

**BRISTOL CITY COUNCIL  
RESOURCES SCRUTINY COMMISSION**

**21<sup>st</sup> September 2012**

**Report of:** Director of City Development & Neighbourhoods

**Title:** Energy and Carbon Reduction in Bristol City Council's Buildings

**Ward:** All Bristol wards

**Officer Presenting Report:** Paul Isbell, Energy Manager

**Contact Telephone Number:** 0117 92 24430

**RECOMMENDATION**

That members note the progress in meeting energy and carbon reduction in Bristol City Council's Buildings

**Summary**

The carbon emissions of Bristol City Council's own Buildings are on target to meet its policy of a 3% year on year reduction.

## Context

In 2008 Bristol City Council unanimously adopted a target to reduce the City's Carbon Dioxide emissions by 40% by 2020, from the 2005 baseline, and to reduce the City Council's own emission by the same. This translates into a 3% year on year reduction.

Overall the Bristol City Council's direct emissions are approximately 58,000 tonnes. Some 75% of emissions are from buildings and sites, including schools, and these are the focus of this paper. In addition, work has taken place to reduce energy use and emissions in streetlighting and Council transport:

Streetlighting accounts for 19% of BCC's direct emissions. A white light retrofit programme is underway, with Phase 1 completed - replacing some 10,500 lamps on main and distributor roads and fitting all of the city's illuminated bollards with LED lamps. Phase two and three will replace a further 12,500 and 11,000 lamps respectively.

To date, energy usage for street lighting and traffic signals has been cut by 25% representing an annual saving of £675k and 3,150 tonnes of CO<sub>2</sub>. Further details are included in Appendix 3.

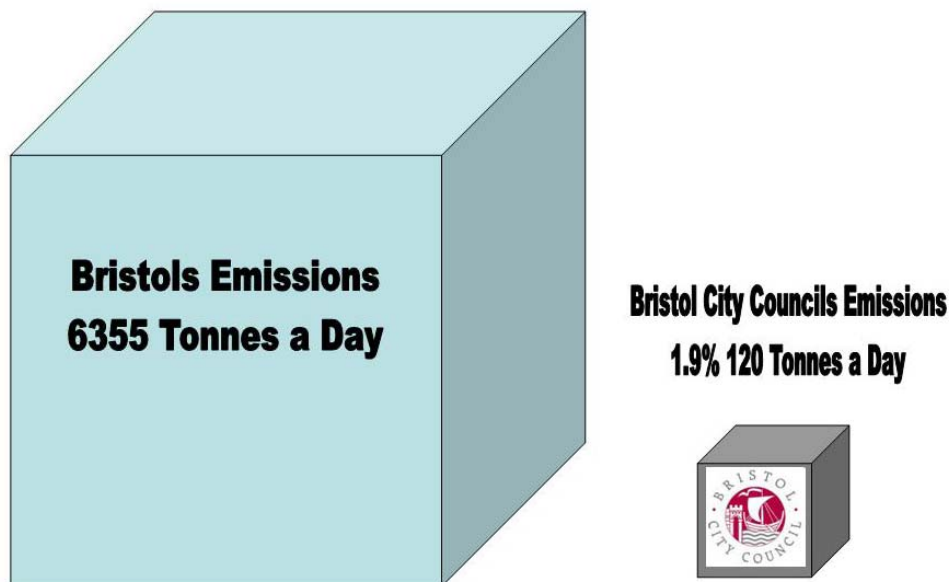
BCC's vehicle emissions accounts for 6% of the Council's total direct emissions. Two thirds of these emissions arise from our badged fleet, with the other third from business mileage claims. 2011/12 saw a significant improvement in performance - emissions dropped by 12% against a target 3%.

In addition to direct vehicle emissions, it is anticipated that the recent changes to the municipal waste contract will lead to a significant reduction in fuel consumption by waste collection vehicles. Results should be available at the end of the year.

The Council is also developing an energy services company and associated investment programme that will support achievement of BCC's corporate energy and carbon targets as well as the Citywide targets. That programme is in development and is the subject of other reports to the committee.

## Emissions from BCC Buildings and Sites

Bristol City Council carbon dioxide emissions from its buildings for 2011/12 are **43,979 tonnes CO<sub>2</sub>**. This is **120 tonnes** per day. It excludes emissions from the Council's streetlighting and from its transport activities.



The work carried out in Green Week to visualise carbon use in the City of Bristol showed a cube the size of Queen Square to represent the **6355** tones of carbon that the whole of Bristol emits **every day** from industry, domestic and transport.

On this basis the Council is currently responsible for about **1.9%** of the whole of Bristol figure. Although being small percentage, Bristol City Council's actions act as an exemplar to the city, region and the country.

### Actions being carried out

Work to reduce carbon from the City Council's buildings and sites is carried out in three main ways:

1. **Cutting waste** - ensuring that building and equipment is not operating when they should be switched off
2. **Energy efficiency** - replacing old inefficient equipment and bringing building structures up to modern-day levels
3. **Renewables** - replacing the demand for energy from carbon intensive generation to renewable sources

## Performance

Historically there have been multiple measures of carbon reduction, which has caused confusion about what is being achieved, this has been compounded by the government starting and stopping various measures and performance indicators.

Bristol City Council is now using three Performance Indicators that are recorded on the Council's performance management database.

311 - Reduce energy used at council sites

318 - Reduce the Council's carbon dioxide equivalent emissions (in tonnes)

319 - CO<sub>2</sub> reduction from energy efficiency schemes

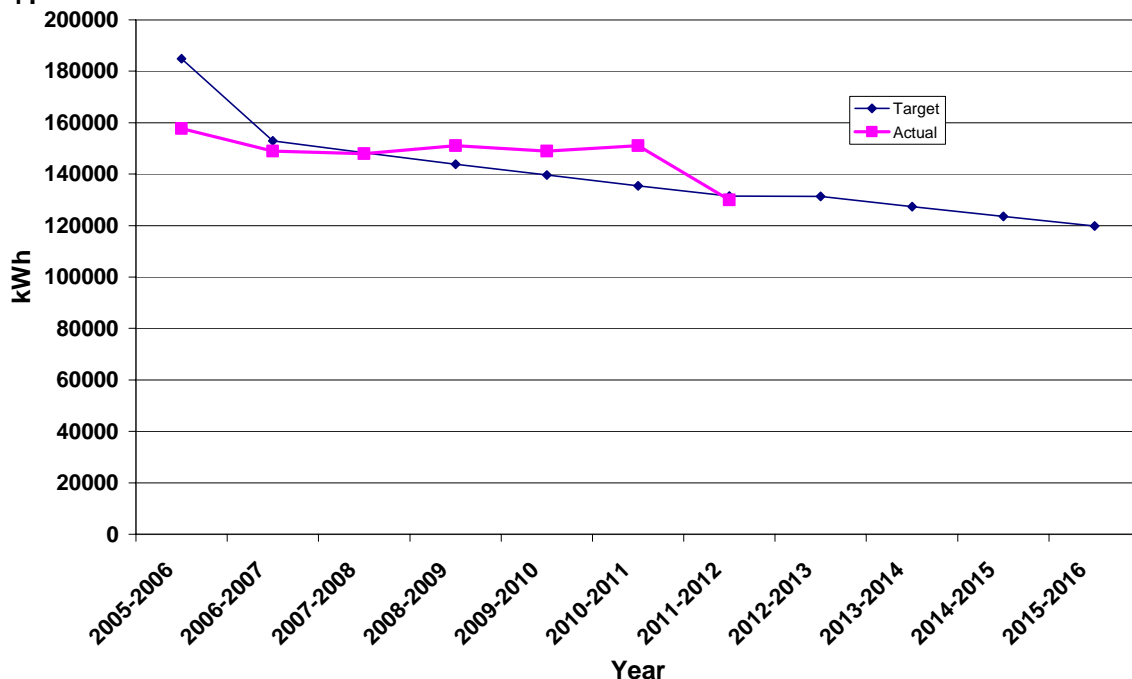
**Appendix A** shows the screen images for the data monitoring up to date.

**Appendix B** shows how the data for the indicator has been arrived at for the past year.

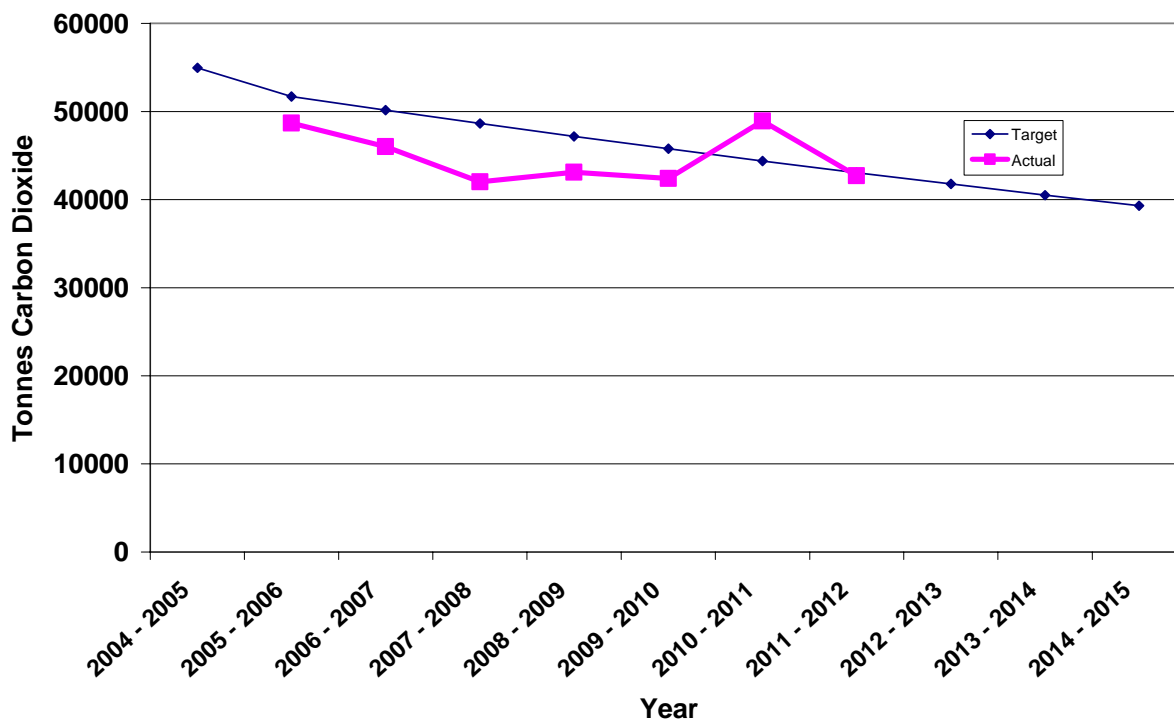
These are Bristol City Council's own indicators, so they are not directly comparable to other authorities. Their prime purpose is to enable us to track our own performance and get a sense of the direction of travel over a time period. Specific individual changes in a year can give misleading understanding of this direction of travel.

### 1 Current position Carbon and Energy Reduction

The graph below shows how Bristol City Council is performing against the target 3% year on year reduction in energy use for Performance Indicator 311.



The graph below shows how Bristol is performing against the target 3% year on year reduction in carbon emissions from Council buildings and sites.



## Notes

In these performance indicators we are monitoring the energy use from over 2100 supplies of electricity, gas, and oil.

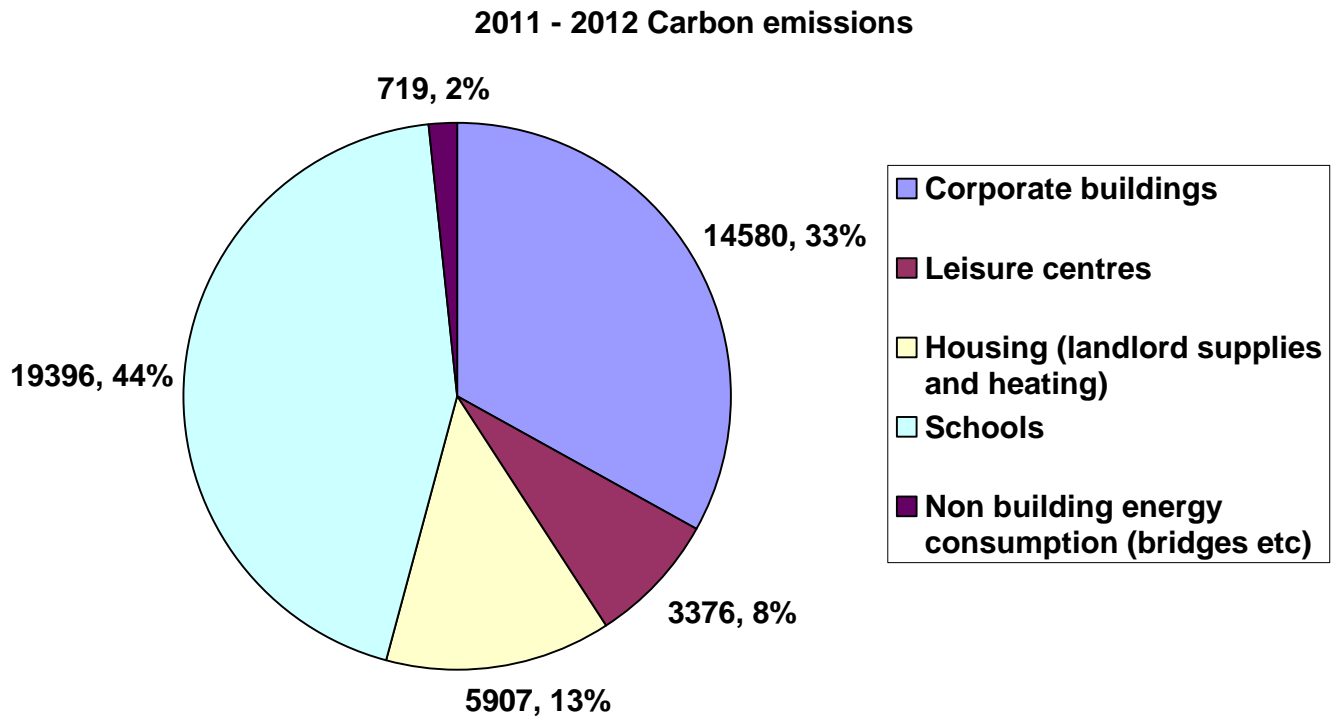
After a high increase in carbon and energy in 2010 / 2011 we now seem to be back on track with our emissions reduction strategy.

There are a number of reasons for this as follows:

1. The period 2005/06 to 2009/10 appears much lower, this may be due to some supplies not being captured, and during this time we still had a lot of estimated readings.
2. The winter period was much colder for a longer period in 2010/11 than 2009/10. In addition the data may be distorted by changes needed for the commencement of the Carbon Reduction Commitment and the need for more accurate recording, and finalisation of old contracts that consumption for older periods may have been allocated to the current year.
3. During 2010/11 we still had some of the metering issues as Automatic Meter Reading was still being installed.
4. The winter of 2011/12 continued to be cooler than the previous years so being on target is a good achievement.
5. It should be noted that this indicator still includes the Private Finance Initiative and Academy Schools that are managed by other parties but are still classed by the government to be the council's responsibility for carbon purposes.

## 2. Activity Split of Carbon Emissions from Buildings and Sites

The 43,979 tones of Bristol City Council generated carbon dioxide come from the following Council activities. It should be noted that schools account for 44% of the Council's usage.

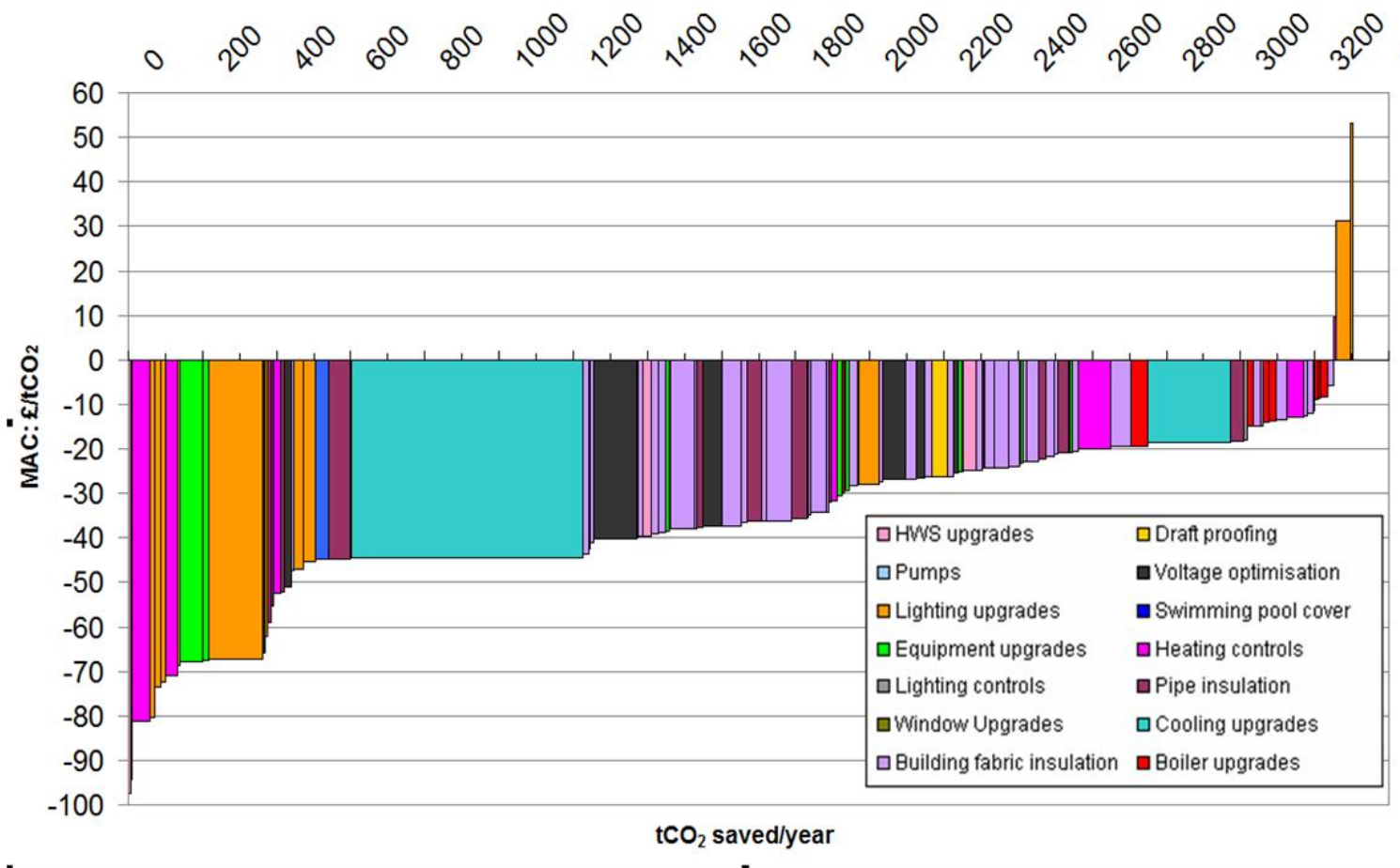


## Building Energy Efficiency Project Overview

In November 2011 an analysis was carried out on all the energy efficiency investment that had been carried out under the Council's revolving energy fund scheme using the Marginal Abatement Cost (MAC) methodology.

The Council has invested £1,541,624 on 190 projects which has resulted in CO<sub>2</sub> saving of 3,311 tonnes/yr

These graphs are good at representing the most cost effective works to the left with the width of the column representing the amount of saving



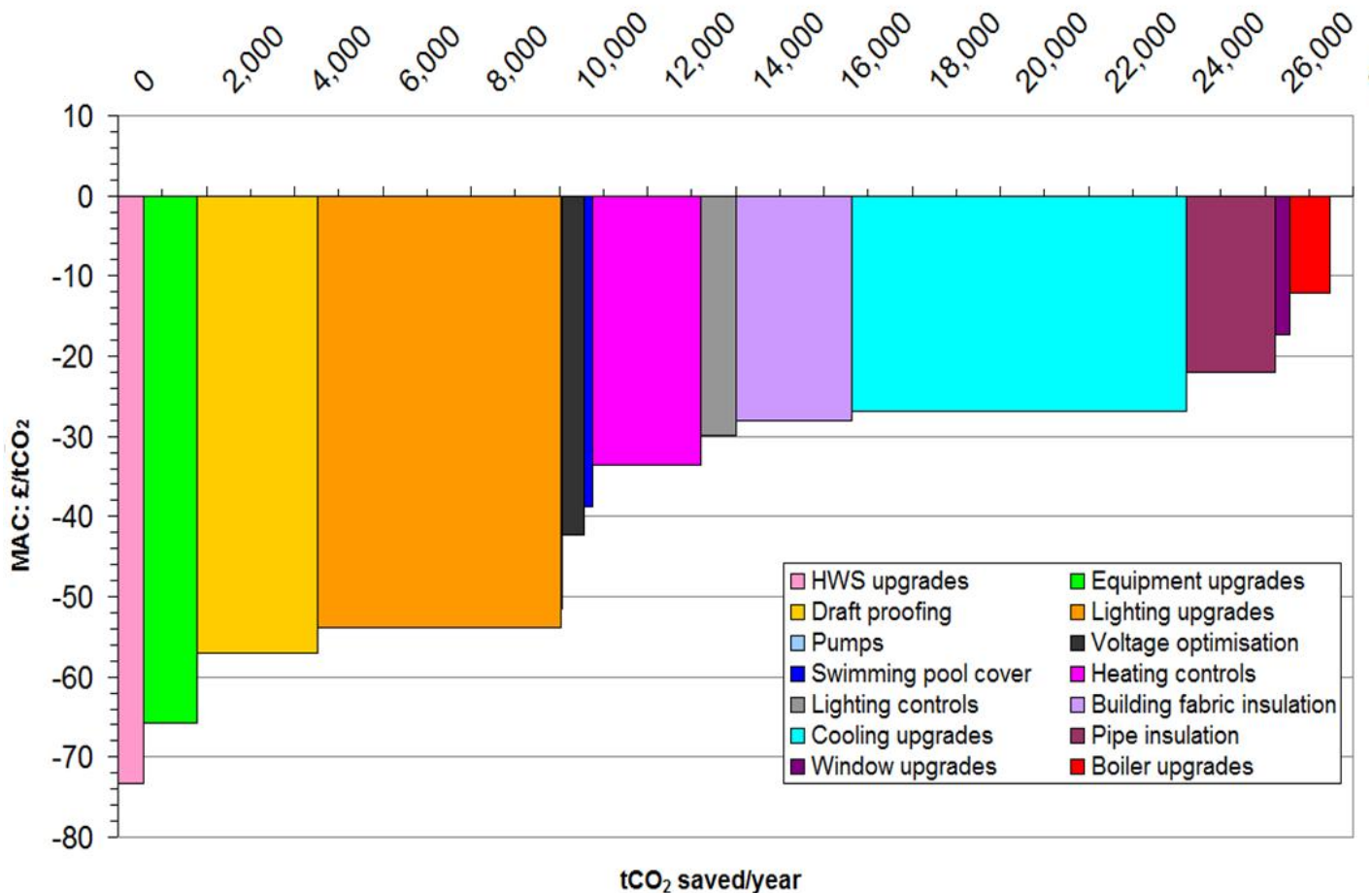
A desk top analysis was carried out on the rest of the estate to give an indication of future savings potential. This gave the following potential results.

A total potential investment of £12,556,000 would realise annual savings 28,000 tonnes CO<sub>2</sub>. This would save the Council £5,516,000 per year (based on 185 £/t CO<sub>2</sub> energy prices & 12 £/t CO<sub>2</sub> CRC)

The Energy Management unit are aiming to save 800 tonnes CO<sub>2</sub> a year through the Council’s revolving fund therefore in 9 yrs 6400 tonnes CO<sub>2</sub> would be saved.

Based on this analysis the Carbon Board agreed to EMU receiving an additional £200,000 to the Council’s revolving fund once staff could be committed to spend it.

This desk top analysis needs to be tested in reality but goes to show the scale of what could be achieved by targeted investment. The graph below shows an indication of where this investment might be targeted.





## **Creating a world class energy management service.**

Bristol is one of 26 European partners in a project called SMARTSPACES. We are working with our data provider Systemslink to create a system that is able to use the data that we have from all the half hour meters and use it in a smart way to save energy and carbon.

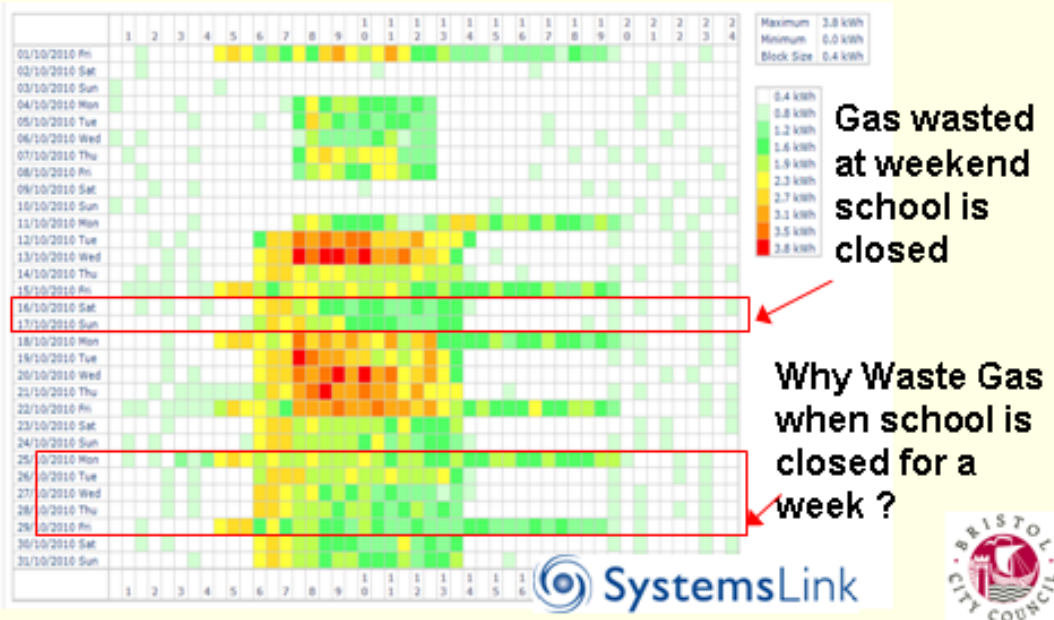
Currently systems store lots of historical data on consumption; the aim is to use this data in a smart way to gain greater savings

The characteristics of a smartspaces building are as follows:

- Buildings are under control
- Energy is only used to heat, cool & light when needed
- Energy waste is spotted quickly
- Corrective action is taken
- Staff are trained to understand excess use
- Energy is reduced
- Carbon emissions are reduced
- Money is saved

The output below is being used to help caretakers understand the energy usage in their school and to take early corrective action

## AMR Footprint report – gas usage



We are working on setting up profile usage of energy in building so that when it is used out of these bands it can be easily visualised (red bars),


## Profile Alarms – Unplanned usage



Illustrating consumption data outside tolerance limits



## Appendix A Performance Management Database Sparnet Data 2011/12

Performance Indicators for Paul Isbell <span style="float: right;">i</span>						
Code ▲	Title	Responsible Manager	Last Year Status	This Year Status	Improvement	Date Effective
 <b>Building Practice</b>						
CD311	Reduce energy used at council sites	Paul Isbell	Above target	Data not due		1 Apr 2008
CD318	Reduce the council's carbon dioxide equivalent emissions (in tonnes)	Paul Isbell	Above target	Data not due		1 Apr 2008
CD319	CO2 reduction from energy efficiency schemes	Paul Isbell	Well above target	Data not due		1 Apr 2008

## Performance Indicator (Edit)



**Service**

**Folder**

**Title**  \*

National  Local

**Prefix 1**  **Code 1**  \*

**Prefix 2**  **Code 2**

**Executive Member**

**Definition**  \*

**Unit**  \*  Positive  Negative  Off

**Statistic**  \* **Date**

**Period Type**

**Formula**

[Instances](#)
[PIs](#)
[Perf Status](#)
[Sign-Off](#)
[Comparisons](#)
[Links](#)
[Notes](#)
[Flags](#)
[Aims](#)
[Personnel](#)

Instance	Target	Estimate	Period	Actual	Notes	Status
2005-2006	184,838			157,692	0	Well above target
2006-2007	152,961			149,000	0	Above target
2007-2008	148,372	160,000		148,000	0	Above target
2008-2009	143,921	175,000		151,000	1	Below target
2009-2010	139,604			149,000	1	Below target
2010-2011	135,415			151,000	1	Well below target
2011-2012	131,353			130,000	1	Above target
2012-2013	127,412				0	Data not due
2013-2014	123,590				0	Data not due
2014-2015	119,882				0	Data not due

## Performance Indicator (Edit)



**Service**

**Folder**

**Title**  \*

National  Local

**Prefix 1**  **Code 1**  \*

**Prefix 2**  **Code 2**

**Executive Member**

**Definition**  \*

**Unit**  \*  Positive  Negative  Off **i**

**Statistic**  \* **Date**

**Period Type**

**Formula**

[Instances](#)
[PIs](#)
[Perf Status](#)
[Sign-Off](#)
[Comparisons](#)
[Links](#)
[Notes](#)
[Flags](#)
[Aims](#)
[Personnel](#)

Instance	Target	Estimate	Period	Actual	Notes	Status
2002-2003				57,229	0	No Target
2003-2004				56,691	0	No Target
2004-2005	54,969				0	Data not entered
2005-2006	51,703	53,839		48,677	0	Above target
2006-2007	50,152	48,000		46,000	0	Above target
2007-2008	48,647	47,000		42,000	0	Well above target
2008-2009	47,188	46,000		43,100	1	Above target
2009-2010	45,772			42,400	1	Above target
2010-2011	44,399			48,900	1	Well below target
2011-2012	43,067			42,700	1	Above target
2012-2013	41,775				0	Data not due
2013-2014	40,522				0	Data not due
2014-2015	39,306				0	Data not due

## Performance Indicator (Edit)



**Service**

**Folder**

**Title**  \*

National  Local

**Prefix 1**  **Code 1**  \*

**Prefix 2**  **Code 2**

**Executive Member**

**Definition**  \*

**Unit**  \*  Positive  Negative  Off

**Statistic**  \* **Date**

**Period Type**

**Formula**

[Instances](#) [PIs](#) [Perf Status](#) [Sign-Off](#) [Comparisons](#) [Links](#) [Notes](#) [Flags](#) [Aims](#) [Personnel](#)

Instance	Target	Estimate	Period	Actual	Notes	Status
2008-2009	800	800		714	1	Below target
2009-2010	800			1,032	1	Well above target
2010-2011	750			829	1	Above target
2011-2012	700			1,407	1	Well above target
2012-2013	1,400				0	Data not due
2013-2014	700				0	Data not due
2014-2015	700				0	Data not due

## Appendix B Building Energy Consumption and Carbon Emissions

### 2011-2012 Energy Consumption

	Elec consumption (kWh)	Gas consumption (kWh)	Oil consumption (kWh)
Corporate buildings	18,899,623	22,310,931	2,043,746
Leisure centres	3,213,074	9,205,363	-
Housing (landlord supplies and heating)	11,254,667	17,575	66
Schools	23,511,928	35,907,822	1,684,388
Non building energy consumption (bridges etc)	1,312,864	165,117	-
Purchased 100% Green Energy	8,758,492		
	58,192,156	67,606,807	3,728,200

Total of all (Excluding Green Elec)	129,527,164	kWh
-------------------------------------	-------------	-----

Rounded Figure for Indicator CD 311	130,000	Mwh
-------------------------------------	---------	-----

### 2011 - 2012 Carbon Emissions

	Elec	Gas	Oil	Total CO <sub>2</sub>
Corporate buildings	9915	4096	569	14580
Leisure centres	1686	1690	0	3376
Housing (landlord supplies and heating)	5904	3	0	5907
Schools	12334	6593	469	19396
Non building energy consumption (bridges etc)	689	30	0	719
Purchased 100% Green Energy				
	30528	12413	1039	43979

Rounded Figure for Indicator CD 318	43979	Mwh
-------------------------------------	-------	-----

## **Appendix C: Street lighting energy efficiency improvements**

The first phase of the white light retrofit programme was completed in the summer of 2012. This covered the majority of the Group A street lights - main and distributor roads. Some 10,500 lanterns were replaced or retrofitted with new lamps and controllers. This was funded through interest free loans from the Council's Energy Management Unit loan funds and additional funding from the street lighting capital budget. At the same time all of the city's illuminated bollards were fitted with LED lamps.

Phase two which covers the Group B street lights on residential roads is now under way. This is funded through £1M from the Invest in Bristol Programme and a contribution from the street lighting capital budget. Some 12,500 lamps will be retrofitted over an 18 month period with the aim being to complete this work by October/November 2013.

Following completion of this work there will be approximately 11,000 residential road lights to convert to white light but these will be relatively slow payback with lower energy savings than those included in phase 1 and phase 2. Illuminated signs are also being retrofitted with LED lamps.

To date from the measures detailed above, energy usage for street lighting and traffic signals has been cut by 25% representing an annual saving of 5,900 MWh equivalent to £675k and 3,150 tonnes of CO<sub>2</sub>.

When the works detailed above are completed in October/November 2013 energy savings should be 35% of total energy usage representing an annual saving of 8,200 MWh equivalent to £950k and 4,400 tonnes of CO<sub>2</sub>.