

Energy Efficient Technologies in the East Midlands

A project report prepared for *emda*

Pro Enviro Limited

February 2011

This work, with the exception of logos, photographs and images and any other content marked with a separate copyright notice, is licensed under a [Creative Commons Attribution 2.0 UK: England & Wales License](#)

The use of logos in the work is licensed for use only on non-derivative copies. Under this licence you are free to copy this work and to make derivative works as long as you give the original author credit.

The copyright is owned by Nottingham Trent University.



This document forms part of the *emda* Knowledge Bank



Pro Enviro

Report

Energy Efficient Technologies in the East Midlands: Project Report

4076/EMD
CRN1000

February 2011

Pro Enviro Ltd
8 Davy Court
Central Park
Rugby, Warwickshire
CV23 0UZ
United Kingdom
T : +44 (0)1788 538 150
F : +44 (0)1788 538 151
E : info@proenviro.co.uk
www.proenviro.co.uk



Contents	Page
Energy Efficient Technologies in the East Midlands: Project Report	1
Executive summary	1
Project outline	2
Background	2
The Carbon Trust	2
Energy Efficient Technologies in the East Midlands project	3
Outline method	3
Project log	5
Recruitment	5
Site surveys	8
Carbon Trust loan application	9
Technology install	10
Verification visit	11
Case study	11
Changes to project outputs and timings	11
Project outputs and outcomes	14
Risks and lessons learned	14
Conclusions	17
Appendix A – Delegates at recruitment events	19
Appendix B – Programme collateral	22
Appendix C – Projects not suitable for a loan	40
No project identified during survey	40
Project identified but deemed to be ineligible	40
Eligible project identified but not taken forward due to lack of evidence or commitment	42
Project submitted but declined by Carbon Trust	43
Other	43
Appendix D – Case studies	44
Bakewell Town Hall	44
Belmay Fragrances	47



Panel Technologies	50
RCS plc – Voltage optimisation project	50
RCS plc – Lighting project	53



Executive summary

The Energy Efficiency Technologies for the East Midlands project aimed to increase the energy efficiency of businesses through the most cost-effective method; improved energy efficiency. This would have two immediate outcomes; increased productivity through reducing the amount of energy used and as a result, reduced CO₂ emissions.

To drive this, the project was originally tasked with recruiting a minimum of 50 companies, undertaking a detailed energy survey to establish their current consumption and the potential for savings through the installation and use of energy efficient technologies. The cost of installing these energy efficient technologies would be met (or part met) through the Carbon Trust's interest-free loan scheme.

The project was initially conceived to run between January and July 2010, however due to unexpected changes in the Carbon Trust loan scheme was extended to run until the end of February 2011.

Originally the outputs for the project were specified as:

- At least 50 successful Carbon Trust loan applications
- A case study for each successful loan application
- A minimum of 50 businesses assisted (E4 output)
- A minimum of £500,000 of leveraged investment (E7 output)

However, due to the aforementioned changes they were modified to:

- At least 23 successful Carbon Trust loan applications
- A case study for each successful loan application
- A minimum of 23 businesses assisted (E4 output)
- A minimum of £230,000 of leveraged investment (E7 output)

Due to a number of factors, explained in detail within this report, the number of completed loans was less than expected, however the results, pro rata, exceeded the output requirements.

The following was achieved as a result of the project:

- Annual carbon reduction of 711.95 tonnes
- Annual energy saving of £68,203 achieved
- Loan applications totalling £150,770 submitted
- Total technology investment of £102,088 backed by £86,170 of interest-free loans



Project outline

Background

It was recognised in the Regional Economic Strategy (RES) that if the East Midlands was to become a top 20 region in Europe, it must significantly improve its economic performance and must provide the appropriate support structures to help the organisations in the region to improve their performance in the field of energy and low carbon technologies and skills.

Energy Efficient Technologies for the East Midlands was a component of realising the region's economic strategy of sustainable economic success. This strategy identified rising energy costs as a major driver for change and committed the region to reduce carbon dioxide emissions per million pounds of Gross Value Added (GVA) to match or better the UK average. Given the various ways in which energy is generated, both in the region and nationally, a reduction in energy consumption also helps the UK to meet its ambitious climate change targets of a 34% reduction in carbon emissions by 2020 and 80% by 2050 based on 1991 levels.

At the local level, improving energy efficiency provides a cost-effective method of reducing carbon dioxide emissions and energy costs, therefore increasing competitiveness and helping companies demonstrate a commitment to the environment. The RES estimated that the region's businesses waste one third of the energy they buy, totalling £1.8bn per year. This damages profitability, competitiveness and productivity.

Within the next 15 years it is estimated that as much as three quarters of the UK's primary energy demand will be imported. To ensure security of supply whilst we increase our renewables base and modernise infrastructure, it is crucial to ensure that this waste energy is dramatically reduced if not eliminated completely.

The Carbon Trust

The Carbon Trust was set up by the government in 2001 as an independent company with the aim of accelerating the UK's move towards a low carbon economy.

They do this via a number of mechanisms:

- Providing business and the public sector with expert advice, finance and accreditation
- Stimulating demand for low carbon products and services
- Developing new low carbon technologies through project funding and management, investment and collaboration
- Identifying market barriers and practical ways to overcome them

The Energy Efficient Technologies for the East Midlands project utilised the first of these mechanisms; finance.

Carbon Trust loans are an attractive and risk free method of financing investments in energy efficient technologies; they are interest free, unsecured and cash flow neutral as the repayments are tied to the savings generated by the installation of the new equipment. They provide a vital bridge between



the desire to implement new equipment and technologies, and have the ability to fund these, something of particularly importance during the current economic climate where companies may face problems accessing finance from banks on reasonable terms, if at all.

Energy Efficient Technologies in the East Midlands project

The Energy Efficiency Technologies for the East Midlands project aimed to increase the energy efficiency of businesses through the most cost-effective method; improved energy efficiency. This would have two immediate outcomes; increased productivity through reducing the amount of energy used and as a result, reduced CO₂ emissions.

To drive this, the project was originally tasked with recruiting a minimum of 50 companies, undertaking a detailed energy survey to establish their current consumption and the potential for savings through the installation and use of energy efficient technologies. The cost of installing these energy efficient technologies would be met (or part met) through the Carbon Trust's interest-free loan scheme.

The project was initially conceived to run between January and July 2010 and was to deliver a number of outputs and outcomes, specifically:

- At least 50 successful Carbon Trust loan applications
- A case study for each successful loan application
- A minimum of 50 businesses assisted (E4 output)
- A minimum of £500,000 of leveraged investment (E7 output)

Outline method

The process to achieve this aim was detailed in our tender response and is illustrated in Figure 1 and summarised below:

1. **Identification and recruitment of businesses** – This would be achieved through a number of regional events as well as our relationships with a number of existing business support programmes such as Business Link and Manufacturing Advisor Service.
2. **Undertake initial site survey** – A consultant would undertake a site visit of the client premises and determine how energy was being consumed. They would then be able to look at replacing equipment with more energy efficient alternatives as well as suggesting process optimisations that would yield energy and cost savings. It was noted in the tender that we anticipated the need to visit 75 companies to find 50 potential projects that would result in loan applications.
3. **Application for a Carbon Trust loan** – An application to Carbon Trust loan scheme would be completed once the consultant has examined the options with the company and a decision made on a course of action. Assuming the application is successful (i.e. it meets the criteria the Carbon Trust have with regards to investment versus carbon and cost savings), the funds are made available to the company to cover the cost of the supply and fitting of the equipment.
4. **Installation of technology** – If the loan application was successful, Pro EnviRo will liaise with the loan applicant and equipment supplier(s) to ensure that the installation takes place on the agreed timescales. This was particularly important given the aggressive timescales for



the project and leave sufficient time for the collection of post-install energy data.

5. **Verification of savings** – Once the equipment funded by the loan has been installed the consultant would then verify that the anticipated savings are being made. This would usually mean a return visit to the site and the collection of energy and production data for analysis.
6. **Write a case study** – After the verification visit has taken place a case study is written according to the criteria specified in the contract.

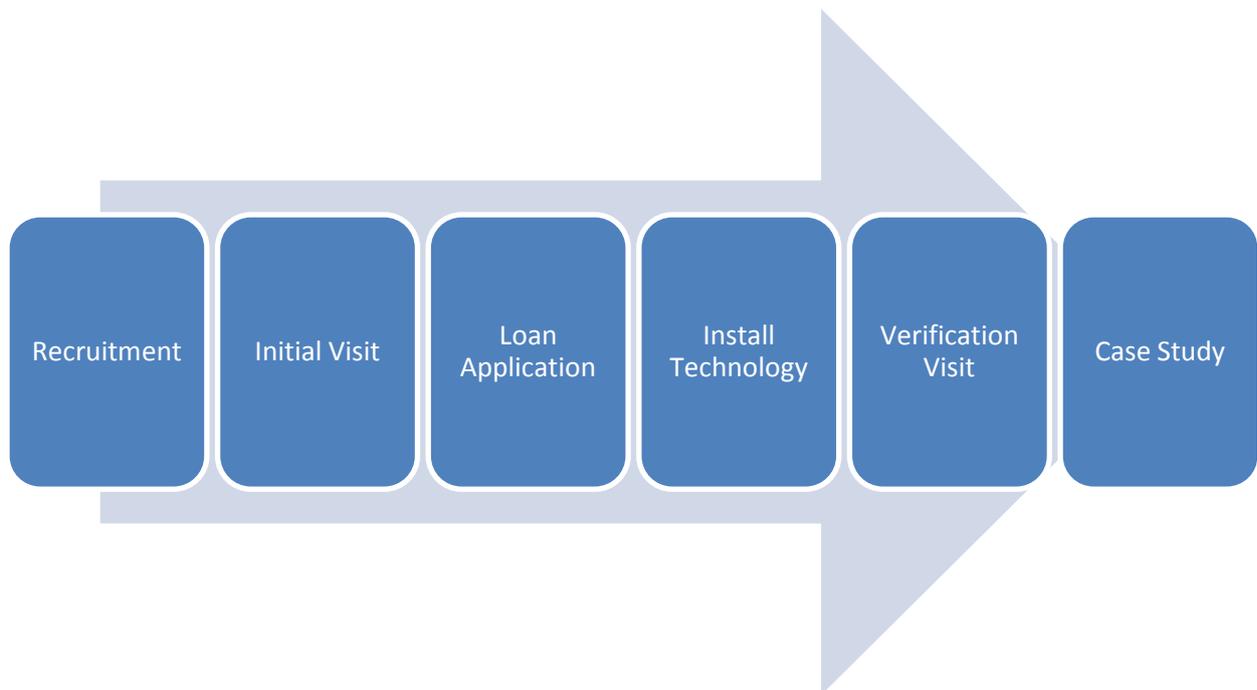


Figure 1 - Illustrated method for the project workflow



Project log

Below is a detailed account of how the project was developed and implemented.

Recruitment

Pro Enviro understood the need for the project to be composed of businesses that are representative of the East Midlands as a whole. This meant companies both from the regions industrial heartlands and rural areas were targeted. In addition to the geographical spread it was also important to ensure that women and BME (Black and Minority Ethnic) businesses were adequately represented.

Our first recruitment drive was targeted at the region as a whole for the purposes of raising awareness of the project. We held five half-day events across the region, as seen in Table 1:

Location	Date	Number of attendees	Number of follow-up visits
Nottingham (Gateway Hotel)	4 th March 2010	9	5
Lincoln (County Showground)	8 th March 2010	9	5
Leicester (National Space Centre)	10 th March 2010	6	3
Derby (Conference Centre)	11 th March 2010	8	3
Northampton (Northampton University)	25 th March 2010 ¹	>20	2
TOTAL		>52	18

Table 1 - Details of recruitment events held

In addition to the events we also promoted the programme through a number of channels in partnerships with other regional business support structures (as they existed at the time):

- **Business Link** – through direct referrals from Business Link advisors (who we supplied printed collateral to hand to their clients), the Improve Your Resource Efficiency programme and promotion of the events through the Business Link portal²
- **Manufacturing Advisory Service** – through direct referrals from MAS advisors and promotion of the events through the MAS portal³
- **Beyond Brokerage** – through direct referrals from practitioners

¹ This event was part of the regional Waste to Resource Network (W2RNET)

² <http://www.businesslink.gov.uk/bdotg/action/event?site=140>

³ <http://www.mas-em.org.uk/events>



- **East Midlands Supplier Diversity Hub** – promotion of the events through the MSDUK portal⁴
- **Women in Business Network** – promotion of the events through the Women in Business Network portal⁵

Details of the delegates from each event and the referrals from the programmes above can be found in Appendix A. The material delivered at these events, and distributed to the regional partners noted above can be found in Appendix B.

The map⁶ shown in Figure 2, below, shows the distribution of the 45 companies that received a site survey through the project.

Analyses of locations reveal that 24 of the companies are located in urban areas and the remaining 21 located in rural areas. We feel that this (almost) 50/50 split achieves the objective of ensuring that urban and rural businesses were able to benefit from the programme.

In terms of diversity, from the signed declarations we have received to date (32 of 45), it shows:

- Asian (Bangladeshi) – 1 (3%)
- Asian (Indian) – 1 (3%)
- Mixed – 4 (13%)
- Prefer not to say – 4 (13%)
- White British – 22 (68%)

This shows that at least 19% of the businesses were majority managed by mixed / ethnic minorities. This compares very favourably with the regional demographic which shows that 6.5% of the population are non-white British⁷.

⁴ <http://www.msduk.org.uk/events.aspx>

⁵ <http://www.wibn.co.uk/events>

⁶ <http://bit.ly/gXjZKf>

⁷ <http://www.statistics.gov.uk/census2001/profiles/E-A.asp>



Figure 2 - Distribution of participants in the project

In terms of the gender split from the same sample set:

- Female managed – 4 (13%)
- Male managed – 18 (56%)
- No clear majority – 5 (15.5%)
- Prefer not to say – 5 (15.5%)

Comparing this with the statistics from the Department for Business, Innovation and Skills⁸ this would seem to broadly match the national trend (14% majority female managed) and would indicate that the companies recruited to the project were representative of those to be found in the East Midlands. This is further supported by data in an emda commissioned research paper⁹ titled *Women's Enterprise and Business Support in the East Midlands*.

To monitor the effectiveness of the various routes into the programme we noted the source of each enquiry and referral:

- Business Link – 3
- Direct email (own intelligence) – 9

⁸ www.berr.gov.uk/files/file50124.doc - page 8, table 3.1 (Leadership by gender)

⁹ <http://www.emda.org.uk/research/documents/research-studies/projects/EMDA-Women.pdf>



- Direct postal (own intelligence) – 2
- Events (as above) – 27
- Improving Your Resource Efficiency (IYRE) programme – 2
- Sustainable Development Fund Panel – 2

Site surveys

We arranged site surveys with all companies that expressed an interest in receiving one.

Before visiting the site we asked for details of their current energy use and expenditure to gauge their size and the potential for savings. In some cases it was immediately apparent that a visit would not be suitable; for example their total energy spend was less than the minimum threshold for a Carbon Trust loan (£3,000). In cases such as this we signposted the company into other support structures such as the IYRE programme.

During a visit a consultant would investigate how energy was being used (i.e. for space heating, lighting, cooling, processes etc) and using their knowledge, identify ways in which it could be reduced. Where it was available we requested and analysed half-hourly electricity data to gauge the potential for further savings.

In some cases it was difficult to accurately determine how the energy used on site was split. In these instances we would fit a number of portable sub-meters and leave them on site for between 7 and 14 days. We would then revisit the site to collect the meters and analyse the data. An example energy footprint generated from such data can be seen in Figure 3.



RCS plc - Electricity Consumption (kWh / 30 mins)

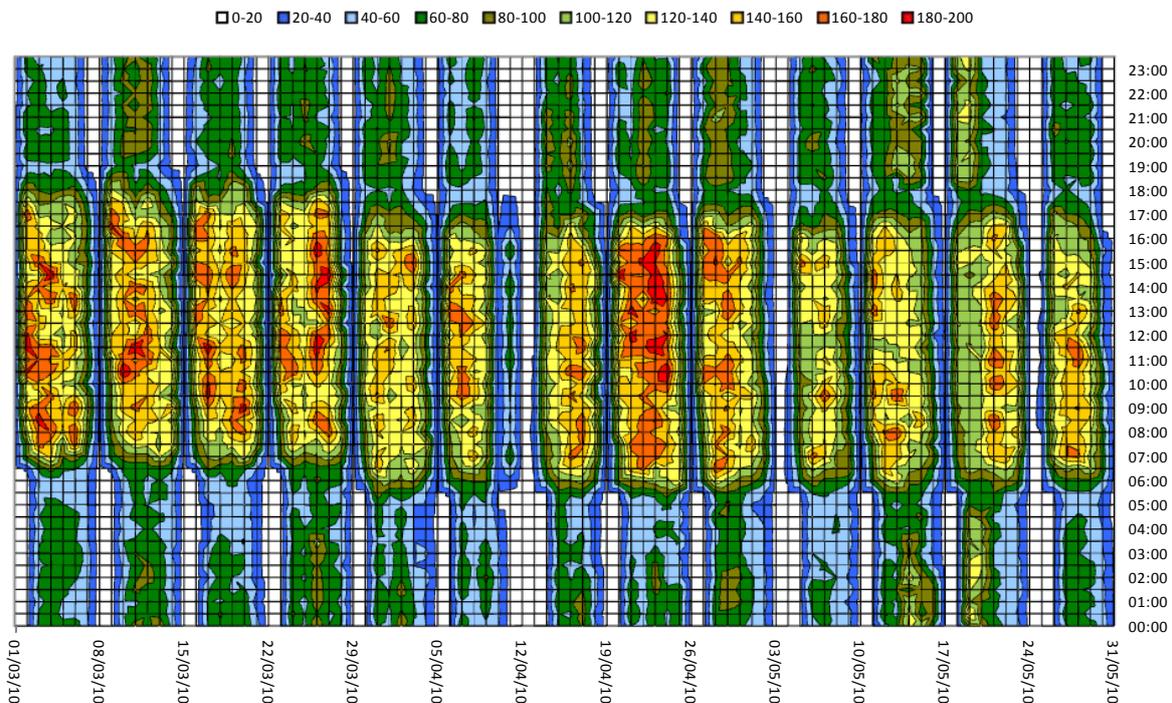


Figure 3 - EnviroTrack showing half-hourly electricity consumption for RCS plc



Findings from the site survey were then communicated back to the company; these broadly fell into two categories:

- **No potential project identified** – In cases where no suitable project could be identified, such as an insufficient carbon saving to apply for a loan, we communicated the reasons back to the client and, where appropriate, signposted them to other programmes such as IYRE, MAS or Business Link. Appendix C details the reasons that projects were deemed to be unsuitable for a loan application.
- **Potential for a project** – If a suitable project was identified we would work with the client to obtain quotes, usually three if they did not already have a preferred supplier, for the replacement equipment and provide them with figures relating to the energy saving and potential Carbon Trust loan amount.

We also encouraged the client to consider purchasing equipment listed on the Energy Technologies List. This is managed by the Carbon Trust on behalf of the Department for Energy & Climate Change (DECC) and HM Revenue & Customs (HMRC) and purchasing equipment listed provides an Enhanced Capital Allowance (ECA), a further financial benefit for the company. Under the ECA scheme eligible equipment can provide 100% tax relief on corporation tax.

Once the replacement equipment had been decided on we would produce a model to calculate the energy savings, cost reductions and carbon saving. If the client still wanted to go ahead we would use this information as the basis of the Carbon Trust loan application.

Carbon Trust loan application

Carbon Trust loan applications were submitted on behalf of the client company via the Carbon Trust's online portal¹⁰. To complete a loan application we were required to provide:

- Details about the company the loan was for
 - Company name and named contact
 - Registered address and address the equipment would be installed if different
 - Employee count
 - Turnover and total value of assets on balance sheet
 - Length of time trading
 - Whether or not company has SME status
 - Industry sector and sub-sector
 - Legal structure
- Details about the proposed project
 - Calculation of energy savings
 - Assumptions used
 - Details of hours of operation
 - Type and size of the building that the technology will be installed in
 - Energy output of existing equipment and proposed replacement
 - Energy efficiency ratings if available
 - Details from any site survey / data logging that has taken place

¹⁰ <https://www.carbontrust-online.co.uk/Pages/login.aspx?ReturnUrl=/Default.aspx>



- Description of existing equipment
 - Details as per previous bullet point
- Details of fuel savings
 - Fuel type¹¹
 - Unit price paid (pence per kWh)
 - Existing annual usage
 - Post project annual usage
- Loan details
 - Requested loan amount
 - Total project amount
 - Number of staged payments and what they are for
 - Expected start and ends dates
- Supplier details
 - Company name and address details
- Supporting documents
 - Quotations
 - Utility / energy bills
 - Bank statements (for sole traders / charities / Friendly Societies / clubs)
- State aid
 - Details of any De Minimis state aid received by the loan applicant in the last three years
- Bank details
 - Account name, number, sort code, address

Upon receipt of these details the Carbon Trust would usually make a conditional offer within 24 hours. During this period they would ensure that the loan applicant is a bona fide company and perform a credit check. If these checks are passed the Carbon Trust appoint an independent consultant working to examine the project proposal to ensure it fits within the loan scheme guidelines and that the savings detailed in the application are achievable.

If the figures were verified then an unconditional offer would be sent to the company detailing the total loan amount, the period over which the loan would run and the monthly repayment. The company would then sign this and return it to the Carbon Trust. Upon receipt of the signed contract the Carbon Trust would set aside the loan sum. This must be drawn down within 3 months of the signed contract. Disbursement of the loan is tied to the payment schedule set out in the application which is taken from the equipment supplier's terms and conditions and invoice schedule.

Technology install

We worked with both the recipient of the loan and the supplying company to ensure that equipment was delivered, installed and commissioned according to mutually agreed timescales. In some cases, particularly where the installation of the technology was complex and might span a number of days

¹¹ Grid electricity / natural gas / LPG / Burning oil / Fuel oil / Gas oil / Diesel / Coal / Wood waste / Wood pellets



or interfere and impact the normal course of business, the install would need to wait for a scheduled shutdown so it could take place.

Verification visit

Once the technologies were installed and commissioned we would arrange for a return site visit so that we could verify the level of energy savings and the associated reduction in carbon emissions. This would require the loan recipient to supply us with utility bills and in some cases for us to fit sub-metering equipment so we could accurately determine the reduction in energy usage and carbon emissions.

Case study

Once this verification was completed we would then write a case study which contains:

- Size, sector and nature of the company
- Location
- Technologies considered and used (including the reason for selecting them)
- Value of the Carbon Trust loan
- Detailed installation and commissioning costs
- Lessons learned

The case studies from the project can be found in Appendix D.

Changes to project outputs and timings

The original project plan is shown in Figure 4, below.

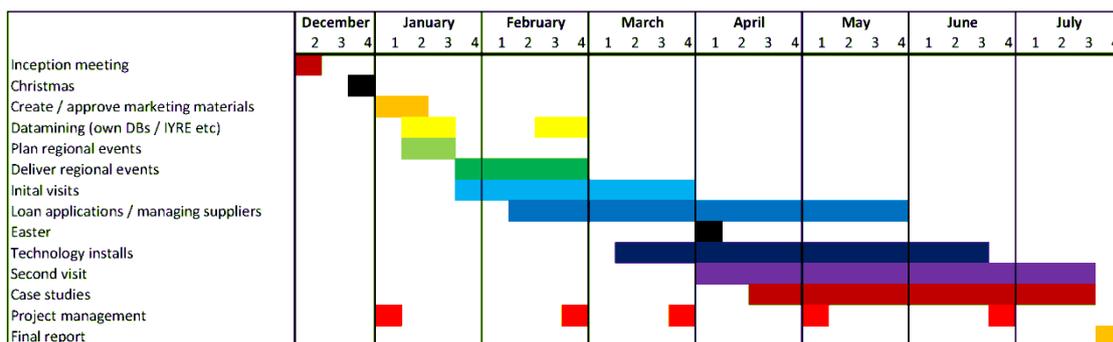


Figure 4 - Original project plan (as submitted with tender) for 2010

The project was delayed initially due to the extended period required to get approval from the Communications team at emda for the printed materials (signup form / A5 booklet) and electronic materials (presentation, as shown in Appendix B). Unfortunately this meant that the events which had been booked to run in February had to be cancelled and rebooked at additional cost.

The materials were finally cleared by the end of February and in March we wrote to the emda programme manager to seek an extension to the project. The extension sought to move the original project ending date from July 2010 to October 2010 as a result of the delays in approving the



recruitment materials. This was accepted and the events went ahead in March as detailed in the recruitment section of the report.

In April 2010 we wrote to the *emda* programme manager to request a budget increase of £19,000, in light of significant changes to the Carbon Trust loan scheme which were published on 12th April 2010. The changes are shown in Table 2, came into effect for new applications received after 19th April 2010.

	Original Scheme	Scheme post-April 2010
Maximum loan	£500,000	£100,000
CO₂ saving per £1,000	1.5 tonnes	2.0 tonnes
Loan payback period	60 months	48 months

Table 2 - Changes to the Carbon Trust loan scheme (April 2010)

An increase in the project budget was not feasible so we were asked instead to cost the impact of the changes and suggest a reduction in the project outputs instead.

In our reply (dated 27th May 2010) we set out the additional costs that were likely to be incurred in delivering the project to the original specification. The cost increases were driven by the additional recruitment activity that would need to take place to engage companies that would be likely to have projects eligible for a loan under the new scheme. There was also a requirement for us to revisit 16 of the companies that we had conducted site surveys for to date to explain the loan scheme changes to them and examine the feasibility of the projects we had already identified in light of the new eligibility rules. In some cases the project would no longer be eligible for full funding (and as a result the company not wishing to go ahead with it) and as such we would have to recruit additional companies to replace them within the project.

The cost of these revisits and calculations was calculated at £10,500. Additional costs identified included reprinting marketing material (£500) and an increase in the number of visits required to complete the project (£8,000). As a result of this we proposed a contract variation that would reduce the outputs from 50 loan applications to 23. There would also be a relative scaling of the other output; leveraged investment would be reduced to £230,000 and the project end date would be pushed back to December 2010 to allow for the additional recruitment activity and visits to take place.

The variation and new costs were accepted by *emda* and an amendment to the contact was issued.

In July 2010 the eligibility for the loan scheme was again unexpectedly changed by the Carbon Trust. The changes are outlined in Table 3.



	Original Scheme	Scheme post-April 2010	Scheme post-July 2010
Maximum loan	£500,000	£100,000	£100,000
CO₂ saving per £1,000	1.5 tonnes	2.0 tonnes	2.5 tonnes
Loan payback period	60 months	48 months	48 months
Company size	All	All	Only SME ¹²
CRC participants eligible^{13?}	Yes	Yes	No

Table 3 - Changes to the Carbon Trust loan scheme (July 2010)

This further compounded the issues raised regarding the previous change in eligibility. The pool of companies suitable for recruitment was immediately reduced as only SMEs that were not participants in the Carbon Reduction Commitment scheme were now eligible. Once a suitable company had been identified and recruited it was now even more difficult to define a project that would meet the more stringent carbon reduction requirements for a loan.

To illustrate the effect that these changes had on the project it would be useful to compare the ratio of site surveys to loans under each of the phases of the Carbon Trust loan programme.

	Original Scheme	Scheme post-April 2010	Scheme post-July 2010
Number of site surveys undertaken	13 ¹⁴	11	15
Number of loan applications	3	0	3 ¹⁵
Total loan value	£79,181	0	£71,589
Average loan value	£26,394	0	£23,863
Total project value	£163,913	0	£85,775

Table 4 - Loan applications and values under the shifting Carbon Trust criteria

After the change to the scheme in April we undertook 11 visits in the three months before the next scheme change in July. The majority of these visits were as a result of the events however the result was that no potential loan projects were identified.

In the six months after the scheme changes in July we conducted a further 15 visits which resulted in three loan applications; two for RCS plc and the other for Newtech Powder Coaters Ltd.

¹² Defined at the time as having fewer than 250 FTE employees, annual turnover not exceeding £42.5M and / or a balance sheet total not exceeding £36.5M

¹³ Organisations must participate in the CRC scheme if their annual electricity consumption exceeded 6,000 MWh in 2008 (equivalent to an annual electricity bill of approximately £500,000)

¹⁴ One of these visits resulted in a loan application in December 2010

¹⁵ One of these loan was rejected by the Carbon Trust as the applying company failed the credit check, however the project was deemed to be financially viable



Project outputs and outcomes

The project did not produce the 23 loan applications required under the revised contract. If we look at applications that were accepted by the Carbon Trust the outputs are:

- **43 companies assisted** (37 site visits / 9 event only)
- **6 loan applications¹⁶** submitted totalling **£150,770** to support projects worth **£249,688**
- **4 loan applications** accepted and monies disbursed totalling **£86,170**
- Total project value of **£102,088**
- Annual carbon saving of **711.66 tonnes**
- Average carbon saving per project of 177.92 tonnes, 232% the national average¹⁷
- Annual cost savings of **£68,203**
- **4 loans completed and case studies** written

Risks and lessons learned

As part of our tender response we analysed the risks that would prevent successful delivery of the project:

- Short overall time-scale of the project (7.5 months)
- Number of critical points outside of our direct control
 - Approval of the loan application by the Carbon Trust
 - Supply and installation of purchased equipment, especially if there are back orders or a delay in installing equipment necessitated by a shutdown
 - Once the loan is in place equipment still needs to be supplied and installed within the project timeframe
- Identification of companies to participate with the project to ensure fairness and meet the project aims

To mitigate these risks we proposed:

- **Tight project management** – Each company would have a nominated single point of contact who will liaise with the Carbon Trust and equipment suppliers to ensure the

¹⁶ Includes the loan application for Newtech Powder Coaters which, while technically valid, failed at the credit check stage and the loan for City Scaffolding which was subsequently clawed back as they did not draw down the funds within the 3 month time limit

¹⁷ Figures from the Carbon Trust showed that in FY09/10 the average carbon saving per funded project was 76.80 tonnes



timescales were met

- **Front loading the project** – Ensuring that the vast bulk of the recruitment, baseline measurements and loan applications were completed in the first 2 – 3 months of the project to give a cushion against possible slippages
- **Diverse recruitment process** – To ensure that we engaged a sufficient number of companies and ensured that they were representative of the demographics within the region we identified a number of other programmes (both regional and national) that could help promote the programme and refer into it. Programmes identified include Business Link, MAS, the High Growth programme, the NTI Grant programme and the Energy and Low Carbon Beyond Brokerage programme.

In delivering this project a number of lessons have been learned that could be applied to future projects of a similar nature:

- **Improved pre-qualification** – To reduce the number of visits to sites that resulted in having no immediately apparent project identified. Typically this was because total energy consumption or spend was small. To counter this we would improve our pre-qualification process and make no site visit until the company had provided us with preliminary information in the form of a year's worth of energy bills.

On the basis of the original project costs (we estimated that each initial site visit would cost £400) and the number of companies where no project was identified (five in total, see Appendix C for details) this would save £2,000 (2.5% of total project cost)

This could be taken a step further; if a sufficiently detailed pre-qualification process was put in place it may be possible to reduce the number of visits to sites where a project is identified but not eligible because the carbon / cost savings do not meet the threshold. However, this could have the effect of dismissing sites where that particular project or another unidentified project might be identified (false positive).

On the basis of the original project costs (as detailed above) and the number of companies where a potential project was identified but not eligible (thirteen in total, see Appendix C for details) this would potentially save £11,600 (29% of total project cost).

- **Ensure companies are investment ready** – To reduce the number of surveys and post visit reports / calculations undertaken, greater effort could be made to ensure companies are ready for investment. This covers two broad themes:
 - Ensuring additional capital is available for the project if the full project cannot be met by a Carbon Trust loan
 - Ensuring that the company is able to schedule a suitable shutdown window to install the equipment as quickly as possible to avoid risk of forfeiting the loan due to the three month time limit on draw down of the funds

We believe that the risk that was not identified, that of the Carbon Trust making fundamental changes to the loan scheme, had the biggest impact on the running of the project. However, this was, at the time, a risk that could not be predicated or mitigated against yet. It was a low



probability event that has a major impact. However, in light of the current cuts in the public sector and at the Carbon Trust¹⁸ I would expect further changes in the loan scheme after April 2011.

¹⁸ <http://www.guardian.co.uk/environment/2011/feb/14/carbon-trust-funding-cut>



Conclusions

It is important to keep in mind that the project was conceived as a pilot to address a perceived market failure¹⁹ (uptake of Carbon Trust loans in the East Midlands being fewer compared to the other English regions with the exception of the South West). If the project is *solely* judged by the original output requirements then it would appear unsuccessful.

However, the initial assumption of the project was that the each loan would be, on average, for £10,000. This would cover the cost of a typical boiler replacement or small scale lighting replacement project. Under the original Carbon Trust loan scheme criteria such a project would be expected to save around 15 tonnes of carbon each year; on this basis the entire project should produce a total carbon reduction of 750 tonnes.

Ignoring for the moment the effects that the Carbon Trust loan scheme changes had on the project, if we pro-rata the outputs, we can see that the reduction in carbon emissions is many times greater than would be expected; 711.66 tonnes from 4 loans applications versus 750 tonnes from 50 loans. This is an average carbon saving of 177.915 tonnes per project which far exceeds both the national average (71.23 tonnes) but also the regional average (69.82 tonnes).

A similar scaling can be seen in the value of the loans; £86,172 from 5 loans versus £500,000 from 50. Judging the success of the project by these measures, carbon abated and investment per company, the project delivered more than the original specification and could be considered successful. The total savings are summarised in Table 5, below.

	Loan value	Project value	Carbon saved (tonnes, annual)	Energy saved (annual)
Bakewell Town Hall and Community Trust	£6,177	£7,909	10.53	£1,926
Belmay Fragrances	£22,004	£22,004	70.42	£9,178
RCS plc (Voltage optimisation)	£24,348	£38,533	470.71	£39,389
RCS plc (Lighting)	£33,643	£33,643	160.29	£17,710
Total	£86,172	£102,089	711.95	£68,203

Table 5 - Summary of loan and project values with associated savings

Of course this result is driven by the larger scale projects that were pursued (and possibly a result of the size of the companies that were engaged) due to the changes to the Carbon Trust loan scheme. As noted in the risks section, this was not anticipated and proved impossible to mitigate against.

Overall the programme delivered a measureable reduction in the regions carbon emissions and proven cost savings to the participating companies in the face of a shifting framework. On this basis

¹⁹ Figures from the Carbon Trust for FY09/10 show that a total of 1,318 loans were made of which 173 were in the East Midlands. Other regions NW (283), NE (197), WM (183), SW (139), SE (225), LON (118)



we would judge the overall project successful and consider it to have provided value for money in keeping with the original project specification.

Appendix A – Delegates at recruitment events

Below is a list of the companies engaged with the project, how they were first engaged (source), their location and ownership details where disclosed.

Company name	Address	Source	Initial visit date ²⁰	Urban / Rural	Ethnicity ²¹	Gender ²²
A Green Engineering Ltd	Unit 3, Whisby Road, North Hykeham, LN6 3QT	Business Link	14/05/2010	Rural	WB	NCM
Abakus Ltd	Grange Farm, Bourne Road, Stamford, PE9 4LU	Nottingham Event	28/04/2010	Rural		
Abbey Parks Farm Shop	East Heckington, Boston, PE20 3QG	Lincoln Event	01/04/2010	Rural	WB	FM
Access Irrigation	Crick, Northampton, NN6 7XS	Nottingham Event	N/A	Rural		
App Mat	Units 6 & 7 Lyndon Business Park, Farrier Road, Lincoln, LN6 3RU	PE Email	28/09/2010	Urban	WB	MM
ASIP IP Ltd	Loughborough Innovation Centre, Epinal Way, Loughborough, LE11 3EH	Leicester Event	13/05/2010	Urban	AB	MM
ATM Automation	Unit F Winchester Avenue, Blaby Industrial Park, Leicester, LE8 4GZ	PE Email	22/07/2010	Urban	WB	MM
Bakewell Town and Community Trust	Riversdale Farm,, Bakewell, DE45 1AR	SDFP	08/04/2010	Rural	WB	MM
Barry Boot Jewellers Ltd	5 Leicester Road, Blaby, Leicester, LE8 4GR	PE Email	27/09/2010	Urban	WB	FM
Belmay Fragrances Ltd	11 Pondwood Close, Moulton Park, Northampton, NN3 1RT	Northampton Event	07/04/2010	Rural	PNTS	NCM
BI Limited	2 Robinson Road, North Evington, Leicester, LE5 4NS	Business Link	29/07/2010	Urban	AI	PNTS

²⁰ Where N/A appears it indicates that the company attended an event but did not wish to have a follow-up visit

²¹ WB = White British, AB = Asian Bangladeshi, AI = Asian Indian, Mixed, PNTS = Prefer not to say

²² MM = Male managed, FM = Female managed, NCM = No clear majority, PNTS = Prefer not to say

Broadway Media Centre	14 - 18 Broad Street,, Nottingham, NG1 3AL	Nottingham Event	N/A	Urban	WB	NCM
Carlton Properties	Enterprise Court, Geddington Road, Corby, NN18 8ET	Leicester Event	11/05/2010	Rural	WB	MM
Champion Labs	Crown Farm Way, Crown Farm Estate, Mansfield, NG19 0FT	Nottingham Event	17/05/2010	Rural	Mixed	MM
Chemquip	Wharf Rd, Whaley Bridge, High Peak, SK23 7AD	PE Email	10/09/2010	Rural	WB	MM
City Scaffolding Ltd	124a Chesterfield Road, Barlborough, Chesterfield, S43 4TT	Lincoln Event	29/03/2010	Rural	WB	FM
City Screen Printer	Unit 9 Earls Way, Off Churchhill Road, Leicester, LE4 8DL	EM Letter	19/07/2010	Urban		
Coffee Aroma	24 Guildhall st, , Lincoln, LN1 1TR	Lincoln Event	26/03/2010	Urban	PNTS	MM
County Court Care Homes	66 Hawthorne Bank, , Spalding, PE11 1JQ	Business Link	01/09/2010	Rural	Mixed	NCM
CPS Flexible Ltd	Airmans Business Park, Ratby Lane, Leicester, LE3 3PZ	PE Email	25/10/2010	Urban	WB	MM
Earheat Ltd	Clarke's Road,, Wigston, LE18 2BG	Leicester Event	18/03/2010	Urban	WB	MM
Envirotrye	46 Fydell Street, , Boston, PE21 8LF	Lincoln Event	28/04/2010	Rural	WB	PNTS
Fabriweld	Gibbons St, Harrimans Lane, Nottingham, NG7 2SD	EM Letter	21/07/2010	Urban		
Heritage Heating Ltd	Brook House, Asher Lane Business Par, Ripley, DE5 3SW	Derby Event	N/A	Urban		
HR Electrical Installations	38 Guthlaxton Avenue, Lutterworth, LE17 4ET	Leicester Event	N/A	Urban	WB	MM
John Merison BMC Ltd	2a Thornborough Road,, Coalville, LE67 3TH	Leicester Event	19/04/2010	Urban	WB	PNTS
Lighthouse Health Care	2nd Floor, Bezant House, Chellaston, DE73 5UH	Leicester Event	14/05/2010	Rural	Mixed	MM
Manby Farms	Grange Farm, Grange Farm Lane, Louth, LN11 8HF	Nottingham Event	N/A	Rural		
Mannocks	Cedar Lawns, Forties Lane, Ashby De	Nottingham	30/04/2010	Rural		

	La Zouch, LE65 2SN	Event				
Martec of Whitwell	Unit 12, Midway Business Centre, Chesterfield, S45 9NU	Nottingham Event	N/A	Rural		
Newtech Powder Coaters	65 Morris Road, , Leicester, LE2 6BR	IYRE	08/09/2010	Urban	WB	MM
Northampton Arts Collective Ltd	The Fishmarket, Bradshaw Street, Northampton, NN1 2HL	IYRE	01/04/2010	Urban	WB	MM
Nottingham Community Housing Association	12 Pelham Road,, , NG5 1AP	Leicester Event	17/05/2010	Urban		
Nottingham Zinc Group	Byron Avenue, Lowmoor Business Park, Kirkby in Ashfield, NG17 7LA	PE Email	04/10/2010	Urban	WB	MM
NS Engineering Solutions Ltd	Unit 23/24 Snibston Drive, Coalville, LE67 3NQ	PE Email	27/09/2010		WB	MM
Panel Technology	Whittle Rd,, Hinckley, LE10 3DW	PE Email	14/10/2010	Urban		
Peak UK	Adbolton Lane, West Bridgford, Nottingham, NG2 5AS	Derby Event	19/04/2010	Rural	WB	MM
RCS plc	Randall Park Way, Retford, DN22 7WF	Lincoln Event	29/03/2010	Rural	WB	MM
Slater Electrical	Elnor St, Langley Mill, Nottingham, NG16 4AP	Derby Event	N/A	Urban		
The Nightingale Centre	Great Hucklow, Buxton, SK17 8RH	SDFP	29/03/2010	Rural	WB	FM
The Poplars	Beaumont Fee,, Lincoln, LN1 1EZ	Lincoln Event	26/03/2010	Urban	Mixed	NCM
The Print Shop	1a Hinckley Road, Earl Shilton, LE10 1HA	Leicester Event	30/03/2010	Rural	PNTS	PNTS
Treatrate Ltd	The Manor House, Market Place, Ilkeston, DE7 5HY	Derby Event	N/A	Urban		
Vale Electrics	1A station Lane, Old Dalby, Leicester, LE14 3ND	Nottingham Event	N/A	Urban		
WCR UK Ltd	Unit A Park Road, Holmewood Industrial Park, Chesterfield, S42 5UY	PE Email	05/10/2010	Rural	PNTS	PNTS

Table 6 - List of companies engaged in the Energy Efficient Technologies for the East Midlands project

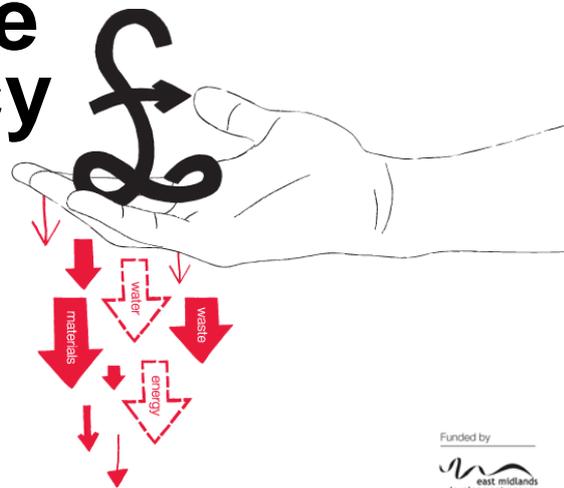


Appendix B – Programme collateral

Below are the slides used in each of the events to introduce the delegates to the Carbon Trust loan scheme and explain how the Energy Efficient Technologies in the East Midlands project would support them in choosing suitable equipment, making the loan application and verifying the savings once the technology had been installed.

Improve Your Resource Efficiency

Davoud Davies
10 March 2010



Solutions for Business

Funded by government

Funded by



Contents

- > Introductions
- > Background
- > The support offer
- > Carbon Trust loans
 - > Benefits
 - > Eligibility
 - > Process
- > Case studies / examples
- > Questions

Solutions for Business

Funded by government



Contents

- > Introductions
- > Background
- > The support offer
- > Carbon Trust loans
 - > Benefits
 - > Eligibility
 - > Process
-  > Case studies / examples
-  > Questions



The target

80%

Britain's legally binding target for carbon emissions reductions by 2050 (2008 Climate Change Act)

Solutions for Business

Funded by government

Background

- > Britain has highly ambitious climate change targets
- > Need to decouple carbon emissions from economic growth
- > Transition to a low carbon economy
- > Issues around future of energy supply, security and costs

Solutions for Business

Funded by government



The Carbon Trust

- > A not-for-profit company with the mission to accelerate the move to a low carbon economy
- > Specialist support to help businesses and the public sector
 - > Cut carbon emissions
 - > Save energy
 - > Commercialise low carbon technologies

Solutions
for Business

Funded by
government

The *emda* offer

- > Free expert support
- > Identify suitable projects
- > Assistance with the loan application process
- > Part of the “Improve Your Resource Efficiency” programme which also offer free resource efficiency reports for eligible businesses

Solutions
for Business

Funded by
government



The interest-free loan

- > 0% business loans of £3,000 - £500,000
- > Anticipated energy savings offset the loan repayments
 - > New equipment should pay for itself and you should continue to make savings year on year after the repayment period
- > Government funded, unsecured
- > No arrangement fees
- > Can reduce your tax liability in conjunction with Enhanced Capital Allowances

Solutions
for Business

Funded by
government

What can I purchase?

- > Building Technologies
 - > Air conditioning
 - > Boilers and heating controls
 - > Boiler and hot water tank insulation
 - > Building insulation
 - > Heat recovery
 - > Lighting
 - > Pipe insulation
 - > Solar thermal systems

Solutions
for Business

Funded by
government



What can I purchase?

- > Industrial Process Technologies
 - > Compressed air fittings
 - > Motors
 - > Materials handling equipment
 - > Power factor correction
 - > Process heating
 - > Process controls
 - > Refrigeration
 - > Variable speed drives

Solutions
for Business

Funded by
government

The benefits

0%

The loan's interest rate.

Solutions
for Business

Funded by
government



The benefits

£3,000

£500,000

Solutions
for Business

Funded by
government

The minimum and maximum loan values.



The benefits

Anticipated energy savings offset the loan repayments

- > i.e. purchase a new boiler for £30,000 using the loan
 - > New boiler is more energy efficiency, and costs £10,000 a year less to run
 - > £10,000 saved goes towards loan repayment, loan repaid in 3 years
 - > Enjoy future savings from then on

Solutions
for Business

Funded by
government



The benefits

Government funded – unsecured

- > No need to offer any collateral
- > Approval in principle within 24hrs
- > No arrangement or approval fees – the amount borrowed is the amount paid back

Solutions
for Business

Funded by
government

The benefits

An effective tax break

- > Claim 100% first-year capital allowances on eligible plant and machinery
- > Write off the whole of the capital cost of the investment against taxable profits of the period during which you make the investment
- > Can deliver a helpful cash flow boost and a shortened payback period

Solutions
for Business

Funded by
government



The benefits (potential)

Take advantage of Feed-in-Tariffs

- > A commitment from government to buy electricity from renewable sources
- > Fixed price and duration
 - > Up to 5 times current market prices
 - > Contracts up to 25 years
- > Covers anaerobic digestion, hyrdo, microCHP, PV and wind

Solutions
for Business

Funded by
government

Enhanced Capital Allowances – ETL

Covers 15 different technologies

- > Air-to-air energy recovery
- > Automatic Monitoring and Targeting
- > Boilers
- > Combined Heat and Power
- > Compact heat exchangers
- > Compressed air equipment

Solutions
for Business

Funded by
government



Enhanced Capital Allowances – ETL

- > Heat pumps for space heating
- > HVAC zone controls
- > Lighting
- > Motors
- > Pipework insulation
- > Refrigeration Equipment
- > Solar thermal systems

Solutions
for Business

Funded by
government

Eligibility

- > Site must be based in the East Midlands
- > Private company, partnership, charity, sole trader or voluntary organisations that has been trading for at least 12 months
- > Not fall under the Carbon Reduction Commitment (CRC Energy Efficiency Scheme)
 - > Consumption under 6,000 MWh in 2008
 - > Generally energy spend >£500,000

Solutions
for Business

Funded by
government



Eligibility

£1,000

Of loan per 1.5t CO₂ saved

Solutions
for Business

Funded by
government

Eligibility – exemptions

- > Agriculture – businesses involved in agriculture have a lower maximum loan amount (£20,000)
- > Export-related sector – the loan cannot support export-related activities i.e. establishment and operation of a distribution network
- > Transport sector – loans cannot be used to obtain, improve or otherwise adapt vehicles

Solutions
for Business

Funded by
government



De Minimis

- > The loans fall under the De Minimis Block Exemptions
- > However, it's only the interest element that would have been charged if the loan was a commercial one
- > For most purposes the De Minimis value is approx 5% of the loan value per year of payback

Solutions for Business

Funded by government

The process



Solutions for Business

Funded by government



Documentation

- > Sign-up sheet (includes De Minimis declaration)
- > Energy bills (usually last 12 months)
- > Quotations (including commissioning and delivery costs)
- > Invoices, delivery notes, commissioning certificates

Solutions
for Business

Funded by
government

Timescales

- > Agreement in principle within 24 hours
- > Loan applications typically take 10 working days
- > Loan payments typically take 5 working days once all documentation has been received

Solutions
for Business

Funded by
government





Case study – The Swim School

- > Based in Chesterfield
- > Private swimming school
- > Provides 1-to-1 and group swimming classes to 800 people a week

Solutions
for Business

Funded by
government

Case study – The Swim School

- > Spending £6,000 per year to heat and ventilate the facilities
- > £10,000 loan to replace equipment with modern ventilation package which included a heat exchanger
- > 55% of the heat between the supply and extract air was recovered
- > **Reduced energy spend by £3,500 per year**
- > **Reduced CO₂ emissions by 3 tonnes per year**

Solutions
for Business

Funded by
government



Case study – The Cavan Bakery

- > Based in Hampton Hill, Middlesex
- > Employs 33 people
- > Previously using two gas ovens, installed in 1946 and 1968
- > Powered by two steam water boilers which were unreliable and expensive to maintain

Solutions
for Business

Funded by
government

Case study – The Cavan Bakery

- > £31,000 loan to replace old ovens with a modern steam oven
- > Project payback in 36 months
- > **Reduced energy spend by 75%**
- > **Reduced CO₂ emissions by 81 tonnes per year**

Solutions
for Business

Funded by
government



Case study – Mastmead Ltd

- > Based in north London
- > 3 full time employees
- > Rents 88 business units as office spaces
- > Building dates from early 1900s
- > Windows / frames were original fittings i.e. single glazed and leaky!

Solutions
for Business

Funded by
government

Case study – Mastmead Ltd

- > Spending nearly £70,000 per year on energy
- > £53,715 loan to replace windows with modern double-glazed units (half total cost)
- > 60% of heat lost through building fabric
- > **Reduced energy spend by £24,000 per year**
- > **Return on investment in just over 2 years**
- > **Reduced CO₂ emissions by 138 tonnes per year**

Solutions
for Business

Funded by
government



Case study – Buxton Press

- > Based in Derbyshire
- > Specialist magazine printer
- > Employs around 100 people
- > Operates from a modernised 18th Century factory
- > Currently print 41 million magazines for more than 140 publishers each year

Solutions
for Business

Funded by
government

Case study – Buxton Press

- > Utilise machinery from Germany designed for 230V operation
- > £40,000 loan to purchase power equipment to reduce voltage from 240V
- > Not only saved money, increased operating life of the machinery
- > **Reduced energy spend by £13,000 per year**
- > **Reduced CO₂ emissions by 104 tonnes per year**

Solutions
for Business

Funded by
government



Questions

> Any questions?





Appendix C – Projects not suitable for a loan

When conducting site surveys we were not always able to identify potential projects for Carbon Trust funding.

In some cases where we were able to identify a potential project follow-up work to quantify the savings would reveal that it was ineligible for funding because the project did not offer a sufficient carbon saving or repayment of the loan within the stipulated timeframe. In others the company was unable or unwilling to supply supporting documentation (typically utility bills to demonstrate energy consumption and costs).

Below are some of the reasons that loan applications were not submitted or were declined.

No project identified during survey

In the case of the following companies we were unable to find a suitable project when conducting the site survey:

- **Abakus Ltd** – Design and manufacture lenses and optical systems. Company operates from a single room. Total carbon footprint is smaller than the loan minimum and hence not eligible.
- **Coffee Aroma** – Coffee shop and cafe based in Lincoln. Survey determined that energy spend was under the Carbon Trust minimum loan limit of £3,000 and hence would not meet the cost saving criteria.
- **Lighthouse Health Care** – Operator of nursing and residential homes. Survey determined that given the high level of energy efficiency there was little that could be done to improve under the limits imposed within the Carbon Trust loan scheme.
- **Mannocks** – Distributors of corporate wear. Survey was unable to find an eligible project.
- **The Poplars** – Six bedroom bed and breakfast located in Lincoln. Survey determined that energy spend was under the Carbon Trust minimum loan limit of £3,000 and hence would not meet the cost saving criteria for a loan.

Project identified but deemed to be ineligible

- **Abbey Parks Farm Shop** – Retailer of fresh farm produce. Project to replace refrigeration display units in the shop but calculations revealed that the carbon and cost savings were not sufficient to meet the Carbon Trust's threshold.
- **App Mat** – Provides plating services to a number of industries. Was interested in extracting heat from their process areas to provide space heating in their office space. Capital cost of heat exchange equipment meant the project was not viable (£40,000 of heat exchange equipment vs. £4,000c heating costs).
- **Barry Boot Jewellers Ltd** – Jewellery shop located in Balby, Leicestershire. Survey identified that all of the lighting units could be replaced with energy efficient fittings (HF T5s / LED) to reduce running costs. However, the carbon saving were too small under the loan



scheme rules. If this survey had been conducted under the original loan rules it would have been eligible and the company would have taken forward a loan application.

- **Broadway Media Centre** – Independent cinema based in Nottingham. Broadway Media Centre were keen to reduce their running costs by fitting solar photovoltaic panels to their roof space. Although the panels would offset a large amount of carbon they would not provide the cost savings vs. capital costs stipulated by the Carbon Trust. We advised Broadway Media Centre to instead look at funding the panels through the Feed in Tariff scheme which provides a guaranteed return on investment.
- **Champion Labs** – Manufacturers of filters, primarily for the automotive sector. Project identified but unable to progress as the Carbon Trust rule change in July 2010 prohibited non-SMEs from benefitting from the interest-free loan scheme.
- **City Screen Printers (UK) Ltd** – Garment printers based in Leicester. Were interested in reducing manufacturing costs. Survey identified potential to switch motors to variable speed drives however calculations indicated that the carbon saving fell under the 7.5 tonne minimum limit for a loan.
- **Earheat Ltd** – Supplier and installer of air and ground source heat pumps. Were seeking a loan to modernise office premises located in Wigston. Projects identified; improved insulation, glazing, space heating and lighting systems but the utility bills provided meant current levels of consumption (<£1,500 per year) were insufficient to make a loan to the Carbon Trust.
- **Northampton Arts Collective Ltd** – Operators of the Old Fish Market in Northampton which provides space to microbusinesses and artists. Survey examined if it was possible to reduce space heating and lighting costs but neither were viable from a cost or carbon saving point of view. Change of space heating problematic due to the fabric of the building.
- **Nottingham Community Housing Association** – Social Registered Landlords. Project identified that a solar hot water system could replace their existing units. Further calculations revealed that the payback time would fall outside of the Carbon Trust loan and as a result could not be fully funded. NCHA were unable to provide the remaining capital to fund the project so no application was made.
- **Nottingham Zinc Group** – Zinc platers. NZG were interested in reducing their electricity costs through improving the efficiency of their rectifiers. The survey indicated that more efficient rectifiers were not available and as such there was no project to take forward for a loan.
- **Peak UK** – Small shop selling canoeing equipment located next to the National Water Sports Centre near Nottingham. Peak UK had already installed energy efficient lighting but were looking to improve their space heating system. The existing system was oil fired and using 1,200L per year and 55% efficient. A possible replacement was identified that was 90% efficient but the total carbon saving only amounted to 2.4t, under the 7.5t limit required for a Carbon Trust loan.
- **The Print Shop** – Small printing and design shop located in Earl Shilton. The survey examined whether a more efficient lighting system could be installed as well as more energy efficient motors in material handling machines. Further analysis of machine run and operating



hours revealed that the carbon and cost savings would fall under the limits required for a Carbon Trust loan.

- **WCR UK Ltd** – Manufacturers and repairers of heat exchangers. Survey identified a number of potential projects; replacing gas fired heaters with a radiant heating solution and installing destratification fans in remaining areas to improve employee comfort whilst reducing energy consumption. The client did not want to go ahead with the heating system change but was interested in the destratification fans, however the savings generated by the fans themselves were under the 7.5t carbon saving limited needed for a loan.

Eligible project identified but not taken forward due to lack of evidence or commitment

- **A Green Engineering Ltd** – Offer manufacturing, engineering and inspection services. Project to replace existing factory lighting with energy efficient lighting system. Project was deemed viable but A Green Engineering declined to provide utility data needed to make an application to the Carbon Trust.
- **ASIP IP Ltd** – Project to replace gas boilers in student accommodation blocks with solar hot water system. Whilst the project was nominally viable, ASIP were unable to provide utility bills to support a Carbon Trust application.
- **Chemquip** – Wholesalers of pumps, valves and mixing vessels. Project identified but unable to progress as they had only been in their current premises for a short period of time and so unable to evidence spend on utilities to support a loan application.
- **County Court Care Homes** – Care home operator with homes across eastern England. A viable project was identified to switch the buildings hot water system from electricity to natural gas. There was also a project to upgrade some of the older glazing units to more modern units which would have improved thermal efficiency which could be part-funded (40%). County Court were unable to provide all of the evidence required to make an application.
- **John Merison BMC Ltd** – Building contract company. Potential project identified to improve lighting controls and building insulation but company did not wish to pursue a loan.
- **NS Engineering Solutions Ltd** – Providers of precision and general purpose machining, fabrication and finishing solutions. Two potential projects were identified during the survey; one involving the changing of their space heating system to biomass, the other to change their lighting to a more energy efficient system. NS Engineering declined to go ahead with the biomass space heating project despite it being fully funded but did go ahead with the lighting project identified. However, the supplier of the lighting project completed the Carbon Trust loan application and hence we are unable to claim the outputs.
- **The Nightingale Centre** – Holiday and conference centre located in the Peak District National Park. A number of projects were identified (improved heating control system, improved zoning for heat distribution, improved lighting system) but declined as rather than funding the improvements through the loan scheme they were able to access a non-repayable grant from the Sustainable Development Fund. If the projects had gone ahead the total cost saving would be £5,389 per year with a reduction of 28.96 tonnes of carbon.



Project submitted but declined by Carbon Trust

- **Newtech Powder Coaters** – Powder coating. A loan application was made to purchase a new box oven. The loan met the eligibility criteria and would have saved 43.83 tonnes of carbon each year; however, the £13,600 loan²³ which would have covered the entire project cost was declined by the Carbon Trust as the company failed a credit check.

Other

- **BI Limited** – Food production and processing company. BI Limited were interested in changing process heating equipment. However they had already purchased replacement plant prior to us completing an application to the Carbon Trust which made them ineligible for a loan as they cannot be applied for retrospectively.
- **City Scaffolding Ltd** – Scaffolding company who also specialise in asbestos removal. A loan of £51,000²⁴ was secured for a £134,000 project for a site they were in the process of buying. The project was to replace the lighting systems in three buildings, insulate one of the buildings (wall and roof) and install a new energy efficient gas boiler and calculated to save around 100 tonnes of carbon per year.

The loan was approved in July 2010 however the funds have to be drawn down within 3 months of the signed application. Unfortunately City Scaffolding were unable to complete their purchase of the site and defray the funds so the loan was rescinded by the Carbon Trust.

- **CPS Flexible Ltd** – Manufacture plastic for the food and media industries. The survey took place towards the end of the programme (December 2010) and with the unavailability of key decision making staff due to holidays and illness we were unable to advance a potential application for an improved lighting and control system.
- **Envirotyre** – Environmental friendly disposal of tyres. Similar to the case with BI Limited, project was identified but the company had already purchased the equipment and unable to make a retrospective application.

²³ Carbon Trust reference CTL13642 dated 23/09/2010

²⁴ Carbon Trust reference CTL12547 dated 09/07/2010



Appendix D – Case studies

Below are the case studies for the companies that have received a loan.

Bakewell Town Hall



Bakewell Town Hall **Case study** Energy efficient heating system

The 19th century Town Hall in Bakewell, Derbyshire wanted to update its aged heating system into something suitable for the present day. With support from the Improving Your Resource Efficiency programme and the Carbon Trust they were able to do just that.



“We were delighted with the support which enabled us to install a 21st century heating system”

Pat Lunn
Director

Key Achievements

A modern, high-efficiency boiler was installed into a period building, allowing it to be transformed into a valuable community asset whilst reducing running costs and carbon emissions.





**Solutions
for Business**

Funded by
Government

Bakewell Town and Community Trust (BTCT) is a registered charitable company established in 2006 and employing three people. The main purpose of the trust is to take over and manage the restoration and re-launch of the 19th century Town Hall, an important community building in the centre of Bakewell, which has been neglected for many years.

The problem

The nineteenth century Town Hall, located in the picturesque Derbyshire market town of Bakewell, was using a gas-fired space heating system of a similar vintage. The Powmatic PD500 boiler had been installed in 1972 and provided hot water for space heating. Whilst comparatively efficient at the time of its installation it performed poorly compared to modern units.

Some low cost energy reducing measures had already been taken in the building to reduce gas consumption and costs; thermostatic valves had been fitted to radiators and the boiler was being used in conjunction with a clock timer to ensure it wasn't firing when the building was not in use.

Analysis of the gas bills for the year ending March 2010 showed a total consumption of 163,786 kWh at a cost of £5,114. Gas within the building is used primarily by the boiler for space heating with a small amount used for the generation of hot water. This is reflected by the small amount used over the warmer summer; between July and September 2009 total gas consumption was just 11,159 kWh, 7% of the yearly total.

The solution

It was decided that a boiler replacement would be the next step to reduce the amount of gas used and costs. A number of possible replacements were evaluated and

finally a decision was made to install a Buderus GE315 boiler rated at 170kW. This is a high-efficiency boiler, rated at 96% efficient, compared to the existing boiler which was rated 60% efficient when installed. However, the old unit was likely to be closer to 50 – 55% efficient due to loss of efficiency over time.

Projected savings

Based on the total gas use and the difference in efficiency between the boilers it was calculated that gas consumption would be reduced to around 96,630 kWh per year – a reduction of nearly 60%.

This would produce a net reduction in gas consumption of 67,156 kWh with a corresponding saving of £1,692 in running costs and 12.36 tonnes of carbon per year.

Carbon Trust interest-free loan

The Carbon Trust interest-free loan scheme provides a cash-flow neutral way for companies to finance energy efficient equipment. For every 1.5 tonnes of carbon saved the Carbon Trust will loan £1,000 if the return on investment is less than four years with the savings made on reduced energy consumption used to pay off the loan.

Project costs

The total project cost was £7,909 and the costs were broken down as:

- Supply and installation of a Buderus GE315 boiler and removal of the old boiler - £7,224
- Supply and installation of a new circulating pump, valves and flanges - £685

Given the level of carbon saving (12.36 tonnes) and the return on investment (just over four years) the project was partially funded by the Carbon Trust. A loan application for £6,177 was made and accepted.



**Solutions
for Business**

Funded by
Government

Lessons learned and savings

The new boiler was installed and commissioned during June 2010.

	Old boiler	New boiler	Saving
Yearly gas consumption	163,786 kWh	107,734 kWh	57,217 kWh
Yearly gas cost	£5,297	£3,188	£1,926
Carbon emissions	30.14 tonnes	19.61 tonnes	10.53 tonnes

The total reduction in gas consumption was shown to be 57,217 kWh per year which is broadly in line with the initial estimates once degree day data has been taken into account.

Annualising these results produces a saving of £1,926 on the Town Hall's gas bill and a reduction in carbon emissions of 10.53 tonnes.



Belmay Fragrances

Solutions
for Business

Funded by
Government

Belmay Fragrances **Case study**

Improving energy efficiency of key plant

Northampton based Belmay Fragrances wanted to sniff out cost savings for their temperature controlled storage. With support from the Improving Your Resource Efficiency programme they were able to invest in energy efficient technologies financed with an interest-free loan from the Carbon Trust.



“Reduced energy costs and interest-free finance mean this project was a win-win”

Vincent Keedle
HSE Manager

Key Achievements

Energy used to maintain temperature in a controlled storage room reduced by more than 94,000 kWh per year, saving nearly £9,000 annually and reducing carbon emissions by more than 70 tonnes





Solutions for Business

Funded by Government

Belmay Fragrances, established in 1935, are a family owned business offering creative scent solutions to customers across the world. Employing 56 people at their Northampton site, they are one of the leading creators and manufacturers of fragrances which are destined for use in the air care, personal care, home care and fine fragrance markets.

The problem

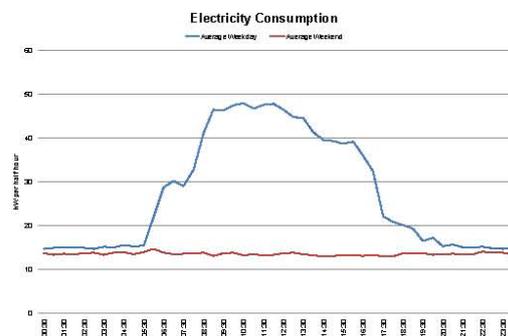
The odoriferous compounds which form the basis of all fragrances are extremely temperature sensitive so the correct environment for storage is of paramount importance. Belmay Fragrances have a temperature controlled store room which needs to be kept at a constant temperature of 40°C. This room made use of a 24kW electric boiler which supplied hot water to a number of radiators located with the store room.

The store room had a single entrance which was designed to accommodate fork-lift trucks so that bulk materials could be stored. However, staff also needed to retrieve small quantities of chemicals and so entered on foot via the large door. Given the size of the door opening (approximately 8m x 3.75m) this meant heat escaped to atmosphere and was consequently wasted.

The electric boiler also supplied heat to a small process tank located just outside the store room. This was powered constantly but infrequently used, further wasting energy.

Analysis of the half-hourly electricity consumption for the site showed that the electric boiler was on full load for around 80% of the time. This resulted in an annual cost in excess of £12,000, and produced more than 91 tonnes of CO₂ each year. In the chart overleaf, the red line shows the constant electrical demand on the weekend despite no production taking place, whilst the blue line

shows the demand for a normal weekday (values as kWh per 30 minutes).



The solution

To reduce the cost of heating the store room and powering the small process tank a number of critical changes were made:

- Replacing the electric boiler with a high-efficiency (90% efficient) gas-fired condensing boiler. Gas is cheaper than electricity and based on existing contract prices the running cost for heating the storage room and process tank would be reduced by 64% per kWh.
- Increasing the insulation around the store room. Originally the store room was construction using breeze blocks with no insulation. High efficiency insulation boards were fixed to the walls and ceiling to stop the loss of heat to atmosphere. This was estimated to reduce the cost of keeping the room at the correct temperature by more than 55%.
- Adding an additional pedestrian entrance to reduce heat loss. The pedestrian entrance is nearly 13 times smaller (2.3m² versus 30m²) which means less heat is lost to atmosphere each time the door is opened. We





Solutions for Business

Funded by Government

estimated that given the ratio of fork-lift to pedestrian traffic a saving of around 5 - 7% could be achieved.

Projected savings

Based on the solution outlined above we estimated that a Belmay Fragrances would reduce their electricity consumption by 168,192 kWh per year, saving £12,041 and reducing the association carbon footprint by 91.53 tonnes per year. This would be partially offset by an increase in gas consumption due to the new boiler. This was expected to amount to 48,618 kWh per year at a cost of £1,256 and produce carbon emissions of 8.94 tonnes annually.

This would produce a net reduction in annual energy usage of 119,574 kWh with a corresponding saving of £10,785 and 82.58 tonnes of carbon, once the savings due to the additional insulation are factored in.

Carbon Trust interest-free loan

The Carbon Trust interest-free loan scheme provides a cash-flow neutral way for companies to finance energy efficient equipment. For every 1.5 tonnes of carbon saved the Carbon Trust will loan £1,000 if the return on investment is less than four years with the savings made on reduced energy consumption used to pay off the loan.

Project costs

The total project cost was £22,004 and the costs are broken down as:

- Supply and installation of a Vaillant ecoTEC plus 615 condensing boiler and four 1400mm double panel radiators - £8,064
- Supply and installation of a single gas burner and associated pipe work and controls for process tank heater - £3,780

- Supply and fit insulation (80mm thick) to walls and roof of storage room - £8,104

- Create a pedestrian entrance to store room and seal and insulate door frame and door - £2,056

Given the level of carbon saving (82.58 tonnes) and the return on investment (just over two years) the project was fully funded by the Carbon Trust.

Lessons learned and savings

The new boiler was installed and commissioned at the end of September 2010 and the insulation work was completed at the same time. Analysis of electricity consumption following commissioning shows an average decrease of 20kW in peak electricity demand:

	Pre-install (Jan 2010)	Post install (Nov 2010)
Max Demand	138 kW	118 kW
Weekday Average	111 kW	78 kW
Weekend Average	62 kW	43 kW

The total reduction in electricity consumption was shown to be 12,264 kWh per month, which is broadly in line with the initial estimates. Gas usage has increased by approximately 4,380 kWh per month, once adjusted for degree day data and compared with the same period last year. This is also in line with the initial project estimates.

Annualising these results produces a saving of £9,178, a reduction in carbon emissions of 70.42 tonnes and a net energy saving of 94,608 kWh.





Panel Technologies

Loan calculations are still taking place for Panel Technologies. If the project is viable it could produce a loan application for £80,000 - £100,000.

RCS plc – Voltage optimisation project



RCS plc **Case study**

Reduced costs through voltage optimisation

RCS are passionate about the environment. They are committed to a programme for change to reduce their carbon footprint and to operate in an environmentally friendly way. To further this they approached the Improving Your Resource Efficiency programme to make even greater reductions.



“TBC”

Michael Todd
Managing Director

Key Achievements

Voltage optimisation equipment was installed to reduce electricity use, producing an annual saving of nearly £40,000 and reducing carbon emissions by more than 470 tonnes.





Solutions for Business

Funded by
Government

RCS plc offers a full service printing operating from a 43,000 square foot purpose built office located in Retford, Nottinghamshire. Employing 112 people, they offer everything from design services, small-to-large format printing and product finishing. Committed to being sustainable they are accredited to the ISO 14001 system for environmental management and are a member of the Forestry Stewardship Council.

The problem

RCS is a 24 hour business, with printing running day and night virtually every day of the year in order to meet the delivery requirements of its customers. Analysis of electricity bills for the year ending November 2010 showed a total consumption of 1,460,711 kWh at a cost in excess of £115,500 before standing and authorised supply capacity charges are added.

The solution

It was decided that voltage optimisation equipment would be installed to reduce the overall level of electricity consumption. The average mains supply in the UK is typically around 242V, however most equipment, including the German printing presses used by RCS, is designed to run on a 220V / 380V 3-phase supply which is the level typically seen on the continent. Voltage optimisation equipment also balances the phases which mean that 3-phase AC motors operate with greater efficiency and reduces higher level harmonics.

Projected savings

A study was undertaken as the level of saving for voltage optimisation is dependent on the loads connected to the electricity supply. The study indicated that a 12.25% reduction in electricity consumption was a realistic prospect; this equated to an annual cost saving of

£11,500 and a reduction in carbon emissions of 97.39 tonnes per year.

Carbon Trust interest-free loan

The Carbon Trust interest-free loan scheme provides a cash-flow neutral way for companies to finance energy efficient equipment. For every 2.5 tonnes of carbon saved the Carbon Trust will loan £1,000 if the return on investment is less than four years with the savings made on reduced energy consumption are then used to pay off the loan.

Project costs

The total project cost was £38,533 and the costs were broken down as:

- Supply and installation of a powerPerfactor™ unit rated up to 560 kVA/ 800A - £32,431
- Delivery and installation - £6,102

Given the level of carbon saving and the return on investment (in excess of four years) the project was partially funded by the Carbon Trust. A loan application for £24,347 was made and accepted.



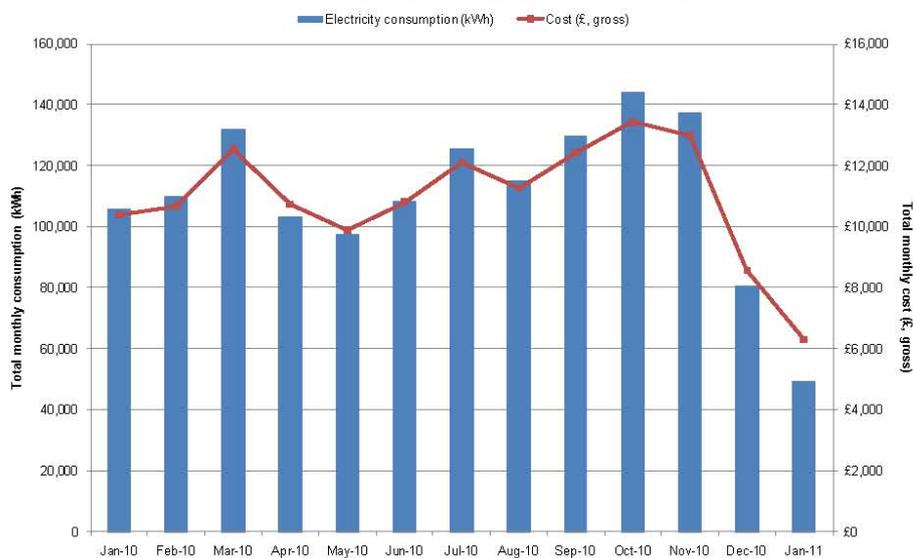
**Solutions
for Business**

Funded by
Government

Lessons learned and savings

The powerPerfector™ unit was installed in the middle of December 2010 and the savings were immediately apparent.

Monthly Electricity Consumption and Cost



	Pre-installation	Post-installation (pro-rata)	Annual saving
Yearly electricity consumption	1,460,711 kWh	595,437 kWh	865,274 kWh
Yearly electricity cost	£115,500	£76,111	£39,389
Carbon emissions	794.63 tonnes	323.92 tonnes	470.71 tonnes

The total reduction in electricity consumption for the first full month the equipment was installed, January 2011, was 69,739 kWh. This is far better than the initial estimates given that production levels were at a similar level to the average for the previous year.

Annualising these results produces an annual saving of £39,389, nearly four times more than was initially anticipated. This meant that the return on investment is less than one year whilst at the same time the total level of carbon emissions will reduce by more than half.





RCS plc – Lighting project

Technology (new low energy LED lighting system) is currently being installed at RCS and is expected to be completed by the end of April 2011. Savings should be apparent within 1 month as they operate 24x7 and have access to half-hourly electricity data.