

# **BUILDING MANAGEMENT FOR BUILDINGS OF ANY SIZE**

How affordable, cost-effective and easy-to-use technology can help support key outcomes in your building including operational efficiency, the occupant experience and sustainability.



**Honeywell**

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# EXECUTIVE SUMMARY

**Many of the same building system advances that help make large facilities healthier, more sustainable and profitable are now also available for small- and medium-sized buildings at a fraction of the cost.**

In this white paper, a small- and medium-sized building is defined as “50,000 square feet or less.” Yet buildings of all sizes face the same reality: The needs, demands and expectations of building occupants have changed.

An increasingly tech-savvy, well-being-aware, and environmentally conscious population is wielding its power. Everyone is an “influencer” to some extent, and many relish any opportunity to make their views known on social media. For most people, though, their greatest power comes from the choices they make: Where they work and shop, the brands and people they trust, and the places they feel good about visiting.

The lesson? It doesn't matter if it's a retail building, commercial building, a government building, or a school building. The key to optimizing your investment is providing a healthier, more sustainable environment that delivers a welcoming occupant experience.

## **HEALTHIER, MORE SUSTAINABLE AND MORE PROFITABLE?**

Unfortunately, many small and medium buildings are falling behind the increased demand for healthier, more sustainable environments.

One reason: Owners and operators believe that creating a healthier environment and hitting energy efficiency targets are competing goals. They do not have to be. In fact, smart building technology now makes it possible to achieve a building that's healthier and more energy efficient at the same time.

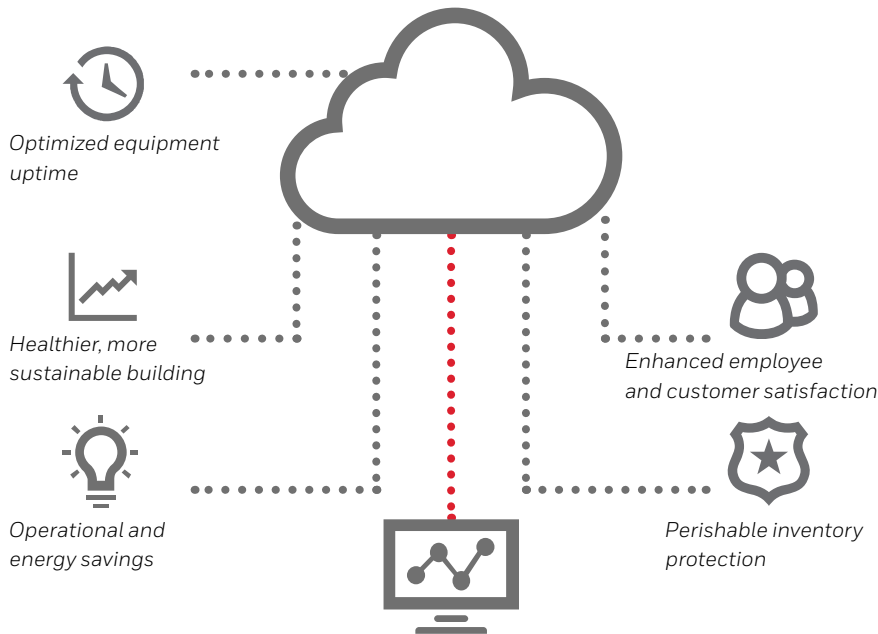
Expense is another reason. Small and medium buildings with multiple locations have a lot of the same needs and desired outcomes as their larger counterparts, but they don't need a large, complex technology solution. A “big-building” BMS sometimes can be overkill and too expensive. Smart technology designed specifically for smaller buildings is the answer.

## **THE INTERNET OF THINGS TO THE RESCUE**

The Internet of things (IoT) is any kind of device connected to the Internet. By combining IoT with secure cloud computing, even smaller buildings with multiple locations can now achieve outcomes similar to those of larger facilities. The benefits come from a building management system (BMS) suited for the unique needs of a smaller building.

## BENEFITS OF A BUILDING MANAGEMENT SYSTEM (BMS) DESIGNED FOR SMALL AND MEDIUM BUILDINGS

The Internet of things (IoT) is any kind of device connected to the Internet. By combining IoT with secure cloud computing, small and medium buildings can now achieve outcomes similar to those of larger facilities. The benefits come from a building management system (BMS) suited for the unique needs of any building.



*Affordable building management systems can also benefit small- and mid-sized buildings with multiple locations.*

### Supports occupant comfort and well-being<sup>1,2</sup>

It's easy to forget the impact an indoor environment can have on the comfort and well-being of people inside. Also, what happens inside a building can benefit or hinder business operations and profitability.

A BMS investment returns many potential benefits:

- Improves indoor air quality (IAQ) through increased monitoring
- Increases occupant comfort, productivity and job satisfaction<sup>3</sup>
- Bolsters public perception when you share positive information about your IAQ and sustainability efforts
- Helps attract and retain tenants<sup>4</sup> and top employees<sup>5</sup>
- Helps make your site a preferred location over competitors

### Improves return on investment (ROI) via operational and energy savings

- Enables remote monitoring and control of multiple sites from one location – managers can troubleshoot problems, optimize equipment uptime, and save time and money on travel and service calls
- Optimizes energy use to help lower costs and carbon footprint
- Automates precise management of temperature-controlled environments and alerts you to problems to protect perishable inventory

### A plug-and-play solution that's easy to scale

In many cases, technicians can install, configure and deploy the system in a matter of hours with little to no interruption to your operations.

It's a plug-and-play approach that makes the technology affordable, cost-effective, and easy to use. It's also easy to scale as your operations grow.

## WHY IT MAY NOT BE RIGHT FOR YOUR BUILDING

### Incompatible with existing system

If your building has existing management software or programmable logic controllers for equipment that isn't compatible with newer technology, this may present limitations. With older systems and controls, upgrades may be needed before you can fully benefit from the capabilities of a newer BMS specifically designed for smaller buildings.

### You prefer a complete on-premises solution

If you do not want to use a cloud-based solution, this may limit the capabilities and savings that new technology can offer. While IoT hardware and software are designed for data security, you may prefer that the complete system be on the premises, working with an on-site computer server, in which case more traditional approaches to building management may still present the best value.

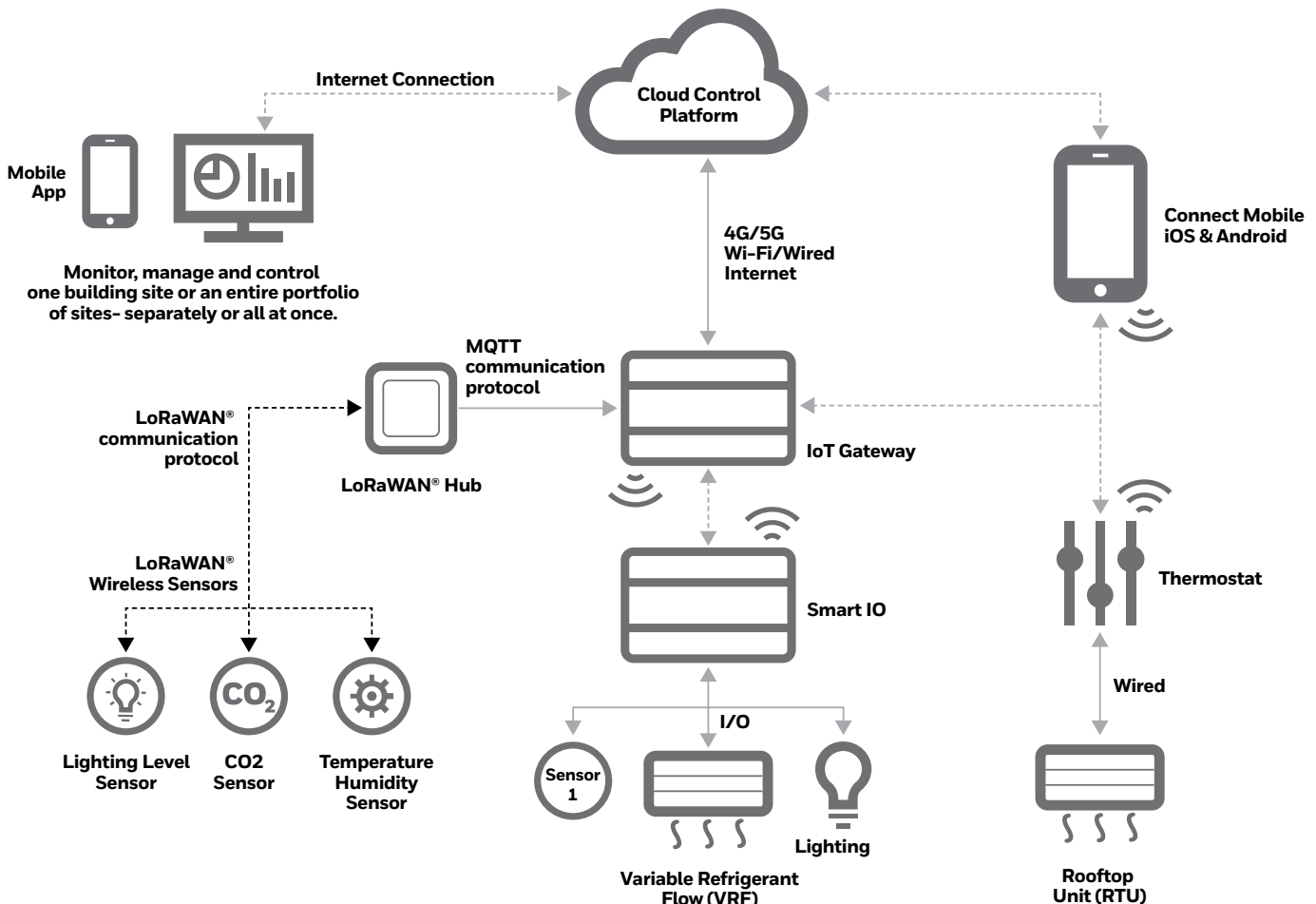
# INSIDE A BMS DESIGNED FOR SMALL AND MEDIUM BUILDINGS

# 1

IoT capabilities plus advances in smart building technology and cloud computing now enable the kinds of outcomes once afforded only to large singular facilities.

A BMS for small and medium buildings integrates technologies to monitor and control a building's electrical and mechanical equipment. Here's how it works.

## EXAMPLE OF SMALL TO MEDIUM BUILDING ARCHITECTURE



# COMPONENTS

## HARDWARE

Within the IoT architecture, some components use wired connections. Other components connect via wireless technology including Wi-Fi and Bluetooth®.

An **IoT gateway** is a computer installed on-site in a secure utility room or similar location. It sits between the cloud platform and on-site sensors, I/O devices and thermostats. These BMS components use different communication protocols or rules to relay data. The gateway acts as a protocol converter or translator so that it can gather data about the building and send it to the cloud<sup>6</sup>. There the data is stored, processed and can be accessed by the BMS software.

The reverse is also true. The IoT gateway can receive commands from the BMS software so that you can control and automate IoT smart devices in the building.

A **LoRaWAN® (Long Range Wide Area Network) hub** uses the LoRaWAN wireless communication standard to connect sensors to the IoT gateway.<sup>7</sup> The hub transmits sensor data to the gateway using MQ Telemetry Transport (MQTT), a standard communication protocol for IoT.<sup>8</sup>

**LoRaWAN® wireless sensors** monitor and collect data on the physical conditions in your building, including:

- Temperature and humidity
- Indoor air quality
- Carbon dioxide (CO2) levels
- Lighting levels
- Movement
- Water leaks

The sensors relay data to the BMS monitoring software. As part of a LoRaWAN network, these sensors can transfer data across long distances, which is especially useful in remote areas of a building.<sup>9</sup> Sensors do not control building equipment. That's the job of the Smart IO and thermostat.

A **Smart IO** extends the reach of the IoT gateway to areas where a wired connection is normally required. Examples include controlling variable refrigerant flow (VRF) in a refrigeration unit and any equipment you want to turn on and off at specific times, such as lighting. The Smart IO is installed near the equipment you want to control. That equipment is directly wired to the Smart IO, which then communicates wirelessly with the gateway.

One or more commercial **smart thermostats** in your building serve as automatic climate-control devices. They work with a rooftop unit (RTU) or other type of HVAC system. As part of a BMS, you can schedule thermostat operations to balance occupant comfort and energy efficiency.

A smart thermostat can also control your building's energy recovery ventilator (ERV). The ERV connects to the ducts that are part of your HVAC system to distribute fresh air from the outdoors into indoor spaces.

## SOFTWARE

Installation technicians typically use a mobile app to commission the hardware. Then they sync the settings to the cloud. IoT data from the building sensors is securely stored and processed in the cloud – more specifically, by web-based software on a network computer server that's hosted by a cloud services provider.

For building owners and operators, the real power comes from the BMS **web portal and mobile app**. These give you secure 24/7/365 access to real-time IoT data “in the cloud” from anywhere. Onsite or away, all you need is a computer or mobile device with an internet connection to monitor, manage and control one building site or an entire portfolio of sites, separately or all at once.

BMS software capabilities vary. Most include some form of reporting or analytics: energy usage reports, compliance reports and other data for better decision making. The software can be easy to use with minimal training.



# HEALTHIER SMALL AND MEDIUM BUILDINGS

# 2

Smart technology captures data on indoor air quality, automates support for a healthier more comfortable environment, and provides reporting to aid decision-making and sustain compliance.

**Buildings play a vital role in commerce, community and human innovation. It's no wonder why demand for healthier, safer buildings is at a record high.<sup>10</sup>**

Researchers have long studied the impact that indoor environments can have on occupant well-being. As you'd expect, better indoor air quality (IAQ) is an essential element to a healthier building.

## HVAC SYSTEMS PLAY A CRITICAL ROLE

A building's ventilation system has the greatest effect on indoor air quality (IAQ). Without enough air exchange, it can become a breeding ground for air pollution. According to the U.S. Environmental Protection Agency (EPA), "Inadequate ventilation can increase indoor pollutant levels by not bringing in enough outdoor air to dilute emissions from indoor sources and by not carrying indoor air pollutants out of the area. High temperature and humidity levels can also increase concentrations of some pollutants."<sup>12</sup>

## IMPACT ON OCCUPANT WELL-BEING

The link between common indoor pollutants and our well-being has long been established. Indoor air pollutants can cause immediate effects, including eye, nose and throat irritation, headaches, dizziness, fatigue and asthma symptoms.<sup>13</sup>

Factors that impact indoor air quality can originate both inside and outside of the building. Common pollutants can include:

- Combustion byproducts: Carbon monoxide, fine particulate matter (PM) such as soot, smoke, and smog
- Chemicals: Cleaning supplies, paints, insecticides
- Volatile organic compounds (VOCs): Industrial solvents, fuel oxygenates, by-products of water chlorination
- Degrading building materials: Asbestos fibers, lead
- New building materials: Chemical off-gassing from pressed wood products
- Naturally occurring substances: Radon, pet dander, mold
- Gases: Ozone (from some air cleaners), flammable gas<sup>14</sup>

It's not surprising that poor IAQ is detrimental to well-being and comfort. It can also affect performance at work and learning in educational environments.<sup>15</sup>

## THE 9 FOUNDATIONS OF A HEALTHY BUILDING

- Ventilation
- Air quality
- Thermal health
- Moisture
- Dust and pests
- Safety and security
- Water quality
- Noise
- Lighting and views

Harvard T.H. Chan School of Public Health<sup>11</sup>

## INDUSTRY INSIGHT

"For most office tenants, a 1 to 2 percent improvement in productivity is worth far more than \$1 per square foot (\$10.76 per sq m) per year. A 1 to 2 percent reduction in employee turnover can also save most tenants \$1 per square foot in the avoided costs of finding, hiring, and training new employees."

Urban Land Institute<sup>16</sup>

## HOW TECHNOLOGY CREATES HEALTHIER SPACES

A building management system (BMS) enables you to monitor and control key factors that impact occupant comfort, well-being and experience.

### Monitor indoor air quality

- CO<sub>2</sub> levels
- Volatile organic compounds (VOCs)
- Particulate matter of only a few microns in diameter (e.g., PM 2.5)

### Monitor indoor climate

- Temperature
- Humidity

### Ventilation

- Mechanized fans
- Exhaust ventilation
- Supply ventilation

### Filtration

- Electronic air cleaners

A BMS for small and medium buildings also helps automate your building's health and generates use and compliance reports. It gives administrators a holistic view of their site or multiple sites to gain valuable insights, minimize risk, and adapt to evolving standards of compliance.

## AN OCCUPANT EXPERIENCE THAT DELIGHTS CAN HELP YOU, TOO

Research shows that providing a healthier, comfortable building environment promotes a welcoming occupant experience. It also yields important operational advantages.

### Greater productivity

Studies show that a healthier building improves the confidence and productivity of the people who use it. It can improve occupant cognitive ability and confidence in making better business decisions. In addition, a healthier building can help ensure a more sustainable working environment that directly impacts the bottom line.<sup>17</sup>

### Fewer sick days

According to an article in the Harvard Business Review, "Study after study has shown that the amount of ventilation, or fresh outdoor air brought inside, is a critical determinant of health. Good ventilation has been shown to reduce sick building syndrome symptoms, cut absenteeism, and even reduce infectious disease transmission."<sup>18</sup>

Further evidence comes from a study conducted in the Netherlands. Researchers relocated 70% of a municipality workforce to a building designed to focus on sustainability, health, and well-being. The study's purpose: investigate the impact of indoor environmental conditions in the workplace on employee health and job satisfaction, as core factors of productivity.<sup>19</sup> The study observed a 42% reduction in the prevalence of "sick building symptoms" (SBS) among participants. The study also found an increase in job satisfaction and a 2% reduction in sick leave.<sup>20</sup>

## ATTRACTING AND RETAINING HIGHLY SKILLED TALENT

The increase in hybrid work has changed the expectations for the workplace. Today, many workers are seeking out employers and organizations that foster better environments.<sup>21</sup> Wellness certifications such as WELL, Fitwel, and RESET help make buildings and the organizations that occupy them even more appealing.<sup>22</sup>

The Leadership in Energy and Environmental Design (LEED) certification also stands out. LEED is the most widely used green-building rating system in the world for virtually all building types. It provides a framework for healthy, highly efficient, and cost-saving green buildings.<sup>23</sup>

In a 2018 survey conducted by the U.S. Green Building Council, 79% of respondents said they would choose a job in a LEED-certified building over a non-LEED building. Millennial workers are especially more values-driven than previous generations. Wellness certifications are important to them because they spend so much time in a corporate environment.<sup>24, 25</sup>

The results of Honeywell's third annual Healthy Buildings Survey focused on both occupant well-being and the environment. The study queried 2,500 office workers in buildings with 500-plus workers in Germany, India, the Middle East, the United Kingdom and the United States.

More than nine in 10 respondents (91%) said they would forego job perks if the cost were reinvested in reducing their workplace's environmental impact.

Concerns about indoor air quality in the workplace increased over prior year's survey, as nearly three in four respondents (74%) express some degree of worry about their workplace's IAQ, 43% of those surveyed say they're very or extremely worried – a seven-point increase over last year's results.

To read the full report, [click here](#).



# MORE SUSTAINABLE SMALL AND MEDIUM BUILDINGS

# 3

Focusing on sustainability and building health can help improve profitability.

Many organizations are committing to carbon-reduction goals to improve operational efficiency, reduce environmental impact and meet the expectations of investors and customers.

With smart building technology, your buildings can become both healthier and more energy efficient at the same time.

The opportunity for energy savings is great:

- In the U.S., commercial buildings occupying less than 50,000 square feet represent 94% of the commercial building count and consume approximately 8% of the nation's primary energy.<sup>26</sup>
- Reporting on small- and medium-sized office buildings in the U.S., Energy Star noted that the average commercial building wastes 30% of the energy it consumes.<sup>27</sup>

## INDUSTRY INSIGHT

More than 90% of the U.S. commercial building stock consist of properties under 50,000 square feet and most of these buildings lack a proper building management system to manage energy usage.<sup>28</sup>

—Energy Star

## HOW TECHNOLOGY SUPPORTS SUSTAINABILITY

A building management system (BMS) for small and medium buildings enables you to measure, manage and optimize energy use across your portfolio. You can lower your carbon footprint and save on energy costs.

BMS software gives you a holistic view of each site. Energy use and compliance reports enable you to identify inefficient sites and make improvements, helping you work toward sustainability goals and meet compliance requirements that may apply to your operations.

# MORE PROFITABLE SMALL AND MEDIUM BUILDINGS

# 4

The ROI comes from potential operational and energy savings.

The same technology that helps enable healthier, more sustainable buildings can also support profitability.

## HOW TECHNOLOGY SUPPORTS PROFITABILITY

### **Automation**

Schedule system changes to help optimize energy use based on usage. This can include automating lighting, heating and cooling schedules to align with the hours of operation for each facility in your portfolio.

### **Remote monitoring and control**

You can manage many of your buildings' systems from a single location. Receive alerts, troubleshoot problems and optimize equipment uptime. Remote capabilities can help save time and reduce costs associated with travel and labor. This is especially true if you operate multiple buildings and must also account for vehicle fuel and maintenance. The savings can increase for operations that rely on facility managers or technicians in geographically dispersed locations.

### **Increased operational efficiencies**

A BMS web portal or mobile application can provide real-time data and spot trends from one building or a multi-site operation, in the same city or spread across the globe. You can control sites individually or issue commands to a whole segment of your portfolio at once.

### **Perishable inventory protection**

Temperature-controlled environments are critical to protecting products that are sensitive to temperature changes. Food and pharmaceuticals are two examples. Uncertain storage conditions can put valuable inventory and assets at risk for damage or equipment downtime.

A BMS can help automate precise management of temperature-controlled environments to protect perishable inventory. It can also alert you to problems like an unwanted temperature change or something as simple as an open refrigeration-unit door that's wasting energy because it was left open.

### **Increased equipment lifespan**

Optimizing equipment use can reduce energy costs. It also helps increase equipment lifespan by preventing excessive wear. In addition, BMS software can include the ability to send a reminder for system maintenance or an alert when equipment reaches a specific parameter and should be checked by a technician.

# CONCLUSION

**Although the availability and adoption of smart building technologies by small and medium buildings has been slower than by larger buildings, they face the same reality: The needs, demands, and expectations of building occupants have changed.**

As a result, success now relies more heavily on providing a healthier, more sustainable environment that delivers a welcoming occupant experience.

## **AFFORDABLE TECHNOLOGY HELPS SMALL AND MEDIUM BUILDINGS EVOLVE FOR THE BETTER**

Smart technology is the answer for building owners and operators eager to satisfy market demands, sustainability goals and compliance requirements. The right solution combines IoT, secure cloud computing, and a scalable building management system designed for plug-and-play simplicity. A cloud-based system should also enable you to centrally manage more than one building site at a time.

Whether you have a single building nearby or a multi-site operation throughout the world, smart building technology can enable indoor environments that are:

- Healthier to support occupant well-being and comfort<sup>29, 30</sup>
- More energy efficient to support sustainability
- More cost-effective to support profitability

## **CONSULT WITH AN EXPERIENCED SOLUTION PROVIDER**

Smart building technology for small and medium buildings is not yet an optimal fit for every situation. This approach may be incompatible with a building system in which you've already invested, or your building may have specialized needs that require a more complex and customized solution.

If you're considering smart building technology, consult with an experienced solution provider you can trust. It's important that they have the technical expertise to evaluate your building's existing systems and recommend effective solutions. Ask questions: Have they installed smart technology solutions in buildings like yours? What were the results? Can they provide references?

# HONEYWELL IS A GLOBAL LEADER IN CONNECTED BUILDING SOLUTIONS

The Honeywell Remote Building Manager powered by Honeywell Forge simplifies remote management of small- and medium-sized buildings with smart, modular capabilities.

## PORTFOLIO MANAGEMENT MADE EASY

Occupant comfort. Energy savings. System uptime. Risk management and cybersecurity. These needs are interconnected. That's why Honeywell integrated them into one convenient platform designed for organizations operating small to medium single site buildings or multi-site portfolios.

With the Honeywell Remote Building Manager you'll be able to monitor your sites via a secure, cloud-based dashboard that analyzes data from our modular ecosystem of wireless devices and sensors to track the KPIs that are important to your success.

- Decrease energy usage with automatic HVAC control based on machine learning to optimize setpoints.
- Reduce service calls through remote monitoring that allows you to see your locations and troubleshoot remotely.
- Improve occupant comfort and customer satisfaction.
- Increase employee productivity through temperature, humidity and air quality control.

**For more information** about the advantages of Honeywell Remote Building Manager, contact your Honeywell representative or [visit our website](#).

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**Honeywell Building Technologies**

715 Peachtree St NE  
Atlanta, Georgia 30308  
[buildings.honeywell.com](https://buildings.honeywell.com)

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