree Master Plan.	ECCS, RAMS, InfraMS, PMS	2030
	NCC-62	Continue the implementation of the Alternative Fuels Program, which aims to decrease usage of fossil-based fuels throughout Council operations.	SPFMS	Ongoing
Project Evaluation	NCC-63	Evaluate projects and programs in terms of actual project performance against expected performance, including resource efficiency improvements, carbon reductions and/or financial savings.	TBD	Ongoing
Case Studies	NCC-64	Complete detailed case studies for all significant / innovative projects to: › share and document knowledge and experiences › celebrate project outcomes and achievements › recognise the contributions and experiences of the individuals involved › report on barriers and lessons learnt › identify opportunities for replication and full-scale implementation.	TBD	Ongoing

Residential Sector

The Residential Sector is made up of over 140,000 individuals living within the Newcastle LGA.

There are over 63,000 private dwellings, with over 90% of these privately occupied and an average of 2.41 persons per household.



Residential Sector Footprint

Carbon Emissions

The City of Newcastle has estimated that the Residential Sector was responsible for the emission of 521,729 t CO_2-e in 2008, equating to approximately 4.3 t CO_2-e per person. In the absence of mitigation efforts, these emissions are likely to rise with population growth. Figure 15 shows the contribution of each emissions source to the total residential carbon footprint.

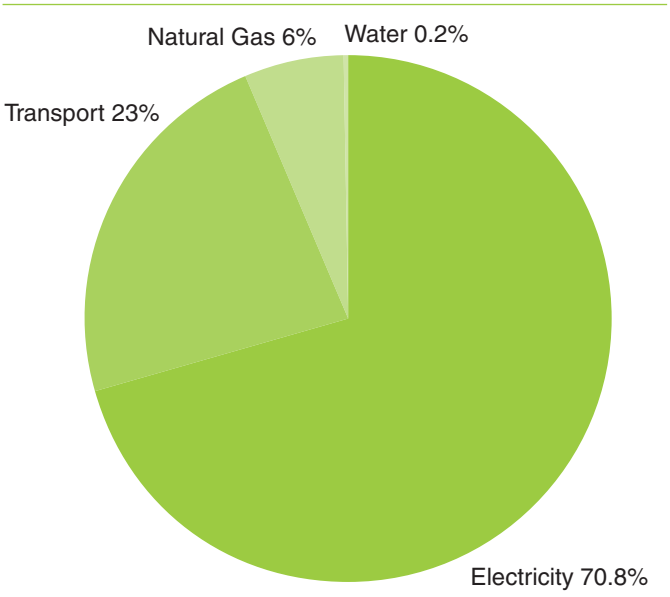


Figure 15: Residential Sector - Scope 1 & 2 Emissions in 2008

Electricity use makes up the majority (71%) of the residential carbon footprint and is therefore a key focus area for emissions reductions. Improving usage efficiency is also a primary way to reduce household energy expenditure. Reducing electrical demand during periods of peak system usage can bring further benefits such as helping to avoid or delay the need for costly electricity infrastructure investment, improving electricity system reliability and minimising system losses.

The typical breakdown of electricity use in the home is shown in Figure 16, with the most significant opportunities for emissions reductions being water heating (37%) and space heating and cooling (22%), followed by lighting and cooking (both 9%), refrigeration (7%) and other appliances (including unnecessary standby power use).

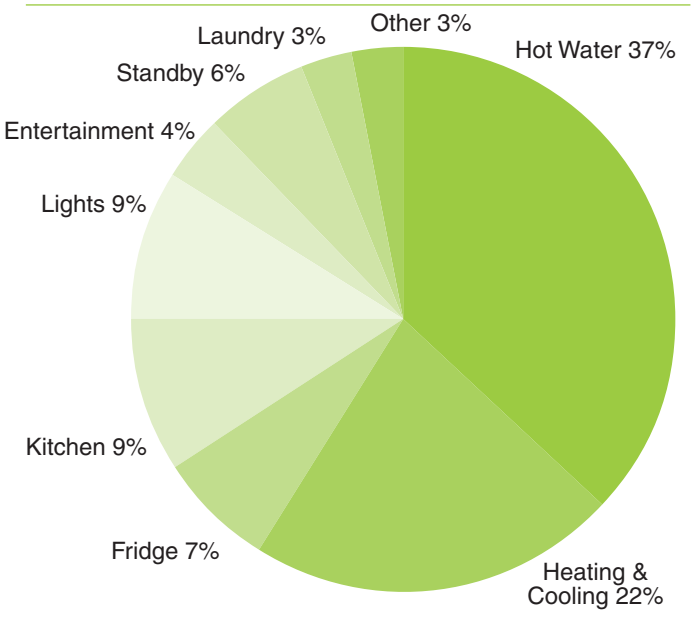


Figure 16: Typical breakdown of electricity consumption by appliance in the home (EnergyAustralia, 2010)

Emissions arising from waste generation by the Residential Sector have not been included in the carbon footprint. While Council has been able to estimate total emissions arising from its landfill operations, apportioning this to each sector is complex, in that the amount of waste disposed is not directly correlated to the amount of emissions generated. Rather, landfill emissions are influenced by the amount of degradable carbon present in the waste material. For instance, garden and food waste will generate higher levels of emissions than plastics. Estimates of the Residential Sector's waste emissions may become available in the

future, through data being collected from waste audits commissioned by Council.

It should be noted that the carbon footprint outlined above is based on calculating readily quantifiable emissions sources that occur directly within the Newcastle LGA. It therefore does not reflect the complete carbon footprint of the Residential Sector. For instance, it does not take into account the emissions embodied in products manufactured using inputs of stationary energy and water from outside the Newcastle LGA, such as food, steel and household goods. The emissions calculated in the footprint above are likely to constitute less than one-third of all direct and indirect emissions generated by the average household, as illustrated by Figure 17.

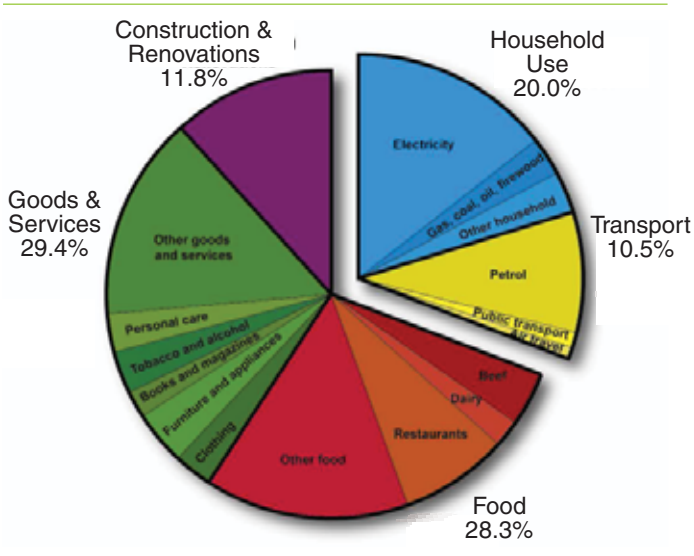


Figure 17: Average household profile: greenhouse gas pollution (ACF, 2007)

While a reduction in stationary and transport energy use is vital for reducing residential carbon emissions, in order to drive deep cuts in emissions, it is imperative that individuals rethink consumption, purchase wisely and reduce wastage. This need not mean going without but rather substituting patterns of material consumption towards other forms of lifestyle enjoyment and fulfilment, such as education, art, personal services, outdoor leisure activities and sports. Council can play a role in this regard by providing community education programs on actions such as sustainable purchasing (for example, energy efficient appliances, Green Power and recycled products), food-waste avoidance and growing food locally.

The emissions associated with household consumption illustrates how energy efficiency improvements, sustainable production methods and a transition towards the provision of services (as opposed to goods) in the Business Sector can assist in lowering the Residential Sector carbon footprint.

Water Consumption

The Residential Sector consumed 10,460 ML of potable water in the 12 months leading up to April 2009, an average of 74,000 litres per person. Figure 18 shows the breakdown of water consumption within the average household. Although water used in baths/showers (25%) and outdoor areas (24%) make up half the total, the breakdown illustrates that targeted action in all areas of usage will drive water reductions.

Similar to the carbon pollution generated by households, the water used to produce the foods and goods consumed by individuals outweighs the water used directly within the home (Figure 19). The largest contributor to the average household water footprint is food production (46%). The NSW Government has estimated that 38% of the average household's garbage contents is wasted food, totalling 315 kilograms each year at an annual cost of $1,036 to the householder in 2010 (DECCW, 2010).

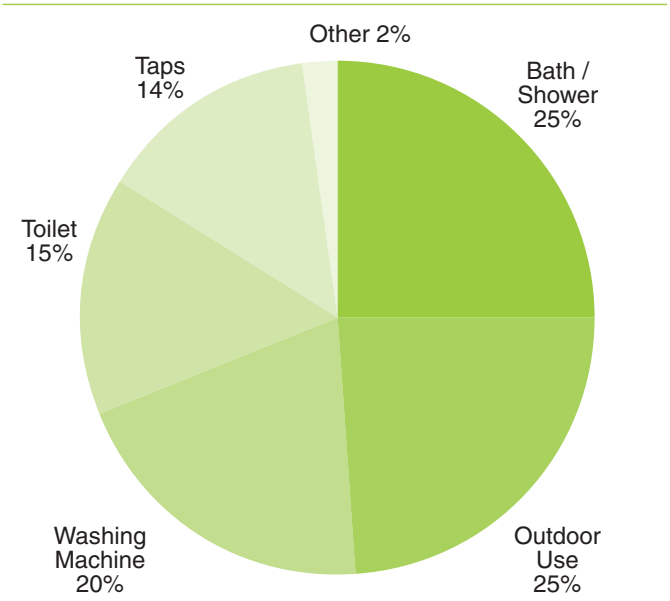


Figure 18: Typical breakdown of water use in the home (M. Conner, Hunter Water, personal communication, 27 April 2010)

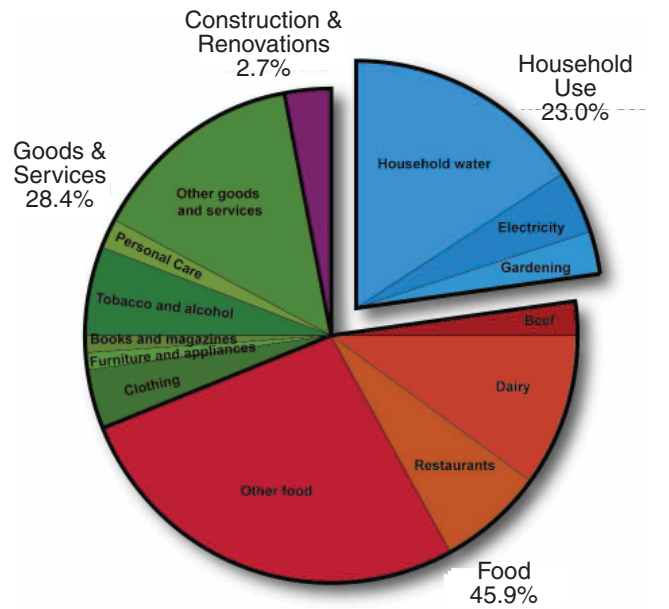


Figure 19: Average household profile: water use (ACF, 2007)

Residential Sector Aspirational Goals

By 2020, The City of Newcastle is aiming for:

- 30% reduction in per capita carbon emissions below 2008 levels
- 100% of homes to have replaced electric element storage hot water with solar hot water or energy efficient alternatives, such as high efficiency instantaneous gas and heat pumps
- 50% of homes to have solar photovoltaic (PV) systems installed
- 90% of homes to have ceiling insulation
- 100% of homes to have access to rich real-time energy data
- 10% of Newcastle houses to be participating in peak load reduction programs (other than off peak hot water)
- 8,000 second fridges to be removed from Newcastle households
- 75% of domestic waste to be diverted from landfill (with an interim target of 66% by 2014)
- 100% of homes to have a sustainability rating
- 15% reduction in per capita mains water consumption below 2008 levels
- 90% of homes to have water efficient (three-star or above) showerheads
- 90% of homes to have water efficient (three-star or above) tapware
- 80% of homes to have water efficient (three-star or above) washing machines
- 95% of homes to have dual flush toilets
- 50% of freestanding homes to have rainwater tanks.

Residential Sector Actions

Step	Ref	Action	By Whom	By When
Commitment	RES-01	Endorse the development and implementation of the CWMAP using the ClimateCam Delivery Framework.	Council	Complete (2010)
	RES-02	Integrate a request for residents to make a verbal, written or public commitment to adopt a new or preferred behaviour when designing major programs and projects that engage the Residential Sector in the CWMAP.	ECCS	Ongoing
Policy	RES-03	Develop and adopt a Strategic Climate Change Policy inclusive of commitments to undertaking carbon mitigation action within Newcastle.	SPS	Complete (2010)
	RES-04	Raise awareness and drive uptake of Federal and State Government residential energy and water rebates and programs.	ECCS	Ongoing
	RES-05	Advocate to the Federal and State Government to develop policies and invest in mechanisms that reduce carbon emissions and promote water conservation, including programs and subsidies that can promote the uptake of sustainable technologies by the residential sector.	ECCS, SPS	Ongoing
	RES-06	Develop and adopt a set of low-carbon and low-water building performance enhancements for inclusion in the city's Development Control Plan (DCP) for all new dwellings and major renovations.	ECCS, SPS	Complete (2011) Review in 2015
	RES-07	Develop and adopt a Waste Avoidance and Resource Recovery (WARR) Policy to provide a strategic framework for the development of a sustainable waste management and resource recovery strategy for the Newcastle community, with specific reference to: › legislative and statutory drivers, including the NSW Government's waste standards and landfill diversion targets › the NSW Waste Hierarchy (as defined by the WARR Act 2001) of avoidance, resource recovery and safe disposal › best practice waste avoidance, resource recovery and landfilling operations › a continuous improvement approach › community education.	CPS, CES, ECCS, SPS, GCS	Complete (2010) Review every two years

Step	Ref	Action	By Whom	By When
Communication	RES-08	Initiate discussion and planning with stakeholders in the development of the CWMAP who can assist in engaging the residential sector.	ECCS	Complete (2010)
	RES-09	Develop a communications plan for all major programs and projects designed to engage the Residential Sector in the implementation of the CWMAP.	ECCS, CSCCS	Ongoing
Baseline Information	RES-10	Obtain baseline information for the Residential Sector on a range of carbon and water indicators that will assist in the identification of priority actions, including: › energy and water usage profiles for dwellings › number of residences with water-efficient technology, including low-flow shower heads, dual flush toilets and rainwater tanks › number of residences with electric storage hot water systems › number of residences with solar electricity systems › number of residences with ceiling insulation › volume and composition of waste presented for kerbside recycling and garbage collection.	ECCS	Complete (2011) Review in 2015
Monitoring & Reporting	RES-11	Improve the online ClimateCam monitoring system in regards to: › update the methodologies utilised for calculating emissions › the presentation and interpretation of consumption and pollution data › the inclusion of carbon sinks (e.g. street trees) › monitoring and reporting of progress towards aspirational goals.	ECCS, InfoMS	2013
	RES-12	Provide ratepayers with access to a sustainability rating for households.	ECCS	2015
Monitoring & Reporting	RES-13 	Facilitate the opportunity for all residences to gain access to real-time incremental energy and water consumption information and data to assist in ongoing consumption reduction activity. Partner with the relevant energy and water utilities, service providers and hardware vendors to achieve this outcome.	ECCS	Ongoing

Step	Ref	Action	By Whom	By When
Monitoring & Reporting	RES-14	Facilitate the opportunity for all residences that have solar photovoltaic (PV) systems to gain access to real-time and cumulative performance data for their individual systems to ensure maximum ongoing efficiency and output.	ECCS	Ongoing
	RES-15	Provide an annual carbon and water management performance report to ELT and Council.	ECCS, GCS	Ongoing
Team Work & Partnerships	RES-16	Work with stakeholders, such as Together Today, Transition Towns and Climate Action Newcastle, to identify and assist with the implementation of programs and initiatives that can assist the Residential Sector to reduce their carbon and water footprints.	ECCS	Ongoing
	RES-17	Provide a platform for environmental groups and service providers to communicate their carbon and water management service capabilities to the Residential Sector.	ECCS	Ongoing
Knowledge & Capacity	RES-18	Work with a range of strategic partners, including educational organisations, energy and water utilities and government agencies, to provide a series of learning resources and education programs for residents.	ECCS	Ongoing
Target Setting	RES-19	Establish aspirational goals targeting carbon emissions and water consumption for the Residential Sector in consultation with the community.	ECCS	Complete (2011)
Innovation & New Ideas	RES-20	Actively promote Newcastle as an international test laboratory for best practice carbon and water reduction technology and services for the national and international markets.	TEDS, ECCS	Ongoing
	RES-21	Facilitate the establishment of an Innovation Hub in partnership with strategic organisations including the CSIRO, University of Newcastle, Together Today and energy and water utilities. The purpose of the Innovation Hub will be to identify appropriate new and emerging technologies and practices that can be applied across the city that will help to achieve the vision and targets of the CWMAP.	ECCS	2012

Step	Ref	Action	By Whom	By When
Research & Piloting	RES-22	Facilitate the on-ground testing of identified products and services that emerge and ensure wherever possible that local research partners have access to performance results and technical data.	ECCS	Ongoing
Low Hanging Fruit	RES-23	Assist residents to identify and prioritise carbon and water reduction initiatives that have high rates of return and/or potential for resource efficiency improvements and carbon reductions.	ECCS	Ongoing
Implementation	RES-24	Assist residents to implement priority actions identified as Low Hanging Fruit and verified through Research & Piloting.	ECCS	Ongoing
	RES-25	Promote the findings of all pilot studies and research on the ClimateCam portal and seek implementation partners to take these pilots through to full-scale deployment.	ECCS	Ongoing
	RES-26 	**Low Income Households -** Assist low income earners, pensioners and disadvantaged members of the community to reduce energy and water consumption.	ECCS	Ongoing
	RES-27 	**Rental Properties -** Assist tenants and landlords to reduce energy and water consumption within rental properties.	ECCS	Ongoing
	RES-28 	**Solar PV -** Promote the installation of solar PV systems, including education about various technologies and available rebates and incentives. Investigate opportunities for broad scale roll-out programs with long-term payment options.	ECCS	Ongoing
	RES-29 	**Sustainable Hot Water -** Raise awareness about sustainable hot water systems, including system options and available rebates and incentives. Investigate opportunities for broad scale roll-out.	ECCS	Ongoing
	RES-30 	**Sustainable Hot Water -** Assist with research into householder use of solar hot water systems and use the findings to run education programs focused on maximising the contribution of solar into water heating.	ECCS	Ongoing
	RES-31 	**Renewable Energy -** Increase the uptake of renewable energy, such as GreenPower.		

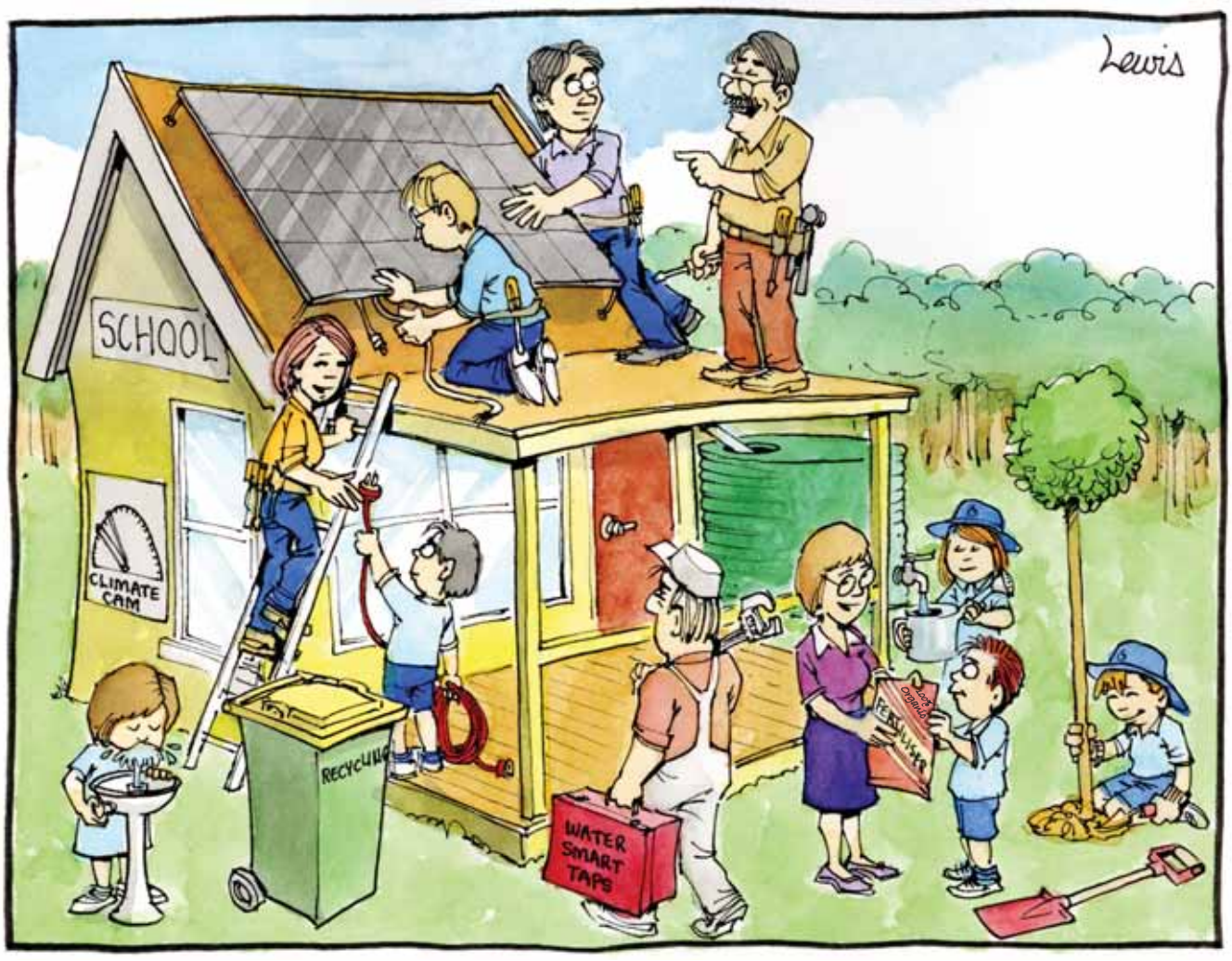
Step	Ref	Action	By Whom	By When
Implementation	RES-32	**Thermal Efficiency -** Promote and encourage improvements to the thermal efficiency of homes, including ceiling insulation and draught sealing. Investigate opportunities for programs that offer reductions in financial outlay for residents and landlords.	ECCS	Ongoing
	RES-33	**Fridge Removal -** Work with the NSW Government to extend its Fridge Buyback Program to the Newcastle LGA and actively promote the program to residents.	ECCS	Ongoing
	RES-34	**Demand Side Management (DSM) -** Raise awareness of DSM issues among residents, including opportunities to alter electricity usage patterns so as to divert electricity demand to periods outside of peak system usage.	ECCS	Ongoing
	RES-35	**DSM -** Actively promote the Newcastle LGA as a location for DSM trials and register the interest of households prepared to participate in such programs.	ECCS	Ongoing
	RES-36	**Transport -** Raise awareness among residents of opportunities to reduce transport emissions, including low emission vehicles, correct vehicle maintenance and driving behaviour, public transport, and cycling and pedestrian facilities.	ECCS	Ongoing
	RES-37	**Food -** Provide educational opportunities about sustainable food choices and production.	ECCS	Ongoing
	RES-38	**Sustainable Consumption -** Encourage residents to practice sustainable resource consumption and environmental purchasing.	ECCS	Ongoing
	RES-39	**Waste Education -** Continue to deliver Council's waste education program, promoting Council's waste services to residents and increasing knowledge of waste minimisation and correct recycling practices.	ECCS, CPS	Ongoing
	RES-40	**Food Waste -** Provide education programs targeting the diversion of food organics from landfill, including food waste avoidance and home composting / worm farming.	ECCS, CPS	Ongoing

Step	Ref	Action	By Whom	By When
Implementation	RES-41	**Resource Recovery -** Pilot and research alternative waste technologies and innovative resource recovery incentives.	ECCS, CES	Ongoing
	RES-42	**Resource Recovery -** Explore opportunities to increase resource recovery when renewing kerbside bulk waste collection contracts.	CPS, ECCS	2012
	RES-43	**Kerbside Recycling -** Continue to provide a three-bin kerbside collection service for the ongoing recovery of recyclables and organics.	CPS	Ongoing
	RES-44	**Kerbside Recycling -** Investigate increasing the capacity and/or frequency of residential kerbside recycling services.	CPS, ECCS	2012
	RES-45	**Kerbside Recycling -** Explore opportunities to recover additional types of materials when renewing kerbside recycling collection contracts.	CPS, ECCS	2012
	RES-46	**Electronic Waste -** Continue to provide electronic waste recycling services to recover metals, plastics and other materials.	CPS, ECCS	Ongoing
	RES-47	**Public Place Recycling -** Investigate opportunities to expand public place recycling bins within public areas.	ECCS, CPS	Ongoing
	RES-48	**Sustainable Events -** Develop and implement a Sustainable Events Management Policy for corporate and community events.	ECCS, CPS, TEDS	2013
	RES-49	**Water Efficiency -** Investigate and implement opportunities to provide water saving devices and technologies at low or no cost to the householder, such as showerhead exchange events.	ECCS	Ongoing
	RES-50	**Water Efficiency -** Deliver education programs targeting water conservation, water harvesting and water reuse.	ECCS	Ongoing
	RES-51	**Carbon Offsets -** Assess the feasibility of estimating the absorption of carbon from street trees and open space vegetation and the potential to use this to informally offset the Newcastle community's emissions.	ECCS	Ongoing

Step	Ref	Action	By Whom	By When
Project Evaluation	RES-52	Evaluate projects and programs undertaken within the Residential Sector in terms of actual versus expected outcomes and outputs, including resource efficiency improvements, carbon reductions and/or financial savings.	ECCS	Ongoing
Case Studies	RES-53	Complete case studies for significant/innovative projects undertaken in the Residential Sector to: › share and document knowledge and experiences with the wider community and other local governments › celebrate project outcomes and achievements; › recognise the contributions and experiences of the individuals involved › report on barriers and lessons learnt › identify opportunities for replication and full-scale implementation.	ECCS	Ongoing

Education Sector

The Education Sector covers government and non-government primary and secondary schools, early education centres, the Hunter TAFE (Hamilton, Hunter Street and Newcastle campuses) and the University of Newcastle (Callaghan Campus).These educational institutions provide training and education for over 70,000 students each year and employ approximately 7,000 individuals, who reside both within and outside the Newcastle LGA.



Education Sector Footprint

Carbon Emissions

Carbon emissions from the Education Sector are primarily related to the use of electricity, with some use of natural gas. The City of Newcastle has estimated that 42,000 t CO_2-e of emissions were generated from electricity use by the Education Sector in 2008. Figure 20 shows the breakdown of this electricity use between the University of Newcastle (all Newcastle campuses and facilities), Hunter TAFE (Hamilton, Hunter Street and Newcastle campuses) and public and catholic schools in the Newcastle LGA.

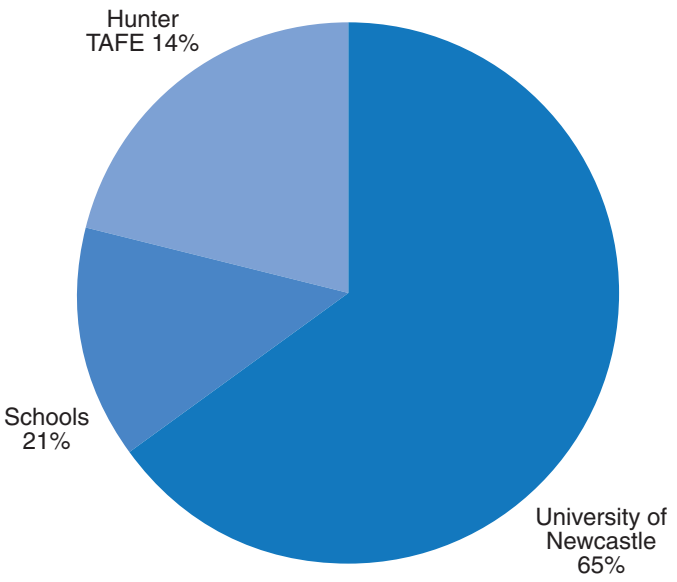


Figure 20: Education Sector - Electricity Use by Institution in 2008

The calculated emissions are based on real electricity consumption data for 2008 for the University of Newcastle and Hunter TAFE, and an estimate of electricity consumption by all Newcastle public and catholic schools. The school estimate has been extrapolated from reliable electricity consumption data for 22 schools to determine an electricity use per student value, which has then been applied to all schools based on the student population within the Newcastle LGA.

The collection of real electricity data for Newcastle schools and natural gas data for schools and the University of Newcastle was underway at the time of publication. Natural gas data for Hunter TAFE has been included in the emissions for the Education Sector presented in the Newcastle LGA carbon footprint by sector on page 14.

Although the contribution of the Education Sector to the carbon emissions of the Newcastle LGA is small in comparison to the residential and business sectors, these facilities are attended by over 70,000 students. The engagement of the Education Sector in the CWMAP can influence the carbon footprint of these other sectors through the transfer of knowledge and behaviour gained by students and staff.

Water Consumption

At the time of publication, water data was not available for the Education Sector. The City of Newcastle is working with each institution to obtain this data to establish a baseline and for future monitoring and reporting purposes.

The aspirational goals outlined on pages 50 to 53 have been established based on known opportunities to reduce potable water consumption in the Education Sector.

Education Sector Aspirational Goals

Catholic Schools Office

By 2020, The City of Newcastle in partnership with the CSO is aiming for:

- 100% of Catholic schools to have developed environmental management plans
- 100% of Catholic schools to have adopted carbon and water management policies
- 100% of Catholic schools to have completed detailed energy audits
- 100% of Catholic schools to have real-time energy monitoring
- 100% of Catholic schools to have real-time water monitoring
- 100% of Catholic schools to have water efficient (minimum three-star rating) hardware
- 100% of Catholic schools to have rain water storage or water reuse systems
- 100% of Catholic schools to have commingled recycling services
- 100% of Catholic schools to have reduced out-of-hours electricity use by 50%
- 100% of Catholic schools to have efficient lighting systems installed
- 100% of Catholic schools to have onsite renewable energy generation e.g. solar photovoltaic (PV) systems
- 100% of Catholic schools to have improved thermal efficiency of buildings
- 100% of Catholic schools to have sustainability ratings.

Catholic Schools Office
Maitland-Newcastle Diocese

Department of Education and Communities

By 2020, The City of Newcastle in partnership with DEC is aiming for:

- 100% of public schools to have developed environmental management plans
- 100% of public schools to have adopted carbon and water management policies
- 100% of public schools to have completed detailed energy audits.
- 100% of public schools to have real-time energy monitoring
- 100% of public schools to have real-time water monitoring
- 100% of public schools to have water efficient (minimum three-star rating) hardware
- 100% of public schools to have rain water storage or water reuse systems
- 100% of public schools to have commingled recycling services
- 100% of public schools to have reduced out-of-hours electricity use by 50%
- 100% of public schools to have efficient lighting systems installed
- 100% of public schools to have onsite renewable energy generation e.g. solar photovoltaic (PV) systems
- 100% of public schools to have improved thermal efficiency of buildings
- 100% of public schools to have sustainability ratings.

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Education Sector Aspirational Goals

Hunter TAFE - Hamilton, Hunter Street and Newcastle campuses

By 2020, The City of Newcastle in partnership with Hunter TAFE is aiming for:

- An environmental management plan to be developed and implemented for all campuses
- A carbon and water management policy to be adopted by all campuses
- 100% of campuses to have completed energy audits
- 100% of campuses to have real-time energy monitoring
- 100% of campuses to have real-time water monitoring
- 100% of campuses to have water efficient (minimum three-star rating) hardware
- 100% of campuses to have rain water storage or water reuse systems
- 100% of campuses to have implemented a comprehensive waste management strategy
- 100% of campuses to have reduced out-of-hours electricity use by 50%
- 100% of campuses to have efficient lighting systems installed
- 100% of campuses to have onsite renewable energy generation e.g. solar photovoltaic systems
- 100% of campuses to have improved thermal efficiency of buildings
- 100% of campuses to have sustainability ratings.

TAFE NSW HUNTER INSTITUTE

University of Newcastle - Callaghan Campus

By 2020, the City of Newcastle in partnership with the UoN is aiming for this campus to have:

- Developed and implemented an environmental management plan
- Adopted a carbon and water management policy
- Completed energy audits
- Real-time energy monitoring
- Real-time water monitoring
- Installed water efficient (minimum three-star rating) hardware
- Stormwater and rainwater capture and reuse projects
- Commingled recycling services
- Avoided unnecessary out-of-hours electricity use
- Efficient lighting systems installed
- Optimal use of renewable energy sources, including purchasing green power
- Improved thermal efficiency of buildings
- Ecological sustainable development building design standards for refurbishments, retrofits and new buildings.

Education Sector Actions

Step	Ref	Action	By Whom	By When
Commitment	EDU-01	Endorse the development and implementation of the CWMAP using the ClimateCam Delivery Framework.	Council	Complete (2010)
	EDU-02	Confirm the commitment of each participating Education Sector organisation - i.e. UoN, Hunter TAFE, CSO, DEC - to integrate a continuous improvement and reporting approach to carbon and water management into their operations.	ECCS	Complete (2010)
Policy	EDU-03	Encourage each participating organisation to adopt a policy inclusive of commitments to carbon and water management.	ECCS	2012
	EDU-04	Encourage each school and campus to adopt a policy inclusive of commitments to carbon and water management.	ECCS	2014
	EDU-05	Assist the Education Sector to identify and take full advantage of Federal and State Government grants and rebates stemming from policies and legislation relating to energy and water conservation, carbon pollution and environmental education.	ECCS	Ongoing
Communication	EDU-06	Initiate discussions with stakeholders to engage the Education Sector in the development of the CWMAP.	ECCS	Complete (2010)
	EDU-07	Develop program based communication strategies to engage schools and campuses to implement carbon and water management programs.	ECCS, CSCCS	Ongoing
Baseline Information	EDU-08	Obtain baseline information for schools and campuses to establish: › electricity, gas, water and fleet fuel consumption › operational and out-of-hours electricity and water usage patterns for schools and campuses with time-of-use meters.	ECCS	2012 Complete (2011)
	EDU-09	Undertake audits at representative schools and campuses to determine: › estimates of waste volumes and composition › energy and water end-use profiles.	ECCS	2013 2012

Step	Ref	Action	By Whom	By When
Baseline Information	EDU-10	Encourage all schools and campuses to undertake detailed energy audits to determine end-use profiles and identify areas of improvement.	ECCS	2016
Monitoring & Reporting	EDU-11	Encourage schools and campuses, through promotion and training, to utilise available online data monitoring systems to monitor and analyse energy usage patterns.	ECCS	Ongoing
	EDU-12	Provide reports to schools to allow them to track their annual energy and water consumption and benchmark their performance against similar facilities.	ECCS	Ongoing
	EDU-13	Upgrade the ClimateCam online monitoring system to report the electricity consumption of the UoN Callaghan Campus as an individual zone.	ECCS	Complete (2011)
	EDU-14	Partner with the relevant energy and water utilities, service providers and hardware vendors to facilitate the opportunity for all schools and campuses to gain access to real-time incremental energy and water consumption data to assist in ongoing consumption reduction activity.	ECCS	Ongoing
	EDU-15	Provide an annual carbon and water management performance report to ELT and Council.	ECCS, GCS	Ongoing
Team Work & Partnerships	EDU-16	Actively recruit additional participants in the ClimateCam for Schools program with a view to engaging all schools within the Newcastle LGA.	ECCS	Ongoing
	EDU-17	Invite representatives from participating organisations to join a Carbon and Water Management Team - Education Sector (CWMT-ES) to strengthen information sharing channels and to create a collaborative approach to carbon and water management.	ECCS	Complete (2011)
	EDU-18	Continue to work through partnerships such as Together Today to identify opportunities for programs and initiatives that can assist the Education Sector in its endeavours to reduce respective carbon and water footprints.	ECCS	Ongoing
	EDU-19	Provide a platform for environmental groups and service providers to communicate their carbon and water management service capabilities to the Education Sector.	ECCS	Ongoing
Knowledge & Capacity	EDU-20	Prepare a plan to build the knowledge and capacity of the Education Sector in carbon and water management.	ECCS, CWMT-ES	2012

Step	Ref	Action	By Whom	By When
Knowledge & Capacity	EDU-21	Continue to develop and deliver learning programs and resources for the Education Sector addressing knowledge and skills gaps.	ECCS	Ongoing
	EDU-22	Develop carbon and water education resources for early education centres.	ECCS	2015
Target Setting	EDU-23	Encourage and assist the UoN, Hunter TAFE, DEC and CSO to establish carbon pollution and water targets for schools and campuses based upon the analysis of information collected in the form of baseline data, financial viability and available technologies.	ECCS	2012
Innovation & New Ideas	EDU-24	Actively promote Newcastle as an international test laboratory for best practice carbon and water reduction technology and services for the national and international markets.	TEDS, ECCS	Ongoing
	EDU-25	Facilitate the establishment of an Innovation Hub in partnership with strategic organisations including the CSIRO, University of Newcastle, Together Today, and energy and water utilities. The purpose of the Innovation Hub will be to identify appropriate new and emerging technologies and practices that can be applied across the city that will help to achieve the vision and targets of the CWMAP.	ECCS	2012
	EDU-26	Establish a process to gather and review carbon and water reduction ideas and concepts that could be implemented in educational institutions.	ECCS	2012
Research & Piloting	EDU-27	Identify opportunities for the Education Sector to test innovative products and services and encourage the provision of performance results and technical data to local research partners.	ECCS, CWMT-ES	Ongoing
Low Hanging Fruit	EDU-28	Encourage the Education Sector to prioritise the implementation of actions based on their internal rate of return and/or potential for resource efficiency improvements, carbon reductions and learning opportunities.	ECCS	Ongoing
Implementation	EDU-29	Promote the findings of research and pilot studies to the Education Sector and seek implementation partners to take these pilots through to full-scale deployment.	ECCS	Ongoing
	EDU-28	Assist the Education Sector to implement priority actions identified as Low Hanging Fruit and verified through Research & Piloting.	TBD	Ongoing

Step	Ref	Action	By Whom	By When
Implementation	EDU-29	Encourage and assist all schools and campuses to develop environmental management plans inclusive of actions to reduce their carbon and water footprints.	ECCS	Ongoing
	EDU-30	Facilitate access to programs that assist schools and campuses to install water efficient (minimum three star rating) hardware.	ECCS	Ongoing
	EDU-31	Facilitate access to programs that schools and campuses to install rain water storage or water reuse systems.	ECCS	Ongoing
	EDU-32	Develop programs to assist schools and campuses to implement commingled recycling services.	ECCS	2013
	EDU-33	Develop programs to encourage schools and campuses to reduce out of hours electricity use.	ECCS	2014
	EDU-34	Facilitate access to programs that schools and campuses to install efficient lighting systems.	ECCS	Ongoing
	EDU-35	Facilitate access to programs that schools and campuses to install onsite renewable energy e.g. solar photovoltaic (PV) systems.	ECCS	Ongoing
	EDU-36	Develop programs to encourage schools and campuses to improve the thermal efficiency of buildings.	ECCS	2015
	EDU-37	Develop programs to assist schools and campuses to determine sustainability ratings for their facilities.	ECCS	2017
Project Evaluation	EDU-38	Encourage and assist the Education Sector to evaluate projects in terms of actual versus expected outcomes and outputs, including resource efficiency improvements, carbon reductions and/or financial savings.	ECCS	Ongoing
Case Studies	EDU-39	Encourage and assist the Education Sector to complete case studies for significant/innovative projects to: › share and document knowledge and experiences › celebrate project outcomes and achievements; › recognise the contributions and experiences of the individuals involved › report on barriers and lessons learnt › identify opportunities for replication and full-scale implementation.	ECCS	Ongoing

Business Sector

The Business Sector comprises approximately 11,000 individual enterprises, with 84% of these businesses employing 1 to 10 employees.

The Business Sector has been split into two distinct categories:
Top 20 Businesses and **Business Sector (excluding Top 20 Businesses)**.

Business Sector Footprint

Carbon Emissions

The contribution of the Business Sector to the carbon emissions of the Newcastle LGA is significant, but difficult to quantify in detail. The major barrier to obtaining data on business carbon activity is the historical lack of systematic, detailed recording of such data.

The total emissions for the Business Sector in 2008 were estimated at 2.86 million t CO_2-e, based on available stationary energy data and estimates of transport fuel use extrapolated from ABS and RTA datasets. The emissions from waste generation attributable to the Business Sector is not known and therefore has not been included.

The majority of the calculated emissions arose from electricity (44%) and natural gas (52%) consumption, however, this breakdown is heavily skewed by a small number of chemical manufacturing firms using significant quantities of natural gas (Figure 21).

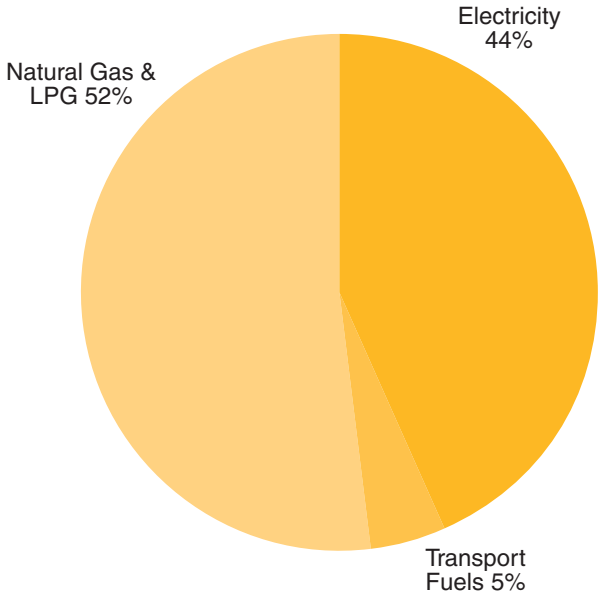

Figure 21: Business Sector - Scope 1 & 2 Emissions in 2008

Removing industrial use of natural gas from the analysis yields a carbon output of 1.37 million t CO_2-e for the Business Sector in 2008. Once the emissions attributable to industrial natural gas consumption are omitted, the vast majority (90%) of emissions in the Business Sector are from electricity consumption (Figure 22).

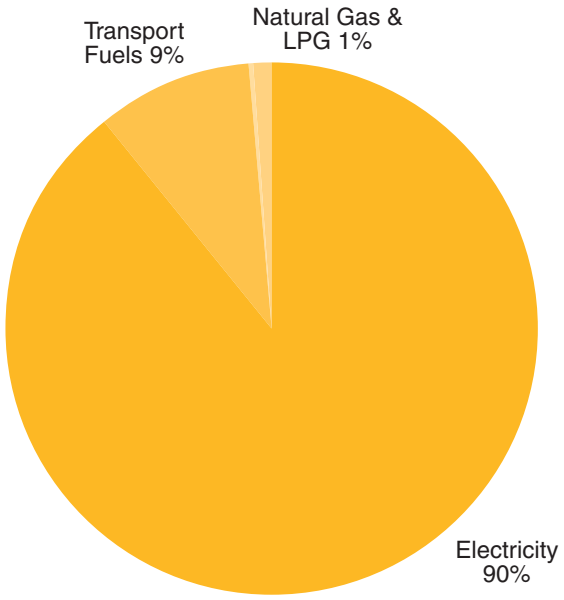

Figure 22: Business Sector - Scope 1 & 2 Emissions in 2008, excluding industrial natural gas (Note: water use is not shown and accounted for 0.08% of emissions)

Electricity Consumption

Of the 1,435 million kilowatt-hours (kWh) of electricity consumed by the Business Sector in 2007/08, 79% was used by large business customers and the remaining 21% by small business customers. The definition of 'large' and 'small' is not defined by the energy distributor due to privacy reasons, however, Council's own

research estimates that approximately 20 large businesses account from approximately 80% of the electricity consumed in the Newcastle LGA. It has been assumed that 'large' corresponds to the Top 20 businesses, and 'small' to the small to medium enterprises (SMEs) in the Newcastle LGA.

Transport Fuels

Council has estimated that over 53 ML of liquid fuels were sold to business customers in the Newcastle LGA during 2008. Automotive diesel oil constitutes a higher percentage of this transport fuel use (53%) when compared to petrol (43%). This reflects a strong commercial and heavy transport base within the Newcastle LGA. Other fuels (including LPG) only constituted 4% of the total fuel use – with taxis and materials handling equipment (such as forklifts) most likely to be the major consumers of LPG (Figure 23).

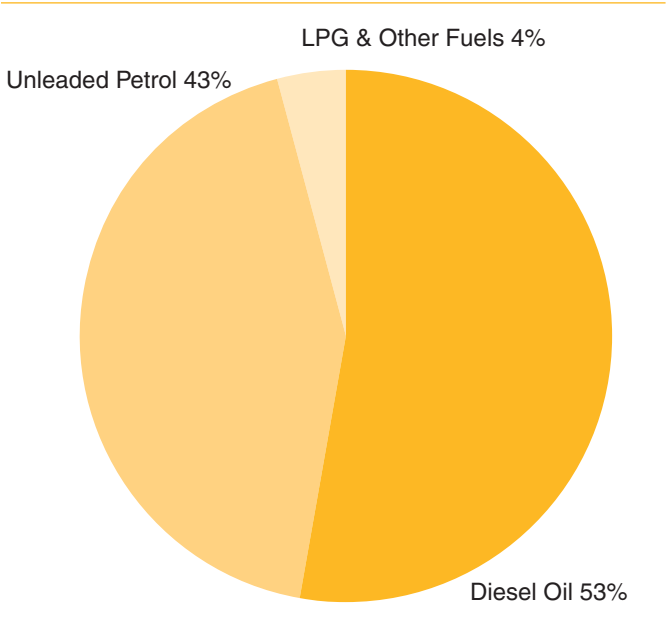

Figure 23: Business Sector - Transport Fuel Usage by Fuel Type 2008

Water Consumption

Industrial and commercial water use, at 9,321 ML in 2008, accounted for 47% of total potable water consumption in the Newcastle LGA. As with electricity use, the breakdown between large and small businesses cannot be obtained directly.

Environmental performance data supplied by Hunter Water shows that the 29 highest water consuming businesses in their service area account for just over 50% of all industrial and commercial potable water use (HWC, 2010). While this does not apply directly to the Newcastle LGA, it does infer that the majority of potable water use across the Newcastle LGA is likely to be consumed by a small number of large businesses.

The Challenge Ahead

Due to the lack of data available, much of the early action in the Business Sector must focus on obtaining better baseline data. Setting long term targets for 2020 would be impossible in the absence of such information. The engagement of large business is of vital importance and the Top 20 Business Program will be specifically designed to create a data collection and reporting framework that will enhance Council's understanding of how resources are used within the Newcastle LGA.

Business Sector Aspirational Goals

Top 20 Businesses

By 2020, The City of Newcastle in partnership with the Top 20 Businesses is aiming for:

- 100% of businesses to commit to energy, water and waste reduction programs
- 100% of businesses to publicly report energy use, water use and waste reduction against business and industry targets
- 5,000 new Clean Tech jobs to be created within the Hunter Region
- 100% of businesses to have sustainability ratings
- 50% of businesses source 20% or more of their energy from renewable sources.

Business Sector (excl. Top 20)

By 2020, The City of Newcastle in partnership with businesses is aiming for:

- 500 businesses to have implemented and reported against the ClimateCam Framework
- 50% of businesses that have implemented the ClimateCam Framework to have completed an energy efficiency upgrade
- 100% of businesses that have implemented the ClimateCam Framework to monitor their electricity consumption
- 80% of businesses to utilise recycling services
- 80% of businesses to have water efficient hardware.

Business Sector Actions - Top 20 Businesses

Step	Ref	Action	By Whom	By When
Commitment	T20-01	Endorse the development and implementation of the CWMAP using the ClimateCam Delivery Framework.	Council	Complete (2010)
	T20-02	Identify and seek the commitment of large businesses to participate in the Top 20 program.	ECCS	2012
Policy	T20-03	Encourage the Top 20 Businesses to adopt a policy inclusive of commitments to carbon and water management within their respective organisations.	ECCS	2012
	T20-04	Assist businesses to identify and take full advantage of Federal and State Government grants and rebates stemming from policies and legislation relating to energy and water conservation and carbon pollution.	ECCS	Ongoing
Communication	T20-05	Initiate discussions with the Business Sector in the development of the CWMAP.	ECCS, CSCCS	Complete (2011)
	T20-06	Develop communication tools to engage the Business Sector in the implementation of the CWMAP. Work in collaboration with established communication networks.	ECCS, CSCCS	Complete (2011)
Baseline Information	T20-07	Encourage and assist the Top 20 Businesses to obtain baseline information on electricity, gas, water and fuel consumption for each of their respective organisations on an individual building or site basis.	ECCS	Ongoing
Monitoring & Reporting	T20-08	Encourage and assist the Top 20 Businesses to monitor and publicly report on their carbon and water footprints to the local community on an annual basis.	ECCS	Ongoing from 2012
	T20-09	Partner with the relevant energy and water utilities, service providers and hardware vendors to facilitate the opportunity for the Top 20 Businesses to gain access to real-time incremental energy and water consumption data to assist in ongoing consumption reduction activity.	ECCS	Ongoing

Step	Ref	Action	By Whom	By When
Monitoring & Reporting	T20-10	Provide an annual carbon and water management performance report to ELT and Council.	ECCS, GCS	Ongoing
Team Work & Partnerships	T20-11	Invite representatives from the Top 20 Businesses to join a Carbon and Water Management Team – Top 20 to strengthen information-sharing channels and to create a collaborative approach to carbon and water management.	ECCS	Complete (2011)
	T20-12	Actively support existing and new partnerships such as Together Today and the Tom Farrell Institute in their endeavours to establish Newcastle and the Hunter as the most energy, water and waste-efficient region in Australia.	ECCS	Ongoing
	T20-13	Work with industry groups to provide a platform for relevant service providers and government agencies to communicate their carbon and water management service capabilities to the Business Sector.	ECCS	Ongoing
Knowledge & Capacity	T20-14	Work with local education and training institutes (e.g. UoN, Hunter TAFE) to identify knowledge and training gaps and to secure their commitment to assist in developing learning programs and resources for business.	ECCS	2012
	T20-15	Enhance the online ClimateCam portal so that the Business Sector can access carbon and water saving information.	ECCS, InfoMS, CSCCS	2012
Target Setting	T20-16	Encourage and assist the Top 20 Businesses to establish carbon pollution and water targets for their respective organisations based upon the analysis of information collected in the form of baseline data, financial viability and available technologies.	ECCS	Ongoing
Target Setting	T20-18	Establish and report annually on a collective target for the Top 20 Businesses for carbon pollution and water consumption.	ECCS	Ongoing
Innovation & New Ideas	T20-17	Actively promote Newcastle as an international test laboratory for best practice carbon and water reduction technology and services for the national and international markets.	TEDS, ECCS	Ongoing

Step	Ref	Action	By Whom	By When
Innovation & New Ideas	T20-18	Facilitate the establishment of an Innovation Hub in partnership with strategic organisations including the CSIRO, University of Newcastle, Together Today, and energy and water utilities. The purpose of the Innovation Hub will be to identify appropriate new and emerging technologies and practices that can be applied across the city that will help achieve the vision and targets of the CWMAP.	ECCS	2012
Research & Piloting	T20-19	Encourage the Top 20 Businesses to trial new and emerging carbon and water reduction technologies and assist them to promote the outcomes. Ensure wherever possible that local research partners have access to performance results and technical data.	ECCS in collaboration with innovation partners	Ongoing
Low Hanging Fruit	T20-20	Encourage the Top 20 Businesses to prioritise the implementation of actions based on their internal rate of return, alignment with strategic objectives and/or potential for resource efficiency improvements and carbon reductions.	ECCS in collaboration with innovation partners	Ongoing
Implementation	T20-21	Promote the findings of research and pilot studies to the Business Sector and seek implementation partners to take these pilots through to full-scale deployment.	ECCS in collaboration with innovation partners	Ongoing
	T20-22	Assist the Top 20 Businesses to implement priority actions identified as Low Hanging Fruit and verified through Research & Piloting.	ECCS in collaboration with innovation partners	Ongoing
	T20-23	Facilitate and encourage the implementation of carbon and water reduction projects and programs within the Top 20 Businesses that assist in meeting the established targets.	ECCS in collaboration with innovation partners	Ongoing
Project Evaluation	T20-24	Assist the Top 20 Businesses to evaluate projects in terms of actual versus expected outcomes and outputs, including resource efficiency improvements, carbon reductions and/or financial savings.	ECCS in collaboration with innovation partners	Ongoing
Case Studies	T20-25	Assist the Top 20 Businesses to complete case studies for significant projects to: › share and document knowledge and experiences › celebrate project outcomes and achievements; › recognise the contributions and experiences of the individuals involved › report on barriers and lessons learnt › identify opportunities for replication and full-scale implementation.	ECCS in collaboration with innovation partners	Ongoing

Business Sector Actions - excluding Top 20 Businesses

Step	Ref	Action	By Whom	By When
Commitment	BUS-01	Endorse the development and implementation of the CWMAP using the ClimateCam Delivery Framework.	Council	Complete (2010)
	BUS-02	Seek the commitment of 500 businesses (not included in the Top 20) to implement the ClimateCam Framework.	ECCS	Ongoing
Policy	BUS-03	Encourage program participants to adopt a policy inclusive of commitments to carbon and water management within their respective organisations.	ECCS	Ongoing
	BUS-04	Assist businesses to identify and take full advantage of Federal and State Government grants and rebates stemming from policies and legislation relating to energy and water conservation and carbon pollution as part of the overall business program.	ECCS	Ongoing
	BUS-05	Develop and adopt a set of low-carbon and low-water building performance enhancements for inclusion in the city's Development Control Plan (DCP) for all new commercial buildings and major renovations.	ECCS, SPS	2011
Communication	BUS-06	Provide communication channels for businesses (not in the Top 20) as part of an overall business communication plan.	ECCS, CSCCS	Ongoing
Baseline Information	BUS-07	Establish the criteria for eligibility in a Business Sector program aimed at small to medium enterprises.	ECCS	2012
	BUS-08	Obtain baseline information for the Business Sector for electricity, gas and water consumption.	ECCS	Ongoing
	BUS-09	Collect and disseminate best practice energy and water use benchmarks for different business types as part of the overall business program.	ECCS	Ongoing
Monitoring & Reporting	BUS-10	Partner with the relevant energy and water utilities, service providers and hardware vendors to facilitate the opportunity for businesses to gain access to real-time incremental energy and water consumption data to assist in ongoing consumption reduction activity.	ECCS	Ongoing

Step	Ref	Action	By Whom	By When
Monitoring & Reporting	BUS-11	Monitor and report on the annual energy and water consumption of the Business Sector.	ECCS	Ongoing
	BUS-12	Assist program participants to monitor and report on their energy and water consumption and carbon pollution.	ECCS	Ongoing
	BUS-13	Provide an annual carbon and water management performance report to ELT and Council.	ECCS, GCS	Ongoing
Team Work & Partnerships	BUS-14	Assess the feasibility of establishing Carbon and Water Management Working Groups for business types to strengthen information-sharing channels and to create a collaborative approach to carbon and water management.	ECCS	Complete (2011)
	BUS-15	Actively support existing and emerging partnerships such as Together Today and the Tom Farrell Institute in their endeavours to establish Newcastle and the Hunter as the most energy, water and waste efficient region in Australia.	ECCS	Ongoing
	BUS-16	Work with industry groups to provide a platform for relevant service providers and government agencies to communicate their carbon and water management service capabilities to businesses.	ECCS	Ongoing
Knowledge & Capacity	BUS-17	Consult with local education and training institutes (e.g. UoN, Hunter TAFE) to identify knowledge and training gaps and opportunities for collaboration.	ECCS	2012
	BUS-18	Enhance the online ClimateCam portal so that the Business Sector can access carbon and water saving information.	ECCS, InfoMS, CSCCS	2012
Target Setting	BUS-19	Encourage program participants to establish energy and/or carbon pollution and water targets for their respective organisations.	ECCS	Ongoing
	BUS-20	Establish carbon pollution and water targets for the Business Sector in consultation with program participants.	ECCS	2012
Innovation & New Ideas	BUS-21	Actively promote Newcastle as an international test laboratory for best practice carbon and water reduction technology and services for the national and international markets.	TEDS, ECCS	Ongoing

Step	Ref	Action	By Whom	By When
Innovation & New Ideas	BUS-22	Facilitate the establishment of an Innovation Hub in partnership with strategic organisations including the CSIRO, University of Newcastle, Together Today and energy and water utilities. The purpose of the Innovation Hub will be to identify appropriate new and emerging technologies and practices that can be applied across the city that will help achieve the vision and targets of the CWMAP.	ECCS	2012
Research & Piloting	BUS-23	Encourage program participants to trial new and emerging carbon and water reduction technologies and assist them to promote the outcomes. Ensure wherever possible that local research partners have access to performance results and technical data.	ECCS in collaboration with innovation partners	Ongoing
Low Hanging Fruit	BUS-24	Encourage program participants to prioritise the implementation of actions based on their internal rate of return, alignment with strategic objectives and/or potential for resource efficiency improvements and carbon reductions.	ECCS in collaboration with innovation partners	Ongoing
Implementation	BUS-25	Promote the findings of research and pilot studies to the Business Sector and seek implementation partners to take these pilots through to full-scale deployment.	ECCS in collaboration with innovation partners	Ongoing
	BUS-26	Encourage (and assist where appropriate) program participants to implement priority actions identified as Low Hanging Fruit and verified through Research & Piloting.	ECCS in collaboration with innovation partners	Ongoing
	BUS-27	Facilitate and encourage the implementation of carbon and water-reduction projects and programs that assist in meeting the established targets.	ECCS in collaboration with innovation partners	Ongoing
Project Evaluation	BUS-28	Encourage (and assist where appropriate) program participants to evaluate projects in terms of actual versus expected outcomes and outputs, including resource efficiency improvements, carbon reductions and/or financial savings.	ECCS in collaboration with innovation partners	Ongoing
Case Studies	BUS-29	Complete case studies for significant/innovative projects to: › share and document knowledge and experiences › celebrate project outcomes and achievements; › recognise the contributions and experiences of the individuals involved › report on barriers and lessons learnt › identify opportunities for replication and full-scale implementation.	ECCS in collaboration with innovation partners	Ongoing

Table Key


Carbon Sequestration


Food


Stationary Energy - Electricity & Natural Gas


Street Lighting


Transport Energy - Liquid Fuels


Waste


Water

Acronyms

ABS	Australian Bureau of Statistics
CES	Commercial Enterprise Services
CPS	City Presentation Services
CSCCS	Customer Service, Communication and Consultation Services
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSO	Catholic Schools Office
DEC	NSW Department of Education and Communities
ECCS	Environment and Climate Change Services
ELT	Executive Leadership Team
FS	Financial Services
GCS	Governance and Council Services
HRS	Human Resource Services
Hunter TAFE	TAFE NSW Hunter Institute
InfoMS	Information Management Services
InfraMS	Infrastructure Management Services
LS	Life Services
NRM	Newcastle Regional Museum
PMS	Place Management Services
RTA	Roads and Traffic Authority NSW
RAMS	Road and Asset Maintenance Services
SPFMS	Strategic Property and Fleet Management Services
SPS	Strategic Planning Services
TBD	To be determined
TEDS	Tourism and Economic Development Services
UoN	University of Newcastle

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