CASESTUDY

Transport Infrastructure Ireland

200,000Kg CO_2 Saved in One Year

Transport Infrastructure Ireland is a State Agency of the Department of Transport in the Republic of Ireland charged with the development of light railway and metro infra-structure. It was established in December 2001. Transport Infra-structure Ireland's main role is to oversee the operation of the Luas light rail system, along with the planning and construction of new light rail and metro lines for Dublin.

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01 metro Dublin

Transport Infrastructure Ireland's head office is located in Dublin, and consists of 2 buildings, each with 4 floors and a total floor space of 3563 sq. metres, across the two buildings. Each building is conditioned with air side fan coil units with heating provided to the fan coil units by gas boilers and chilled water via an air cooled chiller. An air handling unit provides fresh air make up in each building.

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"The ABB Cylon® Active Energy Manager quickly identified exactly where we needed to make changes to our operating systems, which generated the type of energy efficiencies that will help us in the attainment of our 2020 energy targets."
Eugene Murtagh ,
Senior Systems Engineer
Transport Infrastructure Ireland

Project Summary
Transport Infrastructure Ireland experienced significant reduction in energy usage resulting in CO2 savings and monetary savings between 2010 and 2014:

- Electrical Savings: 40%
- Natural Gas Savings: 42%
- Annual monetary savings: €75,000
- Total Co2 savings to 2014: 600,000 $KgCo_2$
- Payback on Investment: 3 Months
- Applications: Active Energy Manager
- Type of Building: 2 Office Buildings, 4 floors each
- Size of Building: 3,563 m^2

As a public body, Transport Infrastructure Ireland is committed to a target of 33% energy savings by 2020. Transport Infrastructure Ireland have been proactive in attaining this goal and have undertaken a number of initiatives in this regard.

Transport Infrastructure Ireland's Green Team which was established to help facilitate these 2020 targets conducted an energy audit, which identified, among other things, the need for an energy monitoring and targeting solution.

ABB Cylon® Active Energy Solution
In November 2011, the main gas and electricity meters for both blocks were connected to the ABB Cylon® Active Energy Manager. Historical bill information was uploaded to the system to facilitate immediate trend analysis based on historical data. Using the Active Energy tools, a number of anomalies were highlighted including:

1. The spectral analysis tool showed a high baseload outside of core operating hours which would be non-standard for this type of building;
2. Normalisation analysis with degree day information showed a poor correlation between gas consumption and heating / cooling degree days indicating an inefficient operation of the heating and cooling controls;
3. Trend analysis showed a high usage of gas during the summer period which would not be the norm for this type of office building in an Irish climate;
4. Time period comparison showed electrical energy profiles starting earlier in the morning and ending later at night for certain periods indicating a drift in energy control outside of core operating hours.

The findings from this analysis directed the energy team to the BEMS to investigate the heating and cooling controls in particular and quickly it was identified that there were issues in the way the buildings were being controlled for example:

- Heating and cooling were running simultaneously on the floors caused by non-standard temperature set points across a floor.
- The heating system was running during summer months.
- The chilled water system was running during winter months.

These and other factors resulted in excessively high and unnecessary energy consumption across the two buildings.

Time Period Comparison Jan 2010 v Jan 2014
Electrical Consumption | 39% Reduction

Savings as a result in a fall in baseload consumption as indicated by the purple line (2014) being lower outside of core operating hours than the green line (2010)

With the data gathered on Active Energy Manager, the ABB Cylon® Active Energy team were then able to optimise the control strategies on the building management system (BMS) whilst improving and maintaining occupancy comfort levels. This was achieved through improvements made in the following areas:

- The chilled water system was changed from operating on a time schedule to operating on demand. The system is now only enabled when the number of zones requiring cooling exceeds the threshold set and when the out side air temperature is greater than 15°C. This dramatically reduced the annual operating hours of this equipment.
- The heating system was changed from operating on time schedule to operating on demand. The system now only runs when the number of zones requiring heating exceeds the threshold set and the outside air temperature is below 13 °C.
- Standard temperature set points and dead bands have now been introduced on each floor to eliminate simultaneous heating and cooling.

Post the optimisation of the BEMS as outlined Transport Infrastructure Ireland set smart targets and alarms on the ABB Cylon® Active Energy Manager to automatically monitor and alert should the building start to drift from the new expected profile. Should the building drift from target, an alarm is received via email to alert the energy manager that the building energy profile is drifting allowing the energy manager to investigate further and correct the issue in real time.

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Continuous Energy Efficiency
The aim of this project was to deliver energy efficiency savings. The ABB Cylon® Active Energy Manager tool can provide real time energy consumption data that allows the Facilities Manager to monitor energy consumption in the whole building and take corrective action where appropriate thus improving energy efficiency on a continuous basis.

Using the automated report scheduling function, the energy team have set standard report templates which are automatically generated and forwarded to them on a weekly / monthly basis providing an overview of performance for the previous period.

Since the initial amendments in 2011, the energy team continue to monitor the building's energy profile to identify and track additional areas for energy efficiency which has resulted in continuous energy savings in gas and electricity over the last four years.

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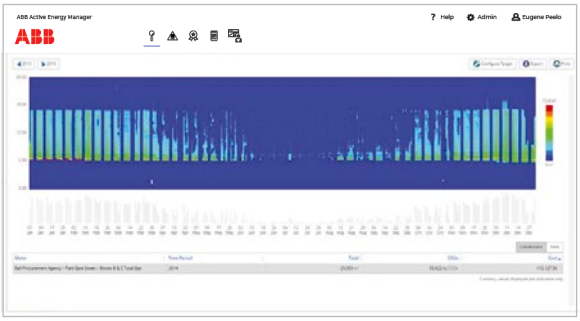
Definition: Spectral Analysis feature automatically applies colour for every 15/30 minute interval over the period shown in the graph. Red is the highest and dark blue is the lowest. Each bar is a day ranging from 00:00 to 24:00. An office block should show a pattern of colour during the day with dark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

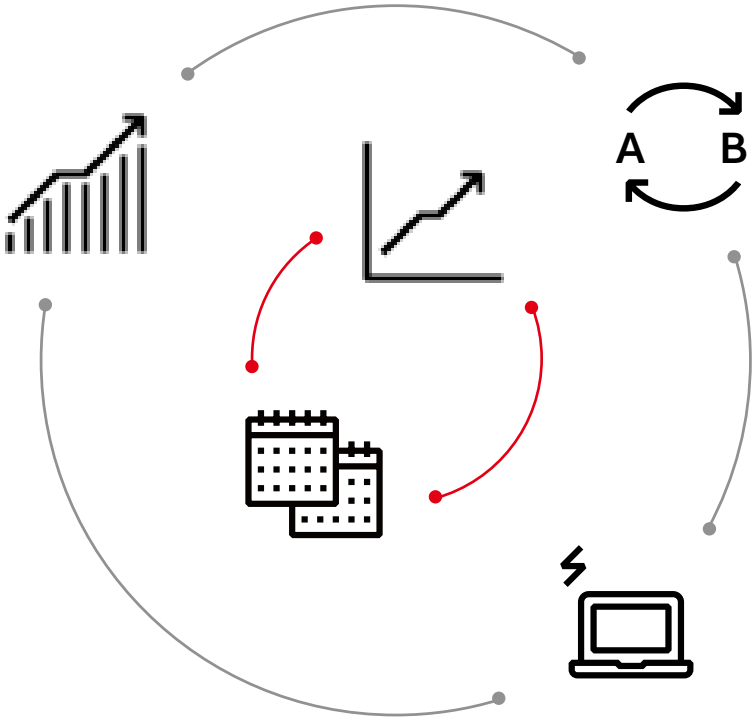
Time Period Comparison 2011 v 2014

(Normalised for heating degree days)
Gas Consumption | 36% Reduction
Purple spike from June to October indicates a high usage of gas consumption in summer months when not required. Flat green line in 2011 indicates better gas consumption control e.g. boiler turned off by the BMS when external temperate is above a certain threshold.

Spectral Analysis | Gas Consumption 2014



The profile of the graph demonstrates tight control of gas consumption outside of core office hours (dark blue colour) and low gas consumption in summer months (middle of the graph) as indicated in the previous graph.



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