

Buildings of the Future

Sustainable | Resilient | Hyper-efficient | People-centric

Buildings of the Future:

Creating safer, healthier and more responsive environments

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Introduction

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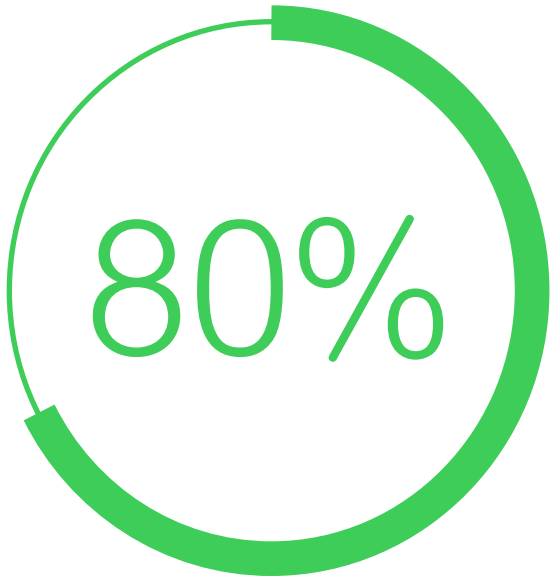
For the last two decades, building owners and managers have been focused on making their facilities smarter. Boosting sensor and control capabilities towards these goals has succeeded in improving buildings' energy efficiency, lowering environmental impacts along with related energy costs. These technologies also have helped automate some building functions to improve the occupants' experience. Now, we're recognizing a new need for building intelligence to also make buildings healthier.

This shift in focus is already a part of building owners' plans. *National Real Estate Investor* magazine found that nearly 80% of companies expect healthy building initiatives to shape their near-term real estate strategies.

Further, 37% expect that influence to be significant. Among the leading technologies for healthy building investments are security and access control for contact tracing, occupancy and tenant management apps, and programmable indoor air quality sensors.

These are factors in creating resilient, sustainable, hyper-efficient and human-centric buildings of the future – and transforming today's buildings to meet tomorrow's needs. The importance of these foundational elements has come to the forefront in this new pandemic era. This isn't just about reducing health risk; it's also a strategy for improving overall wellness, returning resources to our planet, providing a productive environment and responsiveness. But keeping up with the

technologies that can help deliver on these strategies can be challenging. Fortunately, our EcoStruxure™ platform offers easy-to-implement solutions that can provide you with the insight and control needed to address your occupants' health and comfort concerns, often while using existing building management infrastructure, which helps reinforce the goal of preserving our planet's resources.



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-National Real Estate Investor magazine



4 objectives for the new era of building operations

4 objectives for the new era of building operations

As we continue to embrace this “new normal,” we can expect building health to become even more important. Owners and managers will see a new level of scrutiny and demands for many building practices – including enhanced sanitation, physical distancing, and improved heating, ventilation and air-conditioning (HVAC) performance – that didn’t exist before the pandemic.

As a result, new attention will need to be paid to four key objectives to transform your occupants’ experience:

1. Maximize space efficiency: real-time visibility to meet new regulations, guidelines and company policies:

- Physical distancing
- Occupancy monitoring
- Optimal layout
- Equipment requirements

2. Enhance occupant well-being: to boost peace of mind and safety:

- Air quality monitoring
- Optimal humidity
- Volatile organic compound (VOC) control
- Transportation
- Policies and plans

3. Improve employee experience: improved communications for a better occupant experience:

- Transparency
- Manage new complexities
- Share current occupancy levels

4. Reduce operating costs: to shrink costs and allocate resources wisely:

- Optimize HVAC and energy use
- Amenity management
- Power management
- Smart cleaning
- Asset tracking

Why transforming your building experience matters

Why transforming your building experience matters

We spend up to 90% of our time indoors, according to Joe Allen, director of Harvard University's Healthy Buildings Program. In his research, Allen found three indoor air variables that can affect workers' cognitive function and performance:

1. Ventilation rate
2. CO₂ levels
3. Exposure to volatile organic compounds (VOCs).

It's been estimated that annual productivity benefits of higher ventilation rates alone could total \$6,000 to \$7,000 per person.¹

In collaboration with AECOM, the world's premier infrastructure consulting firm, Schneider Electric™ initiated global studies in 21 office buildings. These efforts looked at the impact of **six key environmental factors that can impact occupants' health and comfort:**

¹ Allen, Joseph G. and Macomber, John D., "Healthy Buildings: How Indoor Spaces Drive Performance and Productivity." Harvard University Press, 2020.

6 Environmental factors that impact health and comfort

1. **CO₂ levels** – Higher levels lead to drowsiness, poor concentration, sleepiness, and even headaches.
2. **Temperature** – Closely tied to humidity, temperatures outside optimal levels can impact cognitive functioning, and these levels can vary between individuals.
3. **Humidity** – Combined with temperature, humidity can impact cognition and performance. Additionally, high humidity levels can lead to condensation and mold growth, while overly dry air can increase risk of disease transmission and cause problems for those with respiratory conditions.
4. **VOCs** – These airborne chemicals can cause a range of health problems, including eye irritation, nose and throat discomfort, headaches, and nausea.
5. **Noise** – While acceptable thresholds can vary from person to person, noises beyond certain frequencies can trigger fight-or-flight reflexes leading to a release of the stress hormone cortisol.
6. **Lighting** – Glare and resulting eyestrain are obvious health issues related to lighting. But there is also evidence that light quality, including its color temperature, can impact our natural sleep/wake cycles.

Our study revealed 4 key findings:

1. **Most building managers often do not know how to get information on air quality, especially not in a way that allows them to make actionable decisions.**
2. **Technology exists today to provide insight into all these environmental factors and can be tightly correlated to a specific space.**
3. **Building managers who are empowered with this data can adjust their air-quality management practices and, as a result, complaints decrease and occupant satisfaction increases.**
4. **It is possible to use the Internet of Things (IoT)-enabled sensor information on health to automatically control building operations, helping building managers even more.**

Any unpredictable crisis places more urgency on integrating technology to improve monitoring and managing our indoor environments. We're finding that factors like ventilation rates, along with personal proximity to each other, impact transmission of viruses and other pathogens. As a result, expectations of both regulators and occupants are increasing as everyone prepares for a new way of working.

Just as we're taking care of ourselves, we also need to pay attention to the conditions inside the buildings to incorporate new ways for remote monitoring – you can think of this as telemedicine for our buildings.



Healthy building transformation: 3 Steps

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4 objectives for building operations

Building experience matters

3 steps towards a healthy building

Digital transformation for your building



Healthy building transformation: 3 Steps

With a better understanding of key health and well-being factors, owners and facility managers are better prepared to uncover the health potential of their buildings. The good news is that much of the sensing infrastructure needed to gather critical building data might already be in place. Creating a healthy building environment is a process that requires a thorough assessment of the existing infrastructure, including HVAC sensors, setpoint devices, and IoT sensors. The data collected allows for analysis and given the proper platform, yields actionable insights to drive continuous occupant health and well-being. The actions from the analysis can help to resolve technical and equipment issues and ensure optimal occupant health and comfort.

Sensor-enabled remote monitoring provides building managers and occupants with the information they need to improve building performance, and, possibly, to change their own behaviors. This capability adds a second set of eyes – in real-time – which helps supervise and maintain building systems and critical infrastructure. So, as occupancy increases, buildings equipped with remotely monitored occupancy systems will be in a better position to manage how many people are in offices and shared spaces to avoid exceeding capacity limits.

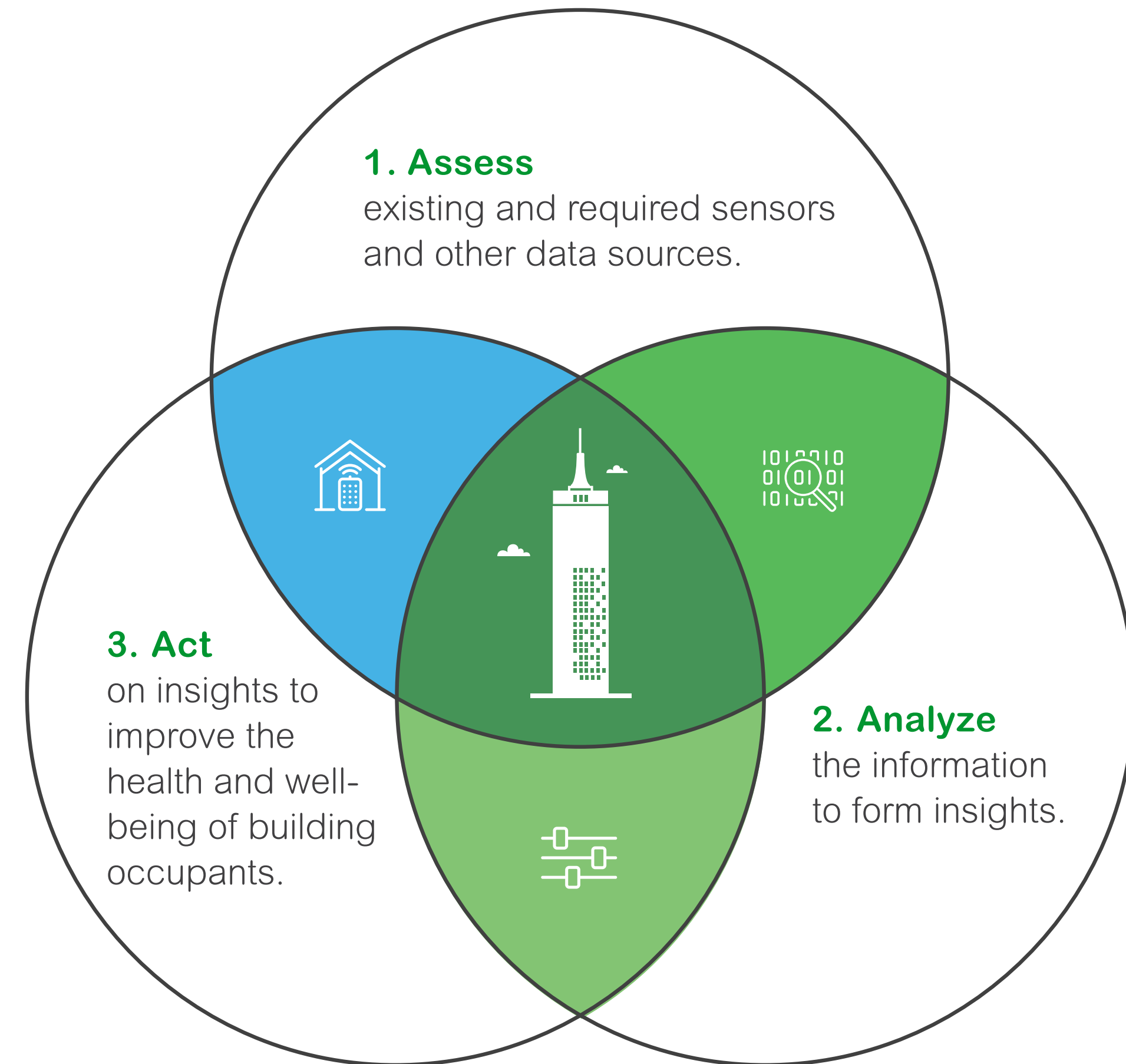


Opportunity exists to connect data streams from different sensor types – including occupancy, ventilation rates, and VOCs for example – to further improve occupant well-being. Making real-time information available to occupants can enable a more interactive experience, which can also help build occupants’ confidence as they begin navigating inside offices again.

We recommend a **three-step process** for bringing such a data-driven approach to reality.

Step 1: Assess

Understanding the sensors and other data sources already in place is a critical first step in instituting healthy building practices. This includes identifying: whether existing sensors are accurate and calibrated, that they are distributed to accurately measure environmental impacts on occupants, and whether more sensors are needed to cover all relevant building zones. This can also include data from ongoing employee surveys, real-time data from apps on occupants’ laptops and smart phones, and informal knowledge about a cold or other illness “going around.”





Step 2: Analyze

Analysis provides insights into the building's indoor environment, information that can be useful for both building managers and occupants. Typically, managers use a building management system (BMS) to monitor sensor activity (although purpose-built, stand-alone monitoring applications also are used) with analysis onsite or through cloud-based approaches. Smart alarms tied to critical parameters such as CO₂ levels, temperature and humidity can help maintenance staff understand where problems are developing before the complaint calls start coming in.

Step 3: Act

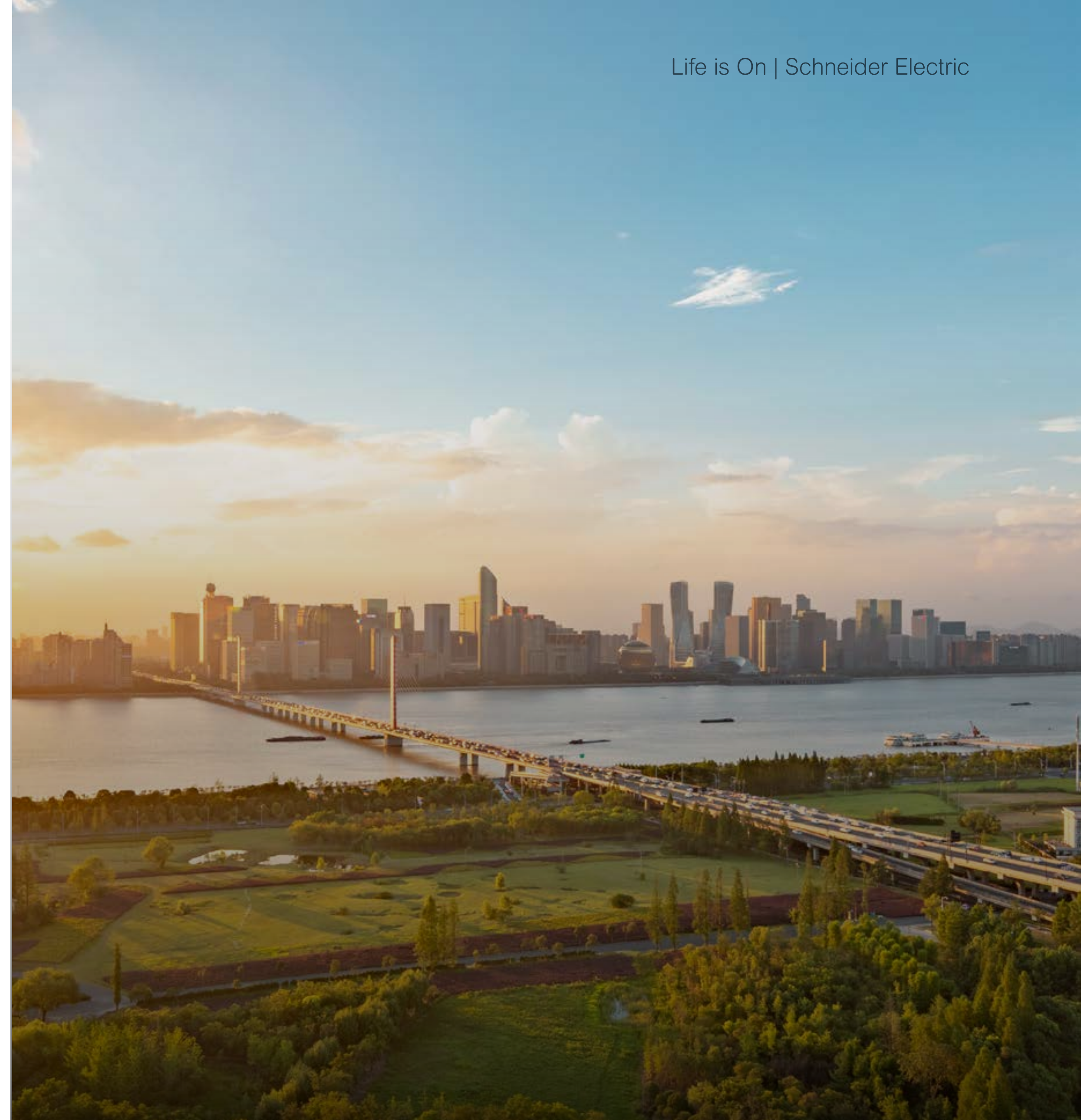
With data collected and analyzed, building managers can learn the root cause of identified healthy building issues and develop plans for addressing them. Some building systems can create automated tickets for maintenance staff when measurements fall outside pre-set thresholds. Monitoring systems also might be able to pass data directly to the BMS to automate actions like rescheduling supply-air temperature and humidity setpoints.

EcoStruxure™ Building drives your digital transformation

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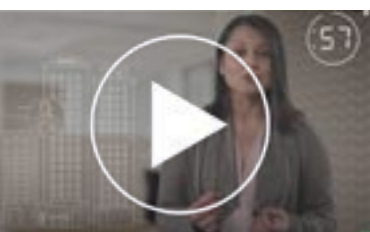

EcoStruxure Building offers a platform of digital connectivity solutions for meeting the four objectives required for healthier buildings: space management, occupant well-being, occupant engagement, and operational efficiency.

This digital system of systems is a multi-layered architecture spanning smart, IoT-connected devices, building-system management and control software, along with apps, analytics and services. EcoStruxure Building can analyze all your building's data to detect downtime, drive efficiency, and boost performance.



4 objectives, 8 digital solutions

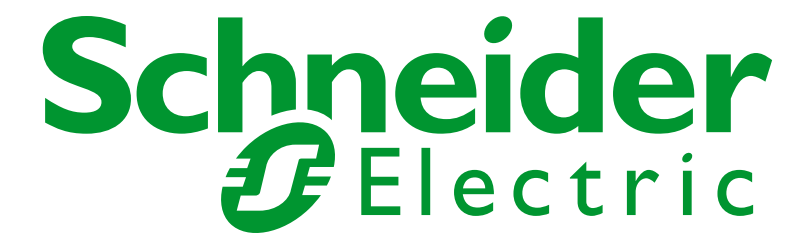
This platform incorporates eight solutions that each address and improve one or more of the critical healthy building objectives:

	Enhance Occupant Well-Being	Reduce Operating Costs	Maximize Space Efficiency	Improve Employee Experience	How It Works
EcoStruxure™ Building Operation. An open and secure building management platform to integrate multiple systems for centralized, real-time control, allowing you to:	●	●			
EcoStruxure™ Workplace Advisor. An integrated workplace management system that gives visibility into current space use, helping to:	●		●		
EcoStruxure™ Engage Enterprise. An intuitive app for sending occupants personalized safety updates and guiding them to open seating locations to:				●	
EcoStruxure™ Building Advisor. Intelligent building analytics software that monitors core building systems to identify faults, enable predictive maintenance, and reduce energy costs to:		●		●	

Continued

	Enhance Occupant Well-Being	Reduce Operating Costs	Maximize Space Efficiency	Improve Employee Experience	How It Works
<p>EcoStruxure™ Power Advisor. Power analytics software that monitors electrical networks to empower service teams with better visibility into electrical data, further improving data quality to:</p>		●			
<p>Connected Room Solution. An IoT-enabled connectivity hub that helps improve building efficiency and delivers a personalized occupant experience, to:</p>	●	●		●	
<p>EcoStruxure™ Security Expert. An integrated, role-based physical-access control and intrusion-detection solution that unifies building security infrastructure and building management systems, helping to adhere to safety protocols, in order to:</p>	●	●			
<p>EcoStruxure™ Access Expert. An open, mobile cloud-based approach enabling remote access to video monitoring, intrusion detection and alarms, and contact tracing from a simplified user interface, to:</p>	●	●	●		

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To learn more about healthy building operations and our Schneider Electric solutions to help improve your buildings' health scores, visit:

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