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Building Transformation – From standard to smart. A demand-side response (DSR) solution demonstration.

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ABSTRACT

In recent years, the Isle of Wight council building managers has been thriving to ensure energy is used in a more sustainable way within their estate through their building management system (BMS). The challenge was to establish if there were any loads that could be affected within the Isle of Wight's commercial and industrial buildings, by reducing demand and using less energy to achieve a better economic and more efficient solution. The Heights Leisure Centre was selected as the pilot building.

Siemens integrated the existing building control and energy infrastructure with a smart building management system, turning a conventional building into a connected building. This meant occupants can experience more comfortable temperatures, the Council can lower their energy spend and the planet can benefit from reduced carbon emissions.

Introduction

Siemens and Isle of Wight Council's buildings project were developed in relation to the 'InteGRIDy' programme's demand-side response (DSR) pillar. The overall purpose of the project was to establish if there were any loads that could be affected within the Isle of Wight's commercial and industrial buildings, by reducing demand and using less energy to achieve a better economic and more efficient solution. For this project, The Heights Leisure Centre was selected as the pilot building.

Siemens recognised that in order to design the optimum solution, there needed to be improved understanding of how the building operated and a clearer picture as to where and how energy was being used. Although the majority of the building's assets were controlled by a building management system (BMS), there was no visibility of the detailed operation of equipment and what was happening in the centre's spaces.

The challenge for Siemens was to deliver a solution that greatly improved the existing data logging system. It had to be a flexible platform with remote capabilities to allow information to be shared easily and provide the project's stakeholders - located at various locations across the UK and Europe - with the ability to easily visualise vast amounts of data.

Solution implementation

The first step we took to delivering an effective solution was to install the Siemens Navigator platform. This allowed immediate access to the building's data by the various project stakeholders. Navigator is a proven, integrated, cloud-based platform, that is used to collect and store data for detailed reporting and advanced analytics. In this instance, it provided visibility of the building's performance and its energy use."

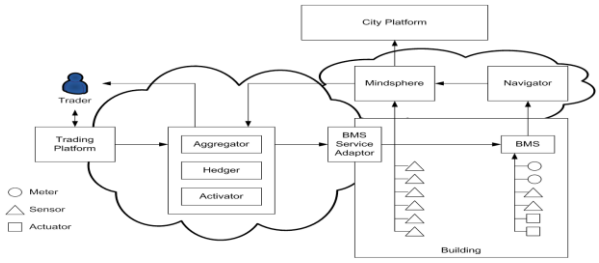

Figure 1. Navigator Platform Integration with BMS

The platform allowed users to easily evaluate the Leisure Centre's data - through either manual or automated fault detection - to identify potential energy waste and building improvements. In a leisure Centre environment, this could range from lights being left on when exercise spaces are not being used, to the continued operation of ventilation systems when the building is closed.

As part of the installation, the Siemens team decided to leverage the existing building management system's infrastructure and the leisure centre's utility metering to trend over data points, which automatically sent update information to the Siemens Navigator

servers as part of daily reporting. In addition to providing a technically sound system, the solution also required close collaboration between the site's BMS contractor, the council's IT department and technical experts from Siemens to collect the data and export it successfully outside of the council's IT network. The result was web-based access to, new data values every day for ad hoc reporting and easy-to-interpret data visuals from the Navigator dashboard.

Outcome

The initial objective of the project to provide programme stakeholders with access to building data was successfully achieved. Building operations, meaning what was running, when, and how efficiently, were given a greater level of transparency, and a potential for DSR control was exposed. The Navigator platform solution provided both Siemens engineers and council staff the data necessary to identify opportunities for increased energy efficiency, lower operating costs and improved comfort for the leisure centre's visitors.

Siemens was also able to deliver added value by leveraging its own cross-divisional relationships and exploiting the knowledge of its experts in energy solutions and building technologies in the design of the solution. The Navigator solution, combined with the Building Performance and Sustainability engineers behind it, and with support from the Isle of Wight council and the site's BMS contractor, meant any technical hurdles were easily overcome without risk of compromising the quality of the solution.

Other areas that would improve the leisure centre's energy efficiency or comfort where identified and discussed with the Isle of Wight council. Analysis of space temperatures against outside air temperatures and time of day indicated that control of the ventilation and temperature control system could be adjusted for improved efficiency and comfort throughout the day." "We also found that the swimming pool hall air temperature was set based on the main pool's water temperature. The smaller teaching pool was kept at a higher temperature which meant the air surrounding it was colder than the water, this increased evaporation and heat loss and made swimmers feel cold when exiting the pool. These problems could be mitigated by installing a pool cover overnight and making changes to building control.

This is a demonstration of how a conventional building can become a smart building. The integration of existing data into a modern, cloud-based platform can provide a clear insight into what is happening inside and proves that a building does not have to be new to be connected.

Conclusions

This project demonstrates how a conventional building can become a smart building and proves that existing buildings can become easily connected with the right know-how.

The Siemens Navigator platform allowed immediate access to the building's data by the various project stakeholders.

About Siemens Plc

Siemens is involved in more than 200 countries globally focusing in the areas of electrification, automation and digitalisation. One of the world's largest producers of energy – efficient, resource-saving technologies, Siemens is No. 1 in offshore wind turbine construction, a leading supplier of combined cycle turbines for power generation, a major provider of power transmission solutions and a pioneer in infrastructure and energy solutions as well as automation and drive and software solutions for industry.

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