



THE ENERGY BLIND SPOTS

Are UK hi-tech manufacturers obtaining maximum benefit from their critical plant and equipment data?



Foreword

From pharmaceutical and life sciences, through to semiconductor and microchip manufacturing, the UK government believes the country's hi-tech industries will be the engine of economic growth and prosperity.

However, these industries, whilst being world-leading, are increasingly facing a growing number of energy-related headwinds that are impacting profitability and competitiveness.

Like all sectors of the economy, sustainability is becoming a more and more important factor. No organisation can ignore its impact on the environment, but is it possible to deliver sustainability on a budget?

Similarly, it is impossible to ignore the massive increases in utility costs, both gas and electricity, in recent months. What impact is this having on operating costs and what can be done to mitigate any impact?

These challenges demand an approach akin to preparing for a marathon, which requires an ongoing and extensive time commitment. This consistent approach can see small improvements add up to a larger whole, similar to the data-driven philosophy of 'marginal gains'. Though this approach has been adopted in multiple fields, the question remains – how can it be applied in the world of hi-tech manufacturing? More specifically, how do facilities managers identify where those gains can be made, and is it possible to measure their return on investment?

And, of course, we are still dealing with the effects of a pandemic when more and more is being asked of all economic stakeholders as we attempt to be better, safer and more sustainable.

We wanted to find out what those at the sharp-end of these issues think, the facilities managers and site managers who are juggling these issues and attempting to find a route through the maze. These are the people charged with contributing to long-term strategic plans for their organisations who are attempting to juggle the sometimes differing objectives of their own internal stakeholders.

We also wanted to know where the barriers to implementation are, what the C-Suite really thinks about energy costs and sustainability and, perhaps most importantly, whether data can truly help deliver all of hi-tech manufacturing's energy objectives.

Our hope is that this report can provide a roadmap for those organisations that want to use existing data sets to improve operational efficiency, reduce energy costs, and deliver sustainability, while simultaneously improving profitability and competitiveness.

Thank you for reading.



Paul Walsh,
General Manager, CIM

Research Respondents



We asked...

- 100 facilities managers



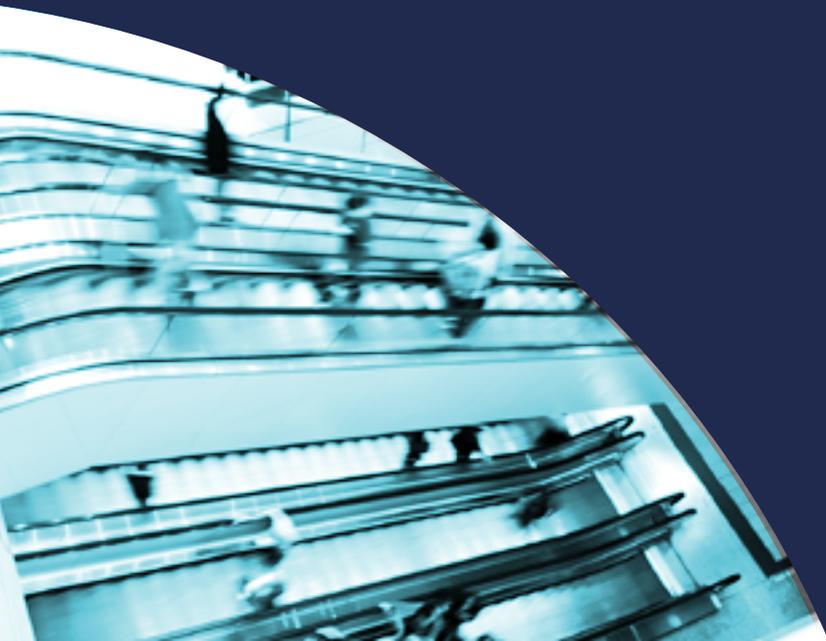
Working in...

- Life sciences manufacturing
- Hi-tech manufacturing



At companies with...

- 500+ employees





Key Findings



34%
of hi-tech facilities
managers say HVAC is their
site's biggest energy cost



1 in 3
are not using data to
identify high value
HVAC priorities



Only 35%
of C-Suite view HVAC
costs as a high priority



40%
remain in reactive
mode for their HVAC
maintenance strategy



80%
say CAPEX constraints are
a major barrier to improving
energy performance



1 in 3
believe their Building
Management System
has been inadequately
commissioned



Only 30%
admit to continuously
monitoring carbon
emissions



On average a BMS
delivers 12.5 alarms every
day, with **50%** of sites
reporting as many as **30**



62%
say they are deficient in
terms of data collection
and analysis for their
HVAC systems

Section 1: Energy Costs

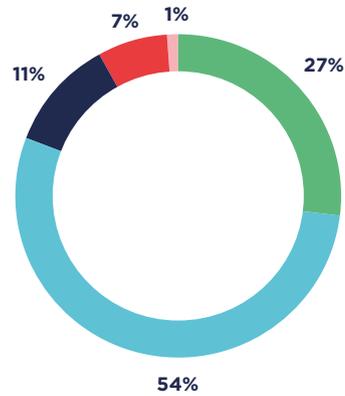
Our first task was to determine the major energy costs for manufacturing facilities.

We asked our respondents, sourced from large life science and hi-tech manufacturing plants with over 500 employees, to identify the biggest single energy cost in their facility from a range of options.

Overwhelmingly, it was the heating of validated spaces (25%) that was the biggest single energy cost, with process steam (21%) coming a close second. We then asked our respondents to rate the energy efficiency of their facilities. 27% rated their facilities as highly efficient with 65% rating energy performance as either quite efficient or average.

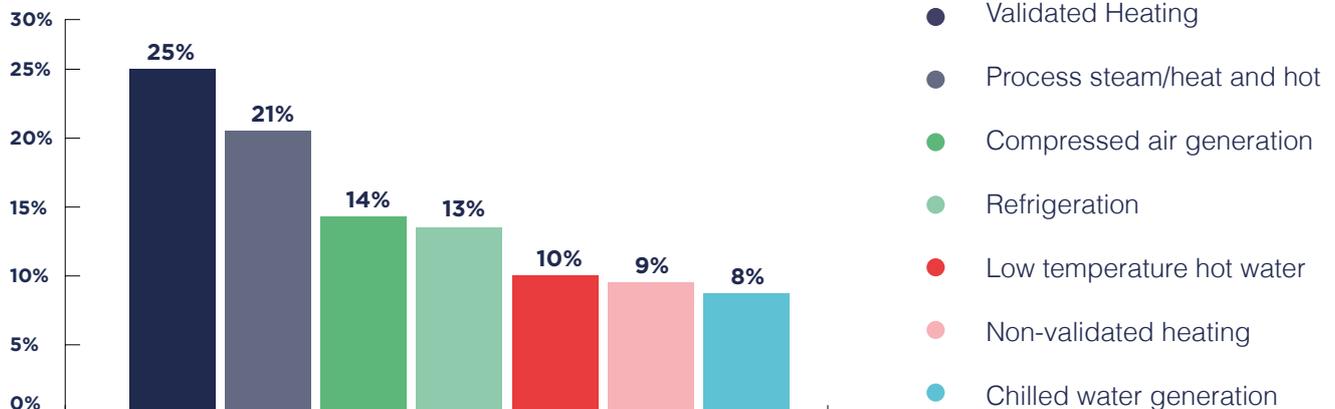
To us, this suggests three potential scenarios: the efficiency gains from moving a facility from 'quite efficient' or 'average' to 'highly efficient' are not considered significant enough to warrant increased investment, the payback period is too long; or areas of improvement have not been identified.

How would you describe your site's current energy usage?



- Highly efficient
- Quite efficient
- Average
- Quite inefficient
- Highly inefficient

Biggest single energy cost



Section 2: Energy Monitoring, Decision-Making and Maintenance

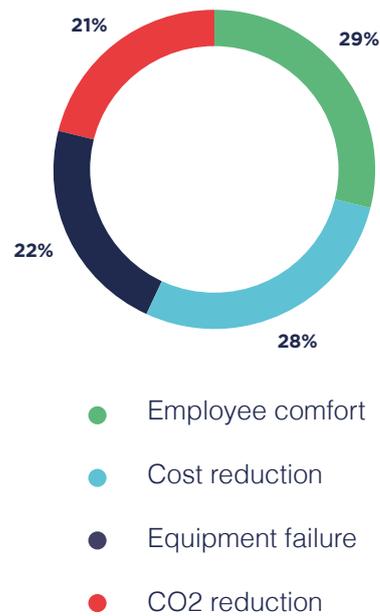
Decisions affecting energy usage and efficiency have traditionally been a lower priority on the C-Suite agenda. We asked our respondents whether energy has become more or less important for senior management in the last two years.

The good news is that more than half of the 100 facilities managers we surveyed, 54%, told us that energy usage has become one-third more important. However, 32%, nearly one third of all respondents across the hi-tech and life sciences industries, told us that energy usage has become less important, with a further 14% telling us that there has been no change.

We then asked what motivates the C-Suite to get involved in HVAC issues? Interestingly, CO2 emissions now account for more than a fifth of respondents, behind the two major drivers of employee comfort (29%) and cost reduction (28%). Worryingly, equipment failure, which potentially indicates a more reactive stance, is cited as being the primary motivator by only 22% of respondents.

Of great concern is that the monitoring of carbon emissions remains sporadic. A good proportion, 29%, are always monitoring carbon emissions but a huge number, 61%, are only intermittently monitoring, and one in 10 are not monitoring at all. This is all the more worrying, considering 63% of the organisations surveyed are certified to the ISO 50001 accreditation for energy management systems.

Motivation for C-Suite interest in HVAC issues



ISO 50001 accreditation



Nevertheless, with major capital expenditure typically requiring sign-off at a senior level, we wanted to know if CAPEX restrictions are acting as a barrier to improved energy performance.

Overwhelmingly, 87% of facilities managers told us that CAPEX restrictions are a significant or major barrier. This poses the question: is senior management committing to improve energy performance with ISO 50001 but unwilling or unable to pay for projects the accreditation identifies?

It would appear, despite the impact of the UK's net-zero commitments that senior managers are not seeing the interdependency between sustainability, efficiency and competitiveness.

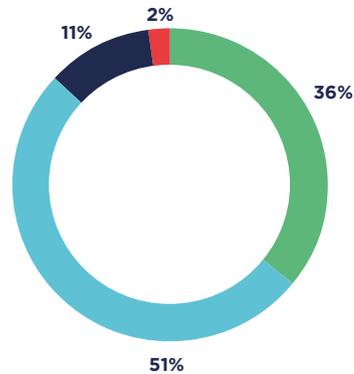
The continued maintenance of HVAC systems is vital, but too often we see maintenance teams firefighting rather than proactively planning.

40% of those we surveyed confirmed our suspicion that too much maintenance remains reactive, with 54% telling us that work is assigned on the basis of a maintenance schedule. Less than half, (46%) are prioritising maintenance based on value.

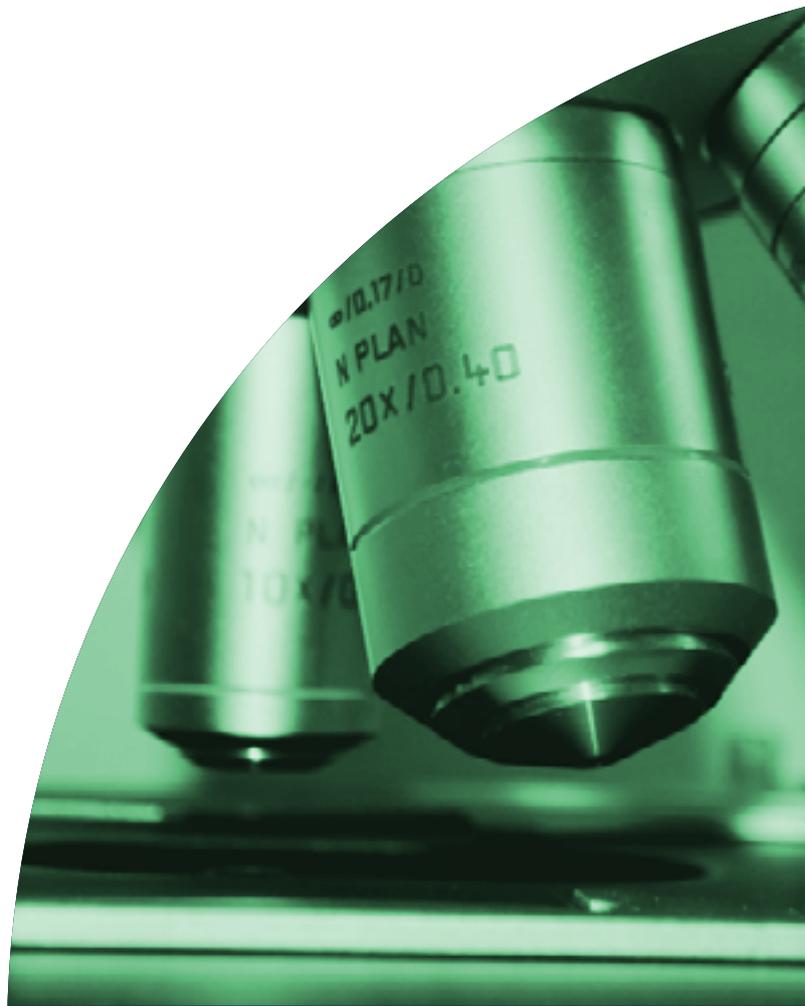
How would you describe your HVAC maintenance strategy?



CAPEX restrictions as a barrier to improved energy performance



- Major barrier
- Significant barrier
- Minor barrier
- No barrier at all



Section 3: Building Management Systems

The key to controlling maintenance costs is the development of a more preventive maintenance strategy based on data. Central to this objective is the building management system or BMS.

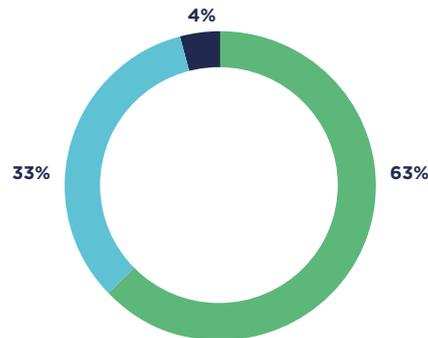
However, merely having a BMS is not enough. A BMS must work for an organisation, not add to its management burden.

All-too-often we have found that poor BMS commissioning is hampering rather than helping hi-tech manufacturers understand and control their HVAC systems.

Our experiences were confirmed by our respondents, with one-third (33%) telling us their BMS system has been inadequately commissioned.

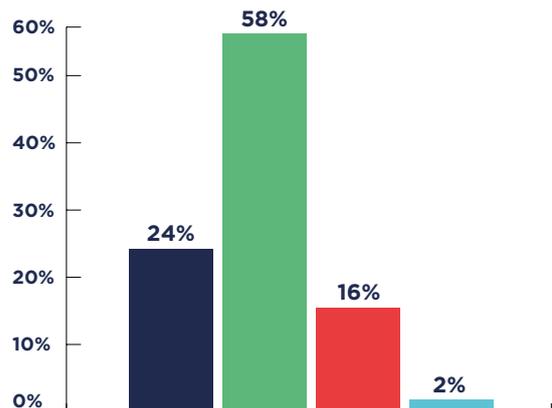
We then asked how helpful their BMS is at identifying HVAC issues at their plants. 58% told us that their BMS was only somewhat helpful in identifying HVAC related issues, with a further 18% telling us that it was either not too helpful or not helpful at all.

How well is your building management system commissioned?



- Very well
- Not very well
- Don't know

BMS identification of HVAC issues



- Very helpful
- Somewhat helpful
- Not too helpful
- Not helpful at all



The heart of the BMS should lie in its ability to collect and analyse data so that it can accurately automate and control the building's critical utilities. The ability to collect good data and then send it to a data analytics platform can help organisations develop a more proactive rather than reactive maintenance strategy, control energy costs and reduce CO2 emissions.

We then asked our panel of respondents to rate their own use of data, both in terms of data collection and analysis.

82% told us that they are using building data to identify areas for action, but only one-third (35%) are using building data to identify high priority actions.

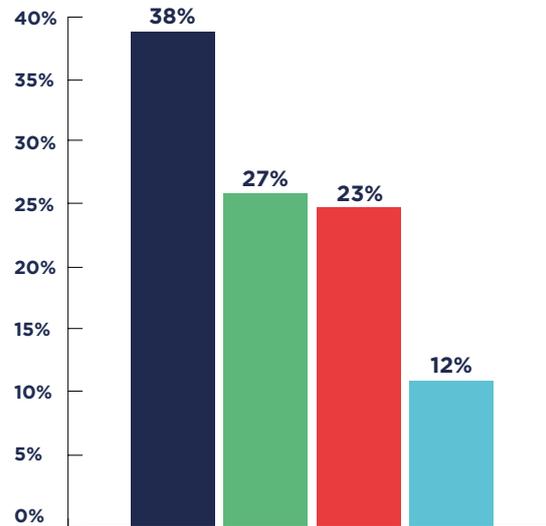
We then asked how well data is collected and analysed. 38% of respondents believed their organisations to be good at both data collection and analysis.

However, 27%, more than one in four, believe that whilst their organisations are good at analysis, they are deficient in the actual collection of data.

More concerning is that 23% of respondents say they are poor at both data collection and analysis.

Our suspicion from the answers is that too many organisations are not being sufficiently supported by their BMS and many are being blinded by a blizzard of data with inadequate technology to make informed decisions quickly.

Use of data



- We are good at data collection and analysis
- We are good at analysis but not collecting data
- We are poor at both data collection and analysis
- We are good at collecting data but not at analysis



Section 4: BMS Alarms

BMS alarms are an HVAC early-warning system for poor operational performance. 67% of our 100 respondents receive BMS alarms, but surprisingly nearly one-third (32%) receive no alarms that could alert them to problems.

Whilst BMS alarms are important, when combined with wider time constraints placed on facilities management teams, too many can lead to alarm fatigue and obscure high priority areas - placing maintenance and facilities teams on a reactive footing.

We asked our panel of facilities managers how many alarms are sent each day by your site's BMS system?

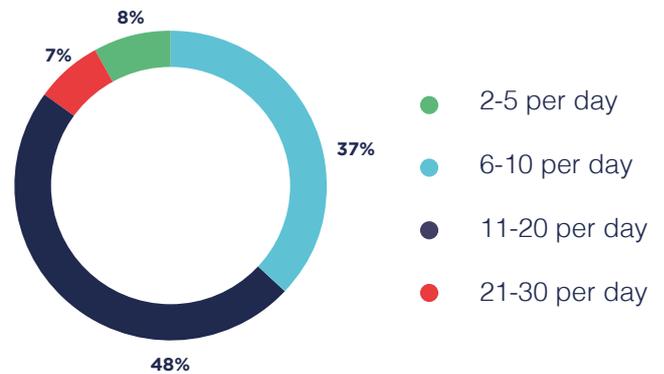
The answer confirms our suspicion that too many facilities managers are in danger of alarm fatigue, with nearly half of respondents receiving 11-20 alarms each day. The average number of alarms amongst those researched was 12.5 per day.

Alarm fatigue can lead to inaction which, in our experience, leads to critical optimisation opportunities being missed.

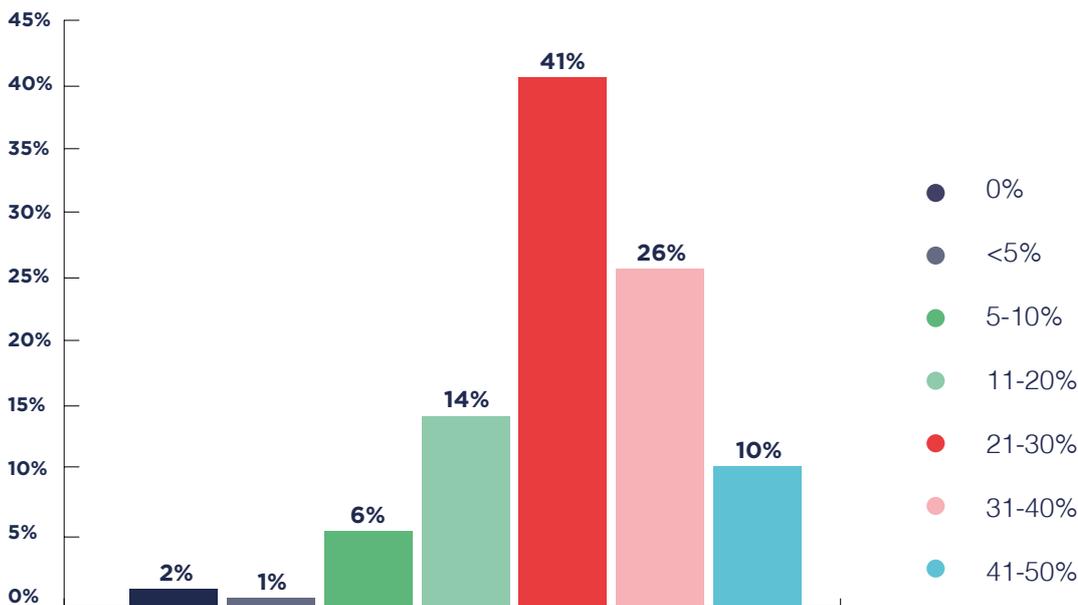
One in five of our panel said that more than two in five alarms receive no action, with more than a quarter (26%) responding that 31-40% of alarms are not actioned.

This tells us that alarms are not regarded as an aid to better control of an HVAC system or as a means for an organisation mitigating its energy costs or reducing its CO2 emissions. Rather, alarms are too often regarded as a nuisance that can be ignored, ultimately demonstrating that there is insufficient value being delivered by the BMS or the data.

Number of alarms per day



Number of alarms receiving no action





Conclusion

We titled this report the Energy Blind Spots, but in truth our research has uncovered multiple areas of concern.

For the C-Suite and Senior Leadership Teams, energy efficiency and the monitoring of CO2 emissions remain a low priority. However, facilities management teams are finding themselves caught in a cycle of day-to-day fire-fighting. In turn, their teams are struggling to respond to the volume of BMS alarms they are facing at their hi-tech and life sciences manufacturing plants. Likewise, too few are correctly able to collect and analyse the data available to them in order to effect change, regardless of their sector.

The problem now is that the impact of these issues is becoming more severe. Ever-rising energy prices and the UK's commitment to net-zero by 2050 are now making these problems more pressing, the impact on profitability and competitiveness more acute and the search for solutions more urgent.

The answer is not just investment. Budgets are likely to remain tight and the challenge therefore is to find ways of becoming more efficient, more sustainable and more profitable without placing undue burden on an organisation's finances.

In reality, the answer lies in the better use, understanding and interpretation of existing data from building and plant systems. Ultimately, it is data that can prioritise maintenance workloads. It is data that reduces consumption and it is data that can deliver the ROI required.

The challenge for our hi-tech industries is to be a master of data, not a slave to it.

PEAK Performance for Hi-Tech Manufacturers

Operating large manufacturing sites efficiently and sustainably is challenging, and many factors add pressure for onsite teams as uncovered in this report. CIM's award-winning PEAK Platform ingests and monitors existing building data, leveraging fault detection algorithms to pinpoint, highlight and prioritise inefficiencies. PEAK continuously aggregates data from your BMS and HVAC equipment, and multiple sensors including chillers, boilers and air handling units transforming it into actionable insights for improvement across hi-tech manufacturing sites.

Crucially, PEAK is underpinned by human technical 'customer success' teams tasked with identifying top priority fixes, and ensuring they are dealt with immediately. CIM Engineers provide our customers with continuous expert capability across all sites, ensuring issues are identified and resolved quickly delivering improved efficiency, sustainability, safety and comfort.

Smarter building operations deliver better outcomes



**Energy &
OPEX savings**



**Technical
engineering
support**



**Greater team
performance**



**Improved
comfort**



**Data-driven
maintenance**



**Reduced
carbon
emissions**



**Extended
equipment
lifespan**



**Increased
asset
profitability**

PEAK in Practice - Case Study

A Tier 1 hi-tech manufacturer deployed PEAK to effectively manage critical plant and equipment to unlock actionable insights for the facilities management team.

Legacy systems controlling critical plant and equipment throughout the 95,000sqm site were proving difficult to integrate into the BMS, which hindered the FM team when it came to prioritising which operational planning challenges to tackle first. Similarly, a lack of visibility into the performance of critical plant and equipment made energy savings nigh on impossible.

CIM worked with the manufacturer's FM team to digitise the facility by unlocking data from multiple onsite sources, including the BMS, electrical energy meters and main meter data from utility companies. The data was normalised, cleansed and blended before being ingested into the PEAK fault detection

and diagnosis (FDD) software platform. PEAK distils actionable insights for the manufacturer by applying 931 FDD rules to the data every 15 minutes. The rules compare how critical equipment should be performing, versus how it is actually operating. The software automatically generates alerts when operational inefficiencies are detected.

Crucially, CIM's highly qualified 'Customer Success' engineers act as remote HVAC experts for the time constrained FM team by prioritising key issues and helping onsite team resolve them.

CIM software is now accessed daily by the manufacturer's onsite FM team to help them optimise the operational performance of their critical plant and equipment. The manufacturer has committed to a CO2 reduction target of 50% by 2030, and is relying on the PEAK Platform helping onsite teams resolve them.

Key results



440+ issues identified and resolved



930+ rules deployed



4000+ data points monitored, across 1000+ pieces of equipment



A 490,000kg reduction of CO2



“Sustainability and energy efficiency are increasingly important parts of company strategy, driven by regulatory requirements, rising energy costs and external and internal stakeholder pressures.

This report highlights the key role of HVAC systems in meeting strategic energy efficiency objectives in hi-tech manufacturing, which faces mounting pressures to deliver energy and decarbonise towards net-zero, while maintaining cost competitiveness.

Technology and data analytics' role cannot be understated in meeting this challenge, as also highlighted in ASHRAE's ['Digital Lighthouse and Industry 4.0'](#) vision.

The timely report highlights the need for improved intelligence in HVAC commissioning and maintenance, moving from reactive approaches to more proactive predictive or preventative models.

ASHRAE has played an important role in this effort through the introduction of the BACnet open building communications standard, and more recent guidance on building commissioning standards and [public data repositories](#) supporting ongoing research and standardisation.”

Daniel Coakley,
President, ASHRAE Ireland Chapter 2021-22



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“One of my key priorities with J&J Vision Care is to minimise our environmental footprint, and reduce CO2 emissions.

The opportunity to optimise our existing data with CIM's PEAK Platform and to uncover insights for immediate savings throughout our critical plant and equipment aligned with our internal goals at J&J.

Our team became more engaged, we have control of our data in realtime and can maximise efficiencies delivering on our CO2 reduction journey in a cost effective way.”

Barry O'Sullivan
VP Vision Care Manufacturing,
Johnson & Johnson



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