Optimised Buildings

22%
energy saving of HVAC

<7
months ROI

Case study: Large Supermaket Retailer

Background

Ranked in the top four UK supermarket chains, this food retailer serves customers nationally throughout the UK from almost 500 stores and an online home delivery service. Every week, 11 million customers pass through the doors and employ over 110,000 staff across the business. Our client has a Trend BeMS (Building energy Management System) across their retail portfolio, that controls HVAC (Heating, Ventilation and Air Conditioning), lighting and hot water. Half hourly meter data from both gas and electricity was available to baseline and manage the stores energy performance.

Challenge

Optimised Buildings were commissioned to undertake a trial on 4 pilot stores to 'optimise' the BeMS and monitor the potential impact on energy savings that this would generate. This optimisation was to be undertaken through maximising the efficiency and operation of existing assets (specifically the BeMS/HVAC), with no additional capital equipment installed. The trial was undertaken in May 2018 for a period of 4 weeks where a saving of 51% on gas and 6.5% on electricity was achieved, compared with the same month of the previous year. The outcome of this trial led to our client entering into a contract with Optimised Buildings to optimise 450 stores over a 6-month period and once optimised, to deliver a managed service bureau contract to ensure savings were maintained for the longer term.

See the solution overleaf

Quick facts - Year 1

- £7.32 million energy saved
- 35,853,269 kgCO_2e saved
- 159 MWh saved
- 20% reduction in HVAC work orders
- 6 million+ work orders managed
- 450 stores optimised in 6 months
- 496 stores and 336 petrol filling stations optimised and managed through the 24/7 Optimised Bureau

Solution

The first objective was to upload strategy from the Trend BeMS system and 'optimise' the control strategies. Over the 6 months period we pulled together an engineering team to meet both the aggressive technical goals and programme that had been set before us. Once the software had been optimised for a specific store, our commissioning team then moved in. They uploaded the software while on site at the specific store and recommissioned the BeMS controllers, addressing any faulty sensors, equipment in hand, wiring issues and much more besides. At the peak of the project we were commissioning 80 stores a month and had ramped up the optimisation team to 17 dedicated engineers. While the software was being optimised, along with the onsite commissioning our team of office based engineers were importing the 270,000 data points into the new Trend IQVision platform, setting up around 50,000 analytics points and pulling in 1,500 half hourly fiscal meters into the aM&T platform. The fiscal meters were already available which negated any integration requirements, this half hourly data was logged and 'pushed' to our cloud-based 'Optimised aM&T' (automatic Monitoring and Targeting) software. This created the transparency and baseline data to effectively monitor and measure the impact of the building optimisation deployed.

Then 'Optimised Analytics' were added to monitor the BeMS and HVAC systems through intelligent algorithms and rules. This cloud-based platform tracks the performance of assets, equipment and systems and quickly identifies anomalies in plant operation saving energy and maintenance costs. Once the systems were set-up, we were able to start and analyse the baseline data and energy profiles for each store, aligning time schedules to match trading times, operating at suitable temperatures during trading periods without affecting store environmental conditions, and ensure that lighting overrides were minimised.

The '24/7 Optimised Bureau' managed service then took over, remotely monitoring the performance of each stores HVAC, BeMS and lighting circuits to ensure continuous operational efficiency. The Optimised Bureau is now providing 24/7/365 monitoring for the client, to identify anomalies, energy issues, BeMS analysis and ongoing energy management recommendations. Monitoring hundreds of thousands of data points across a geographically diverse retail portfolio is challenging for any business and is unlikely to be solved without dedicated resource, domain expertise and the right technologies. It is this combination, that is now generating great results and what is important is that not only are these savings maintained through the ongoing managed service, the portfolio will continue to improve in its efficiency and performance. The analytical technology is now driving the human analysis, which creates a winning combination in terms of a competitive solution and business outcomes for the client.

Results

The project that started in July 2018, on a 6-month programme delivered energy savings that equalled the value of the contract on the 21st December 2018! During the first 18 months our client saved over £9m in energy saving equating to £2.50 returned for every £1 invested. All of this achieved through optimisation of existing assets and systems, with NO additional controls being installed.

We are now providing the Optimised Bureau services 24/7 for the whole retail portfolio which includes 494 stores, 336 petrol filing station. This is all done from the head office of Optimised Buildings in Ashby de la Zouch, Leicestershire. The Optimised Bureau service is now being delivered, including a full environmental service where the stores can call the Optimised Bureau at any time of day for any issues / support around the temperature, heating, environmental issues, lighting or domestic hot water and this will be dealt with by the team.

While energy efficiency has been the biggest driver of this project, other benefits include; reduced maintenance costs due to the remote analysis and first-time fix, improved staff satisfaction as issues are resolved before they know they have an issue, improved asset life, due to reduction in operating hours, greater analytical understanding of the retail portfolio's performance current and future opportunities. The model described above has now been adopted and deployed across many UK clients from hotels, schools, office buildings and even embassies!

> "The Optimised Buildings Bureau service combined with the analytical technologies has given us greater visibility of our portfolio of stores and as a result has contributed to significant savings since we started the HVAC and BMS optimisation. The insights, processes and expertise that we now have in place has created key foundations for further savings across the portfolio as strive for a more sustainable future."
>
> **Senior Property Manager for Energy**

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Optimised Buildings

Optimised Buildings

26%
overall kWh reduction

<5
months ROI

Case study: Financial Services HQ

Background

This 10,000 m² facility, located in the West Midlands provides commercial office space, a call centre and comms rooms for one of the UK's leading banks. The facility was built around 20 years ago and accommodates around 2,000 staff daily. The site has no sub-metering and relied on the fiscal half hourly meters to prove savings. The HVAC system was being controlled by a 15 year old Trend IQ1 BeMS (Building energy Management System).

The facility is part of wider portfolio that is managed under an energy performance contract by one of the UK's leading facility management companies. The site was consuming around 6.4 GWh annually of energy and while the FM company had already done a good job at reducing consumption by around 13%, Optimised Buildings identified further saving opportunities.

Challenge

Optimised Buildings were asked to assess the facility to determine if further energy savings could be achieved through their optimisation proposition.

See the solution overleaf

Quick facts

- < 5 Months ROI
- 25% reduction in Electricity (kWh)
- 28% reduction in Gas (kWh)
- 1,656,978 kWh saved annually
- All savings achieved through optimisation of the HVAC and BeMS system
- Technology, expertise and process have all been major contributors to the savings achieved

46% of the sites energy was being consumed by Heating, Ventilation and Air Conditioning (HVAC)

The HVAC system consumed 40% of the electricity and 95% of the gas consumption at this facility. Optimised Buildings undertook a detailed energy audit and determined a further 500,000 kWh (8% of total kWh's consumed) could be saved over a 12 month period. These savings were all identified to come from HVAC and BeMS optimisation.

Optimised Buildings were then contracted by the FM company to deliver the savings and challenged to exceed these projections of 500,000 kWh a year.

Solution

The solution consisted of both technology and expertise to achieve the savings.

Following a site assessment mechanical, electrical and controls issues were identified and a plan put in place to resolve these issues, all of which were contributing to excessive energy consumption. Controls strategies were reviewed and corrected along with time schedules, setpoints and runtimes.

Remote communications were set-up to the site which enabled data to be extracted from the Trend BeMS system on a 15 minute interval. This data was then pushed to the cloud, which feeds the Optimised Analytics platform where fault diagnosis and detection algorithms identifies and tracks the performance of assets, equipment and systems and quickly identifies anomalies in plant operation saving energy and maintenance costs.

The continuous monitoring and analysis undertaken by the Optimised Bureau team ensures that savings are not only delivered, but they are maintained long term. The Optimised Analytics data combined with aM&T data has enabled our energy analysts to identify anomalies with the operation of the HVAC / controls and make energy conservation measures recommendations. This is fed back to the FM/Energy team to rectify the issues in a timely manner and the results analysed.

Combining the technology, expertise and process has resulted in significant energy savings being achieved throughout this facility.

Results

Following a 24 month optimisation programme, 1,656,978 kWh of annual savings is now delivering an ROI of less than 5 months.

Further savings opportunities have been identified and savings are expected to increase further over the coming months.

The net result is a **26% saving** for the client.

Annual savings

£ savings	£126,793	% of Total Energy Spend	26%
CO_2 Reduction	572,456 kgCO_{2e}	% of HVAC Energy Spend	51%
kWh Saving	1,656,978 kWh	ROI (months)	**4.84 Months**

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Optimised Buildings

19%
overall kWh reduction

42%
reduction HVAC energy spend

Case study: whg

Background

Housing provider whg manages more than 19,000 homes throughout the West Midlands and 5 commercial buildings. The business moved to 100 Hatherton Street in the heart of Walsall to a new 5,000 sq Metre facility in 2012. The 4 story facility is now the workplace for around 300 colleagues on a daily basis and incorporates a state of the art datacenter.

The control systems within the new facility included a Trend IQ3 BeMS, Mitsubishi Split VRF system providing heating/cooling on the floors, a Delmatic lighting control system, 33 sub meters, Solar PV, Variable Speed Drives, Grey water system, but to name a few.

Challenge

whg moved into their new BREEAM Excellent rated building with the expectation that this new green, sustainable building would be cost effective and simple to operate. Within 6 months of occupancy, neither of these objectives had been met.

Quick facts

- 19% kWh reduction in Electricity consumption
- 42% kWh reduction in HVAC, post optimisation
- £28,500 predicted saving for the year
- Savings achieved through integration and system optimisation
- Full visibility of BeMS, energy consumption and lighting

See the solution overleaf

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Optimised Buildings were asked to assess the facility to determine if further energy savings could be achieved through our optimisation proposition. As a result of this whg engaged Optimised Buildings to undertake an audit and it soon became apparent that the building had some fundamental issues. These included poor temperature control in some areas, lack of integration between control systems and high utility costs.

This BREEAM Excellent state of the art building was consuming more than double the kWh/m² against the CIBSE benchmark for a building of this type.

The building had all the systems and assets, where it fell down was in the integration and contractors appreciation of how these systems needed to work together to deliver a BREEAM Excellent building that whg could operate efficiently and simply.

Solution

Working in conjunction with whg's newly appointed facility management company, Optimised Buildings took the technical lead in putting together a plan to get the building back on track. Over a 120-day program working with sub-contractors and specialists the various building services systems were back on track and operating correctly. The core of the project consisted of:

- BeMS headend set-up and control strategy modifications
- Lighting control system interface to BeMS and graphics
- Sub metering interface to BeMS
- AC interface to BeMS and graphics
- UPS upgrade
- Implement Optimised aM&T
- Emergency Lighting integration to BeMS
- Generator operation and test
- Optimisation of systems

The Optimised aM&T platform was installed to monitor the energy sub-meters and fiscal meters to ensure that the building remained on track.

The Optimised Bureau is now providing continuous monitoring on behalf of whg to identify anomalies and generate reports, alerts and ongoing energy management advice.

Results

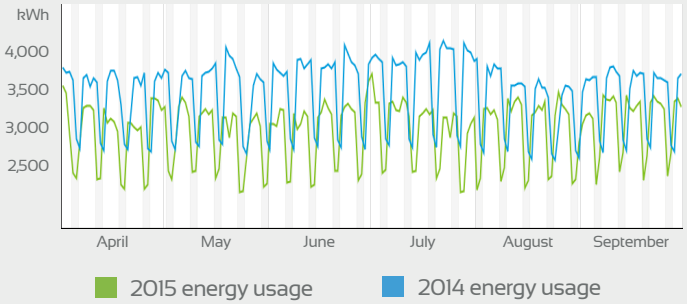
After just 6 months the savings are currently on track to save 19% of the total energy spend compared to the previous year, generating a saving of £28,500 for the year. This saving was generated from HVAC alone, reducing consumption by 42%.

Year 1 Results*

£ savings	£28,500
CO_2 Reduction	103,685 kg
kWh Saving	233,000 kWh
% of Total Energy Spend	19%
% of HVAC Energy Spend	42%

*Projected over first 12 months (figures calculated based on 6 months of results)

Annual Comparison



"The technical expertise of Optimised Buildings has really helped us get our building to where we expected it to be when it was handed over to us. We have learned a lot since we took on this new facility and believe it is not until you take this journey that you appreciate the full extent of what you are signing off at completion stage. We are very pleased to report that we now have a building that we can manage effectively and one that operates efficiently."

Steven Davis – Facilities and Environmental Manager, whg

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Optimised Buildings

Optimised Buildings

26%
overall kWh reduction

98
tonnes of carbon saved

Case study: Ivanhoe College

Background

Ivanhoe College is at the heart of the community in Ashby-de-la-Zouch, Leicestershire. The school has 878 students aged 11-14 years old and has recently converted to an Academy. The school's main building dates back to 1954 and the footprint of the school covers around 8,000 sq Metres of space. Ivanhoe's vision statement describes their 'Journey to Excellence' which includes their commitment at all levels of the college to reduce their carbon footprint and improve the environment.

Challenge

Escalating energy costs combined with Ivanhoe's new sustainability strategy drove the Principal, Business Manager and Governors to seek a solution that would enable them to effectively monitor their energy consumption and costs in more detail. Lack of energy expertise, time available from the facilities team to analyse energy data and the funding available all have been key challenges to effectively implement an energy efficiency strategy for the school.

Quick facts

- 26% kWh reduction in electricity and gas
- 98 tonnes of carbon saved per annum
- Equivalent to taking 19 cars off the road each year
- Equivalent to the carbon footprint of seven UK citizens for one year

See the solution overleaf

Solution

Optimised aM&T platform was selected to take up the challenge of providing the visibility and transparency of where energy was being consumed throughout the site. To minimise installation costs wireless technology was deployed, enabling meters in far reaching corners of the site to be monitored by the system. Synetica Meters and data loggers were installed on 9 electrical circuits and 2 gas meters. The water meter was read manually on a weekly basis by the schools premises officers and entered into the Optimised aM&T platform. All metering channels are logging data every half hour, 24/7 and this data is represented through a site specific dashboard that provides the facilities team, Business Manager and students alike complete visibility of their energy usage. Through these comprehensive dashboards, data is converted into actionable information that can be acted upon.

In conjunction with the software dashboards and reporting, Optimised Buildings also provided the 'Virtual Energy Manager' service to Ivanhoe. The Optimised Buildings Energy Analysts review the Optimised Analytics dashboards on a monthly basis and from their findings drive recommendations in the form of energy conservation measures. This has led to a number of initiatives being implemented at Ivanhoe including; lighting upgrades, lighting controls being fitted and HVAC/BMS controls being optimised.

So what's next?

Ivanhoe has used the data from the Optimised aM&T platform to support funding applications at County and Central Government level for a site wide double glazing windows upgrade. The Optimised Buildings Energy Analysts have also identified savings in gas consumption through optimisation of the Trend building management system.

The Optimised aM&T Platform and the transparent data it provides is now being used by the students who are engaging in energy management to further reduce costs and carbon.

Visualisation of energy usage and carbon footprint on public displays throughout the school are also going to be installed by Optimised Buildings to further engage students in the programme.

"The Optimised aM&T platform in conjunction with the expertise from the Optimised Buildings energy analysts has enabled us to focus on running our school while providing us with specific energy saving initiatives that we have been able to act upon. This has driven a range of operational changes throughout the school along with some capital projects being undertaken. The net result has been measurable and quantifiable business outcomes for Ivanhoe College."

Tracy Winfield – Business Manager

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3.5%
overall energy saving (Year 1)

16.8
months ROI (3 Years)

Case study: Hilton Hotel, Canary Wharf

Background

The Hilton Hotel is in the heart of Canary Wharf, London where it predominately serves the business traveller. The hotel was built in 2006 and has 282 guest rooms. The hotel benefits from meeting spaces that can accommodate up to 400 people and over 15,000 sqft of flexible space for many types of events. In addition it also has a number of dining facilities, bars, fitness suite, sauna and steam room.

The hotel has an Automated Logic BeMS, 3 Chillers, 15 AHU's, 5 Boilers and intelligent room controls.

Challenge

The hotel has always been one of the best performers in the Hilton Group from an energy efficiency perspective, which has been down to a combination of the building infrastructure and the Chief Engineer that has been responsible for operating all technical services at the hotel since it opened. With the hotel already being energy efficient making further savings was going to be challenging. The Hilton Group considered if we could make savings at this hotel, we are likely to make savings at most of the Hilton Hotels.

See the solution overleaf

Quick facts

- Annual Savings of £12,498
- 7.0% saving of HVAC energy spend
- Analysed base line data and energy profiles through Optimised Analytics
- BeMS improvements & optimisation ensured constant comfort and efficiency
- Modified control strategies to improve energy efficiency while improving guest comfort
- Optimised Bureau provides continous monitoring to identify anomalies

Solution

The objective was to make energy savings through optimisation of the existing assets and systems already in place. The BeMS was reviewed, a list of energy conservation measures was developed and agreed with the hotel. An action plan was put in place to implement changes over a number of weeks/months, working with the technical services team.

A controller was installed to collect the historical data from the Automated Logic BeMS systems that could be pushed to the Optimised Analytics platform. The Analytics and aM&T platforms were configured and our Optimised Bureau team utilised the insights to make informed decisions about further optimisation strategies, whilst maintaining the energy conservation measures.

Analytics and Optimisation

The combination of technology (Optimised Analytics / aM&T) and expertise (Optimised Bureau) provides the winning combination to ensure energy saving measures are not only identified, but acted upon. The Optimised Analytics import around 500 points from the BeMS every 15 mins and it is this data that feeds the analytical rules that help us ensure that the hotel remains optimised.

The Optimised aM&T platform focuses on the metering, analysing data that allows continuous performance monitoring of energy consumption. As issues are identified our skilled BeMS engineers remotely connect to the hotel and make changes accordingly, while keeping the technical services team aware at all times.

Results

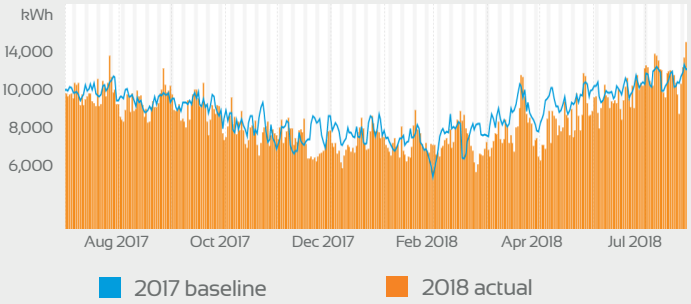
Working closely with the technical services team has enabled us to achieve 3.5% kWh reduction in the first year that was inline with originally projected forecast. Over the next 2 years the goal is to increase the savings by a further 1% per annum with additional energy conservation measures generated from the Analytical data.

Year 1 Results*

£ Savings	£12,498
CO_2 Reduction	13,699 kg
kWh Saving	180,467 kWh
% of Total Energy Spend	3.5%
% of HVAC Energy Spend	7.0%

* Figures based on actual data from Aug 2017-July 2018

Annual Comparison



"Optimised Buildings has provided further insights and energy saving measures that with new analytical tools, skills and resources that were not previously available to us. Through our working partnership we are now squeezing further energy savings from what was already a very efficient hotel."

Paul Wallace, Chief Engineer
Hilton Hotel (Canary Wharf)

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