Worcester City Council Carbon Management Plan

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Foreword from the Chief Executive and Political Sponsor

Worcester City Council is committed to lead the way in building a low carbon, sustainable future for all residents, visitors and businesses in the City.

The cost of energy is expected to continue to rise to unprecedented levels, driven by both supply constraints and high demand, whilst high carbon emissions are adversely affecting the environment. It is clearly, therefore, the right time to take action.

The Carbon Management Plan provides the framework for Worcester to reduce its CO_2 emissions and also to reduce expenditure over a 5 year period. It also contributes to key priorities in our Corporate Plan, helping to deliver a cleaner and greener city, economic prosperity and value for money.

We recognise the enormity of a 25% reduction in our CO2 emissions over the next five years, but the pressing need to meet this is such that we look forward to rising to the challenge.

Foreword from the Carbon Trust

Cutting carbon emissions as part of the fight against climate change should be a key priority for public bodies - it's all about getting your own house in order and leading by example. The UK government has identified the public sector as key to delivering carbon reduction across the UK in line with the Climate Change Act targets, and the Public Sector Carbon Management programme is designed in response to this. It assists organisations in saving money on energy and putting it to good use in front line services, whilst making a positive contribution to the environment by lowering carbon emissions.

Worcester City Council partnered with the Carbon Trust on this ambitious programme in 2012 in order to realise substantial carbon and cost savings. This Carbon Management Plan commits Worcester City Council to a target of reducing CO_2 by 25% by March 2016 and underpins potential financial savings to the organisation of around £100k per year by that date.

There are those that can and those that do. Public bodies can contribute significantly to reducing CO_2 emissions. The Carbon Trust is very proud to support Worcester City Council in their on-going implementation of carbon management.

Executive Summary

Through this Carbon Management Plan, Worcester City Council aims to reduce its carbon emissions by 25% over the next 5 years

This Plan outlines how the Council will set about achieving this challenging target. Once the target is met, the Council will be saving around £100,000 a year on current energy costs. An investment of £123,000 has been identified as being required, with some projects still to be identified.

We emitted 2759 tonnes of CO_2 in 2010/11 – our 'baseline year'

Our carbon footprint is comprised of emissions from our office buildings and from our operations such as refuse and recycling collections. Figure 1 illustrates our carbon footprint. The majority of carbon emissions are currently from our buildings, with our crematorium and the Guildhall as the two highest emitters. Our refuse, recycling and street cleaning fleet accounts for 30% of emissions. Highlighting the need for a Carbon Management Plan with a clear course of action is the very small reduction in carbon emissions of just 0.2% seen between 2009/10 and 2010/11.

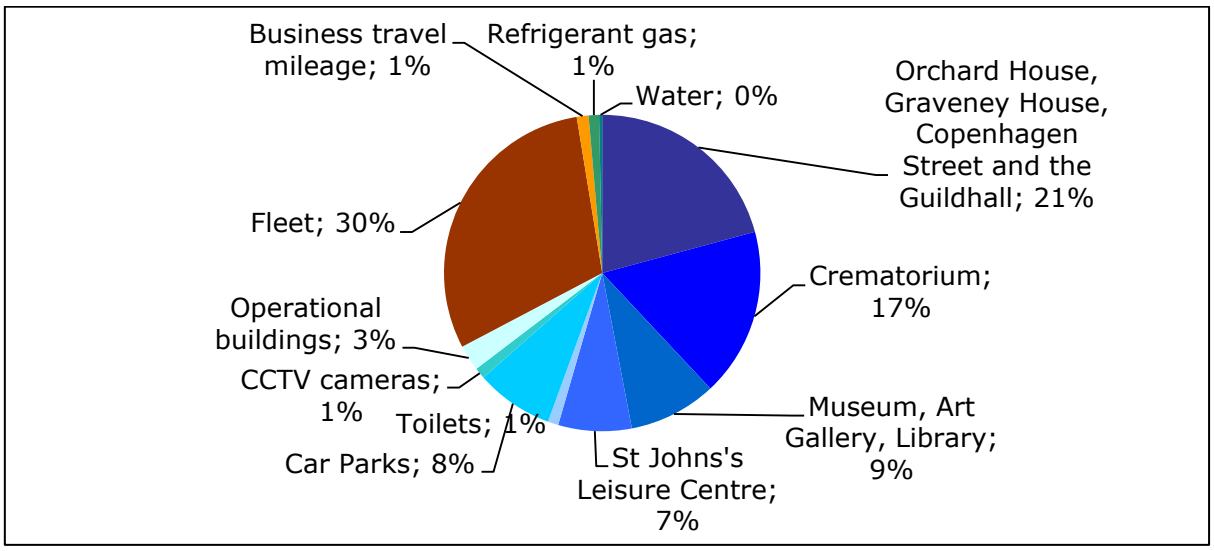

Figure 1. Breakdown of Worcester City Council Baseline Carbon Footprint 2010/11

A key project within the Carbon Management Plan is to upgrade the lighting in our one multi-storey car park to LED lighting. Currently, this car park accounts for c.8% of our total carbon emissions due to the high electricity demand of the lighting. Other projects identified include encouraging more staff action on energy usage and improvements to how vehicles and buildings are managed and operated.

After 5 years, the annual carbon emissions of the authority should have dropped to 2069 tCO_2, from the baseline in 2010/11 of 2759 tCO_2. Taking into account a total rise in annual emissions of 98 tCO_2 at the end of the five years under a business as usual scenario, emissions will have fallen annually by 788 tCO_2 in total. Due to expected rises in energy prices over these 5 years, if we do not act to reduce our energy and fuel usage, we expect these to be costing the authority £216,000 more than in 2010/11.

This Carbon Management Plan supports a number of other initiatives within the authority, including the Corporate Plan objectives of achieving value for money, a cleaner and greener city and economic propensity. Other benefits of the Plan are that it includes the opportunity to embed carbon management and energy management principles in the authority, with designated responsibility for achieving target reductions.

The Carbon Management Plan will ultimately be owned by the whole authority and embedding carbon management into the working lives of all employees is a crucial element within the plan. The Carbon Management Project Board will retain responsibility for governance of the Plan and subsequent project implementation. Progress on the Carbon Management Plan will be reported to Cabinet on an annual basis.

1. Introduction

This Carbon Management Plan defines our carbon management programme of activity for the next 5 years. The Plan is the core element of our carbon reduction activities and provides the opportunity to tackle carbon emissions from internal operations in a strategic and controlled way. It sets the strategic context and details the drivers for action, records our current carbon emissions, and launches a programme of proposed projects and actions to reduce those emissions. This section includes a summary of the financial aspects to the plan, as well as the governance arrangements required to keep the programme on track.

In this introduction we will set out:

- Our low carbon vision and target
- Drivers for reducing our carbon emissions
- The context of the programme and how it supports other organisational initiatives

1.1 Our low carbon vision

Worcester City Council's vision is to become a low carbon authority, through significant reductions in our energy usage.

Our mission is to reduce our energy usage, which will in turn save CO_2 and money. We must embed energy management and CO_2 reduction across the whole organisation to achieve this goal.

1.2 Our target and objectives

Worcester City Council will reduce the carbon emissions from our internal operations by 25% by the end of March 2016, from a 2010/11 baseline of 2759 tonnes CO_2

The key objectives of the Carbon Management Plan are to:

- Reduce the Council's CO2 emissions
- Save money on energy and water usage
- Enable the council to mitigate against rising energy prices
- Create and embed a low carbon/carbon reduction culture across the whole organisation
- Improve energy management across the whole organisation
- Reduce reliance on unreliable energy supplies
- Establish a clear, strong and maintained approach to carbon management

1.3 Our drivers and priorities for reducing our carbon emissions

Climate change is recognised as one of the greatest environmental and economic global threats, faced by national governments and individuals.

The overwhelming driver for this carbon management plan is to reduce the impact that we have on future climate change, by reducing the carbon emissions that Worcester City Council is responsible for. Climate change is already happening and it is imperative that we take all possible action to limit its implications.

There are many additional benefits of addressing our carbon emissions, beyond reducing our contribution to climate change. Many actions will increase the Council's sustainability and resilience..

As a local authority, it is very important that we make efficient use of public money. Ensuring that we prevent expensive energy from being wasted is therefore essential. Our energy costs have risen significantly over the last few years (above inflation), in line with the market, and therefore we also need to mitigate against these cost increases to reduce impacts on already constrained budgets. Worcester City Council is not currently included within the Carbon Reduction Commitment Energy Efficiency Scheme; however with the proposed price per tonne of CO_2 for 2012/13 set at £16, if the criteria for inclusion changed our annual liability would be around £36,000.

The Climate Change Act 2008 commits the Government to nationwide carbon reductions of 80% by 2050. Although this target has not been specifically passed onto local authorities, it provides the basis of the reductions from a 1990 baseline required from all energy users.

Legislation requires the Council to show 'Display Energy Certificates' (DECs) for all public buildings over 1000m^2. These clearly rate the energy efficiency of the buildings, enabling members of the public to scrutinise the building. These certificates therefore act as another driver to improve the energy performance of our buildings. Around half of our buildings must provide a DEC, and the ratings range from E up to C.

We signed the Nottingham Declaration on Climate Change in 2007, committing ourselves to considering the environmental impact of all council activities and develop a framework for future action. This Carbon Management Plan forms a major part of that framework. The Nottingham Declaration is currently being revised, but it is likely that Worcester City Council will renew its commitment.

Greenhouse gas emission reporting is still required by the national Government, despite the abolishment of the National Indicator 185, which previously placed a requirement on local authorities to record their annual carbon emissions. This encouraged reductions, and the new 'GHG emission reporting' schedule should be evaluated in the same light.

The importance of Local Authorities 'leading the way' in reducing carbon emissions should not be underestimated. Worcester City Council has a key strategic leadership position, with significant influence of local businesses, organisations and residents. We must lead internal carbon reduction by example. This is required and expected of us by our local residents. The most recent Worcestershire resident's survey (May 2011), the Worcestershire Viewpoint, found that 71% of residents feel there should be an improvement in carbon emissions in the county (i.e. that carbon emissions should be reduced), with 80% saying that carbon emissions are an important aspect of the environment.

1.4 The context for our Carbon Management Programme

There is a history of previous work in this area:

- Local Agenda 21 – no overall monitoring of carbon emissions, but expected carbon emissions from buildings calculated
- Work by internal Property Service continued until this service was developed into a shared service with Property.
- Work has taken place on enabling and encouraging the local community to reduce emissions
- An officer has sat on the **Worcestershire Partnership Climate Change Task Group** for the last two years
- Partnership and liaison work influences our internal and community climate change work

In order to develop the new approach, we have taken part in the Carbon Management Programme 'Lite', run by the Carbon Trust (this support was provided free of charge using funding offered as part of the West Midlands Low Carbon Economy Programme). We have followed the process shown in Figure 2. The most difficult aspect of developing the plan has been to identify and quantify projects.

Figure 2. The Carbon Management Plan development process

2. Emissions baseline and projections

The carbon baseline is a record of all our carbon emissions in 2010/11, the year chosen for our baseline figures. The targets and performance set out in this plan are measured as a percentage of the baseline value. This section outlines the scope of the baseline figure and how we have calculated that baseline. Calculating and analysing our carbon baseline has greatly improved our understanding of where our emissions are coming from and where reductions could be made.

2.1 Scope

The baseline is comprised of emissions from electricity, gas and fuel (diesel/petrol) usage, and also emissions related to our water usage.

This baseline includes our main internal operations:

- Our offices (Orchard House, Graveney House and the Guildhall)
- The civic areas of the Guildhall
- St Johns Sports Centre, a dry leisure centre managed internally
- Worcester Crematorium
- Public toilets
- Multi-storey car park (St Martins Gate)
- All other buildings or energy/water meters for which we are responsible for the utility bills, eg. our parks buildings, the floodlights on the bridge, meters on street water pumps etc.
- The running of our refuse and recycling fleet, street cleaners and parks vehicles.
- Business travel, by public transport or employees own car

We estimate that our baseline covers approx. 85% of our estate (this figure does not include shared services). We have excluded the two sports centres which are run by external contractors, as we do not have the influence over the management of these buildings. We have also excluded one of the sports centre run internally, Nunnery Wood Sports Centre, as it is on a shared site and therefore we do not have overall control over the building. The inclusion of these buildings will be evaluated at annually and assessments made as to whether they could be included.

The emissions from the office at our operational depot 'Warndon Sixways' is not included as this site is shared, but not sub-metered and therefore measuring the energy usage accurately is not possible. As with the Sports Centre, inclusion will be evaluated annually and usage added in if possible.

As stated, emissions from the usage of water have been included within our carbon emission baseline; although these represent only a small proportion of our overall emissions, it is important to the council for overall sustainability reasons that our water usage is reduced. Including the emissions within our carbon management plan will help to achieve this goal.

We have not included emissions arising from the waste produced from our buildings. Currently this is not measured; however, this could change in the future.

Worcester City Council has a number of shared services; one of which is hosted by ourselves, some by Worcestershire County Council and others by our district council partners. This baseline includes emissions from the service which we host. This policy was established for the Greenhouse Gas Reporting requirement for Central Government, in order to ensure that emissions were not double counted, and for ease of gathering data and reporting.

2.2 Baseline

The baseline is based on 2010/11 (financial year). Our baseline has been calculated using the tools provided by the Carbon Trust, based on data from our utility bills. Some of these bills are based on estimates, and therefore will not be 100% accurate. Measures have been taken to improve data accuracy through the recent installations of Automatic Meter Readers in many of our buildings.

Carbon emissions from the fleet are calculated from actual fuel usage; carbon emissions from business travel are calculated from mileage figures.

Table 1 shows the breakdown of CO_2 by type of building and type of transport and clearly shows offices and our crematorium together are responsible for the highest proportion of emissions; the single largest individual source is our refuse, recycling and street cleaning fleet. (See also Figure 1 for a diagrammatical representation of emission sources).

Our baseline data was compiled from the following sources:

- Gas and electricity from buildings and other meters – from manual meter readings where available, otherwise taken from utility bills
- Water from buildings and street pumps – from utility bills
- Fuel usage – from the Cleaner and Greener data officer, accurate records of fuel usage in all these vehicles are kept
- Business travel – mileage from public transport and from employee's own cars is recorded by our Payroll section in Finance

Table 1. Baseline figures showing tonnes of CO_2 emitted by each category, and the percentage of the footprint each category represents

Category		tCO2 2010-11	%
Buildings	Offices and Town Hall	574	21%
	Crematorium	475	17%
	Museum, Art Gallery, Library	248	9%
	Dry Leisure Centre	207	7%
	Toilets	30	1%
	Car Parks	219	8%
	CCTV cameras	31	1%
	Operational buildings	73	3%
Transport	Fleet	831	30%
	Business	33	1%
	Outsourced	0	0%
	Commute	0	0%
Further Scope	Refrigerant gas	29	1%
	Waste	0	0%
	Water	9	0%
	Other	0	0%
		2,759	**100%**

The current cost of gas and electricity is £352,000 (budgets for 2011/12). The current cost of diesel for the fleet is over £300,000.

2.3 Projections and Value at Stake

Using Carbon Trust projections, if we take no action to reduce our carbon emissions, we are likely to be spending an additional £215,952 annually on energy and fuel, by the end of 2016. This includes standard growth in demand and increases in energy tariffs we are likely to experience. This is the 'business-as-usual' scenario and under this, we would also be likely to see carbon emissions rise by 98 tonnes of CO_2.

If we reduce our emissions by our target amount of 25%, our emissions by the end of 2016 would be 690 tCO_2 lower than our 2011 baseline of 2,759 tCO_2 and 788 tCO_2 lower than the projected 2016 emissions figure under a business as usual approach.

The 'value at stake scenario' is the difference between the business as usual scenario, and the reduced emissions scenario.

Our financial value at stake by 2016 is predicted to be an annual amount of £253,757. Following full implementation of the plan, this can be seen as avoided annual costs. It is important to note however, that this value at stake does not include the cost of implementing the projects to achieve those emission reductions.

The value at stake of not implementing a Carbon Management Plan is an additional cumulative cost of £726,299 to Worcester City Council by 2016

Figures 3 and 4 graphically demonstrate the figures above, showing the carbon and financial differences.

The model has been modified to account for our current electricity and gas prices, and also to reflect our current contract arrangements; we are in a fixed term contract for the next three years. After that, we have estimated the cost rise in kWh units when procuring a new energy contract.

Worcester City Council is not currently included within the CRC Energy Efficiency Scheme and therefore these costs are not included within the calculations.

The figures in this section have been taken from the Baseline Tool provided by the Carbon Trust.

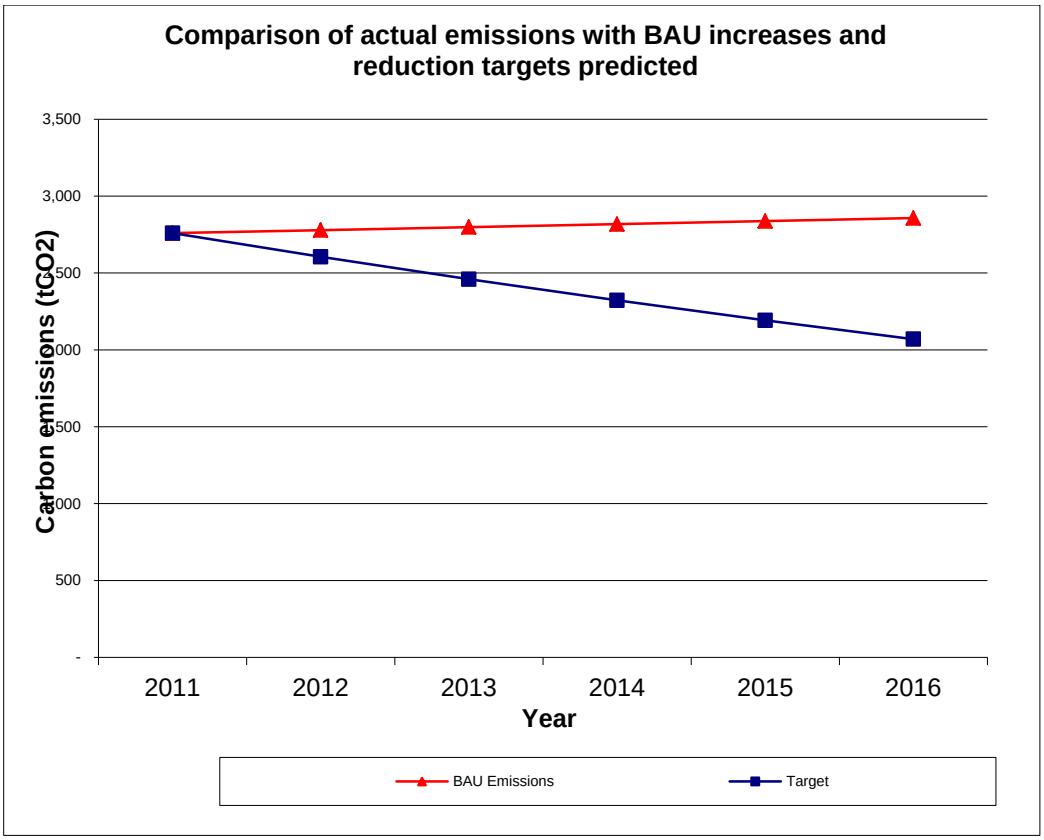

Figure 3. BAU scenario against reduction target - carbon

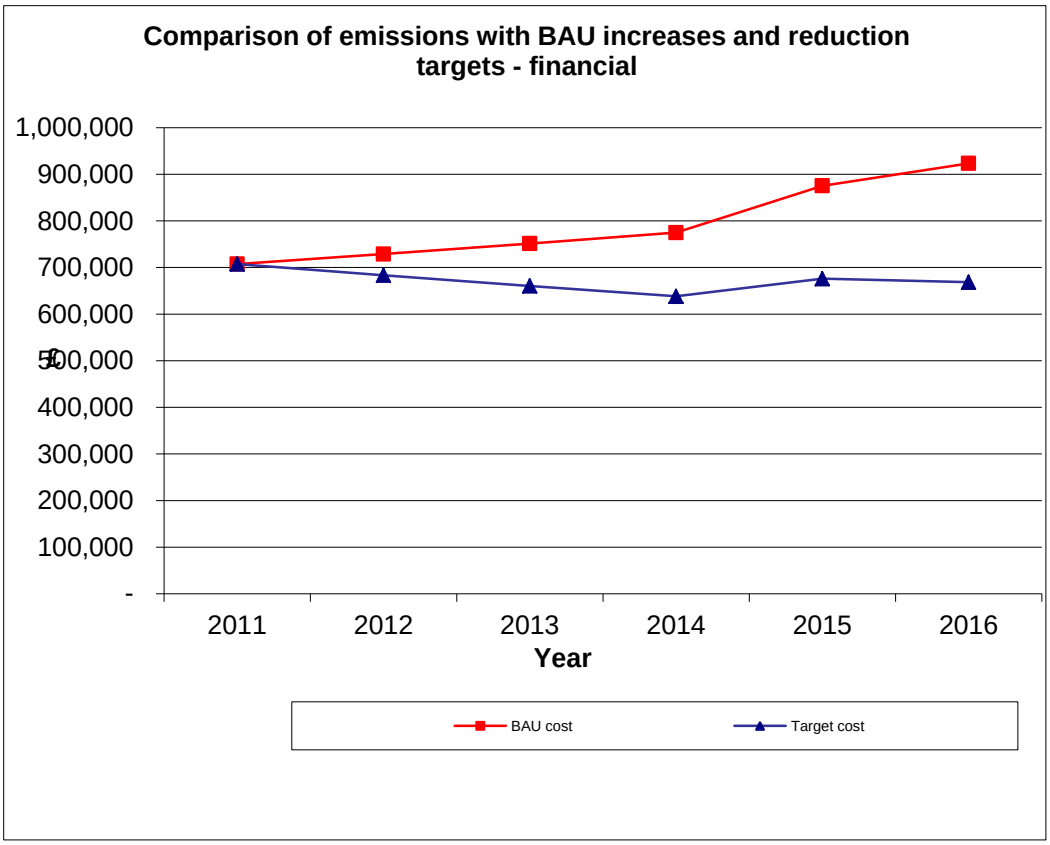

Figure 4. BAU scenario against reduction target - financial

3. Carbon management projects

Our existing and proposed Carbon Management projects will deliver estimated saving of 552 tonnes of CO_2 per year, equating to a reduction of over £100,000 annually on energy and fuel bills

3.1 Background

Over the last few months, we have identified a number of projects which will reduce our carbon footprint, equating to 79.5% of our 25% reduction target. Some of these are new ideas which we will strive to implement, some are projects that were happening for other reasons but will reduce our carbon emissions and so have been included within the carbon management plan.

The tables are divided into existing projects and new projects. For the purposes of this plan, all projects which were already planned prior to the start of the carbon management process have been classed as 'existing'. Implementation dates will vary; some may have happened already, some may be currently underway and others may not yet have started.

The New Projects section records projects which have been developed specifically to reduce emissions, during the development of this Carbon Management Plan.

There is a separate section recording initial ideas for potential future projects. No figures have been produced on costs/savings for these potential ideas and they are not yet included in the plan. As mentioned, projects achieving further reductions of 138 of CO_2 must be found in order to meet our reduction target. This list may give us some starting points as to where these additional savings may come from.

For existing projects, the capital cost is not included as the projects were taking place already. If we are incurring additional costs in a project in order to maximise the carbon reductions achieved, these additional costs would be listed. However, this situation has not arisen.

Project information has been inputted into the Carbon Management Project Register, and outputs here are taken from that register.

Projects were identified following site surveys of all buildings and discussions with staff about potential opportunities for reducing current energy usage. Consultation with experts regarding the cost of projects and the expected energy savings that could be achieved has taken place wherever possible, however all project details are subject to confirmation and figures of costs/savings are estimations.

Each project identified here will be implemented as a separate project, following the standard Worcester City Council project management methodology. This means that projects will have to be separately endorsed by the Strategic Programme Board or the relevant Corporate Director.

Projects were chosen for the plan on the basis of their potential carbon and cost saving, and the expected payback period. Based on current cost estimations, only one project with a payback period longer than 5 years has been included in the plan.

3.2 Summary of Projects

The project with the most impact in the programme is the upgrading of the lights at St Martins Gate multi-storey car park (18.6% of our target). The project payback also takes into account a separate project to reduce the hours which the lights are in operation at St Martins Gate. It is very important to ensure this project is implemented, particularly as it will have a very positive impact on our energy costs in addition to the large annual carbon saving.

The other major project is the proposal to install voltage optimisation units in a number of our major buildings. Further work is required to identify the exact savings; the figures shown in table 3 are based on the standard 10% energy reductions that one potential supplier uses for initial calculations.

Further details on all projects can be found in Appendix A, Definition of Projects.

3.3 Existing projects

This section identifies projects which existed prior to the development of this Carbon Management Plan, in planning or delivery stages.

Table 2. Existing projects

Ref	Project	Lead	Capital Cost	Annual Savings (year 1)		Payback (yrs)	% of target	Implement ation year (financial)
				Financial (gross)	tCO_2			
1	Sunrays (thin IT clients)	ICT	Already funded	Financial savings already identified (£1860)	10.9	n/a	1.60%	2011/12
2	Commandery Reception Lighting	Property	Already funded	£340	2	n/a	0.30%	2011/12
3	Guildhall Lighting Upgrades	Property	Already funded	£835	4.9	n/a	0.70%	2011/12
4	Improved insulation in the cremators	Cleaner and Greener	Already funded	£201	0.8	n/a	0.10%	2011/12
5	Refuse fleet trackers	Cleaner and Greener	Already funded	Financial savings already identified (£7391)	16.6	n/a	2.40%	2012/13
6	Refuse Route Optimisation	Cleaner and Greener	Already funded	Financial savings already identified (£5345)	12	n/a	1.70%	2012/13
7	Office Accommodation Phase 1	Corporate	Already funded	Financial savings already identified (£8899)	47.8	n/a	6.90%	2012/13
8	Bridge Floodlights Replacement	Property	Already funded	£1,347	7.9	n/a	1.10%	2012/13
9	Automatic Meter Readers – subsequent reductions following data analysis	PIE	Already funded	£9,301	44.2	n/a	6.40%	2012/13
10	Office Accommodation Phase 2	Corporate	Already funded		46.6	n/a	6.80%	2014/15
	Totals			**£12,024 (£35,519 inc savings already in budgets)**	**193.7**		**28%**	

3.4 Planned / funded projects

This section lists all the projects that are planned with funding provisionally in place. Funding is from the Transformation Reserve fund, unless Salix Financing is applied for and granted.

Table 3. Planned / funded projects

Ref	Project	Lead	Capital Cost	Annual Savings (year 1)		Payback (yrs)	% of target	Implementation year (financial)
				Financial (gross)	tCO_2			
11	Reducing business travel	PIE	£1,000	£908	1.6	1.1	0.20%	2012/13
12	Staff engagement	PIE	£1,000	£3,043	17.8	0.3	2.60%	2012/13
13	St Martin's Gate reduced lighting out of hours	Cleaner and Greener	£0	£6,209	36.4	0	5.30%	2012/13
14	Creation of heating zones in the Guildhall	Property	£3,000	£2,640	11.1	1.1	1.60%	2012/13
15	Improved insulation in the Guildhall	Property	£37,000	£4,967	20.9	7.4	3.00%	2013/14
16	Pipe lagging in Guildhall, Museum and Art Gallery, Copenhagen Street and Crematorium	Property	£3,500	£1,646	6.9	2.1	1.00%	2013/14
17	Voltage Optimisation at the Guildhall	Property	£15,166	£4,124	24.2	3.7	3.50%	2013/14
18	Voltage Optimisation at St Martin's Gate car park	Property	£12,165	£3,367	19.7	3.6	2.90%	2013/14
19	Voltage Optimisation at St John's Sports Centre	Property	£12,165	£2,822	16.5	4.3	2.40%	2013/14
20	Voltage Optimisation at the Museum and Art Gallery	Property	£5,630	£1,453	8.5	3.9	1.20%	2013/14
21	Energy efficiency measures at the Crematorium	Cleaner and Greener	£2,000	£15,094	63.5	0.1	9.20%	2013/14
22	St Martin's Gate Lighting Upgrade	Cleaner and Greener	£30,000	£21,838	128	1.4	18.60%	2013/14
	Totals		**£122,626**	**£65,106**	**355.1**	**(average) 2.41**	**51.5%**	

3.5 Potential future projects

This section records ideas that have been had for additional projects which will reduce our carbon emissions. These ideas could be investigated further to help bridge the gap between planned reductions and our reduction target. No work assessing costs or savings has yet been achieved and therefore these are not formal projects and are not included in the Carbon Management Plan calculations. .

Table 4. Potential future projects

Project Idea	**Description**
Replacement of diesel fleet with electric vehicles	Currently our diesel fleet is responsible for 30% of emissions. Conversion to electric vehicles would significantly reduce emissions, whilst increase in electricity would be comparatively small. May not be possible for all vehicle types. Conversion to electric lift system may be possible if full electric refuse vehicles are unavailable. No information on current vehicle replacement programme.
Boiler replacements in the Guildhall and Museum and Art Gallery	It is expected that the boilers in this two buildings will need replacing fairly soon, and that replacements will be much more efficient. Involvement is taking place to ensure that carbon emissions are considered.
Provision of electric cars for use by staff as pool cars	Although emissions from business travel are relatively small, purchasing electrical vehicles for staff to use instead of their own cars would reduce our emissions. It would also benefit staff who would otherwise not bring their car to work, if they did not need to use it for business travel.
Dry-cycling technology on the boilers	More research needs to be done as unaware of any neighbouring authorities with experience of this technology. Information suggests that savings can be found by installing a module to prevent a boiler from unnecessarily clicking on and off.

3.6 Projected achievement towards target

The projects identified in the four tables above will, when all implemented, reduce our emissions by 19.8% from the 2010/11 baseline. This takes us 79.5% towards our reduction target of 25%. Work must continue therefore on the identification of projects to achieve the full reduction target. Over the 5 year lifetime of this plan, it is expected that new projects will become possible and new technologies may also become available.

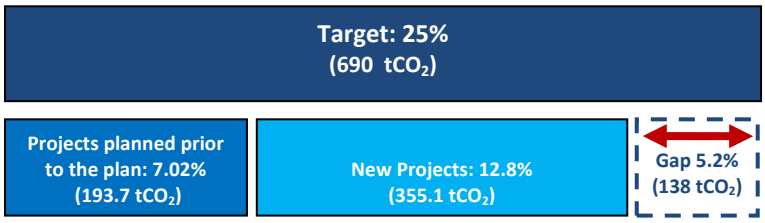

Figure 5. Projects identified against target and the carbon gap.

Figure 6 below shows predicted business-as-usual (BAU) emissions and the target emissions. The 'emissions in chosen plan' plot shows the emissions reductions from the projects scheduled across the years of this plan. This plot includes the effect of BAU forces, so shows the impact of no projects in one year – resulting in a trend towards the BAU line. The impact of project life is also included, so when a short life project is finished (e.g. awareness raising) before the end of the programme and not maintained or repeated) the trend shows a stepwise increase in emissions. Finally a degradation factor is included. This assumes that over the life of a project its carbon saving impact will decrease due to factors such as business focus being diverted to other initiatives, projects not being maintained and also % savings becoming smaller as a building becomes more efficient.

By including these effects we are trying to model some of the real life factors that may impact on our ability to meet our target. Because of these additional factors the plot does not directly agree with a simply summed list of the carbon saving impact of the projects.

As can be seen on figure 6, our emissions in chosen path are 138 tCO_2 greater than the target emissions. Emissions in chosen path are in line with target emissions until 2014.

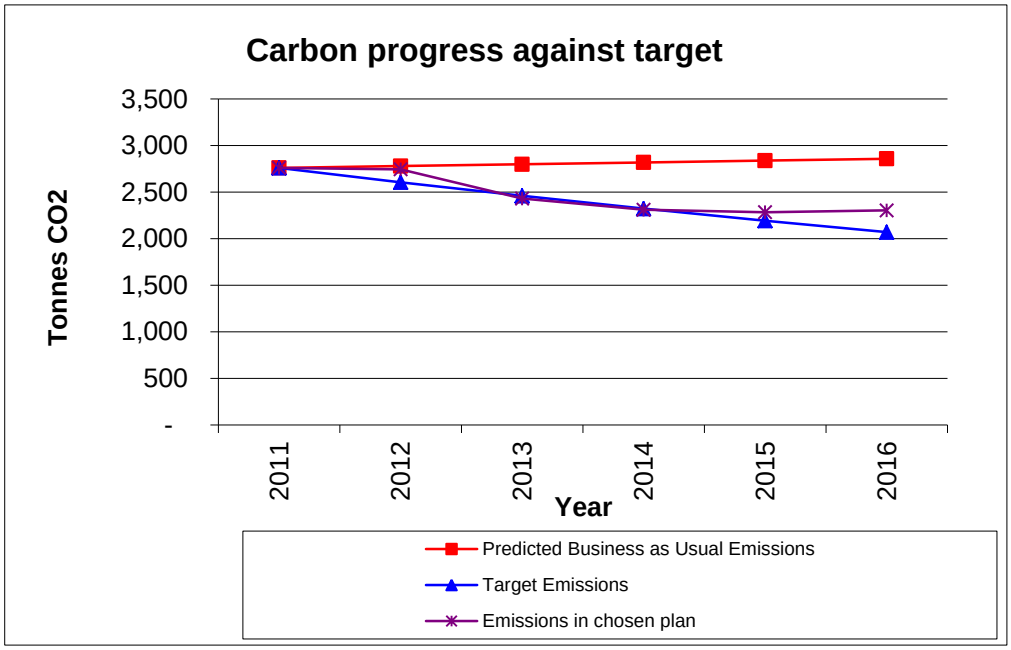

Figure 6. Example projection of impact of projects on meeting carbon target

4. Carbon management plan financing

Implementation of the new projects defined in this plan will cost £123,000. It is proposed that this amount is allocated from the Transformation Reserve fund.

When all new projects are implemented it will result in estimated annual financial savings / cost avoidance of £80,000. Including savings already identified in budgets from existing projects, cost savings will be over £100,000.

All projects bar one will payback within 5 years of implementation.

The headline £123,000 cost of project implementation refers only to new projects which have been identified through this Carbon Management process. The costs of existing projects, whether or not these have been implemented, have not been included as these have already been budgeted for.

There are no existing projects for which an additional cost has been added to the original cost of the project, in order to improve the carbon savings from that work.

The authority may apply for Salix funding in order to finance two of the projects: it has been identified that projects with costs amounting to around £42,000 may be eligible for this funding. Salix funding eligibility is based on a number of factors, including cost per tonne of CO_2 and payback period etc.

The capital cost of projects will be regained by the end of the 2014/15 financial year.

If Salix funding is not applied for, or the application is not successful, then the majority of new projects with a capital cost will be implemented in 2013/14, as budgets for the financial year 2012/13 have already been set. The need for additional capital, particularly for projects that have not yet been identified, will be assessed during an annual review of the plan.

Projects have been classed as requiring either finance from either revenue or capital funding. These decisions have been made according to standard financial accounting guidelines. Table 6 shows the total cost of implementing projects on an annual basis.

Table 5. Summary of costs

Costs	2011/12	2012/13	2013/14	2014/15	2015/16
Total annual capital cost (new projects)	£0	£5,000	£117,626	£0	£0
Total annual operation cost (new projects)	£0	£0	£0	£0	£0
Total costs	£0	£5,000	£117,626	£0	£0

4.1 Financial costs and sources of funding

Table 6 and Figure 7 show the annual costs of delivering on the Carbon Management Plan, together with the savings that will be seen each year. With a total programme cost of £123,000, it can be seen that a full return on investment should be seen by the end of the 2014/15. All costs identified have been categorised as capital costs.

Table 6 shows, for each year:

- the costs of project implementation (column B)
- the 'new' savings that will be realised each year as new projects that were implemented during the previous financial year generate a full year of energy savings (column C)
- the 'new' savings that will be realised each year as existing projects that were implemented during the previous financial year generate a full year of energy savings (column D)
- the annual savings that will build up over time that are new to budgets (column E).
- the annual savings that are already in budgets (from existing projects) (column F).
- the combined annual savings that will be seen–not in budgets and already in budgets (column G)
- the cumulative savings that will be seen over time, i.e. by 2015/16, a total of £186,470 will have been saved, over the previous 5 years (column F), that is not currently in budgets
- the combined cumulative savings that will be seen over time (already in budgets and not already in budgets, column I)

Table 6. Annual capital costs and savings

	Column B	*Column C*	*Column D*	*Column E*	*Column F*	*Column G*	*Column H*	*Column I*
	Costs	**Savings from new projects implemented in previous financial year**	**Savings from existing projects implemented in previous financial year**	**Annual savings (new to budgets)**	**Annual savings (already in budgets)**	**Annual savings (new and already in budgets)**	**Cumulative savings (new to budgets)**	**Cumulative savings (new and already in budgets)**
2011/12	£0	£0		£0			£0	
2012/13	£5,000	£1,376	£3,236	£1,376	£3,236	£4,612	£1,376	£4,612
2013/14	£117,626	£23,448	£32,484	£24,824	£35,720	£60,544	£26,200	£65,156
2014/15	£0	£55,311	£0	£80,135	£35,720	£115,855	£106,335	£181,011
2015/16	£0	£0	£unknown	£80,135	£35,720	£115,855	£186,470	£296,866

Figure 7 illustrates this data in a graphical form.

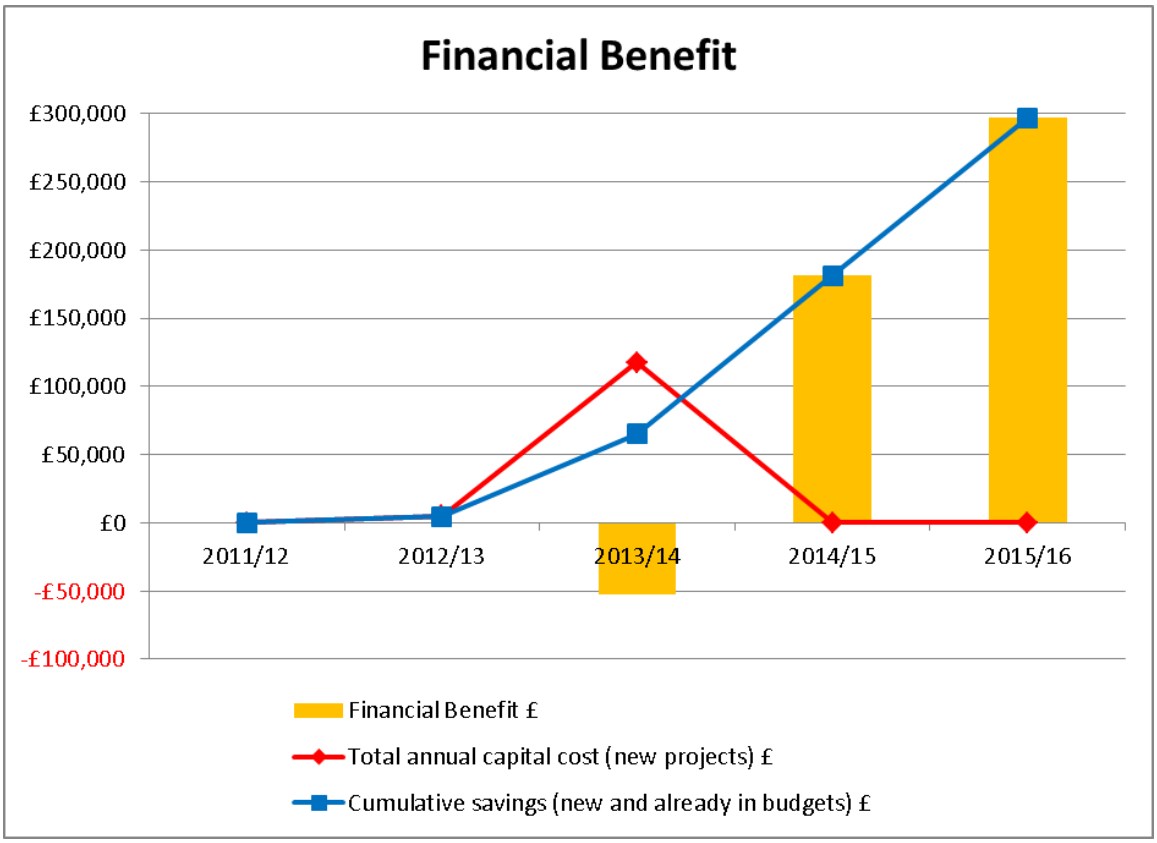

Figure 7. Financial progress graph – Annual capital costs and savings

4.2 Assumptions

Worcester City Council currently procures energy on 3 year fixed term contracts. New contracts were signed in Oct 2011, meaning that we know that prices will stay constant until Oct 2014. A static price for this period has been built into the model, with rises in 2014. These rises have been estimated to be the cumulative average annual increases which the model previously estimated. Therefore, electricity will rise from the current 10p per kWh to 12.54 in 2015 (first full year) and natural gas from 3.36p to 4.21p. From here, the existing estimated annual price rises remain in the model.

No other assumptions have been made in the development of this plan.

4.3 Benefits / savings – quantified and un-quantified

Table 7. Financial progress table - Costs and savings

	2011/12	**2012/13**	**2013/14**	**2014/15**	**2015/16**
Annual cost saving	£0	£4,612	£60,544	£115,855	£115,855
Annual tCO_2 saving	0	18.6	214 *(195.4 + 18.6)*	502.2 *(288.2 + 214)*	548.8 *(502.2 + 46.6)*
% of target achieved	0%	2.7%	31%	72.7%	79.5%

Unquantified benefits:

- Reduced vulnerability to volatile energy supplies
- Local taxpayers will be getting better value for money on their council tax
- A more environmentally aware workforce (this may lead them to reduce emissions in their homes as well)
- Enhanced reputation with the public and partner organisations
- Local businesses and organisations may feel inspired to reduce emissions, leading to a greater community-wide benefit
- Reduction in emissions will be demonstrated when the national reporting requirement on Greenhouse Gas Emissions is responded to, meaning that the authority will be seen as performing well on carbon emissions against other authorities.

5. Change management

Corporate support for the Carbon Management Plan is strong and we are committed to ensuring implementation of the identified projects over the next five years

5.1 Corporate Strategy – embedding carbon reduction across Worcester City Council

Senior support for the carbon management plan has been strong and this will help to embed the plan in the organisation. All employees have been kept up to date with the progress of the writing of the plan. In order to establish the importance of the plan to employees, and to introduce the plan to the residents of Worcester, a press release will be written on its publication and the plan itself will be published on the website.

Carbon management and ownership of the plan is written into the Performance, Improvement and Efficiency service plan, ensuring that governance of the plan will be maintained. The Policy and Performance team will be monitoring progress and achievements of the targets.

We have included one specific project on staff engagement with energy usage through a behavioural change programme. In addition to this project, which will focus on the changes that staff can easily implement at their desks, such as switching lights on only when required and ensuring that computers are switched off over night, a key aspect of embedding is to ensure that staff look out for larger potential projects. For example, the attendants in the Guildhall may see other possibilities for reducing energy; either small 'day to day changes' that they can suggest to the manager and implement themselves, or more significant opportunities which will need to be implemented as a full project.

Only once staff are acting without frequent reminders in a carbon-conscious manner, in their work and in their attitudes towards their workspaces, will carbon management be fully embedded into the organisation.

5.2 Corporate Responsibility – saving carbon is everyone's job

Worcester City Council acts as One Council and it is very important that carbon management must be part of the daily job of all employees, across all sectors of the Council. It is imperative to the owners of the plan that staff do not feel that carbon management is now taken care of, with no action required from them. Reducing our energy usage, whether that be from our buildings, fleet or business mileage, is something that every single employee can influence. This will be stressed to them, through internal communications in the staff newsletter, 'In the Know', through team meetings, and where necessary, through extra training or personal development.

Some staff will have a larger role in carbon management, such as the officers in charge or building managers. These staff will be responsible for the overall energy usage of the building, and so will be required to monitor this usage either through the regular reading and recording of meters (in the smaller buildings, such as parks buildings), or through the monitoring of the online energy usage software, 'Savenergyonline', where data from automatic meter readers is sent. This member of staff will often be the identified Project Owner for some building-based projects within this plan, or at least will be the main on-site contact for Property Services.

We will evaluate the possibility of including the requirements to managing carbon usage efficiently within staff job descriptions; this could be included as part of current projects to evaluate job descriptions and the Council's terms and conditions for employees.

'Carbon Champions' (or a similar role) will be established but it is essential that the role they are expected to carry out, the scope and their empowerment is first detailed and agreed by HR and the corporate directors. A Carbon Champion network will need to liaise with the equivalent network at Worcestershire County Council, as with two of our buildings, the Commandery and the Museum and Art Gallery, the occupants are employees of the County Council. The Carbon Champion network at County Council is more established and would provide a useful model for establishing our own successful model. Having Carbon Champions spread across the different buildings and therefore also services will help to maintain momentum over the 5 years of the programme and to ensure that staff engagement is upheld.

5.3 Monitoring and reporting

Monitoring and reporting on the progress of this plan is essential and will be an organised process. The automatic meter readers will provide accurate information on energy usage for many of our buildings.

For those buildings which have not had automatic meter readers installed (whether or not they feature on this programme), the member of staff in charge of the building will be provided with a dedicated spreadsheet for recording manual meter readings. Readings should then be taken weekly and the data regularly sent to the programme co-ordinator, Ruth Johnson. Data from the manual recordings and from the automatic meter readers will be collated onto a separate database. This will measure progress against specified targets. Clear information trails will be kept of project implementation, in order to allow us to attribute savings to particular projects.

Data collection from our fleet fuel usage is currently very good, as is the data collection on our business mileage. No changes need to be made here, but monitoring must take place to assess the success of the associated carbon reduction projects.

As we are already required to publish information on our carbon emissions in the format of a Greenhouse Gas Emissions report, we will extend this document to include detailed progress of the implementation and impact of our Carbon Management Plan. This report will be circulated to the Programme Board, staff and will also be made available on the City Council website. This will allow transparent tracking of progress against stated project implementation dates. Together with the information on energy usage and financial bills, this should provide a clear picture of our progress. These reports will be published in July each year, based on the previous financial year.

5.4 Communication and training – ensuring everyone is aware

An identified project within the Carbon Management Plan is to engage with staff on carbon management and to improve the awareness of energy efficiency issues across the authority. Ongoing communication on the Carbon Management Plan will therefore be delivered partially through this project.

Communication on the progress of the plan will also be delivered through the internal staff newsletter, 'In the Know', which is circulated monthly. It is intended that each newsletter will have one article on carbon management/sustainability and energy efficiency, and therefore this opportunity can be used to report on progress on the plan, and also encourage action where appropriate. Other internal communication mechanisms, such as the Intranet, will also be utilised where possible and suitable.

Staff induction is now mostly conducted through online training and assessment. Options for integrating basic carbon management skill training into this induction programme are being investigated. New staff will at least be informed through a short briefing note circulated to them, even if wider training is not possible.

We have identified a number of specific actions to focus on with office staff:

- Ensure electrical equipment is being switched off – half of the screens and one computer left on in one area of the Council over the Christmas break – despite a warning that work was being carried out and that all computers and screens must be switched off.
- Reducing business mileage wherever possible – please use the train, bus or car share wherever possible.
- Reducing use of printers etc and taking action to help reduce energy usage wherever a new opportunity is seen
- Reporting carbon reduction opportunities that cannot be acted on immediately to I&E to help implement a change

Worcester City Council does not currently conduct staff surveys; however this will be monitored and liaison will take place with the Communications team as to whether this would be possible and appropriate to do.

5.5 Engagement of our stakeholders – leading by example

In order to communicate our carbon priorities and plans to reduce our carbon emissions we will publish this plan on our website following a launch via a press release to increase engagement and awareness of the planned projects. The Plan will then be available on our website which is available for searching by members of the public and other interested stakeholders.

We will also promote the Plan wherever possible at Worcestershire Partnership and Worcester Alliance (our Local Strategic Partnership) meetings and events, to increase awareness of the plan.

We have a sustainable procurement policy and aim to encourage our suppliers to actively manage and monitor their carbon emissions. Carbon emissions 'embedded' within goods that we procure and use are not currently counted as our emissions.

5.6 Policy Alignment – saving CO_2 across all operations

We will strive to ensure that all decisions on new policies or revisions to existing policies take the environmental impact (which should include carbon management) of that policy, into consideration

We must also attempt to quantify the impact on our carbon footprint of major capital projects or changes within the authority.

5.7 Change Management Action Plan

Table 8. Change Management Action Plan

When	***What***	***Owner***
Corporate Strategy		
Feb 2012	Carbon Management Plan delivery as an action with the service improvement plan for Performance, Improvement and Efficiency *(completed)*	Performance, Improvement and Efficiency manager (Julie Slatter)
April 2012	Investigate potential to include Carbon Management Plan reporting in the Worcester City Council Annual Report	Performance, Improvement and Efficiency manager (Julie Slatter)
April 2012	Discuss with Policy and Performance Team whether carbon emissions can be included as a service performance measure	Policy and Performance Team
Corporate Responsibility		
2012-13	Investigate potential to include Carbon Management responsibilities within all staff job descriptions	Programme Co-ordinator / Human Resources (Gail Hatfield)
2012-13	Establish a Carbon Champion network to run alongside, support and maintain momentum with the behavioural change programme	Programme Co-ordinator
Ongoing	Regular staff communications, particularly when new projects have been completed	Communications team
Monitoring and Reporting		
April 2012	Discuss with building managers / service managers where necessary best person to take weekly manual meter readings	Programme Co-ordinator
April 2012	Distribute manual meter readings spreadsheet to identified staff	Programme Co-ordinator
Monthly	Ask monthly (last day of the month) the spreadsheet	Programme Co-ordinator
Monthly	Collate data from manual meter readings with data from automatic meter reading data for other buildings	Programme Co-ordinator
June 2012	Change template for the Greenhouse Gas Emissions Report to include a section of CMP progress	Programme Co-ordinator
Annually (July)	Greenhouse Gas Emissions and Carbon Management Plan Progress report – produce and publish	Programme Co-ordinator
2013-14	Re-evaluate scope of Carbon Management Plan – are	
Communication and Training		
Ongoing from March 2012	Bi-monthly articles on the Carbon Management Plan, sustainability or energy efficiency in 'In the Know', the internal communications newsletter	Programme Co-ordinator / Comms Team
2012-13	Investigation of options regarding integration of Carbon Management training into the process of inducting new staff	Programme Co-ordinator / Human Resources
2012-13	Investigate use of staff surveys for monitoring levels of engagement and awareness of energy efficiency / carbon management.	Programme Co-ordinator / Policy and Performance team

Engagement of Stakeholders		
March 2012	Launch the Plan via a press release	Communications team
March 2012	Make the Plan available on our website	Website administrator
2012-13	Assess communication opportunities for staff in different buildings, paying particular attention to staff working for Worcestershire County Council through Worcester City Council buildings	Programme Co-ordinator / Comms team
Ongoing	Promote the Plan, our targets and drivers at partnership events such as Worcestershire Partnership and Worcester Alliance (our LSP) meetings wherever possible	Performance, Improvement and Efficiency manager (Julie Slatter)
April 2012	Promote to Transition Worcester	Programme Co-ordinator
Policy Alignment		
2012-13	Investigate ways to ensure that all new policies and projects take into account potential impact on carbon emissions / wider sustainability	Policy and Performance team
2012-13	Look at ways to assess carbon impact of commissioned services and how this could be improved	Policy and Performance team / Procurement

6. Programme management

A governance structure for carbon management has been developed as part of this programme; this is something that has not previously existed. Responsibility for carbon emissions now formerly sits within the Improvement and Efficiency team, which is part of the Performance, Improvement and Efficiency service. Overall management and co-ordination of delivery of the Plan therefore lies with Improvement and Efficiency manager, David Thorpe, who acted as project sponsor.

The on-the-ground delivery of the Carbon Management Plan will be co-ordinated by Ruth Johnson, trainee Project Officer within the Improvement and Efficiency team, who has worked as Project Leader for the development of the Carbon Management Plan. This role will now become a Programme Co-ordinator, whilst the Project Leader will become the Programme Leader.

Individual Project Owners, as identified in Appendix A: Definition of Projects, are drawn from the whole authority and from our shared services.

6.1 The Programme Board – strategic ownership and oversight

The Carbon Management Board, established during the course of the Carbon Management Programme, will continue to provide a governance role, monitoring the progress of delivery of the Plan. They will also help to remove any barriers that are preventing or delaying project implementation.

This Carbon Management Board is comprised of David Thorpe, Improvement and Efficiency Manager and Project Sponsor, Lesley Meagher, Finance Service Manager and Councillor Roger Knight, Cabinet Member for Cleaner and Greener, Member Sponsor of the Carbon Management Programme. The Board will be chaired by David Thorpe.

The Board will meet on a six-monthly basis, and will receive the following reports from the Programme Co-ordination / Programme Sponsor:

- the overall progress of the Programme, including a Red, Amber and Green (RAG) rating (for projects which have started to be implemented),
- update to identified project/programme risks and actions taken to mitigate against these risks

This Carbon Mangement Board will report by exception to the Strategic Programme Board, which monitors progress of all projects and programmes across the authority.

6.2 The Carbon Management Team

The Carbon Management Team will continue to meet wherever necessary. However, meetings between the Project Owners and the Programme Co-ordinator will take place regularly throughout the implementation of a project. This will involve people beyond the Carbon Management Team.

Liaison with the relevant members of the Property team is necessary and efforts must be taken to ensure that colleagues with the most suitable expertise in individual areas are engaged.

6.3 Implementation of the Carbon Management Plan

Table 9. Implementation Plan

When	What
Mid-Jan 2012 (slipped from Dec 2011)	Draft Carbon Management Plan to Carbon Trust
20 March 2012	Carbon Management Plan with report to Cabinet
20 March 2012	Press release on the Carbon Management Plan
20 March 2012	Article on Worcester City Council website promoting CMP
April 2012	Article in staff newsletter, 'In the Know', promoting the CMP
April 2012	Endorsement received from Carbon Trust
May – July 2012	Discussions with individual service managers about the CMP and its relevance to each service
April 2012 onwards	Continued monitoring of existing projects and their implementation progress
May 2012	Implementation of new projects begins

6.4 Succession provision

Should the Programme Co-ordinator leave, responsibility would be passed to the other Project Officer within the Improvement and Efficiency team. The Improvement and Efficiency Manager, as Project Sponsor, would help to ensure continuity whilst another Programme Co-ordinator was identified.

All the documentation is stored on a shared Council documents area, and so is accessible to other members of staff within the Performance, Improvement and Efficiency service.

Through the Carbon Management Board governance, ongoing management of the Plan is ensured.

6.5 Routine and annual reporting

Progress on the Carbon Management Plan will be reported to the Carbon Management Project Board on a six-monthly basis. Briefing notes and reports will be produced for these meetings.

It will be recommended that progress on the Carbon Management Plan is reported publically through the Council's Annual Report.

A separate report will be published alongside the annual Greenhouse Gas Emissions report, which will be re-named as the 'Greenhouse Gas Emissions and Carbon Management Plan Progress' report. This report will include the Council's carbon footprint data, and changes from the previous year. This will be correlated with expected reductions mapped in the Carbon Management Plan.

6.6 Benefits Realisation

Once correctly implemented, this Carbon Management Plan will yield significant benefits for Worcester City Council. These, along with how they will be measured, are described in Table

Table 10. Descriptions of benefits and their measurement

Reduced energy usage and fleet costs
Measured by officer in charge of collating information for Greenhouse Gas emission reporting; in addition by individual officers in charge / budget holders. These measurements are taken from energy bills, from data on our fuel use in fleet vehicles, and from business mileage claims. The accuracy of this data will improve with the introduction of automatic meter readers (meaning we can view and download energy usage online for these meters) Benefits will be realised in accordance with the implementation of the projects over the 5 year period (so all benefit associated with projects should be realised by the 2017/18 financial year) Outcomes of the realised benefit are: • reduced energy costs • reduced carbon footprint • increased sustainability of the council • employees see a employer who is acting to reduce environmental impact
Reduced carbon footprint
Measured by officer in charge of collating information for Greenhouse Gas emission reporting (as above) Benefits will be realised in accordance with the implementation of the projects over the 5 year period (so all benefit associated with projects should be realised by the 2017/18 financial year) Outcomes of the realised benefit: • Council is setting a good example to citizens • mitigation of climate change

Energy Management Principles will be established through City Council buildings

Measured by the awareness among staff in individual buildings – through staff surveys and through walk-around surveys assessing whether equipment is turned off; also by measured reductions in energy usage that are not attributable to other projects

Benefits will be realised in accordance with the implementation of the projects over the 5 year period

Outcomes of the realised benefit:

- all staff will adopt energy conservation working practices
- all staff will be aware of the need to conserve energy
- energy will be reduced through more efficient energy use

Clear and strong approach to Carbon Management is formed, likelihood of project implementation taking place is increased (opposed to if projects were identified outside of the Carbon Management Plan)

Measured through the governance work of the ongoing Project Board for the Carbon Management Plan, comparisons with carbon management work undertaken over the last 2-3 years can be made; also through the implementation of individual projects on the Plan and whether stated timescales are held.

Benefits will be realised throughout the course of the whole 5 year plan and beyond as the benefits of individual implemented projects are realised

Outcomes of the realised benefit:

- Carbon Management Plan will link to other strategies such as the climate change strategy and improve the quality of these strategies
- Other benefits resulting from the implementation of the plan will increase

Worcester City Council will be working towards national Government targets on carbon reduction

Measured through the annual greenhouse gas emission calculations, Climate Change Act 2008 commits the Government to a 35% reduction in emissions by 2020.

Benefits will be realised by the end of the programme

Outcomes of the realised benefit:

- mitigating climate change
- local authority is seen as positively contributing towards requirement to reduce national emissions
- council is acting in accordance with the Nottingham Declaration, signed in 2004, and the Memorandum of Understanding between DECC and the Local Government Group, stating that councils will take firm action towards reducing carbon emissions from their own estates.

Appendix A: Definition of projects

Each project has a 'definition of project' page which clearly identifies the key financial and carbon figures, the project owner and the timing of the project. Also provided is the background to how project savings have been calculated, which will be useful if a project scope changes. Where projects are very similar and have the same owner / lead they have been grouped together, for example with voltage optimisation.

Project: **Reference:**	**Sunrays** 1
Owner (person, service)	Mac Chivers, ICT Shared Service
Implementation year	2011/12
Description	Thin clients or 'Sunrays' are being implemented across the Authority, in the place of traditional desktop computers. These devices save energy as they connect to the server and do not work as 'stand alone' computers.
Benefits	• Annual financial savings: (£1860) (already realised in budgets) • Annual CO_2 emissions reduction: 10.9 tonnes of CO_2 • 1.6% of target • Daily consumption difference: Sunrays use 72% less energy. Figures are reasonably accurate; kWh saving has been calculated using the kW usage of a desktop computer currently in use and the kW usage of a Sunray client.
Funding	• Project cost: already funded, part of wider ICT work • Source of funding: ICT Investment Fund – no new funding required • Decision on funding has already been made
Resources	• Project will be implemented within current resources
Ensuring Success	• ICT time needs to be provided for this project to succeed
Measuring Success	• Achievement metric will be a reduction in the electricity usage of the buildings where Sunrays are being implemented (Orchard House and the Guildhall) • Success may be difficult to measure with other measures being implemented at the same time in these buildings. However, the difference in Wattage of the different devices is clear.
Timing	• Start date: 01/08/2011 • Completion date (when it will deliver savings): 31/03/2012
Notes	Spreadsheet devised 'Energy consumption desktop versus Sunray' (stored in Carbon Management folder).

Project: **Reference:**	**Commandery Reception Lighting** 2
Owner (person, service)	Cliff Dawson, Property
Implementation year	2011/12
Description	The lighting in the reception of the Commandery museum is being replaced in order to reduce energy load
Benefits	• Annual financial savings: £340 • Payback period: 0.88 years • Annual CO_2 emissions reduction: 2 tonnes of CO_2 • 0.3% of target Accurate calculations based on wattage difference from Property Services.
Funding	• Project cost: £299 (already funded) • Operational costs: none • Source of funding: Internal, Property Maintenance budgets
Resources	• Current resources
Ensuring Success	• Principal risks: that the interference with the fire alarm will be too great and bulbs will have to be removed
Measuring Success	• Energy usage figures
Timing	• Start date: 01/12/11 • Completion date (when it will deliver savings): 01/12/11
Notes	• If solution to the interference with the fire alarms could be solved, then more lights could be installed in place of older ones and energy savings would be greater.

Project: **Reference:**	**Guildhall Lighting Upgrades** 3
Owner (person, service)	Cliff Dawson / Craig Jennings - Property
Implementation year	2011/12
Description	Change to the type of lighting bulbs used in the Chandeliers in the Guildhall (a Grade 1 Listed building) to reduce maintenance, requirements to replace bulbs and energy costs.
Benefits	• Annual financial savings: £835 • Payback period: 0.14 years • Annual CO_2 emissions reduction: 4.9 tonnes of CO_2 • 0.7% of target Figures are accurate; based on wattage differences between current and proposed bulbs.
Funding	• Project cost (already realised in existing Property budgets): £118 (will need to be replaced approx. annually)
Resources	• Current resources will be sufficient for implementation
Ensuring Success	• Key success factors, or things that will need to happen for this project to succeed • Principal risks: technical, financial (e.g. what happens if the project is insufficiently resourced), etc.
Measuring Success	• Metrics/indicators for displaying performance or achievement • When success will be measured / evaluated
Timing	• Start date: 01/01/12 • Completion date (when it will deliver savings): 01/01/12
Notes	• Additional Property spreadsheet available on the expected energy usage differences between current and proposed lighting

Project: **Reference:**	**Improved Insulation in the Cremators** 4
Owner (person, service)	Phil Burton, Bereavement Services, Cleaner and Greener
Implementation year	2011/12
Description	Our cremator contractor recommended that we install a backing insulation layer on the secondary walls of the cremators. This backing layer will be of an insulating fabric called 'Microtherm'.
Benefits	• Annual financial savings: £201 • Payback period: 4.22 years • Annual CO_2 emissions reduction: 0.845 tonnes of CO_2 • 0.1 % of target Figures here are by supplier using a thermal profile of the two cremators. Assumptions made = 300 working days / year, 8 working hours / day.
Funding	• Source of funding: Already Funded • Materials plus installation, cost £648 No extra running or maintenance costs are foreseen
Resources	• Project will be implemented within current resources, being installed at the same time as essential improvements to the cremator brickwork
Ensuring Success	• Insulation will need to installed correctly • Principal risks are that the insulation may not be installed correctly and cause problems in the effective working of the cremator. This risk is mitigated by using a trusted contractor. • Once the extra insulation is successfully installed, then the project is complete.
Measuring Success	• An Automatic Meter Reader is being installed at the same time as the extra insulation, and so reductions in energy usage should be seen through the software. • We will be monitoring gas usage against the figures available for gas use in previous years.
Timing	• Insulation installation date: 15/12/2011 • Completion date (when it will deliver savings): 01/01/2012
Notes	• Energy efficiency improvement calculations including detailed current and new thermal profiles provided by the chosen contractor. A copy of this information (as an Outlook email file) is stored in the Carbon Management folder. • If working hours / days of the cremators change, then the benefits of the extra insulation will be less and the payback time longer. However, if the gas price increases, the payback period will fall. • This extra insulation will hopefully have the added benefit of improving the working conditions of the staff operating the cremators. Currently, the heat loss from the chambers is severe and the temperature in the working area can be very high. Reducing the heat loss from the cremators will decrease the temperature outside them.

Project: **Reference:**	**Refuse fleet trackers** 5
Owner (person, service)	David Sutton, Cleaner and Greener
Implementation year	2012/13
Description	Following a trial period, 'trackers' are being installed on to all of our operational vehicles, such as the refuse fleet, the street cleaning vehicles and the parks vehicles. 'Trackers' will track and record the driving style of the operator. These trackers will enable back office staff to monitor fuel usage by employee, and suggest ways in which to decrease fuel usage. Monitoring standby time, particularly at the beginning of the day, is likely to be particularly important.
Benefits	• Annual financial savings: (£7391) (already realised in budgets) • Annual CO_2 emissions reduction: 16.6 tonnes of CO_2 • 2.4% of target Estimates are based on a 2% fuel saving; savings depend on administrative resource deployed and on receptiveness of the drivers.
Funding	• Source of funding: Cleaner and Greener service funding, already identified in budgets
Resources	• Project will be implemented within current resources
Ensuring Success	• Success depends on the engaged implementation of the software, correct and detailed analysis of that software and then sufficient driver training
Measuring Success	• Success of the initiative will be measured through fuel usage statistics, with some data shown through the programme. • Success will be measured regularly
Timing	• Start date: 01/03/2012 • Completion date (when it will deliver savings): 01/09/2012 (estimate of when initial driver training would be completed)
Notes	Estimations of 2% savings have been mentioned through the procurement programme but it is clear that the extent of savings will be greatly influenced by the amount that the software is analysed and results reported back to drivers. Encouraging fuel conservation through a driver competition or similar might prove a good way of engaging the drivers long term, with the accurate measurements now readily available. Many statistics are given through the software, therefore giving many areas for drivers to address – from the amount of time that the engine is left on whilst the vehicle is idling to the severity of the braking force.

Project: **Reference:**	**Refuse Route Optimisation** 6
Owner (person, service)	David Sutton, Cleaner and Greener
Implementation year	2012/13
Description	Refuse Route Software has been procured alongside neighbouring authorities. This software will, when correctly programmed, optimise our refuse routes and thereby decrease the miles travelled and fuel used. Savings will depend on the 'inefficiency' of our present routes. Savings presented here are therefore estimations. Financial costs are not known and therefore this information is not provided. Implementing new routes, once these are identified, will take considerable time and resource.
Benefits	• Annual financial savings: (£5345) (already realised in budgets) • Annual CO_2 emissions reduction: 12 tonnes of CO_2 • 1.7% of target – the percentage of your CO_2 saving target this project will annually contribute
Funding	• Project cost: already funded from existing resources • Decision on funding this project has already been made, procurement process has taken place
Resources	• This project is being managed within current resources
Ensuring Success	• Project success will depend on the degree of difference between current and 'optimised' route. Project success will also depend on an optimised route being correctly implemented. • Project success will also depend on the quality of the information provided to the software – for example, if critical information regarding the narrowness of certain streets etc is given to the software then it will take this into account; if not, then the routes will not take note of this. The software will only be as good as the information given. • IT involvement will be required
Measuring Success	• Fuel usage is the key metric for measuring success. • There may be further, future benefits from cross-working with our neighbouring authorities (for example along the boundary lines)
Timing	• Start date: 01/03/2012 • Completion date (when it will deliver savings): 01/01/2013 (this is an estimate, based on expected time to programme software and implement new routes) • Interim Decisions will have to be made on whether to implement new routes, once devised (cost savings will have to be high enough to justify)
Notes	Assumptions made – 2% fuel saving is a figure that was initially mentioned, however this has not been confirmed.

Project: **Reference:**	**Office Accommodation programme** (combining Phase 1 and 2) 7 and 10
Owner (person, service)	Corporate / Performance, Improvement and Efficiency
Implementation year	Phase 1: 2012/13 Phase 2: 2014/15
Description	Worcester City Council has a short term plan to move staff out of Graveney House when the Customer Service Centre moves to the Hive in July 2012 and rent out Graveney (Phase 1). In the long term (but within the next five years), we hope to continue to evaluate our office accommodation and reduce the amount required (Phase 2)
Benefits	Phase 1 (Graveney House closure): • Annual financial savings: (£8899) (already realised in budgets, amount is from energy savings only) • Payback period: n/a • Annual CO_2 emissions reduction: 47.8 tonnes of CO_2 • 6.9% of target Phase 2: • Annual financial savings: unknown • Payback period: n/a • Annual CO_2 emissions reduction: estimated to be 46.6 tonnes of CO_2 • 6.8% of target The figures for closing Graveney are reasonably accurate as no increase in electricity or gas usage for Orchard House is expected – the amount of space to be heated in Orchard House will remain the same and the impact of an increased number of computers will be minimal. The figures for Phase 2 are estimates only.
Funding	• Source of funding: Already funded
Resources	• The project will be implemented within current resources
Ensuring Success	• As an existing project, separate project management documentation exists on ensuring the success of the project. Overall governance is provided by a dedicated Programme Board.
Measuring Success	• From a carbon reduction perspective, overall project success will be measured by the reduction in the overall energy spend of the City Council.
Timing	• Start date: 02/07/2012 • Completion date (when it will deliver savings): Phase 1 – 2012/13 Phase 2 – 2014/15

Project: **Reference:**	**Bridge Floodlights Replacement** 8
Owner (person, service)	Cliff Dawson, Property Services
Implementation year	2012/13
Description	The Floodlights on Worcester Bridge have to be replaced for electrical safety reasons. This gave the opportunity to choose lower energy lighting options.
Benefits	• Annual financial savings: £1347 • Annual CO_2 emissions reduction: 7.9 tonnes of CO_2 • 1.1% of target CO_2 reduction figures are accurate as the Wattage of the current and proposed lighting is known.
Funding	• Project cost: (already funded from Property Maintenance budget) implemented for reasons other than carbon management, and therefore cost is not included • Operational costs: none
Resources	• Project will be implemented within current resources
Ensuring Success	• Key success factors will be the installation of the new lighting structures.
Measuring Success	• Success will be measured through monitoring of the electricity meter supplying the Bridge (this will have to be read manually and data sent to our supplier).
Timing	• Start date: unknown • Completion date (when it will deliver savings): unknown
Notes	Project Owner must ensure that meter is read for savings to be measured. More savings could be achieved if the times of operation of the lighting is changed – currently, the lights are on from dusk to dawn.

Project: **Reference:**	**Automatic Meter Readers: installation and use of software** 9
Owner (person)	Ruth Johnson
Service	Performance, Improvement and Efficiency
Implementation year	2011/12 and 2012/13
Description	Automatic meter readers will be installed on gas and electric meters in our major buildings in order to provide our suppliers with accurate readings of our energy usage. Data will also be sent to online software, providing officers-in-charge (building managers) with the ability to monitor energy usage on a half-hourly, next day basis.
Benefits	• Annual financial savings: £9301 • Payback period: 1.4 years • Annual CO_2 emissions reduction: 44.2 tonnes of CO_2 • 6.4% of target • Costs are established; savings are estimates based on good knowledge of the current working practices and therefore the potential for reduction
Funding	• Project cost (already identified in budgets): £11,775 (paid in 5 annual instalments) • Operational costs: none • Source of funding: Area-based grant for climate change
Resources	• Project will be implemented within current resources
Ensuring Success	• Engagement of the officers in charge to maintain momentum monitoring the online software and checking for unexplained fluctuation is key to this project working. • Risks: officers in charge leaving and not being replaced for a period of time; officers in charge being unable to change and keep up to date the TREND systems which control our buildings boilers; issues with decreasing temperatures in open space officers • A further risk exists if electricity or gas usage has been previously overestimated by our suppliers (in which case, percentage reductions stated would still be achievable but would add up to lower kWh reductions).
Measuring Success	• The automatic meter reader online software will itself provide the data for analysis of the success of the project • Annual figures for gas and electric usage by building will be compared with the best available figures for 2010/11.
Timing	• Start date: 01/03/2012 • Completion date (when it will deliver savings): 01/07/2012
Notes	10% gas saving assumed from the following buildings: Guildhall, St Johns Sports Centre, Orchard House, Museum and Art Gallery and Copenhagen Street. A gas meter is also being installed in the Crematorium but savings expected from this will be analysed as a separate project as it involves other changes. Gas savings are expected to result from significantly enhanced management of the Building Management System (Trend), which currently is managed only by an external contractor on request. From an initial look at the TREND systems installed in our buildings, the AMR data is likely to show that the heating in the

	majority of the buildings is on far more than necessary – over weekends, overnight and on bank holidays. Better management of the TREND systems and monitoring through the AMRs should lead to significant reductions in gas usage – estimated at an average 10% saving across the named buildings. Greater or lesser savings may be seen in some buildings – for example, St Johns Sports Centre may be greater, as we strive to ensure that the air conditioning and heating systems are not working against each other. 2.5% electric saving assumed from the following buildings: Guildhall, St Johns Sports Centre, Orchard House, Museum and Art Gallery, Copenhagen Street and the Crematorium. Savings are expected to come from enhanced checking of what is left on overnight and at weekends, and better use of power saving devices. The savings will come from equipment and from lighting.

Project: **Reference:**	**Staff engagement (encompassing two projects: Reducing Business Travel and Staff engagement)** 11 and 12
Owner (person, service)	Ruth Johnson, Performance, Improvement and Efficiency
Implementation year	2012/13
Description	A behavioural change programme will be rolled out across all Worcester City council buildings and employees, encouraging people to save energy wherever possible. Types of measures encouraged will be switching off of computers overnight, turning off lights where possible, switching off printers or switching onto an energy saving mode, printing large documents double-sided. Staff will also be encouraged to reduce their business mileage, through promotion of the cycling business mileage rate, and other alternatives to travelling by car.
Benefits	• Annual financial savings: £908 + £3,043 = £3951 • Payback period: 1.1 years • Annual CO_2 emissions reduction: 19.4 tonnes of CO_2 • 2.8% of target
Funding	• Project cost: £2000 (for incentive measures and promotional costs) • Operational costs: none • Source of funding: Internal, from existing PIE budget resource or from the Transformation Reserve fund • Decision will be made by Performance, Improvement and Efficiency manager
Resources	• Additional staff resource may be required to successfully implement a behavioural change programme (1/2 day a week required, this is not included within project cost as resource may be found within the existing team).
Ensuring Success	• For project to be successful, good communications will be required and sufficient engagement on the topic. Some element of training may be required for staff to understand the importance of measures. • If the project is insufficiently resourced then the project will fail, as key to the success is continued maintenance of communication with staff about progress.
Measuring Success	• Success will be measured through energy usage in the relevant buildings.
Timing	• Start date: 01/09/2012 • Completion date (when it will deliver savings): 31/03/2013
Notes	Buildings included within the staff engagement on energy saving issues: Orchard House, Museum and Art Gallery, Guildhall, Commandery, St Johns Sports Centre and Copenhagen Street. 2.5% electricity saving estimated, from these buildings.

Project: **Reference:**	**St Martin's Gate Car Park – Reduced lighting out of hours** 13
Owner (person, service)	Andy Chinn, Transportation, Cleaner and Greener
Implementation year	2012/13
Description	For Health and Safety reasons, approx. 40% of the lighting in St Martins Gate multi-storey car park is left on overnight, when access to these floors is prevented. This project proposes that the lighting is reduced to a maximum of 10%
Benefits	• Annual financial savings: £6209 • Payback period: no cost to implementation • Annual CO_2emissions reduction: 36.4 tonnes of CO_2 • 5.3% of target Energy saving estimates based on reducing lighting out of hours from 40% left on to 10% left on. Saving of 3 hours lighting at full operation.
Funding	• Project cost: no cost • Operational costs: none
Resources	• Requires the electrician to be able to adapt the current hours of operation; should be able to do
Measuring Success	• Reductions in energy usage will be measured through the automatic meter readers
Timing	• Start date: asap • Completion date (when it will deliver savings): by 01/05/2012 • Dates will depend on the level of authority required – CMT/Cabinet report may be necessary.
Notes	The energy saving expected has been calculated from the baseline electricity figures; reducing the out of hours lighting (between the hours of 9 and 7) from 40% to 10%. This represents a reduction of 3 hours of lighting at 100% operation – equivalent to a 16.6% reduction. Lighting represents 100% of the electricity load of St Martins Gate.

Project: **Reference:**	**Creation of heating zones in the Guildhall** 14
Owner (person, service)	Ian Forrester, Property Services
Implementation year	2012/13
Description	To install more temperature sensors and improve the working of the TREND system, so that different areas can be managed appropriately. This would reduce wasted heat and improve working conditions. It would also enable the civic areas of the Guildhall, used for more of the day than the office areas, to be heated separately.
Benefits	• Annual financial savings: £2640 • Payback period: 1.14 years • Annual CO_2 emissions reduction: 11.1 tonnes of CO_2 • 1.6% of target Figures were estimated during a previous Carbon Trust report (2004), where annual kWh savings was estimated to be 60,000. This will be impacted by other projects to reduce usage.
Funding	• Project cost: £3000 (as in 2004) • Operational costs: none • Source of funding: Transformation Reserve funding
Resources	• Contractor will be used
Ensuring Success	• Key success factor is the ability to install discrete sensors which are acceptable under the Listed building regulations. For the sensors to work efficiently, they need to be in the correct locations.
Measuring Success	• Success will be measured through energy usage and also the reports from staff and users of the Guildhall as to the comfort levels.
Timing	• Start date: 01/04/2013 • Completion date (when it will deliver savings): 01/05/2013
Notes	See the additional Carbon Trust report from 2004, 'IOA Multisite Report Worcester City Council'. Listed building application acceptance will be required.

Project: **Reference:**	**Improved Insulation at the Guildhall** 15
Owner (person, service)	Ruth Johnson / Ian Forrester, Performance, Improvement and Efficiency / Property Services
Implementation year	2013/14
Description	This project will improve roof space insulation and the sealing of vents such as chimneys and around doors in the Guildhall
Benefits	• Financial savings: £4967 • Payback period: 7.4 years • Annual CO_2 emissions reduction: 20.9 tonnes of CO_2 • 3% of target – the percentage of your CO_2 saving target this project will annually contribute Estimates are calculated using benchmarks and the RAP tool
Funding	• Project cost: £37,000 • Operational costs: none • Source of funding: Transformation reserve funds
Resources	• Contractors would be used for the installation
Ensuring Success	• Key success factors, or things that will need to happen for this project to succeed • Principal risks: that improving the works will not pass the necessary requirements for changes to a listed building; that work is carried out but significantly impacts on or damages the condition of the buildings; that suitable financing is not found
Measuring Success	• Reduced energy usage, as measured by the automatic meter readers data • Success of this project would be measured on an annual basis, taking into account degree day data
Timing	• Start date: 2013/14 • Completion date (when it will deliver savings): 2014/15 • Listed building application decision: unknown
Notes	Although payback is longer than for other projects, insulating the Guildhall would be beneficial in order to improve the working environment and so has been chosen for implementation.

Project: **Reference:**	**Pipe lagging in the Guildhall, Museum and Art Gallery, Copenhagen Street and the Crematorium** 16
Owner (person)	Ruth Johnson / Ian Forrester
Service	Performance, Improvement and Efficiency / Property Services
Description	Lagging in the boiler rooms could be improved, particularly around the valves. Buildings included: Guildhall, Museum and Art Gallery, Copenhagen Street, Crematorium (boiler room only)
Benefits	• Annual financial savings: £1646 • Payback period: 2.13 years • Annual CO_2 emissions reduction: 6.9 tonnes of CO_2 • 2.1% of target Estimations of cost and of benefit
Funding	• Project cost: £3,500 (estimation) • Operational costs: none • Source of funding: Transformation Reserve funds
Resources	• Project will be implemented within current resources
Ensuring Success	• Financing project and demonstrating benefits alongside other projects will be the principal risks
Measuring Success	• Success will be measured immediately after installation is complete and then on an annual basis
Timing	• Start date: unknown • Completion date (when it will deliver savings): unknown • It is probable that listed building applications would need to be completed and therefore time needs to be allowed for these
Notes	Figures produced from the RAP tool provided. 70% gas saving on 5% of the utility.

Project: **Reference:**	**Voltage Optimisation** 17, 18, 19 and 20
Owner (person, service)	Ruth Johnson / Cliff Dawson, Performance, Improvement and Efficiency / Property Services
Implementation year	2013/14
Description	Voltage Optimisation reduces energy consumption by bringing down the supply voltage to levels more suited for UK equipment. Voltage Optimisation is suitable for most buildings but will be more successful in some than others.
Benefits	• Financial savings: £11,766 • Payback period: 3.8 years • Annual CO_2 emissions reduction: 68.9 tonnes of CO_2 • 10% of target Estimations are currently based on the standard 10% saving that one supplier expects to see in a building. These estimations will be updated once more accurate, building specific information is available.
Funding	• Project cost: £45,126 • Operational costs: none • Source of funding: Transformation reserve funds
Resources	• Can be implemented within current resources
Ensuring Success	• Risks: lack of financing; savings not seen; lack of agreement to install in the buildings (dependent on space, and for Museum and Art Gallery and Guildhall we must have a successful listed building application form). • Agreement from supplier to guarantee a certain percentage of savings may be possible
Measuring Success	• Savings would be measured through the automatic meter reader data. • Difficulty in attributing savings could result if a number of projects are implemented in a short space of time
Timing	• Start date: 2013/14 • Completion date (when it will deliver savings): 01/09/2014
Notes	Return on Investment calculations by PowerPerfector have been used to estimate the costs and savings, however, other suppliers of similar technologies are available. Buildings included within this project: Guildhall, St Martins Gate car park, St Johns Sports Centre and the Museum and Art Gallery.

Project: **Reference:**	**Energy efficiencies measures at the Crematorium** 21
Owner (person)	Phil Burton
Service	Bereavement Services, Cleaner and Greener
Implementation year	This project will be long-term between 2011/12 and 2013/14, enabling time for new efficiencies to be identified within the work
Description	This project has already started, with staff taking daily meter readings and trying to use the cremators in the most efficient way. Automatic meter reader data, if studied carefully, should help with this, highlighting where resources are not being deployed to the greatest efficiency. A new scheduling assistant may then be identified as being necessary, in order to restrict the booking of cremations to enhance the efficiency of the cremators. For example, currently the system will allow one funeral to be booked at 10am, and another at 4pm, meaning that the furnace would be on twice, with time to cool down in between.
Benefits	• Financial savings: £15,094 • Payback period: 0.13 years • Annual CO_2 emissions reduction: 63.5 tonnes of CO_2 • 9.2% of target Based on a 15% efficiency saving
Funding	• Project cost: potential £2,000, for new scheduling assistant (cost is a rough estimate only) • Operational costs: none • Source of funding: Transformation reserve fund
Resources	• This project would be implemented within current resources
Ensuring Success	• Key success factors would be the engagement of the staff at the Crematorium to analysis their current working practices, relate to the energy usage data displayed through the automatic meter reader software and subsequently identify opportunities for reduction.
Measuring Success	• Indicators for success will be a reduction in the gas used at the Crematorium, alongside a maintaining of current number of cremations (around 2000 per year).
Timing	• Start date: analysis of the half hourly data to commence 01/02/12 • Completion date (when it will deliver all potential savings): in 2013/14 • Decision will be made as to whether a new scheduling assistant would give greater energy efficiency benefits.
Notes	Saving has been calculated as 15%, based on comments about the current working practices this is considered challenging, but achievable. It is believed that the drive to reduce the amount of gas used exists. The savings will be driven potentially by a new scheduling assistant, but also by analysis of the online half hourly data readings and subsequent knowledge of individual cremator gas usage. This project does not propose holding coffins overnight.

Project:	**St Martins Gate Lighting Upgrade**
Reference:	22
Owner (person)	Andy Chinn (Transportation Manager) / Cliff Dawson / Craig Jennings (Property)
Service	Transportation / Property Services
Implementation year	2013/14
Description	The lighting at St Martins Gate car park is currently T8 lighting and is therefore of a low energy efficiency. Several options for upgrading the lighting exist but converting to LEDs, whilst expensive, would result in the greatest energy saving (estimate 70% energy saving).
Benefits	• Annual financial savings: £21,838 • Payback period: 1.4 years • Annual CO_2 emissions reduction: 128 tonnes of CO_2 • 18.6% of target Estimates take into account the planned project to reduce the current energy usage by 16.6% by cutting the hours of operation. 70% energy saving from lighting upgrade is an estimation.
Funding	• Project cost: estimate c. £30,000 • Operational costs: none • Source of funding: Transformation reserve funds
Resources	• This project will require resource from Property services
Ensuring Success	• Risks: the LED lighting could prove inadequate for the multi-storey car park; capital costs could prove inhibitive; costs of installation (if closure of car park required) may prove difficult.
Measuring Success	• Measuring success will be through energy usage at the site; car park users feedback about the lighting
Timing	• Start date: 2013/14 • Completion date (when it will deliver savings): 2014/15 • Further analysis of the car park by Property Services is required
Notes	Following calculation carried out (to take account of the expected 16% reduction in energy usage due to change in percentage of lighting left on overnight): (all figures in kWh) Current baseload: 402,219 16.6% reduction: 66,768 New baseline: 335,451 70% of this (reduction possibility): 234,815