CASESTUDY

Commercial Offices
Active Energy Manager

An ABB Cylon® Controls BEMS was installed in the Client Building in 2000 during construction phase, and 8 years later was connected to ABB Cylon´s® Active Energy Manager SaaS (Software as a Service) via a secure GPRS modem supplied by ABB Cylon®.

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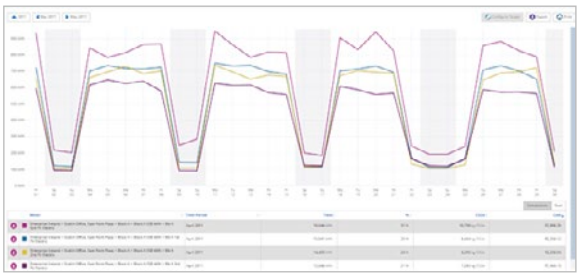
01 Commercial Offices

Introduction
The BEMS integrates with a Mitsubishi VRV systems and controls heating and cooling in the Client Building. There are also 64 sub meters connected to Active Energy Manager that collects data in 15 minute intervals in real time.

As a new building with a well-developed BEMS and an in-house facilities team, the building was deemed energy efficient. To validate this, a benchmarking exercise was carried out on the energy usage per floor using the meter comparison tool in Analysis.

Figure 1. Before: Meter comparison view | Month 1

Figure 2. After: Meter comparison view | Month 4



Analysis & Corrective Action
Analysis of the energy usage per floor clearly identified high base load and peak load usage for the ground floor and first floor whilst the second floor and third floor were very similar to each other. Figure 1 shows the trend line for 4 floors. The top 2 graph lines follow unexpected patterns highlighting excessive energy usage during periods of both occupancy and vacancy.

On investigation, it appeared that the integration between the BEMS interface and the VRV air conditioning system was not operating correctly on the ground and first floor and as a result the air-conditioning was being used during periods when it was not required including at night and weekends.

A BEMS engineer corrected this issue and the energy profiles of both floors were brought in line with the other floors in the building.

Figure 2 shows all 4 floors following a more standard pattern of energy usage against occupancy levels.

Using the Active Energy Manager Spectral Analysis tool, the improvement in energy usage became very apparent and the profile fell in line with the occupancy profile of the building.

Figure 3 and 4 below shows the dramatic difference in the energy expenditure before and after, with the blue areas indicating periods of no energy usage versus the volume of green in figure 3 illustrating the continuous use of energy.

The savings achieved from this energy saving corrective action resulted in energy savings of up to €100,000 per annum.

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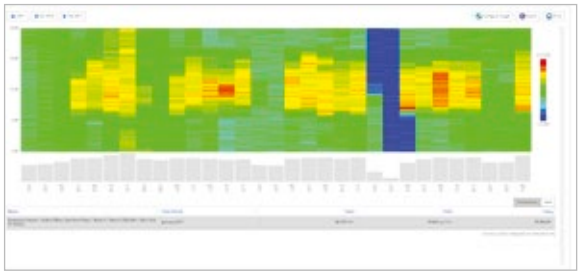
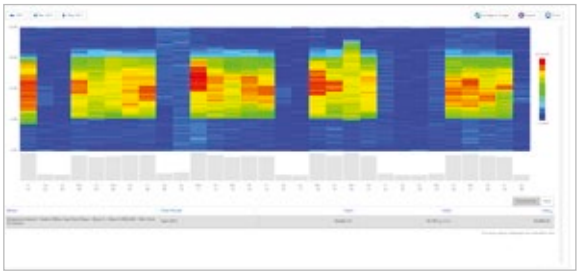
Definition:
Spectral Analysis feature automatically applies colour for every 15/30 minute interval over the period shown in the graph. Red is the highest and dark blue is the lowest. Each bar is a day ranging from 00:00 to 24:00. An office block should show a pattern of colour during the day with dark blue outside of core operating hours.

03 Figure 3. Before: Spectral Analysis | Month 1



04 Figure 4. AFTER: Spectral Analysis | Month 4



On Going Monitoring & Corrective Action
Following from the initial VRV and BEMS integration connection, the Client Building Facility Management Team implemented a number of energy efficiency measures across the building.

For each measure, they calculated the actual energy saving and return on investment by conducting a trial, monitoring the energy savings and subsequently rolling out the improvement across the buildings.

All of the measures implemented were no-cost / low-cost measures leveraging off the BEMS back-bone in the building.

On implementing the energy efficiency measures, smart targets were set in the analysis section of Active Energy Manager enabling the accurate tracking of both the KWhr and cost savings from the energy efficiency improvements in order to calculate the return on investment.

Measures Implemented Over a 3 Year Period
- Relocating outside temperature sensors to the north facing wall of the building to give more accurate data to the Building Management System.
- Switching off gas boilers and associated heating pumps when the outside air temperature is above 15°C.
- Increasing the dead band between heating and cooling set points for the VRV air conditioning system via the BMS.
- Increasing the communication room air conditioning temperature set point.
- Connecting the printing stations to the BEMS and implementing out of hours control to automatically turn off all but one printing station out of hours.
- House-keeping: programming holidays on the BEMS and eliminating unnecessary energy consumption.
- Using the light switch to enable/disable the air conditioning for the meeting rooms Building Management System.
- Installation of CO_2 room sensors allowed for fresh air and extract AHU for each floor to be switched off when the CO_2 level is below a certain threshold. Resulting in a reduction in the AHU run time by 50% and €3,500 over a two year period.
- Alarms are set on the smart targets in order to alert the user via Email where the energy usage has exceeded the target. Alerting enables the facilities team to respond and correct the issue in a timely manner, which results in the prevention of potential building energy drift.

Overall Energy Savings
In a four year period, electricity energy consumption fell by 14% and gas consumption fell by 48%.

Additional savings from other energy efficiency measures, excluding the VRV integration, totalled €75,000.

Circa 1m Kg$C0_2$, 1.1M Kwhrs electricity and 65k m3 of gas were saved over a four year period.

Solution Benefits

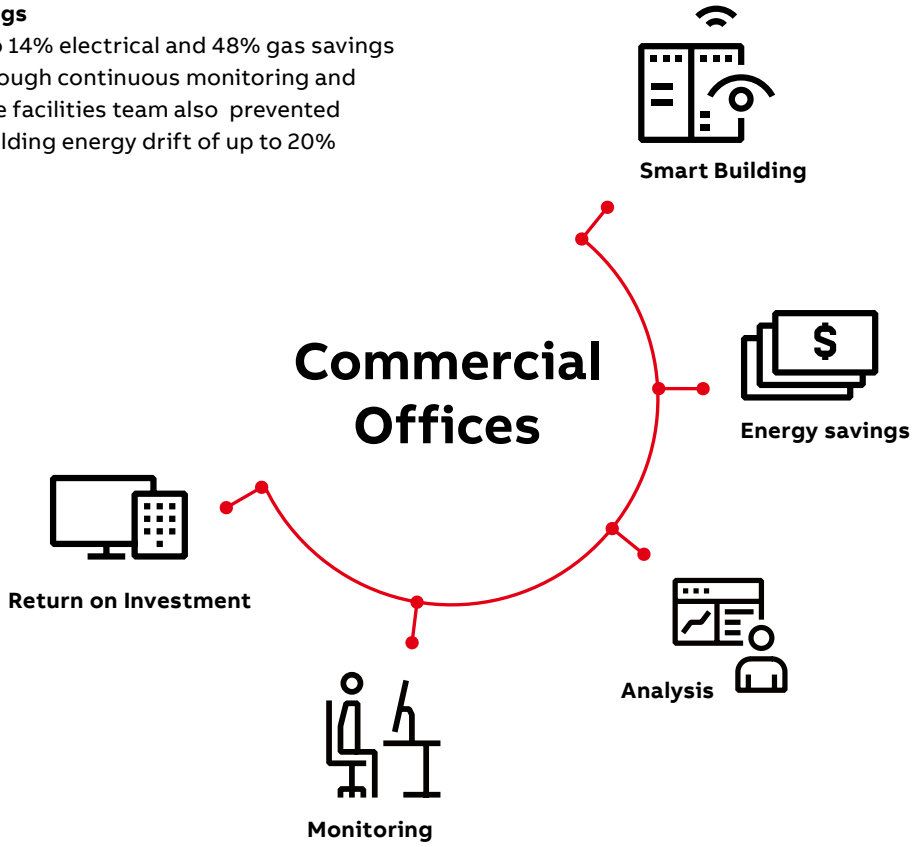
Better Control
As a result of the changes made on the BEMS, the facilities team now have full control of the main plant and equipment in the building including; scheduling of the VRV air conditioning units, control of the printing stations out of hours, and optimised CO_2 control of fresh air AHUs.

Maximising installed BEMS Potential
The facilities team maintained and improved on occupant comfort whilst making the building more efficient and reducing energy costs. This has an additional benefit of improving the life cycle of the plant and equipment and reducing ongoing maintenance costs to the organisation.

Energy Savings
In addition to 14% electrical and 48% gas savings achieved, through continuous monitoring and managing the facilities team also prevented potential building energy drift of up to 20% per annum.

Return on Investment
By using the energy data from the energy monitoring system, the facilities team trialled smart control strategies in an area; monitored and validated the impact and prepared a return on investment calculation to determine the benefit of rolling out the strategy throughout the organisation.

Low Cost Energy Information
By using hours run and sensors which are recorded on the BEMS, the facilities team availed of additional data on the energy efficiency of plant and equipment at zero capital cost.



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