UL Solutions

Safe, Smart and Sustainable Buildings:
A guide for mitigating risks and driving asset performance across the
real estate portfolio

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Rise to the challenges of today's built environment

Safe, smart and sustainable buildings

Today's buildings are complicated, comprising many overlapping systems that require careful integration and evaluation. However, understanding the three core areas of safety, security and sustainability can help mitigate critical safety risks, drive asset performance and support occupant satisfaction.

By analyzing a property or portfolio holistically, real estate stakeholders can identify targeted improvements and investments to realize rich benefits, such as improved sustainability metrics, increased asset value, enhanced tenant satisfaction and many more.

Learn about key issues trending in safety, smart technology and sustainability for real estate stakeholders and how to start making measurable progress today.

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Safe

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Ventilation

Data center safety

Building verification

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Staff training

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Safety beyond the surface

Respond to new concerns and drive results with a holistic approach to safety

Today's real estate ecosystem requires a more nuanced view of safety that extends beyond the bricks and sticks that make up a property. By looking at safety holistically, from the physical premises to emerging digital developments, all stakeholders can play an active role in protecting and preserving life, property and asset value.

Peace of mind through bedrock fire protection

According to the National Fire Protection Association, fire departments respond to a fire in the United States every 23 seconds. In 2021, 1.35 million fires caused 3,800 deaths, 14,700 injuries and $15.9 billion (USD) in property damage. While alarming, injuries and deaths from fires have decreased dramatically from rates in the 1970s and 1980s globally. This progress can be attributed to enhanced building codes and building materials and better fire detection and suppression technology.

Provide reassurance to asset owners and occupants with sustained vigilance. Here are some actionable ways to improve and maintain fire safety throughout a property:

- **Demonstrate compliance** with applicable codes and standards requirements including annual inspections on fire, firestop systems, fire-resistant joint systems and perimeter fire containment systems.

- **Select fire doors and dampers** that have been tested and certified to applicable standards and ensure these are inspected annually on site.

- **Choose professional, ethics-driven experts** to perform independent analysis on your fire safety efforts to identify gaps in compliance that may impact safety.

In 2021, 1.35 million fires caused 3,800 deaths, 14,700 injuries and $15.9 billion (USD) in property damage.

"Large-Loss Fires and Explosions in the United States in 2020,"
National Fire Protection Association, 2021,
www.nfpa.org/~/media/Files/News%20and%20Research/Fire%20
statistics%20and%20reports/US%20Fire%20Problem/osLargeLoss.ashx

Enhancements through lighting strategies and products

Lighting can be used to support optimal performance of occupants, and it can provide additional functional benefits.

In 2020, researchers studied the biological effects of office lighting, which is generally only designed to meet minimal performance requirements and reduce visual discomfort. However, by adding human-centric lighting solutions such as high circadian lighting, office workers reported better sleep and fewer depressive symptoms.

Indoor air quality remains a hot topic and priority for current and prospective tenants. Ultraviolet (UVC) lighting has powerful sanitizing and germicidal properties and is gaining in adoption in public, but not all UVC products on the market safely contain UVC radiation or comply with regional requirements — without proper safeguards these products can even be harmful.

Make the most of lighting throughout your properties for the comfort and safety of tenants. Review this list of smart next steps:

- **Understand your current lighting conditions** by tapping lighting experts to conduct 2D heat mapping and circadian mapping to shape your performance strategy.

- **Select tested and certified UVC products** to meet performance, design, safety and functional goals and provide staff with appropriate training.

- **Work with lighting experts** to review your properties to identify gaps in safety or performance that may present hazards or opportunities for refinement and differentiation.

"Personalized Office Lighting for Circadian Health and Improved Sleep," Electrical Engineering Department, Eindhoven University of Technology and Signify, Charikleia Papatsimpa and Jean-Paul Linnartz, 2020, www.ncbi.nlm.nih.gov/pmc/articles/PMC7472178/

Identify — and plan for — performance and ongoing safety needs for the building envelope

The building envelope represents significant risks for real estate stakeholders. More erratic weather patterns put additional demands on the integrity of windows, walls, facades, roofs and other key parts of the building envelope. Warmer, wetter winters can also lead to problems with mold, insects or rodents.

Planning for building maintenance while balancing return on investment is always challenging. Add in the additional complications and costs from climate change and the picture gets cloudier — and costlier. Asset owners should expect additional costs from weather-related projects, while building staff need training to spot these other hazards. But when you're already stretched thin, having that holistic perspective can prove difficult.

As you begin reckoning with what the reality of climate change means for your building envelope, add these ideas into your planning process:

- **Consider working with a third-party provider of advisory services** with deep experience across the built environment. Advisory support helps you understand existing requirements for all phases of a building's life cycle.

- **Identify areas of risk** where improvements performed can make a significant, positive impact on safety and asset value. These should be done by your team, enhanced by the support of outside experts who can offer seasoned counsel.

- **Select products that have demonstrated compliance** with up-to-date regulatory requirements. Certified products undergo rigorous field testing, standing up to wind-driven rains, hurricane and tornado winds, extreme temperatures and more, to see how they perform before, during and after construction.

Advanced preparation for lightning strikes

Did you know that lightning strikes cause more than $1 billion (USD) in structural damage every year? That's 3%-5% of all commercial insurance claims. But adding a lightning protection system can help.

High-value buildings such as skyscrapers, government institutions and airports often have lightning protection systems. While building codes don't often require lightning protection systems, increasingly, other commercial structures are adding this tool to their safety toolboxes.

Take note of these tips for adding a lightning protection system or evaluating your existing system:

- **Look for systems** that have been tested, inspected and certified, including products with Master Label® certification.

- **Find qualified technicians** proven to have critical knowledge of and skills in the lightning protection systems industry, such as a UL Solutions Lightning Protection Journeyman Certification (LPJC) or a UL Solutions Lightning Protection Master Certification (LPMC).

- **Evaluate the need for a lightning protection system** for building additions, outbuildings and more.

"Lightning Protection Technologies (LPT) - Global Market Trajectory & Analytics" Global Industry Analysts, www.prnewswire.com/news-releases/global-lightning-protection-technologies-lpt-market-to-reach-1-1-billion-by-2026--301322160.html

Help occupants breathe easy

Recent studies show that more than 40% of renters and more than 70% of office workers are concerned about indoor air quality, which can be tainted by particulate matter and volatile organic chemicals. Indoor aerosols, from pathogens such as coronavirus, influenza and the common cold, also represent a significant risk to occupants and building staff due to their transmissibility and ability to remain airborne for hours.

The largest source of risk to healthful air is poor ventilation — and increasingly, occupants understand this and demand information about your building's approach to managing good indoor air quality. However, many properties can't provide much information outside of a maintenance schedule for HVAC maintenance or filter changes.

Tell a complete story about your property's methods for proactively managing indoor air quality. Here are some methods to improve your communication strategy and boost occupant confidence:

- **Aim to achieve at least two equivalent air change rates** delivered at the building level and 99% hourly aerosol removal in at least 10% of high-density areas.

- **Work with an independent provider** to verify the performance of your ventilation, filtration and air cleaning technologies — and share the results with current and prospective occupants.

- **Participate in ongoing monitoring** to ensure continual delivery of healthful indoor air, at least on an annual basis.

"New Survey Finds Many Renters are Concerned About the Impact of Home On Health," 2021, Joint Center for Housing Studies of Harvard University and The Farnsworth Group,

"2022 Building Occupant Survey," 2022, Honeywell and Wakefield Research, https://buildings.honeywell.com/us/en/solutions/healthy-buildings/healthy-buildings-occupant-survey-2022?utm_source=pressrelease&utm_medium=pr&utm_campaign=healthy_buildings&utm_content=feb-occupant_survey-report

More than 40% of renters and more than 70% of office workers are concerned about indoor air quality.

Enhance safety of data centers

In 2021, the demand for data centers in the United States increased by 72.9% from 2019, according to research from real estate firm JLL.

These dedicated spaces house information technology equipment for the purposes of storing, processing and disseminating data that support our daily online and mobile applications. Data centers are considered critical infrastructures typically requiring redundant architecture or backup systems, tight environmental control and the highest level of security to reduce or eliminate the risk of downtime.

At the same time, a tight labor market means finding skilled staff can be a challenge. Connectivity has never been more important, and poorly trained data center employees may lead to installation and operational errors that impact reputation, tenant retention and cost of ownership.

Take a smart approach to data center development, whether that's a fixed location or a rollout of modular sites. These steps can help manage operational costs while keeping uptime and safety in mind:

- **Identify highly qualified data integrators** that have demonstrated mastery of equipment installation by looking for independent verifications from reliable third-party organizations.

- **Select modular data center equipment** that has been evaluated systemically, along with certified components, to help increase safety during installation, operation and transportation.

- **Stay current with data center technology**, such as immersion cooling, to maximize operational efficiencies, conserve carbon emissions and enhance safety.

"Data center leaders: Ready to tackle rising construction costs?" 2021, JLL, www.us.jll.com/en/views/data-center-leaders-ready-to-tackle-rising-construction-costs

Inspire confidence across the built environment

Real estate stakeholders need to satisfy two key audiences throughout a building's lifecycle: regulators and tenants. From construction through occupancy, developers must perform due diligence and demonstrate compliance with key safety requirements.

At the same time, prospective and current tenants are growing more concerned about the healthfulness of their indoor environments. As a result, 61% of real estate investors are using healthy building certification or verification programs as a way to showcase successful efforts toward health and wellness or to attract and retain tenants.

Satisfy regulators while reassuring tenants and occupants as to the safety of the built environment, both holistically and systemically, through this approach:

- **Arrange for rigorous, science-based assessments** before regulatory inspection to discover issues ahead of time, accelerate occupancy timelines and reduce costs.

- **Secure advisory services** to plan remediation when regulators flag issues prior to sale or to assess contractual compliance.

- **Perform a third-party assessment** of the holistic built environment, including indoor air quality, water quality, lighting, acoustics, hygiene and more, to demonstrate performance.

- **Enhance property marketability** by verifying health and wellness claims efficiently, in tandem with the requirements of other green building programs, to attract the attention of high-value tenants.

BentallGreenOak, Center for Active Design, & United Nations Environment Programme Finance Initiative, (2021). A New Investor Consensus: The Rising Demand for Healthy Buildings. www.fitwel.org/new-investor-consensus

61% of real estate investors are using healthy building certification or verification programs.

Building details when you need them most

Key professionals need instant insights into how a building was constructed and where building systems are located, such as components, access points and disconnections.

This information helps first responders more effectively manage crises and construction and engineering professionals streamline work.

Here's how you can add visibility into your built environment during emergencies and beyond:

- **Identify a technology solution** to offer real-time access to life-safety data.

- **Look for a web-based system** that allows stakeholders to access, validate and analyze building data efficiently and quickly.

Training that makes a difference

Seasoned, skilled staff are so important in maintaining and managing a safe, smart and sustainable building.

Functional training should go beyond demonstrating compliance with requirements and help you safeguard staff and occupants through targeted instruction. An investment that builds a highly trained workforce can pay off with reduced injury rates, turnover and operating costs.

Here's what you should look for when evaluating providers of functional training:

- **Recognition from industry publications or organizations**, plus a wealth of references from other real estate organizations.

- **Broad range of environmental health and safety programs** across multiple formats and language offerings developed by subject matter experts.

- **Can customize or create courses** unique for your staff or situations.

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Smart

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Smart buildings: a challenge and an opportunity

Future-forward strategies for today's tech-centric occupants

Modern buildings contain interconnected systems that require smart approaches to enhance productivity, security and performance.

The evolving needs of the built environment must be addressed from an integrated perspective to support the needs of occupants and the professionals who manage, maintain and own these assets.

Learn how offering intelligent solutions that support a connected landscape can help grow satisfied occupancy, achieve marketing distinctions and enhance asset value over the long term.

Understand how smart technology can optimize results

Today's workplaces rely on hyper-connected technology and a reliable, least-cost power supply to attract and retain businesses. Transforming a property into a true smart building can meet these needs now and set up stakeholders for future success, realizing a range of benefits such as premium rents and transaction prices, eligibility for credits and grants, and access to performance data that leads to more informed decisions.

Satisfy regulators while reassuring tenants and occupants as to the safety of the built environment, both holistically and systemically through this approach:

- **Demonstrate real progress via independent assessment** that analyzes aspects of the property such as cybersecurity and connectivity, health and well-being, life and property safety, power and energy, and sustainability.

- **Design and optimize sustainable energy storage** to preserve access to power in case of supply issues or inclement weather.

- **Make a plan to support the energy needs of electric bikes and vehicles,** especially as tax credit programs have made these products more affordable for more consumers.

Smart buildings command a rent premium of 8.2% and a 23.7% sale premium over buildings without those features.

Real Estate Innovation Lab at Massachusetts Institute of Technology (MIT), Dr. Andrea Chegut, 2020, https://www.ey.com/en_us/real-estate-hospitality-construction/how-smart-can-a-smart-building-be

Responsiveness through connectivity

The advanced nature of individual building systems, such as lighting, HVAC, acoustics and more, can only be maximized through communication and cooperation throughout the built environment.

Greater interoperability can transform a building's efficiency by connecting devices, appliances and systems in response to occupant needs or environmental factors. Depending on the type of built environment, such as historic settings or large campuses, enhancing interoperability may present additional challenges that require more complex solutions.

See how interoperability should be considered holistically to advance smart building performance.

- **Gain a complete understanding of the current state of interoperability** with an evaluation to identify, prioritize and promote your smart building performance. Depending on the framework, you can start with a self-assessment followed by more rigorous, independent analysis.

- **Follow this road map to enhanced interoperability** by selecting building control systems, building automation tools and communications equipment that demonstrate compliance with interoperability standards and requirements.

- **Choose professional, ethics-driven experts** to perform independent analysis on your fire safety efforts to identify gaps in compliance that may impact safety.

Cybersecurity challenges for a highly connected world

Device manufacturers, suppliers, system integrators and other stakeholders from chip to cloud continue to face cybersecurity challenges in today's highly connected world. This impacts real estate stakeholders that need to improve building connectivity and occupant security.

As more stringent government and industry regulations emerge across industries, here's what to look for to boost cybersecurity:

- **Choose wireless products that have been assessed for cybersecurity** and issued clear ratings based on science-based metrics.

- **Ask systems integrators if they evaluate the security performance** of firmware in installed systems in the field.

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Advance your sustainability journey

Transparent progress that supports evolving stakeholder goals

Sustainability is increasingly on the minds of many real estate stakeholders.

Property managers want to streamline costs by using resources more efficiently. Occupants are in search of greener, more healthful and reliable living and working environments. Asset owners need to demonstrate progress toward environmental, social and corporate governance (ESG) goals through public disclosures.

Discover how to enhance sustainability throughout the built environment with science-focused strategies that address significant challenges with actionable plans for progress.
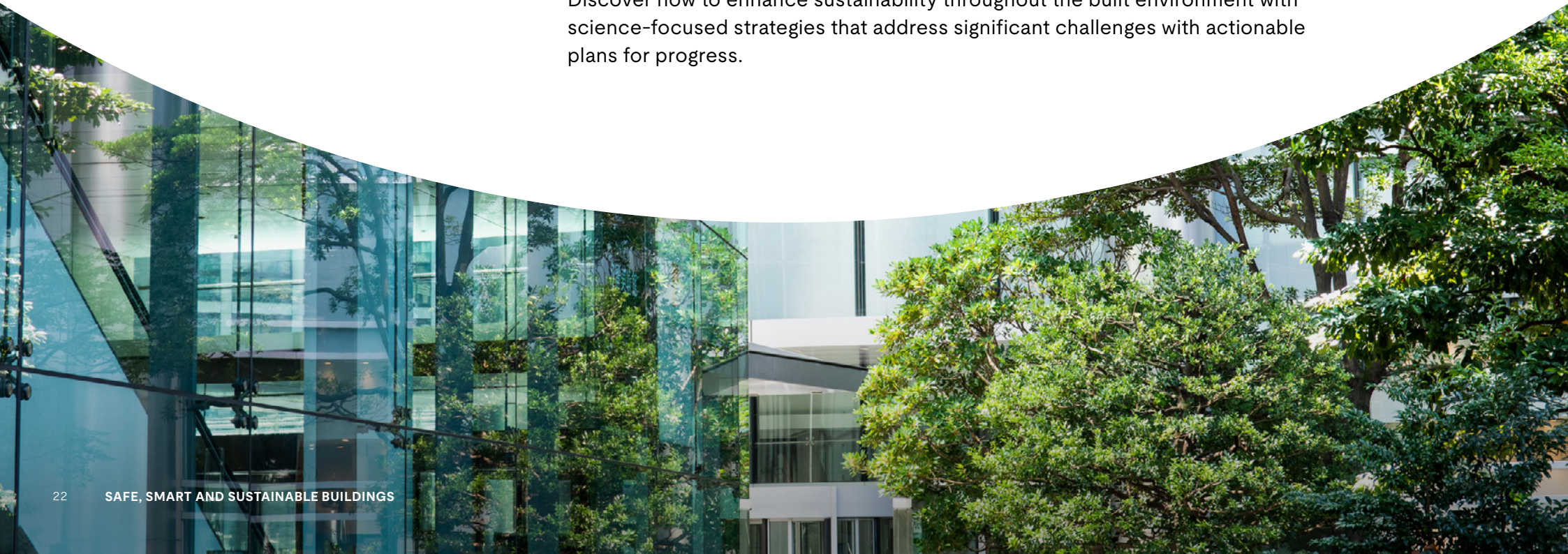
Measurable and meaningful sustainability

Increasingly, key stakeholders turn to ESG reporting to drive decision-making — including 65% of investors, who look to ESG to manage investment risks.

The real estate industry is responding by participating in ESG-related reporting frameworks to communicate long-term risk, but also more immediate benefits derived from sustainability, as well as the portfolio's impact on the community.

According to EY, corporations have more than 600 potential reporting frameworks to choose from, each with their own specific data requirements. Sustainability software can help collect, calculate and communicate relevant data so your staff can focus more resources on developing and implementing ESG strategies.

Here's what to look for:

- **Choose a product designed for the real estate industry**, not a general platform. This will help make reporting more efficient and minimize the demands on staff time.

- **Look for options that offer user-friendly features**, such as compare-and-contrast tools and executive views, while facilitating a clear audit trail with qualitative data checks and automated calculations.

- **Select sustainability software that helps you grow your reporting journey**, with accreditations across multiple protocols, including GRESB, CDP for scope 1, 2 and 3 emissions and Energy Star®.

"The future of sustainability reporting standards: The policy evolution and the actions companies can take today," June 2021,
https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/sustainability/ey-the-future-of-sustainability-reporting-standards-june-2021.pdf

Actionable sustainability guidance

Increasingly, investors are looking at ESG strategies and performance metrics to judge potential return on investment and anticipate risks.

While new reporting frameworks make communicating progress easier, developing and maintaining a long-term, successful ESG program remains challenging.

Keep these priorities in mind as you customize your corporate ESG strategy development and management to achieve measurable results:

- **Get advice and guidance from professionals** with a wealth of knowledge in reporting frameworks, regulatory requirements and impactful strategies.

- **Develop real road maps**, including materiality assessments, identification of key performance indicators, reporting, data tracking and much more.

- **Find support that helps streamline your team's efforts** so they can focus on improving performance.

Total energy consumption by residential and commercial buildings

39%
in the U.S.

40%
in Europe

Sources: United States Energy Information Association, Bentall Kennedy

Sustainable lighting solutions

Lighting is an essential element of smart cities' infrastructure supporting multiple objectives of municipal leaders, including community wellness, safety, reduced costs through lower energy use, lower carbon footprint and broader sustainability commitments.

A connected approach to solar lighting supports automatic illumination optimization based on surrounding conditions, maximizing performance and minimizing maintenance costs.

Add connected photovoltaic (PV) lighting throughout your real estate portfolio safely and effectively.

Here's how:

- **Perform a site analysis** to determine how and where to integrate PV products and solutions.
- **Select PV items that have been tested**, inspected and certified to comply with performance, safety and connectivity requirements by third-party laboratories.

Sustainable storage solutions

As communities and companies seek more stable, sustainable energy solutions, microgrids have taken center stage as a promising solution.

These smaller-scale, localized energy grids support energy cost reduction, decarbonization and continuous access to energy, regardless of weather or other power interruptions. Real estate stakeholders should weigh microgrid needs for built environments to offer more reliable, resilient energy solutions as well as additional features such as electric vehicle charging.

Advance your energy-resilient future with microgrids. Some aspects to consider include:

- **Work with a reputable provider** to perform energy modeling based on your sites and goals.

- **Determine the optimal mix of energy resources**, system size and configuration.

- **Anticipate capital and operating costs** of microgrids and distributed energy resources (DER).

Enhance your assets across core areas

Addressing the complex challenges of today's more complicated built environments requires attention to safety, security and sustainability.

UL Solutions offers unbiased, science-centric products and programs specific to the real estate industry. By working with us, stakeholders can manage safety and security concerns while progressing toward regulatory and sustainability goals. Our technology-forward innovations, combined with expertise from recognized professionals, can help you realize portfolio growth and increased tenant retention.

Learn more at **UL.com/SSSB**.

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