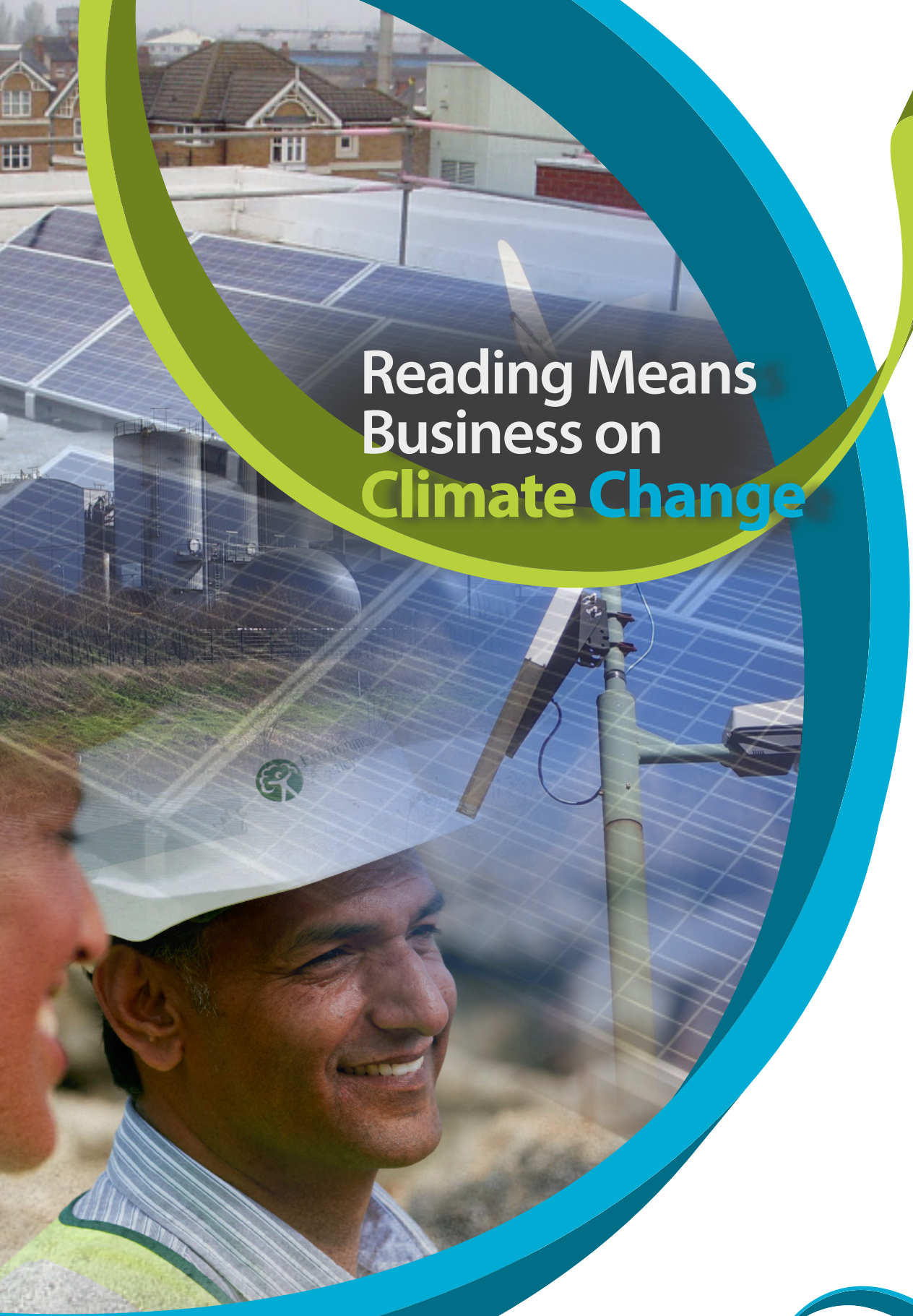


Reading Means Business on Climate Change

Reading's Climate Change Strategy 2013 – 2020

Reading Climate Change Partnership

Sept 2013

Reading Means Business on Climate Change

Reading's Climate Change Strategy 2013-2020

CONTENTS

FOREWORD

As chair of the Reading Climate Change Partnership, it gives me great pleasure to present Reading's new climate change strategy, 'Reading Means Business on Climate Change 2013-2020'.

The scientific community is becoming increasingly certain that our activities are causing global climate change. Whilst the UK will not suffer the worst effects, the implications for future generations are predicted to be very significant indeed.

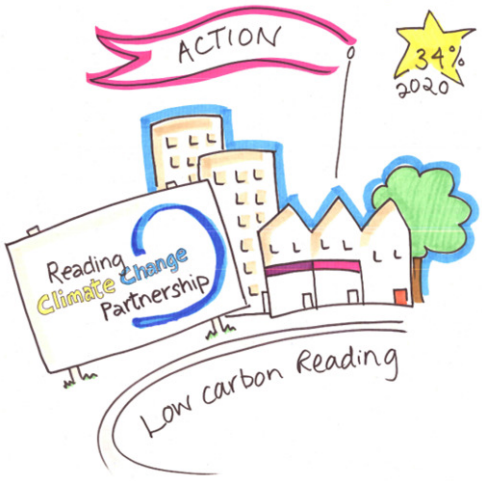
Whilst we face economic challenges, our focus on regaining our buoyant economy must involve innovating to adapt to the future challenges, or our progress will be short-lived. Against this economic backdrop, Britain's share of the £3.3 trillion global 'green market' is already at £122 billion and has been growing steadily through the downturn.

Reading is a place of action. We want to be at the forefront of providing solutions to these global challenges and to take the opportunities that arise in doing so.

Reading Climate Change Partnership was formed in 2009 and we have been pleased to see how much progress there has been since then. We have seen a substantial reduction in the harmful carbon emissions in recent years, with Reading being amongst the highest performing areas in the country.

In addition to this there have been environmental improvements which will assist us in preparing for the effects of climate change, such as sustainable drainage and improved wildlife habitats.

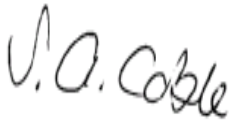
These improvements have come through the hard work of many people. From groups of volunteers who have created orchards, to public sector organisations who have brought about sustainable developments and helped those who are unable to afford to heat their properties to keep warm. The private sector has provided the design expertise and innovation in goods and services to make it all happen. Everyone has played their part.



So we are proud to have joined together to continue to forge a pathway towards sustaining and improving the quality of life of those who live and work in Reading far into the future, through setting out our clear priority to play our part in tackling global climate change.

Just as the progress has been down to many, so has the compilation of this strategy. We have worked together as a partnership to create a document that spans the priorities of a range of groups and organisations.

To use an African proverb, *"To go fast you should go alone, to go far you should go together"*. We want to go far. We are therefore trying to build a wide network of organisations and individuals that will work together to build our sustainable future and allow the citizens of Reading to benefit from leading the way in our response to climate change.



Sally Coble,
Chair of Reading Climate Change Partnership

EXECUTIVE SUMMARY

There is overwhelming global consensus that society must rise to the challenge of tackling climate change.

Reading Means Business on Climate Change is for everyone; it aims to inspire individuals, businesses and other organisations to commit to take action to reduce Reading's carbon footprint. Business is the engine of innovation and therefore key to providing the solutions.

Reading Means Business on Climate Change has been developed by the Reading Climate Change Partnership (RCCP) and presents a vision for Reading in 2020.

Our vision:

Reading's thriving network of businesses and organisations will be at the forefront of developing solutions for reducing carbon emissions and preparing for climate change. Low carbon living will be the norm in 2050.

Our target:

We will work to reduce the carbon footprint of the borough in 2020 by 34% compared with levels in 2005.

To help achieve the overall target, we invite residents, businesses and other organisations to become members of the Reading Climate Action Network and join the challenge to **reduce their carbon footprint by 7% per year.**

In order to achieve our vision and target, the strategy aims to address two broad objectives:

1. **Develop a low carbon Reading**
2. **Prepare for a changing climate**

The strategy is divided into eight themes and sets out a number of strategic priorities for each, providing a framework for how we aim to achieve the overall vision. Each theme chapter presents a vision for the theme and a 'business perspective' which highlights the key issues and potential areas of action for businesses. The chapters have been developed by a number of authors from different organisations.

We have consulted widely with stakeholders during the development of the strategy and the strategic priorities, including a public consultation exercise in November and December 2012.

A three year action plan is being developed for each theme, with actions to be delivered by a range of organisations from the public, private and

voluntary sectors. Progress will be monitored and reported on annually by RCCP.

READING CLIMATE ACTION NETWORK

We need to work together if we are to make a difference.

Reading Climate Action Network is the growing collection of individuals, businesses and other organisations who have committed to take action to help achieve the strategy's targets. The Reading Climate Action website at www.readingclimateaction.org.uk enables interested parties to sign up to the strategy and commit to any of a number of 'challenges' which will help us to reduce our carbon footprint.

Our annual event and awards scheme will offer participants of the network the opportunity to celebrate contributions towards achieving the vision.

STRATEGIC PRIORITIES

The strategy sets out the following strategic priorities, organised by theme:

Energy Supply

- *Reduce electricity consumption within the commercial and public sectors (T1SP1[1])*
- *Introduce smart meters and energy storage solutions in Reading (T1SP2)*
- *Develop heat supply networks to deliver low carbon heat in Reading (T1SP3)*
- *Increase the amount of energy generated locally using renewable technologies (T1SP4)*

Low Carbon Development

- *Buildings in Reading to be built to high standards of energy efficiency incorporating on-site renewable energy where possible (T2SP1)*
- *Retrofit energy efficiency measures into Reading's buildings (T2SP2)*
- *Improve properties to reduce fuel poverty in Reading (T2SP3)*
- *Enable the uptake of Green Deal and associated grants in Reading (T2SP4)*
- *Minimise the 'embodied carbon' incorporated in construction projects (T2SP5)*
- *Continue to develop planning policies that:*
  - *support the reduction of greenhouse gas emissions directly and indirectly from the borough*
  - *reduce the risks of climate change to the communities of Reading (T2SP6)*

[1] *reference code: T = theme; SP = strategic priority*

Natural Environment

- *Improve the quality and connectivity of natural habitats (T3SP1)*
- *Encourage local community groups and businesses to become more involved in the management of local green spaces (T3SP2)*

Water Supply and Flooding

- *Manage demand for and supply of water to reduce the expected impact of water shortages on consumers and on wildlife (T4SP1)*
- *Reduce the carbon footprint of water supply and water heating (T4SP2)*
- *Reduce the risk of damage due to flooding (T4SP3)*

Transport

- *Develop a transport infrastructure which supports more low carbon travel options for people in Reading (T5SP1)*
- *Reduce energy use and embodied energy in transport infrastructure (T5SP2)*
- *Manage transport infrastructure and services to prepare for climate change (T5SP3)*
- *Encourage non-car travel for all sectors of the population, through targeted advice, incentives and enforcement (T5SP4)*
- *Reduce the air pollution from vehicles (T5SP5)*

Purchasing, Supply and Consumption

- *Enable people to make sustainable purchasing choices (T6SP1)*
- *Support and encourage local purchasing and the development of local supply chains (T6SP2)*
- *Promote and encourage new business models focused around the 'circular economy' (T6SP3)*
- *Develop standards and the commitment to sustainable procurement in both the public and private sectors (T6SP4)*
- *Increase recycling rates (T6SP5)*
- *Reduce waste by supporting the re-use and repair of products and materials (T6SP6)*

Education, Communication and Influencing Behaviour

- *Further integrate sustainable behaviour promotion and practice throughout schools, colleges, universities, and workplaces (T7SP1)*
- *Ensure that communication which is aimed at influencing climate change related behaviour is delivered in a consistent and targeted way (T7SP2)*
- *Engage organisations in the private sector, including residential and commercial landlords, in effective action to reduce their carbon footprint (T7SP3)*
- *Develop the market for climate change related local business and the skills to ensure that local jobs are created in line with the growing low carbon economy (T7SP4)*

Community

- *Build community activity relating to sustainable communities (T8SP1)*
- *Build community resilience to climate change and self sufficiency (collective and individual) (T8SP2)*
- *Reduce consumption by building a 'sharing economy' (T8SP3)*
- *Build an 'alternative economy' focused on quality of life and emphasising sustainable communities (T8SP4)*

For further information on Reading Means Business on Climate Change, or to sign up to action to help achieve the targets, please see:
www.readingclimateaction.org.uk
or contact: climate.change@reading.gov.uk

INTRODUCTION

There is overwhelming global consensus that society must rise to the challenge of tackling climate change.

"The Intergovernmental Panel on Climate Change tells us, unequivocally, that greenhouse gas emissions must be reduced by half by 2050, if we are to keep the rise in global temperatures to 2 degrees since pre-industrial times". (U.N. Secretary Ban Ki-moon, Durban Climate Change Conference 2011).

In times of economic uncertainty and with the planet facing unprecedented pressures on natural resources, energy reserves and land use, we must face our responsibilities and play our part in averting the risks of severe climate change. This is crucial to ensuring a sustainable future.

We must act locally in the global interest, but we should also not overlook the significant local benefits of this action. These benefits include improving the efficiency and resilience of our local communities and infrastructure.We must reduce the risks that climate change will present and maximise the opportunities that lie in innovating and developing solutions.

Figure 1 - Young people in Reading taking part in the Durban Climate Change Conference model climate summit

Reading Means Business on Climate Change is for everyone. It aims to inspire individuals and businesses to commit to take action. Whether that action is to contribute towards our ambitious challenge for organisations and individuals to reduce their carbon footprint by 7% annually, or to help deliver the strategy's detailed action plan, we want to bring everyone together to take action.

Reading Means Business on Climate Change sets out to make Reading a place where action on climate change also improves our quality of life, drives business opportunities and creates jobs for local people.

READING CLIMATE CHANGE PARTNERSHIP

The Reading Climate Change Partnership (RCCP) is part of the overarching Local Strategic Partnership for Reading, called Reading 2020.

RCCP was created to provide a single body that would oversee urgent action taken by individuals and organisations to tackle climate change, by reducing our carbon footprint and preparing for climate change locally.

The partnership brings together businesses, community groups and public sector organisations such as the Council, National Health Service and the University of Reading, and is chaired by the Environment Agency.

Reading Means Business on Climate Change has been written by a range of authors, overseen by the partnership.

READING MEANS BUSINESS ON CLIMATE CHANGE 2013-2020

Our Vision and Target

Reading Means Business on Climate Change presents a vision for Reading in 2020 and sets out how Reading will tackle climate change between 2013 and 2020.

Our vision:

Reading's thriving network of businesses and organisations will be at the forefront of developing solutions for reducing carbon emissions and preparing for climate change. Low carbon living will be the norm in 2050.

Our target[2,3]:

We will work to reduce the carbon footprint of the borough in 2020 by 34% compared with levels in 2005.

[2] *34% is the current target for the UK against a 1990 baseline; however there is no data for Reading for the period 1990 to 2005. National emission reductions between 1990 and 2005 were 15%; source: Table 5 of DECC statistical release 2012 UK Greenhouse Gas Emissions Provisional Figures.*

[3] *borough emissions will be measured using the National Inventory of Greenhouse Gases - (Carbon Dioxide Emissions with the Influence of Local Authorities) published by Department for Energy and Climate Change, annually.*

The strategy presents the main outcomes that we want to achieve; these are our **strategic priorities** which provide the framework for achieving our vision. Running throughout the strategy are two broad objectives that we are seeking to address:

1. ***Develop a low carbon Reading***

   We need to reduce the carbon footprint of Reading. This is a measure of the main climate affecting pollution caused by Reading every year.

   To help achieve this, we invite residents, businesses and other organisations to become members of the Reading Climate Action Network and **join the challenge to reduce their carbon footprint by 7% per year[4,5].**

2. ***Prepare for a changing climate***

   We need to be prepared for the inevitable effects of climate change that are going to happen due to the high concentration of greenhouse gases from activities past and present.

   We will identify the key risks to Reading from the predicted impacts of a changing climate and establish ways to protect against these risks. We will encourage people to consider how climate change might affect them and to prepare to minimise the risks.

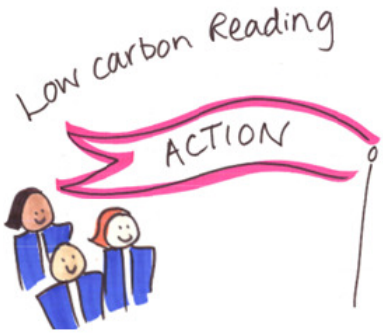
Reading Climate Action Network

RCCP's central vision is one of participation. Thriving in the future involves doing positive things together that will make a local and global contribution.

The ***Reading Climate Action website*** will enable organisations, groups and individuals to sign up to one or more of a set of climate change 'challenges'. These include a range of options to help meet the strategy's objectives and target of 7% reduction in their carbon footprint each year, as well as other ways to contribute to the strategic priorities set out in Reading Means Business on Climate Change.

To join the network, please visit the website www.readingclimateaction.org.uk or contact climate.change@reading.gov.uk.

We will host an annual event that will offer participants of the Reading Climate Action Network the opportunity to celebrate their contributions to this future vision for Reading through our annual awards scheme.



[4] *for organisations, measurement of their carbon footprint should be made using the Greenhouse Gas Protocol or similar standard and reductions measured against a baseline*
[5] *this is a slightly higher annual percentage than required to meet the overall 34% target as it assumes that not every Reading resident or organisation will be able to take part in the challenge*

Climate Friendly Business – a 'Circular Economy'

A significant proportion (46%) of the borough's carbon footprint is attributable to the business sector and therefore commercial organisations, both large and small, are a key focus of this strategy. We hope to engage a range of businesses, particularly small and medium sized enterprises (SMEs), in the delivery of the strategy through the development of the Reading Climate Action Network.

Business is also the engine of innovation and can provide the solutions that we need to reduce carbon emissions and protect us from the impacts of climate change. The 'circular economy' is at the heart of our strategy. This concept presents a positive vision for the future economy, where clean energy is used to power production, products and materials are re-used, and natural materials that can safely be returned to nature are used where possible. The economy then becomes circular with little impact on the environment *(see the chapter on Purchasing, Supply and Consumption' for more on the 'circular economy')*.

How will the Strategy be Delivered?

The strategic priorities will be delivered through a three year rolling action plan for each of the themes (see below), which will be updated annually. The action plan will be delivered by the wider network and will be monitored by RCCP who will produce an annual progress report.

Development of the Strategy

Themes

The themes for the strategy have been developed through working closely with a range of organisations and individuals as a means of structuring the strategy.

The themes are:

- Energy Supply
- Low Carbon Development
- Natural Environment
- Water Supply and Flooding
- Transport
- Purchasing, Supply and Consumption
- Education, Communication and Influencing Behaviour
- Community

Consultation on the Draft Strategy

We have consulted extensively during the development of Reading Means Business on Climate Change, refining the content through a series of events and workshops, with individual chapters authored by different members of the partnership. A draft of the strategy was published for general consultation in November and December 2012. The strategy will be reviewed in 2016/17.

SETTING THE SCENE - REDUCING OUR CARBON FOOTPRINT

UK's Greenhouse Gas Emissions

The Climate Change Act 2008 establishes a long term framework for the UK for tackling climate change. The act aims to encourage the transition to a low carbon economy in the UK through setting national targets. This means a reduction of at least 34% in greenhouse gas emissions by 2020 and at least 80% by 2050, against a 1990 baseline.

Figure 2 shows the reduction in carbon dioxide emissions since 1990 in the UK and the projected emissions to 2020.

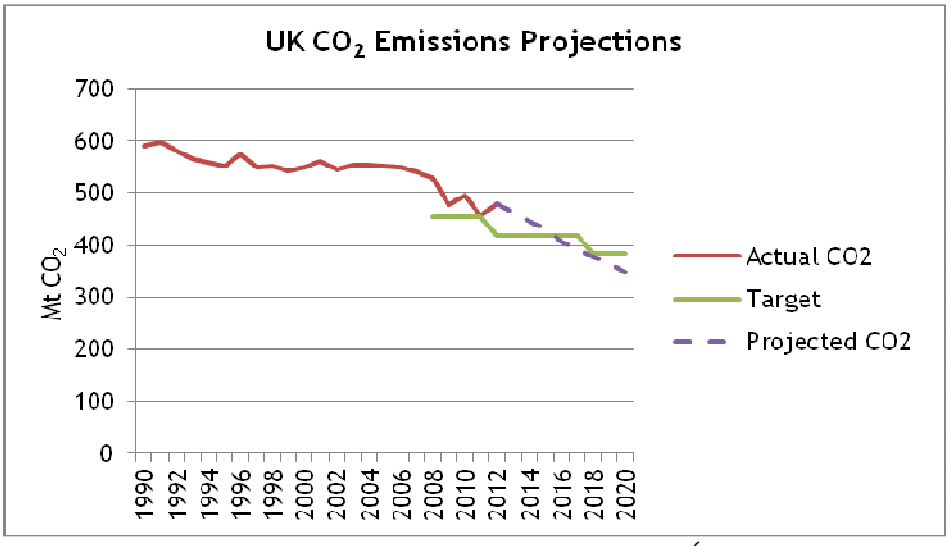


Figure 2 - UK carbon dioxide emissions - projections 2010[6]

Reading's Carbon Footprint

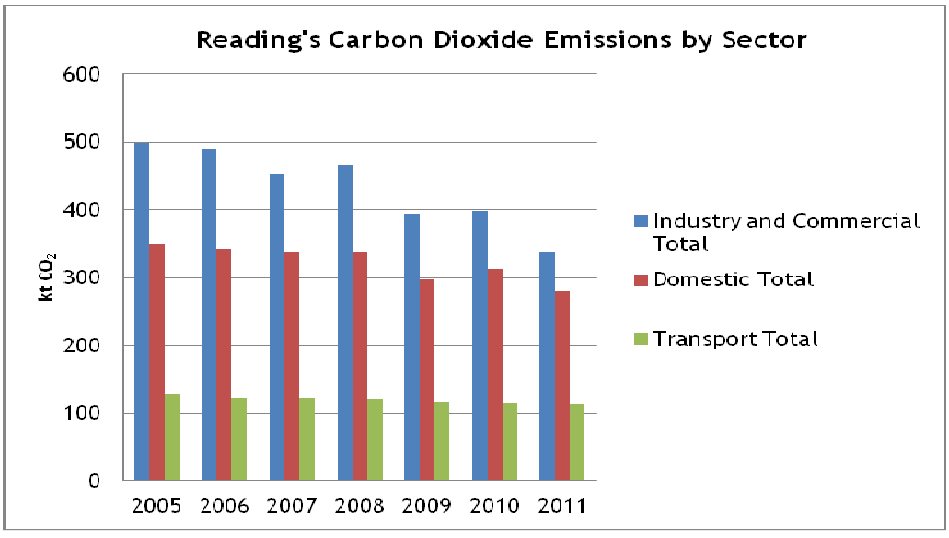


Figure 3 - Reading borough carbon dioxide emissions by sector

[6] *source Department for Energy and Climate Change - https://www.gov.uk/government/publications/2012-energy-and-emissions-projections*

Reading is a busy commercial town, with a significant proportion of its carbon footprint (46%) attributable to its commercial activities. Reading's carbon footprint reduced by 26% between 2005 and 2011. Our rising population means that the carbon footprint per person actually reduced by 29% during the same period. Only fourteen of nearly 400 English and Welsh local authority areas reduced their per person emissions by more than Reading over the period 2005 to 2011.

Through the delivery of Reading Means Business on Climate Change, RCCP aims to reduce Reading's emissions by 34% between 2005 and 2020. The UK target is 34% reduction against a 1990 baseline, however it would be difficult to adopt the same target for Reading as there is no reliable data for emissions in 1990. This makes the Reading target more of a challenge.

Figure 4 shows the carbon footprint of Reading between 2005 and 2011 against the target set out in Reading Means Business on Climate Change. It can be seen that whilst not every year shows a reduction, overall since 2005 the reductions have exceeded the target. At the time of publication, data is only available up to 2011.

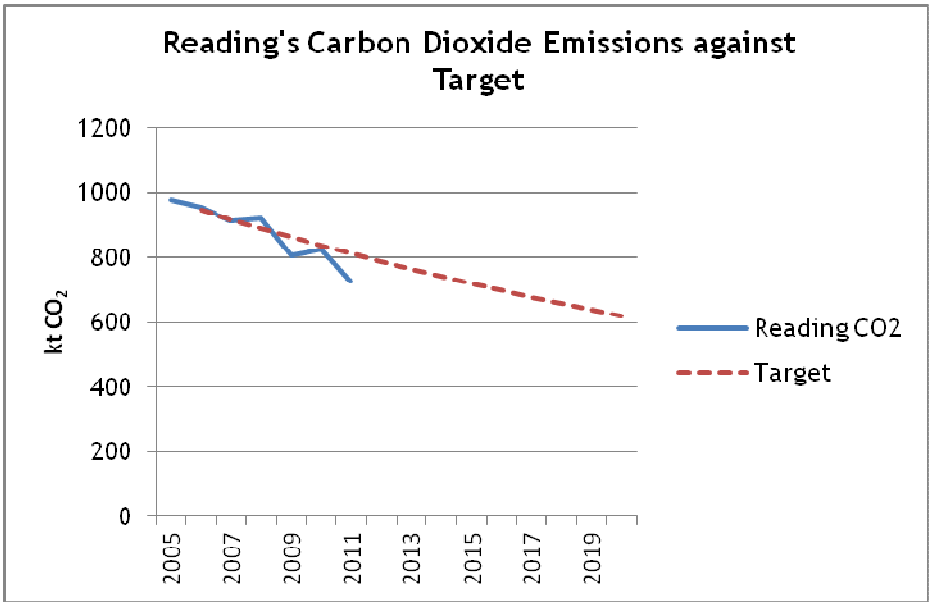


Figure 4 - Reading's carbon dioxide emissions against target

RECENT ACHIEVEMENTS AND SUCCESSES

The Council's first climate change strategy, Stepping Forward for Climate Change 2008-12, was written in consultation with the community and set out targets for the Council to reduce its own CO_2 emissions by 50% by 2020, becoming 'zero carbon' by 2050. It also set out the initial steps towards the wider borough reaching an 80% reduction in emissions by 2050.

Some of the accomplishments during the period of the first strategy include:

- Thousands of homes insulated
- Hundreds of people trained in 'green skills'

- Solar panels installed on many of the borough's schools and corporate buildings such as the bus depot and Rivermead leisure centre
- Development sites earmarked for energy schemes
- An increase in sustainable transport choices

The Council made good progress with reducing its own carbon footprint in all years from 2007 to 2012, except for 2009.

However, the reductions delivered under Stepping Forward for Climate Change were only a small proportion of the total progress made by organisations and individuals throughout the borough during that time.

Other significant achievements during the period from 2008 to 2013 include:

- The Royal Berkshire Hospital installed a new energy centre using combined heat and power and entered into a contract with Dalkia to reduce carbon emissions by 4000 tonnes by 2015

- Reading Buses introduced a fleet of 11 'Greenwave' gas powered buses, with the majority of the remaining buses replaced with new electric hybrid and Euro 5 buses, making it one of the most modern fleets in the country

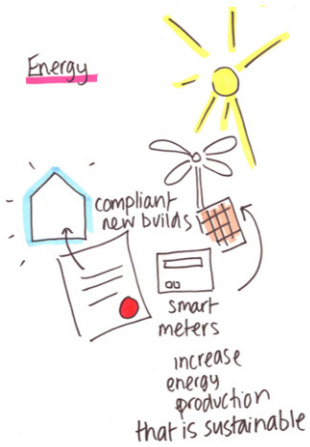
- The University of Reading reduced their carbon footprint by 16.5% from 2008/9 to 2011/12, a reduction of over 6466 tonnes

- Reading's new train station received government funding and moved near to completion with the opening of the new footbridge and additional platforms, increasing the train and passenger capacity and preparing the way for electrification

- The number of registered renewable energy systems which have been installed has significantly increased to 607 since the Feed in Tariff scheme opened in 2010.

1. ENERGY SUPPLY

INTRODUCTION



Modern society relies on the provision of energy to our homes and workplaces; life in the UK climate would simply not function without it. Most of us assume that energy is freely available. We turn on any appliance (kettle, cooker, computer, for example) when it suits us and for as long as we like. This energy of course has to be generated, normally in a power station using mainly fossil fuels (such as coal, oil and gas). Combustion of these fuels releases green house gases into the atmosphere.

The heavy dependence on fossil fuels to provide energy in the UK has been identified as our most significant impact on global climate change. It is therefore crucial that we consider how our energy is produced, supplied and consumed in order to reduce our impact on climate change and to meet the needs of our society in the long term.

To achieve this, we need to be efficient with the energy we use and find clean and 'green' ways of producing heat and electricity. Firstly we must conserve energy by insulating our homes and reducing our consumption of electricity through switching off and improving the efficiency of our energy consuming devices. Secondly we must generate a larger proportion of our energy from renewable sources like wind and solar. Thirdly we must consider the right sort of infrastructure to provide energy locally. This will involve heat networks that provide low carbon heat directly to buildings and a smart grid where the right amount of energy is generated and little is wasted.

This chapter sets out Reading's plan to reduce its emissions from energy.

VISION BY 2020

By 2020, Reading will use less energy and have cleaner, greener supplies of electricity and heat. We will have made a significant change in the provision of locally generated renewable energy which will have increased to at least 8%.

Local smart grids and power plants (decentralised energy) will offer more responsive, cost effective, low carbon energy to consumers.

Smart meters will be installed across the borough to improve monitoring and control of local energy supply. Communities and businesses will work together to reduce their energy consumption and develop low carbon energy solutions.

SUMMARY OF STRATEGIC PRIORITIES

- ***Reduce electricity consumption within the commercial and public sectors (T1SP1[7])***
- ***Introduce smart meters and energy storage solutions in Reading (T1SP2)***
- ***Develop heat supply networks to deliver low carbon heat in Reading (T1SP3)***
- ***Increase the amount of energy generated locally using renewable technologies (T1SP4)***

HOW WE WILL ACHIEVE THE VISION

ELECTRICITY

The Carbon Intensity of Electricity

A range of different fuels are used to generate the electricity provided on the grid. High carbon fossil fuels such as gas and coal are used alongside lower carbon nuclear fuels and renewable energy such as wind and hydro-power.

National policy is set to reduce the quantity of harmful carbon dioxide emissions per unit of electricity produced for the national grid (its carbon intensity). Proposed electricity market reforms aim to shift electricity generation from fossil fuels to low carbon sources with a subsequent change of the UK energy mix. Reading will continue to be supplied by energy that is generated both locally and further away (including Europe). Supplies will increasingly include electricity from offshore wind and local renewable energy sources.

Small scale, locally generated energy tends to be used locally and therefore the more low carbon electricity that is generated locally, the lower the carbon emissions in the borough.

Our Electricity Consumption

In 2011, the borough used 723 gigawatt hours (GWh) (723 million kilowatt hours (kWh) of electricity, with Reading's households using an average of 3,376 kWh per year. However, the greatest consumption of electricity in Reading is by the commercial sector, using 488 GWh (488 million kWh) per annum. Commercial buildings such as offices and shops typically use electricity for lighting, air conditioning, heating and computer equipment.

[7] *reference code: T = theme; SP = strategic priority*

Reducing our Electricity Consumption

Reduction in consumption is widely recognised as the first action to take. For commercial buildings there are many technology improvements that can reduce the electricity consumption such as low energy lighting and efficient air handling systems. These can be implemented along side on site renewable energy generation to create whole building solutions for new and existing commercial buildings.

Strategic priority:

- *Reduce electricity consumption within the commercial and public sectors (T1SP1)*

Smart Electricity Grids

In order to use the power we generate efficiently and to adapt to the variable amounts of renewable energy being generated, we need a smart electricity grid which allows energy storage and communication between the user and the supply network. Smart meters are a new kind of meter that allow the consumer to see when they are using their power in real time and allow them to adapt their consumption in order to make long term savings. It will also allow suppliers to maximise the use of renewables on the grid.

Strategic priority:

- *Introduce smart meters and energy storage solutions in Reading (T1SP2)*

HEAT

Our Heat Demand

In Reading, our homes and businesses are mostly heated using gas or electricity. Gas, although a fossil fuel, has a lower carbon footprint than electricity currently and installing efficient modern boilers can make a difference. In the future, however, we need to move to cleaner, greener energy sources to provide our heat. Electricity will become a low carbon heating source when the supply becomes decarbonised.

In 2011, 1109 GWh (1,108,932,462 kWh) of natural gas was used in the borough to provide heat. Domestic use accounts for over half of the gas used in Reading, with an average household using 16,093 kWh per annum[8]. The greatest use of heat is for heating the space inside buildings. The thermal efficiency of a building is dictated by its building fabric; the greater the level of insulation, the less heat will be lost and the less energy will be needed to keep it warm.

[8] *based on data from housing condition survey 2013 and Department for Energy and Climate Change estimates of CO2 emissions in local authority area*

Reducing our Energy Consumption from Heating

In order to reduce the amount of energy that is used in Reading, it is crucial to upgrade insulation and improve heating equipment.

New buildings are built to much higher energy efficiency standards than older buildings. The majority of buildings in 2050 will be built before 2006 and therefore it is important to upgrade these properties, as well as setting high standards for new buildings. For more detail on improving the energy efficiency standards of buildings, *see the chapter on 'Low Carbon Development'*.

District Energy – Heating Neighbourhoods

District energy schemes provide heat supply networks that can heat multiple local buildings using waste heat from local power plants and/or renewable energy. Reading has earmarked certain areas where development could incorporate district heating networks, where heat is needed continuously, such as housing, hotels, hospitals etc. Detailed planning policy sets out the requirement to consider this approach. Investment in these kinds of networks would give Reading the opportunity to meet its local heat demand and continue to reduce carbon dioxide emissions.

Strategic priority:

- *Develop heat supply networks to deliver low carbon heat in Reading (T1SP3)*

RENEWABLE ENERGY

Renewable Energy as a Share of Reading's Energy Supply

Renewable energy is generated using natural resources such as wind, sun, ground heat and biomass. The UK has a target to generate 15% of its energy from renewable sources by 2020. In 2011, about 3.8% of UK energy was from renewable sources. In Reading 3% of our energy is currently sourced from renewable technologies. The Reading Local Strategic Partnership has agreed to significantly increase renewable energy generation as part of its commitment to provide clean green energy into the future and to kick start the 'green economy'. Reading's partnerships are keen to increase renewable energy generation in line with the national target of 15%. However, geography and prevailing weather conditions play a key role in the number of viable sources of renewable energy within an area.

A report on current renewable energy generation in Reading and Berkshire was carried out by Thames Valley Energy. These studies indicated around 8.5% of total energy could be generated locally using renewable resources available in Reading, with the balance provided by renewable electricity on the national grid. The report identifies around 12 MW of electrical generation capacity and 18 MW of renewable heat generation capacity from

projects that include biomass, solar, wind and waste to energy. This would provide around 8% of local power generation.

With incentive schemes such as the Feed in Tariff and the Renewable Heat Incentive now in place for renewable energy technologies, business cases are more likely to show a return on the required investment.

Companies and community organisations may offer to finance renewable energy systems on houses and land and recoup the incentive payments. These organisations are typically referred to as ESCos (Energy Service Company). ESCos may also offer investment into energy efficiency services.

Strategic priority:

- *Increase the amount of energy generated locally using renewable technologies (T1SP4)*

RENEWABLE ENERGY RESOURCES IN READING

ELECTRICITY

Reading's natural resources provide the potential for solar, hydro and to a lesser extent wind, generated energy. Waste and wood also offer significant potential for heat and electricity generation through combined heat and power systems.

Solar Panels

Solar panels are much more common since the introduction of financial incentives. Though these incentives have recently reduced, the Council has installed solar panels on 40 buildings in Reading, and overall there are around 500 further households who have installed electricity generating solar panels.

Hydropower

Reading sits at the confluence of the rivers Thames and Kennet, providing further potential for hydro-power energy generation, in addition to that produced by the Mapledurham turbine, which generates around 0.5 GWh per annum.

Wind

Onshore wind is used to generate electricity. Whilst Reading is not a 'windy' place, it is considered viable and the Green Park turbine produces enough electricity to power 730 homes. Wind remains a significant opportunity for local renewable energy generation.

HEAT

Figure 5 - Anaerobic digesters at Thames Water Treatment Plant

Whilst renewable electricity can be easily transmitted over significant distances, this is not the case with heat, which makes renewable heat generation more of a challenge.

Reading's resources include the availability of wood (Berkshire provides an extensive wooded area), ground source heat and the large volumes of waste and sewage, which urban centres create, and which can be used to generate energy via anaerobic digestion.

Biomass

Heat is generated from the combustion of wood and energy crops. It can provide continuous and consistent flow of energy with less variability compared to other sources of renewable heat. Forest management processes are important to make sure that new wood growth provides further fuel and to capture carbon. Carbon dioxide emissions are considered neutral as they are captured by the photosynthesis process. However, transport and forestry operations use fossil fuels and therefore the process cannot be described as entirely carbon neutral. About 1% of the total UK heat demand is sourced from biomass with the potential to provide up to 6% by 2020 (UK Bioenergy Strategy).

To successfully implement biomass it is crucial that fuel is from sustainable sources and preferably from local suppliers. Biomass can create local supply chains and benefit both woodland biodiversity, through sustainable management, and climate change.

However, biomass does affect air quality, as combustion emits particulate emissions (smoke) and nitrogen dioxide (gases). Particulate emissions are not high in Reading and so there are no special control areas for this pollutant. Particulate emissions can be controlled using air pollution control equipment before the discharge flue.

Biomass remains a good option for providing renewable heat in Reading. Where there is a sufficiently high requirement for heat in a small area, combining district heating systems with biomass could provide an efficient low carbon solution.

Ground and Air Source Heat Pumps

Ground source heat pumps are used to obtain heat from the ground. The system typically uses 1 unit of electricity to deliver 3-4 kW of heat or cooling as required. Reading has been identified as particularly suitable for

ground source systems, due to its geology and the mobility of ground water.

Air source heat pumps use the same concept but use the outside air instead. They are generally less efficient than ground source heat pumps as the ground stores more heat than the air. A study by the Energy Saving Trust showed system efficiencies of 1.82 and 1.86[9] for systems with radiators and under-floor heating respectively[10].

Comparing this with a domestic gas heating system, currently the heat generated by an air source heat pump has a greater carbon intensity and a higher price.

Anaerobic Digestion

This is the name given to the biological process of digesting organic material such as food waste and/or sewage in a sealed vessel to create natural gas. This natural gas can then be combusted to provide heat and power. Reading's sewage treatment works run by Thames Water use this process to treat sewage waste. The heat and electricity generated are then both used in the on-site process of sewage treatment.

Waste Heat

Wherever processes have waste heat there is potential to utilise this locally to reduce the amount of fossil powered heat that is needed. This could range from harnessing heat from computer servers within larger commercial buildings to large scale industrial processes being used to power district heating systems.

A BUSINESS PERSPECTIVE

Business accounts for 46% of energy use in the borough and therefore has a significant role to play in reducing energy consumption and selecting decarbonised forms of energy. Rising energy prices also constitute a substantial risk that businesses must manage. Where businesses are owner occupiers – or are able to specify insulation, heating, ventilation and air conditioning systems as part of a new development or refurbishment - there are sound commercial benefits associated with investing in more efficient use of energy and on-site micro-generation. Incentives such as 'feed-in tariffs and the Green Deal are available for businesses as well as domestic energy users, and these, combined with the reduction in energy costs, often allow pay-back within normal commercial timescales. Other sources of funding exist that are targeted specifically at businesses, for example the Energy Efficiency Financing programme delivered through the Carbon Trust. In addition, the Enhanced Capital Allowance Energy Scheme allows small and medium sized enterprises (SMEs) to claim 100% first-year tax relief on investments in energy-saving products and technologies.

[9] *the number of units of heat provided per unit of electricity*
[10] *Source: Energy Saving Trust*

The vast majority of businesses are SMEs and most of these are tenants. When a business doesn't own its premises, it has less control over the specification of buildings and the equipment that is installed in them. Reducing the energy consumed by business therefore has to involve commercial landlords and developers. Businesses only have the opportunity to influence leases at initiation and break-points, and even then it can be difficult to convince landlords to invest in measures that won't increase their return on capital. Payback periods may be longer than the tenancy period, and leases often require tenants to pay for any changes made to be reversed on termination, so making the business case can be challenging. 'Green leases' have been pioneered by the Better Buildings Partnership, a group comprising some of the UK's more enlightened commercial property owners; these provide mutual contractual lease obligations for tenants and owners to minimise environmental impact in areas such as energy, water and waste.

There are, however, steps that can be taken by all businesses to avoid energy being wasted in the course of business, through the use of more energy-efficient business equipment and more efficient patterns of use. There are both financial and reputational benefits to adopting a methodical approach to monitoring and minimising energy use. We can be confident that energy prices will continue to increase, so prudent use of energy and minimisation of energy costs are essential to control operating costs; operational efficiency releases funds that can be re-employed in more productive ways. Although it is harder to quantify, there is also a reputational benefit to being a 'low carbon business' which can be instrumental in winning contracts from customers with a strong sustainability focus. In some sectors it is a minimum requirement that suppliers are able to demonstrate effective systems and processes for controlling carbon emissions.

Some energy efficiency measures involve significant investment and it can be harder to make a compelling business case. Innovative business models, for example 'pay per lux' for LED lighting, are beginning to emerge, enabling the higher capital cost of innovative technology to be converted to an operating expense. These innovations create opportunities for new product-service systems, creating new market segments and stimulating competition.

Carbon offsetting is one option available to businesses, but it should not be seen as an alternative to reducing operational emissions. In the context of this strategy, only genuine emissions reductions count towards achievement of our shared target.

2. LOW CARBON DEVELOPMENT

INTRODUCTION

The quality of the built environment is of crucial importance to our contribution to climate change, through reducing the amount of energy we use in our buildings. Insulating and improving the efficiency of our existing buildings and building highly efficient new buildings are critical to reducing our energy consumption and carbon footprint, and to reducing energy costs and addressing 'fuel poverty'.

To adapt to climate change and achieve sustainable development, long term economic, social and environmental strategies must continue to evolve and guide the revision of spatial development policies for the future.

VISION FOR 2020

By 2020, Reading will have reduced its energy consumption from buildings through the improved design, construction and refurbishment of existing buildings. Reading has planning policies in place that reduce energy consumption. As 'zero carbon' standards are established (in 2016) for new build, planning policies will emphasise local retrofit and renewable energy programmes and other ways to reduce emissions from the local area.

Planning policies and standards for buildings will address energy use, energy embodied in construction, and the local effects of climate change. Strategic planning will assess the long-term implications of development trends on reducing carbon emissions and adapting to the effects of climate change.

SUMMARY OF STRATEGIC PRIORITIES

- ***Buildings in Reading to be built to high standards of energy efficiency incorporating on-site renewable energy where possible (T2SP1)***
- ***Retrofit energy efficiency measures into Reading's buildings (T2SP2)***
- ***Improve properties to reduce fuel poverty in Reading (T2SP3)***
- ***Enable the uptake of Green Deal and associated grants in Reading (T2SP4)***
- ***Minimise the 'embodied carbon' incorporated in construction projects (T2SP5)***

- ***Continue to develop planning policies that:***
  - ***support the reduction of greenhouse gas emissions directly and indirectly from the borough***
  - ***reduce the risks of climate change to the communities of Reading (T2SP6)***

HOW WE WILL ACHIEVE THE VISION

STANDARDS FOR LOW CARBON BUILDINGS

Building Regulations, which now include strict standards for insulation and ventilation, apply to most built development and compliance is mandatory. All buildings built, rented, or sold now require an Energy Performance Certificate (EPC) based on their design, but currently there are no required standards of actual energy consumption. From April 2018 all property for rent or sale will be required to meet EPC standards E rated or better.

Reading currently has planning polices that require developers to exceed the mandatory building control standards for energy efficiency. In 2013 Building Regulations will change again and will demand compliance with higher standards. Further planned changes to Building Regulations, including the move to 'zero carbon' homes in 2016 (non-domestic buildings to be 'zero carbon' by 2019), are expected to increase energy efficiency and encourage greater use of local renewable and low carbon energy supply.

The emerging Building Regulations definition of 'zero carbon' for domestic buildings sets a maximum energy input based on floor area, but does not cover energy use for cooking and appliances. It does allow for off-site low carbon and renewable energy generation. A 'zero carbon' building could therefore still require significant energy inputs.

Figure 6 - Solar panels on Park Church

Therefore, it will be necessary to ensure that high insulation standards are applied to minimise the dependency on external energy supply for heating. Examples of best practice in insulation can be found e.g 'MINERGIE' or 'Passive House'[11]. However, with higher levels of insulation, the risk of over-heating in summer must be addressed in the design and specification. Maintaining comfort will require more attention to ventilation in buildings and natural and/or mechanical shading.

[11] *MINERGIE® is a sustainability brand for new and refurbished buildings, registered in Switzerland. Passivhaus buildings provide a high level of occupant comfort while using very little energy for heating and cooling, and designed according to principles developed by the Passivhaus Institute in Germany*

It will also be necessary to provide low carbon energy sources, as considered in the 'Energy' chapter. With 'zero carbon' requirements from 2016, there will be a need for developers to demonstrate that, where they are not able to meet zero carbon on-site, they are investing in the reduction of carbon emissions elsewhere to compensate. A local Community Energy Fund[12] could allow developers' contributions to be invested in local projects which would benefit the local 'green economy', as well as 'fuel poverty' objectives *(see section on 'fuel poverty' below)*.

Strategic priority:

- *Buildings in Reading to be built to high standards of energy efficiency incorporating on-site renewable energy where possible (T2SP1)*

IMPROVING EXISTING PROPERTIES

The majority of existing homes and buildings will still be standing in 2050[13], so it will be important to undertake a significant programme of retrofit and energy demand reduction across almost the entire housing stock. This refurbishment work will need to consider issues around reducing emissions of greenhouse gases, improving energy security, tackling 'fuel poverty' and creating 'green' jobs.

Householders and businesses may benefit from guidelines to help them when deciding on the best available option for installing renewables (e.g. buying solar panels), particularly as planning permission or listed building consent may be needed. There is a similar need for guidance about retrofitting insulation and other energy efficiency measures. This guidance would best be developed in local partnership, and examples of low carbon buildings, whether new build or improved existing stock, could be used to demonstrate the benefits of good practice.

Ideally new buildings will be built to last without requiring further retro-fit, but in determining appropriate standards for retro-fit there is a potential conflict between implementing relatively low cost measures that will bring short term benefits (warmer homes, reduced emissions, economic returns at current prices) but that are likely to require costly retro-fit of additional measures by 2050, and more expensive measures that are unlikely to require further expenditure.

Strategic priority:

- *Retrofit energy efficiency measures into Reading's buildings (T2SP2)*

[12] *a local Community Energy Fund is defined in the Climate Berkshire - Zero Carbon Standards study 2012*

[13] *the date by which UK has committed to achieve 80% reduction in emissions against a 1990 baseline*

Fuel Poverty

An added benefit to making homes more energy efficient is the consequent reduction in 'fuel poverty'. Where householders struggle to heat their homes, due to low incomes and high bills, they are described as being in 'fuel poverty' and tend to face higher risks to both their mental and physical health (in particular cardiovascular and respiratory health). Children's educational attainment can also be impacted and there are more 'excess winter deaths' associated with those in fuel poverty[14] .

In Reading in 2011, 9.8% or 6239 households were regarded as being in fuel poverty[15]. A Reading Borough Council survey of privately-rented homes in Reading in 2006 (the Decent Homes survey) indicated that 32% of houses were classed as having a 'category 1 hazards on excessive cold'.

Reading has operated a number of schemes in areas that are particularly at risk of fuel poverty, providing free loft and cavity wall insulation, alongside a range of other measures to help householders to be safer and more secure in their homes.

Strategic priority:

- *Improve properties to reduce fuel poverty in Reading (T2SP3)*

Green Deal

The Green Deal is the government's flagship scheme, launched in 2013, to retrofit buildings in order to make them more energy efficient. The scheme provides householders with the opportunity to use their future energy savings to pay for energy efficiency measures to be installed in their homes. The scheme is designed to create a market in energy efficiency that goes beyond previous approaches which focused on loft and cavity wall insulation.

In the case of tenanted properties, tenants will pay the Green Deal charge on their bill, with the charge shifting to the landlord when the property is vacant and passing on to future tenants when re-let. The landlord is required to enable Green Deal works upon request after 2016 and will be required to carry out works on their property if it fails to meet an Energy Performance Certificate rating of E by 2018.

Reading has a large number of older houses, many of which have poor energy efficiency ratings, providing many opportunities for householders to improve their homes. Through the recent government funded Green Deal Pioneer Places project, the Council visited over 800 homes, with over 500 householders going on to book assessments for Green Deal.

[14] *Marmot Report on Health Impacts of Cold Homes and Fuel Poverty*
[15] *Source: Department for Energy and Climate Change*

Where homes are expensive to insulate (e.g. solid wall Victorian houses), or where householders are at risk of being in fuel poverty, there are subsidies available.

Strategic priority:

- *Enable the uptake of Green Deal and associated grants in Reading (T2SP4)*

Embodied Carbon – Construction Impacts

The climate impact of construction goes beyond the 'running cost' of buildings in terms of their carbon footprint. Considerations should extend to whether refurbishment is better than demolition and rebuild in terms of the 'embodied' carbon (the total carbon emissions resulting from the construction process) and other natural resource impacts. This is also considered in the *'Procurement, Supply and Consumption'* and chapter.

Strategic priority:

- *Minimise the 'embodied carbon' incorporated in construction projects (T2SP5)*

STRATEGIC PLANNING AND DEVELOPMENT CONTROL

The National Planning Policy Framework includes many references to sustainable development and climate change and places the onus on local authorities to develop detailed policies, in the absence of more detailed national and regional guidance.

Success in achieving a low energy low carbon future will require current strategies and policies to be reviewed and adapted. Any long term strategy for development that takes account of climate change will need to reconcile a number of potentially conflicting policy aims:

- Reducing emissions from transport both within and outside Reading
- Encouraging a thriving economy that supports growth in the 'green economy' and local services
- Provision of 'good' housing
- Low carbon energy supply, water supply, and waste management (there will be limits to local exploitable low carbon energy supplies and water resources) based on geography and meteorology; the more that is required the higher the cost will be
- Reducing the local impacts of a changing climate through the design of buildings and infrastructure that support the population of Reading

The Council will continue to review its strategic plans to ensure they continue to be compatible with local and national emissions targets, and with other local policy aims.

Strategic priority:

- *Continue to develop planning policies that:*
  - *support the reduction of greenhouse gas emissions directly and indirectly from the borough*
  - *reduce the risks of climate change on the communities of Reading (T2SP6)*

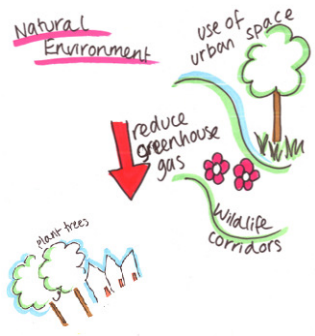
A BUSINESS PERSPECTIVE

Few businesses have the luxury of being able to design and build their own premises, but for those that do, the benefits of commissioning low carbon buildings are becoming stronger. Reading's planning policies already encourage the design of commercial buildings to at least BREEAM (Building Research Establishment Environmental Assessment Method) 'very good' standard, and this is a material consideration in the determination of planning applications. With energy costs on an upward trend this is likely to pay dividends in the future; commercial buildings constructed on a speculative basis are likely to be more appealing to potential occupiers if they have a good energy performance rating, due to the reduced operating costs this will deliver. Other sustainability standards for commercial buildings include SKA, an environmental assessment tool for sustainable fit-outs.

The emergence of new energy efficiency and renewables products and rating standards, together with government initiatives like the Green Deal, provides commercial opportunities for both entrepreneurs and established businesses, by creating new markets and stimulating demand. Up-skilling to deliver low carbon solutions for both domestic and commercial customers will be a source of significant revenue for those who already work in construction and associated industries.

3. NATURAL ENVIRONMENT

INTRODUCTION



The natural environment plays a key role in making our urban spaces liveable, both for people and wildlife.

In response to climate change, communities of wild animals and plants will have to relocate from places that are becoming unsuitable for their survival to places where conditions are becoming more favourable. The way that open spaces and parklands are managed can have a significant impact on wildlife corridors and habitats and consequently on wildlife's ability to survive.

Tree planting, for example, can help mitigate both the 'heat island' effect (where an urban area is significantly warmer than its surrounding rural areas due to human activities) and the emissions that impact on both climate change and air quality.

This chapter addresses how the natural environment should be managed and developed to respond to the threat of climate change, including the role of the local community, to make Reading a better place for people and for wildlife.

VISION FOR 2020

By 2020, Reading will have a thriving and interconnected natural environment, with links and stepping stones, such as parks, back gardens and river corridors. Wildlife will be able to live in and move through the urban environment, allowing it to adapt to a changing climate. The people of Reading will be active guardians of our natural habitats, and the community will be more involved in the management of local green spaces.

SUMMARY OF STRATEGIC PRIORITIES

- ***Improve the quality and connectivity of natural habitats (T3SP1)***
- ***Encourage local community groups and businesses to become more involved in the management of local green spaces (T3SP2)***

HOW WE WILL ACHIEVE THE VISION

EXISTING POLICIES AND STRATEGIES

There are currently a number of policies in place that relate to the natural environment, such as the Council's Biodiversity Action Plan 2005-2015 (BAP), Tree Strategy, Open Spaces Strategy, Thames Parks Plan, the Reading Waterspace vision and the Lower Kennet Valley Management Plan.

Although Reading's Biodiversity Action Plan does not specifically refer to climate change it does recommend that, as Reading develops, a structured mosaic of habitats is created through the planned incorporation of appropriately located corridors and buffer zones. A key action is to review the Biodiversity Action Plan when it expires in 2015 to ensure it takes a holistic approach to the conservation and enhancement of biodiversity.

The Local Development Framework also addresses green spaces, wildlife and the natural environment in specific sections of the Core Strategy, sections of the Sites and Detailed Policies Document, and sections of the Sustainable Design and Construction Supplementary Planning Document. Further development of planning policy will ensure that wildlife aspects and green infrastructure are given more weight in development control.

In addition, some of Reading Borough Council's large publicly owned meadows receive funding through Natural England's High Level Stewardship scheme and both the Council and Berks, Bucks and Oxon Wildlife Trust are involved in the Berkshire Local Nature Partnership, building on the work already done by the Berkshire Nature Conservation Forum. A further key action is to ensure the Berkshire Local Nature Partnership is appropriately resourced and functions effectively.

WILDLIFE IN DEVELOPED AREAS OF READING

'Ecological permeability' is the term used to describe the ability of wildlife to live and move through an area. In urban areas, permeability is improved by including features such as trees, green roofs, watercourses, allotments, playing fields, grass verges, and hedges, which reduce the distances between areas with suitable habitat, by providing stepping stones.

Wildlife can also be made more resilient to climate change by increasing the amount of available (or linked) habitat to create larger, more stable populations of flora and fauna. Small isolated populations are vulnerable.

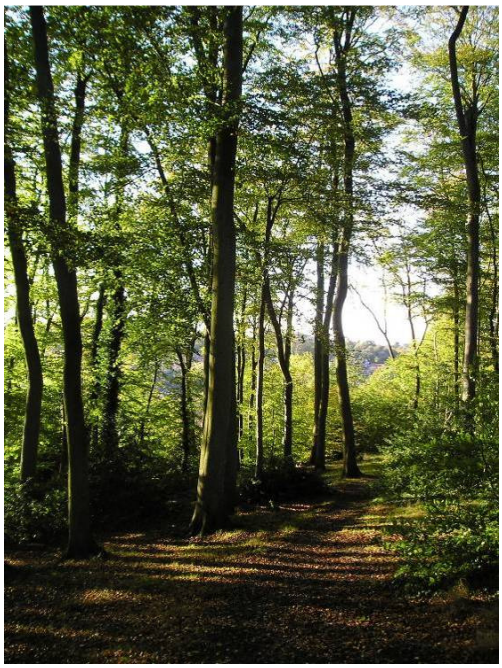


Figure 7 - Beech Wood, Emmer Green

'Green Infrastructure' is the network of natural environmental components and green and blue spaces, such as woodlands, parks, rivers, street trees and gardens, which lies within Reading's urban area and which provides multiple social, economic and environmental benefits.

Reading Borough Council will continue to work with developers, partnership agencies and the general public, to both increase and improve areas of wildlife habitat and to improve the ecological permeability of the urban area.

Increasing tree canopy in strategic locations using trees that are drought tolerant where appropriate, and capable of thriving in predicted future conditions, should be a particular priority. Trees must be an integral feature at the design stage of new development proposals.

However, the management of open space needs to take a broader approach than a focus on just green infrastructure. It needs to address social and physical needs, as well as green infrastructure needs. We need to consider how we use open spaces to provide habitat for wildlife and offer solutions to some of the problems caused by climate change and population growth. We need to address the competing demands of intensification of land use for leisure and increasing physical activity, along with solutions for alluvial flooding and support of an increase in housing density. It is important to ensure that habitat enhancement takes place alongside any habitat loss due to development, in order to maintain and improve conditions for wildlife and natural environments for leisure purposes.

KEY WILDLIFE SITES IN AND AROUND READING

'Local Wildlife Sites' (formerly known as Wildlife Heritage Sites) are non-statutory areas identified by the Council for their local wildlife value. They are designated if they meet certain criteria such as:

- containing habitats and species that are nationally uncommon as well as threatened
- supporting a diverse range of species and habitats acting as wildlife corridors or links between other important habitats, enabling wildlife to move around the countryside
- functioning as buffers to more sensitive sites helping to protect core wildlife areas

Reading has 23 Local Wildlife Sites; four of these sites are also designated as Local Nature Reserves.

In addition to these, there are a series of Biodiversity Opportunity Areas (BOAs) across Berkshire. These areas have been identified by the Berkshire Local Nature Partnership as potential areas for biodiversity enhancements. In Reading there are two BOAS:

- The Kennet Valley East BOA - from Newbury to Reading extending to include large areas of gravel pits in the east and in Reading includes the Kennet floodplain east of the A33.

- West Reading Woodlands BOA – which includes most of the woodland in Tilehurst.

Strategic priority:

- *Improve the quality and connectivity of natural habitats (T3SP1)*

COMMUNITY INVOLVEMENT AND EDUCATION

Local community groups are important in the management of local green spaces, but different groups are often unaware of each other's activities. There is a need to promote more partnership work, in particular between local groups and individuals and organisations with a Berkshire-wide remit.

Current projects include the Council's Outdoor Classrooms (funded trips to wildlife sites for school children), and volunteer days; the Council also supports voluntary groups in its parks. More education and involvement of the public in land management for wildlife, e.g. guided walks, wildflower trails, and other local activities, would be beneficial.

There are also potential opportunities for community involvement in the use of public land for food growing purposes (e.g. Food4Families, Transition Towns Reading, Food Group projects) and in the development of more city farms and community gardens. Such projects would provide a range of benefits, including some for wildlife. *See also chapter on 'Community' for more on community activity and local food production.*

Strategic priority:

- *Encourage local community groups and businesses to become more involved in the management of local green spaces (T3SP2)*

A BUSINESS PERSPECTIVE

The commercial relevance of the natural environment may not be immediately apparent to the average business, but business impacts can be extensive and wide-ranging. Many products and materials used by businesses cause environmental damage, although this is often experienced in a remote region. For example, the rare earth and other metals contained in the technology products that drive our information economy have to be mined, with potentially disastrous impacts on the natural landscape and ecosystem. This can both displace indigenous people, causing unwanted social impacts, and damage habitats, putting species at risk of extinction. These effects may seem remote and irrelevant, but consumers are becoming concerned about the ethical choices of brands and increasingly less willing to buy products associated with environmental or social harm further up their supply chain.

Campaigns like Friends of the Earth's 'Make it Better' help to bring supply chain impacts to the attention of both consumers and manufacturers. By being mindful of these "hidden" impacts, and taking concrete steps to reduce them, businesses can demonstrate high ethical standards and build trust which assists with customer retention and creates new business opportunities.

Closer to home, the UK already has effective legislation to prohibit the pollution of land, air or waterways and compliance represents the absolute minimum requirement. For businesses that wish to do "more good" rather than "less bad", protecting the natural environment and promoting biodiversity in and around commercial premises can improve working conditions and staff morale. It also demonstrates good corporate responsibility, which carries a reputational benefit. Landscaping can help with energy efficiency, for example by using vegetation screens to protect against solar gain through south-facing windows and thereby reduce the need for mechanical cooling. Environmental clean-up events are a popular staff volunteering activity and adopting a local green space can be a valuable way of creating a positive relationship with domestic neighbours.

4. WATER SUPPLY AND FLOODING

INTRODUCTION

A changing climate is expected to mean more extreme weather events such as intense rainfall and floods, heat-waves and droughts. These impacts are predicted to increase over time, with winters getting warmer and wetter, while summers become hotter and drier.

Hotter, drier summers will tend to increase demand for water and reduce supply while more variable winter rainfall may increase the frequency of droughts despite the increase in average rainfall. As well as affecting water supply, this could also have significant impacts on biodiversity and the natural environment.

Carbon dioxide emissions resulting from water use in the home are typically 800 kg per household per year[16], with 89% of this attributable to water heating in the home.

This chapter and associated action plan sets out measures to adapt to the threats to water supply and the risks of flooding. It also looks at reducing carbon emissions resulting from the use of hot water.

VISION BY 2020

By 2020, supply and demand for water will be managed so as to improve the projected 'supply demand balance', reduce the risks of 'temporary use bans' (hosepipe bans), and reduce the effects on wildlife of poor water quality and of damage to habitat through drought.

The risks from changing patterns of rainfall and extreme weather events will be better understood and people will be well prepared with homes and businesses becoming increasingly resilient.

[16] *source: Energy Saving Trust*

SUMMARY OF STRATEGIC PRIORITIES

- ***Manage demand for and supply of water to reduce the expected impact of water shortages on consumers and on wildlife (T4SP1)***
- ***Reduce the carbon footprint of water supply and water heating (T4SP2)***
- ***Reduce the risk of damage due to flooding (T4SP3)***

HOW WE WILL ACHIEVE THE VISION

WATER RESOURCE MANAGEMENT

The main water source for Reading is surface water from the river Kennet which is treated at the Fobney Island Water Treatment Plant, in the south of the borough. Smaller amounts of water are extracted at Pangbourne and Playhatch. The River Kennet and its tributaries are largely groundwater fed, so abstraction from surface water and from groundwater near to surface watercourses could impact on water supply.

Thames Water is responsible for Reading's water supply, sewage treatment, and much of its surface water drainage. The organisation produces a Water Resource Management Plan (WRMP) every five years, which sets out how it plans to provide water to meet customers' needs while protecting the environment.

For 2011, the WRMP shows almost 33% surplus water available against the 'average daily demand in a peak week of a dry year', though this surplus drops to just under 9% by 2039. Over this period demand is expected to rise while supply falls.

Despite the forecast surplus, low winter rainfall can reduce the levels of groundwater and of water in underground aquifers, which can lead to water shortages in the summer. Thames Water's agreed levels of service allow restrictions on supply in drought conditions - a sprinkler ban one year in ten on average and a 'temporary use ban' (formerly hosepipe ban) one year in twenty.

The Environment Agency (EA) produces Catchment Abstraction Management Strategies to assess the amount of water available, sets out licensing policies to protect the environment from over-abstraction, and monitors water levels, water quality, and water availability.

The EA is required by the Water Framework Directive to ensure that all rivers reach Good Ecological Status or Potential by 2027. Maintaining good water flow rates improves river ecology by diluting planned or un-planned discharges and run-off that enter rivers.

Reducing Demand for Water

Reducing demand for water reduces the costs of supply and waste water treatment, makes supply restrictions less frequent, and protects the environment from over-abstraction.

Potential measures to reduce demand include: identifying and reducing leakage (which accounts for over 20% of 'dry year distribution input'); using water meters to charge for water used (estimated to save around 10% per household); installing water efficiency measures such as diffusers, dual flush toilets and low-flow shower heads; rainwater harvesting; and grey-water re-use.

Grey-water recycling and rainwater harvesting (other than systems like water butts for garden use) can reduce mains water use but tends to increase energy use and carbon footprint due to the energy-intensive processing required. They are often too costly at dwelling level, but more affordable for large commercial buildings, especially those newly built.

Thames Water ensure that all businesses, and new and converted domestic properties, are fitted with meters. In the future, smart water meters, which allow customers to monitor water usage closely, could reduce meter reading costs, help to identify leakage, facilitate implementation of 'social tariffs', and allow the charge for water to be varied in order to incentivise water saving.

However, because the Water Resource Management Plan currently shows a surplus, Thames Water cannot immediately prioritise measures to reduce leakage in the Kennet Valley Water Resource Zone, and propose to start to roll out compulsory metering only from 2020. However they are committed to promoting the wise use of water and offer free water saving devices to consumers, fit water meters free of charge on request, and are keen to co-operate with other parties to reduce water demand from new developments or refurbishments by providing equipment and advice.

For new housing, Building Regulations set a mandatory standard of 125 litres per household per day (l/h/d) for maximum consumption of drinking water (compared with an average of 145 litres of water per person per day, supplied within the Kennet Valley Water Resource Zone which includes Reading, in 2011-12). Including water efficiency standards in planning policy can help to ensure that new housing stock and commercial buildings are build to high standards, in order to help reduce demand.

Reading Borough Council's Sustainable Design and Construction policy calls for:

- new homes to meet Code for Sustainable Homes levels 3 and 4 for which 105 (l/h/d) is mandatory
- maximum consumption of 5,500 litres per year per person for office developments

CFSH level 3 can be achieved at little extra cost per dwelling (estimated at £125). The London Gateway project has shown that a water efficiency

standard of 95l/h/d can be achieved without grey-water recycling and rainwater harvesting but this is more expensive per dwelling (estimated at £500 per home).

Strategic priority:

- *Manage demand for and supply of water to reduce the expected impact of water shortages on consumers and on wildlife (T4SP1)*

HOT WATER USE AND CARBON EMISSIONS

Carbon emissions resulting from water use in the home are typically 800 kg per household per year[17], with 89% of this attributable to water heating in the home. Only 11% is attributable to water supply and wastewater treatment and Thames Water has an active programme to address the energy intensity and carbon footprint of its operations to reduce this further.

Reducing the amount of water taken from the supply will therefore have a fairly small effect on a household's carbon footprint unless very large quantities of water are involved. A 10% reduction in a household's consumption would save around 9 kg CO_2 – less than 0.3% of the 3,200 kg footprint from energy use in the home for a typical household. Reducing the use of hot water is therefore a priority.

Consumers may be encouraged to change their behaviour in order to save money (particularly if the water is heated with on-peak electricity) at the same time as saving water and reducing carbon emissions.

This can be achieved through taking showers not baths and the use of low-flow showers, shower timers, water efficient dish and clothes washing appliances, and reducing the length of hot water pipe-runs.

Strategic priority:

- *Reduce the carbon footprint of water supply and water heating (T4SP2)*

FLOODING

Climate change can affect local flood risk in several ways and the impacts will depend on local conditions and vulnerability.

Wetter winters may increase river flooding in both rural and urban areas. More intense rainfall causes more surface run-off, increasing localised flooding and erosion, which may increase pressure on drains, sewers and affect water quality. Storm intensity in the summer could increase, even in drier than average summers. Rising sea and/or river levels may increase

[17] *Source: Energy Saving Trust*

local flood risk inland or away from major rivers because of the interactions with drains, sewers and smaller watercourses.

In particular for Reading, there is a risk of flooding from groundwater-bearing chalk and limestone aquifers across the district.

Reading Borough has been designated a Lead Local Flood Authority and is in the process of producing a Local Flood Risk Strategy, a statutory requirement of the Flood and Water Management Act 2010.

Drainage

While modern developments have foul sewage piped directly to the sewage works and surface water drains direct to watercourses, most older sewers carry both foul sewage and surface water and roof run-off. This can create particular problems of pollution and overloading of sewage works at times of heavy rain.

Reading's Sustainable Design and Construction policy advocates implementation of 'Sustainable Urban Drainage Systems' (SuDS), a range of techniques to reduce the flood risk due to heavy rainfall, in new developments and redevelopments. These techniques include open space or permeable areas to allow rain to soak away, surface water drains, holding ponds, and flood relief areas that prevent sudden discharge of water to watercourses. Some of these techniques may become less effective after prolonged periods of wet weather so it is important that they are well designed and implemented.

Reading will need to create a SuDS Approving Body (SAB) in accordance with the Flood and Water Management Act, probably by spring 2014. In developments where planning permission is required the SAB will have to approve drainage systems for managing surface water before construction begins to ensure compliance with yet-to-be-published national standards. The right to connect surface run-off to public sewers will be conditional on the drainage system being approved by the SAB.

The SAB must adopt and maintain approved SuDS that serve major planning applications (10+ dwellings and /or over 1000 m^2). After an initial three year period following the commencement of the SAB, this threshold may be reduced.

Figure 8 - flooding at Christchurch Meadows

Although the legislation is not yet in place, Reading Borough Council's transport department

require that all new roads serving new development must be drained by a SuDS system either through environmental measures (swales, balancing ponds) or engineering measures (attenuation tanks) to ensure surface water run-off is contained.

Adaptation

Measures to adapt buildings to address risks of flooding fall into two categories: resistance and resilience. Resistance measures prevent or limit the amount of water entering a building by identifying and blocking all possible entry points. Measures such as non-return valves on main drains, demountable door guards etc.

Resilience measures aim to reduce the time and cost of recovering from a flood. Measures such as raising electrical points above flood level, using water-resistant paint on lower walls, etc. Thames Water is carrying out a strategic risk assessment of the resilience of its processes and its capability to maintain its services to customers.

Strategic priority:

- *Reduce the risk of damage due to flooding (T4SP3)*

A BUSINESS PERSPECTIVE

The impact of water scarcity varies greatly by business sector and for office based businesses its commercial relevance can appear slight. Those businesses for which water is an essential raw material are well aware of the impact on their business that can be caused by an interruption of supply, but the indirect effects of water scarcity can impact the production of food crops and natural resources, causing price volatility in commodities that have a knock-on effect.

The water supply is all drinking quality, but many commercial flushing or washing operations do not need drinking water and can be carried out equally well with grey-water or rainwater. Building in (or retrofitting) grey-water recycling or rainwater collection systems to substantial commercial premises can be beneficial, as can adapting processes to use less water or adjusting frequency. Water used in one process could be re-used in another at the same site – or even by a different company; for example, water that has been used to wash food could be re-used to wash down construction equipment in a neighbouring business. As with energy, using less water can reduce costs, and as water becomes increasingly scarce, we can only expect those costs to increase.

The effects of flooding can have a very direct and damaging impact on business continuity. It can prevent staff from reaching their place of work or visiting customers, it can disrupt shipments of products or provision of services and it can directly damage the workplace. Increased flood risk also influences the cost of commercial insurance. Flooding should be an essential consideration in any business risk assessment or continuity plan.

5. TRANSPORT

INTRODUCTION

Every citizen's choice of transport impacts on climate change, as well as road safety, air quality, and noise pollution.

Stepping Forward for Climate Change 2008-2013 estimated that 12% of Reading's carbon footprint was attributable to transport in 2008 (0.7 tonnes per capita). While this was well below the national average of 21%, and compares favourably with the South East regional average and other urban areas in the region, there remains scope to reduce this further.

More generally, an effective transport system is fundamental to building sustainable and thriving local communities. Reading's excellent links to national road and rail networks as well as Heathrow Airport, have contributed towards the town becoming a major population and employment centre within the South East. The vitality and success of Reading has attracted significant investment from business, retail, sport and cultural sectors, and the town serves a catchment that extends far beyond the borough's administrative boundaries, resulting in a complex set of travel patterns.

However, the ability to continue to attract inward investment into Reading, while at the same time reducing carbon emissions, depends on efficient management of the transport network as demand for travel grows. The challenge is to minimise transport's contribution to greenhouse gas emissions, through reducing the need to travel, encouraging the use of more sustainable modes of transport and alternative energy sources, and reducing congestion.

The 'Transport' theme considers how people move around, including 'active travel' such as walking and cycling, public transport such as buses and trains and private transport such as cars and vans. It also reviews the infrastructure that allows people to travel, and the impacts of travel choices not only on climate change, but also on other aspects of the environment.

VISION FOR 2020

By 2020, we will have achieved targeted and measurable reductions in greenhouse gas emissions from transport and created an infrastructure network which supports and encourages low carbon travel, while improving air quality.

Reading will have a healthier and more active population as more people choose to walk and cycle for short journeys whether to the town centre or

other local destinations. The transport network will be less congested and safe for cyclists and pedestrians of all ages and abilities. People will use information which is easily accessible and provided in innovative ways to make smarter choices in the way they travel. Public transport will be efficient, reliable and affordable. Low carbon travel will be the preferred choice for people and goods moving around the town. Reading will have a reputation as a beacon for sustainable travel.

SUMMARY OF STRATEGIC PRIORITIES

- ***Develop a transport infrastructure which supports more low carbon travel options for people in Reading (T5SP1)***
- ***Reduce energy use and 'embodied energy' in transport infrastructure (T5SP2)***
- ***Manage transport infrastructure and services to prepare for climate change (T5SP3)***
- ***Encourage non-car travel for all sectors of the population, through targeted advice, incentives and enforcement (T5SP4)***
- ***Reduce the air pollution from vehicles (T5SP5)***

HOW THE VISION WILL BE ACHIEVED

The 2011 census 'journey to work' data shows that Reading ranks within the top 50 local authorities for percentage of commuters travelling by bus, rail, bicycle and on foot. Excluding the unemployed or those working from home, 18% of Reading residents walk to work, up from 12% in 2001. Public transport commuting has remained steady at 22%, whilst car commuting has fallen slightly and bicycle commuting has risen slightly. Reading's annual cordon count also reflects the high proportional use of sustainable transport for journeys into the town centre, with car trips falling from 27% in 2006 to 20% in 2011, whilst trips by sustainable modes of transport rose by 7%.

Building further on Reading's excellent track record of successful sustainable transport measures undertaken since 2001, we will continue to invest in accessible information and technologies to improve the efficiency and effectiveness of the transport network and systems in Reading and to help more people understand their travel choices, and we will also continue to invest in new transport infrastructure and services to increase the choices available.

A number of plans and strategies are already in place for Reading, perhaps most importantly the Council's third Local Transport Plan (LTP3), which sets out transport policy for the period to 2026. The LTP3 Implementation Plan is updated through a rolling three year programme of measures. Reading Borough Council and its partners have secured approximately £25 million from the Department for Transport's Local Sustainable Transport Fund

(LSTF) to accelerate LTP policy projects and implement a committed programme to March 2015.

INFRASTRUCTURE AND INNOVATION

Transport infrastructure both impacts on and serves the needs of communities. The life and business benefits associated with good connectivity to the transport network need to be balanced against the impacts on noise and pollution levels, safety, and of course greenhouse gas emissions.

An over-riding objective is to increase trips by walking, cycling, public transport and other low carbon modes of travel. One way of achieving this is through developing the transport infrastructure to enable more people to travel by means other than private cars (known as modal shift).

Funding is now available from the LSTF to deliver an extensive programme aimed at achieving modal shift, including new or improved pedestrian and cycling infrastructure, cycle hire, and new park and ride and rail sites. The programme extends to include parts of West Berkshire and Wokingham to address the wider impacts of travel to and from Reading.

The current targets set for the transport investment programme to March 2015 are to achieve: an additional 7,200 daily bus trips; additional 12,050 daily walking trips; and additional 2,300 cycle trips, resulting in an approximate 10% reduction in congestion and a 29,000 tonne reduction in carbon emissions. This equates to a 7.5% reduction in car trips, a 4% increase in public transport trips, a 10% increase in cycling trips and a 5% increase in walking trips. It also represents a 25% reduction in Reading's carbon footprint attributed to transport.

Through the LTP3 Implementation Plan and development planning, other measures such as car clubs, car sharing schemes, infrastructure to support electric vehicles and cycle training, are being extended and promoted.

The environmental impacts of all new infrastructure is assessed and ways to minimise carbon emissions from construction and future maintenance (embodied carbon) are explored. Also included in the LSTF programme are measures to directly reduce energy use through the installation of low energy street lighting and the reduction of unnecessary illuminated street furniture.

Figure 9 - proposed Thames pedestrian/cycle bridge

Transport infrastructure and the people that depend upon it are at risk from the impacts of climate change, particularly the likely increase in extreme weather events in terms of heat, cold and flooding.

Therefore, developing and maintaining strategies for adaptation and up-to-date, publicly understood policies for issues such as winter maintenance and flood management are crucial to supporting Reading's neighbourhoods and networks.

Strategic priorities:

- *Develop a transport infrastructure that supports more low carbon travel options for people in Reading (T5SP1)*
- *Reduce energy use and 'embodied energy' in transport infrastructure (T5SP2)*
- *Manage transport infrastructure and services to prepare for climate change (T5SP3)*

ENCOURAGING PEOPLE TO TRAVEL MORE SUSTAINABLY

In order to reduce carbon emissions from transport by 80% on 1990 levels by 2050 (the UK target), we require a step change in behavioural attitudes to non-car travel from all sectors of the population (*see also the chapter on 'Education, Communication and Influencing Behaviour')*.

We need to break down perceived barriers to walking and cycling. Partnerships are already in place with major organisations such as Sustrans and CTC the national cycling charity, as well as health providers, educational institutions, major employers and local groups. Among other projects, an updated Cycling Strategy is due in 2013 to reflect the increased priority of cycling and local partnership activity.

Accessible information technology can make it easy and more affordable for people to choose and use low carbon travel. The LSTF programme includes improvements that will build on Reading's position as a centre of expertise for transport management and information technology. Personalised travel planning, smartcard ticketing, incentive schemes, and real-time data for transport are intended to support alternative travel choices.

The design of neighbourhoods can also encourage people to choose to travel more sustainably and actively. Safety and the perception of safety is a key factor in people's decisions to walk or cycle to their destination. Continued enhancement of cycling and pedestrian facilities is an ongoing priority for Reading, as is ensuring that good pedestrian and cycling routes exist to town centre and community centres. This means that the Planning process is an important means of influencing the design of such infrastructure for new developments. Enabling people to work and access services on-line can help to remove the need to travel at all.

Strategic priority:

- *Encourage non-car travel for all sectors of the population, through targeted advice, incentives and enforcement (T5SP4)*

AIR POLLUTION

Another impact of the increase in use of fossil fuelled vehicles is the increase in air pollution. Air pollution has both global and local impacts. Emissions from vehicles contribute to the total global concentration of greenhouse gases, and are therefore direct contributors to global climate change. Emissions of certain pollutants are also harmful to human health at a local level, causing respiratory and pulmonary conditions. They can also be harmful to plants and animals, as well as corroding materials and buildings. The main pollutants that affect health in Reading are nitrogen dioxide and particulates from the combustion engine. However, not all measures that may reduce carbon emissions also reduce air pollution e.g. the use of more efficient diesel vehicles.

In addition to direct pollution from transport use, climate change itself also contributes to high concentrations of harmful pollutants, in particular ozone, which tend to occur in certain weather conditions and increases concentrations of nitrogen dioxide.

By diverting trips from private vehicles to more sustainable transport options, particularly walking and cycling, and by enforcing better emission standards, air quality in Reading will improve.

Strategic priority:

- *Reduce the air pollution from vehicles (T5SP4)*

A BUSINESS PERSPECTIVE

Business is responsible for a significant proportion of transport emissions and therefore has enormous potential to reduce transport related emissions. Reading Means Business on Climate Change's aims of reducing the need to travel, encouraging the use of more sustainable modes of transport and alternative energy sources are very relevant to business. There are three main components to business travel impacts – freight, personal travel in the course of business and personal travel to and from the workplace.

Freight

Transporting goods contributes significantly to the UK's carbon footprint. There is potential to reduce this in numerous different ways. Some of the more direct options are choosing lower emissions vehicles, optimising delivery routes, re-designing packaging to reduce the weight or volume of cartons and consolidating consignments to maximise use of vehicles.

Taking a more holistic approach, based on the principles of the 'circular economy' (*see the chapter on 'Purchasing, Supply and Consumption' for more on the 'circular economy'*), it may also be possible to reduce transport impacts by replacing a physical product with a service, or by collaborating with other companies to share distribution networks or set up freight hubs. With fuel costs steadily rising, reducing the use of fuel for freight can also reduce costs, improving both profitability and competitiveness.

Travel in the course of business

Most businesses need to visit customers or suppliers, but the frequency of these visits can often be reduced without any negative impact on the relationship. The use of video-conferencing or tele-presence allows high quality meetings to take place without the need to leave the office. If "virtual meetings" are presented as part of a strategic approach to reducing business impacts, the reaction can often be positive. Altering the mode of travel can also help; if several people are attending the meeting, car-sharing is a possibility. Where company vehicles are provided, an emissions limit is a good way to ensure that they are as fuel efficient as possible. Often, public transport can be an alternative – and it's possible to do productive work while travelling by train, which is impossible when driving. Policy can be established via a company travel plan that makes it clear how to choose the appropriate mode of transport. Cycling can also be promoted for more local business travel, and supported by pool bikes or cycle hire schemes.

Travel to and from work

Businesses have less direct influence over how employees travel to and from their workplace, but it's still possible to encourage behaviour change. While the local authority can provide the facilities for low carbon and active travel, the business can help staff make positive choices. Businesses can help by incentivising active travel, subsidising public transport and the purchase of bicycles, and taking part in national, regional and local events that promote active or low carbon travel. Where travel by car is unavoidable, car sharing clubs and priority parking spaces for car sharers can be considered. Active travel can also have a business benefit in terms of improved fitness for work.

6. PURCHASING, SUPPLY AND CONSUMPTION

INTRODUCTION

Even though 'sustainability' remains a fairly abstract and remote concept for many people, the purchasing, supply and consumption (PSC) of goods plays an integral part in everyday life for all of us. The purchasing, supply and consumption of goods effects climate change in a variety of ways, both directly through the emissions of greenhouse gases from the manufacture and transport of goods, and more indirectly by affecting the resilience of the town to a changing climate by boosting local supply of products and services and the 'green economy' *(see the 'Community' chapter for more on community resilience and the 'Education, Communication and Influencing Behaviour' chapter for more on the 'green economy')*.

If we are to meet the challenging targets set out in this strategy, all sectors of Reading's community will need to adopt more sustainable PSC practices and behaviour. This means basing our choice and use of goods and services on maximising benefits to the environment, the economy and society, for both ourselves and the wider community, rather than on a purely private cost-benefit analysis.

As we start to understand the impact that our purchases have on the local and global environment, we will be more inclined to make choices that offer wider benefits, and accordingly, the market will respond by offering products that match these preferences.

Our consumption of products and food and our business activities all produce waste, which impacts on climate change in numerous ways. 'Zero waste' is the process of using all of our waste as a resource for other purposes, thus avoiding land-fill and improving resource efficiency.

VISION FOR 2020

By 2020, people and organisations in Reading will understand the need for action on climate change and adjust their purchasing, supply and consumption choices accordingly, both individually and collectively.

A substantial number of Reading residents and local communities will have made real change to their PSC behaviour, with the results accurately recorded through proven, credible carbon measurement and monitoring techniques.

The majority of large (public and private) organisations based in the Reading area, plus a significant number of local small and medium sized enterprises (SMEs) and other small organisations, will have a detailed understanding of

sustainable purchasing, supply and consumption principles; they will have formal practice and procedures embedded into their activities.

By 2020, Reading will have significantly reduced its waste going to landfill, through producing less waste, expanding the market in the recycling and re-use of products, and by generating energy from waste. Surplus material will be viewed as a resource for others to use rather than categorised as waste.

SUMMARY OF STRATEGIC PRIORITIES

- ***Enable people to make sustainable purchasing choices (T6SP1)***
- ***Support and encourage local purchasing and the development of local supply chains (T6SP2)***
- ***Promote and encourage new business models focused around the 'circular economy' (T6SP3)***
- ***Build the commitment to sustainable procurement in both the public and private sectors (T6SP4)***
- ***Reduce waste by supporting the re-use and repair of products and materials (T6SP5)***
- ***Increase recycling rates (T6SP6)***

HOW WE WILL ACHIEVE THE VISION

WIDER COMMUNITY

Consumers do not always have a good understanding of how their choices can help to combat climate change and there remains a major communication challenge in increasing people's awareness of how to be sustainable consumers.

Whilst there is a variety of labels and marks, and accreditation, performance and certification schemes already running, few of these give a direct measure of a product's impact on climate change. Given the wide range of factors that consumers consider when making purchases, it is questionable whether a system of accreditation specifically for climate change would be effective.

However in the future, technology and process innovations will enable consumers to invest with confidence in products offering greater efficiency savings, and greater use of renewable resources, providing more clarity on product performance and resource use.

The provision of information, education, and skills to support people to make informed and responsible purchasing and consumption choices is

crucial e.g. providing real-time feedback on the effect of behaviour on energy consumption via smart meters *(see also 'Education, Communication and Influencing Behaviour' chapter)*.

Community networks could be used to spread messages about purchasing and consumption standards, as well as the benefits of sharing equipment, and supporting local businesses to establish resource efficient services *(see the 'Community' chapter for more on community activity and community resilience)*.

Strategic priority:

- *Enable people to make sustainable purchasing choices (T6SP1)*

BUSINESS SECTOR

A survey by the Carbon Trust and the Guardian newspaper (2012) found that 46% of businesses plan to make 'tangible investments' in carbon reduction during 2012 (compared with 58% of public sector agencies and 33% for the voluntary sector). The bigger an organisation's energy and resource consumption and corresponding carbon footprint, the bigger the potential savings, therefore it is the large corporate organisations that tend to invest in longer term savings. They also tend to be driven by more formalised corporate social responsibility policies, market pressures , and cost –benefit planning, so that energy and resource saving and carbon reduction is already a priority for many of them.

However, for the vast majority of small and medium sized enterprises (SMEs), struggling in very difficult economic times, short term financial imperatives prevail and many lack the skills, expertise and resource to be able to take advantage of low carbon opportunities such as retrofitting of buildings and renewable energy installation. Lacking reliable, proven evidence (or simply knowledge) that resource saving and carbon reduction investments will provide short term benefits means many will not be inclined to take action.

This attitude may limit short term capital measures but there is still much that can be done in terms of changing behaviour, with simple energy and resource saving measures involving all staff, which can bring swift, tangible benefits. Getting employees involved with a well planned, joined up and clearly communicated action plan is key to progress in the wider SME sector. Businesses need to guide staff to use resources wisely, offer advice on best practice and consider incentives for responsible resource purchasing and use. Once these practices are embedded into the culture of the business, larger steps are more likely to follow.

Businesses also need to be encouraged to consider new business models that generate revenue in more resource efficient ways, as well as offering customers wider benefits than simply lowest price, and advising them how to use products wisely and manage 'end of life' impacts, i.e. use less energy and recycle more waste.

Local Supply Chains

The low carbon economy has been identified as a sector of national importance, where
local supply chains have a significant role. Local supply chains encourage more efficient use of resources, minimise transport emissions and help develop the local area's economy.

Purchasing and procurement managers can strongly influence the low carbon and sustainability practices of suppliers, and major supply chain leaders can have a significant impact on whole supply chains. Procurement procedures and practices should reflect this.

However small businesses continue to be out-priced by larger organisations offering lower costs. Major contractors continue to dominate large scale refurbishment works and will not easily accommodate local SMEs into their supply chains and there are few strong local supply chain networks that can effectively compete with 'big business'.

One example of progress is 'RE Start Local', an European Union funded project operating in the Reading area and across the South East region, which aims to increase and improve local procurement and build capacity of local SMEs in renewable technologies and low carbon supplies and services (*see 'Education, Communication and Influencing Behaviour' chapter for more on the 'green economy')*.

Circular Economy

While many businesses are gradually accepting the need to reduce their direct energy and resource consumption and consequently their carbon footprint (known as 'operational carbon'), the additional challenge of limiting the total carbon footprint created throughout the product's life cycle (known as 'embodied carbon') is less well understood or considered.

The concept known as the 'circular economy'[18] encourages more efficient use of, and greater reuse and recycling of, materials through the production cycle, as opposed to the conventional approach of 'take/make/waste'. With this new approach, 'end of life' products become a source of materials for new products – thus the name 'circular economy'. The approach promotes optimum resource use and minimum waste, while creating greater economic competitiveness and increases the local focus of economic activity.

The producer aims to 'design out' waste, so that all resources are reused, and man-made materials that are not biodegradeable are designed from the outset to be reusable in the development of new products.

The circular economy also aims to change the relationship between producer and consumer by encouraging the lease, rent or sharing of durable products or equipment, rather than the sale of lowest cost, disposable

[18] *for more information see www.ellenmacarthurfoundation.org*

products. Where products are bought, there are incentives in place to encourage 'end of life' return and reuse *(see the 'Community' chapter for more on a 'sharing economy')*.

From a business perspective this approach offers the opportunity to create new customer value and appeal, ultimately resulting in local wealth creation and employment as well as conserving resources and reducing carbon emissions.

Strategic priorities:

- *Support and encourage local purchasing and the development of local supply chains (T6SP2)*
- *Promote and encourage new business models focused around the 'circular economy' (T6SP3)*

PUBLIC SECTOR

The Government and the public sector generally have a crucial role to play in leading on the low carbon agenda, both in terms of cutting emissions from the public sector's own estate and operations, as well as creating the incentives and environment to encourage more of the private sector to participate.

The potential for increasing demand for sustainable products and services through public procurement is huge, with public authorities across Europe spending almost €2000 billion, or 16% of GDP, on goods and services annually. There is a wealth of information and advice on sustainable procurement for the public sector, including NHS "Procurement for Carbon Reduction" and the Department for Environment, Food and Rural Affair's National Sustainable Public Procurement Programme, offering free training opportunities to public sector procurers.

Through the Social Value Act 2012, all public authorities are required to factor in 'social value' as part of the commissioning process, considering how the services they commission and procure might improve the economic, social and environmental well-being of the area. This involves looking beyond the price of each individual contract to what the collective benefit to a community might be. By introducing requirements for environmental sustainability into tender specifications, the demand from public authorities could significantly increase the market for green products and drive technological innovation, as well as increasing local supply.

Public sector purchasing and procurement managers can strongly influence the low carbon and general sustainability practices of suppliers. Although the general level of innovation and supply of low carbon goods and services is still relatively slow, and as yet both public and private procurers find it difficult to identify those suppliers offering true sustainability and value for money, opportunities exist to test innovative ideas, which will open up and stimulate greater focus on sustainable purchasing and supply. Public

authorities (and increasingly large private sector organisations) will increasingly group together and enforce higher sustainability standards.

A number of standards exist for a range of global impacts and many of these are consistent with tackling global climate change, or at least overlap with climate related impacts. It is important to carefully consider which schemes to prioritise in making procurement decisions.

Strategic priority:

- *Build the commitment to sustainable procurement in both the public and private sectors (T6SP4)*

RE-USE AND RECYCLING OF WASTE

The production of waste impacts on climate change in numerous ways: the disposal of materials leads to the use of raw materials for replacement products; the decomposition of waste releases greenhouse gases directly; the transportation of waste and raw materials uses energy.

To achieve 'zero waste', it is necessary to establish markets based on the inherent value of waste. As well as continued focus on moving towards zero waste in the household collection waste stream, specific focus is also needed on commercial waste streams, including construction and food waste. Obtaining energy from waste that has no other value is also a priority.

The 'waste hierarchy' is to reduce waste if at all possible, then to re-use, recycle and recover energy from waste. Almost all 'product types' could potentially feature products made entirely or partly from recyclable raw materials.

Re-use

Repairing and servicing of products to extend their life reduces the total number of products manufactured and thereby the amount of associated pollution and waste. Products can be re-used by supporting second ownership e.g. second hand shops (including charity shops) and services that repair and re-condition products for re-sale.

Markets can be created for material re-distribution. For example, the re3 partnership (Reading, Wokingham and Bracknell Borough Councils) have joined together to support Sue Ryder, the national charity for people with life-changing illness, via the two local Household Waste Recycling Centres. Staff identify items with a re-use value and, perhaps following some refurbishment, the items are then re-sold by Sue Ryder in their local shops. Construction sites often dispose of excess products, such as wood, aggregate and building materials in a

similar way.
Products that have no further use for their designed function can often be re-engineered for lower grade uses. Artisans and craftsmen can utilise waste products using skilled processes to create further objects. Reading's 'scrap store' has been set up specifically to help with this.

Recycling

If re-use is not possible then recycling is a good way of re-using the raw materials in products and of diverting waste from landfill sites. Recycling has become a mainstream activity for most people and many businesses choose to recycle their trade waste and this service is provided by the market.

Reading borough's recycling rate is currently 36%, though the Council is looking to increase this to 42% by improving our waste collection services and encouraging waste prevention. Reading Borough Council is also implementing an initiative to improve recycling in flats and introduce a recycling incentive scheme using funding from the Department of Communities and Local Government's Weekly Collection Support Scheme.

Strategic priorities:

- *Reduce waste by supporting the re-use and repair of products and materials (T6SP5)*
- *Increase recycling rates (T6SP6)*

A BUSINESS PERSPECTIVE

This is where business plays its most significant role in helping to build a more sustainable future. Its influence here is enormous and the whole of this chapter is therefore relevant to businesses.

Business fuels consumerism by producing goods and services and promoting them to customers. The choices made in how those products and services are made, delivered, used and disposed of are almost entirely within the control of the business and so, it follows, are their environmental impacts. Equally, businesses are also consumers of the goods and services they need in order to operate. Both directly and indirectly, businesses influence 100% of the manufacturing impacts that account for 46% of Reading's carbon footprint.

Most of the work done up until now by the business sector to reduce carbon emissions has been incremental, however to embrace concepts such as the 'circular economy' and the 'sharing economy' requires more innovation. For businesses that are prepared to be bold, there is an opportunity to introduce innovative business models, develop new revenue streams and create brand new market sectors.

We can already see examples of this, for example the peer-to-peer rental business model of Zipcar and the advent of 'cloud' computing. As a result of these trends, businesses find they have to react to new and unexpected competitors. Taking a proactive approach to business model change offers 'prime-mover advantage', so that a company can compete from a position of strength.

7. EDUCATION, COMMUNICATION AND INFLUENCING BEHAVIOUR

INTRODUCTION

Climate change affects everyone and everyone is able to play a part in helping to tackle it. By thinking about how we live, work and play, and by making simple changes to our behaviours to reduce energy consumption, we can all be part of the solution.

Meeting Reading's targets for minimising the effects of climate change will depend on significant long term changes in everyone's behaviour across the borough, from individuals and communities to businesses and the public sector.

How we behave is determined by many factors, such as our habits, beliefs about how we should behave in a given context (social norms), and cultural expectations, as well as by incentives. Although changing our behaviour and habits can sometimes feel challenging and complex, changing our social norms can have great benefits. This can be demonstrated through the popular growth of initiatives such as fair trade and recycling. These initiatives have developed through the communication of consistent and clear information.

Our priorities and consequent behaviour can also be influenced by issues that immediately affect us, such as our finances, health and available time. Crucially, these factors contribute to how we see ourselves in society and to the values which we feel are important to us, which in turn can have an impact on our behaviour.

This change in behaviour will result in Reading's residents adopting more energy efficiency measures and therefore Reading's workers will need to develop skills in a variety of technical and specialist areas, particularly in the building trade, to enable the development of a 'green economy' – from plumbers and builders to architects and chartered surveyors.

This chapter aims to set out how education, communication and influencing behaviour can lead to action on climate change, and identifies some key target audiences.

VISION FOR 2020

By 2020, people and organisations in Reading will understand the reasons for action on climate change; we will be aware of what we can collectively achieve and the contribution we can make.

People of all ages will be equipped with knowledge and skills that will increase access to employment within the local 'green economy'.

SUMMARY OF STRATEGIC PRIORITIES

- ***Further integrate sustainable behaviour promotion and practice throughout schools, colleges, universities, and workplaces (T7SP1)***
- ***Ensure that communication which is aimed at influencing climate change related behaviour is delivered in a consistent and targeted way (T7SP2)***
- ***Engage organisations in the private sector, including residential and commercial landlords, in effective action to reduce their carbon footprint (T7SP3)***
- ***Develop the market for climate change related local business and the skills to ensure that local jobs are created in line with the growing low carbon economy (T7SP4)***

HOW WE WILL ACHIEVE THE VISION

Research shows that understanding and awareness alone do not always motivate us to change our behaviour. Concerns about the environment do not necessarily translate into action. Equally, what people say they do is not always what they do in practice. Common behaviour can sometimes prove difficult to change, and unsustainable behaviours can be regarded as 'normal'. Appeals to change behaviour in one area e.g. energy saving on the grounds of financial benefit, may simply divert resources into another 'unsustainable' but normal activity e.g. flying on holiday. Therefore it is important to understand more fully what influences people to change their behaviour and why some people are willing to make certain behaviour changes, but not others.

However, despite these complexities, sustainable living can become the social norm. A coherent range of interventions will be needed over both the long and short term to encourage behaviour change – no single policy or intervention is likely to achieve change on its own. The increase in waste recycling shows how, with the right information and at the right scale, social norms can be altered.

EDUCATION

Knowledge and understanding are fundamental to behaviour change, although not always sufficient in themselves for long term change. Structured education and training have a role to play in both improving understanding and raising skills levels in sustainable services and industry.

Certain key life stages, such as childhood and young adulthood, can present ideal opportunities for influencing attitudes and behaviour. Reading's various educational institutions already contribute to educating people about climate change. The University of Reading, New Directions (the Council's adult learning provider), Reading College and many of the

borough's schools have established green teams, pressure groups, eco-schools groups or the equivalent, where students encourage their peers and staff to change their behaviour.

Figure 10 - children using a thermal imaging camera to learn about heat loss

In addition there are a number of education programmes such as the Institute of Education's 'Changing with the Climate' and Reading International Solidarity Centre's 'Global Advocates' course, which are available for teachers and students. New Directions has also developed an online course 'EcoAdvantage' to enable adult learners to develop sustainable skills.

Despite the wealth of current provision, this strategy recognises the opportunity to develop this further and to promote its take-up by Reading residents. One particular focus is the knowledge and understanding gained by children and young people. Alongside this, workplaces should seek to educate their workforce on climate change related practices.

Strategic priority:

- *Further integrate sustainable behaviour promotion and practice throughout schools, colleges, universities and workplaces (T7SP1)*

COMMUNICATION

Even if the broad causes of climate change are understood and accepted, it is not clear that people and organisations always understand how the things they do and the choices they make, either individually or corporately, contribute to the root cause of man-made climate change.

Information alone is unlikely to change people's behaviour and short term information campaigns in particular are rarely sufficient. However when used alongside other measures, good communications can be crucial to influencing people's thinking and supporting behaviour change. Techniques such as positive framing, i.e. emphasising the benefits of a low carbon future and changes in lifestyles, have been known to encourage positive responses.

As well as the content of the message, we are also affected by *who* communicates information to us, whether it be our workplace, university, school, family or friends, and *how* they communicate it, whether we hear it through the internet, newspaper, radio, television or word of mouth. Our challenge is to develop appropriate, long-term information campaigns across partner organisations and beyond.

It is therefore important that we understand the audience we are seeking to influence so that we know what type of message and what channel of communication will have the most effect. We need to target messages so that every individual can fully understand the ways in which they can contribute to minimising the impacts of climate change. These channels will include formal education opportunities delivered through schools, colleges, further education and work based training (see Education above), as well as informal awareness raising achieved through the media, the work of charities and community groups within the borough.

Developing 'Influencing Behaviour' Programmes

Reading Climate Change Partnership has established an 'influencing behaviour' sub-group, which has started to draw on the expertise of partner organisations, particularly University of Reading, in the science of behaviour change and how this can be applied to communications and programmes that seek to influence climate change related behaviour. Our aim is to use and extend the work of this group to ensure that all relevant communications and programmes of action, across all themes of this strategy, are as informed and effective as possible.

Where possible, we will use communications networks which are already in place (e.g. newsletters, business networks and voluntary sector networks) to engage with a wide variety of audiences on climate related issues, and we will need to be sure that we are co-ordinating messages, language, tone and voice to maximise the impact on the target audience.

In order to measure the effectiveness of our communications, we will need to consider establishing a process and mechanism for measuring changes in the levels of knowledge, understanding, motivation and commitment to changing behaviour across different audiences in Reading.

Our key messages will need to reach the widest possible span of the local community, as well as being targeted at specific groups and audiences.

Our key communication aims with respect to climate change are to:

- Encourage individuals, businesses and organisations to consider climate change as part of their everyday activities and to operate and behave in ways that support the objectives of Reading Means Business on Climate Change.
- Ensure that people who live in, work in and visit Reading are aware of any new initiatives and projects they can join in with or benefit from and contribute to
- Present Reading as serious about climate change and promote opportunities for external investors and companies looking to move to Reading.

Strategic priority:

- *Ensure that communication which is aimed at influencing climate change related behaviour is delivered in a consistent and targeted way (T7SP2)*

KEY TARGET AUDIENCES

As mentioned, it will be important to ensure that we understand the key target audiences we are seeking to influence, in particular how they receive information and what/who is likely to influence their thinking.

Business

Business is one of the key contributors of greenhouse gas emissions, responsible for 46% of Reading's green house gas emissions and is therefore a key focus for Reading Means Business on Climate Change.

There is some legislation around reporting emissions for larger businesses but little incentive other than cost savings for smaller businesses to change their practices. In a small area like Reading Borough, there will be opportunities for businesses to work together and realise both emissions and cost savings by sharing resources, best practice and joint working on procurement *(see the 'Purchasing, Supply and Consumption' chapter for more on the private sector).*

Landlords

Residential as well commercial buildings in the private sector are significant contributors to greenhouse gas emissions, and Reading has both a relatively large private rented sector and a relatively young and transient population. This, alongside the funding available for energy efficiency measures through the Energy Companies Obligation and the Green Deal, makes private sector landlords a key target audience. An added benefit to making homes more energy efficient is the consequent reduction in 'fuel poverty' for those who struggle to heat their homes *(see the chapter on 'Low Carbon Development' for more on the Green Deal and 'fuel poverty').*

As well as targeting private sector landlords, communication messages will need to address and engage with more transient groups who may have different perceptions to the general population regarding their long-term investment in the town or their local community.

Strategic priority:

- *Engage organisations in the private sector, including residential and commercial landlords, in effective action to reduce their carbon footprint (T7SP3)*

GREEN SKILLS

As communities become more aware of the effects of climate change, there will be increased demand for electric vehicles, renewable energy, and insulated homes. The Green Deal will provide opportunities for greater uptake of energy efficiency and renewable energy technologies (*see chapter on 'Low Carbon Development' for more on Green Deal*).

The 'green economy' stimulates the creation of jobs that will help us to reduce the effects of and adapt to climate change, as well as help us manage our waste. This market has grown significantly during the current recession and nationally is set to grow further.

The development and implementation of these initiatives and new technologies will require training for the current and future workforce. Whether this is in the maintenance of electric vehicles, design of 'zero carbon' buildings or the ability to install ground source heat pumps, there needs to be access to high quality training at affordable prices. Training opportunities, whether delivered by specialist bodies, manufacturers, local training providers or government sponsored programmes, will need to be effectively signposted.

Strategic priority:

- *Develop the market for climate change related local business and the skills to ensure that local jobs are created in line with the growing low carbon economy (T7SP4)*

A BUSINESS PERSPECTIVE

Business is able to influence the behaviour of both its staff and its customers, and the power of brands should not be underestimated. To a greater or lesser extent, people see their brand choices as a reflection of their own values and this gives brand owners enormous power to shape behaviour. By reducing the environmental impacts of their products and services, and by communicating those changes to customers, companies can help to 'normalise' environmentally sustainable choices. They can also help their customers to use those products or services in a more sustainable way, thereby reducing further the business's carbon footprint.

This power carries with it responsibility. Claims must be authentic, transparent and substantiated by hard data, or trust will be broken and the company's reputation damaged. There is 'green claims' guidance on the Department for Environment, Food and Rural Affairs' website which provides a solid basis for communicating environmental attributes and benefits. Independent accreditation is a useful way of proving the validity of claims too.

Unless your product or service is specifically designed for eco-consumers, it's probably unrealistic to expect your customers to buy it for altruistic reasons. Some of the most effective environmental communications campaigns are where the benefit to the consumer is clearly articulated as well as the environmental gain – for example the Unilever 'turn to 30' campaign which quantified the cost saving of washing at lower temperatures.

Reducing your company's carbon footprint relies as much on the behaviour of your staff as it does on the equipment you buy or the processes you set up. Employee engagement can be challenging and behaviour change is notoriously difficult to achieve. There are no magic bullets but you should expect to have to repeat key messages periodically and to be clear about the benefits to the business of the changes you expect staff to make. Competitions can help to harness peer pressure, and incentive programmes can be very effective; they need not be costly and for activities like energy saving they can be funded from the savings achieved.

Convincing staff to adopt more carbon efficient ways of working is more effective if it aligns with the culture and values of the business. The more consistently the company lives its values, the more likely it is that the desired behaviours will become instinctive. Helping staff to reduce their carbon footprint at home can be a useful way of engaging them to do the same at work. The benefits they experience in terms of reduced energy bills, for example, can help make the business benefits more tangible and increase motivation. They may even become advocates for the cause, and help get their colleagues on-board.

8. COMMUNITY

INTRODUCTION

Communities can play a central role in developing a more sustainable way of life that reduces the impact that our lifestyles have on the global climate. This can be achieved through individuals being more self sufficient, coming together as a community to share resources, and through a strong local business community.

Whilst Reading's action to reduce its impact on climate change will be the sum of all the changes made by each individual, business or other organisation, this can be significantly enhanced through collective community action at a local level. Working with Reading's existing strong community sector, including a number of environmental groups, will benefit local action taken on climate change.

To reduce our ecological impact, prepare for inevitable climate change and build high quality low carbon lifestyles, we will need to reconsider our interpretation of 'success' to include factors relating to our overall quality of life.

Our quality of life (see vision below) is dependent on much more than increasing our material wealth, as currently dominates our GDP, defining how successful we are as a nation. The significance given to economic growth should be balanced with other factors which affect our well-being, such as protecting, enhancing and recognising the contribution of our local environment and our social interactions. To this effect, we should be working towards building sustainable communities.

This chapter sets out how collective action at the community level can help to reduce the effects of climate change and can help people to adapt to a changing climate, whilst improving communities' quality of life by helping everyone to lead their lives in a more sustainable way.

VISION FOR 2020

By 2020, people will have an understanding of how their local environment contributes towards a better quality of life; they will have the commitment and community capacity to support each other to lead more sustainable lives. Reading's neighbourhoods will be places where success is measured by the uptake of life-styles centred on self-sufficiency, sustainable consumption and sharing of resources.

Quality of life will include not only wealth and employment, but will also consider physical and mental health, education, recreation and leisure time, as well as the effects of the built and natural environment on their well-being, and the social attachment they feel.

SUMMARY OF STRATEGIC PRIORITIES

- ***Build community activity relating to sustainable communities (T8SP1)***
- ***Build community resilience to climate change and self sufficiency (collective and individual) (T8SP2)***
- ***Reduce consumption by building a 'sharing economy' (T8SP3)***
- ***Build an 'alternative economy' focused on quality of life and emphasising sustainable communities (T8SP4)***

HOW THE VISION WILL BE ACHIEVED

BUILDING COMMUNITY ACTIVITY

Reading has a well-developed and growing volunteering base and culture, with at least 725 voluntary and community groups across Reading[19]. Although these groups make up the community and voluntary sector and may be seen as 'one body', they actually deliver a range of services in differing ways, engaging with a wide variety of people. These voluntary and community groups can play a key role both in promoting knowledge and understanding of climate change and in developing sustainable communities more generally across Reading.

A sustainable community is one where everyone is equally able to meet their own needs and improve their quality of life without harming the environment, depleting natural resources or putting any part of society at a disadvantage.

Valuing the contribution of these groups and engaging them in climate change related campaigns will help move us towards the vision set out in Reading Means Business on Climate Change. Reaching these groups in a creative and effective way will help us to encourage people to adopt low carbon life styles.

Neighbourhoods

Strong neighbourhoods are an important aspect of a sustainable community. Having influence over and being involved in our local physical environment and building local social networks are important to both our quality of life and low carbon living. A focus on a geographical location is an important method of engagement; people often relate to the area where they live, socialise or work.

Engaging neighbourhoods on climate change issues can be done in a variety of ways. For example, renewable energy projects often attract attention

[19] *registered with Reading Voluntary Action*

through the opportunity to be part of an 'ethical' and beneficial shared investment or the growing of food can engage people who like being outdoors. Involvement with a city farm or community allotment can help build a connection with the natural environment, which may lead to a change in values, and subsequent action that will help reduce the effects of climate change.

Community Organisations and Networks

Figure 11 - tree planting

There are a number of organisations and cross community based networks working on building local community action to tackle the impact of and resilience to climate change, and to pursue the wider aim of building sustainable communities. Currently, the most prominent networks include Econet, Greater Reading Environmental Network, Transition Town Reading , Go Local On a Better Environment (GLOBE) groups. Other significant local organisations include True Food Community Cooperative, and Reading International Solidarity Centre (RISC), both of which trade and generate income which is re-invested in their activities.

These groups demonstrate what collective community action can achieve, e.g. a solar panel bulk buying scheme. Sustaining and building on this activity by increasing their capacity and co-ordination will help to further strengthen their contribution to a sustainable community. This will in turn encourage and empower grass roots groups to take action to help shape sustainable local communities because their input is more explicitly valued and they can see how they contribute to local policy and action.

In addition, these groups can provide a different perspective to that held by larger organisations as they are closer to the communities involved and can act as a 'sounding board'. Therefore increasing their links with Reading Climate Change Partnership, Climate Berkshire and other influential bodies, will be beneficial to the work of these partnerships.

In essence, we can achieve much more together. The knowledge, skills and experience within each of the business, community and public sectors is unique and can be of benefit to the other sectors and to delivering the overall aims of this strategy.

Strategic priority:

- *Build community activity relating to sustainable communities (T8SP1)*

BUILDING COMMUNITY RESILIENCE

One way to increase self-sufficiency and remove reliance on energy and food brought in from a distance, at a financial and environmental cost, is to increase local renewable energy production and food growing. With international supply chains at the mercy of volatile weather, a local supply can be more reliable and increase a community's resilience to climate change *(see the chapter on 'Purchasing, Supply and Consumption' for more on local purchasing and supply chains)*.

A good example of low carbon living would be a community and charity sector that operates from energy efficient buildings, generates renewable energy, grows its own food and sells its waste resources, thereby saving money and /or earning an income.
This is an ideal way for an organisation to become more self-sufficient and to fund its work.

Local Food Growing

Creating shared allotments and supporting more people to grow their own food is an important way of becoming more self-sufficient, with the additional benefits of reducing the carbon footprint of a product if it enters the local food supply chain.

Currently community leaders in this market include the True Food Co-op and the Farmers' Market. The Food 4 Families project creates opportunities for communities to grow food and hosts a bi-annual 'Town Meal' promoting the benefits of growing and sharing locally grown food. Initiatives like this will help raise awareness and confidence amongst residents and organisations to purchase locally through local networks and trading groups.

The Council has an Allotment Strategy which sets out the provision of space for its residents for growing food. In addition, the Council has been supportive of community schemes to create orchards and fruit hedges. The community sector also provides space for food growing and uses it as a mechanism to empower local people.

These initiatives will promote greater availability of local food and other resource supplies. More reliable supply chains are needed in order to develop this market and to make locally grown food more accessible and affordable.

Local Renewable Energy Generation

Another important way to become self-sufficient is for communities to take control of their energy use, and take advantage of the potential to install renewable energy, which in the longer term will benefit them both financially and environmentally.

Collectively, there are a number of ways in which the community sector can benefit from renewable energy generation and schemes offering financial incentives. Reading has seen some activity in this area through a community

bulk buying scheme and the installation of renewable energy systems within community centres, but more can be done.

There are a number of ambitious schemes nationally that demonstrate what a community group can achieve through installing a community renewable energy system. This may be possible in Reading where community assets and determination are aligned to achieve such a goal.

Resilience for All

A sense of a community 'pulling together in tough times' (e.g. unfavourable economic conditions) is also an important aspect of a sustainable and resilient community and is something we wish to build. To this effect, making sure everyone is becoming more resilient and not just the most able or knowledgeable, is an important aspect of a sustainable community. Everyone should be able to progress and share in its success. Resources and effort will be needed to make sure everyone in our community is given the opportunity to improve their quality of life, and to challenge life limiting factors such as poor financial or residential circumstances, as well as social barriers.

Strategic priority:

- *Build community resilience to climate change and self sufficiency (collective and individual) (T8SP2)*

A SHARING ECONOMY

The consumption of goods contributes significantly to the total amount of carbon released globally. The extraction of raw materials, as well as the manufacture and transportation of goods, can result in carbon emissions and environmental destruction.

Plastic, cardboard and polystyrene are all commonly used for packaging and presenting goods, and to keep them in perfect condition. This has raised consumers' expectations so that they prefer new and pristine goods, and has significantly increased the amount of waste from packaging.

The 'circular economy'[20] concept *(see also the chapter on 'Purchasing, Supply and Consumption')* considers the 'end of life' of goods from a business perceptive. This approach defines all goods at the end of their life not as waste, but as materials for the production of further goods. Sustainable communities have a related role to play in the reduction of waste by helping to develop an economy based on sharing. This reduces the need for new goods and therefore reduces the impacts from production.

A sharing economy is an economy measured by social interactions and exchanges of goods, with a culture of 'borrow rather than own'. Trust will

[20] *for more information see www.ellenmacarthurfoundation.org/circular-economy/circular-economy*

be key to these exchanges, therefore time and effort needs to be invested to build links between individuals and organisations. Changing the negative perceptions that the majority of the population hold about second hand goods will also be a challenge.

There are existing re-use and service exchange schemes (Freegle and Reading Local Exchange and Trading Scheme) that we can start to build on *(see also the chapter on 'Purchasing, Supply and Consumption')*. A repair scheme movement ('repair cafés') is becoming popular and could be encouraged in Reading. This not only provides a platform for people to have their broken possessions fixed, but also provides them with the skills to fix items themselves.

Taking this one step further, a market for goods developed from waste materials would help to increase the richness of community skills and stimulate creativity, as well as reducing the amount of waste going to landfill.

Strategic priority:

- *Reduce consumption by building a 'sharing economy' (T8SP3)*

READING AS A 'COMMUNITY' TOWN

Reading is a town with a thriving economy, attracting international business headquarters due to its excellent transport links and closeness to London. The consequent supply of jobs pulls 30,000 people into Reading everyday, rendering Reading a 'commuter town'. It has also become a sub-regional shopping centre hosting many 'chain stores' similar to other towns in the country, which to some extent has drawn attention away from Reading's unique character.

These businesses and jobs are vital to the survival of Reading's community. However, the 'corporate image' Reading has gained as a consequence of its thriving economy perhaps eclipses the thriving community sector. This gives the impression that Reading life is centred on prosperity alone, which in turn attracts businesses and residents who hold similar values. This may lead to a lack of social investment by residents in particular, the effects of which may then be reflected in both the physical environment and community life.

To build sustainable communities, we need to rebalance Reading's image, moving away from a focus on financial prosperity, towards a focus on community well-being and ultimately promoting a new way of measuring success. This will help build a Reading that has a more diverse local business community that contributes to a local identity and a thriving local community. This is turn will attract more people to Reading who want to see it thrive and improve.

Reading's 'alternative economy' could mirror efforts undertaken by cities who have strong environmental movements and a strong local identity,

known for their culture and their richness of life, such as Bristol, Brighton and Lewes.

New ways of measuring success and progression are being developed by leading charities. These consider social, environmental and quality or life factors, alongside the more traditional measures of national growth which do not always benefit all sectors of society.

Local Business and Trading Charities

Building a local diverse business community where innovative small business and social enterprises are supported, will help us meet these aims. Local businesses are more likely to support community activity and invest in their local areas. Keeping 'money local' and encouraging businesses to reinvest in the communities in which they are located is a significant element of building a sustainable community.

There are a number of charities that have a trading arm to enable them to raise funds and meet their aims. The most visible examples of these are charity shops selling second hand goods. The aim is not only to raise funds for the work of the charity but to support a movement that reduces carbon by re-using goods. One example in Reading is Reading International Solidarity Centre (RISC) which promotes the 'Global Schools' programme and 'Fair Trade' movement. These charities call for greater awareness of sustainable communities internationally, as well as other ethical causes including climate change. The further development of these organisations is key to taking forward our alternative economy.

Strategic priority:

- *Build an 'alternative economy' focused on quality of life and emphasising sustainable communities (T8SP4)*

A BUSINESS PERSPECTIVE

Whether or not they choose to play an active part, businesses are part of the community. Simply by providing employment for local people, businesses can support their local economy. They can increase that contribution by hiring locally where possible and by resisting the temptation to offshore jobs. Sourcing products and services from local businesses is also beneficial to the community as a whole, both economically and in terms of reducing transport impacts.

Employers have the opportunity to improve the quality of life of their employees, both in the workplace and outside. Initiatives that support personal development, healthy living and flexible working can reduce sickness absence as well as improving productivity, morale and staff retention. A staff volunteering scheme can be a good way of providing practical support for local climate change and biodiversity projects that also provides opportunities for team building.

The most progressive companies look beyond their direct stakeholders and engage with the wider community, either through their own activities to promote emissions reduction or by funding or providing in-kind support for other initiatives. Even small businesses can do this, and it need not be a massive drain on resources if it is kept relevant and scalable. In a company where environmental and social impacts are valued equally to financial results, being a positive influence on the local community can become second nature.

GLOSSARY

Adaptation – preparing for the possible consequences of a changing climate, such as floods and heat-waves.

'Alternative' economy – an economy which focuses on quality of life and sustainable communities, rather than more traditional focus on financial prosperity alone.

Biodiversity - the number and variety of organisms found in a particular habitat or eco-system.

Carbon emissions - release of carbon into the atmosphere contributing to the greenhouse effect.

Carbon footprint - is the total amount of greenhouse gas emissions caused directly or indirectly by an individual, group or organisation. It is expressed as carbon dioxide equivalent (CO_2e).

Circular economy - a concept which encourages more efficient use, and greater re-use and recycling, of materials through the economy, rather than the conventional approach of 'take/make/waste'; 'end of life' products become source materials for new products; man-made materials which are not biodegradable are designed from the outset to be reusable in the development of new products; encourages the lease, rent or sharing of products or equipment, rather than the sale of disposable products.

Decarbonised - the reduction or removal of carbon emissions from the production of energy such as electricity.

District energy scheme - a local system for distributing heat generated in a centralized location for residential and commercial heating, generally using waste heat from local power plants or renewable energy.

Embodied carbon/ energy – the sum of energy or carbon involved in the production of goods and services, including the extraction and transportation of raw materials, manufacture, assembly and maintenance.

Feed-in tariffs - a government scheme whereby generating you own electricity through wind or solar energy means that you can receive payment from your energy supplier for all energy generated known as a 'generation tariff'. Any surplus generated and not used by the customer receives a higher rate of payment known as an 'export tariff'.

Green Deal - a government scheme to retrofit buildings in order to make them more energy efficient, providing householders with the opportunity to use future energy savings to pay for energy efficient measures to be installed in their homes.

Green economy – an economy whose growth in income and employment is driven by public and private investments that reduce carbon emissions and

pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services.

Greenhouse gas emissions - the release of the six greenhouse gases into the atmosphere , which absorbs and emits radiation contributing to the greenhouse effect. These six greenhouse gases are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

Heat supply networks - the method of supplying heat to multiple buildings using waste heat from local power plants or renewable energy, as part of a district energy scheme.

Local supply chain - a system of purchasing and distribution based around the demand and supply of goods within the local area.

Low carbon – generating relatively few carbon emissions.

Modal shift - a change in the type of transport used.

Modes of transport - different methods of transport, such as car, public transport, walking and cycling.

Operational carbon/ energy - carbon emissions/ energy resulting from the use of a building, including transport, lighting, heating, cooling etc.

Quality of life - the conditions in which we live, including social factors such education, environment, and physical and mental health, as well as material and economic factors.

Renewable energy - energy which is generated using natural resources which are renewed such as wind, sun, ground heat or biomass.

Retrofit - the addition of new technology or features into existing older buildings; this often applies to energy efficiency measures.

'Sharing economy'- an economy measured by social interactions and exchanges and sharing of goods.

Smart electricity grids – a system which allows energy to be stored, and enables communication between the user and supplier, in order to provide a better understanding of variations in power supply and consumption.

Smart meter - a device for recording and displaying the consumption of electricity in real-time, for the purpose of monitoring energy use by both customers and energy suppliers.

Sustainable - capable of being maintained at a certain level without depleting natural resources.

Sustainable community – a community where everyone is equally able to meet their own needs and improve their quality of life without harming the

environment, depleting natural resources or putting any part of society at a disadvantage.

Sustainable development - development that meets the needs of the present without compromising the ability of future generations to meet their own needs

Sustainable Urban Drainage Systems (SuDS) - an approach to drainage which attempts to mimic natural drainage and prevent the risk of flooding, through a range of techniques in developments and redevelopments.

Transport infrastructure- the network of roads, railways, ports and airports, which are used by different modes of transport.

Zero carbon – refers to achieving net zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount sequestered or offset, e.g. through a local Community Energy Fund which would allow developers' contributions to be invested in local renewable energy projects. Changes to building regulations are expected to include a requirement for developers to build 'zero carbon' homes by 2016, and business premises by 2019.