Case study

Reducing costs and carbon with voltage optimisation

As the largest council in Scotland, Glasgow City Council recognises the need to improve efficiency and lead by example. Its commitment to a 30% reduction in carbon by 2020 was the primary driver for its recent voltage optimisation project and this has resulted in some valuable savings and benefits.

Key facts

- Undertaken by Carbon Management Team (CMT) at Glasgow City Council.
- Voltage Optimisation installed at 62 buildings, including schools, offices, depots, leisure centres, museums and a theatre.
- Financial savings of nearly £400,000 a year
- Average payback of 4 years
- Improved energy efficiency and carbon reductions of over 2,200 tCO2
- Reputational benefits.

Background

Overarching commitment
To support its overarching commitment to carbon reduction the council has established a new carbon management structure where all in-house and outsourced services are represented and tasked with responsibilities and targets. Most importantly, says the Principal Officer from the Carbon Management Team, there is accountability and buy-in at a senior management level to reinforce this commitment.
Voltage Optimisation
The commitment to reduce carbon was the primary driver for a project to install voltage optimisation technology at 65 sites across the council estate.

Savings from this technology can be considerable; with the total savings in this case being nearly £400,000 per annum and a return on investment (or payback period) of an average of 4 years. It is worth noting that the savings and payback periods that can be achieved with voltage optimisation technology are site specific and will therefore vary.

Voltage optimisation technology is an electrical energy saving technique that is installed in series with the mains electricity supply to provide a reduced supply voltage for equipment. The technology is best applied to motors and pumps as this is where the most energy savings can be made.

This case study examines the voltage optimisation project in more detail, the steps, the implementation costs at each of the phases, the financial, sustainability and intangible benefits, and some of the challenges faced by the project team. Finally, it provides some tips for those wanting to take a similar project forward.

The process/methodology
Key steps
The key steps undertaken in this project were to:

1. Define the specification, identify what was required from the technology and align this to council’s perception of risk
2. Select a supplier
3. Establish a dedicated project management team and put processes and protocols into place
4. Engage with stakeholders from across business to gain buy-in, influence decision makers, educate, and promote change
5. Undertake a trial period to test technology
6. Use a phased approach and evaluation of results to inform next phase
7. Undertake an end of project evaluation
8. Share success with all stakeholders

A phased approach
The voltage optimisation technology was tested during a trial period at three sites, a school, a depot and a resource centre (office block). An evaluation was undertaken at the end of the trial period to identify any issues and risks, inform the phased roll-out and to gain buy-in from ‘late adopters’. The evaluation also had additional benefits which compelled the team to identify operational risks that could be better documented, such as the processes in place for responding to a loss of power.

- Phase 1 began in April 2012 and ran for 4 months and was funded through Central Energy Efficiency Fund (CEEF)
- During Phase 1 the technology was rolled-out at 12 large sites including leisure centres, a theatre, and primary and secondary schools
- Phase 2 covered a further 30 sites
- Roll-out is still continuing with an additional 20 sites pending in Phase 3

After proving the technology in Phase 1, £1.2m of capital funding was secured for Phase 2. This was a key step for the CMT as it demonstrated their ability to present a compelling enough business case to Corporate finance to merit Capital investment

The technology has been installed in a variety of buildings, old and new and of varied size. Going forward the council has committed to install voltage optimisation technology everywhere it is viable across its estate.

Engagement is also key
The Carbon Management Team spent a significant amount of time engaging with stakeholders from across the business; this started 18 months – 2 years in advance of the trial period. The Carbon Management Team believes that engagement was key to overcoming many of the challenges faced throughout the project and that the next project will run more smoothly because the team has built considerable trust with its stakeholders and delivered results.

Key outcomes
The benefits
The benefits realised through this project included:

- Improved efficiency, internal operations and management
- Financial savings of over £400,000
- Short payback periods
- Savings with no real burden (voltage optimisation technology does not change the way a building is used)
- Projected carbon reductions of over 2000 tonnes per annum.
- Enhanced reputation with internal and external stakeholders
The table below provides an overview of the costs to implement, the financial and carbon savings and the payback periods at each of the phases.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Implementation costs (pa)</th>
<th>Financial savings (pa)</th>
<th>Payback period (Years)</th>
<th>Carbon savings (tCO₂)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>£265,000</td>
<td>£90,000</td>
<td>Average of 2.4</td>
<td>580</td>
</tr>
<tr>
<td>Phase 2</td>
<td>£662,000</td>
<td>£184,000</td>
<td>Average of 3.98</td>
<td>1,039</td>
</tr>
<tr>
<td>Phase 3</td>
<td>£484,000</td>
<td>£123,900</td>
<td>Average of 4.01</td>
<td>620</td>
</tr>
</tbody>
</table>

*At time of writing, this phase was underway therefore; savings are based on logging and site assessment and have not yet been verified.

In addition to the sustainability benefits and financial and carbon savings there have been other, intangible benefits. The way the Carbon Management Team is perceived within the council has changed; it has improved its reputation and raised the profile of the team and of carbon management. The team is now seen as a resource that can support others in achieving targets rather than an additional part of the organisation.

**The challenges**

The most significant challenges were the complexity of the organisation. As a result knowing who to speak to with regards decision making, and the number of stakeholders that needed to be engaged, educated and persuaded was considerable. The team overcame these challenges by meeting with the numerous and varied stakeholders to address concerns, being forthcoming with information, and involving the supplier in the engagement process – the supplier spent a considerable amount of time engaging with council services and facilities managers to build knowledge and gain buy-in.

A further complication was that many of the buildings and sites on the council estate are operated under a Private Finance Initiative/ Public Private Partnership (PFI/PPP) contract. With third parties (and joint ventures) running these contacts this increased the stakeholders involved and also the factors that needed to be considered and managed.

**Top tips**

1. Know your stakeholders and undertake engagement early-on and throughout all stages of the project
2. Take time to understand the technology, its benefits and limitations
3. Draw on the experience of others who have already undertaken a similar project to yours
4. Establish a dedicated project management team and good governance
5. Used a phased approach, review results, identify issues and risks, and use findings to inform the next phase.

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