OpenBlue
Pioneers

Technology company integrates Johnson Controls platform for lower energy consumption and cleaner air at Beijing HQ

It comes as little surprise that Microsoft has set some of the business world's most ambitious decarbonization targets. The company has pledged to be carbon negative by 2030, and to remove all the carbon it has ever emitted directly, or via its power consumption, by 2050.

In its drive for decarbonization, Microsoft is targeting emissions from its physical data centers, the thousands of computing systems that underpin its mighty cloud, and consume hundreds of terawatt hours of electricity every year. But like many companies with large real estate footprints, Microsoft also welcomes any opportunity to save energy and cut emissions from the hundreds of buildings it owns and operates around the world.

Reducing embodied carbon, or the emissions associated with materials and construction processes throughout the entire lifecycle of built assets, is just one part of that mission. The company is also pursuing the digital transformation of those buildings and their myriad systems to further shrink its carbon footprint.

Microsoft has relied on its own technology, such as Azure, cloud-based software for application management, to retrofit and optimize its buildings. But the company is now enhancing Azure with Johnson Controls International's building management platform, OpenBlue Enterprise Manager (OBEM), to maximize energy savings and further drive down emissions.

That's exactly what is happening in the Chinese capital of Beijing. There, Microsoft has turned to OBEM for the ongoing retrofit and optimization of its 150,000 square meter campus, which serves as its headquarters in the country. The collaboration is already bearing fruit: The campus, which hosts nearly half of Microsoft's workforce in China, has achieved notable energy savings in just seven years, and passed a recent energy audit with flying colors.

OBEM is also helping to boost the health and comfort of Microsoft's Beijing-based employees, with the platform driving a significant improvement in air quality and conditioning across the two-building campus.

Microsoft: ahead of curve

The Chinese government has pledged to ensure that its carbon emissions peak by 2030, and that it achieves carbon neutrality by 2060. "This places a huge responsibility on its buildings sector to dive deeply into the latest sustainable engineering technology," said Anu Rathninde, the president of Asia Pacific business at Johnson Controls.

Microsoft, which has spent 30 years in China and employs more than 11,000 people in the country, is well ahead of the curve on sustainable buildings. Recently, the software company, which set its first carbon reduction target in 2009, has migrated the applications and data storage of various systems across its real estate portfolio in China —such as power supply, building controls, energy management and smart management— to its Azure platform. These efforts have helped glean energy savings and operational efficiencies from its offices in the Asian country.

That includes corporate headquarters in Beijing's Haidian district, the hub of China's technology industry. The campus, which is fully owned and operated by Microsoft, houses more than 3,200 employees, most of whom work in research and development in two buildings totaling 31 stories. The HQ has used Azure as its central, integrated 'digital brain' for seven years.

But Microsoft's real estate and facilities team in Beijing knew that if they wanted to maximize energy efficiency and sustainability across the campus, they'd need to enhance this Azure-based digital brain with extra data analysis and insight generation capabilities. They also wanted to better indoor air quality to boost the health and comfort of its occupants.

Microsoft's facilities managers began searching for a platform vendor, and they set the bar high. "We wanted a single building management solution where we could use the same platform," says Kaijun Chen, the Senior Portfolio Manager at Microsoft Beijing.

They also required a highly flexible and interoperable platform that could seamlessly plug into Microsoft's sizeable and diverse portfolio of buildings and systems in Beijing.

Microsoft, who was already using an older version of Johnson Controls' software to manage some aspects of its Beijing campus, such as the HVAC system, decided to go all in on OBEM. "Microsoft makes highly efficient technology, while Johnson Controls is exactly the right partner for us," says Chen. "Together that combination will create more value for both companies."

Energy efficiency

Microsoft's facility managers began by reviewing the campus's major power-consuming equipment, such as its cooling tower, the giant device that uses water to transfer process waste heat into the atmosphere. Where necessary, they made upgrades. For example, they installed a Variable Frequency Driver (VFD) on the pumps, a device that boosts the efficiency of AC motors by varying the frequency and voltage of electricity supply.

The VFD gave them the means to lower the cooling tower's power consumption, but Chen explains that they could only reduce what they could measure. "For energy-efficient operations management, we needed technology that could capture the numbers," he says.

The installation of OBEM gave them that ability. The platform gathers mountains of real-time consumption data from smart power meters across the campus. OBEM's algorithms do the rest, crunching the numbers to allow facility managers to understand usage by type of equipment. OBEM can get a handle on the load curve of the cooling towers, and drill down into the numbers to understand how varying electricity frequency affects energy efficiency. "Over time, we can now see trends, and identify the best opportunities for savings," says Chen.

OBEM also gathers data about the operations and performance of building equipment, such as the HVAC unit on a particular floor. The platform uses fault detection and diagnostic tools to minimize downtime and enable predictive condition-based maintenance. This means building managers can plan corrective action before problems worsen.

> "When you can remotely see the status of equipment and identify problems quickly, that saves effort and time"
>
> **Kaijun Chen,**
> **Senior Portfolio Manager,**
> **Microsoft Beijing West Campus,**
> **RE&F China, Microsoft**

Cleaner air too

OBEM is also helping Microsoft Beijing to measure and reduce the scourge of air pollution. Prior to the platform's installation, hundreds of air quality sensors across the campus relayed data about both indoor and outdoor air quality to the cloud about the concentration of particulate matter 2.5 (PM2.5 μg/m3), the invisible particles produced by the combustion of fuels for vehicles, heating, and power generation. But facility managers lacked an intelligent platform to make sense of the avalanche of data.

The installation of OBEM has changed all of that. Its algorithms now generate real-time PM2.5 μg/m3 averages for the whole campus, as well as for a particular floor or meeting space. The platform also monitors the average concentration of carbon dioxide in the air, and prevailing humidity levels. This gives Microsoft's managers a snapshot of indoor air quality across the campus, and granular detail about specific areas of the building.

If the campus's air quality has deteriorated overnight, facilities managers can increase fresh air flow through the HVAC system's filters. "It takes around 30 mins to lower the number [of PM2.5 μg/m3], so when outdoor air pollution is really bad, we'll start this process at 6AM, before people start working," says Chen. OBEM also boosts comfort levels by monitoring and optimizing temperatures across the campus, according to the space's utilization and the preferences of occupants.

Now facility managers plan to make their monitoring and reporting of indoor air quality and comfort more transparent. As well as displaying key indicators on screens throughout the buildings, they will give occupants access to an app or a webpage connected to the OBEM platform that allows them to monitor real-time PM2.5 μg/m3 and temperature levels. Chen eventually expects occupants will have the means to measure air quality or temperature themselves and upload their results to OBEM. "This actually enhances the accuracy of readings, because there are more proof points."

Bearing fruit

The combination of Azure and OBEM has yielded excellent results and Microsoft's campus has recently passed an energy audit conducted by Haidian District. As a result, the campus will see its carbon footprint continue to shrink, accelerating Microsoft's decarbonization drive. The campus's air quality is also improving dramatically. Indoor PM2.5 μg/m3 levels are about half of those recorded outside. And employees who suffer from pollution-induced allergies feel very comfortable on campus.

Chen emphasizes that OBEM has also given the Beijing campus something more fundamental, which is measurable performance. "We've now got a way of recording and reporting data in a timely, continuous, and accurate way." He has some advice for companies with large real estate footprints who are embarking on digital transformation projects.

> "You need reliable, stable and experienced partners, the right technology, as well as a clear plan to bring more value to your concept, Johnson Controls offered us all of those things."
>
> **Kaijun Chen,**
> **Senior Portfolio Manager,**
> **Microsoft Beijing West Campus,**
> **RE&F China, Microsoft**

About OpenBlue

OpenBlue is a complete suite of connected solutions that serves industries from workplaces to schools, hospitals to campuses, and beyond. This platform includes tailored, AI-infused service solutions such as remote diagnostics, predictive maintenance, compliance monitoring, advanced risk assessments, and more. A dynamic new space from Johnson Controls, OpenBlue is how buildings come alive.

EB2209002F