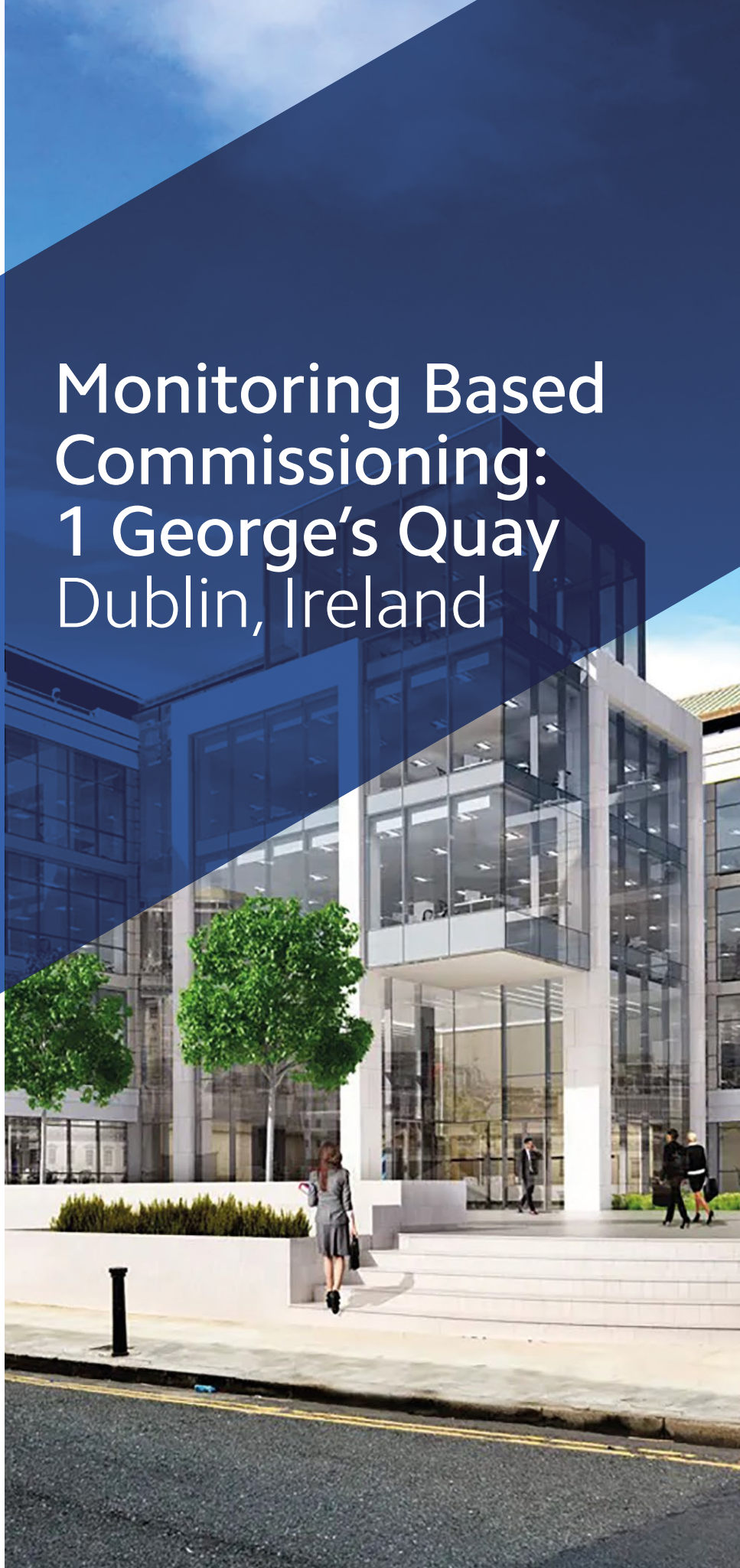
Monitoring Based Commissioning: 1 George's Quay Dublin, Ireland

IES Consulting provided monitoring based commissioning services for this LEED Platinum certified office building to optimise operational performance and uncover significant energy, carbon and cost savings for the client.



MONITORING BASED COMMISSIONING: 1 GEORGE'S QUAY
DUBLIN, IRELAND

SECTOR: Consulting
DATE: September 2022
COUNTRY: Ireland

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IES Consulting were commissioned to review the operational performance of building services equipment within this large office building, using their commissioning expertise and iSCAN data analytics platform to ensure that systems were operating at optimum levels of efficiency.

The building had previously been retrofitted in 2017, the primary aim of these upgrades being to improve the energy efficiency of the building and thereby reduce energy costs. The comprehensive design strategy for the retrofit targeted several aims including:

- Achieving LEED Platinum and BER A3 ratings
- Reducing energy costs by 30% compared to ASHRAE 90.1-2007
- Glazing retrofits
- Energy efficient LED lighting and controls
- Weather compensation controls for heating
- Hot water calorifiers utilising heat recovery from chiller waste heat pipework
- Rainwater harvesting
- Solar PV
- New, energy efficiency mechanical ventilation system with heat recovery

While, in theory, these design elements would be expected to result in a highly energy efficient building, it is important to monitor and verify that the desired energy performance is being achieved in reality once the building is in use. This helps to overcome the performance gap which often exists between the design intent and actual operational performance of buildings, and is exactly what this project set out to do.

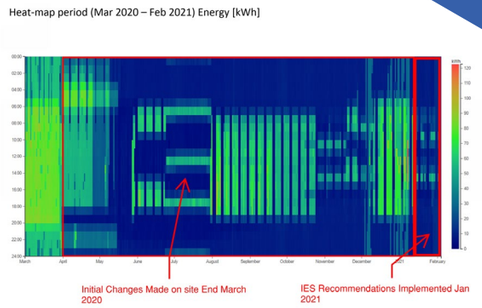
Having initially been involved in the LEED Commissioning process for the Core and Shell scope of the building, IES Consulting already had a good understanding of the building and its central plant to support this performance review. Using a monitoring based commissioning approach, spanning a 12 month period, they were able to support the client's overall goal of improving energy efficiency through the correct operation of building systems, thereby reducing energy consumption, costs and the building's carbon footprint.

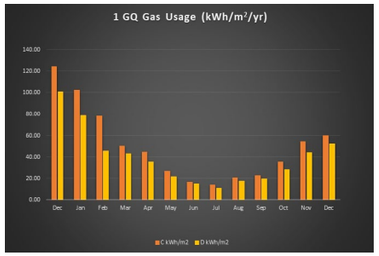
IES Consulting began by undertaking a detailed review of the building's utilities data and building management systems (BMS). While by general standards the building appeared to be performing well in terms of energy efficiency, particularly when compared against industry benchmarks such as CIBSE Guide F and TM46, the consultants were still able to identify a number of significant performance improvements during the period 2020-2021 and a number of recommendations were advised to ensure optimal day-to-day operation.

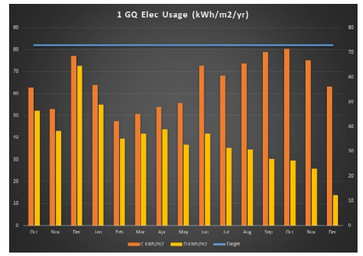
During an initial site visit and inspection of the BMS control strategies, IES identified a number of simple improvements that could be made to the operation of the building's central heating plant to maximise energy efficiency. In one block of the building, they discovered that the return water temperature set-point on the boilers was too high, meaning that some boilers were running when outside temperatures were relatively moderate. By implementing a quick change to the control set-point in the BMS, the client was able to start making instant savings.

Additionally, in reviewing the data from outdoor air temperature sensors installed on the building, IES identified that some of these sensors were receiving direct sunlight which was causing issues with the LPHW water temperature set-points. This ultimately led to the installation of a weather shield to reduce the exposure to direct sunlight and any potential negative impacts on building operation.

Ventilation was another key consideration in this project. Although air handling units (AHUs) are often one of the larger energy consumers in office buildings (and often are provided with excessive fresh air that far exceeds the requirements of local code) it is crucial to ensure that adequate fresh air is supplied to protect the health and wellbeing of occupants. This was a particular area of concern during the COVID-19 pandemic (when this commissioning study was undertaken). However, lockdowns and an increase in remote working also meant that many office spaces were operating at significantly reduced levels of occupancy during this time. IES were therefore able to advise the client on adjustments they could make via their BMS to safely reduce overall airflow in line with the limited number of occupants, allowing them to limit unnecessary energy use and costs. It was advised that the AHUs be checked at least monthly to limit energy wastage, and that an accurate occupant count be conducted once the building returned to full occupancy to provide the required fresh air volume flowrate to meet CIBSE requirements.







Further review of the BMS data within IES' iSCAN data analytics platform uncovered the potential for further savings to be made by adjusting the operation of two electric water-cooled chillers to limit out of hours operation, as well as identifying an anomaly in the control strategy which was overriding the chillers' winter hold off temperature set-point and resulting in unnecessary operation of the chillers during cooler spells. IES also identified that the Domestic Hot Water (DHW) boilers were operating 24/7, even on weekends, and that the temperature set-points were also too high. Again, this presented an opportunity for the client to implement some quick control changes to reduce the temperature set-points and ensure the system now only operates only during hours of building use, to achieve additional energy, carbon and cost savings.

It was advised that future savings opportunities could potentially be realised via additional submetering and control sequencing optimisation of tenant controlled systems. Meanwhile the PV array installed during the previous retrofit works was identified as generating less electricity than anticipated, representing another area for further investigation and potential optimisation.

Overall, IES were able to deliver some significant savings. Within just two weeks of operational changes being implemented in early 2021, energy reductions of up to 69% were observed (however, it should be noted that some of these savings could be attributed in part to COVID lockdowns, which allowed for some equipment to be switched off/adjusted beyond normal operating conditions). The electrical usage data for the Landlord meters indicated projected annual savings of up to €94,833 and 143.54 tonnes of CO_2/year. Meanwhile, a decrease in gas usage is predicted to result in additional projected annual savings of up to €13,796 and 159.4 tonnes of CO_2/Year.

To ensure the continued efficient operation of the building, and to reduce the risk of operational drift as occupancy has increased post-COVID, a six-monthly review of the building services systems and energy data has been advised.

"Working with IES on this project has allowed us to get a much better handle on our building data, helping us understand exactly how the building is operating and where we can make improvements. By making some simple operational adjustments advised by the IES team, we have already seen significant savings in both energy costs and CO_2 emissions, and we hope to continue working together to further optimise the building's performance and ensure that these savings are sustained."

Brendan Doyle
Facilities Manager, Savills

KEY FACTS

- 14,000m² office building
- Retrofitted in 2017 to LEED Platinum standard
- Total projected annual energy cost savings of up to €108K
- Total projected annual carbon savings of up to 302 tonnes of CO_2/year

IES

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