FMJ | OFFICIAL MAGAZINE OF IFMA | JULY/AUGUST 2022 | SUSTAINABILITY

FMJ

IFMA™

WWW.IFMA.ORG/FMJ | JULY/AUGUST 2022

inside

The Costs of Ownership

Rethinking a Finite Resource

Compliance for Success

SUSTAINABILITY

The Value of IFMA

Benefit from the largest global community of facility management professionals.

FACILITATING GROWTH

Resources to increase your industry knowledge

Members receive enewsletters and IFMA's FMJ to keep on top of industry news. You can also find vendors in the FM Buyer's Guide and find your next career opportunity on JOBnet.

Training and Credentials to advance your career

Prove your mastery with an IFMA credential – or develop new skills and learn about industry trends. Members receive discounts on training and free opportunities.

Networking to build your community

Connect with professionals at the local and global levels with IFMA's member-only networking opportunities. Build relationships in the Engage Forum or join a chapter, council or community.

Opportunities to Make an Impact

Make a lasting contribution on IFMA and the FM profession by taking advantage of an IFMA leadership opportunity, submitting content or participating in advocacy efforts.

Events to Grow Your Career

Attend an event to connect with industry professionals while gaining insights and knowledge from world-renowned experts. Members receive discounts on IFMA event registration.

IFMA helps facility mangers advance personally and professionally with 30+ membership benefits.

IFMA™

IFMA.org

EVERY SPACE CAN BE A HEALTHY SPACE

We spend roughly 90% of our lives indoors, and the past few years have highlighted how our well-being is directly affected by our physical surroundings. Indoor environmental quality (IEQ) consists of several key factors: air, sound, temperature, light, and more. Learn how 24/7 Defend™ products can help contribute to outstanding IEQ at armstrongceilings.com/healthyspaces

24

24/7 DEFEND™
Solutions for Healthier, Safer Spaces

CALLA® HEALTHZONE™ AIRASSURE™ PANELS & VIDASHIELD UV24™ AIR PURIFICATION SYSTEM
ARMSTRONG WORLD INDUSTRIES LIVING LAB, LANCASTER, PA / GENSLER

Armstrong®
CEILING SOLUTIONS

Features

020 **SEC's Proposed Climate Rule**
What FMs need to know
Dr. Spenser Robinson & George Sullivan

027 **The Costs of Ownership**
Outsourcing contracts for proper tracking
Alex Ehrenberg & Colette Temmink

030 **Net Zero Labs**
Reducing carbon in energy-intensive labs
Gary Clark & Rob McGill

034 **Building Envelope Campaign**
Year 2 Update
Hayley McLeod

038 **Toxic Buildings**
An additional impact of chemical use
Kim Justesen

042 **By Default**
Incorporating efficiency into routine renovations
Paul Mathew

047 **Underwriting the Cost of Carbon**
The new FM decision making
Robert Behrens, Alan Grant & Sarah Spencer-Workman

052 **Biomimicry, Too**
Organization based on nature
Bill Conley

056 **Waste Solutions**
For green goals
Kristin Steiner

060 **My Facility**
NREL, Golden, Colorado, USA
Caroline Kelley

066 **Water**
Rethinking a finite resource
Robert Glennon

070 **Finding Balance**
Risks & goals in ventilation
John McCarthy, David Macintosh & David Shore

076 **Taking Aim**
Using PropTech to hit targets
Mike Darby

080 **Weather or Not**
Preparing a facility for its climate
Derek Ortt

084 **Keeping Track**
Using AI to reduce carbon footprint
Nikki Mehta

094 **Ready, Set, Go!**
The accelerated race to net zero
Mark Reinbold

100 **Sustainable O&M**
Developing resilient plans
Dan Arant

104 **Follow the Blueprint**
Compliance for success
James Bernard & Magdalene Sim

108 **At the Intersection**
Sustainability & the future of work
Julia Kean

111 **Sustainable Infection Prevention**
FM strategies
Brian Spada

Sections

Editor's Column 006
Chair's Column 007
President's Column 008
Industry News 009
Credential Recipients 064
Corporate Sustaining Partners 088
Behind the Brand 090
Advertiser Index 114

IFMA™

IFMA is the world's largest, most widely recognized association for facility management professionals, supporting more than 20,000 members in 135 countries. Founded in 1980, IFMA's vision is to lead the future of the built environment to make the world a better place. A key contributor to the development of international FM standards, IFMA provides career resources, continuing education and three industry-respected credentials; maintains the largest repository of FM-related content on the web; and hosts year-round global events. Among the values that guide us, we believe in the benefit of global diversity, inclusion and social equity; and we recognize that sustainability, resilience and responsible environmental stewardship are paramount. For more information, visit ifma.org.

FMJ (ISSN 1059-3667) is published six times a year (January/February, March/April, May/June, July/August, September/October, November/December) by the International Facility Management Association, 800 Gessner Road, Suite 900, Houston, Texas 77024-4257 USA. Periodicals postage paid at Houston, Texas and at additional mailing offices. One electronic copy of each issue is supplied to IFMA members. Printed copies are available to members at an additional US$48 per year. Nonmembers can purchase a subscription for US$84 per year. To receive a subscription, mail a check to FMJ, attn: Subscriptions; 800 Gessner Road, Ste. 900; Houston, Texas 77024-4257 USA or visit www.ifma.org/fmj/subscribe. For advertising rates call +1-281-974-5674 or email diana.maldonado@ifma.org. FMJ is printed in the United States. FMJ reserves the right to edit any articles received or solicited for publication. This right includes the discretion to select titles, artwork and layout. Opinions expressed in articles are those of the authors, not necessarily those of FMJ staff.

POSTMASTER Send address changes to: FMJ, 800 Gessner Road, Suite 900, Houston, Texas 77024-4257 USA.

PLEASE RECYCLE ♻

Online

ON THE GO? FMJ can be viewed on your mobile device, so you can get your FM content fix anywhere, anytime.

FMJ Extras

The online version of FMJ features extra resources like videos, podcasts, white papers and more to enhance your reading experience. Click on the FMJ Extra icons that appear in the digital magazine to link to additional sources of information to learn more about topics covered by articles in this issue.

023 Resource
The Enhancement and Standardization of Climate-Related Disclosures for Investors

036 Article
Signed, Sealed, Delivered

043 Case Study
Implementation of ISP in a bank branch office

058 Resource
Recycling Guide

FMJ Extended

Check out the online issue of FMJ for a special section that follows the end of the print magazine and includes additional articles not available in the print edition. Read the extra articles listed below for contributions from councils and communities, and other supplementary content.

Ask the Experts

Grid-Interactive Buildings
A day in the life
Elena Bondareva

Green Business Certifications
FM's challenges
Dr. Dyugu Erten

With (re)Purpose
Giving potential waste a new life
Damon Carson

Consider This
Microgrids
Mark Wialbut

Apples to Apples
Developing a sustainable energy strategy
Azi Feifel

Decarbonization Pathways
Meeting sustainability goals
Tony Liou

Window Inserts
Achieving energy efficiency in historic buildings
Sam Pardue

Sustainable Facilities are Essential for the Future
Nayab Khokhar

Editor's Note Bobby Vasquez

The wants and needs of an organization pull facility management in many directions. Front-facing, visitor-accessible areas must be pristine and "dressed to impress." Workspaces must be functional and flexible for its employees to be productive. Meanwhile, all building systems must be maintained, monitored and ready for any emergency situation.

And that's not all.

With mounting pressure of the looming 2030 Paris Agreement goals, organizations are relying on facility management teams for sustainability action. However, these goals also allow FM to pull their organizations in the right direction. Sustainability is one of few strategies that can truly benefit all. Lowering emissions and using cleaner fuels leads to cleaner air. Monitoring contaminant levels and sustainable conservation practices lead to less contaminated, more accessible water.

There's also sustainability's impact on employee and consumer satisfaction. Users want to know where and how their product was sourced, its carbon footprint and what they can do with its disposable parts and packaging. Employees are generally happier knowing their organization is responsibly and actively supporting their health and well-being, as well as that of the community.

FM's influence has already established longtime practices such as reduce, reuse and recycle as well as more complex projects like green retrofitting and energy management solutions. These initiatives may seem like the proverbial drop in the bucket, but they also are part of a deluge of strategies that can truly change the world for the better. They provide vital cost savings for the organization, while showing visitors and stakeholders that sustainability leads to tangible returns on investment.

When the C-Suite sees the energy savings generated by sustainable FM planning and strategy, they will want FM's next big idea. Just like in maintenance, there's no one-size-fits-all sustainability solution. FMs must know their portfolio and organization to find what works best where they are. The global goals are set. Federal and local mandates can act as guidelines to meet those goals.

It all starts with action. The goals set forth in the Paris Agreement are achievable, but the work must be done. This issue of IFMA's FMJ could have that next organizational-changing solution. Our FM authors discuss global sustainability strategy and efforts from leveraging funding to the delicate balance of pandemic risks and climate change goals.

In addition to the resources found in the magazine, I also encourage you to share your experiences, strategies and solutions on IFMA Engage. Knowledge sharing is one of the most valuable tools we have. This IFMA member-exclusive forum connects industry professionals from all walks of life to ask questions, present challenges and find answers to everyday challenges and niche questions. Chances are another FM has experienced your challenge and can help you find the right solution. Conversely, your situation may have led to a unique strategy that can help FMs down the road.

The global thinkers who presented the challenges that comprise the Paris Agreement can be met by FM's global network of doers. FM has the solution.

Cheers!

Interested in writing for FMJ?
Email **bobby.vasquez@ifma.org** article ideas to be considered for future issues of FMJ.

From the **Chair**

LAURIE A. GILMER

P.E., CFM, SFP, LEED-AP

Chair, Board of Directors

Have you ever rushed out the door to get to a job site, leaving your cell phone on the kitchen counter at home? After the initial rush of emotions (panic, frustration, self-reproach), you went about your day, but likely felt disoriented, disorganized — disconnected from the contacts, apps and files you typically access reflexively.

Connection in all its connotations — physical, social, technological, mechanical, historical, emotional, environmental — holds significant power over our lives. Without it, we can feel displaced, isolated. Connection grounds us. Connection makes things work. Connection leads to understanding, innovation, growth. We need those links and bonds to truly feel we are a part of our families, our workplaces, our communities and our world.

For facility management, the pandemic upset our connections to one another, and we had to create unprecedented connections out of necessity. Barriers between occupants and FM teams were leveled as we worked to ensure safety, transparency and trust. Departmental siloes were broken down, ushering in a new age of strategic cross-functional teamwork. When the world was at its worst, people saw FM at its best.

FM is connected to every facet of the organization like never before. We are at the intersection of all disciplines within the built environment, and we have the attention — and appreciation — of not only our working partners, but C-Suite decision makers and government legislators. Having demonstrated our value in facing a global health crisis, we are positioned to recommend and implement measures that support ecological, human and economic health and resilience.

Almost 20 years ago, IFMA leaders and thinkers foresaw sustainability rising in prominence for our industry. While conventional-minded businesses considered sustainability a buzzword, feel-good fad or brand-building tactic, IFMA embraced FM's role in stewardship of the built environment, elevating the conversation as we began identifying how and where FM could make noticeable contributions to resource efficiency and environmentally responsible building operations — connecting sustainable improvements to triple bottom line benefits.

Whether confronting the challenges of aging buildings in a modern world or seizing the opportunities for organizational efficiency, staffing recruitment and retention, customer engagement and operational cost savings, sustainable business practices are rapidly becoming the rule, rather than the exception. Now, as we are learning to think in the language of net zero and carbon neutral, playing an increasingly important role in our organizations' reporting requirements, IFMA's Sustainability Facility Professional® (SFP®) credential program stands out as an essential tool for educating ourselves and our teams on measurable goals and strategies — the kind we need for long-term survival and growth.

One of my favorite definitions of sustainability is from the Brundtland Commission's "Our Common Future," published in 1987 by the United Nations: "Meeting our own needs without compromising the ability of future generations to meet their needs." That's about as straightforward as it gets and, I believe, something that every one of us can get behind.

More companies are setting and publicly sharing climate action and sustainable development goals. More regulations and standards are pushing sustainable practices to the forefront of long-term business strategy. FM's job is to align organizational practices and policies with what is important to the organization. Sustainability has reached that level of importance. We can lead our organizations on the path to positive action, incorporating the principles of sustainability into the decisions we make.

My term as chair will be focused on connecting members, partners, knowledge and resources for our profession's understanding, innovation and growth. Working together as a global industry — inspired and informed by our association — we can meet the needs of today, while also laying a sustainable foundation for the future.

From the **President**

DON GILPIN

President & CEO
IFMA

A number of recent reports point toward heightened global demand among consumers and employees for sustainably focused brands. Bain & Company's report, Unpacking Asia-Pacific Consumers' New Love Affair with Sustainability, found that among 16,000 APAC consumers surveyed, 90 percent said they are willing to spend a premium on sustainable goods. Essity's survey of U.S. employees who have returned to the workplace found the vast majority (75 percent) want a more environmentally friendly office.

But the same consumers who say they are willing to pay a higher price ultimately do not make a purchase, due in part to lack of trust in the companies' claims. And 71 percent of the more eco-conscious employees feel it is the employees who are leading efforts to make sustainable workplace changes rather than management.

While awareness has graduated to demand for greener, cleaner products and practices, the catch for companies is closing the "say-do gap." It is not enough anymore to simply stamp yourself "green." To not only gain the public's trust in your commitment to prioritize sustainability; but also, and more crucially, make a difference to people and planet, your reduced impact and improved performance must be measurable.

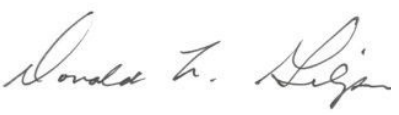
More companies are releasing their Environmental, Social and Governance (ESG) reports, with some incorporating ESG into their annual reports to show that sustainability is deeply rooted in their business. Accomplishments such as clean energy deployments, carbon reductions, increased workforce diversity and expanded customer access, fewer injuries, community volunteer hours, repurposed product materials, awards and certifications received are listed. This high level of transparency engenders confidence from the public as well as investors who are scrutinizing long-term business resilience.

Globally, regulations surrounding ESG reporting are growing. The facility management industry is uniquely qualified to affect change at the ground level of sustainability strategy and ensure that ESG standards are met. However, many business leaders are still scratching their heads over how to approach and factor in ESG, especially if they have lagged behind in fully integrating sustainable targets and initiatives.

Sustainability has been, and will remain, a core component of IFMA training and credentialing, content, research and advocacy. Among the Values that guide our association is recognition that responsible stewardship of the environment is paramount. As sustainability benchmarks and reporting standards evolve, we are adapting our resources to answer current questions and meet future needs.

IFMA's Sustainability Facility Professional® (SFP®) credential, for example — introduced in 2011 to help FMs understand sustainable best practices and make data-driven decisions to improve organizational performance — has undergone a rigorous update to include emerging global sustainability goals and regulations. Due to launch in the coming months, the revised SFP program will not only expand on vital areas such as energy, water, waste, materials and indoor air, it will also address how emerging trends such as ESG and circular economy can play a decisive role in achieving a demand organization's sustainable goals.

Higher expectations for sustainable action and accountability are on the horizon. IFMA is here to help FMs take advantage of the opportunity to lead their organizations from saying to doing, from head-scratching to high-fiving, and from claiming to affirming — good for business, even better for humanity and best of all for our planet.



IFMA 2022-23 GLOBAL BOARD OF DIRECTORS TAKE OFFICE

On July 1, Vice President and COO of Facility Engineering Associates (FEA) Laurie A. Gilmer, P.E., CFM, FMP, SFP, LEED AP began her term as Chair of IFMA's Global Board of Directors for the 2022-23 fiscal year. She is joined on the member-elected Executive Committee by First Vice Chair Dean Stanberry, CFM, LEED AP O+M, and Second Vice Chair Francisco Antonio de Souza Abrantes.

Two returning and seven newly appointed directors round out the global board. Based in Italy, Trinidad and Tobago, Mexico, Canada, Brazil, Singapore, Spain and the United States, IFMA board members support facility, real estate, project and global portfolio management; process improvement and performance management; office optimization and consolidation, technology; and corporate workplace strategy and design for organizations worldwide.

After serving two back-to-back terms as chair (2020-22), guiding the association through challenges presented by the COVID-19 pandemic, Peter Ankerstjerne, MBA, COP, IFMA Fellow will remain involved with the board as past chair.

"Our community is indebted to Peter's crisis management, foresight and enterprise. He accomplished so much for IFMA and FM, leading us through an ever-changing landscape of work and workplace, focusing our energies on buckling down, rather than buckling under, in adapting to new realities," said IFMA President and CEO Don Gilpin.

A published author, accomplished speaker, a strong proponent of professional education and credentialing, and an advocate for sustainable building performance, Gilmer takes the helm at a time of elevated recognition for the FM industry and increased opportunities to rekindle community connections that are the very foundation of IFMA.

"One of the overriding post-pandemic realizations for us as an association, an industry and a society is the importance of connection," said Gilmer. "Being physically cut off from one another made us see how important relationships are. It sparked a strong desire to develop and maintain our personal and professional bonds. Cross-functional teamwork and multi-industry partnerships have flourished. As a result, more organizations and related professions now fully grasp the true value of FM, and we're benefiting from a broad range of working partners from the ground floor to the C-Suite. As chair, I'm looking forward to strengthening our network and engaging with our community — fostering the connections that are not only vital to our future, but truly embody the IFMA experience."

2022-23 IFMA Global Board of Directors

CHAIR
Laurie A. Gilmer
P.E., CFM, SFP, LEED-AP
Vice President/COO, Facility Engineering Associates, P.C.
Santa Rosa, California, USA

FIRST VICE CHAIR
Dean Stanberry
CFM, LEED AP O+M
Chair, IFMA Government Affairs Committee
Denver, Colorado, USA

SECOND VICE CHAIR
Francisco Antonio de Souza Abrantes
Senior Consultant, FASA Consulting
Brazil

Cheryl Carron
Global Head, Facilities Management & Experience Services Corporate Solutions, JLL
Milwaukee, Wisconsin, USA

Christa Dodoo
CFM, CIWFM, FMP, CMQ-OE
Facilities Management Specialist, International Atomic Energy Agency
Vienna, Austria

Trudy Blight
CFM, FMP, SFP, BID, PIDIM, PMP, IFMA Fellow
Project Manager, AES Services, University of Manitoba
Winnipeg, MB, Canada

Jason E. Callis, CFM
Facilities Management, Project Executive
The Veridus Group
Indianapolis, Indiana, USA

Lorena Espada
EMEA Head of Facility Management, Chubb European Group
Madrid, Spain

Aykean Matthews
MBA, CFM, FMP
Facilities Director, The International School of Port of Spain
Port of Spain, Trinidad & Tobago

Arnald NG
CFM, SLCR, MRICS
APAC Delivery & Performance Director, GSK
Singapore

Lena Thompson
FMP, SFP, IFMA Fellow
Director, Building Operations & OFM, American Psychological Association
Washington, D.C., USA

Luis Viña
Director, Alliance Director LatAm, CBRE
Mexico City, Mexico

Learn more about IFMA's global board of directors at ifma.org/about/leadership-staff/board-of-directors/global-board-of-directors/.

IFMA MOVES INTO A NEW SPACE THAT SUPPORTS ASSOCIATION'S NEXT PHASE

"We're recreating the concept of 'work is not where you go, but what you do,' to 'work is where our valued workforce wants to go to enrich what they do.'"

– Don Gilpin, IFMA President & CEO

IFMA Global Headquarters is relocating two floors down from its present suite at One Memorial City Plaza in Houston, Texas, USA. Designed to foster teamwork, stimulate creativity, inspire social interactions and support employee flexibility, the new office will reflect beneficial lessons learned amid the COVID-19 pandemic about optimizing space to improve work performance, the human experience and the triple bottom line.

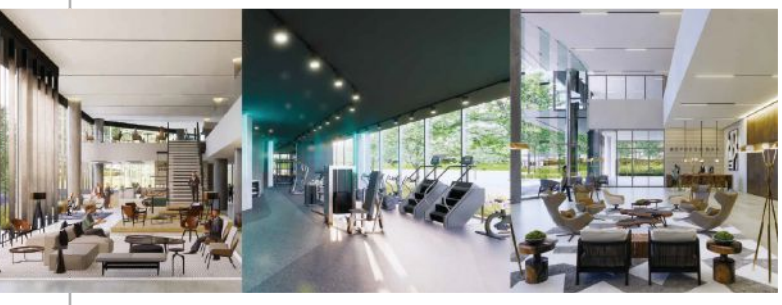
"Over the past two years, IFMA has conducted research, tracked trends, led discussions and built conference programming around the reimagined workplace," said IFMA President and CEO Don Gilpin. "We have to walk the talk in areas of workplace transformation that we're advocating for our members and the FM industry."

In addition to reducing its physical footprint by almost half (from 12,000 sq. ft. to 6,735 sq. ft.), IFMA's goal is to create a space that staff and visitors will want to come to — a comfortable, aesthetically interesting place to work and socialize, with features and amenities that inspire conversation and spark initiative.

"Every detail is aimed at enabling our pursuit for excellence on behalf of our members and the industry,"

– Don Gilpin

IFMA's objective is to keep the best of what it has now — multipurpose space, alternate work/social settings, modern ambiance, amenity-rich location — and enhance the experience for all who use and visit the space.



IFMA's office move coincides with a US$20 million renovation of the Memorial City Plazas complex, including modernized communal areas, touchless technology, tenant-shared meeting hub with a 100-seat auditorium and open greenspaces for events.

Working from an employee-first mindset, IFMA and its real estate and design partners have developed an office blueprint focused on these six key areas:

- ☑ **Safety:** Secure office with no reception area; security card/buzzer system for deliveries and visitors; separate, secured IT area
- ☑ **Sustainability:** Reduced physical footprint; abundant natural light from windows on all sides; natural plants; reusing/selling existing furniture; One Memorial City Plaza is a Class A office building certified LEED Gold Existing Buildings: Operations and Maintenance and WELL Health-Safety rated (IWBI)
- ☑ **Productivity:** Mix of conference/huddle rooms for concentrated work and open spaces for collaboration; double screens/monitors at work desks
- ☑ **Mobility:** Every employee is equipped with a laptop, VPN connection, collaborative tools such as Microsoft Teams; contracted IT support available 24/7
- ☑ **Well-being:** Combined mother's/wellness room and greenroom; frosted glass around enclosed spaces for added privacy; culture focused on diversity and inclusion, open and honest communication, environmental stewardship, innovation and knowledge sharing
- ☑ **Experience:** Designed with a luxury hotel aesthetic; use of modern, stylish furnishings/fixtures; pops of color throughout; booth area for informal or head-to-head conversation; the premier mixed-use Memorial City district is valued for its vibrancy and community connectivity

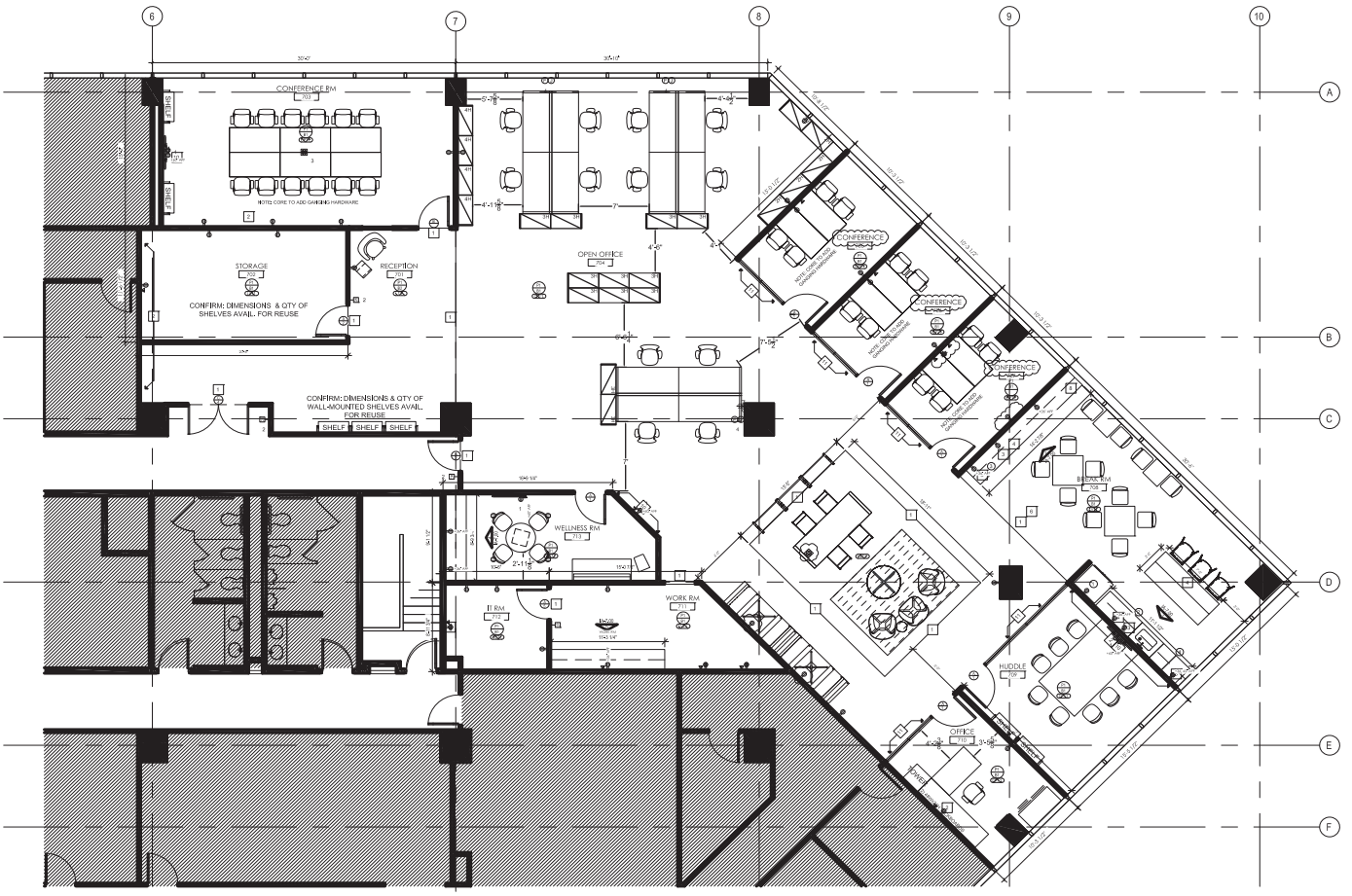
Gilpin added, "IFMA has a 100-percent mobile-ready staff that can respond quickly and successfully to change; but we want to reestablish the personal interactions that have energized our association from the beginning. We're excited to bring people back together in a welcoming, safe and beautiful environment aimed at stimulating the exchange of ideas."

New coalition to advance U.S. federal policy for workplace health and safety

The International WELL Building Institute and ISSA — The Worldwide Cleaning Industry Association recently launched the Healthy Workplaces Coalition. More than 40 organizations, industry leaders and trade associations — including coalition Steering Committee member IFMA — will work together to support U.S. federal policy promoting healthy workplaces and raise awareness about the imperative of workplace health and safety to benefit the well-being of employees, customers and the public.

"IFMA is proud to join with longtime partners and new associates to advance efforts toward improving the human experience in the built environment. The more voices we can add to advocate for elevated workplace quality, the stronger our chance to be heard."

– Don Gilpin



Architectural plan for IFMA Global Headquarters shows multiple seating options for concentrated work or team collaboration.

Canada bans 6 categories of single-use plastics

The Canadian government recently announced a ban on six categories of the most commonly found plastics polluting the country's shorelines and oceans. In June, the Minister of Environment and Climate Change and the Minister of Health published final regulations to prohibit single-use plastics, including:

- checkout bags
- cutlery
- foodservice ware made from/containing hard-to-recycle plastics
- ring carriers
- stir sticks
- straws (with some exceptions)

The ban on the manufacture and import of these harmful single-use plastics, barring a few targeted exceptions to recognize specific cases, will come into effect in December 2022. To provide businesses with enough time to transition and deplete their existing stocks, the sale of these items will be prohibited as of December 2023. The Canadian government will also prohibit the export of plastics in the six categories by the end of 2025, making Canada the first among peer jurisdictions to do so internationally.

Two guidance documents have also been published: one to help businesses adjust to the regulations; another to help businesses and citizens choose more sustainable alternatives to single-use plastics.

EU and Egypt step up cooperation on the green transition

In June, European Commission President Ursula von der Leyen and Egyptian President El Sisi issued a joint statement on climate, energy and the green transition. The EU and Egypt will join efforts to implement the Paris Agreement and ensure ambitious outcomes at COP27, which takes place in Sharm El-Sheikh in November. The joint statement commits both parties to work together on a global just energy transition, on improving adaptation capacity, mitigating loss and damage due to climate change, and on increasing climate finance to respond to the needs of developing countries.

The cooperation will have a particular focus on renewable energy sources, hydrogen and energy efficiency. The EU and Egypt will develop a Mediterranean Hydrogen Partnership to promote investments in renewable electricity generation; strengthening and extension of electricity grids, including trans-Mediterranean interconnectors; the production of renewables and low carbon hydrogen; and the construction of storage, transport and distribution infrastructure.

A trilateral Memorandum of Understanding between the EU, Egypt and Israel for the export of natural gas to Europe was also signed. The three parties will work together on the stable delivery of natural gas, in a way consistent with long-term decarbonization objectives, based on market-oriented pricing, and with the endeavor to ensure that future investments will not cause pollution of the marine or land environment.

Have relevant FM industry news to share?

Submit your news to be considered for inclusion in the Industry News section of the next issue of FMJ.
Send us an email at **communications@ifma.org**

fooda

Thank you for supporting local restaurants through your workplace food program.

Thank you, Fooda clients, for bringing local restaurants into your workplace. You are impacting your community. You are giving people an exciting reason to reunite in person and break bread together. You are raising your team's morale. These are all great reasons.

What are other reasons why workplaces partner with Fooda?

Fooda's flexible, scalable programs shield employers from uncertainty, respond to population fluctuations in real time, and keep budgets under control.

Fooda creates custom-tailored programs from our full stable of services

Food Halls & Cafeterias

Visiting Popup Restaurants

Group Deliveries

Micro-markets & Coffee

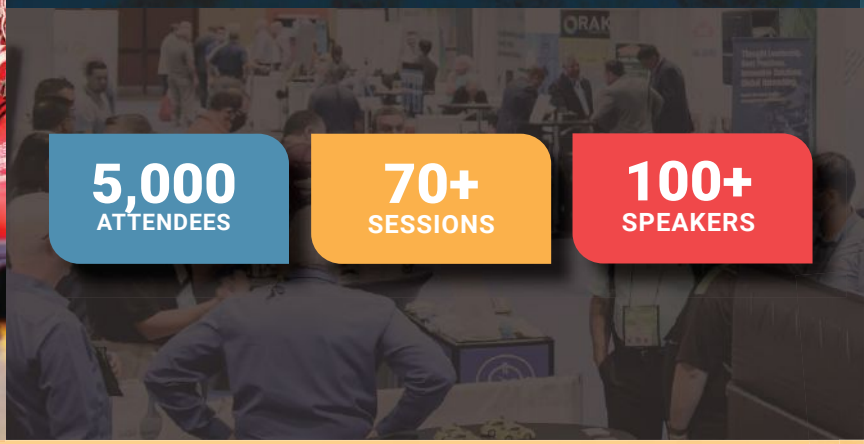
See how you can support your local restaurant community with a program that's designed to meet today's challenges

IFMA's WORLD WORKPLACE

TAKE CENTER STAGE

NASHVILLE, TN
SEPTEMBER 28-30

In the workplace arena, you want to be sure your performance gets a standing ovation. As the curtain lifts on FM's shift from purely operational to indispensably strategic, there's no business like know business. This year's marquee FM event in Music City will prepare you to take center stage in making the spaces you manage your tour de force.



5,000 ATTENDEES

70+ SESSIONS

100+ SPEAKERS

"If there's one place to get a year's worth of education, research and networking done, it's World Workplace. I never leave without growth in all three areas."

– David Stephenson, Director, Little Diversified, Architectural Consulting Inc.

Some may imitate, but cannot truly replicate, the FM industry's original, all-encompassing learning and networking event.

"There are FM conferences and then there is IFMA's World Workplace – memorable, relevant, educational and downright fun!"

– Giselle Holder, Director, Acuitas Caribbean FM Co. Ltd.

★ LEARNING ★

Gather sought-after practices, breakthrough ideas and supersmart tools to help you adapt, manage and master change.

★ NETWORKING ★

Build your network across disciplines and around the world, exchanging viewpoints, outlooks, methods and experiences.

★ ENTERTAINMENT ★

Come for the incredible conversations and information-packed sessions – stay for the 5-star restaurants and world-class entertainment.

"There's no place you can go to meet such a variety of people and backgrounds but have so much in common."

– Thomas Beeching, Regional Business Development Manager, The Davey Tree Expert Co.

300 EXHIBITORS

50+ PRODUCT/SERVICE CATEGORIES

2 KEYNOTES

4 FACILITY TOURS

Featured Activities

Pre-conference Courses

A well-composed career plan – select from IFMA's Real Estate, O&M, Finance & Business, Sustainability, Leadership & Strategy, and Project Management courses and/or the CFM® Exam Prep Workshop.

Expo Grand Opening

Music to the ear – The best in the business of FM support demonstrate tools, toys and tech to help you optimize your spaces; plus, daily prizes, Headshot Lounge, Education Arenas and more.

Welcome Reception

In perfect harmony – Jason Aldean's Kitchen + Rooftop Bar and Luke's 32 Bridge in the heart of Broadway host a Hoppin' Honky Tonk party with live music, food and drink.

IFMA Foundation Event

Walk the line – Enjoy drinks, savory appetizers, line dancing and auction bidding under the stars of Nashville in the majestic Country Music Hall of Fame, all to help make FM a career of choice.

IFMA's Awards of Excellence

Glimpse FM masterworks – Celebrate colleagues, components and companies being honored for incredible achievements in the industry and association.

NEW! Explore FM

The FM profession is dynamic and constantly evolving as innovations are introduced to the industry. Explore FM brings together IFMA's industry partners, councils and communities to share insights and growth opportunities you can apply to your career.

Facility tours

See behind the curtain – Add an exclusive tour to your registration:
Music City Center
Schneider Electric
Asurion - Gulch Hub
Vanderbilt University,
sponsored by Grainger

Facility field trips

A real crowd-pleaser – Experience what makes Music City legendary with the Country Music Hall of Fame & Museum or Walk & Eat Nashville tours.

SEE MORE

PREPARE TO TAKE CENTER STAGE...

DAY 1 OPENING KEYNOTE

Phill Nosworthy

Executive advisor, speaker, writer on leadership, high performance, and making business and life meaningful.

Sponsored by

DAVIES OFFICE
FURNISH A SMARTER WORKSPACE

NEW! Pecha Kucha

Strategic Sustainability for FM from Five Perspectives

Understand your new role in leading sustainability, resiliency and ESG. Learn how to examine your company mission and identify next steps; how to take immediate action and get budget buy-in; and how to identify your in-house and external partners.

Speakers/Topics:

Sheila Sheridan IFMA Fellow, RCFM, Retired Harvard University Director of Facilities: *Breaking through barriers;* **Greg Lamson**, Principal Facility Engineer, Boston Scientific: *Using data to advance sustainability* **Eric Dillinger**, VP of Strategy, Woolpert: *How to fix broken FM communication;* **Meredith Thatcher**, IFMA Fellow, CFM, Prosci®, Managing Principal, Cresa: *Moving toward a hybrid workplace* **Derek Bacigal**, IFMA YP Chair of the Americas, Director of Engineering, **Fairmont Orchid**, Hawaii: *Altering the course of climate change*

Moderator: **Alexa Stone**, LEED AP, SFP, ENV SP, IFMA ESUS Board, President, ecoPreserve

DAY 2&3 EDUCATIONAL SESSIONS

Case studies, panel discussions, lessons learned, goalsetting and strategic planning tools built around three program pillars: Human Factors, O&M and Sustainability.

Featured Sessions

Communication
I Can't Hear You! Effective Communication in a World Full of Noise
Speakers: Trudy Blight, IFMA Fellow, CFM, FMP, SFP, PMP, BID, NCIDQ, LCM; Kathleen Lausman, MBA, BES

Facility Information & Technology Management
Reimagining Buildings With AI and Digital Technologies
Speaker: Sudhi Sinha

Finance & Business
Using Your Capital Wisely: What Every FM Should Know About Operational and Capital Planning
Speakers: John Edwards, PE, CFM, FMP; Christopher Hodges, IFMA Fellow, PE, CFM, FMP

Leadership & Strategy
Leadership Lessons: From Iraq's Battlefields to America's Largest Facilities
Speakers: Jeffrey Jones, PMP, MBA, 6 Sigma MBB; Bryan Gray

Occupancy & Human Factors
Designing for Diversity, Equity and Inclusion: Steps to Creating Workplace Inclusion
Speakers: Kay Sargent, FASID, FIIDA, CID, LEED® AP, MCR/w, WELL AP; Micki Washington, AIA, NCARB, IIDA, NCIDQ, LEED AP

Operations & Maintenance
Advanced Surveying: Technologies and Building Information Modeling for Asset and Facility Management
Speaker: David Headrick

Project Management
From Design to Construction: Successful Transition to Sustainable Operations
Speaker: John Rimer, CFM

"World Workplace is a must for FM professionals at all levels and for those aspiring to work in the field. The education sessions are outstanding, well-organized and relevant to our industry. Amazing networking opportunities, and the vendor presentations and booths are a must. I look forward to attending each year."

– Roy Birbal, Chief of Public Buildings, City of Jacksonville, Florida

...IN LEADING ORGANIZATIONAL CHANGE

Real Estate
Real Estate Portfolio Analytics and Strategy Development
Speaker: Matthew Crocker, CFM, FMP, MBA

Risk Management
Facility Security in a Changing World: Safety Challenges in Today's Facilities
Speaker: Randy Braverman

Sustainability
What Energy Technologies Your FM Peers are Pursuing
Speakers: Jake Smithwick, PhD, MPA, FMP, SFP; Kenneth Sullivan

Workplace Evolutionaries
Best Practices to Pilot, Learn and Evolve Your Workplace Strategy
Speakers: Luc Kamperman, MSc; Kristin Reed, MBA, CCMP; Roy Hirshland; Patrick McGrath; Dr. Wayne Gearey; Surabhi Raman

View full schedule

Scan me

CHOOSE A CONFERENCE EXPERIENCE THAT STRIKES THE RIGHT CHORD.

All prices in U.S. dollars

Full IFMA members who register for the full 3-day event get all this for only

$985

- All-access conference pass
- All-access expo pass + Education Arenas
- Unlimited networking
- Keynote speakers
- Unlimited sessions
- Lunch vouchers + Awards of Excellence luncheon
- Daily expo prize drawing
- Welcome reception

Awesome add-ons

- Facility Tours: $79
- Field Trips: $129
- IFMA Foundation Event: $129
- Pre-conference Courses: (varies; see website)

Regular attendees receive 1 year complimentary membership with full event registration. Student full event registration is just $300. One-day passes are also available.

REGISTER NOW!
worldworkplace.ifma.org

SCAN ME

IFMA WORLD WORKPLACE

Our thanks to the following companies for their participation as an exhibitor and/or sponsor in IFMA's World Workplace 2022. **Thank you for your innovative solutions for our New World of Work.**

Exhibitors & Sponsors

CSP IFMA Corporate Sustaining Partners are listed in **bold.**

Exhibitors

2/90 Sign Systems
ABM
Accruent
ActivePure
ADT
AdvantaClean
AGF Manufacturing, Inc.
Airthings
AkitaBox
American Technologies, Inc.
APCO Sign Systems
Applied Technical Services, Inc.
Aramark Facility Services
ARC Facilities
archSCAN, LLC
Arnold's Office Furniture
Avian Flyaway Inc.
Bear River
BELFOR Property Restoration
Biamp Systems
Blackmon Mooring & BMS CAT
BluSky Restoration Contractors, LLC
Brown & Root Industrial Services
Butlr Technologies, Inc.
C&W Services
Cartegraph
CertPro Painters
Clockworks Analytics
Consolidated Fire Protection
Construction Specialties Inc.
Cora Technologies
CORPORATE CARE
CORT
Crazy Seal Products, Inc.
Dalkia Energy solutions
Davies Office
DHS Office For Bombing Prevention
Digilock
Directional Systems
Disruptive Technologies
Diversified Maintenance
DKI Commercial Solutions
Easi File
Ebm-Papst
eCIFM Solutions Inc.
Ecotech Office Environments
EDI, an ARORA Company
Eighth Day Design, Inc
Embrava
EMCOR Facilities Services
Ergotron
EthoSource, LLC
EVAC+CHAIR North America, LLC
Facility Engineering Associates PC
Farnsworth Group, Inc.
Fellows Brands
First Onsite
Flagship Facility Services
FlexCart
FloorMax USA
FM: Systems
FM360, LLC
FreeAxez LLC
FSR, Inc.
GardaWorld
GDI Integrated Facility Services
General Building Maintenance
Geospatial Analytics Inc
Global Plasma Solutions
GMR
GOJO Industries
Gordian
GP PRO (Georgia-Pacific)
Grainger
Gresham Smith
Haltian
Harvard Maintenance
Haws Corporation
Heraeus Noblelight America
Herc Rentals
Honeywell
Hoshizaki America, Inc.
IA Interior Architects
IFMA Central
Inspirotec (AirAnswers)
Instant Power Corp. (Scotch Corp)
Integrated Building Solutions
Interplay Learning
iOFFICE + SpaceIQ
Iron Mountain
ISSA
Jacobs
Jenkins Restorations
JLL Technologies
JRC Nationwide Construction
Kaiterra
Kastle Systems
KBS
Kee Safety, Inc
Kimberly-Clark Professional.
Kimco Services
Koike Imatecs U.S.A
LaserCycle, Inc.
Leadec
LogiSon Acoustic Network
Lucid Drone Technologies
M3 Technolgy Group
Maptician, Inc.
Marking Services, Inc.
Marsden Services L.L.C
milliCare Floor & Textile Care
Miracle Method Surface Refinishing
Mobile-Shop
Molekule, Inc.
MPW
MRI Software
NaceCare Solutions
Nashville Chapter of IFMA
NEBB
New Pig Corporation
Newmark
North American Rescue, LLC
Nuvolo
OfficeSpace Software
Omaha Steaks
Painters On Demand
Potter Electric Signal
Powering America (NECA and IBEW)
Precision Concrete Cutting
PRIDE Industries
Prime Power Services, Inc
Pringle Robotics
Prodigy Commercial HVAC
RaySecur Inc
Republic Services
Re-Stream
Rose Paving LLC
Rotolo Consultants, Inc.
Royal Cup Coffee & Tea
R-Zero Systems
Safe Facility Services
SafeTraces, Inc.
Sanalife
SCLogic
Seamless Roofing
Securitas Security Services USA, Inc.
SemaConnect
ServiceMaster Restore & ServiceMaster Clean
Servpro Industries LLC
Skudo LLC
Skyfold
Smart Rain
Soft dB
SOLID Surface Care, Inc.
Sony Network Communications Nordics fil till SNCE B.V.
SourceAmerica
Stop the Bleed
StructureTec Group
Sunbelt Rentals, Inc.
Tango
Tarkett
Tecta America Corporation
Tegrete
Terracon Consultants, Inc.
The Budd Group
The Detection Group
TMA Systems LLC
Tork, an Essity Brand
TRAX Analytics
Truly Nolen of America
TuffWrap Installations, Inc.
U.S. Facility Solutions
United Rentals
Vaask
Vantage Elevator Solutions
VARI
Vector Solutions
VendiBean
Verkada
Versico Roofing Systems
Versteel
Western Specialty Contractors
Wizard Software Solutions
WorkInSync/MoveInSync
Xcluder -Global Material Technologies
Yardi Systems
Yellowstone Landscape
Zip Water
zLink

IFMA WORLD WORKPLACE

SEPTEMBER 28-30, 2022
MUSIC CITY CENTER | NASHVILLE, TENNESSEE, USA

Thank you to the following sponsors for supporting IFMA's World Workplace Conference & Expo!

IFMA Corporate Sustaining Partners are listed in **bold.**

Premier Sponsors

DAVIES OFFICE
FURNISH A SMARTER WORKSPACE

smartrain

SRM ServiceMASTER Recovery Management

SUNBELT RENTALS

Sponsors

CONFERENCE PENS
Grainger

EDUCATION ARENA PRESENTATIONS
ActivePure
AkitaBox
Inspirotec (AirAnswers)
iOFFICE + SpaceIQ
LaserCycle, Inc.
MRI Software
Nuvolo
Servpro Industries LLC
Sunbelt Rentals, Inc.
Vaask

EDUCATION ARENA SPONSORS
iOFFICE + SpaceIQ

EXPO SCAVENGER HUNT SPONSORS
AkitaBox
Arnold's Office Furniture
BluSky Restoration Contractors, LLC
Brown & Root Industrial Services
Dalkia Energy Solutions
Ecotech Office Environments
EMCOR Facilities Services
FreeAxez LLC
FSR, Inc.
IFMA Central
Integrated Building Solutions
Kastle Systems
LogiSon Acoustic Network
Marsden Services L.L.C.
MRI Software
OfficeSpace Software
PRIDE Industries
R-Zero Systems
Sanalife
SCLogic
Servpro Industries LLC
Tango
Tecta America Corporation
TuffWrap Installations, Inc.
Vector Solutions

FACILITY TOUR: VANDERBILT UNIVERSITY POWERHOUSE
Grainger

OPENING KEYNOTE SPONSOR
Davies Office

EXPO PRIZE DONATIONS
BELFOR Property Restoration
FlexCart
Iron Mountain
Marsden Services L.L.C.

HOTEL KEYCARDS
Sunbelt Rentals, Inc.

PRODUCT SHOWCASE SPONSORS
AkitaBox
Cartegraph
FreeAxez LLC
iOFFICE + SpaceIQ
Iron Mountain
LogiSon Acoustic Network
OfficeSpace Software
PRIDE Industries
Prodigy Commercial HVAC
R-Zero Systems
Tango
TuffWrap Installations, Inc.

PROFESSIONAL HEADSHOTS
JLL Technologies

Exhibiting and Event Sponsorship Inquiries: expoadv@ifma.org

The SEC Proposed Climate Rule

What FMs need to know

BY DR. SPENSER ROBINSON AND GEORGE SULLIVAN

The U.S. Securities and Exchange Commission's (SEC) proposed rule S7-10-22, The Enhancement and Standardization of Climate-Related Disclosures for Investors, fundamentally affects facility markets. The proposed rule requires all public firms disclose their climate risks, separated into physical and transition risk components, beginning in the 2023 fiscal year. Facility managers and their organizations will need to understand components of the rule, as well as ways to identify how measurement of transition risk and physical risk assessment impact them. Because this regulatory requirement will include the carbon footprint of essentially every link in the value chain of a large firm, this has **international** implications.

The rule affects all U.S. firms that provide a product or service to multinational organizations and other large U.S. firms. All U.S. firms will be required to report beginning in the 2023 fiscal year or 2024 fiscal year depending on the size of the firm, with larger firms facing the first requirement.

Before detailing a few of the specifics, it might be helpful to define physical and transition risk. Transition risk refers to the regulatory and market risk of a building's greenhouse gas (GHG) output. As countries and economic regions increasingly require reduction in GHG, at what point does a building become physically obsolescent? Just like an industrial building from the 1960s with a low clear height fails to meet today's logistics requirements, so too will a building with poor energy efficiency fail to meet the regulatory requirements for low GHG output. Many countries set carbon neutrality goals and the built environment is among the most critical areas to achieve those goals. The SEC proposed rule will require all public firms to report their GHG output, transition risk, for Scope 1 and Scope 2, with larger firms, or those making claims, requiring Scope 3. All reporting will require external attestation. That means that every GHG report will require third-party auditing, similar to financial reports. Just like a certified public accountant must audit financial statements, a GHG expert will be required to audit the GHG statement. Also, organizations using Renewable Energy Credits (RECs) or carbon offsets (defined below) must report those separately. All energy output without those potential reductions must be shown first; then shown with potential reductions included.

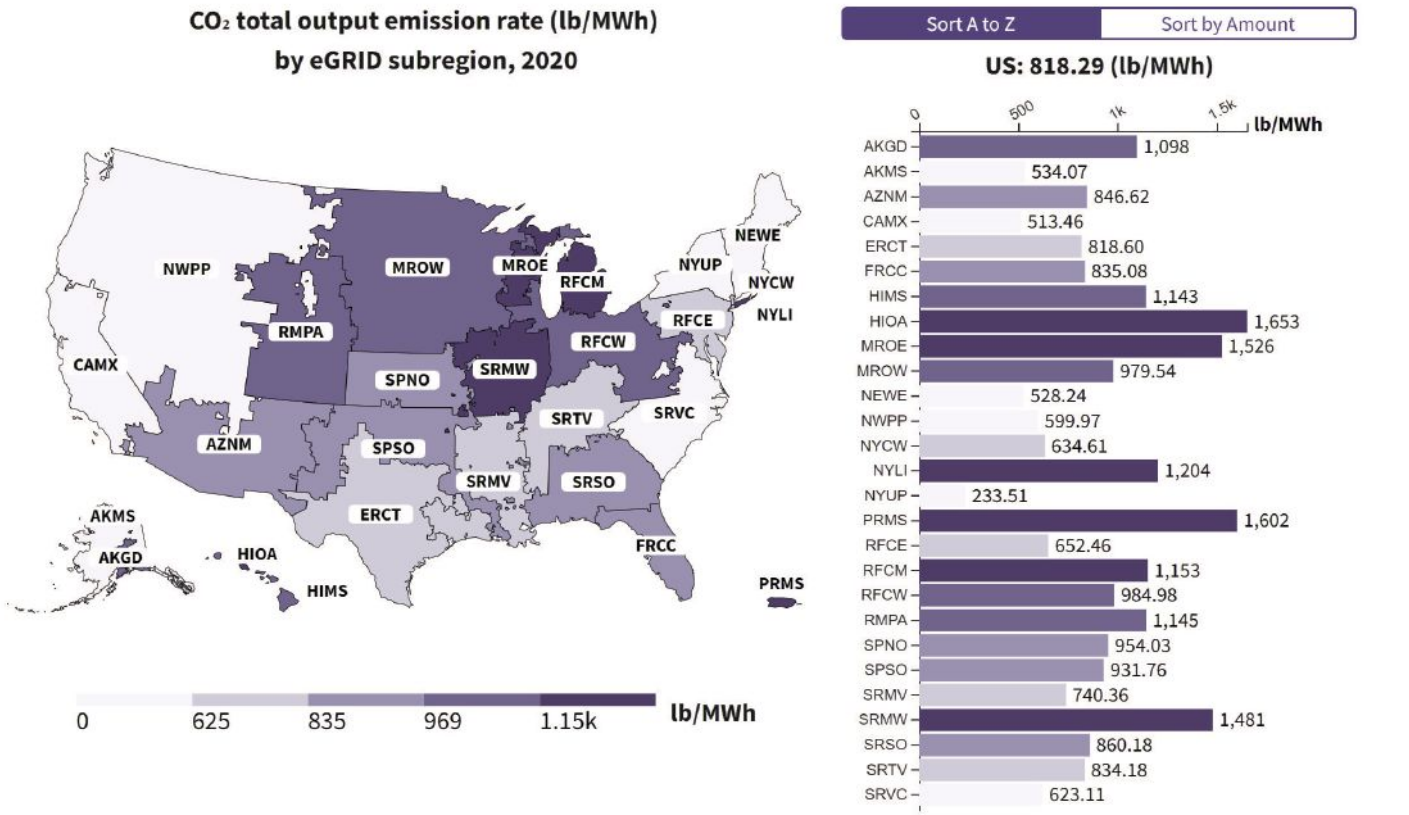
Organizations must understand the three scopes of the proposed rule.

- **Scope 1** is GHG from sources owned or controlled by an organization. This could include vehicles, manufacturing output, landfills and related areas.
- **Scope 2** generally consists of purchased electricity, heat or steam where not generated by the organization.
- **Scope 3,** the most difficult and poorly understood at this point, are emissions from the value chain of the organization. This could include transport of goods, component parts of manufactured products, business travel and a host of services. It could also include the GHG output of purchased services such as janitorial, carpet cleaning and related basic building functions.

One extremely important consideration is that although only public U.S. firms will be required to report, what happens to organizations in the value chain? Anecdotal information suggests that major U.S.-based retailers such as Target and Walmart will require their suppliers to identify their carbon footprints. The only way firms such as theirs can accurately report Scope 3 will be for their supply chain to also report accurately. Even though a firm may not be a U.S. publicly traded firm, if they provide a product or service to one, they likely will soon be asked for this kind of reporting.

Because of the difficulty in estimating Scope 3, especially as firms slowly ramp up their reporting, the SEC included a safe harbor provision in the proposed rule. For Scopes 1 and 2, firms will be required to disclose truthfully and honestly all material facts. Failure to do so could open them up to fines and lawsuits. However, what the safe harbor provision does is acknowledge that Scope 3 may involve some estimates and assumptions. Firms simply will not be able to accurately describe all their service providers in the short term. So long as firms disclose all material facts, state the assumptions and are truthful, they will not be liable for an inaccuracy. This means that if in two years a firm learns that the GHG footprint of a service provider was significantly higher and revises their report, no one can sue them. However, any fraudulent or intentionally misleading statements will still be subject to litigation.

Physical risk is primarily weather-related risk. It can be broken up into two components: acute and chronic risk. The Task Force on Climate-related Financial Disclosures (TCFD) definition for acute risks is, "those that are event-driven, including increased severity of extreme weather events, such as cyclones, hurricanes or floods." In other words, acute risks are weather events that cause sudden, dangerous and unpredictable



damage to the building. Borrowing again from the TCFD, "Chronic physical risks refer to longer-term shifts in climate patterns (e.g., sustained higher temperatures) that may cause sea level rise or chronic heat waves." Chronic risks require more long-range planning. Considerations might include the effect of prolonged heat on the HVAC system or how landscaping requirements change with limited water.

Beginning with transition risk, as firms are required to measure their Scope 1 and Scope 2, much of the reporting and information gathering lies within the built environment. The SEC has not yet prescribed a specific system to measure GHG. The most commonly used systems are the International Organization of Standards (ISO) 14000 family of environmental management, specifically ISO 14064, the fully ISO-aligned PAS 2060 standard from the British Standards Institute and Corporate GHG Protocol by the World Resources Institute (WRI).

As outlined in an Editorial for the Journal of Sustainable Real Estate, ISO standards are globally accepted for greenhouse gas (GHG) reporting across virtually every major economic region. The Climate Neutral Now initiative of the United Nations Framework Convention on Climate Change (UNFCCC) secretariat recognizes the use of ISO standards for reporting GHG inventories. That standard is accepted or cited by every major global environmental, social and governance (ESG) reporting platform. As a stated goal of the proposed SEC rule is to "limit the compliance burden associated with these disclosures (P. 36)," selecting an accepted global standard minimizes the reporting cost for multinational firms. ISO is already the most used standard for reporting by S&P 500 companies, with two thirds of reporting firms using the standard. For FMs looking to adopt a system that will work across regions and regulatory regimes, using ISO seems the clear path.

ISO requires reporting of energy, water and waste. Each of these measures is then converted to GHG output. As requirements to report these items become increasingly relevant to the firm, what systems are in place to measure? Organizations are already tracking energy in some manner; but are they tracking the whole building's energy? Are they currently tracking water or waste?

Each specific electric grid has a different GHG output. In the U.S., the Emissions & Generation Resource Integrated Database (eGRID) published by the EPA provides information on those grids. Organizations

should have information on the GHG output of the energy grid they are using. Similarly, each water supply and trash management systems have unique GHG output factors.

Organizations in need of specific guidance through this process should contact an ISO professional.

The physical risk component of the law requires all firms to identify the potential material risk from hazards such as floods, hurricanes or wind. Typically, this data can be found from a physical risk assessment provider. Every major public rating agency now provides this service along with numerous independent firms. Unfortunately, while each of these firms use the same basic underlying data, many analyze them in different ways.

It will take time to understand the building data being presented, and it will take time and resources to implement procedures to act on the data. This could be anything from what resiliency measures need to be installed at a building level to new emergency health and safety procedures being implemented.

Firms will need to report on water usage if pulling significant water from a region. Consider how prolonged heat stress might impact on the building. Firms with property in a coastal region will need to address rising sea levels. As above, firms should seek outside expertise to help provide and understand this data.

Firms would also be required to report GHG footprints from energy both with and without the inclusion of RECs and carbon offsets. At a high level, RECs are a market instrument that represents 1 megawatt-hour (MWh) of electricity generated from a renewable source. They typically involve a contractual agreement to purchase that renewable energy and receive exclusive rights to retire it in a specific asset name. In other words, if a firm purchased an REC from a solar power farm, they would receive the right to claim the lower GHG footprint of the solar power instead of their specific grid power.

Recently, corporate GHG has treated the U.S. as one energy grid for REC purchases. However, many ISO auditors accurately state that the U.S. is not one grid and that for an REC to count as a Scope 2 reduction, it should at least have the possibility of consumption. Organizations considering a new REC purchase should consider whether they could potentially consume the energy or not.

Importantly, an REC is not a carbon offset, although in some cases the purchase of an REC could be used to create one. There are a few important points to understand about carbon offsets. First, they are financial securities, and although private placements have historically been treated as forward contracts, these may be subject to SEC scrutiny. Any firm attempting to sell a carbon offset should be able to support required disclosures through their SEC broker dealer registration, show detailed record keeping qualifying as an excluded forward or similar diligence. If they cannot, this is likely a firm to avoid. Second, every carbon offset should be registered on an internationally accepted platform such as the United Nations compliant Gold Standard and Verra, or on a government regulated platform such as the Western Climate Initiative or Regional Greenhouse Gas Initiative in the U.S., and comparable platforms internationally.

In summary, the U.S. SEC has proposed to require all firms to report their physical and transition risks, which directly impacts facilities as the majority of GHG output and all the physical risk stem from the built environment. The most globally accepted standard is the ISO 14000 family of environmental standards, and firms adopting measurement using ISO should be well positioned for compliance. Even if a firm is not a U.S. firm required to report, if they provide a service or product to one, this likely will affect them soon! Firms should start planning for these requirements now. FMJ

Dr. Spenser Robinson *is a professor and the director of real estate at Central Michigan University, associate editor of the Journal of Sustainable Real Estate, a 2022 NAIOP Distinguished Fellow and President Elect of the American Real Estate Society. He is an internationally recognized scholar in real estate, sustainability and climate research.*

George Sullivan *has integrated more than 30 years of experience in engineering, industry, commodities trading and building science into helping organizations all over the world meet ESG goals by creating a transparent and globally accepted path to measurement, validation and disclosure that meets United Nations guidelines and stands up to regulatory scrutiny.*

REFERENCES

nortonrosefulbright.com/en/knowledge/publications/137ce3c4/sec-and-cftc-considerations
goldstandard.org/
hverra.org/
wci-inc.org/
rggi.org/

Engineering+

Engineering Solutions Designed by Engineers

ABM Engineering+ is a more comprehensive, customized and valuable approach to self performance of on-site facilities engineering. With 10,000+ engineers and a strong talent pipeline, ABM is one of the largest and most capable providers in the country. We give you expedited access to expertise, on-site engineers and specialized technical services. Let ABM Engineering drive new value for your occupants and your business.

abm.com/engineeringplus

1.877.201.0109

ABM®
Building Value

“Decarbonizing a company’s value chain in line with science and reaching net-zero emissions by 2050 is increasingly becoming the minimum societal expectation on companies.”

– SBTi Net Zero Standard

The Costs of Ownership

Outsourcing contracts for proper tracking

BY ALEX EHRENBERG & COLETTE TEMMINK

Many of today's headlines are focused on global warming and reducing greenhouse gases (GHGs). Carbon dioxide is the largest of the GHGs that acts as a cap in trapping heat in the Earth's atmosphere that would otherwise emanate into space. This has created urgency for the world's population to reduce GHGs where possible and provided organizations such as the Carbon Disclosure Project, United Nations Global Compact, World Resources Institute and the Worldwide Fund to partner in creating the Science Based Targets initiative (SBTi).

SBTi provides companies with a path to reduce emissions aligned with the Paris Agreement goals. According to the United Nations, to meet the limit — the temperature increase to not more than 1.5 C in global warming (as set out in the Paris Agreement) — emissions will need to be reduced 45 percent by 2030 and net zero by 2050. As companies commit to science-based targets or simple carbon reduction goals, some or all of the execution of these commitments will become part of a facility manager's job, especially given the role building operations play in contributing to carbon.

Carbon

Certainly, buildings occupied by corporations have a significant role in contributing to carbon. For example, Architecture 2030 highlighted that buildings contribute approximately 40 percent of annual global CO2 emissions, and of this amount, building operations contribute 28 percent, and construction and building materials contribute 11 percent. They also noted that the floor areas of buildings globally are expected to double by 2060 (similar to adding an area the size of New York City every month).

Buildings contribute to carbon or carbon equivalents (GHG) in many ways. The following chart is a sample of how buildings contribute to carbon emissions:

Table 1. Sample: Building Carbon

Carbon or Carbon Equivalent Category	Sample Use
Electrical or energy consumption	Heating and cooling, building operations, appliances, lighting
Natural gas consumption	Heating, cooking
Embodied carbon	Construction & materials
Other	Waste, transportation, chemicals used

A significant number of companies report their carbon as defined by the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard. According to Global Real Estate Sustainability Benchmark (GRESB), the most widely used accounting tool internationally is the Greenhouse Gas Protocol for companies to understand their GHG emissions. For example, according to the GHG, in 2016, at least 92 percent of the Fortune 500 companies that responded to CDP are using the GHG Protocol.

The GHG Protocol defines three scopes to report emissions as defined below:

Table 2. Emission Scopes

Scope 1	Direct Emissions	From a company's operations (e.g., gas use).
Scope 2	Indirect Emissions	Originates from the generation of consumed energy (e.g., generating and producing utility services such as coal, solar, etc.).
Scope 3	Indirect Emissions	From a company's upstream and downstream value chain (e.g., demand and supply-side consumption such as business travel, purchase of goods and services, waste from operations, transportation and distribution, employee commute, use of sold products, etc.).

In addition, the GHG Protocol suggests companies report Scope 3 areas that are relevant to the company (GRESB). It should also be noted that one company's Scope 1 and 2 emissions are another company's Scope 3 emissions, and vice versa.

The supply chain is a significant part of Scope 3. According to the Environmental Protection Agency's Emerging Trends in Supply Chain Emissions Engagement report many companies found that most of their GHG emissions reside in their supply chain when they assess their full environmental impacts. This report also references various initiatives companies have undertaken over the last 10 years to reduce GHG emissions related to their supply chain management.

The GHG Protocol also notes the following boundaries when reporting GHG:

Table 3. Operational Boundaries

Operational Boundary	Comment
Equity Share	Based on Share of Equity in the Operation (e.g., percentage of ownership in a joint venture).
Operational Control	A company has authority to implement or introduce its operating policies (e.g., control over implementing certain initiatives like an alternative energy project).
Financial Control	Ability to direct financial and operating policies.

Source: GRESB and Greenhouse Gas Protocol

Many organizations have advanced GHG or carbon tracking, measurement, and reporting processes and programs. There are also new, merged or legacy organizations looking to advance and unify the various efforts that have been managed within their business operations and corporate programs in a more aligned and unified approach.

Outsourcing Contracts

In January 2021, The World Economic Forum released a report called Net-Zero Challenge: The Supply Chain Opportunity, co-authored with the Boston Consulting Group. The report takes a practical approach to guiding organizations in taking on supply chain emissions in a step-by-step guide through nine actionable initiatives. The importance of the report is that it makes the business case for the impact to be realized by an organization by taking a focused approach to managing supply chain emissions. An additional benefit is the halo effect that occurs throughout the organization's supply chain and in various global locations where climate action becomes a priority when it may otherwise not have been deemed important or even on the agenda.

Facility managers continue to focus on environmental, social and governance (ESG) areas. Supplier contracts can impact all three of these categories. For example, environmental includes GHG emissions, social includes labor relations or fair wage clauses in agreements, and governance includes ethics or having the appropriate anti-bribery clauses in supplier contracts.

According to the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting outsourced agreements such as janitorial, landscaping, administrative and maintenance and repairs are part of non-production indirect procurement. This can be considered in Category 1 of Scope 3 (called purchased goods and services).

CDP noted that the supply chain emissions are on average 11.4 times higher than operational emissions. For some organizations, their FM can be a large part of their overall costs, so ensuring they consider how their services providers operate and account for their Scope 1 and 2 emissions is becoming a business priority.

It is important to outline the currently expected carbon accounting between the organizations when developing outsourcing agreements. How is the data collected and reported? Is there a clear understanding of the outsourced provider's Tier 1, 2 and 3 suppliers and service partners? What is known about that supply chain? How much transparency and influence can FMs expect to have on the supply chain being engaged at their sites?

Outsourcing agreements for FM services should be reviewed to ensure the contract language addresses the sustainability goals and objectives of the organization. The Chancery Lane Project is a nonprofit organization that brings together international legal professionals to collaborate on a shared vision of "a world where every contract enables solutions to climate change." To this end, the lawyers work together to develop new contract language and clauses that organizations can use, and attorneys can align their work with a decarbonized economy.

Leased Assets

Corporations either lease or own their facilities, and when gaining an understanding if it is the property owner or tenant carbon, the GHG Protocol suggests the following steps:

1. Determine the type of lease in place: finance/capital lease or an operating lease. Ensure this aligns with audited financial statements, if applicable.
2. Determine if emissions should be categorized as Scope 1, 2 or 3 based on the operational boundary (Table 2).

For example, if the lease is considered an operational lease and the lessee uses the equity share or financial control approach, "fuel combustions as well as with the use of purchased electricity should always be categorized as Scope 3 (indirect)." However, if the approach used is operational control by the lessee, "emissions associated with fuel combustion should be categorized as Scope 1 (direct), and emissions associated with the use of purchased electricity should be categorized as Scope 2 (indirect)."

Having the appropriate lease language is an important and operational consideration in the lease, such as separately metering the tenant's space. Companies should also coordinate with owners to ensure emissions are not double counted. As an example, Overcoming Seven Key Landlord-Tenant Hurdles to Make Ambitious Carbon Reductions a Reality, is a report that addresses the impact of New York City's Local Law 97 (LL97), which requires significant whole-building reductions in carbon emissions. The report tackles seven primary tenant-landlord hurdles that must be overcome to collaborate to reduce carbon emissions in commercial buildings materially. It also provides a list of resources for tenants to access to understand the issues and navigate this increasingly important and evolving area of landlord-tenant alignment in reducing whole-building emissions of carbon.

Conclusion

As more companies set science-based targets or include Scope 3 as part of their goals, outsourced services and leased spaces will have an impact and must be addressed in commercial service contract language, in lease provisions and clauses, and through increased collaboration with services providers and landlords. Ensuring that real estate managers understand the future impacts of the structures they put in place today and data reporting requirements will support their success. FMJ

Alex Ehrenberg *serves as operations lead at Blue Skyre IBE. She is responsible for overseeing project quality and delivery to clients, and she also oversees the firm's marketing and online presence. Ehrenberg earned a Master of Arts (Honours) in Management with a concentration in Sustainability from the University of St Andrews in St Andrews, Scotland.*

Colette Temmink *serves as chief strategy and product officer for Blue Skyre IBE (BSI) and was a member of IFMA's Global Board of Directors. She oversees the strategy; product development and quality being delivered to customers to enhance their real estate performance. Temmink's professional affiliations include Counselor of Real Estate (CRE®), Fellow Royal Institute of Chartered Surveyors (FRICS), Certified Property Manager (CPM), Masters of Corporate Real Estate (MCR), Senior Leader of Corporate Real Estate (SLCR) and Certified Facility Manager (CFM).*

Net Zero Labs

REDUCING CARBON IN ENERGY-INTENSIVE LABS

BY GARY CLARK & ROB MCGILL

The market for laboratory and research space has never been hotter, but demand for these specialized workspaces also comes with an environmental trade-off. Labs tend to have a far greater carbon footprint than most building types. Does it have to be that way? Design analysis suggests it is possible to achieve net zero in lab buildings in advance of new climate goals and mandates.

The carbon intensity of labs presents facility managers with a unique challenge. These highly complex spaces require much more ventilation than most building types and are home to highly energy-intensive equipment often in operation 24 hours a day. Labs also require enhanced structural systems to limit floor vibration and support heavy building loads. Structural systems, mostly made up of concrete and steel, contain high volumes of embodied carbon (i.e., the energy expended in the base material extraction, manufacturing and transportation of building materials). The result is that labs demand far greater energy to build and operate than most other building types.

The benchmark operational energy use for a general life science research lab in the U.K. is 589 kilowatt hours per square meter annually (kWh/m2/y), or 4.5 times more than the annual benchmark energy use for a typical commercial office building or residential (130 kWh/m2/y) and nearly five times more than the typical residential building (120 kWh/m2/y). When it comes to embodied carbon, it is not uncommon for lab buildings to contain twice the built-in carbon of other building types.

THE GOAL

Given the threat of climate change and new building codes and laws, can labs be constructed and operated in a manner that is significantly less harmful to the environment? Particularly, can lab buildings achieve net zero status (producing no more greenhouse gases than they offset) by 2030 as set out by the design challenges of both the Royal Institute of British Architects (RIBA) and the American Institute of Architects (AIA)? Those were the key questions of a recent study by architecture/design firm HOK.

Using the RIBA 2030 Challenge as a target, the team explored how lab buildings could reduce operational energy use by 75 percent — from 589 kWh to 147 kWh/m2/y — and embodied carbon 50 percent — from 1400 kgCO2e/m2 to 700 kgCO2e/m2 or lower. (See Figure 1.)

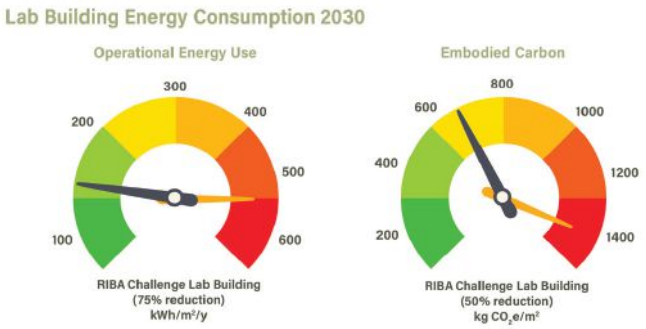


Figure 1: *To meet the guidelines of the RIBA 2030 Challenge, lab buildings would need to reduce their operational consumption by 75 percent (to 147 kWh/m2/y) and embodied carbon by 50 percent (to 700 kgCO2e/m2).*

OPERATIONAL ENERGY STRATEGIES + ANALYSIS

The study analyzed two different lab building forms: a vertical lab akin to those found in city centers and a linear lab more typical of suburban settings. These lab types were modeled to determine how they would perform under three energy design approaches:

Baseline Practice: This approach incorporated performance specifications greater than current building regulations while using products that are still commercially competitive, for example high-performance double glazing. This approach also assumed an average ventilation rate of six air changes per hour (ACH).

Intermediate Practice: This approach improved upon the baseline practice by increasing performance specification to the next commercially available level, for example using high-performance double glazing with a krypton-filled cavity. This approach assumed an average of five ACH.

This approach used back-stop performance specification to achieve net zero certification. For example, where the intermediate approach would use double glazing with krypton cavities, 2030 Net Zero would use triple glazing. Ventilation rates under this approach would be kept to four ACH.

The research team used advanced environmental and design modeling to test the various carbon reduction strategies. Somewhat surprisingly, the modeling revealed statistically little difference between the linear and vertical lab types when it came to operational energy. (The vertical lab performed 1 percent better than the linear lab.) This commonality between the two lab types is largely due to ventilation, which is the main driver of energy loss for lab buildings regardless of their height or massing.

The study revealed the 2030 Net Zero specification reduced energy consumption the most — by 60 percent through a combination of improvements to air tightness, insulation, glazing performance, shading and most importantly, lowering the average ACH. (See Figure 2.)

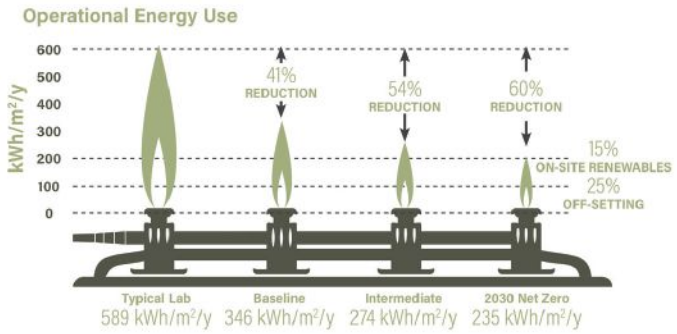


Figure 2: *The study found it possible to reduce operational energy consumption 60 percent off the current benchmark. On-site renewable energy sources could offset energy demand another 15 percent to achieve a 75 percent reduction before additional offsetting.*

These adjustments to the net zero specification would bring energy consumption from the grid down to the targeted goal of 235 kWh/m2/y before on-site renewables and offsetting. The energy modeling assumptions made here also assumed an on-site energy provision through renewables, such as photovoltaics and ground source heat pumps (GSHP), which would reduce grid demand by 15 percent to 147 kWh/m2/y. An additional 25 percent reduction in energy would have to come from certified offsetting programs — a necessary requirement until the energy grid itself is decarbonized.

A follow-up study is examining how labs might achieve targeted operational carbon goals while allowing for more than four ACH. An additional stage of research will investigate what combination of renewables would be required to achieve the 75 percent reduction target. Using current technologies, a 75 percent reduction in operational energy would require a fully electric building with ground source heat pumps and a significant amount of on-site solar. This might be possible in low-rise buildings with large roof areas but would be challenging in tall buildings in dense urban locations, which would likely require offsetting.

EMBODIED CARBON STRATEGIES + ANALYSIS

In addition to studying operational energy, the research team also examined three different lab building construction approaches to determine which offered the lowest embodied carbon. The three construction options studied were:

Baseline Practice: This design would feature a steel and pre-cast concrete structural system with low-carbon concrete. The façade for this approach would use a PPC aluminum panel system with composite timber and aluminum framed fenestration. The fit out would include limited suspended ceilings, limited raised floors, screed and resin flooring, aluminum glazed partitions, and paintings and coating with low or no off-gassing.

Intermediate Practice: This design approach would incorporate a low-carbon concrete structural system and use a pre-cast concrete unitized façade system with PPC aluminum fenestration. Fit out would include suspended ceilings, raised floors, aluminum glazed partitions, and industry standard paints and coatings.

2030 Net Zero Practice: This design would use a mass timber structural system with screed topping, a timber cladding system and full timber framed fenestration. Fit out would have no suspended ceilings or raised floors (the screed floor would be exposed with a polished finish).

While all three approaches reduced embodied carbon, the 2030 Net Zero option had the lowest embodied carbon at 547 kgCO2e/m2, falling within RIBA's 2030 Challenge target. By including the carbon sequestration of the timber (the amount of carbon absorbed from the environment and stored during the growing of the trees used as construction material) the embodied carbon would drop even further to around 141 kgCO2e/m2, or a 90 percent reduction from the benchmark.

CONCLUSION + NEXT STEPS

While not easy, it is possible to build and operate labs in accordance with the sustainable design goals of the RIBA and AIA 2030 challenges. Altogether, the approaches studied in this analysis can significantly reduce the whole-life carbon (operational carbon + embodied carbon × building lifespan) of a lab building.

By reducing embodied carbon, labs can "flip the script" wherein the building of the lab would no longer create a greater carbon footprint than its year-to-year operation. (See Figure 3.)

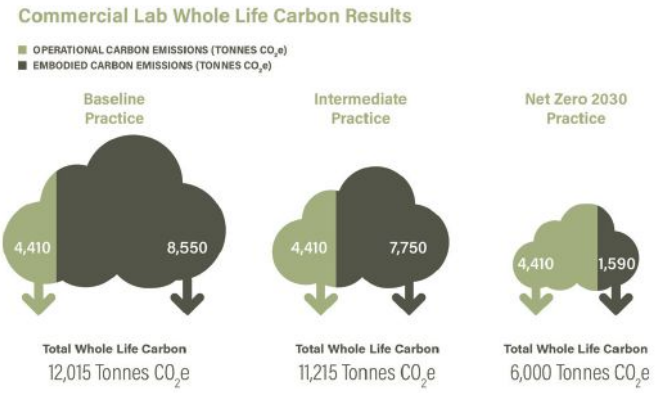
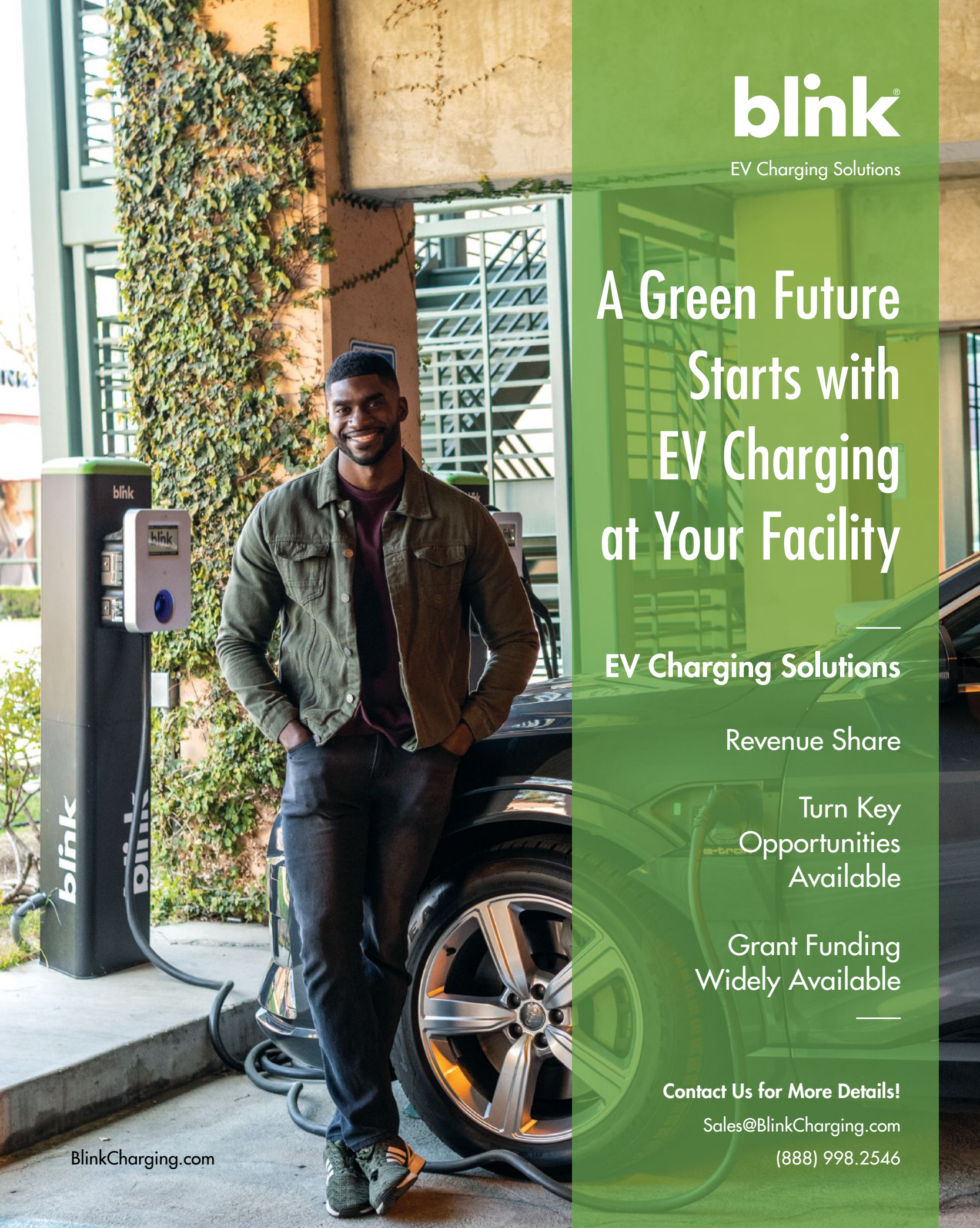


Figure 3: *The whole life carbon for a building could decrease under the more energy efficient Intermediate and Net Zero 2030 approaches. (Figures based on a 10,000-sq.-m. building over 30 years.)*

While the study showed little difference between vertical and linear lab buildings in achieving net zero, linear labs do hold one distinct advantage: Their expansive roofs allow for more solar panel arrays. It is important to note that the analysis examined new lab buildings, but the most sustainable option is to reuse and adapt existing buildings. This retrofit first principle will reduce embodied carbon without the use of limited global timber supply. It is perhaps the best way to achieve net zero carbon for the science and research sector. FMJ

Gary Clark *is the regional leader of the HOK's Science + Technology practice covering the United Kingdom, Europe and the Middle East, and the lead author of the RIBA Sustainable Outcomes Guide developed to support the RIBA 2030 Climate Challenge.*

Rob McGill *is a sustainable design leader for HOK's London studio. He has 20 years of experience as an architect with an emphasis on sustainability and inclusivity.*



blink®

EV Charging Solutions

A Green Future Starts with EV Charging at Your Facility

EV Charging Solutions

Revenue Share

Turn Key Opportunities Available

Grant Funding Widely Available

Contact Us for More Details!

Sales@BlinkCharging.com

(888) 998.2546

BlinkCharging.com

BUILDING ENVELOPE CAMPAIGN

YEAR 2 UPDATE

BY HAYLEY McLEOD

IFMA has been an Organizing Partner of the Better Buildings Building Envelope Campaign (BEC) since its launch in 2020. Affiliated with the U.S. Department of Energy's Better Buildings Initiative, the BEC recognizes participating buildings for their high-performing (and therefore energy- and cost-saving) building envelopes. In its first year, the BEC recognized 14 projects. Organizing Partners, including IFMA, the American Institute of Architects (AIA) and the International Institute of Building Enclosure Consultants, have provided invaluable guidance and support since the campaign's inception. Thirteen additional buildings are expected to be recognized in the BEC's second year.

BEC's award thresholds for leadership in building envelope energy efficiency remain the same as last year. For retrofit projects, the building may be recognized if the building envelope performance (BEP) value demonstrates a 30 or 50 percent improvement over the pre-retrofit building. For new construction projects, the building may be recognized if the BEP value demonstrates a 20 or 40 percent improvement over the relevant code. At the discretion of BEC team, honorable mentions may still be awarded to projects measured below these thresholds.

YEAR 1 AWARDEES

BEC's inaugural year recognized U.S. buildings from the health care, education, commercial and industrial sectors, representing 1.5 million square feet of conditioned floor area and an expected annual energy savings of 9 million kBtu.

New Construction:
Novel 40 Role Model Awardee

- BCH Lafayette Community Medical Center MOB 2, Boulder Associates, Colorado

New Construction: Novel 40 Awardees

- Athens County EMS Station No. 51, Athens County, Ohio
- BVSD Education Center, Boulder Valley School District, Colorado
- Catalyst, McKinstry, Washington
- Credit Human Headquarters, Credit Human Federal Credit Union, Texas
- Vergennes Community Housing, Evernorth, Vermont

New Construction: Novel 20 Awardees

- Industrial Center Building Addition, Fermi National Accelerator Laboratory, Illinois
- Lubber Run Community Center, Arlington County, Virginia
- Plant Sciences Building, Flad Architects, North Carolina
- Vermeer — New Plant 7, Vermeer Corp., Iowa

Retrofit Project: Retro 50 Awardees

- AGU, American Geophysical Union, Washington, D.C.
- ASHRAE World Headquarters, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Georgia
- Prairie Trails School, FGM Architects, Illinois

Retrofit Project: Retro 30 Awardees

- Building 246, EYP Architecture and Engineering, Virginia

YEAR 2 TRENDS

Year 2 has been markedly different for the campaign. Thanks to an engaged network of Organizing Partners, Participants (building owners/managers) and Supporters (manufacturers, energy service companies and

researchers), the BEC spent less time on marketing and outreach. Enrollment of Participants and Supporters continues to climb; as of late April the campaign has 100 registered Supporters and 93 registered Participants.

One Participant was able to submit in both Year 1 and Year 2, and other Participants submitted multiple buildings in Year 2, such as multiple projects in a single school district or multiple buildings on a college campus. Overall, the largest shift was in building types. While Year 1 awardees were mostly new construction projects, with only a few retrofit projects, the opposite is true of the submittals for Year 2, which comprise mostly retrofit projects with only a few new construction projects (This may be a result of supply chain issues due to the COVID-19 pandemic.)

TOOL UPDATES

In response to user feedback received over the course of the campaign, the BEC team has made several updates to the assessment tool.

Exterior Insulation and Finish Systems (EIFS)
A checkbox was added so that users could indicate whether their building used EIFS, a type of continuous insulation that had not previously been included in the assessment tool. According to the definitions of the International Building Code and ASTM International, an EIFS is a non-load bearing, exterior wall cladding system that consists of an insulation board attached either adhesively or mechanically, or both, to the substrate; an integrally reinforced base coat; and a textured protective finish coat. EIFS are in full compliance with modern building codes, which emphasize energy conservation using continuous insulation and a continuous air barrier. Both these components are built into today's EIFS products to provide maximum energy savings and reduced environmental impact over the life of the structure.

Cost
A section was also added to facilitate the collection of cost information. However, the BEC team acknowledges that parsing the cost information for technologies within a large construction project can be extremely difficult to perform accurately. Because of these difficulties, a text box allows participants to provide expanded explanation, in addition to the simpler option to enter dollar amounts for each of the four areas of the building envelope that the campaign emphasizes: walls, windows, roof and airtightness. This data is being collected to better determine return on investment for particular envelope technologies, as well as drafting more complete and useful fact sheets on Year 2 awardees.

New Role Model Awards
During Year 1, a single Role Model award recognized projects showcasing new and/or impressive envelope technologies. In Year 2, the campaign is offering two separate awards: Technology Role Model and Equity Role Model. The Technology Role Model award has the same criteria as the Year 1 Role Model awards and seeks to recognize envelope technologies that go beyond industry standards. The Equity Role Model award is new and is a direct result of President Joe Biden's Justice40 initiative. With guidance from Organizing Partners, the Better Buildings Initiatives and DOE, the campaign added the new award to acknowledge submittals that are improving energy equity in the building stock in the U.S. Because this is the first year the award is being offered, and to ensure that the campaign was not being accidentally exclusionary, Participants were asked to self-identify if they felt their building should be considered for this award, based on building function, location, community served and other factors.

Carbon Footprint Reduction
The assessment tool includes a carbon footprint reduction estimator that is based on the building's zip code and primary heating source. Reduction in carbon dioxide emissions represents an estimate based on the decrease in operational energy associated with improvements to the building envelope specified in the new or retrofit construction. It does not represent the overall reduction or change in carbon dioxide emissions of the building or the change in embodied carbon of the building materials.

COLLABORATING WITH OTHER CAMPAIGNS

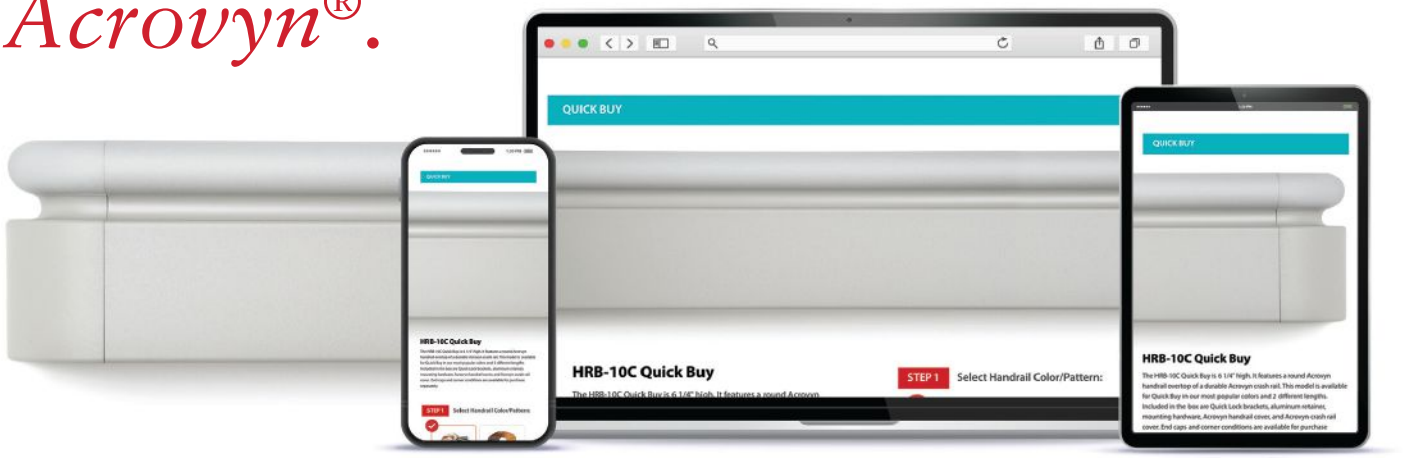
During Year 2, the BEC worked more closely with additional Better Buildings and DOE Technology Campaigns, with the goal of sharing resources and networks. Specifically, as the number of active campaigns has grown, the team has used the time of Participants and Supporters more efficiently. Instead of each campaign running its own webinar series, for example, a three-part webinar series was hosted to share technical assistance and recognition opportunities through four of DOE's Technology Campaigns: the Building Envelope Campaign, the Efficient and Health Schools Campaign, the Integrated Lighting Campaign and the upcoming Storm Window and Insulating Panel Campaign. Each webinar was tailored to one of the following audiences: schools and educational facilities, multifamily buildings and historic buildings. The content is evergreen and hosted on the Better Buildings Solution Center website as a continuously available resource for current and future Supporters and Participants.

The Building Envelope Campaign is anticipated to continue for a third year and will recognize additional buildings in 2023 for their high-performing envelopes. For more information about the BEC, upcoming events and resources, visit ec.ornl.gov. FMJ

Hayley McLeod, *MSPP, served as the lead for the Building Envelope Campaign from 2020-2022. McLeod has been working with sustainability in the built environment for almost 10 years. She holds a master's degree in public policy (with a concentration in environmental policy) from the Georgia Institute of Technology and a bachelor's degree in biology from the University of South Carolina–Columbia.*

REFERENCES
Integratedlightingcampaign.energy.gov/
ec.ornl.gov/

Make your life easier with *Acrovyn®*.



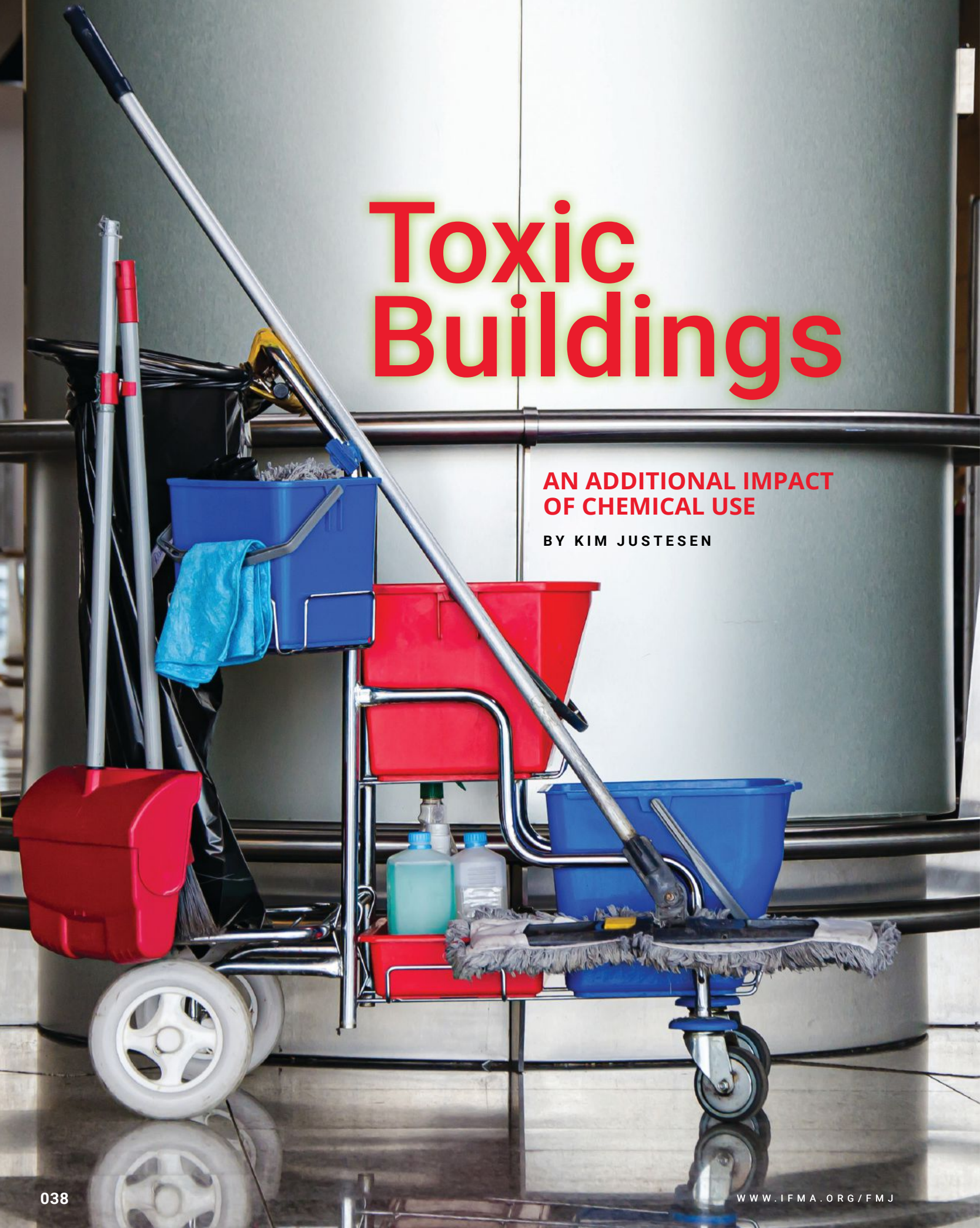
Our durable Acrovyn products are made with materials that resist the growth of bacteria and are easy to clean, saving you time and money on maintenance. Select from Acrovyn wall covering, handrails, corner guards, and more and get them shipped right to your doorstep when you buy online.

Browse. Select. Buy Online.
Get 20% off your order.

Scan or visit to apply discount to your cart.

csinc.bz/ifma

Construction Specialties®



Toxic Buildings

AN ADDITIONAL IMPACT OF CHEMICAL USE

BY KIM JUSTESEN

As a reaction to the rapid spread of COVID-19, facility managers sought cleaning supplies and methods that were the easiest to purchase and implement. In a majority of cases, the go-to choice were chemicals already in use to treat the businesses, homes and schools under their responsibility. Certainly, this was an understandable reaction. Chemicals such as bleach, peroxide and ammonia have been the standard for more than 100 years. During the early days of the pandemic, the supply of these cleaners and disinfectants could not keep up with the demand. Chemical cleaners flew off the shelves of grocery stores and warehouses. Companies such as Clorox, Johnson & Johnson and Dupont saw unprecedented sales during the epidemic. But this rise in the use of chemicals in public facilities also came with several negative consequences.

Science has long known there are side effects associated with the use of chemical cleaners, and as a result, warning labels are prominently displayed on containers and packaging. When handled appropriately by professionals, these chemicals serve as a valuable addition to cleaning regimens and help reduce the risk of contamination from unhealthy microorganisms. However, they can also pose issues relating to safety and sustainability. It is important to understand these issues as well as the more sustainable alternatives available.

AN INCREASE IN CHEMICAL USE

Unfortunately, as a result of the fear caused by the COVID-19 virus, chemicals became the go-to solution for cleaning and sterilizing, and increased reports of illness and injury became common. According to an NBC news report, calls to poison control hotlines increased by more than 20 percent in the early months of the pandemic. In just the first three months of 2020, that increase amounted to 45,550 calls to U.S. poison control centers concerning chemical exposure. This number is likely lower than the actual number of accidental poisonings.

The U.S. Centers for Disease Control and Prevention (CDC) found that this increase was directly related to exposure to cleaning and disinfecting products. Some industry observers might be inclined to blame those who are inexperienced in handling chemicals for the increase in accidental exposure. However, it is important to remember that even individuals experienced with chemical cleaning agent use suffer harm. Envoy Solution's PJP blog reports that more than 100,000 janitorial workers are injured by chemicals every year.

In an article published in The International Journal of Hygiene and Environmental Health, researchers documented the effects of chemical cleaning products on professional cleaners and among residents doing in-home cleaning. Cleaning products investigated included glass cleaners, disinfectants, sanitary and bathroom cleaners, multipurpose cleaners and others. The chemicals identified in these products included ethoxylated alcohols, propanol, ammonium hydroxide, quaternary ammonium, propane, butane, 2-butoxyethanol, sulfuric acid, hydrogen peroxide and many others.

According to these researchers, many of these chemicals, either individually or in combination, could lead to breathing problems and health complications. Accidental inhalation of common cleaning and disinfection chemicals can lead to respiratory issues that range from temporary airway irritation to obstructive lung disease, including asthma and asthma-like disease. Some of the cleaning chemicals may even potentially cause chronic obstructive pulmonary disease (COPD).

Another article in Science Daily reported on a study identifying a higher risk of developing COPD among 55,000 nurses who regularly used disinfectants as part of their job duties. "We found that nurses who use disinfectants to clean surfaces on a regular basis — at least once a week — had a 22 percent increased risk of developing COPD," said Dr. Orianne Dumas of France, who headed the study. The researchers looked at exposure to specific chemical disinfectants: glutaraldehyde (a strong disinfectant used for medical instruments), bleach, hydrogen peroxide, alcohol and quaternary ammonium compounds (known as "quats" and mainly used for low-level disinfection of surfaces such as floors and furniture). All of these were associated with an increased risk of COPD of between 24 to 32 percent.

CLEANING IN COMMON AREAS IN BUILDINGS

FMs want to provide a clean and healthy environment for their occupants and ensuring the cleanliness of common areas poses a greater challenge. It is understandable that FMs would choose to rely on a proven protocol to address public concerns. However, the chemical cleaners and disinfectants used in these indoor locations may be having an unhealthy effect on occupants. As businesses and buildings reopen and welcome back employees, customers and occupants, this desire to provide the safest environment may be having a negative effect on both humans in those spaces and the broader natural environment. Chemical cleaning and disinfecting agents can enter the air through evaporation and contribute to unhealthy air conditions and depleted ozone. They are poured or flushed into sewage systems and get into the water supply, thereby contaminating it. This contamination can kill or endanger fish and other wildlife. As water contamination affects fish and animals, these same contaminants can work their way into the human food chain and water supply.

Even chemical cleaning agents labeled as "environmentally friendly" or "all-natural" may contain chemicals that, while organic in origin, can still irritate or sicken people who come into contact with them. Chemicals used for fragrance, or ingredients such as citric acid, can cause respiratory upset, especially in younger children, who may also try to ingest or inhale products with lemon, orange or tropical fragrances.

Many studies have identified an issue with the effectiveness of traditional cleaning methods. Researchers have discovered that manual cleaning of surfaces with cloths or sponges can miss up to 50 percent of microorganisms and that frequently, dangerous bacteria like salmonella, E. coli, C. difficile, and Staphylococcus aureus can survive chemical cleaning and continue replicating.

There are many reasons why this survival is possible. Sometimes, cleaners or disinfectant solutions are not mixed properly, causing lower efficacy. In other cases, surfaces with uneven textures may allow microorganisms to escape the reach of the cleaners. Human error (e.g., "you missed a spot") is also common. Whatever the reason, the impact can be serious.

Another consideration for the ineffectiveness of chemical cleaners is that they are designed solely for surface cleaning. Many microorganisms such as rhinovirus, influenza and streptococcus are also airborne, meaning they can be spread through the air if an infected person coughs, sneezes or simply breathes. Disinfectants that are aerosol sprays work for a very small amount of time and have limited effectiveness. Even disinfection methods such as electrostatic sprayers leave behind residue that requires additional cleaning and which can also become airborne and ingestible if dislodged.

So, is there a healthier, safer and more environmentally kind way to disinfect while maintaining effectiveness on par with traditional chemicals? Yes, there is.

CREATING SAFER INDOOR ENVIRONMENTS

Given the many issues inherent to chemical disinfectants and cleaning agents, are these harsh chemicals the only way to clean and disinfect common areas in buildings? In a word, no. While the COVID-19 pandemic created an unprecedented demand for cleaners and disinfectants, it also focused attention on the quality of indoor air and the healthy buildings movement. According to several studies, human beings spend between 80 and 90 percent of their lives indoors. As championed by Harvard Professor Dr. Joseph Allen, the healthy buildings movement advocates for structures that consider human health and the environment in their design. This consideration includes implementing programs and protocols that show regard for our natural resources and prioritize sustainability.

So, is there a healthier, safer and more environmentally kind way to disinfect while maintaining effectiveness on par with traditional chemicals? Yes, there is. By harnessing the power of UV-C light, which is ultraviolet light with a wavelength from 200 to 280 nanometers (nm), sustainable and effective disinfection is not only a possibility, it is a reality.

HOW UV-C WORKS

For more than a century, doctors and hospitals have used UV light to inactivate bacteria, mold and viruses. The 1903 Nobel Prize for Medicine was presented to Niels Ryberg Finsen for his work in using concentrated light to successfully treat lupus vulgaris. Since that time, UV-C technology has become the gold standard for hospital disinfection around the world. This technology is helping to reduce microbial loads in indoor environments of all types.

As UV-C light does not penetrate the Earth's atmosphere, microorganisms such as bacteria and viruses have no natural exposure to it. Consequently, these microorganisms are particularly vulnerable to UV-C light's germicidal effects. UV-C light inactivates the RNA or DNA in these microorganisms by disrupting molecular bonds and preventing replication.

UV-C technology is well-suited to the needs of schools, offices, clinics and other facilities with areas serving multiple people at once. While some lower wavelength applications of UV light can be safe for human exposure, UV-C light of a wavelength higher than 222nm can be harmful to humans and pets because it can

penetrate the outer layers of skin and eyes. Consequently, certain precautions are necessary for the operation of devices that use higher wavelength UV-C light. Many devices that use UV-C light at higher wavelengths, such as 254m or 265nm, are used for whole-room disinfection. Light from these devices is often emitted in a 360-degree array for a designated amount of time (typically between seven and 20 minutes) and disinfects both the air and surfaces within the space. To function effectively and avoid risk of exposure, these devices usually necessitate that a room be unoccupied before a disinfection cycle can occur.

Like their whole-room device counterparts, upper room ultraviolet germicidal irradiation (UVGI) devices also emit UV-C light at 250 to 265 nm. As their name suggests, upper room UVGI devices focus on disinfecting air in the upper part of a space. Consequently, UVGI devices are mounted near the ceiling in a given space. They are designed to inactivate airborne microorganisms and support the ventilation in the spaces where they are positioned. Because these devices are elevated above the average line of sight, upper room UVGI solutions are safe for use in occupied spaces.

Another type of UV-C is known as Far UV. This unique section of the UV light spectrum has a special quality: it is safe for human exposure, yet still has the disinfection qualities of the higher wavelengths. Far UV is UV-C light with a wavelength of 222nm. Far UV can disinfect both the air and surfaces in its exposure footprint. Recent studies at Columbia University have shown that exposure to Far UV is no more dangerous than being outdoors. It can also be safely used in occupied spaces.

ADDITIONAL BENEFITS OF UV-C DISINFECTION

UV-C disinfection has been shown to be 99.9 percent effective at inactivation of a number of common, unhealthy microorganisms. High-level studies continue to demonstrate that UV-C is a valid tool in combating dangerous microbes, especially when used as part of a comprehensive cleaning and sterilizing protocol. UV-C disinfection does not produce hazardous side effects, does not require additional storage space, and does not use excessive energy or power to operate. In addition, UV-C disinfection generates less waste and reduces carbon footprint when compared to other traditional methods like manual chemical disinfection or even electrostatic spraying. Upon implementation, UV-C devices require minimal training to use and can be operational in an hour or less.

Chemical cleaning and disinfection have lasted more than 100 years because they are effective. There will always be a role for this tried-and-true method, but with more awareness of the damage these products do to the environment and to people, their role is diminishing. Fortunately, UV-C can pick up the slack and move cleaning and disinfecting into a healthier future. FMJ

Kim Justesen *works at R-Zero as a copywriter and content manager. She is from Salt Lake City, Utah, USA. In addition to her work at R-Zero, she is also a published author with seven books and more than a dozen short stories published. She holds a Bachelor of Arts in speech communication from Westminster College and a master's degree in creative writing from Vermont College of Fine Arts.*

REFERENCES

nbcnews.com/health/health-news/early-months-pandemic-calls-poison-control-went-incidents-cleaning-agents-n1188276

pjponline.com/the-environmental-impact-of-cleaning-products/

sciencedirect.com/science/article/pii/S1438463920305381

sciencedaily.com/releases/2017/09/170910232514.htm

epa.gov/greenerproducts/identifying-greener-cleaning-products

ncbi.nlm.nih.gov/pmc/articles/PMC4827199/

hsph.harvard.edu/joseph-allen/healthy-buildings/

nobelprize.org/prizes/medicine/1903/finsen/biographical/

cdc.gov/niosh/nioshtic-2/20034387.html

gov/coronavirus/2019-ncov/community/ventilation/uvgi.html

cuimc.columbia.edu/news/new-type-ultraviolet-light-makes-indoor-air-safe-outdoors

Energy efficient by default

BY PAUL MATHEW

Incorporating efficiency into routine tenant fit outs and building renovations

Energy efficiency retrofits can enable profound energy and cost savings for commercial buildings, but despite a wide array of effective and commercially available technologies, these upgrades are lagging in industry adoption — only about 2.2 percent of the total floor space in the U.S. is retrofitted annually. Construction disruptions and high transaction costs are standing in the way of major savings for commercial buildings.

Reducing transaction costs for owners and integrating energy efficiency retrofits into routine life cycle real estate events, such as tenant fit-outs, major equipment replacement and building renovations, are actions that can be taken to overcome hurdles to energy-saving technologies adoption. The capital threshold for implementing changes is more favorable when demo is ongoing: ceiling opened up, something else torn up or do not have to maintain HVAC operations. It is easy to add energy efficiency when electricians are already there for some reason.

To date, energy efficiency upgrades have often been handled as component-based retrofits, such as individual equipment or lamp replacements, but systems-based approaches are becoming increasingly recognized as the preferred method for building energy upgrades. Integrated systems approaches enable deeper, cost-effective savings — a report from the Lawrence Berkeley National Laboratory (LBNL) reports that comprehensive systems-based retrofits lead to 50 percent more savings. However, in the past, integrated systems approaches have remained difficult to implement for a couple of key reasons.

Building energy retrofits are often approached as standalone engineering projects, causing disruptions to building activities and occupants due to repeated construction requirements. Nobody, building owners and occupants alike, wants to be repeatedly displaced from their desks and normal job activities to make way for building renovations. Time is almost always a constraint and typically everybody is behind the eight ball. As the frequent planner and coordinator of building upgrades, facility managers are often burdened by standalone retrofits, which are time-consuming and cause inefficiencies in the workflow and disruptions to the entire building. Integrated energy-efficient systems approaches require significant engineering expertise to ensure that they are designed, integrated, commissioned and operated effectively, posing additional burdens and transaction costs to FMs and building owners.

So, while systems-level building retrofits are increasingly accepted in the industry as the most effective approach, these barriers are preventing scaled adoption. Worse, the barriers are hindering much-needed progress toward emissions reductions targets and climate goals — and the world cannot afford further delays. Pre-engineered, quasi-standardized packages of integrated retrofits are a promising solution to overcoming these challenges and enabling easier adoption of energy efficiency upgrades for all properties.

Integrated system packages (ISPs)

With support from the U.S. Department of Energy (DOE), researchers at LBNL have developed ISPs, pre-packaged retrofit combinations, to overcome key barriers to energy-saving technology installation. ISPs take a scalable approach to efficiency deployment in commercial buildings by: 1) seamlessly incorporating the upgrades into routine real estate life cycle events to reduce disruption to building activities and occupants (Figure 1); and 2) minimizing the expertise and additional effort required for implementation by pre-engineering the retrofit packages.

Simply put, the ISP approach makes it easier to adopt systems-level efficiency technologies and start saving on energy consumption and costs.

LBNL has developed ISPs for three common real estate events: tenant fit-out, RTU replacement and whole building renovation.

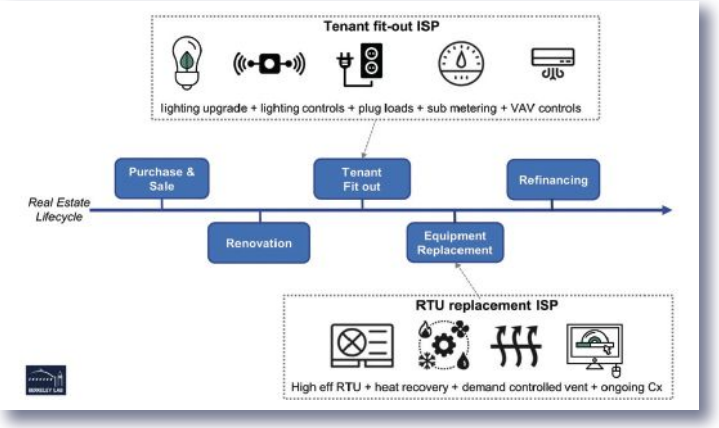


Figure 1. Aligning energy efficiency upgrades with the real estate life cycle.

The Packages

Figure 2 summarizes the measures included in each package, which are described in more detail below. A comprehensive list of measures was considered for each package. The measures finally selected for each package met the following criteria: they are proven and commercially available; they are reasonable to include within the scope of the relevant real estate event; and they are relatively standardizable and do not require highly bespoke engineering. LBNL has developed a toolkit of resources for each package.

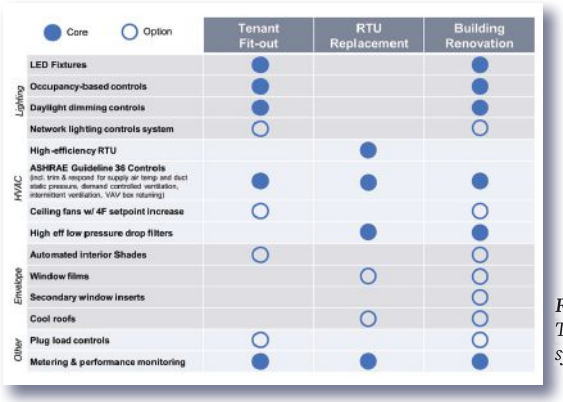


Figure 2. The integrated system packages

Tenant fit-out

This ISP can be implemented in conjunction with a tenant fit-out. These ISPs are cost-effective because: 1) they minimize additional disruption to building occupants and activities beyond what is already occurring due to the tenant fit-out; and 2) they reduce the incremental costs of adding energy efficient measures into a renovation because many of the costs are a result of the baseline tenant fit-out itself.

The core aspects of the package include installing high-efficacy LED fixtures, occupancy-based lighting controls, daylight dimming controls, tenant-level metering, energy performance monitoring and ASHRAE Guideline 36 HVAC controls. Guideline 36 includes trim-and-respond for supply air temperature and duct static pressure, demand-controlled ventilation, intermittent ventilation and VAV box retuning. Optionally and where appropriate, the package also includes installing a network lighting controls system, ceiling fans, automated interior shades and plug-load controls.

These efficiency measures were chosen because they fit well into the scope of medium-to-larger scale tenant fit-outs and they can be easily standardized for routine adoption. Measures that require high levels of customization, such as variable refrigerant flow cooling system retrofits, were excluded.

LBNL utilized laboratory and simulation analysis to reveal significant savings associated with the tenant fit-out ISP. The simulation results from the tenant fit-out showed savings in the range of 23-37 percent depending on location and whether optional measures were included (Figure 3). Laboratory testing was carried out to measure the energy savings, thermal comfort and visual comfort relative to an existing building baseline. Testing was conducted for three orientations, south, west and interior, and with and without optional package components. The laboratory results, retrieved via experiments in LBNL's FLEXLAB, validated the simulation results, showing 69-84 percent savings from lighting, 20-40 percent from HVAC, and 33-40 percent for all end uses relative to an existing building baseline.

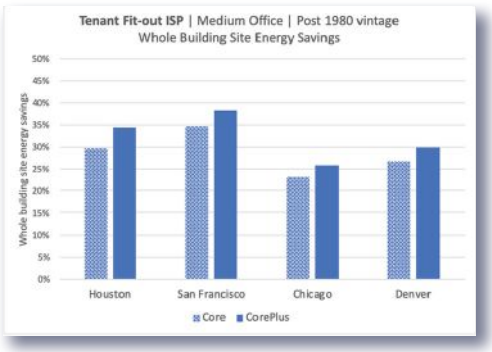


Figure 3. Simulated whole building site energy savings for the tenant fit-out package

Additional benefits of the tenant fit-out package are the reduced professional effort and development cost by using pre-engineered energy efficiency packages, the ability to meet corporate environmental, social and governance goals and regulatory requirements, higher property valuation, and a better building occupant experience through improved thermal comfort and indoor air quality.

The tenant fit-out package is applicable for office buildings undergoing a tenant fit-out that includes lighting and HVAC controls. The HVAC controls retrofit assumes a building automation system (BAS) and digital controls down to zone level.

RTU replacement

Another ISP is one that can be aligned with a rooftop unit (RTU) replacement. It includes a high-efficiency RTU, advanced controls based on Guideline 36 and energy monitoring. Optionally and where appropriate, the package also includes window films and a cool roof to reduce the RTU load and size.

The simulation results showed whole building site energy savings ranging from 12-18 percent (Figure 4). The laboratory results, retrieved via experiments in LBNL's FLEXLAB, validated the simulation results.

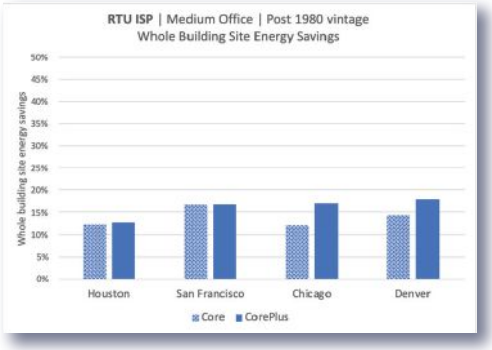


Figure 4. Simulated whole building site energy savings for the RTU replacement package

Building renovation

The building renovation ISP can be implemented during any general building upgrade. The package includes LED lighting and daylight dimming controls, high-efficiency RTUs, HVAC controls based on Guideline 36 and energy monitoring. Optionally and where appropriate, the building renovation ISP also includes ceiling fans, automated interior shades, window films, cool roofs and plug-load controls. The simulation results showed savings ranging from about 25 -45 percent depending on location and whether optional measures were included (Figure 5).

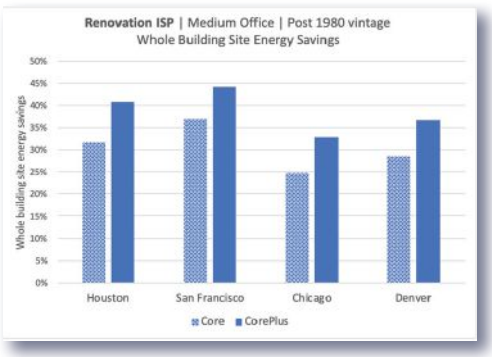


Figure 5. Simulated whole building site energy savings for the whole building renovation package

4SITE by CORT®

Objective Data. Actionable Insights. Smarter Decisions.™

Q1 Is this space working for my workforce now?"

Q2 What type of space is needed for what comes next?

Q3 Should I stay, or should I go when my lease is up for renewal?

Important Questions, New Calculations

Having the right information on how space is used can limit financial exposure to space that isn't working for you.

These are some of the questions that are driving decisions about the workplace in today's environment:

Get rid of the guesswork and make better decisions about your real estate

- Use concrete utilization data to optimize your existing space and drive your workspace strategy for years to come
- Make better informed lease restructuring decisions as you consider what's right for what's next
- Reconfigure spaces to allow employees to connect, collaborate and innovate safely

To learn more, scan the QR code to visit our blog.

Get a quote today.

Email us at 4SITE@cort.com or call us at 833.274.3736

CASE STUDY: ADDING EFFICIENCY TO RENOVATIONS

The world's largest property and FM company and an industry leader in the advancement of energy efficiency for their properties, CBRE was a partner in the development of ISPs. As the property manager for several financial institution properties in the southeastern U.S. that were pending facility renovations, CBRE selected an 8,800 square foot bank in Birmingham, Alabama, USA, as a prime spot to pilot the tenant fit-out ISP.

The bank, built in 2006, already planned upgrading its exterior lighting and adding rooftop solar PV to the building; but with the addition of the tenant ISP, the scope was expanded to include interior lighting upgrades and HVAC controls upgrades. The interior lighting renovation included LED lighting and daylight-based controls, and the HVAC controls upgrade included a static pressure reset, heating lockout, zone-based scheduling, optimized start and widening the deadband to 4 F (-15.56 C). The bank did not have an energy monitoring system, but the site's size did not warrant one to be installed, as recommended in the ISP toolkit; so, CBRE obtained interval meter data from the utility directly.

The International Performance Measurement and Verification Protocol (IPMVP) methodology was used to calculate energy and carbon emission savings from the building retrofits. In total, there were 25 percent annual energy use savings for the entire retrofit, with 6 percent from the exterior lighting upgrade and 19 percent from the ISP measures (Figure 6 left). Including the rooftop PV, the retrofits also resulted in 30 percent GHG savings (Figure 6 right).

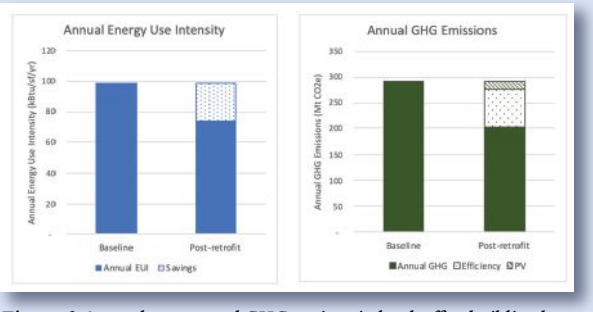


Figure 6. Annual energy and GHG savings in bank office building located in Birmingham, Alabama, USA.

Each ISP has a specification template, developed by LBNL and were provided by CBRE to the lighting and HVAC contractors. The lighting retrofits only required a few adjustments regarding lumen output, daylight sensors and color temperature. Because the applicability of Guideline 36 is dependent on the specifics of the HVAC system and control capabilities, the HVAC upgrades required some iteration and adjustment. This process involved one site visit and a follow-up meeting. Researchers at LBNL have now developed an ISP specifications generator tool for users to build customized ISP specifications depending on the characteristics of the site.

The ISP toolkits offer the ability for project developers and planners to easily apply energy-efficient standards into the design specifications of the project. " The toolkits will not only streamline project execution, but will also allow the planner to estimate the energy savings. This will aid in the approval of any potential cost increase due to installing energy-efficient equipment."

The integration of ISPs into a routine renovation allows for 20-25 percent energy and GHG savings with minimal disruption and lower transaction costs because contractors are already in the process of upgrading the building. Going forward, ISP implementation will be even smoother given the development of the ISP specifications generator toolkits, allowing for increased ISP customization, reduced effort level and streamlined decision making.

Conclusion

Through the use of ISPs, efficiency upgrades no longer have to be expensive special projects. Instead, energy efficiency retrofits can be built into routine renovations to lower transaction costs and reduce disruption to building tenants and activities. ISPs are intended to make the lives of building owners, FMs and building occupants easier. The packages enable more buildings to implement energy efficiency, advancing cost and energy savings opportunities, and contributing to global climate goals. Many cities and states in the U.S. are now passing building performance standards that require energy and GHG reductions in existing buildings. The ISP approach can play a critical role in facilitating energy efficiency adoption and mitigating carbon emissions. FMJ

Paul Mathew *is a staff scientist and department head of whole building systems at Lawrence Berkeley National Laboratory (LBNL), where he conducts applied research and market transformation activities on energy use in buildings. His work is focused on integrated building systems, energy epidemiology, benchmarking tools and energy-related risk analysis for building valuation and resilience. He has authored more than 150 technical papers, articles and reports. He received a U.S. Presidential award for federal energy efficiency. He has a bachelor's degree in architecture, and a Ph.D. in building performance and diagnostics from Carnegie Mellon University.*

ACKNOWLEDGEMENTS:

This work was supported by the assistant secretary for energy efficiency and renewable energy, building technologies program, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231. The author would like to thank Molly Bertolacini for her support in writing this article.

P. Mathew, C. Regnier, J. Shackelford, and T. Walter, "Energy Efficiency Package for Tenant Fit-Out: Laboratory Testing and Validation of Energy Savings and Indoor Environmental Quality," Energies, vol. 13, p. 5311, Oct. 2020, doi: 10.3390/en13205311.

C. Regnier, P. Mathew, A. Robinson, J. Shackleford, and A. Jiron, "System Retrofits in Efficiency Programs: Track Record and Outlook," Apr. 2022, Accessed: Apr. 11, 2022. [Online]. Available: escholarship.org/uc/item/2g6574qn

"Integrated Systems Packages." buildings.lbl.gov/cbs/isp (accessed Apr. 25, 2022).

UNDERWRITING
THE COST OF CARBON
The new FM decision making

BY ROBERT BEHRNS, ALAN GRANT & SARAH SPENCER-WORKMAN

As the world seeks to mitigate climate change through rapid decarbonization, organizations must develop new decision-making tools that facilitate faster, more predictable actions at scale. Carbon pricing puts a quantitative value on emissions and when appropriately applied, holds great promise for facility management leaders tasked with driving changes in their building portfolios. By modifying their existing internal business case templates and processes to include carbon pricing, companies can make smarter, faster and more responsible financial decisions for the long-term health of their employees, their organization and the planet.

There are decision models in place today, but they can be improved for integrating carbon pricing into business decision making based on the net cost of carbon. The following chart depicts this decision-model landscape:

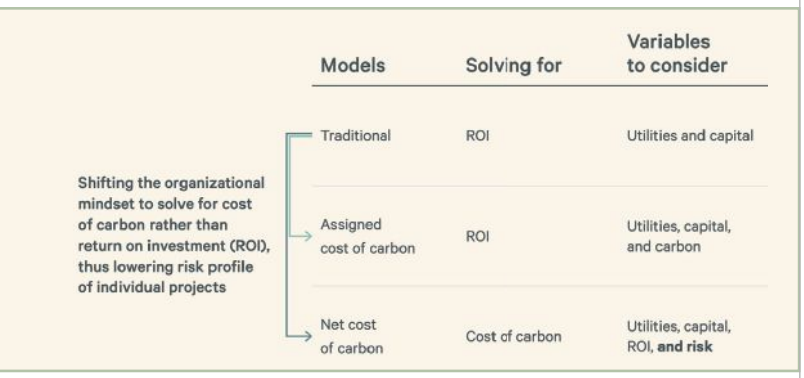


Figure 1: *Company models for project decisions*

By shifting from the traditional model, which does not consider carbon, organizations can consider two additional evaluative methods: the assigned cost of carbon — the price a company believes will approximate the true cost in a particular year — and the net cost of carbon, which helps organizations understand the risk premium paid to complete necessary retrofit projects.

Leave the traditional model behind

Models that fail to include the cost of carbon will not address looming regulatory and taxation changes announced by the EU, national governments and even local authorities. Here are some examples of carbon pricing in the shifting regulatory landscape:

- In 2008, British Columbia, Canada, introduced a carbon tax on gasoline that has since expanded to all fossil fuels.
- In 2019, New York City enacted Local Law 97 as part of the Climate Mobilization Act.
- Also in 2019, Singapore became the first country in Southeast Asia to introduce a carbon price via the Carbon Pricing Act and will facilitate a five-fold increase in carbon taxation by 2024.
- In 2021, the European Union announced a carbon border tax, which will be in full effect by 2026.
- Also in 2021, Boston, Massachusetts, USA, updated its Building Emissions Reduction and Disclosure Ordinance (BERDO) to give the city authority to set emissions standards and place commercial buildings on a path to net zero by 2050.

This changing landscape means more external costs will be added to facility budgets going forward. Companies that act to adjust the physical operation of their facilities can limit, and in many cases, avoid these regulatory costs. But those keeping traditional simple-payback or decision-making models that ignore the cost of carbon (or its likely future cost) will have an expensive and more carbon intensive portfolio.

Organizations that adopted Science Based Targets initiative (SBTi) will need to be even more proactive in adjusting decision-making models to deliver absolute emissions reductions via changes like electrification and on-site renewables. For these companies, carbon offsets can address residual emissions, but not the emissions from core operations (i.e., owned and leased buildings). As a result, the procurement-only approach is not an option for these firms.

This leaves FM leaders facing a shared challenge of knowing what technologies are available and what needs to be done in buildings, but not having financial models approved when retrofits are proposed.

Basic: Assigned cost of carbon

Organizations can adopt an assigned cost of carbon model in which the value of carbon avoided through project implementation is included as an input in the business case analysis. Projects are compared using a company's typical financial evaluation methods (e.g., net present value or internal rate of return). Projects are approved for funding and implementation if the evaluated financials exceed the company's business case threshold or hurdle rate.

A company's existing internal business case templates and frameworks can be modified to include an assigned cost of carbon. This simply requires organizations to determine a price of carbon for future analyses. Some external benchmarks for selecting an assigned cost of carbon are:

- UN Global Impact has called for companies to adopt an internal carbon price of at least US$100 per metric ton of equivalent CO2 emissions.
- The IPCC's minimum estimate of marginal abatement costs is US$135 per metric ton.
- The European Union Emissions Trading System (EU ETS) has accelerated these efforts by adopting a price of 96 euros per metric ton (US$101.36) as of February 2022.
- Sweden's Carbon Tax is at 118 euros (US$124) per metric ton.
- New York City's Local Law 97 has a penalty of US$268 per metric ton above allowed amounts.
- Some organizations are already adopting an internal carbon price of US$100 per metric ton (for example, companies have published internal carbon prices ranging anywhere from US$12 to US$440 per metric ton).
- These prices are expected to rise as demand exceeds supply and as scrutiny on quality increases.

Why does it matter? Putting carbon pricing into decision-making processes and business case models generates investments that allow companies to meet targets and mitigate risk.

Imagine an organization adopting a US$100 price of carbon. Under the traditional return on investment (ROI)-focused model, a project costing US$4 million and saving 2,750 metric tons of carbon dioxide has an internal rate of return (IRR) of 2 percent and is unlikely to be approved. Including the US$100 price of carbon increases this return to a reasonable 11 percent, making the project viable. Per these examples, adopting an assigned cost of carbon approach unlocks increased returns on decarbonization investments. The additional returns fuel more investments that increase building efficiency, making them more reliable, resilient and easier to operate.

Advanced: Net portfolio cost of carbon

Applying an assigned cost of carbon is a critical first step, but it is important to recognize that the methodology has limitations. Even with a US$100 (or more) assigned cost of carbon factored into the process, the deep retrofit projects necessary for portfolio decarbonization will not happen because organizations are not appropriately valuing the risks posed by failing to decarbonize. An additive decision-making framework can help simplify the process of valuing risk on a project basis, and moreover, provide a dynamic framework for reviewing multiple decarbonization projects as part of one decision-making process, the net portfolio cost of carbon.

Figure 2 illustrates how projects required to complete a credible carbon-reduction plan (e.g., electric boilers, thermal solar or heat pumps) are more expensive to implement with less savings than projects implemented earlier in the decarbonization journey and are less likely to be approved on a standalone basis. Yet, given the outsized impact of these technologies, organizations will not meet their decarbonization goals without them.

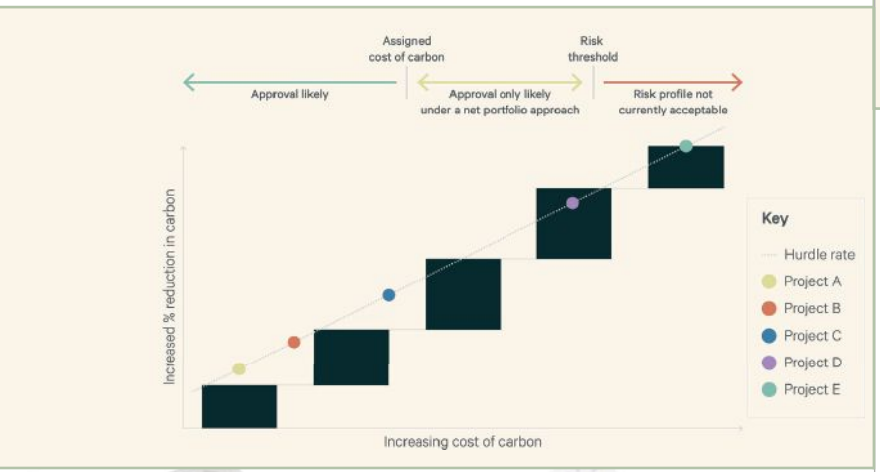


Figure 2: *Cost of carbon required to justify investments*

Considering Figure 3 shown below, imagine an organization chooses to adopt an assigned cost of carbon equal to US$100 per metric ton of CO2 equivalent (tCO2e).

- The organization has a 10 percent IRR hurdle rate
- The cost of carbon (expressed as USD per tCO2e) necessary for each project to achieve this hurdle rate is shown as (B) decarbonization factor (Note: this factor can be more or less than an organization's assigned cost of carbon)
- The net cost of carbon equals the organization's assigned cost of carbon (A) minus decarbonization factor (B), which is represented in Figure 3 as (C)

In this example, two projects have returns in which the net cost of carbon is positive, meaning these projects would likely be approved for implementation on a stand-alone basis. However, the solar thermal project has a net cost of carbon of US$95.96/tCO2e, and on its own would only be approved if the organization values the risks associated with a failure to meet public targets at or above US$95.96.

Decarbonization FM contribution target

	Solar thermal	Solar PV	Heat pump chiller	Total
Capital cost	$4,810,000	$14,178,400	$1,650,000	$20,638,400
Carbon saved (tCO2e)	1,736	6,696	2,888	11,320
A. Assigned cost of carbon	$100	$100	$100	$100
B. Decarbonization factor ($/tCO2e)	$195.96	$58.47	$21.56	N / A
C. Net cost of carbon (A - B)	($95.96)	$41.53	$78.44	N / A
Net project cost of carbon favorable / (unfavorable)	($166,589)	$278,107	$226,545	$338,063

Does not meet organizational IRR hurdle rate

Combined total: **Net portfolio cost of carbon** meets organizational IRR and decarbonization target

Figure 3: *Decarbonization project examples*

When the net cost of carbon per tCO2e is multiplied by the quantity of carbon avoided for each project, this yields the total net cost of carbon, which crucially can be pooled across all decarbonization projects under consideration as the net portfolio cost of carbon. In a portfolio approach, projects with a surplus net cost of carbon can help fund projects with a deficit.

A proposed framework for applying the net portfolio cost of carbon approach is shown in Figure 4. Additional risk factors — those already stated and committed to by an organization — are included within the decision-making framework. Properly implemented, this framework helps FM leaders better understand which projects to develop, how to manage the approval process, and how to pool risks and rewards to reach decarbonization goals.

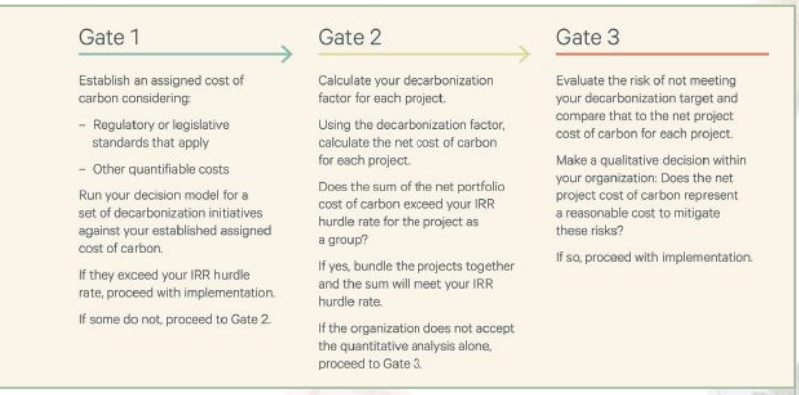


Figure 4: *Organizational decision matrix for projects considering the net cost of carbon*

Some leaders will challenge the application of these factors. For these individuals, referencing internal corporate social responsibility reports, public reporting or internally stated sustainability targets can be helpful to align goals within a practical decision-making template.

A decision framework should be agreed upon upfront by all decision makers, and once the framework is settled, the introduction of specific projects can begin. With consistent application over time, organizations will develop an efficient decision-making process grounded in shared investment parameters.

What next?

FM leaders can start a conversation with executives, as it is critical to align with corporate real estate, tax, finance and business leaders on acceptable language, models and decision-making frameworks.

Executives are likely to be more receptive to this conversation than ever before. Leaders are shifting away from quick payback thinking toward a broader and longer-term perspective, pushed by regulators and their own boards of directors.

To further facilitate discussion, FM leaders can stress urgency. As Figure 5 illustrates, delaying action increases the costs of achieving targets and the risks of not doing so. These are quantifiable, timely issues for every organization.

Figure 5: *Illustrative cost of waiting*

Another important step for organizations is to ensure funding to develop a program and propose actionable projects, particularly those that consider an entire real estate portfolio and the need to track, monitor and report emissions. Leaders must fight for budget allocation to drive site auditing, asset data collection and program development, as these granular inputs will be necessary and integral to identifying, prioritizing and advocating for projects.

Per the World Bank, putting a price on carbon emissions is fundamental to internalizing the external costs of climate change. It will create economic incentives and drive investments in low-carbon economic growth.

FM leaders can make this happen within their own organization. FMJ

Robert Behrns *is CBRE's global energy transformation leader, managing a team that assists clients in changing the way they purchase and consume energy for a low-carbon economy. He also leads all of CBRE's energy and sustainability technical products, energy procurement and data management services globally. Behrns previously co-founded and ran the CBRE|Renewables team focused on the deployment of distributed renewables for Fortune 500 occupiers, as well as oversaw the energy and sustainability service line for the Northeast and Life Sciences divisions concurrently.*

Alan Grant *is CBRE's global technical solutions director for energy and sustainability with more than 25 years of experience analyzing and designing renewable energy and energy efficiency projects, managing financial operations of technology and investment companies, managing investor and client relationships, providing professional mechanical engineering services for building owners, and climate neutrality planning and implementation. In his role, he combines his expertise in sustainability and finance with his technical experience to provide meaningful changes in clients' energy usage and carbon emissions. Previously, he was the energy and sustainability leader for CBRE's Life Sciences sector, serving as a subject matter expert supporting the sustainability goals and objectives of one of CBRE's fastest growing sectors.*

Sarah Spencer-Workman *is CBRE's global director of decarbonization, and in her role she provides leadership and support to CBRE's Fortune 500 clients to accelerate their decarbonization efforts across their real estate portfolios. She is a practitioner and thought leader with 17 years of valued energy and sustainability expertise who is passionate about solving the climate crisis. She was also a lecturer for the University of Colorado's Environment and Sustainability School where she wrote and developed a curriculum, LEED Lab, in partnership with the U.S. Green Building Council (USGBC).*

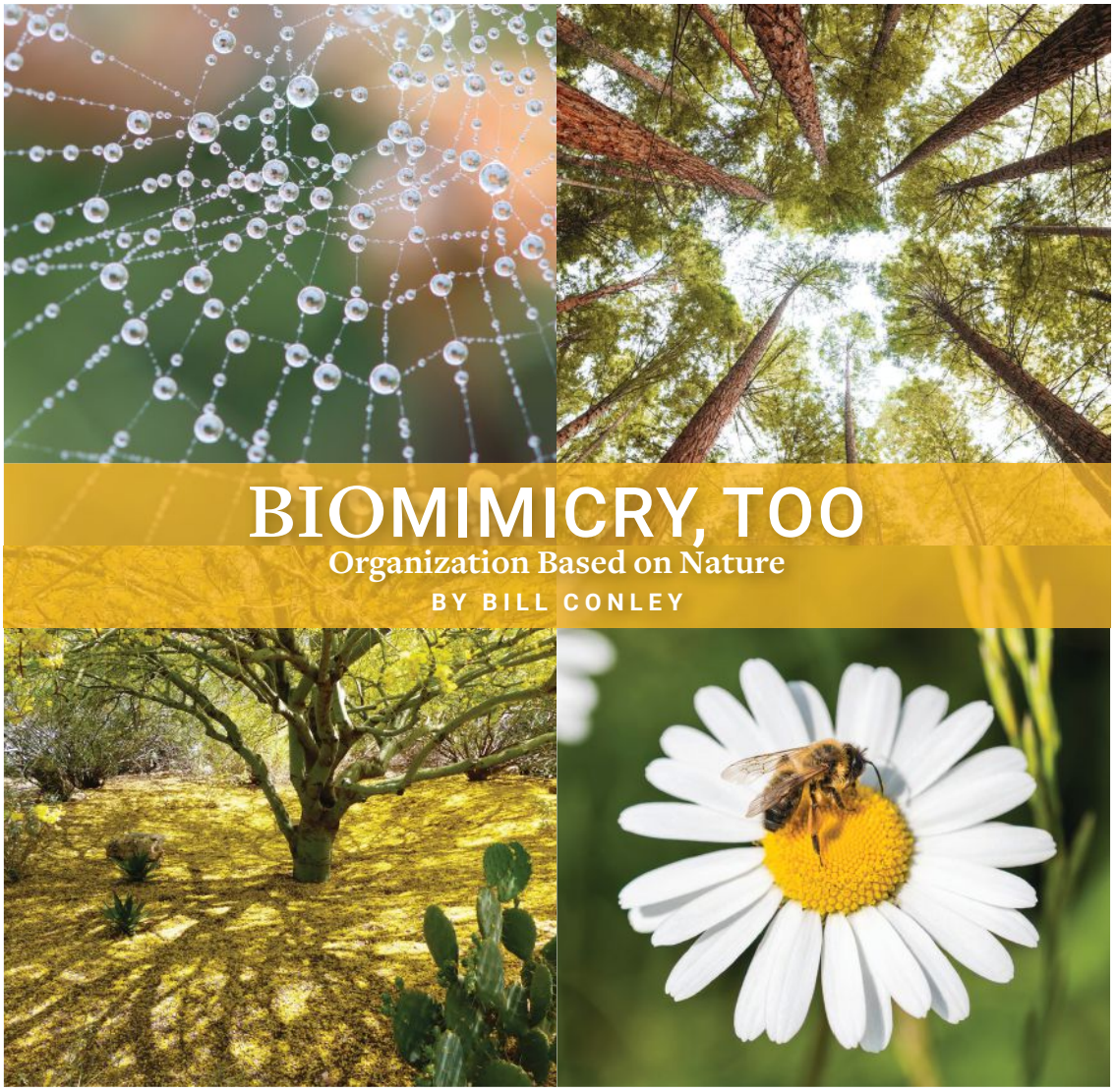
Matt Werner *also contributed to this article.*

Think 20 years down the line.

When it comes to a sustainability strategy, don't think short-term. Think long. And hard. Partner with someone who sees the detailed decisions you need to make to realize the big picture. That's why CBRE has been in commercial real estate for as long as we have. We plan for everything, so you can realize anything.

CBRE

http://www.cbre.com/energyandsustainability



BIOMIMICRY, TOO

Organization Based on Nature

BY BILL CONLEY

Nature has many things to teach facility managers. From the strength and resilience of spider webs, to the adhesive properties of mussels, to the power of wind, there are a multitude of lessons FMs can learn. Biomimicry is about valuing nature for what can be gleaned from its processes and longevity, not what can be extracted, harvested or domesticated. Looking beyond those more tangible aspects of nature, there is much more FMs can take away, especially when it comes to structure and organization.

FM TEAMS THAT COLLABORATE WELL WITH OTHER BUSINESS ENTITIES ARE MORE LIKELY TO CONTRIBUTE MORE TO THE BOTTOM LINE, BE MORE CULTURALLY ALIGNED, AND HAVE HIGHER SATISFACTION RATES INTERNALLY AND EXTERNALLY.

In the process, they can learn about themselves, their purpose, and how to work together better. This entails collaboration and mutual support. When it comes to sustainability, the only identifiable success over a long period of time has been nature. FMs can witness how nature is interrelated, with different species supporting others, and apply that to the need for teamwork, alignment with other departments and a focus on the health of the organization. They can attempt to replicate nature's forms, processes and ecosystems to create a more harmonious and productive workplace.

The philosophy of understanding how life works and creating designs that continuously support and create conditions conducive to business success opens a new realm in FM.

Many of the relationships between organisms in nature are those of dependence. Whether it be humans breathing oxygen generated by plants or an oxpecker bird feeding on parasites on a rhinoceros, every organism depends on another organism in some way.

In the cycle of life, plants consume decayed material from the soil for their nourishment and are consumed by plant-eating animals for their survival. The carnivores then consume the lower animals of the food chain for their sustenance. These components are linked together through nutrient cycles and energy flows. Energy enters the system through photosynthesis and is incorporated into plant tissue. By feeding on plants and on one another, animals play an important role in the movement of matter and energy through the system. They also influence the quantity of plants and microbial biomass present. By breaking down dead organic matter, decomposers release carbon back to the atmosphere and facilitate nutrient cycling by converting nutrients stored in dead biomass to a form that can be readily used by plants. When living organisms perish, they decompose and form a part of the soil, which can again be consumed by plants, continuing the cycle.

The flora in forests also helps establish protection for animals living within them. Protection is offered both within and outside the ecosystem. Trees and large bushes help protect animals from their predators by providing camouflage. Animals are protected to a certain degree from outside influences like extreme weather and harsh climates. This helps to explain why forests are home to a variety of animals. Natural philosophers and biologists have posited a hypothesis that mutual aid among species came to shape plant communities and drives the diversification of life.

Plants even have mentor/mentee relationships. Palo verde trees shelter baby saguaros, helping them through their early years by providing shade and funneling water down from their branches. This relationship will turn when the saguaro comes of age, at which time it may out-compete the nurse plant that has helped it along. This could be called career advancement. There also exists a reproductive dependence between plants and animals. Animals help in plant reproduction by acting as carriers of seeds. It is important that plants grow over an extended area so as not to deplete the resources needed for survival. Too many plants growing in the same region may suffer from insufficient amounts of water, sunlight and/or nutrients. Animals help spread the plants to a wider range to enable their continued existence.

Bees are the major carriers of pollen, which is transferred between flowers. Pollination helps plants to reproduce. Subsequently, the bees obtain the nectar of flowers as their nourishment, establishing a symbiotic relationship between the two species. They work together; they collaborate. Collaboration in the workplace follows the same pattern. It is when a group of people come together and combine their expertise and energy for the benefit of shared objectives or goals. FMs can manage such unions, as they hold a holistic view of the organization. They can help put the pieces together.

The overall cycle could provide a model for FMs and business as well. Each member or department must understand the importance of doing their job while providing support, ideas and input to others in the business, meanwhile gleaning the same assistance and information from others in the system.

FM teams that collaborate well with other business entities are more likely to contribute more to the bottom line, be more culturally aligned, and have higher satisfaction rates internally and externally. Such alliances benefit everybody involved, both in organizations and facilities. A combination of culture, leadership and incentives needs to come together for effective collaboration and productivity to reign. FMs are well equipped to facilitate such efforts, while being able to better fulfill their responsibilities.

Ecosystems

An ecosystem (or ecological system) is a geographic area where plants, animals, other organisms, weather and landscape interact to form an environment in which to thrive. Every factor in an ecosystem depends on every other factor, either directly or indirectly. A human ecosystem defines the way people interact within their ecosystems.

In a work ecosystem, diverse elements — living, inanimate, environmental — must also interact. The key is to unify these disparate elements into an interdependent system focused on the survival and success of the entire organization.

This way of looking at a business or workplace is called systems thinking, and it lies at the heart of what nature does. Understanding all the parts and their impact on one another, having a holistic perspective of all the essential needs of both equipment and the workplace, enables an FM to detect why certain problems arise, or why certain seemingly small issues can turn into major crises. It enables them to be proactive in creating order, avoiding chaos.

In a team-based environment, the workplace is structured to support teamwork and reward the success of team players. Key benefits of working in this setting can include sharing responsibilities with a group of people, developing strong professional bonds with coworkers and developing teamwork skills. In mature ecosystems, cooperation is just as prevalent as competition. This peaceful coexistence is inherently cooperative.

Mutualism

The term mutualism refers to relationships in biology or sociology that are mutually beneficial to two living things or societies. It is the doctrine or practice of dependence as the mutual condition of individual and social welfare, relationships that work together.

Aphids are a minute bug that feeds by sucking sap from plants. They secrete a sugary liquid called honeydew that is the waste product of their diet. Ants are known to engage in a mutualistic relationship with aphids by "milking" them with their antennae and feeding on the honeydew. In return, the ants will protect the aphids from predators and parasites. Some will move aphid eggs and nymphs underground to their nest, which provides shelter and makes harvesting their honeydew more efficient, operating as an ant dairy farm. This directly parallels the activities FMs engage in for the care, feeding and shelter of employees, rewarded by appreciation and mutual satisfaction in jobs well done.

Working together in an organization, each person performing their different roles, can do the same.

Working together

The giant redwood trees of the western U.S. have a shallow root system. Among the tallest trees in the world, their enormous weight is supported, in part, by the interlocking of a tree's roots with those of the other trees around it. Their roots serve as a multitude of people interlocking their arms to support each other. They provide each other with strength and support via their intertwining roots. These roots are not deep, but wide, living in an embrace of others. The merged roots also meet their needs for nurture. The entire system relies on their rooted connections.

After hurricanes, tree roots have been found interlocked to provide mutual support to survive the force of the storm. This is a type of collective intelligence: knowing what is needed and working together for enhanced, exponential support.

There is solidarity in unity, focused on the well-being of all involved. This is a good lesson for FMs. They have an impact on every aspect of a business, which provides them with the means and opportunity to weld all the units together.

Together forever?

All of nature's interdependences point to the prevalence of collective intelligence, which is the body of knowledge that develops within a group. When groups of people work together, they create intelligent support that cannot exist on an individual level. Collective intelligence is a shared or group intelligence that emerges from the collaboration, combined efforts and competition of many individuals and appears in decision making. Collective intelligence has been attributed to all living organisms.

It is all about relationships – how people and departments physically and psychically relate to each other. In business and nature, everything works through flows of relationships. Trust is the fertile earth which allows healthy, vibrant relationships to take root. Relationships struggle to survive without trust. Trust requires mutual respect and understanding, an empathic reaching out beyond any one entity that allows for and promotes reciprocation.

Just as new FMs must learn from more experienced professionals, everyone can learn from the natural world. Nature has learned its lessons well. Successes thrive while failures become fossils. There is not a question that nature cannot answer if one knows where and how to look. Over time, it may even come naturally. FMJ

Bill Conley, *CFM, SFP, FMP, LEED AP, IFMA Fellow, is a facility manager at Yamaha Motor Corp. in Cypress, California, USA. He previously served as owner and chief sustainability officer of CFM2, a facility management company. Conley has more than 40 years of experience in the facility management profession and has been a proponent of sustainable operations for more than 20 years. Conley has served on the IFMA board of directors, is a recipient of IFMA's Distinguished Member of the Year award and has received the association's Distinguished Author award three times. He has been a regular contributor to FMJ for more than 20 years and has authored more than 70 FMJ articles.*

Build your FM training blueprint.

Develop a personalized training plan so you can improve your knowledge while living your life.

Newly released, IFMA's Self-Assessment Tool helps you pinpoint your strengths across the FM body of knowledge so you can build a bespoke learning plan that's unique to you and your team.

TRAIN SMARTER

Focusing specifically on your knowledge gaps saves time and money while avoiding boredom and frustration.

GOOD FOR GROUPS

Assess your FM team's knowledge levels and then build a training plan to achieve cohesion and make upskilling accessible to all.

ADVOCATE FOR YOUR TEAM

Clearly articulate your training needs to leadership and track your progress to FM mastery with the reporting dashboard.

IFMA™

INDIVIDUALS
Gain knowledge where you need it, when you need it. Start today.

GROUPS
Let our Training Support Team help you chart your path to FM success. Learn more.

WASTE SOLUTIONS *for* GREEN GOALS

BY
KRISTIN STEINER

When it comes to taking care of the Earth, everyone has an important role to play.

Being environmentally responsible is not just good for the planet — it can also be good for the bottom line. Customers are increasingly looking to do business with companies and facilities that are sustainable in their operations. Having a sustainability strategy can help conserve natural resources, reduce costs, attract talent and drive employee productivity.

Studies show that consumers are concerned about the environment and are willing to pay more for certain services, including in the building industry. In a Nielsen survey, 81 percent of global consumers said they felt strongly that companies should help improve the environment, and 75 percent of millennials said they are changing their habits to reduce their impact on the environment.

While every company's path to sustainability is unique, it is important to start with a strategy. For facility managers, this means having a plan to waste less, divert more materials from landfills and lessen impact whenever possible.

WASTE LESS

Most people are familiar with the three R's: Reduce, Reuse, Recycle. These three steps are key to wasting less, and the order is important.

- **Reduce single-use materials:** In offices and breakrooms, disposable cups, plates and utensils create a lot of waste. Swap these out for reusable alternatives to be more sustainable. Coffee even tastes better out of a ceramic or steel mug.
- **Go big:** Single-use water bottles and coffee pods are convenient, but they are not environmentally friendly. Provide a water cooler or coffee pot and encourage employees to use it to fill reusable bottles or mugs.
- **Reuse packaging:** In the warehouse, instead of tossing structurally sound cardboard boxes, reuse them for storage or shipping. Some companies offer customers the option of having goods shipped to them in a recycled box.
- **Be energy efficient:** It is also important to evaluate how a facility is using resources such as energy and water. Becoming energy efficient reduces carbon footprints and can help shrink a facility's energy bill. Simple solutions include moving to LED lighting, automating lights with sensors so they shut off when no one is in the room, and using smart thermostats to warm or cool a room only when needed.

For more comprehensive evaluations, the U.S. Green Building Council's LEED system provides a framework for healthy, efficient, carbon and cost-saving green buildings.

DIVERT MORE

After reducing and reusing, recycling is the next best thing. Recycling helps conserve natural resources and supports the circular economy by returning materials to the marketplace where they can be remanufactured into new products or packaging.

Keep these three tips in mind for proper recycling:

- **Know what to throw:** The first step is knowing which materials are recyclable. Cardboard, paper, aluminum, tin and many plastics are widely recyclable. Glass may also be accepted, check with local providers.
- **Empty, clean, dry:** Before placing materials in the recycling bin, be sure they are free of residue. Leftover food or liquid can contaminate otherwise good recyclables and cause them to be sent to the landfill — which is what recycling is trying to avoid in the first place.
- **Don't bag it:** Recyclables should never be bagged. Place them loose in the recycling bin. Plastic bags can tangle and jam the equipment at a recycling facility, causing delays or even damage.

There are specialized forms of recycling that do not use the regular recycling bin but can help a facility be even more environmentally responsible:

- **E-waste recycling:** As businesses modernize and grow, they may have a need to recycle old electronics. Electronics recycling requires special handling separate from regular trash and recycling collection. Proper electronics recycling prevents potentially hazardous materials from polluting the environment and can recover precious metals including gold, silver and copper. There are energy savings, too. Recycling 1 million laptops saves the energy equivalent to the electricity used by more than 3,500 U.S. homes for a year, according to the EPA.
- **Bulb and battery recycling:** Like e-waste, bulbs and batteries contain harmful materials that require special handling and should not be thrown in trash or recycling bins. Through recycling, 99 percent of the mercury in fluorescent bulbs can be recovered. And more than 95 percent of an LED light bulb can be recycled. Mail-back programs for bulbs and batteries provide a solution that helps facilities comply with environmental regulations.
- **Organics recycling:** Another way to divert waste from landfills is by recycling food and green waste. In a landfill, this organic material breaks down into methane, a greenhouse gas. But by diverting food and green waste to an organics recycling program, it can be recycled into nutrient-rich compost for the garden or converted into renewable energy through anaerobic digestion. All those lunch leftovers could eventually help power a facility.

A carbon footprint is the total amount of greenhouse gases, including carbon dioxide and methane, generated by an organization, individual or event.

LESSEN THE IMPACT

To help inform a sustainability strategy, it is important to understand the carbon footprint of the facility or operations. A carbon footprint is the total amount of greenhouse gases, including carbon dioxide and methane, generated by an organization, individual or event. Use of fossil fuels for electricity, heating and transportation all contribute to a carbon footprint.

- **Get a waste assessment:** Waste assessments can calculate a customer's carbon footprint and help determine the right mix of recycling and waste solutions for a facility. This may include regular trash and recycling collection, custom compactors to help reduce waste volume, and roll-off dumpster rentals for short-term projects or long-term use.
- **Think local:** Transportation plays a significant role in a company's carbon footprint. Partnering with domestic or local suppliers reduces miles traveled, which in turn, results in fewer emissions. Becoming a more sustainable facility includes evaluating the companies organizations do business with.
- **Offset carbon:** Facilities that have made changes to reduce their footprint may find there is still a portion they are unable to neutralize. To reach net zero emissions, a facility may choose to purchase carbon offsets, which compensate for emissions by funding an equivalent reduction project elsewhere. Such projects may include forest conservation, creation of windfarms or reuse of landfill gas for energy.

Taking care of the planet is both a responsibility and an opportunity. By becoming more environmentally conscious, facilities can help the planet, attract more customers and inspire employees to be more productive. Beyond the product or service provided, organizations also will be helping their community enjoy a more sustainable future. FMJ

Kristin Steiner *is the sustainability director for Republic Services. In this role, she is responsible for assessing and leading Republic Service's environmental, social and governance (ESG) reporting, initiatives and strategy. She ensures Republic's sustainability efforts enhance business performance, drive innovation and support the long-term interests of the company. Steiner holds a bachelor's degree in civil engineering from San Diego State University, and a dual degree MBA and master's degree from the School for Environment & Sustainability from the University of Michigan.*

REFERENCES
mckinsey.com/business-functions/sustainability/our-insights/sustainability-blog/how-the-e-in-esg-creates-business-value
nielsen.com/us/en/insights/article/2018/global-consumers-seek-companies-that-care-about-environmental-issues/
nielseniq.com/global/en/insights/analysis/2018/was-2018-the-year-of-the-influential-sustainable-consumer/
usgbc.org/leed

GDI Integrated Facility Services

GDI Integrated Facility Services is your one-call destination for expert facility services across the United States.

With thousands of team members, decades of unrivalled experience, the ability to service national and multi-regional property portfolios, and a commitment to health and safety; you can trust us to ensure ongoing customer satisfaction by creating clean and welcoming work and leisure environments.

Established in 1926, GDI is an industry leader committed to Environmental, Social, and Governance policies, and holds minority interests in Women and Minority-owned Enterprises, Contract Direct and Newbold.

Cleaning Coalition of America

A proud founding member of the Cleaning Coalition of America, GDI offers sanitation services across many industries, such as food processing, and offers sustainable solutions including:

Green Cleaning Products

Waste Management

GDI can service national, multi-regional and local properties in a variety of facility types including:

Office Buildings
Educational Facilities
Industrial Facilities
Healthcare Establishments
Stadiums and Event Venues
Hotels
Shopping Centers
Distribution Facilities
Transportation Facilities
Food Plants

Read our 2021 ESG Report here

GDI.com

MY FACILITY

CAROLINE KELLEY
National Renewable Energy Laboratory
Golden, Colorado, USA

The National Renewable Energy Laboratory (NREL), is the United States' primary laboratory for research and development of renewable energy and energy efficiency technologies. IFMA member Caroline Kelley is the facility manager for four buildings on the expansive 327-acre campus in the foothills of the Rocky Mountains in Golden, Colorado.

Photos Courtesy of NREL

FMJ: Tell us about yourself and how you got into FM.

KELLEY: After graduating from Virginia Tech, I worked as a museum exhibit designer in Richmond, Virginia, USA, where I created display cases for institutes such as the Library of Virginia. I then moved into corporate interior design, creating interior spaces for businesses, and learned how to project manage the process of building these spaces. This eventually led to a project administrator position working for an FM who was passionate about the industry. He became a key mentor in my life, and through his guidance, he convinced me that I would be a great FM with my experience in space planning, project management, move management and design.

FMJ: What is day-to-day life like at NREL?

KELLEY: NREL's South Table Mountain campus in Golden, Colorado, USA, sits on 327 acres with many buildings of different sizes, designs and purposes. We even have a new building, the Research and Innovation Laboratory (RAIL), currently in construction. I am the FM for four of the buildings on this campus, including the new RAIL building.

I'm sure many FMs can relate, but I never have two days that are exactly alike. My days can involve construction safety walkthroughs, preparing tours for VIP visitors/potential partners, and meetings and paperwork. Even if some of this doesn't sound exciting, it's a key part of what makes this job fun. There's a lot of variety in each day/week/year, especially in the people and vendors I get to meet.

During the pandemic, my role shifted slightly to incorporate safety and security walks of our mission-critical research equipment that needed to be maintained after our research staff was sent home. I also volunteered at NREL's vaccine clinic for underserved individuals in our community.

FMJ: Why is NREL unique and what kind of unique challenges do you face?

KELLEY: Recognized worldwide, NREL's high-performance buildings are sustainability models for the use of energy efficiency and renewable energy technologies. Nearly all the buildings on our South Table Mountain campus are designed to meet the Gold or Platinum standards of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program.

NREL is the U.S. Department of Energy's only laboratory dedicated to renewable energy and energy efficiency activities, so we have unique challenges related to the wide range of research happening on campus that involves different equipment, chemicals and materials in each laboratory. Our buildings have fire barriers, blast walls, and massive heating, ventilating and air-conditioning (HVAC) requirements.

Due to these unique challenges, I joined the NREL Chemical Response Team, which provides both activation and response capabilities for NREL-based chemical operations and assists facilities using hazardous production materials. The Chemical Response Team includes members trained to implement defensive and offensive actions to eliminate or reduce the risk of personal injury, property damage and/or environmental impact resulting from chemical releases.

One of the buildings I manage is NREL's Field Test Laboratory Building, which is the oldest building on campus. During its more than 40-year history, the Field Test Laboratory Building has gone through many upgrades, which can be challenging from an FM perspective because of the many different hands who have touched it during its long lifespan.

MY FACILITY

>>>>>>>>>> **CAROLINE KELLEY**
National Renewable Energy Laboratory
Golden, Colorado, USA

FMJ: How much space do you manage and how is it used?

KELLEY: NREL's South Table Mountain campus is expansive, and the four buildings I manage total about 162,000 square feet. This includes RAIL, which is in the construction phase.

NREL researchers use the Thermal Test Facility for advanced HVAC research and study of active solar photovoltaic systems. In addition to housing research facilities, the building itself was designed as a research model that provides data that can be applied to buildings designed in the future.

The Field Test Laboratory Building is the oldest building on NREL's South Table Mountain campus. It primarily supports biomass conversion but also focuses on various other projects, including solar research to test modules and systems as well as sustainable aviation fuels.

Once completed, the 15,700-square-foot RAIL building will provide multipurpose lab space for cross-disciplinary research at the intersection of chemistry, materials science, bioscience and engineering in support of a breadth of energy efficiency and renewable energy research areas, including 5,500 square feet of flexible lab space.

FMJ: Tell us about your FM team.

KELLEY: I am in the directorate that leads the management of NREL's facilities and operations. It includes professionals who oversee environment, safety, health and quality; security and emergency preparedness; and information technology. We also have an in-house project management, engineering and construction team. We have in-house electricians and a mechanical team that has HVAC technicians and plumbers. Due to the number of projects and changes in the lab spaces, these groups are indispensable to continuous operations. My group, site operations, includes FMs, shipping and receiving, maintenance, campus mobility and intelligent campus experts.

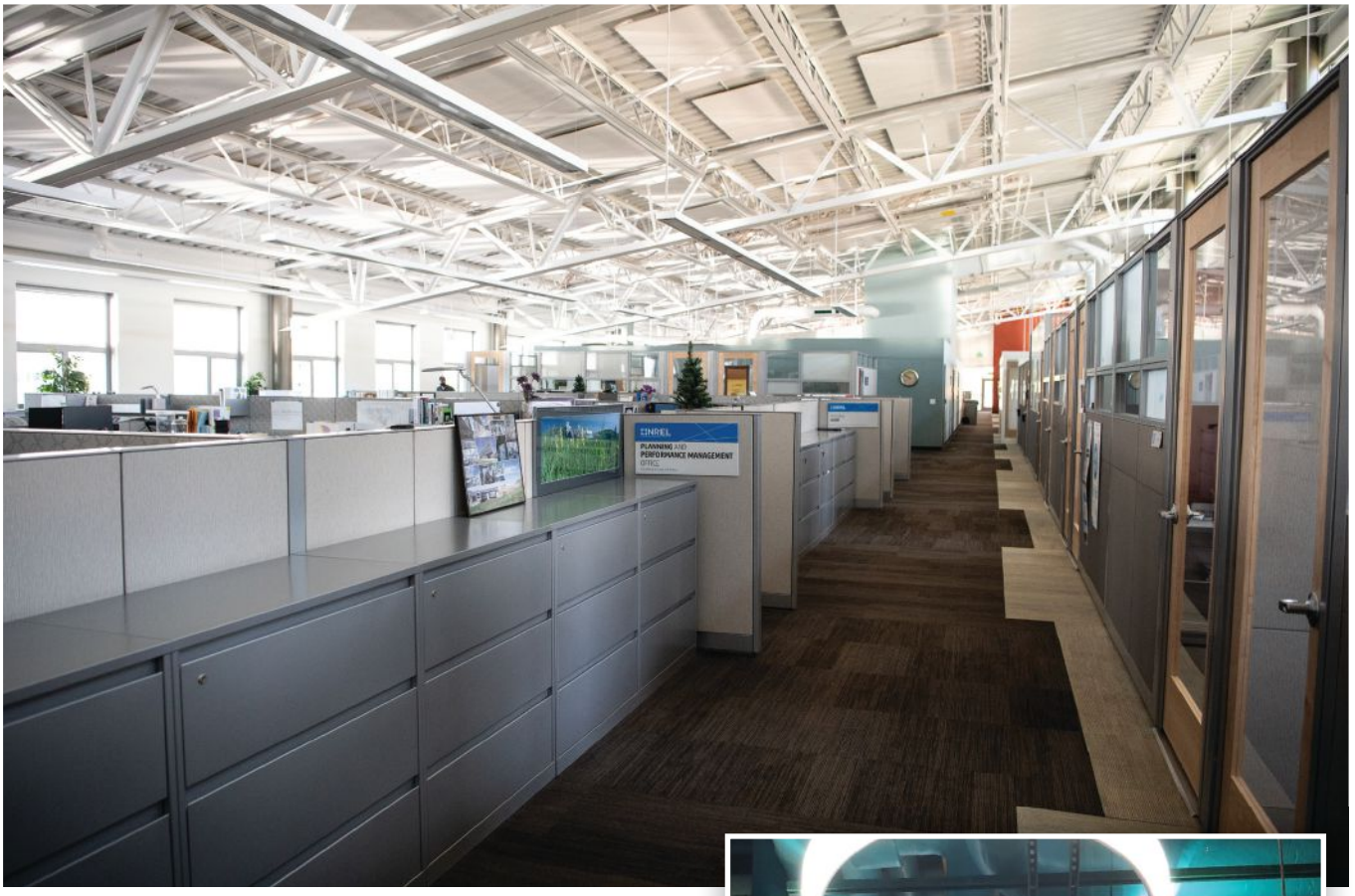
NREL's FMs come from a multitude of backgrounds that range from research to construction to controls. This diverse skillset gives us the ability to project manage the bulk of our operations, repairs and maintenance in-house.

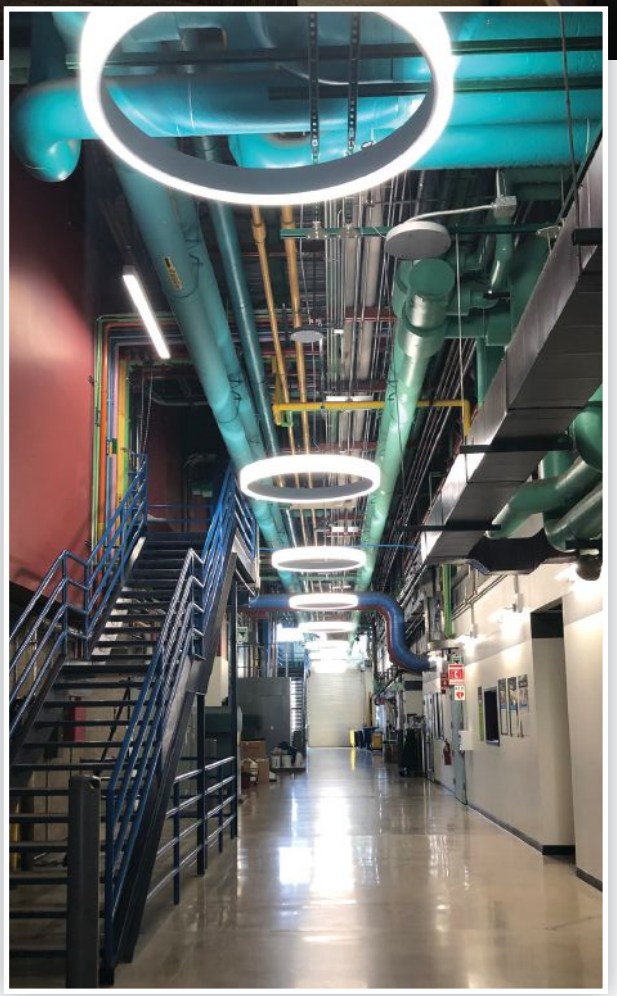
FMJ: How is sustainability shaping how FM is practiced at NREL?

KELLEY: At NREL, sustainability is the foundation of everything we do. Specifically, the FM focuses on ensuring the smooth operation of every building, so the building can meet its rigorous efficiency goals.

Many of the high-performance buildings on NREL's South Table Mountain campus have achieved LEED or net zero energy status. By incorporating state-of-the-art energy efficiency and renewable energy technologies, these buildings are models for sustainability. In addition, the campus features native and xeriscape vegetation.

NREL's Flatirons Campus (also in Colorado), which houses the National Wind Technology Center, is a zero-energy campus. When there is not enough on-site generation to satisfy the energy demand, the campus imports the balance from the grid. When there is more on-site generation than on-site demand, the campus exports to the grid.





Newer buildings like RAIL will strive to attain similar metrics. Older buildings follow Guiding Principles assessments and regular Energy Independence and Security Act audits.

FMJ: What are some FM challenges you face that are common across the industry?

KELLEY: My team's challenges are like those of many other FMs across the industry, including adapting space for growing staff, ensuring preventative maintenance plans and schedules are in place, monitoring equipment updates, ensuring active asset management, continuously practicing high-quality project management, and elevating the levels of communication to staff, vendors and managers.

We also use FM technology that helps with assets, space planning and move management.

FMJ: What do you like best about what you do?

KELLEY: I work with great people and unique and challenging buildings. My colleagues are top notch people who are passionate about the environment and creating a better Earth. It's very rewarding to work with people who care deeply about what they do.

Being an FM is synonymous with continuous learning, and that is a huge motivator and perk for me. I've always had a difficult time sitting still, so the variety in my day-to-day activities keeps me moving forward.

IFMA™ Credentials

The following people were awarded the Certified Facility Manager® (CFM®) certification in MAR 2022:

Ashok Kumar, CFM
Dubai, United Arab Emirates

Mahran Guesmi, CFM
Doha, Qatar

Terry Arnold, CFM
Grand Prairie, Texas

Jim Topor, CFM
Chicago, Illinois

Kenneth Lyday, CFM, FMP, SFP
Kent, Washington

Sami Meskini, CFM
Doha, Qatar

Ravi Teja Pokala, CFM
Lagos, Nigeria

Rahul Mohite, CFM
Lagos, Nigeria

Houda Khaled, CFM
Dubai, United Arab Emirates

Travis Tyler, CFM
Los Angeles, California

Mohammed Abdulrazzaq, CFM
Dubai, United Arab Emirates

Arshad Abdul Majeed, CFM
Dubai, United Arab Emirates

Tom Flick, CFM
Appleton, Washington

Vanessa Shataloff, CFM
São Paulo, Brazil

Mădălin Andreica, CFM
Romania

DeWayne Roberson, CFM
Mableton, Georgia

Lucy Castillo, CFM, FMP
Houston, Texas

Donald Boos, CFM, FMP
Owings Mills, Maryland

Jonathan Olivares, CFM
California

Achu Jayasankaran, CFM
Dubai, United Arab Emirates

Irene Gryniewski, CFM, FMP
Toronto, ON, Canada

Imrana Shamji, CFM, FMP
Toronto, ON, Canada

Mohamed Anas, CFM
Abu Dhabi, United Arab Emirates

The following people were awarded the Sustainability Facility Professional® (SFP®) designation:

Kashaf Zafar, SFP
Abu Dhabi, United Arab Emirates

Saleh AlBlooshi, SFP
Al Ain, United Arab Emirates

Bradley Trew, FMP, SFP
Saskatoon, SK, Canada

Bader Al Shamsi, SFP
Al Ain, United Arab Emirates

Lisa Coombs, FMP, SFP
Aurora, Colorado

James Lau, FMP, SFP
Singapore

James Bakker, SFP
Mount Pleasant, South Carolina

Abdelhamid Elgohary, SFP
Dubai, United Arab Emirates

Christine Wade, FMP, SFP
Suffield, Connecticut

Ron Allan Go-Aco, SFP
Sacramento, California

Matt Spurgeon, FMP, SFP
Dubai, United Arab Emirates

Wayne Whitzell, FMP, SFP
Elk Grove, California

Rickesh Lal, FMP, SFP
San Jose, California

Rodolfo Santana, FMP, SFP
Miramar, Florida

Jon Lunchick, FMP, SFP
Raleigh, North Carolina

The following people were awarded the Facility Management Professional™ (FMP®) designation:

Shan Hoo Lee, FMP
Singapore

Ahmad Alharbi, FMP
Riyadh, Saudi Arabia

Timothy Pratt, FMP
Lapeer, Michigan

Scott Lethig, FMP
Denver, Colorado

Jeff Ferguson, FMP
Austin, Texas

Alex Hersonsky, FMP
Waterdown, ON, Canada

Wayne Whitzell, FMP, SFP
Elk Grove, California

Christopher Makins, FMP
Panama City, Florida

Mutaz Haddadin, FMP
Amman, Jordan

Aarthi K, FMP
Bengaluru, KAR, India

Hansen Tan, FMP
Singapore

Liang Huat Lee, FMP
Singapore

Torke Alzahrani, FMP
Jeddah, Saudi Arabia

Jyotiranjan Pattnaik, FMP
Bengaluru, KAR, India

Sarhan Alshammari, FMP
Riyadh, Saudi Arabia

Salman Asiri, FMP
Dammam, Saudi Arabia

Mark Turuk, FMP
Hastings, ON, Canada

Mike Rampino, FMP
Hickoring, ON, Canada

Justin Shinta, FMP
Columbia, South Carolina

Arielle Berube, FMP
Vaughan, ON, Canada

Srinivas Pedamallu, FMP
Mississauga, ON, Canada

Evan Leatherman, FMP
Myersville, Maryland

Brice Alexander, FMP
Grasonville, Maryland

Adam Fleener, FMP
Denver, Colorado

Claudette Silva, FMP
Edmonton, AL, Canada

Antonio Russo, FMP
Woodbridge, ON, Canada

Celeste Elkins, FMP
Salt Lake City, Utah

Joseph Marriott, FMP
Sandy, Utah

Danny Weisbeck, FMP
Canada

Christine Chew, FMP
Singapore

Will Clay, FMP
United States

Steven Russell, FMP
Aurora, Colorado

Ahmed Bashraheel, FMP
Jeddah, Saudi Arabia

Monkez Alhawiss, FMP
Riyadh, Saudi Arabia

Theresa Taitt, FMP
Champs Fleurs, Trinidad and Tobago

Denrick Brewster, FMP
Port of Spain, Trinidad and Tobago

Toni Hawey, FMP
Pilot Butte , SA, Canada

Pamela D'Andrade, FMP
St. George, Barbados

Jessica Toomey, FMP
Fort Collins, Colorado

Carl Beard, FMP
Universal City, Texas

Cleta Platt-Gibson, FMP
Jeffersonville, Indiana

Bryan Mendenhall, FMP
Denver, Colorado

Denada Gjerasi, FMP
San Francisco, California

Brent Markus, FMP
Sandy, Utah

Cynthia Cenerini, FMP
Hamilton, ON, Canada

Richard Roberts, FMP
Easton, Pennsylvania

Leonard Peter Paul, FMP
Coonoor, Ta, India

Davies Mani, FMP
Suva, CE, Fuji

Khalid Alghamdi, FMP
Jeddah, Saudi Arabia

Christopher Blonski, FMP
Fort Saskatchewan, AL, Canada

Craig Arychuk, FMP
Edmonton, AL, Canada

Dion Huot, FMP
St. Albert, AL, Canada

Pradipta Kumar Pattanaik, FMP
Bangalore, KAR, India

Sunil Kumar V, FMP
Bangalore, KAR, India

Goutam Mukherjee, FMP
Kolkata, WE, India

Abdullah Mohammed Al-Amoodi, FMP
Jeddah, Saudi Arabia

Ganesh Jayakumar, FMP
Bangalore, KAR, India

Ashdeep Sood, FMP
Whitby, ON, Canada

Ahmed Mohamed Alamin Ahmed Alsaid, FMP
Abha, Saudi Arabia

A. Shankar, FMP
Chennai, TAM, India

R. Sundar, FMP
Chennai, TAM, India

Stephen Odei, FMP
Fort McMurray, AL, Canada

Abby Carr, FMP
Columbus, Indiana

Bassam Alyamani, FMP
Riyadh, Saudi Arabia

Keith Williams, FMP, SFP
San Antonio, Texas

Francisco Estrada, FMP, SFP
San Antonio, Texas

Phillip Yiu Fai Chor, FMP
Singapore

Wanli Li, FMP
Singapore

Mohammad Zulkarnain, FMP
Bettiah, India

Jennifer Kirkpatrick, FMP
Fort St. John, BR, Canada

Nawaf Qarmalah, FMP
Riyadh, Saudi Arabia

Burke Jones, FMP
Derby, Kansas

Sarah Al Tahiney, FMP
Riyadh, Saudi Arabia

Farah Mohamed, FMP
Sharja, United Arab Emirates

Edward Baia, FMP
Washington, District of Columbia

Renu Sood, FMP
Whitby, ON, Canada

Abdulrahman.H Alhwaiti, FMP
Riyadh, Saudi Arabia

Manish Kuntal, FMP
Bangaluru, KA, India

Derek Edmonson, FMP
Phoenix, Arizona

Ryan Johnstone, FMP
San Jose, California

Alan Molnar, FMP
Columbus, Ohio

Ryan Triana, FMP
Espanola, United States Minor Outlying Islands

Richard Barrette, FMP
Victoria, BC, Canada

John Williams, FMP
New Braunfels, Texas

Trent Coots, FMP
Houston, Texas

Al Velasquez, FMP
Etobicoke, ON, Canada

Jeffery House, FMP
Kyllburg, Germany

Pauline Mulgrew, FMP
Richmond, BC, Canada

Nagaraju N. K., FMP
Bangalore, KAR, India

Frank Micholle, FMP
Boerne, Texas

Antonio Pino, FMP
United States

Nick Zebrowski, FMP
Forked River, New Jersey

Emily Forlenza, FMP
Savannah, Georgia

Michael Graham, FMP
United States

Scott Glaser, FMP, SFP
Wichita, Kansas

Michael Shippen, FMP
Mt. Airy, Maryland

Carissa Troutman, FMP
Harrisburg, Pennsylvania

Justin Brown, FMP
Randallstown, Maryland

Stan Flint, FMP
Aurora, ON, Canada

Melissa Zuniga, FMP
Thornhill, ON, Canada

Len Jackson, FMP
Marietta, Georgia

Dion Kirton, FMP
Leonardtown, Maryland

Justin Labrie, FMP
Franklin, Massachusetts

Michael Ramirez, FMP
Calabasas, California

Corbin Klinkhammer, FMP
Kirkland, Washington

Justin Vaughn, FMP
Apex, North Carolina

Jennifer Clarkson, FMP
St. Catharines, ON, Canada

Rachel Arja, FMP
Beirut, Lebanon

Greg Wolfe, FMP
Greensburg, Pennsylvania

Alexis Fletcher, FMP
Wichita, Kansas

Krisi Colburn, FMP
Wichita, Kansas

Alejandro San Pedro, FMP
Portsmouth, North Carolina

Spencer Roposas, FMP
Portsmouth, North Carolina

Joshua Steele, FMP
Shiloh, Tennessee

Horace Yiu, FMP
Shanghai, China

Hamad Ali Abdulghaffar, FMP
United Arab Emirates

Johny Akiki, FMP
Industrial Valley, Lebanon

Anthony Nicolas, FMP
Industrial Valley, Lebanon

Joanne Toland, FMP
Montgomery

Abdullah Aldawsari, FMP
Riyadh, Saudi Arabia

Jessica Pegue, FMP
Seattle, Washington

Jordyn Polzin, FMP
Bloomington, Minnesota

Saad Zaman, FMP
Saudi Arabia

Kevin Xue, FMP
Shanghai, China

Davide Cimato, FMP
Welland, ON, Canada

Shaman Mohammad, FMP
Saudi Arabia

Hui Jun Koh, FMP
Singapore

Sri Vathsa, FMP
Bangalore, KAR, India

Herhmanned Varatharaj, FMP
Singapore

Meshari Aljohani, FMP
Dhahran, Saudi Arabia

Qi Dong, FMP
Beijing, China

Jia Teo, FMP
Singapore

Surendra Itkar, FMP
Mumbai, MAH, India

Jiaquan Zhang, FMP
Singapore

Ahmed Nasr, FMP
Cairo, Egypt

Marionette Wyeth C. Antonio, FMP
Kuwait City, Kuwait

Marwan Zreik, FMP
Dubai, United Arab Emirates

Imran Shoaib, FMP
Abu Dhabi, United Arab Emirates

Bilal Boubou, FMP
Beirut, Lebanon

Kamar Sahmarani, FMP
Beirut, Lebanon

Syed Dildar Hussain Naqvi, FMP
Saudi Arabia

Marco Meng, FMP
Shanghai, China

April Fan, FMP
Shanghai, China

Henry Maldonado, FMP
Westfield, Indiana

Kevin Alexander, FMP
Princes Town, Trinidad and Tobago

Abdul Hafeez, FMP
Diriyah, Saudi Arabia

Rajesh Rajendran, FMP
Al Olaya, Saudi Arabia

Jagadeesh Golla, FMP
Hyderabad, TS, India

IFMA™ Credentials

The following people were awarded the Certified Facility Manager® (CFM®) certification in: APR. 2022:

John Pringle, CFM
Vancouver, Canada

Thomas Farrell, CFM
Menomonee Falls, Wisconsin

Steven Voss, CFM
Swansea, Illinois

Yousif Mohamed, CFM
Jeddah, Saudi Arabia

Mohammed Fisal, CFM
Riyadh, Saudi Arabia

Addruval Soto, CFM
Santa Rosa, California

Nick Michael, CFM, SFP
Arabi, Lousiana

Abedalrhman Issa, CFM
Jeddah, Saudi Arabia

Salem Maged, CFM, FMP
Jeddah, Saudi Arabia

Cheron Holloman, CFM, FMP
Jacksonville, Florida

Jeffrey Wojtowicz, CFM
Oak Ridge, Tennessee

Anas Matar, CFM
Jeddah, Saudi Arabia

Okan Acan, CFM
Dubai, United Arab Emirates

Adam lea Bischinger, CFM
Loughborough, United Kingdom

Heather Kastern, CFM
San Francisco, California

Emanuele Sottile, CFM
Las Vegas, Nevada

John Tuttle, CFM
Round Rock, Texas

Kammi Ealey, CFM
Oakland, California

Ka Ki Tam, CFM
Hong Kong

Charles Lewis, CFM
Verona, Virginia

Naif Jleeh, CFM
Riyadh, Saudi Arabia

The following people were awarded the Sustainability Facility Professional® (SFP®) designation:

Julie Erwin, FMP, SFP
Aloha, Oregon

Desi Jackson, FMP, SFP
Winnipeg, MB, Canada

Michael Miller, FMP, SFP
Lake Stevens, Washington

Chris Bingham, FMP, SFP
Toronto, ON, Canada

Pratyusha Jampana, SFP
Brooklyn, New York

Travis Kunkel, FMP, SFP
Brentwood, Tennessee

The following people were awarded the Facility Management Professional™ (FMP®) designation:

Amir Zeb Ali Khan, FMP
Jeddah, Saudi Arabia

Jinbang Bernard Zhang, FMP
Singapore

Keivan Jafari, FMP
Toronto, On, Canada

Husam Bashwieh, FMP
Jeddah, Saudi Arabia

Julie Hatch, FMP
London, United Kingdom

David Silva, FMP
Sugar Land, Texas

Celso Roman, FMP
Savannah, Georgia

Kathryn Morgan, FMP
Westminster, Colorado

Les Chewning, FMP
Secane, Pennsylvania

Victoria Madero, FMP
Austin, Texas

Juan Tello, FMP
McDowall, Australia

Timothy Speidel, FMP
Boyertown, Pennsylvania

Aaron Starr, FMP
Kansas City, Missouri

Bobbi Lavoie, FMP
Littleton, Colorado

Derrick Nelson, FMP
Lemont, Illinois

Adam Bunz, FMP
Welland, ON, Canada

Mohamed Soliman, FMP
Alexandria, Egypt

Raj Makwana, FMP
Mississauga, ON, Canada

Alexandria Frank, FMP
Indianapolis, Indiana

Dustin Sorensen, FMP
Wichita, Kansas

Mohannad Alharbi, FMP
Riyadh, Saudi Arabia

Casie Leaman, FMP
Burtonsville, Maryland

Paul Rosenwinkel, FMP
Bordentown, New Jersey

Gerard Palmer, FMP
Beaumont, AL, Canada

Bassel Samrout, FMP
Riyadh, Saudi Arabia

Cheryl Kearney, FMP
St. Johns, Nl, Canada

Clinton Huhn, FMP
East Lansing, Michigan

Anne McArthur, FMP
Waterdown, On, Canada

Austin Wolff, FMP
Austin, Texas

Gabriel Mata, FMP
Woodbridge, Virginia

Shawn Belsher, FMP
Canada

Jennifer McNally, FMP
California, United States

Randy Hall, FMP
New Windsor, Maryland

Robert Croot, FMP
Bothell, Washington

Jessica Ramsay, FMP
Lower Sackville, NS, Canada

Gregory Bilikas, FMP
Cambridge, Massachusetts

Cassie Menges, FMP
New Albany, Indiana

Jeff Hohnbaum, FMP
Wichita, Kansas

Abhey Sharma, FMP
Toronto, ON, Canada

Christopher Lavigne, FMP
Washington, District of Columbia

Holly Mellor, FMP
Toronto, ON, Canada

Shawn Brent, FMP
Linden, Virginia

Sally Zepp, FMP
St. Paul, Minnesota

Sade Henry, FMP
Arima, Trinidad and Tobago

Sulaiman Alsuhaimi, FMP
Riyadh, Saudi Arabia

Lee Hui Ling May, FMP
Singapore

Rajesh Nediyedath, FMP
Bengaluru, Ka, India

Nasrullah Khan Khan, FMP
Riyadh, Saudi Arabia

Sean Chong, FMP
Singapore

Abdullah Alfozan, FMP
Riyadh, Saudi Arabia

Ling Yunzhen, FMP
Shanghai, China

Okoji Uje-Eje, FMP
Nigeria

Seun Agbejobi, FMP
Lagos, Nigeria

Aeeshah Adesanya, FMP
Kaduna, Nigeria

Jin Kiat Yeo, FMP
Singapore

Amanaganti Janardhan Srivatsav, FMP
Hyderabad, TS, India

Turki Alluqman, FMP
Saudi Arabia

Fahad Ghazi Yahya Alkahtani, FMP
Riyadh, Saudi Arabia

Mohammed Hasosah, FMP
United Arab Emirates

Atheer Alzahrani, FMP
Saudi Arabia

Lim Kiew Hong, FMP
Singapore

Khaled Ali Zurban, FMP
Saudi Arabia

Chenguang Liu, FMP
Shenzhen, China

Gamal Alzyady, FMP
New Cairo, Egypt

Ekenedilichukwu Isiekwene, FMP
Abuja, Nigeria

Kedric Walls, FMP
Addison, Texas

Nicole Gabourie, FMP
Toronto, ON, Canada

Robert Bubadias, FMP
Farmingdale, New Jersey

Erasmo Carrasco Jr., FMP
Mountain View, California

Coryann Carlson-Cotter, FMP
Grosse Pointe, Michigan

Joseph Cannizzaro, FMP
Mays Landing, New Jersey

Angela Harden, FMP
Capitola, California

Martina Hepp, FMP
Levittown, Pennsylvania

Lloyd McBoyen, FMP
Fort Washington, Maryland

April Avigne, FMP, SFP
Pinckney, Michigan

Sarah Murphy, FMP
Wilmington, North Carolina

Eneyo Eyo, FMP
Calgary, AB, Canada

Nick Pironio, FMP
Seattle, Washington

Ken De Ruyck, FMP
Winnipeg, MB, Canada

Jesse Cosme, FMP
Denver, Colorado

Carmella Filiatrault, FMP
Surrey, BR, Canada

Dan Mansell, FMP
Toronto, ON, Canada

Rickesh Lal, FMP, SFP
San Jose, California

Michael Ciccone, FMP
Princeton, New Jersey

Paula Anderson, FMP
St Paul, Minnesota

Thomas Davidson, FMP
Tampa, Florida

Peter Pillsworth, FMP
Waterloo, ON, Canada

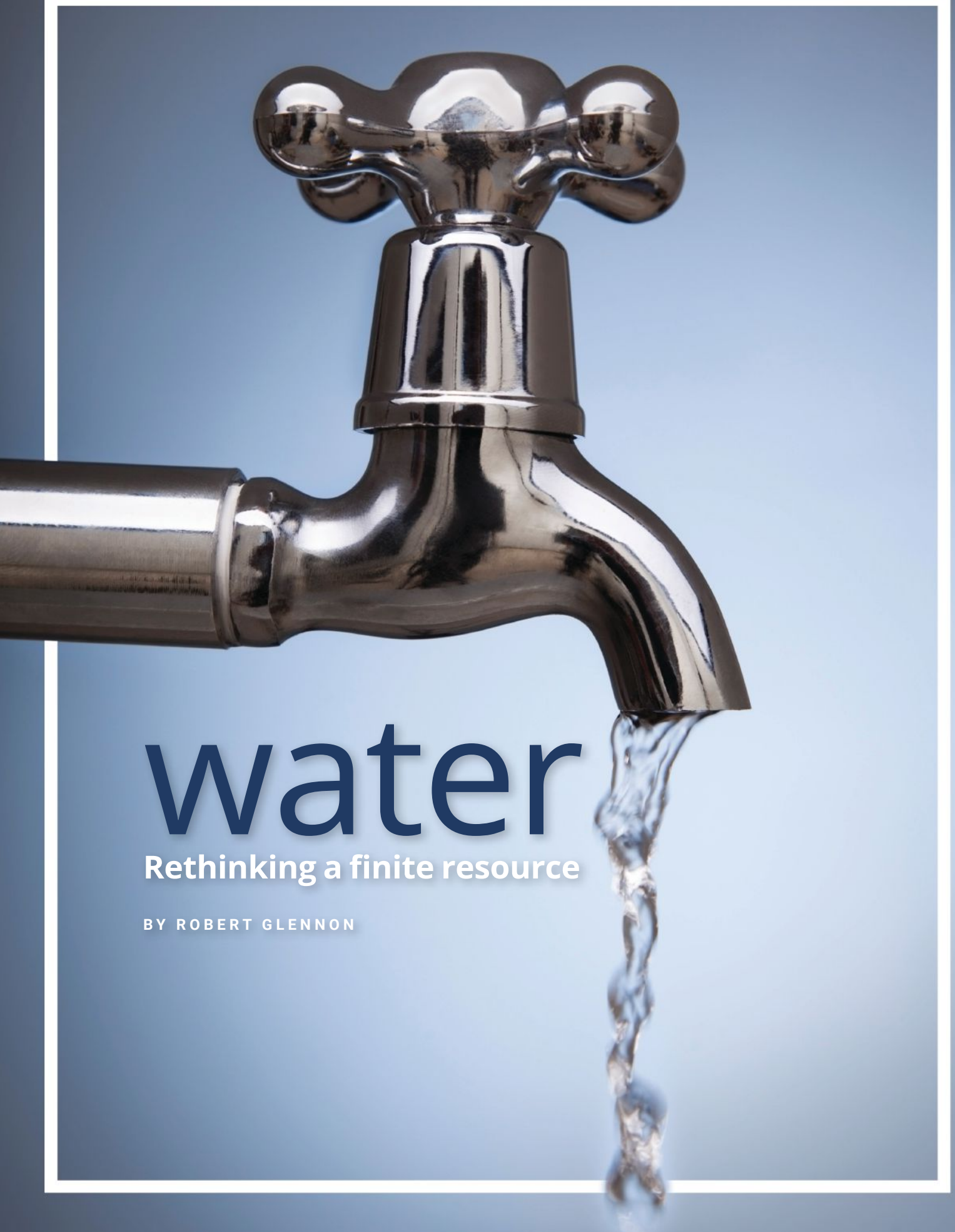
Shawn Sweeney, FMP
Johns Creek, Georgia

Myles Delange, FMP
Campbell River, BC, Canada

Jason Ventura, FMP
Gainesville, Virginia

Ahmed Rashed, FMP
Cairo, Egypt

Want to see your name here? Visit www.ifma.org/credentials/overview/ to find out how.



water

Rethinking a finite resource

BY ROBERT GLENNON

National Hockey League teams in the United States and Canada annually use 300 million gallons of water to operate their arenas. Most facilities use a surprising amount of water. Yet facility managers, much like everyone else, might take water for granted.

When people turn on the tap in the morning, out comes a limitless supply of high-quality water for less than the cost of cell phone service or cable television. Most people think that water is like air, infinite and inexhaustible. On the contrary, it is finite and exhaustible.

Even though water is critical to the operations of facilities, most FMs only think about water once a month, when they pay the bill from the municipal water department or, less frequently, from a private water company regulated by a state public utility commission. Increasing water scarcity around the world, fueled by overuse of rivers and aquifers and exacerbated by climate change, demands that FMs pay more attention to the reliability of their water supplies.

the paradox of water scarcity

The hydrologic cycle teaches that the amount of water in the biosphere is constant. Humans can neither make nor destroy water. People today are drinking the same water as the dinosaurs did when they roamed the Earth. How, then, can water be scarce if the amount of water is constant? The answer to this paradox is that water is not where it is needed, when it is needed, in the form that it is needed.

Consider two examples. In the Boston, USA, metropolitan area, every time someone flushes a toilet, the waste is sent to a treatment plant on Deer Island in Boston Harbor. The plant treats on average 380 million gallons per day. The treated water is put into nine-mile-long tunnels and discharged into Massachusetts Bay. That water is unavailable for reuse until the hydrologic cycle completes another turn, which could take hundreds of years.

JUST AS OIL LUBRICATES THE GLOBAL ECONOMY, SO DOES WATER.

Second, groundwater provides a major source of water. In many states, more than half the population depends on groundwater for their drinking water supply. Groundwater begins as rain or snowmelt and percolates into the ground into aquifers. Think of an aquifer as a giant milkshake glass and each well as a straw in the glass. Many states permit a limitless number of straws in the glass, which encourages overuse of the aquifer. Water that Mother Nature deposited over thousands of years, humans have extracted in mere decades. This tragedy of the commons has produced pernicious results, including ground level subsidence. In California's Central Valley, the surface of the land has dropped more than 30 feet in some places.

Just as oil lubricates the global economy, so does water. Misuse of this precious resource, so essential to life itself, has created water security problems around the world. In Iran, mismanagement caused serious water scarcity that led, in 2021, to protests that the government forcefully crushed.

the challenge of population growth

A 2019 United Nations report predicts that the global population will rise from about 7.6 billion to 9.6 billion by 2050. Where will mankind find the resources, especially water, to support another 2 billion fellow inhabitants of Earth? This challenge is compounded by climate change. As the climate warms, it will take more water for farmers to produce the same amount of food. With hotter temperatures, evaporation increases and plants go to seed too quickly.

climate change and water

Warmer temperatures producing drought and forest fires is the most visible evidence of climate change. The epicenter of climate change involving sea-level rise is Bangladesh in South Asia. Warmer air temperatures have increased ocean water temperatures, providing more fuel for cyclones in the Pacific and hurricanes in the Atlantic. A country with a population of 164 million on a landmass the size of New York State, Bangladesh lies at the head of the Bay of Bengal, on the largest river delta on Earth. As cyclones

push storm surges 50 or 60 miles inland, melting glaciers in the Himalayas cause rivers in Bangladesh to flood. It is getting hammered from both sides.

Nearly one-quarter of Bangladesh is less than 7 feet above sea level; two-thirds is less than 15 feet above sea level. Most Bangladeshis live along coastal areas where alluvial delta soils provide some of the country's best farmland. A 3-foot rise in sea level would submerge almost 20 percent of the country and displace more than 30 million people. Climate change has created a new category of human rights: climate refugees.

Similar but not as dramatic examples are occurring along coastal areas of the United States. New Jersey's coastal islands and Florida's southeast coast face staggering challenges from rising sea levels.

the situation in the United States

The reliability of U.S. water supplies varies across the country. Much has been written about the Southwest, especially the Colorado River Basin. Less well known is the exponential growth of groundwater wells in the Midwest and the East. Lax groundwater regulation has incentivized farmers to drill high-capacity irrigation wells. There are now more than 10,000 center-pivot irrigation wells in Georgia, which is one of the most humid states in the country.

solutions

The typical solution to U.S. water shortages has involved diverting water from rivers, building a dam or drilling a well. But many rivers are already on life support. The flows, even in major rivers such as the Rio Grande and Colorado, dwindle to nothing before they reach the ocean. There have been so many dams built that it is difficult to find a river system with a good dam site and water not already spoken for. New wells are seldom a sustainable option. In short, business as usual is not a viable response to water shortages.

There is no reason to despair, however. Tools are available to keep water shortages from becoming a catastrophe.

MANKIND SHOULD USE WATER MORE CAREFULLY.

conservation

Conservation remains the low-hanging fruit. Mankind should use water more carefully. Consider two examples. First, using a home or office kitchen food disposal for two minutes a day uses 150 gallons of water every month. Instead of using that water to get rid of food scraps, put the waste in the trash or a compost bin. Second, turn off a light. A single 60-watt incandescent bulb that burns 12 hours a day may annually use as much as 6,300 gallons of water to produce the electricity. To save water, turn off a light. Better yet, switch to LED bulbs, which use one-sixth of the energy of incandescent ones.

reuse

Another important tool is to reuse water from treatment plants. The state of Arizona has pioneered using reclaimed water for power plants, golf courses, farms, parks, highway medians, mines and industrial facilities. The new Salesforce tower in San Francisco is making substantial reuse of water from toilets and showers.

The City of Los Angeles announced in 2018 that it would begin to reuse the water from its Hyperion Treatment Plant. The outflow from Hyperion is equal to the seventh-largest river in the U.S.

At this point, there is seldom a need to use this water for drinking — though the technology is there to do so safely. More important is that people stop thinking of it as "wastewater" and recognize it as a major tool in addressing water shortages.

desalination

Not quite the holy grail but still a valuable tool, technology exists to remove salt from ocean water or brackish groundwater aquifers. But there are three impediments to widespread adoption of desalination. First is cost. The membranes used in reverse osmosis (RO) are expensive and require frequent replacement. Second, RO uses substantial energy to create enough pressure to push water through the membranes, and it takes water to generate that electricity. Finally, municipalities face a brine disposal problem with the salty water left over from the RO process. A large quantity of highly saline water dumped into a coastal estuary will face regulatory challenges and resistance from environmental NGOs.

Despite these considerable hurdles, desalination has a place on the menu of options. If a community faces severe water shortages and few options for new supplies, it may find that desalination deserves careful consideration.

price signals

There is no commodity charge for water. Literally. When a city water department or a private water company sets up a rate structure, it is based on a cost-of-service principle. At the end of the month, the revenue stream should equal the cost of providing the service (with a slight bump for the for-profit water companies).

To make matters worse, the rates seldom factor in those new sources of water, such as from a reclaimed system, which are often far more expensive than traditional supplies. U.S. water infrastructure has been woefully neglected. The money from the 2021 infrastructure bill is a good down payment on bringing water systems up to modern standards. But a much bigger investment is needed, and state and local governments are ill-equipped to come up with the funds.

The price for water should include increasing block rates to ensure that those who use high quantities of water bear the true costs of their profligate consumption. That structure should protect low- and modest-income people by guaranteeing them access to water for basic needs. The richest country in the history of the world should recognize a human right to water.

the era of water reallocation

A final tool in the chest is to use the power of markets to bring about a reallocation of water from lower-value to higher-value uses. Water law must be modernized to incentivize trade between willing sellers and buyers. The water available for trade will often come from farmers for a very simple reason. Farmers consume 75 to 80 percent of U.S. water. A good percentage of this water is delivered through flood irrigation, which is notoriously inefficient, and is used to grow low-value crops, such as alfalfa or cotton.

A water market must be sensitive to the impact on rural communities. A farmer who sells out may do well for himself, but that sale creates transaction costs for everyone else in the agricultural economy, including farm workers; seed, pesticide and fertilizer suppliers; and farm implement dealers. Local governments may suffer a decline in tax revenues and neighboring farmers may be harmed from dust carrying weed seeds from fallowed land. It makes sense, then, for a state agency to have authority to regulate trades over a specified size.

ALL THAT IS NEEDED IS THE MORAL COURAGE & POLITICAL WILL TO ACT.

Another kind of market draws on capital from municipal and industrial users to underwrite modernization of farm infrastructure. A shift from flood irrigation to drip or micro-irrigation would allow a farmer to grow the same amount of product with less water. But these systems are frightfully expensive for farmers, who are often land-rich and cash-flow poor. However, to municipal and industrial users, that expense is little more than a rounding error.

conclusion

The U.S. faces daunting water supply challenges, but there is reason for optimism. A combination of conservation, reuse, desalination, price signals and market forces provides a powerful set of tools to address water shortages. All that is needed is the moral courage and political will to act. FMJ

Robert Glennon *is a Regents Professor Emeritus at the University of Arizona College of Law and author of the highly acclaimed "Unquenchable: America's Water Crisis and What to Do About It." One of the nation's preeminent experts on water policy and law, he is the recipient of two National Science Foundation grants. Glennon serves as an advisor to governments, corporations, think tanks, law firms and NGOs looking to solve serious challenges around water sustainability and planning. He is a frequent keynote speaker at conferences. In October 2021, Glennon gave a keynote address at IFMA's World Workplace in Kissimmee, Florida, USA.*

REFERENCES

nytimes.com/2021/11/26/world/middleeast/iran-protests-water-shortages.html

population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf

Jeff Goodell, The Water Will Come: Rising Seas, Sinking Cities, and the Remaking of the Civilized World.

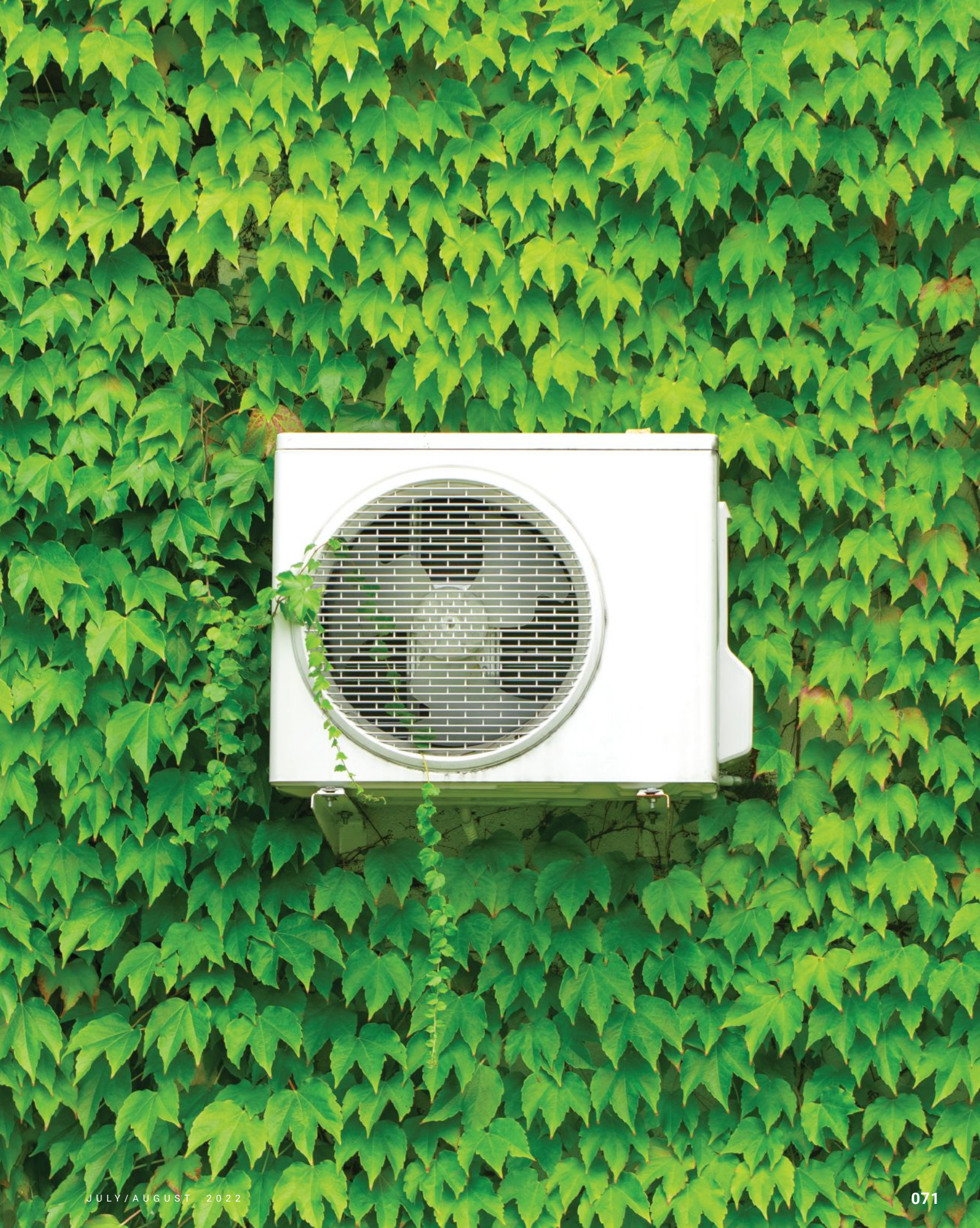
nytimes.com/2021/08/12/magazine/new-jersey-shore.html

FINDING BALANCE

Risks & Goals in Ventilation

BY JOHN MCCARTHY, DAVID MACINTOSH & DAVID SHORE

As COVID-19 precautions loosen with the suspension of masking and social distancing requirements indoors in many locations, facility managers may find that the next stage of the pandemic brings new challenges. While COVID-19 cases have lessened, it is unlikely that FMs will ever be able to fully ignore the role buildings play in airborne transmission of infectious diseases. At the same time, it is not feasible to continue to sustain the high levels of strain under which HVAC systems have been placed to mitigate these disease transmission risks. Not only have facilities been burdened with higher operational costs as a result of running equipment beyond as-designed levels, but heightened calls for climate change action have made it increasingly difficult to ignore buildings' outsized role in generating greenhouse gas emissions (GHG).



Fortunately, this challenge also hints at a path forward. Organizations may find a framework for balancing the triple bottom line of people, planet and profit provides an effective mechanism for guiding decision making for future facility operation. Moreover, FMs are likely to find that sustainable buildings systems can more cost-effectively support the higher outdoor air exchange rates expected during periods of high infectious disease risk in their community. With the use of new tools, FMs can strike an effective operational balance.

THE OPERATIONAL COSTS OF COVID-19

For the past two years, HVAC systems operation and controls have been heavily modified to dilute the concentration of possible airborne COVID-19 virus, lowering the probability of infection and providing peace of mind for building occupants. These modifications have proven useful in mitigating virus transmission in many scenarios, but there have been additional consequences as a result of overtaxing these systems.

Increased run times and the costs of heating and cooling requirements for increased outdoor air flow have put a strain on operating costs. One study published in Advances in Applied Energy found HVAC system energy consumption increased by as much as 128 percent during the pandemic. This is due to a combination of the increased outdoor air ratio with extended operation schedules, use of higher efficiency air filters and the added energy demand of auxiliary air cleaning equipment. In time, many organizations may also see a cost impact as a result of the need for sooner-than-expected replacement of overburdened HVAC equipment.

As a case in point, one facility originally designed for 5,500-person occupancy continues to run HVAC systems at the maximum amount of outside air possible, with a three-hour purge each morning before opening, even though fewer than 800 people are within the facility on a typical day. While actions like this made sense at the beginning of the pandemic, when information about airborne SARS-CoV-2 transmission emerged and guidance was sparse, now it is critical to address the tremendous amounts of wasted energy and GHG emissions generated by this level of operation.

As many building operators might have felt, the organization implementing these air purges before and after daily occupancy did not wish to be held responsible for not taking appropriate steps to reduce disease transmission. Yet there is a tradeoff for focusing on infectious disease transmission alone, particularly when indicators suggest a lower risk of infection due to COVID-19, influenza, rhinovirus or other viral risks.

Instead, organizations must identify clear guardrails for delivering the appropriate amount of air as needed while minimizing waste. These guardrails will need to be tailored to control specific environmental risks and conditions, rather than relying on a one-size-fits-all approach to ventilation. The final piece of this puzzle is to communicate these actions and this balance to building owners and occupants who will continue to demand far more visibility into building operations than has been the norm in the past.

THE ENVIRONMENTAL COST OF COVID-19

In recent years, the operational costs of energy-intensive HVAC units have taken a back seat to concerns about these systems' carbon emissions. According to the Energy Information Administration, buildings generate nearly 40 percent of annual global CO_2 emissions, and organizations that have commitments to lowering their overall GHG emissions will need to take steps to rein in this energy use.

Moreover, many organizations may find themselves required to do so by external drivers that include the expectations of investors, consumers and governments. In the U.S., for example, the Clean Air in Buildings Challenge, and the Securities and Exchange Commission's proposed rule requiring companies to include climate-related disclosures in their registration reporting statements. State and local regulations are also increasingly pushing for change. To date, 24 states, as well as the District of Columbia, have adopted GHG reduction targets. More than 180 cities have pledged their commitment to transition their communities to 100 percent clean energy by 2050.

In addition to the sustainability impact of operating HVAC systems more intensively, COVID-19 has left another environmental impact. Building occupants have now had two years of experience that higher rates of outdoor air lead to a healthy, comfortable indoor environment. There is an increased awareness that building operation can have a distinct impact on health.

This awareness of the need for healthy indoor environments is exacerbated by the many occupants now returning to traditional work environments who are experiencing anxiety and stress associated with resuming activities in the physical proximity of individuals beyond their family and circle of close friends. Heightened stress is a well-known risk factor for lower tolerance to normal fluctuations common to the indoor environment such as temperature, drafts, odors, vibration and noise. In other words, building occupants will be more sensitive to the slightest changes in their environment, and are more likely to associate that with a "sick" building.

While ventilation standards and building codes have long been designed to create conditions that are not damaging to one's health, the wake of the pandemic is revealing an expectation for indoor air conditions that promote good health. Future codes may head in this direction, but it will take time to establish and implement them in new buildings under design and retrofit for existing buildings. For now, it will be up to FMs to take action to ensure more comfortable environments, potentially at the risk of incurring higher operating costs and GHG emissions.

FIVE PILLARS FOR EVALUATING PERFORMANCE

These new expectations around building operation and performance will require FMs to look beyond existing codes for strategies to meet the demands being placed on their buildings. To assess building performance going more effectively forward, FMs should evaluate these five pillars in terms of how each impacts the triple bottom line of people, planet and profit:

1 **Health and safety:** Do ventilation, air cleaning and space cleaning support building occupant well-being?

2 **Comfort:** Are building occupants satisfied in terms of thermal comfort, including temperature and humidity levels, as well as noise levels, vibration, lighting and glare?

3 **Sustainability:** This requires FMs to address strategies for reprioritizing commitments to reduce energy usage and their organization's overall carbon footprint.

4 **How energy is generated:** Today this may mean partnering with sustainably focused utility services to reduce GHG emissions; but in the future, it may mean evaluating more sustainable on-site sources of energy generation.

5 **Increased evidence and transparency:** Building trust among building occupants and confidence in facility health and safety will become a larger part of the FM's world. Strategies may range from public kiosks displaying indoor air quality (IAQ) real-time metrics and quarterly Healthy Building Updates, to inclusion of IAQ updates in environmental, social and governance disclosure statements and more regular communications that convey specifics around measured IAQ.

The key is that this must be an ongoing commitment. FMs and building owners that do not take steps to proactively control this message will find that the narrative will be dictated by external organizations. The NYC Buildings' Energy Grades system — in which buildings are graded on energy performance — is an example of what may be in store for assessing healthy indoor air.

PLAN FOR YOUR FUTURE STATE

As FMs move toward achieving a better balance of operational priorities, it is likely many will begin by identifying a range of short-term, rapid-payback solutions. One strategy for ensuring immediate results is to have a third party perform a building recommissioning process. Recommissioning an existing building is meant to verify the performance of HVAC systems to ensure these energy-intensive systems continue to meet as-designed performance and energy efficiency standards. Through actions taken as a result of recommissioning, organizations see an average payback of 1.7 years through reduced energy costs. More recently, FMs are pursuing a pandemic building commissioning process that takes a more strategic, documented approach to ensuring building systems operate both efficiently and safely. This will prove a useful tool for meeting triple bottom line goals.

In the long term, FMs will find they must develop a strategy for delivering the necessary amount of clean air at the appropriate time to specific spaces. That "necessary amount" will depend upon how many people are present, what is taking place in that space, and how effectively that air is distributed as well as the level of community spread of infectious disease.

The first step will be for FMs to establish guidelines around what constitutes an appropriate amount of clean air and to ensure systems are able to ramp up and down to deliver enhanced rates of ventilation when conditions call for it.

The next step will be establishing a planning system for managing cycles of increased infectious risks. There will be instances when cases of COVID-19 or other respiratory diseases rise above a certain threshold due to seasonal patterns of communicable respiratory illness and other factors. FMs must identify markers to watch and monitor them regularly. Early warning signs might include rates of local disease incidence or elevated pathogen presence in wastewater or might require IAQ monitoring within the building itself. Many FMs may find it useful to install sentinel systems that monitor ventilation conditions and ensure that provisions for increasing ventilation, air cleaning and personal health protection are appropriate given the potential for communicable respiratory disease transmission.

This attention to infectious risks will require that FMs remain in a state of preparedness. However, with appropriate planning, FMs can easily put systems in place that indicate when it is time to launch an immediate, short-term response to an infectious outbreak or, if needed, a long-term response with a clearly marked turning point for recovery.

On the sustainability side, FMs may find it helpful to take a broader look at factors beyond the realm of their control that impact the five pillars of building performance. For example, managers of large portfolios should become conversant with the renewable or GHG status of the electricity delivered to their buildings. Even though the use of clean energy may be beyond their control, laying as it may in the hands of their utilities, this understanding can pave the way for movement toward options that can better support a sustainable future state.

A greening of the electricity grid is underway, which will help some portfolios more easily achieve sustainability goals. In 2020, renewable energy sources including wind, hydroelectric, solar, biomass and geothermal energy accounted for approximately 21 percent of all electricity generated in the U.S., achieving a record 834 billion kilowatt hours (kWh) of electricity, according to the U.S. Energy Information Administration. While implementation of renewable and nuclear energy is uneven geographically at present, meaning this trend will benefit some properties more than others for the time being, the continuing focus on renewable energy may change sustainability data in regions over time.

This understanding of big-picture sustainability needs can also support goal setting for achieving longer-term, higher ROI solutions. This may mean movement toward the electrification of selected equipment currently powered by natural gas, oil or other fossil fuels. Electrification is the first step toward utilization of renewable-driven power sources. Longer-term solutions may include adoption of on-site power generation through solutions ranging from rooftop solar arrays or geothermal systems to air-water energy recovery systems.

Perhaps the most critical future state to consider, however, is the visibility into building operations that will be more necessary going forward. Building operations have long been invisible to building occupants and financial decision makers. Going forward, it will be critical to present a narrative around how building operation impacts occupant health, comfort and productivity. Similarly, it will be important that FMs are transparent and forward focused in financial and strategic conversations that will guide future investments. Conversations taking place today around the need to balance infection risks with climate change goals will set the stage for tomorrow's investments in a healthy, sustainable future. FMJ

John McCarthy, *Sc.D., C.I.H. has written more than 70 technical papers and book chapters and co-edited the "Indoor Air Quality Handbook" (McGraw-Hill 2000), a comprehensive reference for building owners and managers regarding indoor environmental concerns. He is the founder and CEO of Environmental Health & Engineering, Inc.*

David MacIntosh, *Sc.D., C.I.H., DABT is adjunct associate professor of Environmental Health at the Harvard School of Public Health. As chief science officer of Environmental Health & Engineering, Inc., he and his team design information management systems, analyze complex data sets, develop predictive models, and provide data visualization tools to EH&E's clients and staff.*

David Shore *is a frequent speaker and lecturer on workplace and home safety and sustainability. A former director of safety and security for a hospital system, he helps hospitals and health care systems structure programs to minimize liability, maximize resources and improve patient outcomes.*

REFERENCES

ashrae.org/file%20library/technical%20resources/covid-19/ashrae-scientific-c19-guidance.pdf

sciencedirect.com/science/article/pii/S2666792421000329 Aug. 2021

epa.gov/newsreleases/epa-announces-clean-air-buildings-challenge-help-building-owners-and-operators-improve

c2es.org/content/state-climate-policy/

sierraclub.org/climate-and-energy/map

ccohs.ca/oshanswers/psychosocial/stress.html

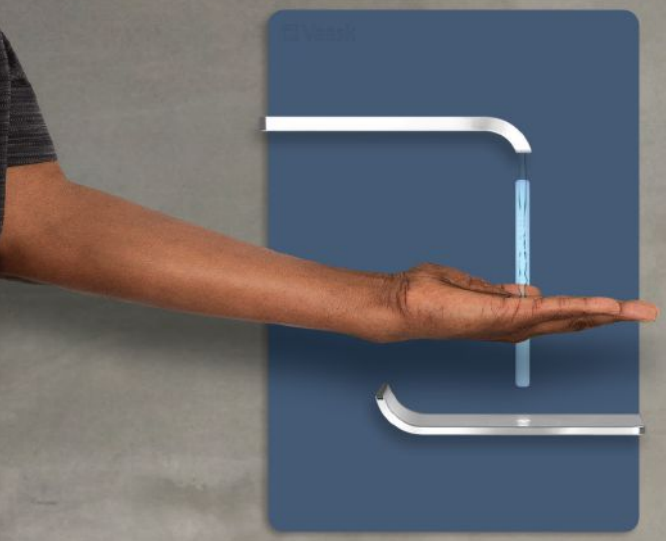
www1.nyc.gov/site/buildings/property-or-business-owner/energy-grades.page

eheinc.com/blog/pandemic-building-commissioning-a-case-specific-strategy-for-reducing-infectious-risks/

Alcohol is the solution

Vaask's hand sanitizing fixture is built to last

- AC power or POE (no batteries required)
- Cast aluminum; 5-year warranty
- Large capacity; refillable with any gel



Also available wall-mounted or freestanding

BUY AMERICAN ACT COMPLIANT

Vaask®

REQUEST PLACEMENT GUIDE

(512) 956-7687 | Vaask.com

EUROPEAN PRODUCT DESIGN AWARD

reddot winner 2021

11th annual Best in Biz Awards 2021 WINNER

BD | NY

HEALTHCARE FACILITIES symposium and expo Architect's Choice

MUSE DESIGN AWARDS 2021 PLATINUM WINNER

healthcare design 2022 PRODUCT INNOVATION AWARDS GOLD

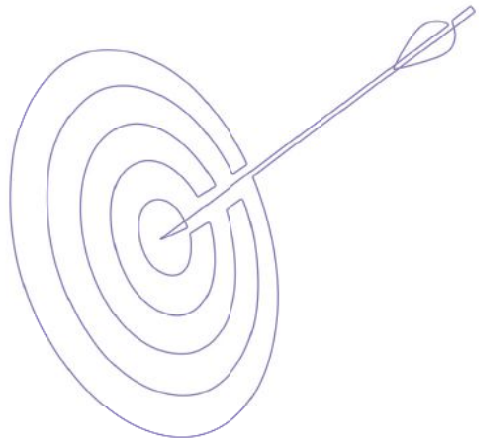
SPARK

Taking aim

Using PropTech to Hit Net Zero Targets

BY MIKE DARBY

Net zero targets have placed pressure on all industries over the past few years, but never more so than in the months following COP26. Although climate scientists warn that the impacts of global warming are close to being irreversible, there is hope for the future if industry professionals put their trust into emerging technologies, such as PropTech.



In the U.K., the built environment is responsible for around 40 percent of emissions — which is not a heartening statistic. But thanks to new developments and innovations in PropTech, buildings have a chance of becoming ever more sustainable and could be a key contributor to helping countries worldwide meet their net zero targets.

However, the construction sector, which makes up a crucial component of the built environment's carbon output, must also make changes to its process. Construction is responsible for up to 11 percent of global carbon emissions, but if the industry looks toward PropTech companies operating within their space and embraces new, developing technologies, it could harness valuable data to help deliver more sustainable buildings globally.

What Leading Global Institutions Are Doing to Help

In 2015, the United Nations unveiled its 17 Sustainable Development Goals, which aim to create a blueprint to achieve a better and more sustainable future for all. For the built environment, relevant goals include addressing challenges and providing solutions for affordable, clean energy, climate action, and sustainable cities and communities.

In addition, the EU's Energy Efficiency Directive sets out how the union will achieve its 2030 energy efficiency targets and reduce greenhouse gas emissions by at least 55 percent when compared to 1990. This extends to buildings, industry and transportation. For buildings, this includes implementing national long-term renovation strategies for the building stock in all EU countries and making it mandatory for energy efficiency certificates to be issued during the sale and rental of buildings. Also, in a bid to increase efforts, the European Commission proposed a new directive as part of the Delivering on the European Green Deal package.

These two examples show that global institutions are interested in future-proofing techniques, but it can be harder to implement these policies for all businesses and buildings.

How the Built Environment Can Help to Achieve Net Zero

In the EU, the construction sector is responsible for more than 35 percent of waste generation. This does not sound like a promising statistic when it comes to achieving net zero targets, but the European Union has recently undertaken a huge effort to renovate buildings and reduce embodied carbon as it works toward its legally binding objective to meet net zero carbon by 2050. Commitments like this could see PropTech lead the way as Europe works toward its sustainability targets.

Embodied carbon from materials alone can make up more than half of a building's total lifetime emissions. PropTech solutions extend to embodied carbon, helping organizations measure the impact of a project before it becomes operational. In addition, paying close attention to the supply chain will be the first step for property developers as they adapt to new regulations. In the future, this may be a deciding factor for who they choose to work with.

As such, the future sustainable built environment will also require a new range of building materials including steel, glass and timber, which all have a lower lifetime emission rate than concrete.

In short, more sustainably built buildings that are developed with lifetime carbon emissions in mind could lead to the reduction of waste, carbon emissions and carbon usage.

The performance gap, which is defined as the disparity between the anticipated energy efficiency of a building during its design phase to its actual efficiency when it is operational, is a worldwide problem that needs to be addressed. With energy costs

rising across the globe, this is a problem that many facility managers will want to solve now.

As a result, one of the easiest ways for this highly polluting industry to understand needed changes is looking closely at new energy and carbon data generated by PropTech companies.

How PropTech Is Revolutionizing the Industry

Raw materials and the potential for pollution during the construction process are issues this industry is already addressing. However, one of the most important aspects of the built environment's move to net zero carbon is understanding and harnessing new and existing technologies that measure the embodied carbon of materials and monitoring the operational carbon emissions during the property's in-use phase.

PropTech innovations that allow FMs to track and analyze a building's operational data can help solve some simple carbon issues during a building's life cycle. For example, managing temperature, spotting and fixing faults, and responding to energy usage needs (such as matching the usage to the occupancy of buildings and its priorities) can help the built environment use less energy, and optimize what building teams use.

This does not just help existing buildings perform better but can increase the capabilities of the future built environment. Developers can use this existing data to make informed decisions when designing new properties, helping them understand how a building's carbon output can be optimized from the very start of its life cycle. This can, in turn, begin to guide industry standards and regulations that can influence the amount of carbon a building will use during construction and operation, which will help toward net zero targets.

As with the data itself, smart buildings can use additional technologies, like digital twins and other AI tools, to give real-time insights into space usage, water consumption, energy usage and more. Though it sounds like a big technical undertaking, FMs willing

to learn and adapt to these tools will ensure that current and future buildings can run more sustainably. In addition, adopting PropTech for building management can also help teams to hold on to clients by running more efficient buildings.

The good news is that global investment in PropTech grew to US$7.1 billion in 2021, showing a positive trend in the wider support for a more sustainable built environment. However, this is still significantly down from US$13.9 billion in 2019, showing that despite the rise, investment has dipped in light of the pandemic. Now is the time to increase support for these solutions before it is too late.

Finding New Ways for the U.K. and EU to Achieve Net Zero Targets

Beyond its capabilities to help the region deliver on their net zero targets, one of the best things about PropTech for the built environment is its adaptability. Fitting new buildings — and retrofitting old ones — with green technologies that monitor energy usage, facilities and faults are recommended to help those responsible for a building's carbon emissions understand and control the areas contributing to the greatest output.

It is more efficient and cheaper to retrofit technology into an older building than it would be to demolish and rebuild it with green materials. It is predicted by the U.K. Green Building Council that around 80 percent of buildings that will exist in 2050, when the net zero target should be met, already exist. Fitting them with the technology to help them run more smartly and sustainably is much quicker and easier than building thousands of new green properties in just 28 years.

Recently, property company Grosvenor announced that it would make retrofitting a priority in their London portfolio, with the organization's U.K. team planning to invest £90m by 2030 in retrofitting to help reduce operational costs and emissions across their properties. In addition, the organization has brought forward their targets for reaching carbon neutrality by five years to 2030, achievable through carbon offsetting and increasing their use of renewable energy.

Keeping Up the Sustainable Design Process

The U.K. and wider Europe's drive to meet its carbon emission targets by 2050 needs to be acted on, fast. If the construction and property sectors ignore PropTech companies that could support them with developing and running greener buildings, they will be at risk of missing their targets. The World Green Building Council

reports the built environment is expected to double its total footprint by 2060 — the result of not harnessing data or investing in new sustainable solutions.

PropTech can influence the way new buildings are designed and built using data from existing properties and can help reduce the emissions of a building once it is operational. It can also help retain tenants who are working toward more sustainable targets; but can it lead to a holistically green process, from design to operation?

If construction companies are open to adopting these principles from day one and understanding the power that their data can have, the region can deliver on their net zero targets to help provide a better future for all. FMJ

Mike Darby *is a leading expert in building services engineering and has worked in the field for more than 20 years. He has designed and delivered controls systems for multi-million pound installations, including major banks, covering business-critical systems.*

RESOURCES

raeng.org.uk/news/news-releases/2021/september/construction-sector-must-move-further-and-faster-

un.org/sustainabledevelopment/sustainable-development-goals/

energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en

ec.europa.eu/growth/industry/sustainability/buildings-and-construction_en

euractiv.com/section/energy-environment/news/eu-to-start-measuring-embodied-carbon-emissions-from-buildings/

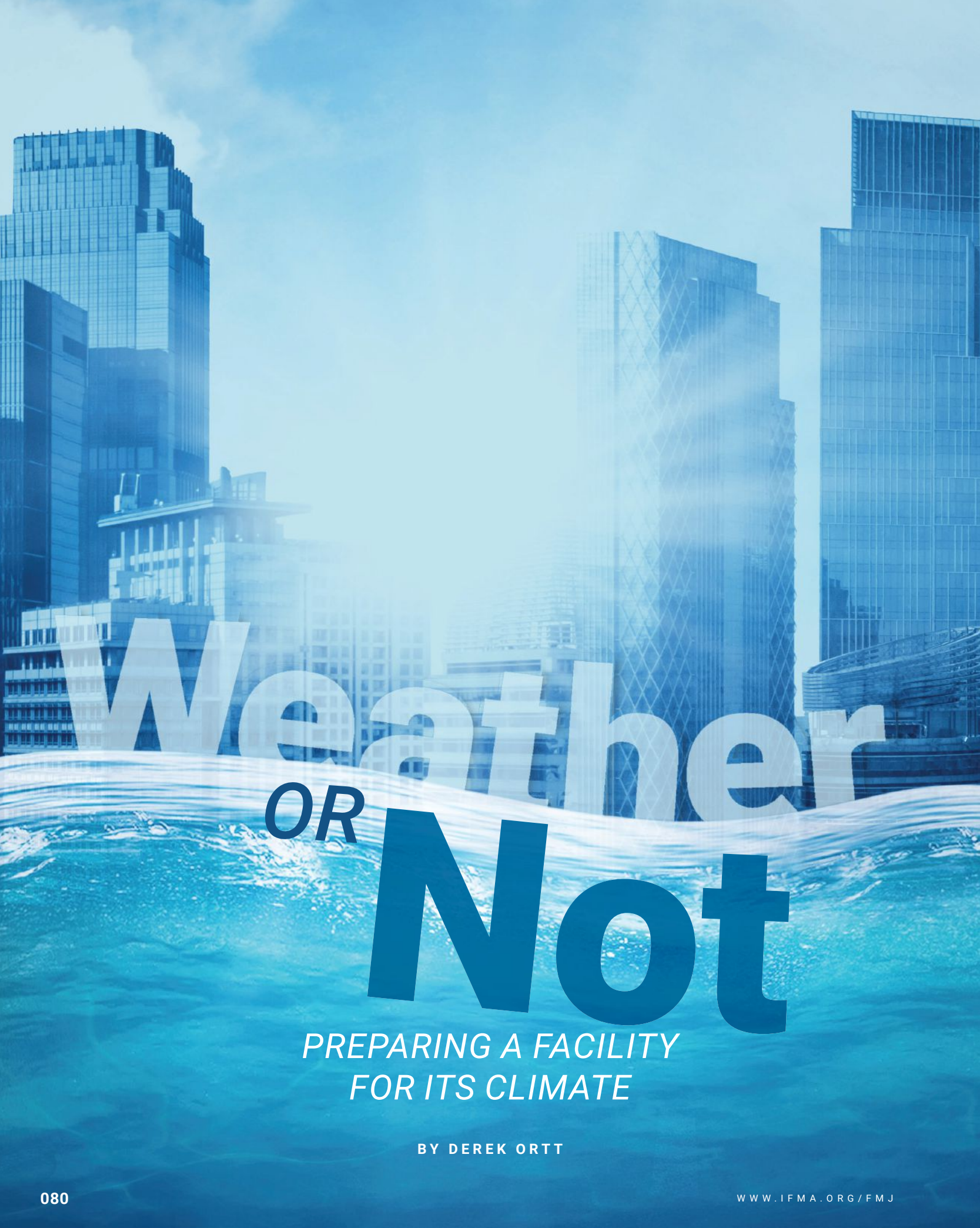
hansard.parliament.uk/Commons/2022-02-02/debates/867CCDAD-4F8F-43FC-B811-F9476B3962A7/CarbonEmissions%28Buildings%29

member.fintech.global/2021/12/01/proptech-investment-is-on-the-rise-again-after-seeing-huge-drop-in-2020/

ukgbc.org/climate-change-2/

theguardian.com/business/2022/apr/24/drive-for-net-zero-fuels-uk-boom-in-retrofitting-buildings-for-new-use

worldgbc.org/thecommitment



PREPARING A FACILITY FOR ITS CLIMATE

BY DEREK ORTT

Business operations and financial performance are disrupted by severe weather on a global scale, impacting a growing number of companies and facilities. Hurricanes, flooding, wildfires and other extreme weather events regularly force facilities to shut down and halt operations and often cause direct physical damage to buildings, infrastructure and assets. According to the reinsurance company Swiss Re, insured losses from extreme weather events globally rose to US$112 billion in 2021, the fourth highest since 1970.

Facilities preparing for weather challenges should take preventive measures to reduce risks and minimize operational disruptions. Although no one can avoid severe weather, how businesses respond before, during and after each event will directly impact the overall outcomes of the event, including how well they keep personnel safe and protect assets and whether they can keep their doors open.

However, despite the potentially devastating effects of severe weather, many companies struggle with outdated or generic weather response plans that are not as extensive as they should be. A robust and actionable business continuity and emergency response plan that addresses vulnerabilities and hazards can mitigate operational downtime during severe weather events.

THE IMPORTANCE OF VULNERABILITY ASSESSMENTS FOR FACILITIES

The backbone of any robust emergency response plan is a vulnerability assessment. By identifying risks and assessing vulnerabilities, businesses can become better equipped to recover rapidly and safely from severe weather events and reduce losses appropriately.

When conducting a vulnerability assessment for weather response, there are three main components to look at: the type of severe weather that may threaten asset locations; the impact the severe weather would have on the facility and employees; and the likelihood of the severe weather event happening. Once vulnerabilities are identified, a detailed plan can be developed that includes potential risks to facilities and assets and outlines how the company will respond to protect the facility and maintain safety. Preparing for a probable weather scenario is better than using generic plans that can put the facility at risk.

Planning for worst-case weather scenarios requires a thorough understanding of the capacities and limitations of a facility. A vulnerability assessment aims to establish a relationship between safety, business continuity and the bottom line by quantifying the overall exposure of weather risks to the facility and addressing individual weather risks in terms of preparation and probability.

IDENTIFYING POTENTIAL WEATHER THREATS

Response planning starts from the ground up, assessing all threats to the facility to eliminate uncertainty if the hypothetical becomes a reality. The first step in any vulnerability assessment is to look at the area's history of severe weather events. What types of events tend to occur where the facility is located? When do these events occur? What anomalous events have happened in the past five years? Could changes in the climate affect future events?

When assessing vulnerabilities to facilities and their functionality, facility managers should consider several weather events, such as:

Severe storms. With warming temperatures and clashing air masses, the threat of severe thunderstorms, flooding, rainfall, damaging winds and tornadoes could increase. Strong winds can push over foliage and trees and block roads during any major storm, while loose debris can damage buildings, power and telephone lines. FMs should especially consider the impact of power outages, which are among the top business disruptors and are becoming increasingly common, especially in the U.S. Thunderstorms, lightning, hurricanes and tornadoes wreak havoc on aging electrical grids, and even the most seasoned utility will struggle to keep the lights on when destructive storms hit their hardest.

Flooding is not a new phenomenon, but it has occurred more frequently and abruptly in recent years. A First Street Foundation study reports that floods could shut down a quarter of all critical facilities in the U.S., and things could worsen due to climate change. Temperature increases lead to an increase in evaporation from lakes, oceans, soil and vegetation, causing heavier rainfall. Furthermore, rising sea levels are causing more flooding in low-lying coastal areas. Facilities, especially those in urban areas, should understand the potential threat of flooding and have an emergency plan in place if water starts closing in. Flooding can damage buildings from the ground up, increase electrocution risks and impact transportation to and from facilities.

Cold and sub-freeze temperatures can create operational difficulties and safety concerns for facilities. Pipes and machinery can freeze, operations may halt and assets may sustain long-term damage. During heavy snowfall, people can become trapped indoors, roofs may cave in, roads may be blocked and transport options may be limited. Facility and emergency management personnel should identify any temperature-sensitive equipment, technology or machinery that may malfunction or become dangerous to use below a specific temperature. Structural weaknesses in buildings that may be impacted by heavy snow should also be identified.

Warm temperatures can overheat and cause long-term damage to machinery and increase wildfire risks, threatening your facility and impacting air quality in the area. Machinery may also become unsafe to use in high temperatures. Facility and safety managers should also consider that heat is the number-one weather-related cause of death in the U.S. and a leading hazard worldwide — more dangerous than lightning, flooding, hurricanes and tornadoes in an average year. Remember that the definition of extreme temperatures will vary depending on the facility's vulnerabilities.

Wildfires are destructive, devastating and unpredictable. The Union of Concerned Scientists, a U.S. nonprofit organization, reports that wildfires are increasing in frequency and severity every year, with climate change being a possible significant driver due to temperature rise, early snowmelt and dry conditions. When a wildfire threatens a facility, FMs and safety managers need precise, ongoing insight into how current active fires, smoke, air quality and forecast fire danger may impact their operations, assets and employees.

UNDERSTAND THE LOCATION BUT PREPARE FOR THE UNEXPECTED

Understanding what to expect at the specific location of the facility is key to building robust business continuity and emergency response plans. For example, businesses based in Florida, USA, should ensure their facility infrastructure can withstand strong winds during hurricane season, as well as any possible tidal surges from the storm. Facility owners in California need to be aware of the potential risks and dangers associated with wildfires, including smoke and air quality. New York-based facilities will have to account for the cold temperature limits of machinery and prepare for arctic blasts, as well as for travel disruptions due to heavy snowstorms.

However, in light of increasing climate-related anomalies, FMs would do well to prepare for the unexpected. For example, in 2021, a polar vortex reached areas along the U.S. Gulf Coast, causing sub-freezing temperatures, power outages, fatalities and billions of dollars in damage.

DETERMINING SEVERITY AND IMPACT PROBABILITY

When addressing negative weather impacts, it is essential to know not only what type of weather causes problems but what the impact of the severe weather will be. For example, what possible damage could occur if the temperature remained below 28 F (-2.2 C) for 12 hours? If the temperature or heat index is forecast to rise above a certain threshold, do certain precautions need to be taken? If so, what precautions? And when do they need to be taken?

Once the weather threats are identified, FMs should consider their potential severity and impact probability, and prioritize the weather events based on their overall danger to the facility. A practical method to manage various threats is to classify them as either slight, moderate, high or extreme threat weather events, depending on their intensity and likelihood. Every weather event requires individual risk assessments to account for all possibilities.

Slight and moderate risk weather events typically threaten the accessibility of the facility, while high and extreme risk weather events typically threaten the facility itself, as well as occupants. For example, if the weather event is a slight risk, any response would be short term. These weather events usually do not cause severe destruction but may cause, for example, street flooding and travel delays. When experiencing moderate weather events, one typically gets something more widespread and prolonged. During slight and moderate risk weather events, a facility usually needs provisions on site until the roads open if staff cannot travel to the office.

During high and extreme risk weather events, facilities may need to shut down depending on what the facility can withstand. Operations may need to be relocated to an alternate work facility. For businesses that operate 24/7, typically, a small ride-out team might stay in the main facility to ensure essential operations are kept running while other employees are sent home or to the alternate work facility. For the most extreme threats, a total shutdown may be necessary for the main facility. Employees also need to be provided with enough time to prepare their families and homes for the severe weather event.

DISCOVERING THE APPROPRIATE RESPONSE

Vulnerability assessments clarify the actual threat severe weather events pose on facilities and identify any weak spots in existing emergency response plans. Furthermore, they help inform the appropriate actions to take before, during and after a severe weather event through preplanned information and tips to aid decision making under stressful conditions.

Every weather impact must have an appropriate response. To determine the optimal emergency response, FMs should establish the proper weather hazards risk thresholds that determine when to execute mitigating actions to maximize the balance between reliability and cost. For example, oil refineries typically decide to shut down a few days before a hurricane makes landfall if the forecast is for a landfall in the vicinity of their facility. This is to ensure that a safe shutdown is conducted. To make the best possible business decision, all potential decisions must be considered in terms of their financial and safety implications. Risk analysis methods, such as cost-loss modeling based on the intensity and probability vectors of the business impact, are helpful in this regard.

Business continuity and emergency response plans need to be flexible and help make timely decisions as weather-related emergencies evolve quickly. By addressing the relevant weather risks and assessing the facility's vulnerabilities, FMs become better equipped to make the right tactical decisions and ensure their buildings, infrastructure and assets remain safe during a severe weather event. FMJ

Derek Ortt *is the business continuity manager and a senior tropical meteorologist at StormGeo. He has 15 years of experience forecasting tropical cyclones and helping businesses mitigate the impacts of severe weather threats.*

KEEPING Track

USING AI TO REDUCE CARBON FOOTPRINT

NIKKI MEHTA

From operational impacts and supply chains to reputation and employee retention, climate change has put businesses' sustainability and resiliency strategies in the spotlight as they combat and adapt to global warming. As the world heats up, so does the urgency for companies to act on their pledges to reduce carbon emissions.

The demand for businesses to assume accountability for climate change has increased noticeably. Just recently, the Intergovernmental Panel on Climate Change reported that it is still possible to limit global temperature rise to 1.5 C, but only if countries and businesses take immediate action.

While climate change can create new risks for a business, such as the operational impacts of extreme weather events or reputation management for its response to global warming, it can also offer rewarding business opportunities. Companies can increase their resiliency and energy efficiency to improve productivity and conservation of resources, thereby potentially reducing operational costs. Climate change is spurring innovation across numerous industries, inspiring the creation of new products and services that are less carbon-intensive or enable carbon reduction for other businesses. All told, these measures can help bolster a company's competitiveness and unlock new market opportunities for growth.

As businesses revisit their energy efficiency and resiliency strategies, many are studying the potential use of artificial intelligence and machine learning (AI/ML) technologies to shrink their carbon footprint. Boston Consulting Group (BCG) estimates that by 2030, AI could reduce greenhouse gas emissions by 5 to 10 percent globally, which translates to 2.6 to 5.3 fewer gigatons. Further, AI could generate between US$1 trillion to $3 trillion in value in terms of corporate sustainability.

Physical buildings are the first place companies should look to reduce their carbon footprint. According to the International Energy Agency (IEA), a commercial building's entire life cycle is responsible directly and indirectly for approximately 37 percent of global energy- and process-related CO2 emissions — and for nearly 15 percent of direct CO2 emissions.

Companies can use advanced technologies to both reduce building emissions and improve resiliency. BCG also found that companies can use AI to monitor their emissions, predict their future emissions and — armed with that knowledge — make adjustments to reduce emissions. AI/ML can optimize logistics as well, reducing the materials required to build things. Before a facility manager can harness the power of AI/ML, it is crucial to understand its capabilities as well as its advantages and disadvantages.

BUILDING AUTOMATION TECHNOLOGIES TO REDUCE ENERGY USE

To use an advanced technology to the fullest potential for managing energy usage, companies must first consider its attributes and how it can best fit into operations. For example, FMs can use AI/ML to anticipate occupants' needs while also improving the occupant experience, operational efficiency and reduction of carbon emissions. These technologies can track and address everything from ideal comfort settings for lighting and temperature to security and energy measures — for example, AI/ML can optimize power consumption or trigger an automatic shutdown during a perceived threat, like an extreme weather event.

Lighting makes up about 17 percent of all electricity consumed in U.S. commercial buildings. To reduce this energy consumption, AI/ML technologies can monitor which rooms are unused and automatically turn off those lights, and can also track room usage data to anticipate future occupancy. With HVAC operations, which are known to account for 35 percent of total energy consumption in commercial buildings, an AI-automated system can determine when and where occupants are not present. With this knowledge, the system can adjust HVAC operations in unused rooms, helping save energy costs. Once a person enters a room, the HVAC system can adjust to enhance occupant comfort and experience.

From the boiler room to the boardroom, AI/ML technologies can help companies better reach their sustainability and resiliency goals. They can also give FMs a clearer picture of how to optimize building performance, reduce carbon emissions and cut energy costs — all while enhancing occupant experience and creating a more resilient future.

DATA ANALYTICS PROVIDE A HOLISTIC VIEW OF ENERGY SPEND

As buildings come back online following the COVID-19 pandemic, companies are implementing AI-powered data analysis to provide FMs with insights to optimize building use. At the macro level, business leaders are also using AI/ML analytics to help adjust their building portfolios in response to fluctuating economic, environmental and regulatory conditions. Those that lease their buildings are looking to owners to focus on key performance indicators (KPIs) tied to reducing carbon footprint, improving energy savings and enhancing occupant safety.

By providing real-time tracking and analysis of KPIs, these advanced technologies can

help optimize building operations to meet energy savings targets and even reduce maintenance costs. Data analytics can also provide FMs with actionable insights they can use to improve resiliency, reduce energy consumption, run predictive maintenance and increase overall efficiency.

When paired with other building technologies, such as upgraded Wi-Fi networks and building management systems (BMS), it can provide owners and FMs with a holistic view of their property's operations for even greater insights into carbon reduction and sustainable management.

BUILDING MANAGEMENT SYSTEMS INCREASE EFFICIENCY AND DRIVE SUSTAINABILITY

A recent study by the Pacific Northwest National Laboratory found that as much as 30 percent of a building's energy consumption can be eliminated through more accurate sensing, more effective use of existing controls and deployment of advanced controls such as those offered by modern, AI-powered BMS.

A BMS monitors and controls a building's mechanical and electrical equipment (e.g., power systems, HVAC, lighting, life safety systems and security systems). When coupled with advanced software, a BMS can reveal intelligence on hidden energy waste and provide predictive information that can be used to optimize energy efficiency and maintenance while still supporting occupant safety and well-being.

For example, AI-driven algorithms can enable a BMS to track and predict energy usage, cost savings and which rooms within a building are getting used the most and for what purposes. An AI-enhanced BMS can also weigh conditions and demand in buildings against current occupancy, weather and utility pricing. It can identify issues before they occur, helping to prevent sudden equipment failures and unplanned downtime.

ADVANTAGES AND CONSIDERATIONS WHEN USING AI/ML TECHNOLOGIES

While the intent of these technologies is to create less carbon, numerous business advantages also exist from cost savings, employee retention and reduced human error to desirable building certifications and market competitiveness.

Sustainability upgrades that improve energy and water efficiency are known to cut utility expenses, and they appeal to today's environmentally conscious employees who pay considerable attention to a company's values. By implementing sustainability strategies and communicating them to the public, an organization potentially increases its attractiveness to the workforce, opening the door to a more competitive talent pool.

AI/ML can also reduce the human error rate by taking over the heavy lifting involved in managing, analyzing and dissecting impossibly large volumes of data. It automates repetitive and mundane tasks, such as addressing comfort requests, and allows facility teams to focus on high-value activities. Unlike humans, this technology is available around the clock to provide FMs support and information.

In addition, the building itself may qualify for certifications, such as the Leadership in Energy and Environmental Design (LEED) certification. LEED sets a benchmark for healthy, efficient, carbon- and cost-saving green buildings and its certification is recognized globally as a symbol of sustainability achievement and leadership.

It is important to understand that advanced technologies can bring negative and positive impacts to the carbon equation, and it is critical for businesses to measure both. AI has the potential to accelerate environmental degradation, according to the World Economic Forum. The use of power-hungry graphics processing units (GPUs) to train AI algorithms has already been cited as a contributor to carbon emissions. The process of training a single AI model produces nearly 670,000 pounds of carbon-equivalent emissions. To put this in perspective, it roughly equals the lifetime emissions of five average cars in the U.S. Even so, the amazing power of AI/ML to automate tasks and improve operational and energy efficiencies may outweigh its negatives.

Climate change is an urgent issue that needs to be addressed. To forestall a potentially cataclysmic future, businesses must reinvent their operational strategies immediately to curb carbon emissions and support a viable future for the planet. As new tools and frameworks are emerging that will impart a fuller understanding of AI's potential to track, analyze and reduce carbon footprints, AI/ML will undoubtedly play an increasing role in mitigating the effects of global warming. FMJ

Nikki Mehta *is the director of energy and sustainability at Honeywell Building Technologies, responsible for developing innovative clean energy and sustainable solutions for the buildings sector. She is an experienced marketing and product management executive and has built groundbreaking SaaS and mobile applications resulting in significant revenue and growth for technology companies. She has a master's degree in energy and sustainability from Virginia Tech and a bachelor's degree in electrical engineering from the University of Maryland. She is active in the Association of Energy Engineers and on the board of its National Chapter. Mehta is also a first responder with the Fair Oaks Fire Department in Fairfax, Virginia, USA.*

REFERENCES

ipcc.ch/report/ar6/wg1/#FullReport
bcg.com/publications/2021/ai-to-reduce-carbon-emissions
iea.org/topics/buildings
energystar.gov/buildings/save_energy_commercial_buildings/ways_save/upgrade_lighting
energy.gov/sites/prod/files/2017/03/f34/qtr-2015-chapter5.pdf
buildingretuning.pnnl.gov/publications/PNNL-25985.pdf
usgbc.org/leed
weforum.org/docs/Harnessing_Artificial_Intelligence_for_the_Earth_report_2018.pdf

ADVERTORIAL

MANAGING WASTE IN A POST CORONAVIRUS WORKPLACE

CASE STUDY

SHARED VALUE SUSTAINABILITY

Sustainable Office Solutions Ltd (SOS) recently completed a project in collaboration with JEB Group, Artificial Intelligence & Social Intelligence Alliance (AISIA) and a couple of key financial institutions to help Lok Sin Tong Yu Kan Hing Secondary School transform its learning environment into a modern, intelligent classroom.

SOS helped to secure unwanted assets from key financial institutions which were redistributed to the school. They received high quality used chairs, lockers, tables, TVs and microwaves.

In total 11 tonnes of office waste was saved from landfill - 47.5% was reused and 52.5% successfully recycled. Throughout the circular process, the project prevented 17,361kgCO2e from ending up in the atmosphere, and the school received a state-of-the-art classroom for their students, elderly and the surrounding Wong Tai Sin community.

To find out how you can work with SOS to facilitate a circular economy , contact sos-action@jebgroup.com

In the wake of the Covid-19 pandemic we have seen fundamental changes within workplaces and a mindshift in how we manage them. As we adapt to these evolving new requirements and challenges, many organisations and corporations are relocating or even downsizing to accommodate employee preferences for remote or hybrid working models. Whilst facility and workplace managers need to be vigilant and stay at the forefront of these emerging trends, it is critical they review how they handle and manage their waste and environmental impact during relocations and decommissions.

According to the US EPA, furniture waste generated by Americans in 2018 totalled a staggering 12.1 million tons - 80.1% of it went to landfill and only 0.33% of it was recovered for recycling. What contributes to this hidden waste stream? Workstations, task chairs, tables, monitor arms and more. For example, a single, complete cubicle accounts for 300 to 700 pounds of mixed metal, wood and plastic waste.

As part of any office relocation move and set-up, managers need to engage with green businesses such as, Sustainable Office Solutions that facilitate a circular economy of office assets. The streamlined process is tailored to divert furniture waste from landfill during office relocation and renovation. Circularity follows 3 principles: waste reduction, product life cycle extension and regeneration. These circular economy services have the potential to shrink global greenhouse gas emission by 39% and reduce virgin resource use by 28%[1].

How does it work? When offices are decommissioned, Sustainable Office Solutions take inventory and stock of all potential waste and items. Assets are removed, cleaned and repaired (if necessary) for repurposing and redistribution to their extensive donation network of NGO's, schools and charitable organisations; or are responsibly recycled.

Upon completion, quantifiable data is collated such as, weight and carbon reduction from the project which is presented back to businesses as an impact report to support clients' sustainability strategies and goals.

To date, in just 10 short months within Hong Kong, Sustainable Office Solutions have diverted 21,137 furniture pieces from landfill equating to 378,591kg and saved over 1.45 million in carbon emissions from ending up in the atmosphere.

As we move back into the post-pandemic workforce and review the space we require, consider ways to responsibly manage your waste with innovative, circular solutions. Services such as, SOS are turning unwanted furniture assets into a sought after, beneficial business strategy that benefits the environment, aligns with corporate sustainable goals & values, and saves on decommission and reinstatement costs.

Source:
[1] https://www.circle-economy.com/news/circular-economy-strategies-can-cut-global-emissions-by-39

CSP IFMA CORPORATE SUSTAINING PARTNER

IFMA's **Corporate Sustaining Partners (CSPs)** are dedicated facility management industry supporters. These best-in-class organizations make a substantial investment in the facility management community as trusted advisers, topic experts and change leaders. They are committed to the success of the professionals they support.

CSP PLATINUM | CSP GOLD | CSP SILVER

Trustworthy

Reliable

Credible

Expert

With the generous support of CSPs, IFMA has the means to deliver the quality, cutting-edge information.

PLATINUM

IAdea
ODP BUSINESS SOLUTIONS
OTIS
JLL/Technologies
Schneider Electric

GOLD

ABM Building Value
Cartegraph
IBM
Kimberly-Clark PROFESSIONAL
Planon
rzero

SILVER

Aerotek
الهاجري لما وراء البحار AL-HAJRY OVERSEAS
APEX SURFACE CARE
APS APEX PROPERTY SERVICES
ARC Facilities
Armstrong CEILINGS
biamp.
Corporate FLOORS
CORT
DAVIES OFFICE
EMCOR Facilities Services
fm:systems
FreeAxez
office + SpaceIQ
KASTLE SYSTEMS
leadec
LogiSon
Mohawk Group
REPUBLIC SERVICES We'll handle it from here.
SCLogic
sodexo
SQUARE CARE
Tarkett
THE ELEVATED CAB
TORK Think ahead.
UFM
WHITMAN

Interested in becoming an IFMA partner? Contact us to learn more: **+1-281-974-5681** |

ACOUSTICAL/SOUND MASKING
Biamp Systems | biamp.com
Lencore Acoustics LLC | lencore.com
LogiSon Acoustic Network | logison.com

BUILDING MAINTENANCE/REPAIR/RESTORATION
Otis Elevator | otis.com
The Elevated Cab | theelevatedcab.com

CARPET/FLOORING/TEXTILES
MasterCorp | mastercorp.com
milliCare Floor & Textile Care | millicare.com
Tarkett | tarkettna.com

CEILINGS/CEILING CARE
Armstrong World Industries | armstrong.com

DISASTER RECOVERY/EMERGENCY RESPONSE
BELFOR USA Group Inc. | belforusa.com

EDUCATION
Capitol Technology University | captechu.edu

ELECTRICAL/WIRE MANAGEMENT
FreeAxez LLC | freeaxez.com
Schneider Electric | schneider-electric.com

ENERGY SOLUTIONS/MANAGEMENT
Schneider Electric | schneider-electric.com

FLOORING INSTALLATION/MAINTENANCE
APEX Surface Care | goapex.com
Corporate Care | corporatecare.com
Corporate Floors | corporatefloors.com
milliCare Floor & Textile Care | millicare.com
Mohawk Group | mohawkgroup.com
Whitman Global Carpet & Floor Care | gowhitman.com

FM CONSULTANTS/SERVICES/PROVIDERS
ABM | www.abm.com
Aerotek | aerotek.com
Alghanim International | falghanim.com
Al-Hajry Overseas Co. LTD. | alhajry-overseas.com.sa
Al Shirawi Facilities Management | alshirawifm.com
Canadian Base Operators | canadianbaseoperators.com
EMCO Qatar | emcoqatar.net
EMCOR Facilities Services | emcorfacilities.com
Facility Engineering Associates, P.C. | feapc.com
Kyocera America Inc. | kyocera.com
Leadec | usa.leadec-services.com
Linc Facility Services. Doha. Qatar | abm.com
ODP Business Solutions | odpbusiness.com
Renaissance Services SAOG | renaissanceservices.com
Sodexo | sodexousa.com
SRACO Company | sraco.com.sa
Staples | staplesadvantage.com
Zurn Industries, LLC | zurn.com

FM HARDWARE
IAdea | iadea.com

FM SOFTWARE
Cartegraph | cartegraph.com
FM:Systems Inc. | fmsystems.com
IBM | ibm.com/us-en
iOFFICE + SpaceIO| iofficecorp.com
JLL Technologies | jllt.com
Planon | planonsoftware.com

FURNITURE
CORT | cort.com
Davies Office Inc. | daviesoffice.com
Kimball International | kimballoffice.com
Versteel | versteel.com

INTEGRATED FACILITIES MANAGEMENT
United Facilities Management | ufm.com.kw

JANITORIAL SERVICES/CLEANING PRODUCTS
APEX Property Surfaces | goaps.co
Excel Dryer | exceldryer.com
Square Care | squarecare.com
R-Zero | rzero.com
Tork, an Essity Brand | torkglobal.com

LANDSCAPE/MAINTENANCE/PLANTS/ SERVICES/SUPPLIES
Ambius | ambius.com

RESTROOM PRODUCTS
Kimberly-Clark Professional | kcprofessional.com/en-us

SECURITY
Kastle Systems | kastle.com
Securitas Security Services USA | securitasinc.com

TECHNOLOGY SOFTWARE TOOLS
ARC Facilities | arcfacilities.com
SCLogic | SCLogic.com
Verizon | location.verizon.com

WASTE MANAGEMENT
Republic Services | republicservices.com

COMPANY NAME: OTIS
EXPERTISE: Elevators/ People-movers; Maintenance/Repair
CSP LEVEL: Platinum
CSP SINCE: 2018
WEBSITE: www.otis.com

OTIS

Otis launched its first ESG (Environmental, Social and Governance) report as an independent company in March, saying it aims to

> *"build connections that help people, societies and environments everywhere thrive."*

Otis Chair, CEO & President Judy Marks took time to answer questions about the company's ESG efforts. Here is an excerpt.

Download the full report at www.otisinvestors.com/2021esgreport.

Now that Otis is an independent public company, how are you thinking about its purpose in the world?

Our vision has not changed since becoming a publicly traded company. We give people freedom to connect and thrive in a taller, faster, smarter world. Every day we connect and move people around the world.

Last year we unveiled measurable goals and strategic actions around ESG. But at its core, it's really about doing the right thing. This goes beyond the movement of people — it's about how we impact our planet, our societies and our neighbors.

What does ESG mean to Otis?

ESG is embedded in our long-term strategy, part of our culture and integral to setting our vision in motion.

We are fostering a culture that embraces all voices and diverse points of view and proactively engages in the communities we serve. We strive to reduce the environmental impact of our products, operations and services both for ourselves and our customers. We uphold the highest standards of strong governance, ethics and integrity in our dealings with customers, colleagues, suppliers and other partners. We create a culture in which people are empowered to speak up and share their concerns. And above all, we're committed to the health and safety of our colleagues and the riding public.

What role can Otis play in the rise of smart cities?

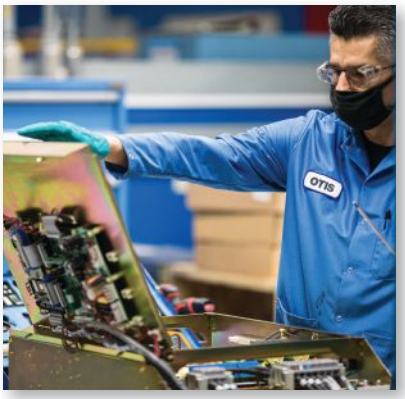
By harnessing the power of smart, connected technologies, we have the opportunity to help create cities that are safer, greener, more efficient, more equitable and more people-friendly than ever before.

We believe that smart, connected elevators will be an indispensable component of any smart city's infrastructure in the future. Data from our connected elevators, about traffic flows in the building, can be converted into knowledge and action and help support smart city ecosystems. Access to this data and actionable insights can help inform smart decision-making that may benefit both building owners and passengers.

As Otis deploys digitalization at scale, how does that benefit the business and customers?

Productivity is one of the key benefits of our service digitalization. Our Otis ONE™ digitally connected platform enables our service professionals to be proactive, identifying potential problems and addressing them before they can cause a service interruption.

Customers benefit with improved uptime and transparency on maintenance and equipment health. Otis ONE monitors equipment health and performance in real time, 24/7. The information is collected, analyzed and accessible to customers with full transparency. Otis customers and our mechanics servicing their units have visibility into their connected portfolio and how it's performing.



Otis organizes its ESG activities into four focus areas. Here are some of the company's 2021 ESG highlights:

OVERALL

Introduced a comprehensive suite of 13 sustainability targets that align with the U.N. Sustainable Development Goals

Formalized our commitment to ESG by conducting our first materiality assessment, launching an ESG Governance page on Otis.com, becoming a signatory to the U.N. Global Compact and issuing our first climate disclosure through CDP

ENVIRONMENT & IMPACT

Introduced pilot electric vehicles in our fleet in Europe and the United States in support of our emissions reduction goal

Achieved environmental management system ISO 14001 certification at 100% of our global factories, four years ahead of our goal

Launched the Otis Gen360™, connected elevator designed to offer higher energy efficiency and a lighter carbon footprint than comparable Gen2 configurations

Initiated a zero-waste-to-landfill pilot at our Florence, South Carolina factory

HEALTH & SAFETY

100% of field professionals and subcontractors educated on life-saving Cardinal Rules

Commissioned an airflow research study that concluded that short elevator rides are relatively low-risk for COVID-19 exposure

~1/3 of our maintenance portfolio is connected

PEOPLE & COMMUNITIES

Launched inaugural Made to Move Communities global student challenge as student teams from 14 schools across 9 countries and territories became the first cohort to complete our signature CSR program

Named to the Human Rights Committee Corporate Equality Index — Best Places to Work for LGBTQ Equality for second consecutive year

~100% of people managers received unconscious bias training, delivered across 34 languages

GOVERNANCE & ACCOUNTABILITY

Launched custom-built scenario-based learning to colleagues focused on our company values and The Otis Absolutes: Safety, Ethics and Quality

COMPANY NAME: Planon
EXPERTISE: Integrated Workplace Management
CSP LEVEL: Gold
CSP SINCE: 2006
WEBSITE: planonsoftware.com/us

Planon
Building Connections

How is your Planon responding to the ever-changing needs of the FM world?

Digitalization and the growing demand for smart technologies are reshaping how we live, work, learn and play. Once seen as a place to simply do business, the office is changing. Workers now want social and interpersonal connections and to feel a sense of shared identity. It is the facility manager that is expected to deliver on these goals.

Planon is constantly evolving its software to meet the needs of its customers by integrating the diverse landscape of smart building technology, business solutions, and data into one single source. With our open platform approach - enterprise applications, vendor systems, and service contractors are easily integrated.

Our platform has a global reach, with services compatible with 12 different languages, providing all building stakeholders with actionable and meaningful insights to transform the future of the workplace and build better connections.

Planon is committed to having a positive impact on users' lives and the planet, empowering all to answer future needs and upcoming challenges. We invest 20 percent of revenue back into R&D for continuous improvement and innovation. We are proud to be recognized as a Leader in –among others– the Verdantix Green Quadrant®: Integrated Workplace Management Systems (IWMS) 2022 and the IDC MarketScape: Worldwide SaaS CMMS Application 2021 Vendor Assessment.

What's on the horizon in your field/industry, and how is Planon meeting those challenges and opportunities?

Planon recognizes that companies appreciate agile, innovative technology that gives them the freedom to use what works best for their requirements. With this in mind, we have developed an innovative open platform that allows clients and partners to develop their own applications to connect buildings, people and processes into one shared information platform.

Our new mobile platform also gives clients a higher degree of autonomy and flexibility over their working environment, helping to create more connected workspaces that inspire a sense of connection and shared identity.

These platforms provide users with continuous access to new features and functionalities that increase productivity and allow them to be successful in their roles.

Planon also focuses on providing clients with improved and innovative ways to utilize their real estate and facility management data. Enhancements to our products, include Planon Connect for Analytics, allowing our clients to integrate their Planon data with their existing BI tools to improve data analysis, and reporting to generate better insight into their operations and potential needs to improve and evolve their organization.

In 2020, Planon partnered with sustainability experts Schneider Electric, allowing us to bring solutions to our clients to help with their sustainability and ESG goals.

Why is it important to consider integrated solutions over point solutions?

At Planon, we constantly hear of companies implementing multiple point solutions to meet their workplace technology requirements. This investment over time has proven costly, complex, and time-consuming.

Typically, each department within one organization purchases a solution based on their own needs without considering the company's requirements or the needs of other departments.

Examples include deploying separate solutions for space management, work order management, lease administration, energy and sustainability management, workplace mobile apps, to name a few.

Silos within the organization cause silos in the deployment of solutions. Or multiple service providers bring different technology tools to fulfill their services for the client. As a result, companies are left managing a mess of legacy point solutions that they must now stitch together through APIs to mimic an integrated platform.

With technology becoming ever-more sophisticated, companies should consider smart sustainable building management software that connects buildings, people and processes. Eliminating data silos and aligning solutions into one single-source platform will enable them to grow solutions as they grow their business without worrying about integrating separate point solutions.

COMPANY NAME: Kastle
EXPERTISE: Security Systems
CSP LEVEL: Silver
CSP SINCE: 2017
WEBSITE: kastle.com

How is Kastle responding to the ever-changing needs of the FM world?

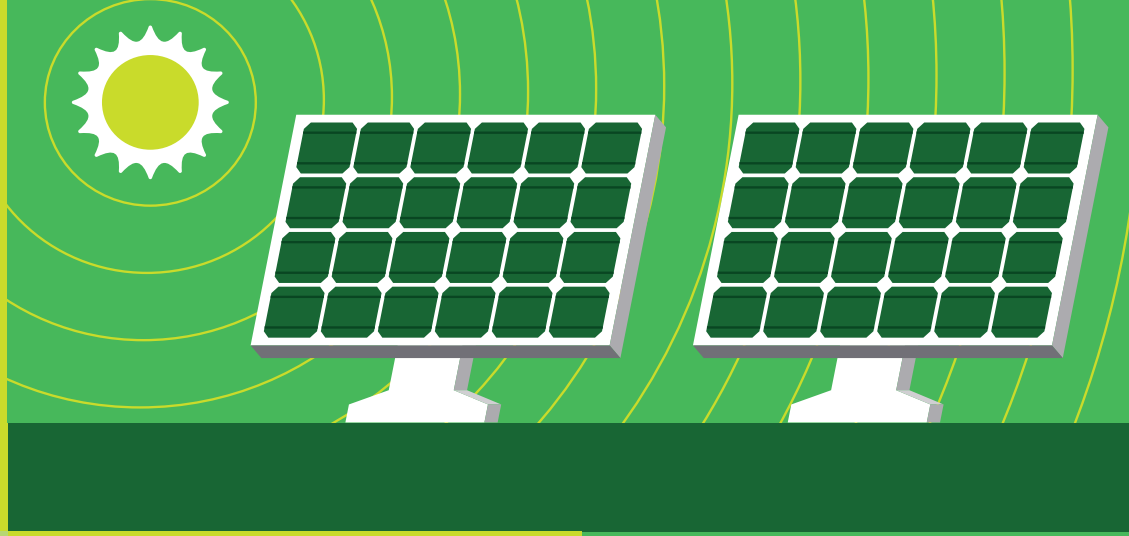
Kastle offers complete managed security solutions for a suite of property technology functions including access control, video surveillance, visitor management and occupancy data solutions. We understand that facility management, especially in the era of the hybrid workplace, is constantly evolving, which is why we are dedicated to creating custom solutions that fit our customer's unique needs and our cloud-based, open-source software integrates with existing building systems and applications, so access control, security and building systems work together seamlessly.

Because we really want to control the quality of the user experience, we extend the concept of managed service beyond cloud hosting and updates — we deliver an end-to-end customer experience backing our products and service performance throughout their use, truly being a partner for our clients as their needs may shift and change.

Tell us about your CSR and ESG efforts. How have these contributed to the community?

Kastle's goal has always been to secure spaces and enable businesses to perform better. Integrating our technology with building systems put access control at the center of understanding how spaces are used. The occupancy and space utilization data that our systems provide can be used to optimize building performance and lower energy demands for a healthier world.

We are also a proud sponsor and partner of Move for Hunger and work with them to engage the real estate industry to support the greater food of wellness, limit food waste and feed the hungry by collecting food that would otherwise be thrown away.



READY, SET, GO

THE ACCELERATED RACE TO NET ZERO

BY MARK REINBOLD

The need for global net zero infrastructure has never been greater, and organizations cannot afford to be left behind. The United Nations' Paris Agreement target to achieve net zero greenhouse gas emissions by 2050 is fast approaching, causing governments to rearchitect their regulations to hold themselves accountable. With the building sector responsible for around 40 percent of global energy-related greenhouse gas (GHG) emissions, it is unsurprising that organizations are heeding the call for sustainable infrastructure.

In a commissioned study conducted by Forrester Consulting on The Race to Decarbonization, 80 percent of organizations name implementing or maturing their sustainability initiatives as their top business priority in the next year, while 47 percent say they are actively working toward at least a 51 percent reduction in carbon emissions/energy consumption. Investing in net zero infrastructure — including resource-efficient and renewable energy solutions and services — is good for the planet and good for organizations' bottom line.

Net zero buildings drive critical business outcomes, including:

- Government compliance
- Reduced overhead costs
- Enhanced customer, investor and employee engagement
- Future-forward resiliency
- Healthier communities
- Improved occupant comfort
- Accelerated digitalization

Organizations do not have to wait to reap these competitive advantages. Through innovative funding methods and strategic partnerships, facility management leaders can take the plunge and join the race to net zero while retaining valuable capital that can be redirected elsewhere. Organizations can work alongside a trusted partner to identify and deploy the funding and procurement mechanism that aligns with their goals.

HAVE A PLAN: DESIGN, DIGITALIZE AND DEPLOY TO ACHIEVE NET ZERO IN EIGHT STEPS

As the decarbonization market grows, there will be many out there selling a plan. How can FMs trust they will help the organization achieve its targets? Will it be just another plan with no path to execution? With the looming deadline of 2050 (or earlier for many companies), private and public sector organizations must accelerate by selecting a partner who can design, digitalize and deploy an effective net zero program.

Be sure the program has these eight steps included. If it does not, expect the program to experience delays or inefficiencies.

1

Goal setting and advisory services: GHG inventory baseline, cultural and organization-wide goal and incentive alignment, financial assessment and potential funding solutions

2

Safe, secure and healthy implementations: Post-pandemic indoor air quality and ventilation solutions, life safety, building and cybersecurity technologies, building code compliance

3

Facility-wide digitalization: Energy management information systems, streamlined data acquisition, data-driven building decision making using predictive, automated, responsive capabilities powered by AI

4

Efficient infrastructure: Savings and outcome-based energy efficiency program, deferred maintenance resolution, infrastructure resiliency, electrification solutions, waste management, water conservation

5

Sustainable operations: Continuous decarbonization operations management plan, training or staffing future-ready infrastructure experts, sustainable life cycle management, condition-based predictive maintenance

6

Distributed energy sources: Distributed energy strategy, on-site renewable energy generation and storage, grid interactive services, EV charging, advanced asset optimization, demand response services

7

Renewable energy supply services: Carbon offsets, renewable energy advisory and procurement, renewable finance, development and trading

8

Certify and recognize impact: Industry-leading certification facilitation, transparent and traceable decarbonization dashboards, accounting and reporting, brand public relations and communications

The reality is, no two buildings are the same, meaning no two net zero roadmaps should be the same either. Many municipalities and organizations have taken the first steps toward decarbonization; now it is important for them to lean on partners to help calculate the next best step and provide tailored guidance along the journey to net zero. The result is a facility or campus plan that is expertly designed and optimized to drive net zero outcomes, while keeping occupants healthy and safe, for years to come.

NOW EXECUTE: FULL-SERVICE GREEN BUILDING MANAGEMENT

It is easy to set net zero targets but achieving them is its own challenge. Two of the most common barriers to net zero investment are lack time and expertise; there are simply not enough hours in the day for building owners and FMs to focus on aggressive decarbonization management alongside their already lengthy list of priorities. Couple those challenges with the desire to deploy capital on revenue-generating activities, as opposed to facility needs, plus lengthy capital allocation approval processes, and an organization's net zero aspirations can quickly fade.

Some partnerships allow facility executives to outsource the design, implementation, monitoring, measuring and optimization of their building's net zero carbon and renewable energy management to a trusted third party. Facility managers gain the peace of mind that their facilities or entire campus is reaching net zero targets while gaining the time and resources to focus on their organization's primary mission. Owners, managers and occupants all enjoy the benefits of a net zero building without ever having to think about it.

The Powerhouse Alliance, a Norwegian collaboration for energy innovation, wanted to build a net zero smart building that would produce more energy than it consumes over its lifespan. In doing so, the leadership team wished to maximize clean energy production, minimize energy consumption, and deliver a comfortable and pleasant environment for all occupants.

Through a net zero buildings as a service model, the Powerhouse Alliance worked with a partner to implement a complete energy system that harvests twice the buildings' annual energy consumption by drawing heating and cooling energy from the ocean. This world-class renewable energy solution produces 85,000 kWh annually and powers the Powerhouse Brattørkaia itself, neighboring buildings, electric buses, cars and boats through a local microgrid.

The net zero buildings as a service model also funded the implementation of building management solutions, low energy LED and VAV HVAC systems, energy efficient heat pumps and electric car chargers. All systems can be tracked on a digital dashboard that provides insights into occupancy, comfort and sustainability, allowing FMs to optimize performance. The facility is a shining example of how a building can be entirely self-sufficient, leading the way in net zero infrastructure.

AN ALTERNATIVE FOR THE PUBLIC SECTOR: DELIVERING GREEN INFRASTRUCTURE WITH MINIMAL IMPACT TO TAXPAYERS THROUGH PUBLIC-PRIVATE PARTNERSHIPS (P3)

P3 or PPP models can be leveraged by public organizations. Through this mechanism, a public sector organization — such as a K-12 school, state university, government building or transportation hub — contracts with private partners with the expertise and funding to make net zero infrastructure improvements. This approach minimizes the risk to taxpayers while allowing public entities to pay in fixed increments over a set term contingent on the performance

and availability of the infrastructure. Communities, cities, states and nations are empowered to invest in healthy, sustainable and connected infrastructure that will serve citizens for generations to come.

With the existing 65-year-old steam plant reaching the end of its life expectancy, the University of North Dakota's FM team seized the opportunity to build a new natural gas central utility plant to foster a green campus for future generations. Working under a 40-year P3 contract, the university transitioned its operations away from coal, reducing operating costs and maximizing energy efficiency across campus — all while staying on budget and without impacting taxpayers.

The new central utility plant will reduce GHG emissions by 40,000 metric tons of carbon dioxide, equivalent to the carbon sequestered by 74 square miles of forest. The project will also address US$90 million in deferred capital, modernizing facilities while reducing its improvement backlog. By replacing the plant with a future-forward clean energy alternative, the university will provide an enjoyable environment for its students and staff while fostering a green campus.

OUTCOMES FOR BUILDING EFFICIENCY: PERFORMANCE CONTRACTING SUSTAINABILITY GOALS DIRECTLY FUNDED BY ENERGY SAVINGS

While not all organizations require full-service building management, most still lack the upfront capital or want to stretch available funding to make efficient facility updates quickly, especially after navigating a costly pandemic. Through a performance contract, organizations can partner with a third party to make critical green infrastructure improvements that are paid for over a set term by the guaranteed energy and operational savings. Any disparity between the projected and actual savings figures is wholly covered by the partner, mitigating the potential risk to the customer and leaving budgets intact. Alternatively, surplus savings can be redirected back into business-critical initiatives or additional updates that progress a plan to net zero.

Leveraging a performance contract valued at CA$86 million, including taxes, Canadian Forces Base (CFB) Kingston, Canada, will implement base-wide net zero infrastructure improvements to support the Department of National Defence's energy resiliency strategy. These updates include solar photovoltaic (PV) panels, distributed energy storage, controls optimization, LED lighting retrofits, upgraded water and HVAC systems, central steam plant and heating optimization, and a community awareness program.

The program is projected to reduce CFB Kingston's GHG emissions by 33 percent and deliver up to CA$1.2 million in utility rebates and incentives. By leveraging performance contracts and data-driven technology, CFB Kingston's leaders can deliver a sustainable environment that supports soldier welfare and comfort, long-term energy resiliency and a healthy community.

IT'S TIME TO CATCH UP

When it comes to sustainability, there is no time to waste. The urgency for net zero leadership is only expected to increase, especially as the world hurtles toward the Paris Agreement's 2050 deadline. Consumers, investors and employees are holding business leaders to higher standards in pursuit of a greener, healthier planet. The SEC (Securities and Exchange Commission) plans to mandate accountability in emissions reporting for the private sector, further pressuring the urgency to act. It is up to organizations across industries — education, health care, financial and more — to do their part to take tangible and measurable action for healthy, safe and efficient buildings that drive us toward a decarbonized economy.

It is time to choose a partner for five years from now. Whether FMs partner with a third party under a net zero buildings as a service agreement, a performance contract or a public-private partnership, they gain the innovative funding and expertise they need to stretch their dollars further. They are empowered to deploy resource efficiency and renewable energy solutions and services that make net zero infrastructure a reality. FMJ

Mark Reinbold *serves as vice president, Global Sustainability Services + Solutions at Johnson Controls. He is responsible for transforming buildings and infrastructure to enable mission-critical activities and achieving carbon reduction/net zero goals for Johnson Controls customers.*

RESOURCES

unep.org/news-and-stories/press-release/building-sector-emissions-hit-record-high-low-carbon-pandemic

Johnsoncontrols.com/forresterstudy

johnsoncontrols.com/insights/2021/case-study/powerhouse-brattorkaia

johnsoncontrols.com/insights/2020/featured-story/university-of-north-dakota-celebrates-opening-of-sustainable-natural-gas-plant

johnsoncontrols.com/media-center/news/press-releases/2021/07/20/energy-performance-contract-with-canadian-forces-base-kingston

Become a catalyst *of* sustainable FM.

IFMA™

Help your organization adapt and thrive in an uncertain future.

If the question is sustainable facility training, then the answer is IFMA's Sustainability Facility Professional® (SFP®).

Now more than ever, sustainable facilities are a must, not a social statement; the time to prepare to meet evolving facility demands is now.

Improve your knowledge of sustainable practices and strategy — IFMA's got you covered with training built by FMs, for FMs.

STEP 1 Learn what it means to embrace sustainability.

Start with **IFMA's Sustainability Course,** which forms your foundation of efficient resource management with a long-term focus.

Adopt a sustainability mindset while supporting core business and corporate responsibility.

Understand management basics of:

- **Energy management**
- **Water management**
- **Materials and consumable management**
- **Waste management**
- **Workplace and site management**

Online, self-paced course | Earn CEUs and a digital badge verifying your knowledge
Those who complete the Sustainability course receive a dollar-for-dollar credit on the SFP.

STEP 2

Demonstrate a proven comprehension of environmental stewardship and sustainability in FM.

Apply your new knowledge with **IFMA's Sustainability Facility Professional® (SFP®).** Learn globally embraced strategies that increase efficiency and streamline operations, whether your facilities are seven or 70 years old.

Online, self-paced courses focusing on 3 major areas of sustainable FM:

- **Strategy & Alignment**
- **Managing Sustainable Facilities**
- **Operating Sustainable Facilities**

ANSI-accredited | A globally recognized, lifelong credential | Earn CEUs and a digital badge

Sustainable O&M

DEVELOPING RESILIENT PLANS

BY DAN ARANT

THE WAY BUILDINGS OPERATE HAS A DIRECT IMPACT ON THE ENVIRONMENT, UNDERSCORING THE NEED FOR FACILITY MANAGERS TO PRIORITIZE ENVIRONMENTALLY FRIENDLY OPERATIONS. TO DO SO, FMS MUST REEVALUATE THEIR APPROACH TO OPERATIONS AND MANAGEMENT PLANNING.

FMS WHO ARE ALREADY RUNNING SUSTAINABLE BUILDINGS HAVE ONE THING IN COMMON: THEY HARNESS DATA-DRIVEN INSIGHTS. THEY UNDERSTAND THAT TODAY'S FACILITIES ARE A PATCHWORK WITH A VARIETY OF AGING ASSETS AND INFRASTRUCTURE THAT REQUIRES A COHESIVE DATA SET TO INFORM FUTURE-PROOFING PROJECTS.

True future-proofing projects are inherently sustainable, and the key is leveraging insights from often siloed data sets to create a holistic story. FMs must marry energy management, maintenance management and capital planning. These three categories inform each other and are a pillar to sustainable operations.

So where should they start?

Ensuring Data Is Centralized, Organized and Actionable

Before FMs can even begin to examine and evaluate how their maintenance and operations plans impact sustainability efforts, they will need to start by tracking data along three KPI pillars for energy and asset management: planned maintenance completion, energy use intensity (EUI) and criticality and risk.

1. **Planned maintenance completion:** High planned maintenance completion is one of the best energy-saving initiatives in an FM's toolbelt. When there is a high amount of routine maintenance conducted on assets, more assets are healthy; therefore, more assets will live longer. By default, this lowers energy consumption. Unplanned and premature asset failures can be a significant driver for high, unanticipated costs and energy waste. They are a burden on the bottom line and negatively impact the environment by consuming more energy and raw materials. FMs must establish an asset registry to understand the current state of their assets. This includes tracking the age, condition, life cycle and replacement costs of assets. Having access to this data will inform stronger preventive maintenance plans — an important weapon in the arsenal to combat high energy utilization.

2. **Energy use intensity:** Adopting an enterprise asset management (EAM) system with energy tracking capabilities is a great place to start when it comes to sustainability efforts. EAM systems give FMs the capability to gather a baseline understanding of their building's energy usage trends and identify high or inefficient areas of energy utilization. The key focus areas for energy data tracking include the consumption of electricity, natural gas and water. Additionally, an EAM system should monitor trends in a facility's weather exposure and occupancy rates. This data demonstrates where energy waste and asset degradation are happening within a facility and how severe the impact is, enabling FMs to better understand where their attention is needed the most. Additionally, FMs can more accurately benchmark their energy consumption goals.

3. **Criticality & risk:** FMs should track the criticality and risk of all their assets. Criticality of an asset is the measurement of how vital it is to the facility's operations, while the risk of an asset looks at the severity of impact if the asset fails. Some assets are much more critical than others, so FMs must plan around which assets need replacement and when. A roof would be a critical asset to a facility's operations. If it fails, there is a significant business risk for facilities. During capital planning, FMs must ensure the roof is replaced or maintained before it fails and creates significant risk for a facility's business. Criticality and risk measurement impacts sustainability

because energy usage and carbon emissions are deemed critical variables in capital planning. FMs must keep a close eye on how the criticality and risk of their energy-intensive assets will impact business performance. For example, with more carbon tax legislation, FM leaders will need to understand how much greenhouse gas emissions will be reduced by maintaining the boilers ahead of failure.

Taking Action

Focusing data tracking where assets are consuming the most time, energy and money encourages FMs to place data-driven insights at the helm in planning. This makes sustainably focused operations and management plans more successful. After a facility has put the proper technology and processes in place to monitor the above KPIs, it is essential to identify usage patterns and develop action plans. These insights should serve as a guide for developing strategies that combat the "bad actors" of energy consumption and setting achievable and impactful sustainably goals.

For example, a goal can be as simple as reducing energy usage year-over-year after noticing lights are being left on in unoccupied areas or reducing waste from unanticipated and premature asset failure after realizing which assets tend to fail the most.

A school district in Oregon, USA, experienced first-hand how impactful data is when it comes to energy savings by turning to technology to bring its energy cost avoidance from 28 to 50 percent. Tracking utility data as energy usage became important as it accounted for a third of the district's budget. After analyzing the district's energy usage from its building management system (BMS), HVAC and BMS schedules and comparing it to the local energy provider's data, opportunities for energy savings emerged. The district now experiences more than 50 percent cost avoidance in energy savings and over the span of 14 years has avoided US$18 million in costs.

Technology's Growing Role in More Sustainable Operations

The FM industry is heading into a technology renaissance period with stronger connectivity driven by the Internet of Things (IoT) boom — IoT devices are predicted to reach 50 billion by 2030 and investment in the devices is expected to reach US$15 trillion by 2025. IoT describes a streamlined, connected exchange of data between internet systems and/or devices. In FM, IoT technology can connect assets and information in one centralized location to help create predictable and sustainable O&M plants that support the environment and the bottom line.

In practice, an IoT-powered system can drive quicker and more intelligent notifications of when an asset needs attention directly to staff's mobile devices. For example, if an HVAC system is not cooling properly, EAM software connected to an IoT asset sensor can alert the maintenance staff working at the facility that the HVAC requires attention. This alarm-to-ticket capability helps a facility lower the energy waste stemming from a malfunctioning asset that goes undetected and ultimately fails prematurely.

EAM systems will help foster a stronger preventive maintenance culture within facilities. Another way they can improve preventive maintenance is by increasing ease of communication for maintenance staff. For example, maintenance personnel can share images of asset conditions, communicate with their teams and manage inventory in real-time from a mobile device wherever they are located. As a side benefit, this virtual communication can help buildings cut down on paper waste.

Martha's Vineyard Hospital (Massachusetts, USA) began leveraging technology for maintenance requests and experienced a notable improvement in completion times — maintenance requests went from taking months to complete to an average of three to five days. As a result, this improved their inventory management. With greater

efficiency and visibility into what maintenance efforts are needed, the hospital was able to save money with the bulk purchasing of asset equipment.

Along with implementing technology for sustainability efforts, there are ways FM leaders can go beyond technology to create a smart, sustainable facility. Each person is a part of the sustainability journey, and sustainable practices require buy-in from everyone. FM leaders should engage their staff members and ensure everyone is on board with overarching environmental goals. An EAM system can play a role here, too. With its tracking and translation capabilities, FMs can communicate the impact of energy consumption more easily with their staff to demonstrate the why behind the efforts. Some facility leaders have created sustainability teams within their organizations to help lead these efforts. Even a few extra people keeping their eyes out for lights that were left on or AC temperatures running high can yield energy savings and impact the bottom line for facilities.

Communicating Results and Building Upon Successes

Once a facility has evaluated its energy metrics, established goals, put plans in place and started seeing results, it is important to maintain sustainability improvements.

A significant component to maintaining these results is communicating progress and achievements with stakeholders. Des Moines Public Schools, the largest public school district in Iowa, USA, demonstrated the power of communication with data-tracking. The school district developed energy report cards, sharing updates with stakeholders on the district's energy consumption and savings throughout the year. This enabled them to regularly monitor and maintain energy levels across the school district's many buildings. Additionally, the district harnesses these insights to develop energy-saving tips for the classrooms. Monitoring sustainability improvements and continually evaluating data to inform decisions is what will drive a truly sustainably future.

Creating more sustainable buildings is imperative for reaching meaningful reduction goals, and FMs have the power to make an impactful difference in our carbon footprint. It starts with taking a more strategic approach to operational processes, harnessing data to drive decisions and help assets live longer, and fostering stronger stakeholder satisfaction. FMJ

Dan Arant *is the global sales manager, energy at Brightly and is a Certified Energy Manager through both the Association of Energy Engineers and the Institute of Energy Professionals. He graduated with a bachelor's degree of science from the University of North Alabama in 2010. Arant is passionate about empowering the public and private sectors to reduce utility waste in their facilities and operations.*

REFERENCES

architecture2030.org/why-the-building-sector/

brightlysoftware.com/sites/default/files/file/2022-04/CS-EDU-GreshamBarlow-v1.pdf

businesswire.com/news/home/20190516005700/en/Strategy-Analytics-Internet-Things-Numbers-22-Billion

towardsdatascience.com/internet-of-things-booming-15-trillion-market-88fde1da2113

brightlysoftware.com/sites/default/files/file/2022-04/CS-HC-MarthasVineyard-v1%20%281%29.pdf

brightlysoftware.com/success-stories/des-moines-public-schools-client-success-story

Follow *the* Blueprint

COMPLIANCE FOR SUSTAINABILITY SUCCESS

BY JAMES BERNARD & MAGDALENE SIM

Every facility manager understands regulatory compliance as a business necessity. Staying ahead of new and continually updated regulations is key to maintaining compliance and avoiding potentially costly fines. However, compliance is also a valuable tool that can guide facilities toward greater sustainability and less waste? Maintaining compliance can generate benefits far beyond a facility manager's initial focus.

Today, compliance is increasingly intertwined with environmental sustainability and the concept of being a good corporate citizen. Government regulations are often mandated to help reach local and national sustainability goals. In addition, some companies are implementing their own compliance mechanisms, with the goal of reaching internal sustainability targets and showcasing their leadership.

Legal Compliance

Legal compliance in San Francisco, California, USA, is driven by both goals and data. In 2003, the city was one of the first to set an ambitious goal of zero waste by 2020. While the city had managed to divert 75 percent of its waste from landfill by 2010, the rate of diversion slowed, and the diversion percentage has hovered around 80 percent for the last five years. However, an estimated 60 percent of the city's waste going to landfill was actually recyclable or compostable. New goals were set calling for a 15 percent reduction in overall waste generation and a 50 percent reduction in landfill disposal by 2030.

To meet the goals and achieve compliance with the city's mandatory recycling and composting ordinance, the city's single-franchise waste hauler set waste stream contamination thresholds of 5 percent with no glass for compost, 10 percent for recycling and 25 percent for trash. The city's businesses had to maintain clean waste streams (e.g., no glass or trash in the compost stream, no organics in the recycling stream).

In February 2018, the largest solely office building in San Francisco triggered the imposition of a 50 percent surcharge by the hauler, in coordination with the city's department of environment, for repeatedly being found with contaminated waste streams.

Working with the building's property management company, a sustainable waste consultant recommended a sorting program and trained the building's janitorial team to properly sort materials they found in all three (compost, recycling and trash) waste streams. Simultaneously, an intensive outreach and education effort was directed at the building's tenants stressing centralized triple-stream waste collection stations to improve waste separation upstream, before the waste was picked up by the janitorial crew.

At the beginning of the sorting and outreach programs, the building was diverting 51 percent of its total waste. After two months, the surcharge was released with audits meeting or exceeding the regulatory thresholds. By May 2019, just a little over a year after the building began work to get into compliance, the building's diversion rate had increased to 85 percent, dropping only slightly during the pandemic. Plus, the building's waste hauling costs decreased US$10,000-12,000 per month due to increased diversion and less waste.

While the efforts were aimed initially at compliance for the building, the most important outcome was the increase in compost diverted from the landfill. The amount of properly sorted compost increased from 21.95 tons per month to 40.61 tons per month over 15 months, while the amount of trash declined from 14.29 tons per month to only 1.75 tons per month.

For this building, regulatory compliance catalyzed lasting changes in tenant waste separation performance upstream and janitorial sorting downstream.

By sorting waste and maintaining compliance, the building also avoided the next round of regulations. San Francisco city leaders had found that 489 large refuse generators were responsible for 20 percent of the city's waste. New regulations that went into effect in July 2019 called for any site generating more than 40 cubic yards of waste per week (or operating a compactor) — including office buildings, hotels, restaurants, multi-unit housing and some city buildings — to be subject to audits every three years to ensure compliance with current recycling requirements.

In this case, the benefits of achieving compliance were greater than simply meeting legal requirements. Without the legal push for an audit, the building could have been complacent about its recycling and composting efforts, and it could have continued paying for the most expensive stream — trash — at an inflated quantity due to contaminated recycling and compost year after year.

By becoming compliant with local regulations, the building is not only saving money, but is now recycling more, diverting more compostable material and improving its sustainability performance. The most recent audit of this building's recycling stream showed a remarkable, almost unattainable 0 percent contamination percentage.

Corporate Compliance

What if a company has facilities spread out over a large geographical area running across numerous local districts with different regulations, or even across the world? Corporations with a wide global footprint face fragmented waste management requirements and diverse country, state and municipal compliance issues. Best practices are a partial solution to coping with different levels of external regulations. Setting internal goals and sustainable practices provides consistency across different production and manufacturing processes.

One multinational corporation decided to expand their sustainability efforts under an internal goal that would go well beyond meeting legal requirements for waste management in the areas in which they operate. This company's corporate mandate was to close the loop on its operations by achieving at least 95 percent diversion from landfill and incineration — beyond the commonly understood definition of zero waste of at least 90 percent.

At one of the company's European sites, a large amount of used paper towels ended up in the landfill, consistent with local health regulations. To close the loop on that stream of waste, the company found a unique solution through the supplier, who recycles the used paper towels using a technology not yet widely available. In this case, compliance with the corporation's own internal mandate is helping the company seek out creative ways to reduce waste, even when not legally required to do so. The corporation is cataloging the best practice so it can push the supplier to provide the same service to the company's operations around the world.

At another facility, located in a different country, a large amount of plastic — representing 40 percent of that operation's overall waste stream — was being legally incinerated as waste-to-energy (WTE) and not being recycled. This was partly because the plastics used at this facility emerged from the manufacturing process combined or as composite materials, making them difficult to recycle. Because both WTE and landfilling are not acceptable under the company's close-loop corporate mandate, the facility explored altering the manufturing process to keep rejected or imperfect components to a minimum, and to keep plastic wastes separated so that they can be easily recycled instead of legally incinerated.

Compliance with this internal corporate policy framework is helping the multinational ensure it maximizes its sustainability targets in every location, no matter what the local rules are, and that all its facilities will be able to maintain a baseline that is measurable across its global operations.

But most importantly, this corporate mandate has showcased the company's leadership in sustainability, which is a key factor in environmental, social and governance (ESG) ratings for investors assessing the world's biggest businesses.

Compliance with National/Global Goals

Organics consistently comprise the largest portion of a facility's trash stream, accounting for an average of 36 percent of what is wasted. This was the finding of the largest and most comprehensive waste characterization study to date focused on commercial office buildings. The study looked at data from waste audits conducted by Great Forest at more than 100 office buildings around the world, analyzing more than 170,000 pounds of waste.

With so much food waste generated by the commercial sector, it is no wonder food waste is recognized worldwide as a major problem. TARGET 12.3 of the UN's Sustainable Development Goals calls for halving "per capita global food waste at the retail and consumer levels..." by 2030.

Regulations to address food waste are proliferating. Even if local regulations do not address food waste, making efforts to reduce food waste is still a smart move, considering the likelihood of food waste regulations coming.

In the U.S., businesses are encouraged to show their leadership on the issue by joining a group of corporations, recognized as Food Loss and Waste 2030 Champions, that have made a public commitment to reduce and report food loss and waste in their operations.

Complying with targets like these, while not mandatory, are reputational pluses. That may have been the impetus behind the decision of one fast casual restaurant chain to go the extra mile to find out how much of their food waste could be rescued.

The chain already had policies and procedures to minimize food waste, but they did not distinguish between surplus food that could be donated and spoiled or otherwise inedible food.

So, the chain selected three key store locations to conduct food waste audits to find out how much of their food waste could be diverted from an organics collection program to a food donation program. The waste audits found the company could rescue an average of 26.7 percent of its daily food waste, which was donatable as defined by a food rescue organization.

The audit provided the data the company needed to move forward with a regional donation program. The company's efforts could return thousands of pounds of food to tables every day, and fill a very pressing need in struggling communities.

While not driven by legal compliance, this desire to comply with the national and global push to reduce food waste will make the company more sustainable, and in the process, earn invaluable goodwill in the communities they serve. This will not only sustain the company, but also help it grow and flourish. FMJ

James Bernard *is Great Forest's West Coast representative undertaking waste stream diversion assessments, LEED-level audits, providing recycling education, donation and reuse assistance, and problem-solving services to major hotel and office clients in Northern California as well as waste management consolidation and compaction assessments and equipment implementation for technology campuses.*

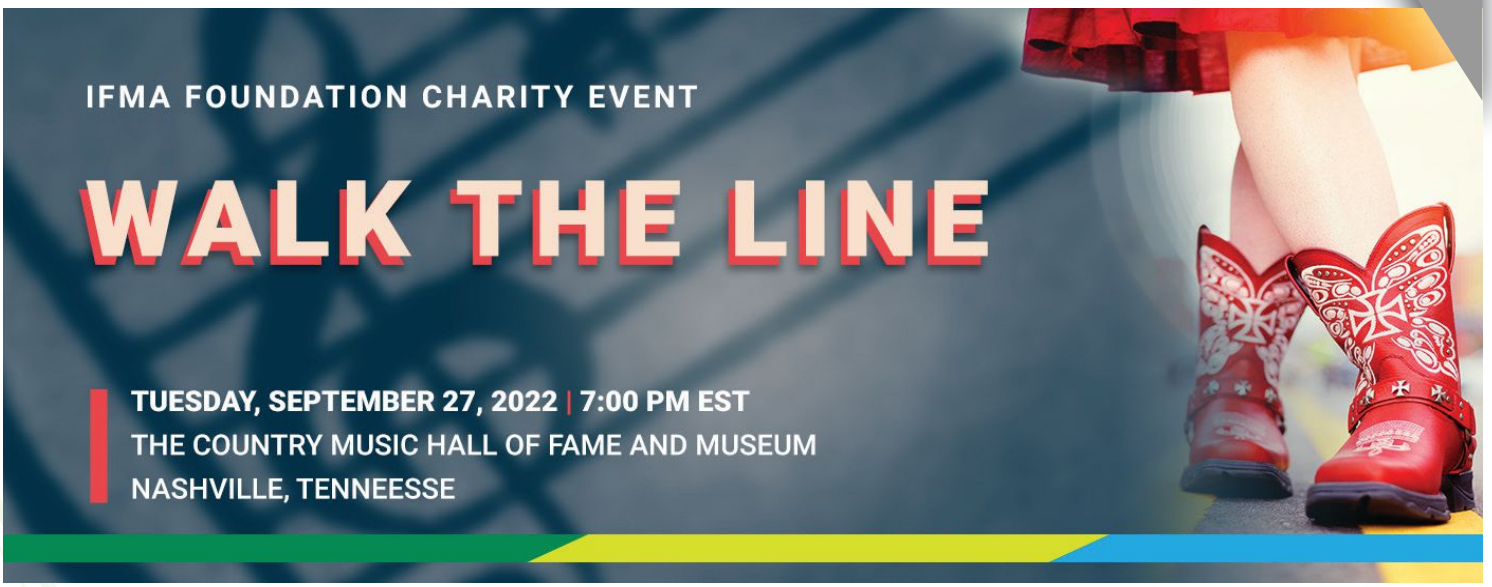
Magdalene Sim *directs communications for Great Forest. She writes and produces Great Forest's Sustainability101 blog and the "3 to Zero (Waste)" Newsletter that goes out each month to thousands of subscribers with actionable tips to help businesses reduce waste sustainably. Sim also assists in the company's outreach and education efforts, including the production of research, reports, and best practices guides that inform the industry and establish thought leadership on waste issues.*

REFERENCES

greatforest.com/sustainability101/largest-global-waste-characterization-study-on-building-waste/

IFMA FOUNDATION
MAKING FM A CAREER OF CHOICE

Brings to you



Become a Sponsor and make a difference in someone's life

IFMA Foundation appreciates the support of the IFMA chapters, councils & communities for their sponsorship toward scholarships.

If interested in impacting the life of a future FM leader, **Contact Program Support Specialist Christina Gonzales at christina.gonzales@ifma.org to learn how to become a sponsor.**

Stomp on in to IFMA Foundation's soiree at the Country Music Hall of Fame and Museum. We're fixin' to have a gala like none other.... an extravaganza under the stars! Ain't no better thang to be found.... We'll be heatin' things up in true southern style.

Tickets for this event are purchased through IFMA World Workplace Registration portal.

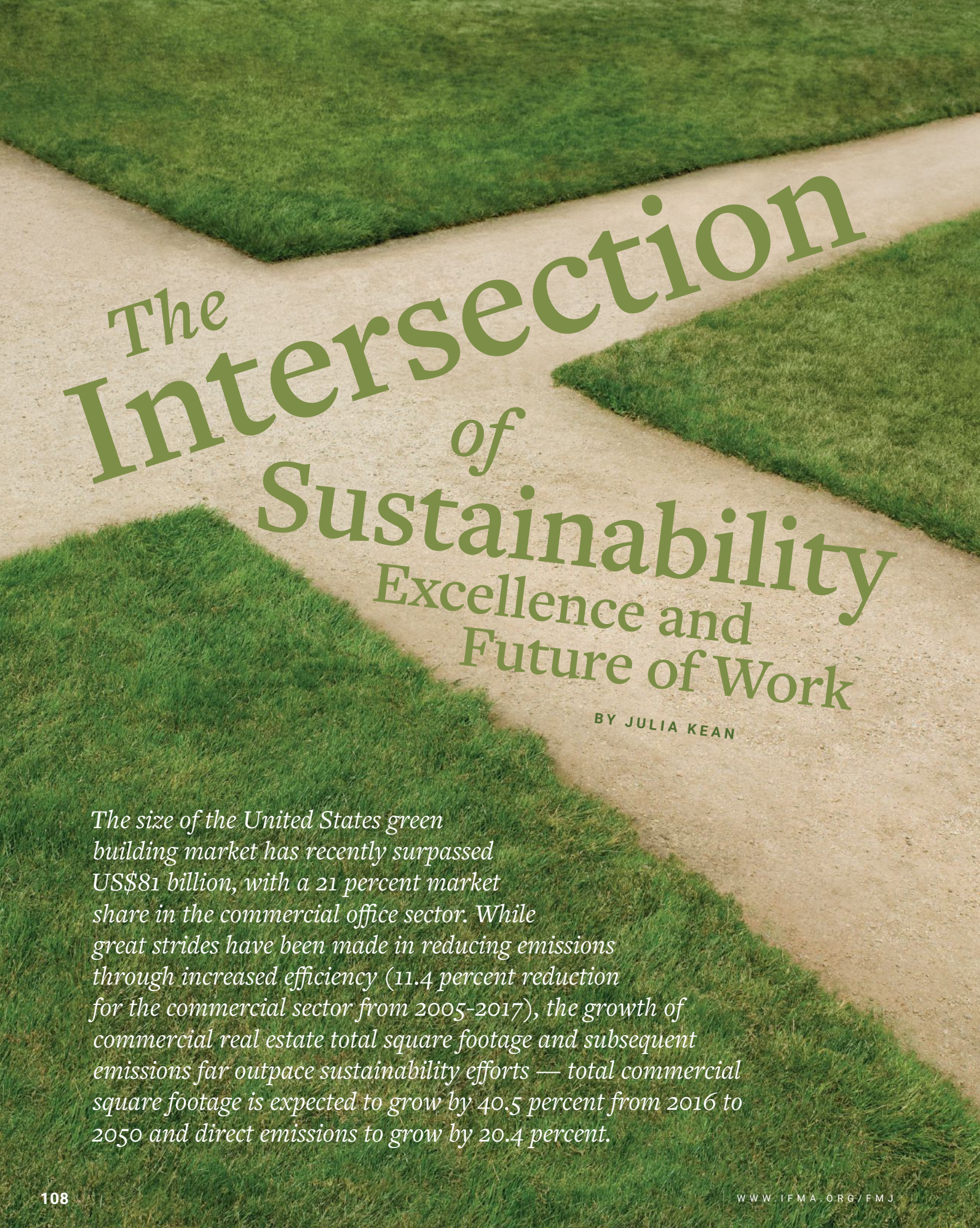
Register for the event at https://bit.ly/3q9T3zf

2022 IFMA Foundation Academic Scholarship

The IFMA Foundation scholarship program has awarded more than US$1.7 million dollars to more than 600 students since the program started in the early 1990s. Scholarship recipients receive a cash award and fully subsidized World Workplace conference travel, registration and participation.

There is still an opportunity for your company or organization to become a 2022 Scholarship Sponsor.

Become a Sponsor https://bit.ly/3zy8c2Z



The Intersection of Sustainability Excellence and Future of Work

BY JULIA KEAN

The size of the United States green building market has recently surpassed US$81 billion, with a 21 percent market share in the commercial office sector. While great strides have been made in reducing emissions through increased efficiency (11.4 percent reduction for the commercial sector from 2005-2017), the growth of commercial real estate total square footage and subsequent emissions far outpace sustainability efforts — total commercial square footage is expected to grow by 40.5 percent from 2016 to 2050 and direct emissions to grow by 20.4 percent.

This market growth, steadily strengthened by a shift in investor priorities towards green building, coincides with a unique inflection point circling the commercial office sector on the tenant side — what is the purpose of the physical workplace? And how can it be leveraged as a strategic collaboration and productivity asset to drive innovation and value for an organization?

During this age of worker choice when, for more workers than ever before, the office competes with employees' homes and other destinations, taking a holistic approach to corporate sustainability and the workplace is required. This involves redefining what a truly smart workplace is, understanding and supporting the value of collocated, hybrid and remote work, and considering how this relates to square footage demand and function in the first place.

More aggressive localized regulations, prioritization of corporate environmental, social and governance (ESG) goals, and general heightened awareness around the urgency of action demand more widespread, mainstream access to and adoption of the practices and solutions brought to bear in the booming green building marketplace. Paired with an overall reconsideration of worker and workplace needs at the organizational level across sectors, there is a unique opportunity for building sustainability to take a stronger foothold by aligning the green market expansion with a right-sized assessment of commercial tenant demand for space. Understanding and addressing challenges for green building initiatives, defining and leveraging the benefits of doing so in a holistic manner, and taking a practical, strategy-based approach build a strong business case for commercial tenant investment.

Broadening Benefits and Drivers

Smart and sustainable building and operating practices benefit the environment. Buildings overall account for approximately 40 percent of worldwide emissions, and the commercial sector is responsible for a significant portion of this percentage. Developers, architects and building owners continue to address this head-on, responding to accelerating pressure from both the investor side and the tenant side to offer green buildings, which usually come at a higher price point.

While taking occupancy in a green building comes with a higher upfront cost for tenants, more corporate real estate executives are beginning to adopt financial models recognizing that the long-term financial benefits associated with lower energy costs and tax incentives outweigh the higher capital expense. Meanwhile, employees are asserting their ability to shift to employers whose organizational priorities align to their personal priorities, and 65 percent of them are more likely to work for a company with well-established environmental policies. This points to a broader talent-driven consideration about sustainability, workplace experience and future-of-work priorities.

Despite this wide-ranging and growing appetite for more aggressive sustainability adoption and operational transformation, challenges remain for corporate real estate, facilities and employee experience leaders in defining a clear path.

Challenges

The decision to commit to sustainable practices in corporate real estate projects is not an easy one or one met without push-back or hesitation. Many corporations feel pressure and motivation to incorporate more sustainable decisions, but struggle to define a clear path forward and leverage a comprehensive ESG strategy to truly push the needle on reducing negative impacts from corporate real estate. The path forward is complicated by perceived risks to sustainable decisions; many assume sustainable practices add additional cost and design time to projects. Additionally, many projects focus on keeping capital expenditures low and downplaying long-term cost savings, making sustainable decisions that are more expensive upfront but save money down the road less attractive. Finally, many organizations do not take advantage of recent advancements in sustainable construction and repositioning practices. Instead, they rely on the status quo when making core building infrastructure and smart building technology decisions, whether for new construction or continued refurbishment of existing buildings.

Other challenges lie in sustainability standards. As building technology advances and more comprehensive and detailed data becomes available, ESG-minded investors and organizations are raising the bar for acceptable building energy use, emissions and water use. This has the potential to push standards beyond existing frameworks and may require organizations to look further than LEED alone to be considered truly sustainable and meet the expectations of investors, tenants and employees. This leaves organizations in a murky place when it comes to which sustainability metrics to use as benchmarks and which certifications to pursue.

Despite obstacles associated with an evolving and localized regulatory and standards landscape, the need for building sustainability is more pressing than ever. It also presents an opportunity to maintain industry relevance and drive innovation with the benefits conferred by taking action as opposed to doing nothing.

Impact and Feasibility

Before defining an ESG-focused corporate real estate strategy, companies must understand what their people and organizations truly need and want. Designing and pursuing a good strategy sits at the crossroads of feasibility and impact. Just as airlines cannot abandon their core business of flying planes because of emissions-heavy jet fuel without having a viable alternative, facility managers cannot shut down their facilities and walk away. Corporate real estate decision makers must consider what is feasible for

their situation in addition to understanding which changes lead to the greatest impact.

To begin, consider the current state of an organization's real estate portfolio — how many offices are there? What is the return-to-work plan? Is the organization breaking ground for a new headquarters or considering refurbishment of current space? These considerations are essential for defining the baseline vision and goals for the strategy. Keeping these and the triple bottom line of profitability, environmental impact and social good at the forefront helps allay fears and define goals all stakeholders can support.

Understanding Space Needs

Understanding space needs is the first order of business for organizations pursuing sustainable corporate real estate strategies. There are a variety of smart building technology solutions that inform and supplement corporate real estate decision making. Space utilization technologies, such as occupancy sensors, allow real estate and facilities personnel and space managers to optimize overall portfolio square footage needs and understand the granular utilization of their spaces to inform smart allocation and programming decisions respectively. Emerging digital twin technologies allow for a 1:1 virtual replica of a physical building and all associated technology, equipment, people, environmental components and sensors. This confers comprehensive, accurate and granular data.

Data sources combined with advanced, integrated analytics allow for actionable analysis of utilization, energy/emissions metrics, and wellness indicators. Relevant data points pulled into analytics include badging data, occupancy sensor utilization data, IoT sensors environmental/wellness indicators, wireless data, end-user systems data and more. Additionally, many emerging analytics platforms provide intelligent, AI-driven recommendations for increased space optimization.

These data points and analytics platforms detailing and analyzing how employees use space can be leveraged to emphasize what employees want out of their workplace and what creates value for the organization in floorplans, while cutting back on or repurposing underutilized space.

Automation and Efficiency

Beyond guiding corporate real estate decision making, smart building technology can provide real-time automation of lighting, heating and cooling to increase energy efficiency and reduce emissions. Smart lighting solutions detect occupancy and automatically turn lights on or off depending on whether a space is occupied. Smart shade solutions similarly provide shade or sunlight depending on the time of day for any building, maximizing natural light and warmth while minimizing overheating and over lighting. Automated HVAC systems working in tandem with sensors can automate the cooling and heating of spaces based on occupancy and individual tenant needs.

In an operational context, automated IoT solutions have historically required management at the individual solution level. Advancements in intelligent orchestration via digital twin solutions are enabling the AI-enabled management of IoT technology and other connected systems. This allows logic-based automated action to be taken from data and takes some of the day-to-day solution management burden off support teams.

Of course, decisions for core infrastructure, including HVAC systems, windows, insulation and the like must also be considered as part of an overall sustainability strategy. Organizations should work with trusted construction and architecture partners to find cost-effective, low impact building design and refurbishment solutions in this area that are tailored to their specific geography.

Taking a Practical Approach

A sustainable strategy for corporate real estate starts with an internal view of space needs and consideration of the purpose of the workplace. The easiest way to reduce the impact of real estate is to have less of it. Where remote work is feasible, organizations can consider investing more money into less space to provide a high-quality collaboration and culture-building asset that provides benefits not found within the home office and maintains high efficiency in its utilization. If remote work is less feasible, it is still important to consider ways to increase efficiency and improve utilization metrics. Corporate real estate was not utilized to its full potential even before the pandemic, and trends in space optimization have accelerated in recent years. Defining an organization-specific vision for what the purpose of the physical workplace is, how it drives value for the business and how it meets the needs of employees needs to be the starting point in determining green building investment and space optimization efforts in tandem. FMJ

Julia Kean *is principal and head of workplace innovation at Xyster Consulting, a management consulting firm that advises and delivers on workplace strategy and technology enablement initiatives. Over the last eight years, Kean has held various positions at the firm driving organizational changes for companies of all sizes. Her latest work focuses on taking a human-centric approach to reimagining the concept of the workplace while leveraging data and technology to provide more equitable experiences and meaningful connections across physical and digital environments.*

RESOURCES

c2es.org/document/decarbonizing-u-s-buildings/

nytimes.com/2021/10/26/business/climate-change-sustainable-real-estate.html

architecture2030.org/why-the-building-sector

unily.com/insights/guides/future-of-the-sustainable-workplace-in-the-age-of-covid-19-and-climate-change

buildingenclosureonline.com/blogs/14-the-be-blog/post/89854-which-us-cities-are-setting-the-most-ambitious-green-building-policies

Sustainable Infection Prevention Practices in Facility Management

BY BRIAN SPADA

With nearly six million U.S. commercial and industrial buildings under the stewardship of facility managers, sustainable practices are crucial to environmental preservation, as well as preserving the health of properties, profits and people. Over the years, the definition of sustainable has evolved and expanded so that it applies to almost every part of FM. Perceptions of sustainability were often limited to corporate citizenship, conservation and pollution reduction. However, in reality, there are health and safety aspects to environmental sustainability that impact employees, building occupants and facility stability as well. Moreover, since the advent of COVID-19, a dynamic shift in focus has placed significant emphasis on infection prevention, hence a greater need for facilities to implement more sustainable practices.

FMs are well-suited for making the decisions and changes necessary to achieve optimal sustainability. They often have broad capabilities that encompass leadership skills and engineering expertise. An FM's duties are widely diverse, ranging from controlling rising costs and raising workforce productivity, to building maintenance and maintaining the safety of occupants. Facility health is one of the most critical responsibilities and can have far-reaching consequences if not managed as efficiently and effectively as possible.

Most FM professionals face similar challenges in terms of time and budget constraints and the nearly constant turnover of housekeeping staff. Lately, these issues have been amplified by unprecedented labor and supply chain shortages. Yet, FMs are held accountable for improvements in building health and a lower carbon footprint, on top of increasing profitability and productivity. A trend points to optimized cleaning programs and more sustainable infection prevention practices as solutions to many operational challenges, while simultaneously enhancing the health of people and the planet.

Sustaining Continuous Improvement

The first step toward achieving healthier facilities and sustainable infection prevention practices is to gain insight into existing processes and performance. Facility-wide surveillance is essential to identifying all the risks, gaps and inefficiencies that need to be addressed. The key to continuous improvement is conducting continual site audits and developing adaptive strategies with specific action steps. Assessments arm FMs with the data they need to make more informed decisions for reducing viral transmission and help guide the direction of sustainability plans.

Since the pandemic, routine housekeeping is no longer the status quo. Cleaning protocols have grown more detailed and increasingly complex. Consequently, training has become a critical component in the sustainability equation. Continuous improvement in infection prevention processes hinges upon continuing education. Program success necessitates comprehensive training programs be tailored to the facility's specific environment and kept current based on the latest risk assessment data and industry guidelines.

The most effective training programs are designed to address the three primary areas in infection prevention: efficiency, efficacy and safety. Learnings should extend beyond basic housekeeping to include procedures for enhanced disinfection, cross-contamination mitigation and more effective cleaning methods, as well as incorporate application considerations, safety protocols and environmental concerns. In addition to reinforcing cleaning competencies, perennial education also helps achieve higher levels of compliance. Adherence to compliance standards is imperative for sustaining health and safety and vital to the future success of sustainable infection prevention practices.

Training is not just essential for existing staff but also when onboarding new team members and should be refreshed on a regular basis. However, for sustainability programs to thrive over the long term, every stakeholder in the ecosystem needs to be educated. Sustainable change initiatives rely on engagement from multidisciplinary team members on a facility-wide scale: The more diverse the team, the greater the likelihood of long-term sustainment.

Sustaining Facility Safety

Establishing a true infection prevention program to protect people from potential hazards is an FM's priority, which includes guarding against risks of exposure. Occupational safety organizations such as OSHA and NIOSH have published numerous studies showing that the use of toxic cleaning chemicals often has negative health effects. They stress the importance of referencing safety data sheets to ensure sanitizers and disinfectants are safe for frontline workers and building occupants.

Unfortunately, most traditional cleaning products contain hazardous ingredients or volatile organic compounds (VOCs), which negate sustainability efforts and put health at risk. According to the Environmental Protection Agency (EPA), VOC concentrates can be up to 10 times higher indoors than outdoors. Some cleaning and disinfecting products are known to cause respiratory issues and cancers. Excessive use of these products can create severe liabilities for facilities.

Sustaining facility safety is contingent upon using environmentally preferable cleaning and disinfection products, which naturally aligns with the implementation of safer, more sustainable infection prevention practices. Low toxicity and biodegradability are two of the most important chemical properties. However, profiles should also have optimal safety ratings that include triple zero HMIS, neutral pH and the lowest EPA category for inhalation toxicity.

Efficacy is the other side of safety. The term broad-spectrum not only refers to a chemistry's versatility but its efficacy against a wide range of bacteria, viruses and fungi. Disinfectants should be EPA

registered against the most prevalent pathogens, such as SARS-CoV-2 (List N), Norovirus (List G) and C. auris (List P), in addition to multidrug-resistant organisms (MDROs) like C. diff (List K), MRSA and VRE (List H.) Products should be able to inactivate these pathogens in four minutes or less. For disinfectants to achieve maximum efficacy, they must also have the highest level 2c Emerging Pathogen Claim (EPC) against the hardest-to-kill, small, non-enveloped viruses. Because biofilm harbors many communicable diseases, an EPA-registered biofilm kill claim is preferred. Nonetheless, though superior biocidal performance is critical, it is equally critical that cleaning chemicals are not harmful to health or the environment.

Occasionally, sustainability and safety goals may appear to contradict each other. For instance, facilities often reuse cleaning cloths to reduce waste. In doing so, they might inadvertently exacerbate the spread of infections by creating cross-contamination. There is a misconception that disposable wipes are not a sustainable option when the opposite is true. Dry-wipe systems can provide more accurate dilution to prevent disinfectant overuse. When combined with biodegradable chemistries and recyclable containers, disposable wipes are a highly sustainable solution that can also mitigate cross-contamination. FMs need to strike a balance between safety and sustainability. It may require wading through mountains of information to arrive at strategies that will raise sustainability without sacrificing safety.

Standardizing for Sustainability

Typically, most facilities use as many as 10 different chemicals to accomplish each task throughout the process, including disinfecting high-touch surfaces, cleaning floors, windows, restrooms, sanitizing food preparation areas and so on. Every product comes with its own usage guides, dwell times and personal protective equipment. This approach can not only increase the potential for errors but can negatively impact productivity and increase operating costs. The sheer volume of product packaging is a primary culprit for environmental waste.

As mentioned, there is an emerging trend toward optimized cleaning programs and more sustainable infection prevention practices. Optimization is centered around standardization to consolidate the number of chemicals facilities use. Standardization is achieved by exchanging single-use cleaning and disinfecting products with broad-spectrum chemistries that serve many different purposes. This approach has many advantages, not the least of which is higher levels of safety. It makes sense that fewer protocols will lead to fewer failure points, and fewer cleaning chemicals will mean less risk for exposure. In addition, if harsh chemistries are replaced by more natural alternatives that are equally or more effective, facilities will be able to sustain longer-term health benefits.

Standardization yields significant financial benefits. Consolidation correlates to savings by reducing chemical consumption, product costs and expiration losses. It can also solve many supply chain challenges. Where efficiency is concerned, standardization helps streamline processes, minimize resource waste and improve workflows.

Aside from chemicals, there are also cleaning technologies that support more sustainable infection prevention practices. For example, electrostatic sprayers have disrupted the cleaning industry in the last few years by enabling faster, more effective surface disinfection while using 65 percent less chemicals to cover more area than conventional methods in a fraction of the time. Because electrostatic sprayers are a touchless technology, they also help prevent cross-contamination.

Sustainable FM

Although FMs oversee facility performance, sustaining health and safety is a responsibility everyone shares. The success of infection prevention practices depends on collaboration between team members. In turn, programs founded upon sustainable practices can create more successful facilities. Sustainability and resiliency go hand-in-hand. Proactive and sustainable infection prevention can result in benefits that are transferable to all facets of a facility, making it stronger and more resilient for the future. FMJ

Brian Spada *is area vice president mid-Atlantic for EvaClean Infection Prevention Solutions. His background is in health, biotech and infection prevention, with extensive expertise in biology and science. Spada has developed training programs at major health systems throughout the U.S., focusing on process improvement and reductions in health-care-associated Infections.*

Advertiser Index

Companies in **bold** are IFMA Corporate Sustaining Partners

LET'S CONNECT!

BUSINESS SERVICES
4SITE by CORT, A Berkshire Hathaway Company | 4sitebycort.com 45

CEILINGS
Armstrong Ceiling & Wall Solutions | armstrongceilings.com/commercial 3

CONSTRUCTION/DESIGN
Construction Specialties | c-sgroup.com 37

ENERGY MANAGEMENT
CBRE | cbre.com | @cbre | linkedin.com/company/cbre/ 51

FACILITY MANAGEMENT SERVICE PROVIDERS
ABM | abm.com | @ABM_Industries | linkedin.com/company/abm-industries 24-25

FOOD/BEVERAGE
Fooda | fooda.com | @GoFooda | linkedin.com/company/fooda 13

HVAC/IAQ
Heraeus Noblelight America LLC | soluva.com | linkedin.com/company/heraeus-noblelight 29

JANITORIAL PRODUCTS/SERVICES
GDI Integrated Facility Services | gdi.com | @gdifacilityservices | linkedin.com/company/gdi-integrated-facility-services 59

OFFICE PRODUCTS/ACCESSORIES/SUPPLIES
Vaask | vaask.com | @hello_vaask | linkedin.com/company/vaask/ 75

PEST CONTROL
Xcluder | BuyXcluder.com | @XcluderRodent | linkedin.com/showcase/xcluder-rodent-and-pest-defense 115

RELOCATION MANAGEMENT/EQUIPMENT
Sustainable Office Solutions Ltd | sos-action.com | linkedin.com/company/sos-action/ 87

ROOFING
The Garland Company | garlandco.com | @GarlandWorks | linkedin.com/company/the-garland-company-inc-/ 79

VEHICLES/TRANSPORTATION
Blink Charging | blinkcharging.com/ | @BlinkCharging | linkedin.com/company/BlinkCharging 33

STOP

THE PROBLEM BEFORE IT STARTS

RODENT-PROOF DOOR SWEEPS

- ✓ *ENHANCED WEATHER SEALING*
- ✓ *EASY TO INSTALL*
- ✓ *GUARANTEED TO STOP MICE & RATS*

See website for more details

See our full line of proven pest exclusion products at BuyXcluder.com

XCLUDER® RODENT AND PEST DEFENSE

The global leader in pest exclusion

Connect with other facility management professionals at the largest FM events.

Tap into today's industry trends and standards for tomorrow's built environment.

At IFMA's events and conferences, FM professionals gain knowledge, share best practices and discover cutting-edge technologies.

Make connections and grow your professional network at some of the most exciting facility management events in the world.

World Workplace Asia-Pacific
26-27 July 2022 | Hybrid Event
Marina Bay Sands | Singapore

IFMA Global China'22
Suzhou, China

IFMA WORLD WORKPLACE
SEPTEMBER 28-30, 2022
MUSIC CITY CENTER | NASHVILLE, TENNESSEE, USA

IFMA Global India'23

WORLD WORKPLACE EUROPE '23

IFMA Global LATAM

IFMA's Facility Fusion 2023 Conference & Expo
April 11-13 San Francisco, CA, USA

Explore IFMA Events

Scan me

Extended

Exclusive online section featuring expanded FM coverage.

118 **Ask the Experts**

120 **Grid-Interactive Buildings**
A day in the life
Elena Bondareva

124 **Green Business Certifications**
FM's challenges
Dr. Dyugu Erten

128 **With (re)Purpose**
Giving potential waste a new life
Damon Carson

130 **Consider This**
Microgrids
Mark Wialbut

134 **Apples to Apples**
Developing a sustainable energy strategy
Azi Feifel

137 **Decarbonization Pathways**
Meeting sustainability goals
Tony Liou

140 **Window Inserts**
Achieving energy efficiency in historic buildings
Sam Pardue

143 **Sustainable Facilities are Essential for the Future**
Nayab Khokhar

SUSTAINABILITY

Ask the Experts

In each issue of FMJ, IFMA's Facility Management Consultants Council shares some commonly asked FM-related questions accompanied by advice from top FM consultants. The questions and answers presented in this section align with IFMA's core competencies following the themes outlined for the given edition of the magazine. While the following answers are intended to be helpful, these responses should not be deemed complete and are limited in context by the space allocated. Please contact the individual consultants directly for further explanation of the opinions expressed.

UBC Brock Commons- 18 Story Tallwood House, Vancouver, BC, Canada; Structurelam Mass Timber Corporation

CONTRIBUTED BY

IFMA FM Consultants Council
International Facility Management Association

The Facility Management Consultants Council (FMCC) represents more than 300 FM consultants from various countries around the globe. Its mission states, "The FMCC is the resource and voice for facility management consultants worldwide to leverage our collective expertise to benefit IFMA members, and the facility management profession."

We are considering constructing a new facility with a focus on sustainability. How does mass timber contribute to meeting sustainability goals?

What's Old is New. From the beginning of time, buildings were constructed of wood. Populations grew; buildings became larger and more complex containing more people, functions, systems and equipment. Concrete and steel became the structural materials of engineering choice.

We are becoming more environmentally calculating. Buildings consume about 35 percent of produced energy and generate about 38 percent of CO_2 emissions. For decades, building owners and designers have been energy consumption conscious, designing buildings to be operationally efficient using high performance insulation, glazing and rain-screens; later including energy production systems like solar panels, ground or air-based heating/cooling pumps.

Most recently, the Intergovernmental Panel on Climate Change (IPCC) determined embodied carbon to be the largest contributor of greenhouse gases. The carbon footprint of buildings suggests we should be building with lower-carbon materials using less carbon intensive construction methods.

Mass timber is becoming the building material of choice for low carbon construction. It is an engineered structural material product manufactured from softwoods (spruce, pine and fir) grown in forests. It takes the form of cross-laminated timbers (CLT), nail-laminated timbers (NLT), dowel-laminated timber (DLT) including glue-laminated beams and posts. Mass timber is used for many structural components in wall, floor and roof systems.

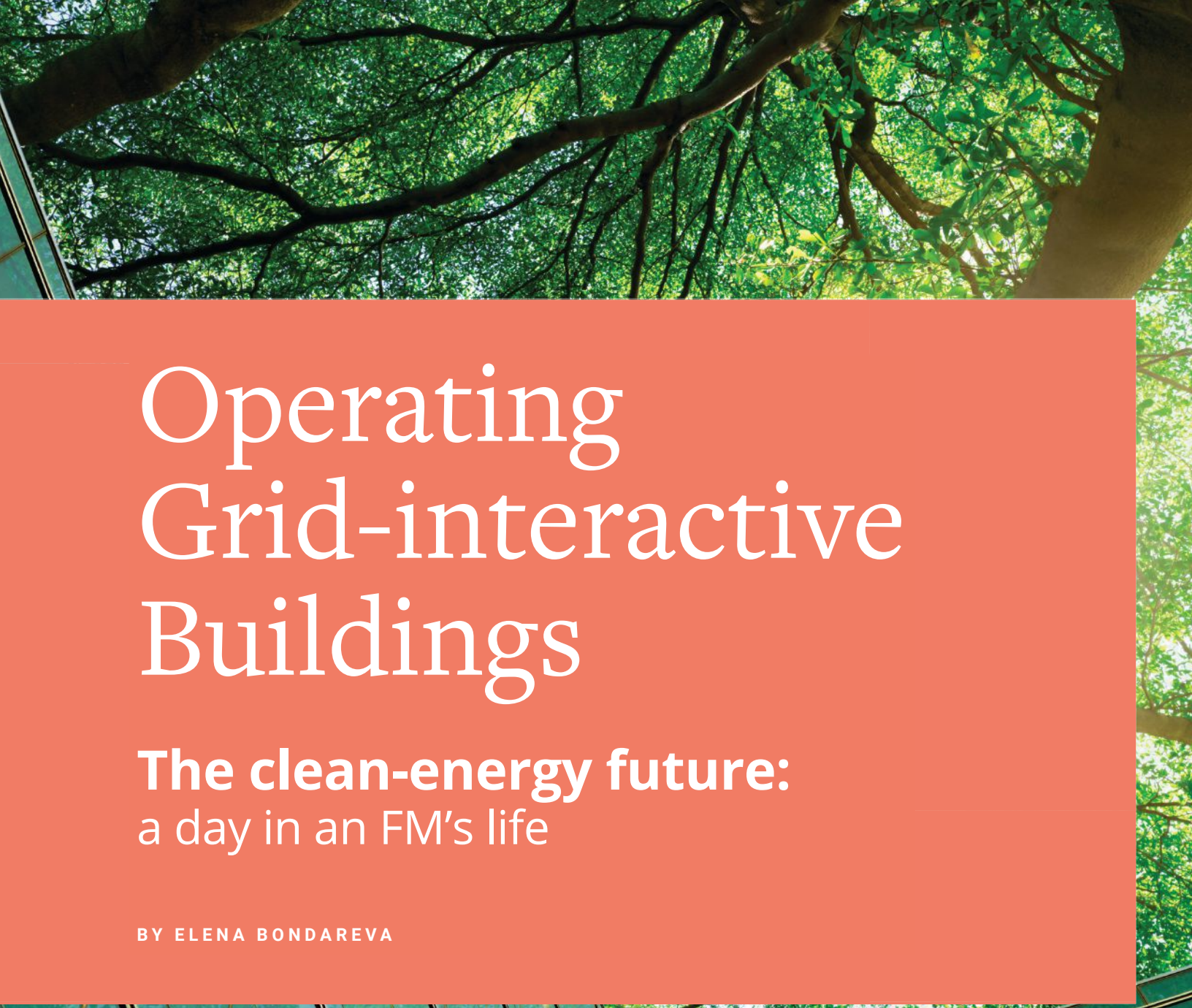
Technology advancements coupled with manufacturing systems like computer numeric control (CNC) equipment and building information modeling (BIM) have enabled mass timber products. A building system construction material with carbon storing, aesthetic and biophilic benefits, mass timber is particularly beneficial in building types like hotels, hospitality facilities, student housing, multifamily development and commercial office buildings.

Mass timber products are prefabricated, trucked to the building site as modular components then assembled. This boosts construction efficiencies, reduces cost and cuts waste. Designed holistically and delivered using a Lean Project methodology, the benefits of mass timber buildings multiply beyond embodied carbon. Costs are determined as systems rather than individual units. This involves a more inclusive design team solving details with constructors, resulting in savings in time and materials and avoidance of change orders or re-work. Compressing the construction schedule results in:

- Up to 25 percent schedule savings from less carrying costs and overhead; and the ability to lease/occupy sooner;
- Faster assembly (prefabricated and precise means less waste);
- Less disruption during construction;
- Mechanical, Electrical, Plumbing (MEP) fully coordinated in the design phase with timber components means less time and material waste;
- Earlier start for sub-trades;
- Long-life buildings easily repurposed over time for changing functions.

Mass timber buildings are being constructed taller. In January 2019, the International Code Council (ICC) approved proposals to allow tall wood buildings as part of the 2021 International Building Code (IBC). The 2021 IBC includes three new construction types — Type IV-A, IV-B and IV-C — allowing the use of mass timber materials. Proposals led to comprehensive code changes developed using a rational performance-based approach which have been validated through fire testing. FMJ

Kathleen Lausman, *MBA, BES is a principal at Shift2Lean and building industry professional with a background in architecture and business and experience as a public owner and leader of project and facility management teams. She is a former deputy minister for the Nunavut Territorial Government in Canada and former co-chair and forming member of the Lean Construction Institute – Canada.*



Operating Grid-interactive Buildings

The clean-energy future: a day in an FM's life

BY ELENA BONDAREVA

Previous articles in the Grid Interactive Buildings series:

- **FM's Next Challenge**
- **What do RECs Mean to Real Estate**
- **Peer-to-Peer Trading**
- **Electric Vehicles**

EDITOR'S NOTE: *This is the final article in our series on preparing facility managers for the energy revolution affecting the profession.*

"The future is already here, it is just not evenly distributed." - William Gibson

This article describes a day in a life of a facility manager (Alex) responsible for a grid-interactive campus. Both the policy and the technology for everything described already exists somewhere in the world. What would it be like if — or when — it all converges in one place?

6:20 A.M.

As Alex finishes their breakfast at home, they open their company's "prosumer rewards" app that rewards employees for contributing to the company's climate goals.

Alex's default home setting is selling — via peer-to-peer energy trading — any excess within their own community if the price is, well, pretty high. Otherwise, they donate it equally to the local veterans' rehabilitation center and the animal rescue; both sell any excess to generate extra funds for their important work.

Since yesterday morning, however, their household has been activated for "solar swap:" all excess solar generation will be automatically sold to their company. That is because a two-day on-campus event that started yesterday has created extra demand, and, to meet its 24/7 carbon-free energy (CFE) commitment, the company is paying double for real-time local renewables. For Alex, that is an extra US$5-10 (depending on local energy prices that day); make it 20 percent more when spent on campus; a win-win that's hard to beat. Which is why Alex has helped implement "solar swap" across the company, engaging its employees in helping with its 24/7 CFE goals.

In the same app, Alex ensures that however much the company buys, the home's battery will keep at a 15 the charge. Since the app has been tracking the home's energy consumption pattern, this includes a buffer to last until the sun shines again.

6:30 A.M.

Alex hops on their bike. This job allowed Alex to cut the commute distance drastically because Alex gets US$835/month for living within a 10-mile radius of the campus; money that offsets the price difference. Seemed like pure PR until Alex saw the research that the FM and HR teams completed just 18 months before Alex started: each employee household spends an average of US$40,000 locally every year, yielding a 400 percent social return on investment for the company. Plus, after the local incentives, the company ends up paying only half of the cost for a lot of benefit.

Last month, the first data set on program participants came in; in time for compiling last year's annual report. It is only the second year that the company will include social impact indicators, and many of them are assigned to the FM team. The data confirms material benefits for the community: local retail revenues are up, new businesses are opening, and local nonprofits report a welcome influx of volunteers. Within the company, there is also an overall improvement in employee satisfaction: more employees are more active, with many walking, running or cycling to work. They also report greater work-life balance and overall job satisfaction. There are also financial benefits for the company: employees report spending more time working, and reduced commute distances have made hybrid work more seamless because it is easier to pop into the office for a couple of hours.

These win-win-wins are a pattern of work now.

6:50AM

Alex arrives at the campus. As they secure the bike, their phone pings with a notification of more cha-ching for the rewards account: walking and cycling get the most points because they best contribute to the company's reduction in Scope 3 emissions, which include employee commuting.

Before showering, Alex picks up dry cleaning, which used 100 percent excess clean energy. Integrating ancillary on-campus services like this into the renewable energy profile of the campus, so that they operate when clean energy is abundant and when the grid can get congested with feed-in solar, was Alex's first big project, and they still tinker with it. Probably more than they should, but it is just so much fun to move the dials in search of that sweet spot where clean energy is used when it is free, with any excess sold to those who need it locally.

7:00 A.M.

Alex swipes into the FM office.

7:15 A.M.

After checking on any overnight emergencies, Alex checks the energy dashboard to see how it netted out overnight. Alex loves these real-time graphs that show both the energy demand and the onsite generation across the campus. Usually, the two lines edge up in near-unison while the campus revs up for the day, but today, the demand has already outstripped on-site supply. With all the equipment for the big event, Alex expected that.

Alex selects the building-by-building view. Every building on campus has been allocated a quota of the overall on-site renewable energy generation and gets to "trade" any surplus within the campus. This behind-the-meter game has activated surprising competition across the FM team, with the proceeds from the trades used by the winners for increasingly outrageous events. Last month, all the staff in the main R&D building got an indigenous plant most suitable for their personality profile. Alex just welcomes the persistent demand reduction overall.

Next, Alex checks the peer-to-peer trading dashboard. The campus operates primarily during business hours, so it has entered into an

energy trading arrangement with a local cinema and urgent care, both with on-site generation and peak demand in hours that complement the campus. In month 11, the three actors have consumed 100 percent of all renewable energy generated between them; none has gone back into the grid. To avoid transmission losses and the costs and carbon associated with transmission infrastructure, renewable energy is best consumed close to where it is generated, so the company has been scoring big here. However, it also looks like the company is saving on average 24 percent on grid electricity costs by not buying from the grid when it otherwise would. So far, so better-than-good.

This morning, though, Alex is even more interested in the other overlaid real-time graphs. All employees within the 10-mile radius had the solar swap option, but only 25 of the pre-committed households have come online. The reminder set for 7:30 a.m. — when most employees would be heading out — should notch that number up, though.

Alex's calculations suggest that at 125 households, today's elevated demand will be fully met with local renewables; but that is still an unrealistic number. Which is why for this event, Alex launched their most cherished program: vehicle-to-building, or V2B. It's time to see how that is working out.

8:45 a.m.

Alex walks out to their car, dropped of yesterday morning, and unplugs it just to check on the user experience. As soon as the connection is restored, a notification on Alex's phone indicates V2G because employees got to opt in last week. The app shows that the battery was fully discharged twice yesterday: at 11:32 a.m. during that cloudy patch and again at 3:46 p.m. It is nearly full again already; more clean energy ready to go back into the campus during peak today.

As an employee, Alex gets points for V2B. However, guests who opt in will return to a full 100 percent clean charge as well as a US$10 gift card to one of three national chains: coffee, rideshare, or athletic wear; all in the company's energy trading circle through their own climate action initiatives.

Alex has been working on the V2B solution for a few months now because by turning more energy consumers into prosumers, EVs supercharge grid-interactive buildings. The company already used incentives (for staff) and price signals (for guests) to direct EV charging to hours when on-site solar is most abundant. By doing so, the company has already unlocked a new revenue stream in California through low carbon fuel standard (LCFS) credits. LCFS credits generate a couple of thousand dollars for a fleet sedan and nearly US$10,000 for every truck; a process Alex helped automate and integrate with the company's accounting and reporting systems. However, Alex's team has long worked to take this to the next level. This event is the first test of both the commercial and carbon value of the new two-way-charging interface.

8:55 a.m.

The event's breakfast is wrapping up, so most guests should be here by now. Alex checks the dashboard again. Almost 50 households are generating for the company, and 43 vehicles are plugged in and ready to discharge their batteries.

9:00 a.m.

Alex checks with Taylor on user feedback. Seems like most people's experience has been as smooth as Alex's, and the full report will be done by noon tomorrow.

9:25 a.m.

Strike when it is hot, so Alex opens up the draft of the new proposal.

Alex's residential energy retailer has offered to contribute 70 percent of the cost of an additional battery if Alex would supply grid flexibility services. This means letting the grid balance the natural variations in energy production and consumption by discharging batteries during times of especially high demand (override available) as an alternative to investment into upgrading the aging peaker plant and distribution infrastructure. A no-brainer: it is time to phase out the high-emitting and very expensive peaker plants that exist for but a few extremely hot or cold hours a year, anyway, and especially so when one gets paid 10 times the usual electricity prices to help. Even without such incentives, batteries are outperforming the market in terms of ROI.

Alex is thinking about all this at work because the utility's initiative has moved one of Alex's ideas from the back to the front burner. Today, Alex wants to finish a proposal for the company to start providing grid flexibility services. Having had their eye on additional energy storage, Alex has estimated how much energy the company stands to sell — and the resulting revenue — and it is looking pretty irresistible. Combined with layers of resilience provided by peer-to-peer trading, solar swap, and V2B, increased storage may finally allow the company to phase out fossil fuels for emergency power; the holy grail Alex have been chasing since they started. It looks like the revenue from grid flexibility services will bring pay-back on energy storage down to 3.4 – 4.2 years. That's a winner!

LUNCH

While Alex is not vegetarian, they've been extra motivated to maximize points lately, and vegetarian meals earn extra points. While enjoying a noodle salad, Alex pulls up their rewards account just to see, again, that it has all paid off; literally: the points have earned Alex's whole family a weekend at Wizarding World of Harry Potter (or, according to Alex's daughter, "surely the best place in the world!"); an amazing way to celebrate the end of the school year.

4:00 p.m.

After more time on that proposal, Alex revisits the energy dashboard. This time of day is when Alex resents the pre-LEED glass facades of the older buildings because the heat gain is ridiculous and negates most of the demand reduction gains the FM team has otherwise achieved. Alex can't wait for those retrofit discussions to become more than words, but best focus on what one can control.

Between the solar swap and the V2B programs (63 EVs have participated!), the two-day event was completely powered by clean local energy! In fact, the software is projecting a net surplus. This also means that all the allocation from the power purchase agreement

(PPA) will be sold on the open market. As more companies pursue 24/7 CFE in the area, local Renewable Energy Certificates (RECs) are an increasingly hot commodity and on a day like today, the company may get more than US$10 per REC. That should yield a good US$2,000; a sum that more than covers the extra promotion to educate the staff and guests on these new initiatives.

Alex is already excited about the 80 percent share from the REC sales landing back in the FM team's budget. That was a nice deal to strike; in more ways than one.

Given the substantial on-site solar generation, the company's PPA has been shifted to a combination of local wind and thermal, to cover the company when the sun isn't shining. That said, the solar swap has worked a treat and is being scaled. As such, the company has actually been selling unused kWh from its PPA on the open market to those needing to top their PPAs up, and the revenue has funded several more pilots targeted at demand management and load shifting; pilots that the FM team pitched and has been running. There is another 18 months on the PPA contract; enough for those to scale. Even with the additional investments, not renewing the PPA will have a net saving of 2.8 percent.

However appealing that is on its own, Alex will be reporting even bigger good news at that point: the campus will be 90 percent of the way towards the company's goal of 24/7 CFE while saving 10.2 percent off the pre-24/7-CFE energy budgets! The real-time graph of the campus' carbon emissions looks like a flat line compared to the other two locations. Not to mention the significantly improved employee and community well-being, engagement and approval. And free media.

Speaking of which, it is time to place the promised call to Chris in marketing.

"We are pulling this off, Chris! You can press 'go'."

"Goodness! That's amazing. Well done to you and the team."

"Thank you! I feel like I've been holding my breath for weeks."

"I bet. Well, it is all paying off. The four local journos were showing up here tomorrow regardless — this is the coolest innovation going — but let me now finalize the media release for the national papers and ping my contacts at Forbes and Wired so that they get onto those feature articles."

"How do you think we'll do?"

"Even if we get a quarter of the coverage that I think we'll get, that is US$2 million in free media. And that is not counting international. I have to tell you, with the war for talent, the HR team has been hanging on your every word, my friend! You should see how many posts they've drafted — already!"

4:30 P.M.

Time to go home. The event has rolled into happy hour. Those on the FM team who got in at lunchtime will take care of the rest and lock up, and Alex will check first thing tomorrow how the whole thing netted out.

Alex is almost back to the bike storage when they remember that today, they are driving home. They've got the 25 percent charge that was requested. Usually, 10 percent is more than enough, but the family is heading out for a show and dinner tonight. Alex pulls out of the lot and smiles while imagining the kids' reactions. They will be so excited, so proud of themselves and the family. And that's before they hear about the vacation! So, Alex is feeling a bit proud, too.

When Alex started this job, they were nervous. Their entire FM career, they had treated energy as a fixed cost. Everybody tries to reduce that number, sure, but at the end of the day, everybody used whatever energy they needed when they needed it, with total disregard for the rhythms of renewable energy generation and blind to the stress inflexible loads created for the grid. Then, Alex became aware that failure to engage with local energy markets left money on the table. But never before did Alex have a chance to put these ideas into action.

Alex does appreciate the other levels of benefits, such as providing the electricity grid with extra energy when it is needed during peak consumption hours, but they seem more abstract. Still, if doing more good costs nothing, it feels like the cherry on top.

So, Alex is feeling grateful that in this job, they get to make it easier for thousands of people to do the right thing. But an even stronger feeling is that of relief. After years of feeling guilty about seemingly every convenience, every decision, Alex has really been enjoying this win-win-win feeling that they are free to pursue the best for their family while enriching their community and without compromising the natural environment. And that they are helping advance this guilt-free, all-electric, clean-energy future for all. FMJ

Elena Bondareva *WELL AP, WELL PTA has a solid record of transformative innovation around persistent problems, which is the focus of her advisory practice, Vivit Worldwide. Bondareva has held public, private, teaching and board roles in Australia, New Zealand, Russia, South Africa, India, and the United States; delivered CPD training to thousands of professionals; participated in globally significant events such as COP17, G20, and the World Green Building Council Congress; published in peer-reviewed and public journals; and presented at countless international conferences.*

Green Business Certifications

FM's challenges

BY DR. DYUGU ERTEN

Climate change is getting worse, and its negative effects are increasing. The built environment is directly responsible for 25-40 percent of emissions globally. The urgency to act on climate change has never been greater, and the built environment sector has responsibility to address the climate emergency and accelerate sector decarbonization as being one of the largest emitters of greenhouse gases (GHGs). Today's focus on environmental, social and governance (ESG) disclosures are making companies increasingly accountable for their overall environmental impact.

Sustainability is receiving mainstream publicity due to climate change-related disasters around the world. The implementation of sustainability initiatives will be possible through EU Green Deal's implementations. EU leaders endorse a proposed target to reduce net emissions by at least 55 percent by 2030 compared to 1990 levels. The EU commission proposes to require its member states to renovate at least 3 percent of the total floor area of all public buildings annually, set a benchmark of 49 percent of renewables in buildings by 2030 and require member states to increase the use of renewable energy in heating and cooling by 1.1 percent each year until 2030. Many countries have similar ambitions to align themselves with the 2015 Paris Agreement goals. The challenge is not only climate change!

Business benefits

Over the past 10 years, the costs of water and wastewater services have risen at a rate well above the consumer price index. Facility managers can expect these and other utility costs to continue increasing to offset the costs of replacing aging water supply systems. The business benefits of implementing water-efficiency measures in and around buildings can include reducing operating costs, as well as meeting sustainability goals. Complementing property management activities with ongoing Green FM processes means that up-to-date, sustainability-oriented techniques are in operation, construction and systems are verified as energy efficient and cost savings are obtainable. Green FM service also provides a useful database for comparison and analysis.

To help FMs with green services, relevant global measures have been taken, such as green building standards and regulations, including voluntary green business certification systems (GBCS). Since the 1990s, GBCSs have played an important role in metric-based sustainabiltiy decision making in the built environment. BREEAM, LEED and other systems were launched in several countries for new buildings and later for existing buildings.

In 2014, the International Well Building Institute launched WELL, which is focused on the health of building tenants. UK-based Fitwel is designed for single- and multi-tenant buildings and commercial interiors. The systems are designed to work with internationally accepted systems for a sustainable environment, such as LEED and BREEAM. Building owners choosing either of these two systems will gain several advantages, including having more productive and healthier people. Although these two standards have their differences, they still focused on implementing strategies for improving the health of the occupants.

Reliable reporting

Building Research Establishment (BRE) in UK launched its BREEAM certification in 1993 for new construction with the intent to promote sustainability in the real estate sector. BRE later launched several different frameworks for existing buildings, communities, refurbishment etc. BREEAM-In-Use (BUI) is a science-based sustainability framework for the verification and certification of operational assets. By establishing a baseline where building owners can set targets and track improvements, higher green rating levels can be achieved. Standards such as BUI (and related green building systems used globally) can guide in making environmental improvements to assets and reduce GHG emissions.

The second widely used system was launched by the US Green Building Council (USGBC) in 1998. The evaluation of existing buildings based on the Building Operations and Maintenance (LEED EBOM) benchmark is based on meeting a series of prerequisites and aspects scored by credits. The certification is achieved by documenting a minimum score through evidence-generated during a period of performance or monitoring by the different intervening agents, such as building managers, maintenance team, contractors, facility manager, suppliers of materials and systems and project information. USGBC released the first draft of LEED v4.1 for LEED O+M. This new rating system will represent a radical shift in how LEED measures the performance of existing buildings. All the typology-based rating systems from V4 have been removed (it used to have separate systems for schools, warehouses, etc.).

Credits add up

Differences among these building types are just dealt with in credit-by-credit requirements. Regional priorities were also removed and the innovation category is made simpler. This rating system is for buildings that are fully operational and occupied for at least one year. It also must include the entire building's gross floor area in the project. Other new features for V4.1 include a shift to data for documentation by tracking performance

in energy, water, waste, transportation, indoor air quality, toxin-free environment and occupant satisfaction. After certification, the building can stay certified with data driven recertification guidance that aligns with certification requirements. The latest version LEED points are based on performance (score) and the first time applies to buildings and interior spaces.

For the LEED v4.1 EBOM rating system, some credits have been removed because their credit intents contribute to the achievement of outcomes that are measured in new credits included in the rating system. The main change of this recertification, LEED-EB v4.1 introduced five performance-based credits: transportation performance (14 points), water performance (15 points), energy performance (33 points), waste performance (8 points) and indoor environmental quality performance (20 points).

Thus, a total of 90 points could be achieved through providing 12 months of data on these performance categories, and this recertification is valid for three years like BUI. The next 10 points can be achieved by applying additional credits, such as rainwater management (SS category), enhanced refrigerant management (EA category) and integrated pest management (EQ category). LEED-EB v4.1 automatically assigns 10 bonus points to each recertified building (LEED-EB v4.1, 2018). LEED v4.1 has performance-based prerequisites for location and transportation, materials and resources, and indoor environmental quality. The performance prerequisites in water efficiency and energy and atmosphere were kept. A prerequisite energy efficiency best management practices was added that incorporates international alternative compliance path (ACP) allowing projects in Europe to use the energy audit procedure defined in EN 16247-2.2014. There are also minor edits to improve applicability for interiors.

Grid harmonization was added as a new credit title, changing from Demand Response to better reflect options available for teams and credit intent to make energy generation and distribution systems more efficient, increase grid reliability, and reduce GHG emissions. Other credits include purchasing and compliance. There are also reduced thresholds for ongoing consumables, going from 60 percent to 50 percent, while increasing threshold for electronic equipment from 40 percent to 50 percent.

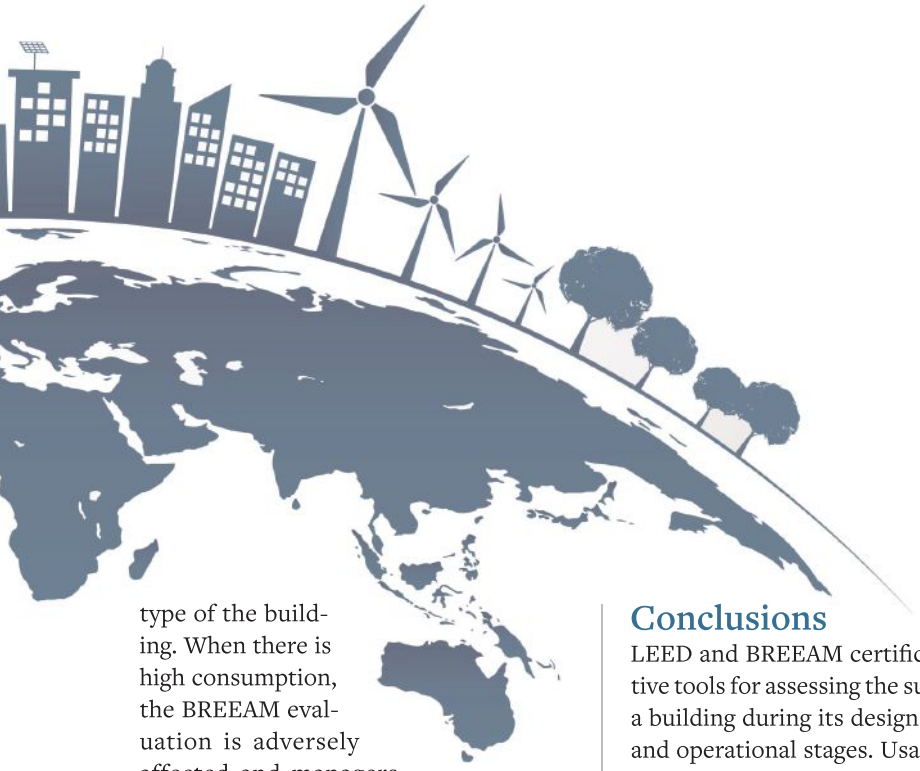
The new green cleaning credit is a combination of custodial effectiveness assessment, products, materials and equipment. There are several edits, clarifications and options for this credit. For powered janitorial equipment (Option 3), compliance is now based on percentage of equipment used to clean the project at time of inventory and tracking over the entire year is no longer required and the requirement for a phase-out plan is removed. For cleaning products and materials (Option 4), tracking total annual purchases is no longer required. Compliance may now be demonstrated with a product inventory or from total annual purchases.

Certified transparency

Commercial real estate assets such as office, industrial, retail and multifamily rental buildings adopted BUI and LEED EBOM over the past 29 years. There are many reasons why asset owners and managers get these certifications. Certification brings improved transparency from a known third party organization. Also, it is a sign of user satisfaction and productivity. The asset owners pay less monthly bills so it improves financial performance. With the current updates of both systems, some of the resiliency criteria against extreme climate events are also included. But to comply with full resiliency, resiliency certification systems should be reviewed and used as complementary (i.e. REDİ and RELİ).

The energy section has the highest percentage in both systems. In BREEAM In-Use Building Performance and Building Management, the environmental weight percentage of the energy is high, and the effect is quite high compared to other evaluation criteria. In building performance, systems such as heating, cooling, ventilation and hot water, the features and efficiency are evaluated. As a result of the BREEAM evaluation, action is taken on the systems that have a negative effect, studies are carried out to increase the efficiency values and these alternatives are evaluated in any renewal work. After a building is occupied for five years, energy audits are repeated every five years in the BREEAM system. Repeated energy audits show advantages of the improvements suggested by the audit report.

In the building management section, annual consumption data for all types of energy used in building operation are evaluated according to the construction area and



type of the building. When there is high consumption, the BREEAM evaluation is adversely affected and managers start savings to reduce these values and increase the certification level. Building managers who do not follow up on annual energy consumption gets the monitoring habit in line with these certification studies.

In the energy section, the CO_2 emission intensity of the fuel type used in the building operation is evaluated and renewable energy alternatives are investigated instead of the fuel types with negative effects. According to the data of the last three years of building energy consumption, the savings rates are evaluated, and strategies are developed for them. Monitoring the monthly energy consumption in the building operation while setting targets is important for the BREEAM evaluation. Sharing all data with building users and management is important for everyone to be involved to achieve goals and compliance. In the BREEAM In-Use energy department, the use of alternative renewable energy sources has a positive impact on the evaluation and increases the certification level.

Tenants' energy use habits have a critical impact on a building's energy consumption. Tenants were found to be responsible for 14 percent to 65 percent of a building's total electricity consumption according to a report published on Energy Consumption in Office Buildings: a Comparative Study (2016). Both systems require green leases which will guide tenants on how to use their building efficiently and effectively.

Conclusions

LEED and BREEAM certificates are effective tools for assessing the sustainability of a building during its design, construction and operational stages. Usage of new and existing building certifications are needed to complete the whole life cycle. Existing building certifications for both BREEAM and LEED systems were recently revised and new versions LEED EBOM V4.1 and BREEAM In Use V6 have been launched. Despite past deficiencies, both systems are now up-to-date related to embodied carbon, LCA and materials. If FMs need to use metrics to measure the performance of their buildings and need ongoing monitoring, both systems provide online tools which makes monitoring much easier. Both systems have not yet accumulated the required number of projects to analyze and critic about their success so sharing data and increasing the usage of the systems will help BRE and USGBC type organizations to improve the quality and impact of their systems. FMJ

Dr. Duygu Erten *works in sustainability of the built environment and has several accreditations as LEED AP, BREEAM AP, BREEAM-In-Use, DGNB In Use and is the chairperson of Climate Change, Energy and Health Department at Istanbul Medipol University. Her research area is green buildings and certification systems. She is a scientific committee member of IFMA and has served on the USGBC Board, LEED Technical Committee and ULI Europe Sustainability Product Council.*

RESOURCES:

LEED EBOM, usgbc.org/leed/rating-systems/existing-buildings

BREEAM In Use, breeaminuse.breeam.com/Home/Welcome

breeaminuse.breeam.com/Home/Welcome

Energy Consumption in Office Buildings: a Comparative Study (2016), skanska.pl/4a58d8/siteassets/oferta/biura/raporty-i-standardy/raport-zuycia-energii-w-budynkach-biurowych/energy-consumption-in-office-buildings-report.pdf

sciencedirect.com/topics/earth-and-planetary-sciences/environmental-impact-assessment

usgbc.org/leed/v41

sciencedirect.com/topics/engineering/rainwater

sciencedirect.com/topics/earth-and-planetary-sciences/integrated-pest-management

Sciencedirect.com/science/article/pii/S2405844021021551

sciencedirect.com/topics/economics-econometrics-and-finance/commercial-real-estate

With (re)Purpose

GIVING POTENTIAL WASTE NEW LIFE

BY DAMON CARSON

Whether it is building, remodeling, demolishing or simply maintaining a facility, waste is always a problem. As facility managers deal with tighter budgets and greater responsibility to protect the environment, the problem of waste management becomes increasingly complex.

Almost 300 million tons of waste is produced every year, just in the U.S., according to the Environmental Protection Agency (EPA). Picture a train, 3 million cars long, stretching nearly one-and-a-quarter times around the world, hauling off one nation's waste.

FMs can play a big part in waste management. And they do not have to undertake big measures to avoid filling landfills.

For more than 50 years, the world has been enamored with recycling. It seemed like the environmentally friendly solution to waste. Recycling means chip it, shred it, grind it or melt it. To recycle something means to convert it into a raw material, which requires a lot of energy and is very costly.

The best way to divert something from the landfill is to simply continue using it. For as long as an item or material can fulfill its original function, it stays out of the dump.

Inevitably, things wear out, become obsolete or go out of style, which presents both a dilemma and an opportunity. If it cannot be used any longer, what's to be done with it? Rather than banish it to the junk pile, and preferable to recycling, the item could serve a new purpose.

In the EPA's Waste Management Hierarchy, repurposing fits into the most preferred category alongside reuse. These options are preferable to recycling and composting because they require little to no energy and create no pollution or toxic waste.

All these options are preferable to the energy recovery process in which nonrecyclable waste materials are burned for heat, electricity or fuel. These are all better than treatment and disposal, which is overflowing landfills and infecting the environment with harmful chemicals and gasses.

Repurposing can be as interesting as trying to find a new use for the end zone goal post pads from an NFL stadium or the glass surrounding a hockey rink. Those used materials became padding in exercise and play areas, and greenhouse walls, respectively.

Sometimes it is as innovative as turning a street sweeper brush on end for a livestock rubbing post.

But sometimes it is as mundane as covering building materials with the retired vinyl from an advertising billboard.

Here are some examples of creative uses of repurposed materials by factory and facility managers:

- Factories have installed used railroad rails, painted bright yellow, as safety curbs to keep forklifts and other wheeled machines from damaging warehouse walls. These rails can be purchased at a fraction of the price of original-purpose rails and are stronger than just about any new safety rail.

- Businesses that must anticipate active-shooter emergencies have used short pieces of retired fire hose to quickly slip over hydraulic door-closer arms to keep them from opening. The hose can be easily cut to any desired length, are more than strong enough to do the job and cost almost nothing to purchase.

And here are ways repurposed materials aid in outdoor work projects:

- Work crews have utilized retired military cargo parachutes as jumbo shade tarps to protect workers from sunburn and heat stroke on job sites. These come in a variety of sizes, are easy to ship and store, are simple to modify and can be purchased for much less than new tarps.

- Retired mining conveyor belts are used for wind breaks on fences across water gaps, cattle slings for hoof trimming and corridor liners in corrals.

There are some secrets to what is repurposable and what is not. A material must have value as is to be repurposable. An I-beam removed undamaged from a building deconstruction can be used for a multitude of purposes. Its engineering has not been compromised. A bent and twisted I-beam from a building wrecked by a tornado probably has no value.

Some items are not repurposable because their original purpose is so specific. A forklift remains a forklift. A refrigerator remains a refrigerator. Without dismantling them for parts, their usefulness is limited.

For something to be repurposed, it must be generic, versatile and adaptable. A prime example is a worn out or damaged tire used as a boat dock bumper or on the side of tugboats.

Regarding the employment of used materials for new purposes, FMs may want to consider ways to utilize castoffs from other industries. To do this, consider the ACE — attributes, characteristics and engineering — needed in a product or material to solve a problem (e.g., waterproof, magnetic, rigid, flexible, etc.).

For something to be repurposed, it must be generic, versatile and adaptable.

FMs should ask what ACE is needed and if there is an item that could be substituted with those characteristics? Answering those questions could save money while still accomplishing the task. Everyone benefits when items with a second purpose are diverted from the landfill.

Sometimes a material engineered for one purpose performs better in its second job. Shooting-range ballistic curtains are one-eighth-inch thick and sell for about US$3 per square foot. Conveyor belts used in the mining industry to move rock, sand or aggregate are one-half-inch thick and can be repurposed for less than US$1 per square foot. In this case, the conveyor belt is what the repurposing world calls a cross-category substitute — the repurposed material is twice as good and costs a third as much.

Mining conveyor belts can take on a surprising number of second lives. They are used to cover roads to prevent damage from heavy machinery and tracked vehicles. They can be laid across running tracks to protect them from football cleats, lawnmowers, and heavy or sharp objects. They can be laid between the rails of train tracks to prevent oil and other drippage from seeping into the ground.

Sometimes an item with diminished quality becomes inadequate in one setting but will suffice in another setting, such as synthetic turf used on athletic fields. To protect the athletes from injury, there are high standards for these surfaces. But when they are too worn for athletic competition, they are still of high enough quality for countless uses in playgrounds, factories, stockyards, etc. Parts of the former turf at Kansas State University's football stadium are now the surface for a multipurpose field at a camp in South Dakota, USA, as well as in dog runs and batting cages across the U.S.

In many cases, it is cheaper to sell or give away an unwanted item than to pay for its disposal. Organizations that utilize a repurposed material over a primary-purpose product typically see a 50-75 percent savings.

Giving materials a second life makes sense environmentally and economically. In many industries, this is an untapped strategy for achieving triple bottom line goals. In addition to reducing emissions and eliminating waste, being environmentally conscious involves finding new uses for castoffs and discards. FMJ

Damon Carson *is the founder of repurposedMaterials, where he finds a second life for discarded facility infrastructure material.*

Consider THIS Microgrids

BY MARK WIALBUT

The built environment requires a constant supply of energy to maintain comfort, safety, security and operations. Antiquated and overtaxed, the electrical distribution system has problems resulting in reoccurring brownouts and outright power outages that will get worse long before they get better. Utility rates are escalating, and the public grid is becoming less reliable.

What does a day without power cost a business? How much of a headache is even a short power outage? How long does it take to restart operations? Facility managers are tasked with finding solutions to ensure uninterrupted operations and reduce energy costs while also meeting company environmental goals. These duties are often at odds with each other.

Stand-by generators are a common solution but certainly not an optimal one. Generators need time to start up before carrying the load, and that means a power interruption that a facility's IT and other important electronic infrastructure cannot tolerate. Use of uninterruptible power supplies (UPS) is mandatory to ensure the availability and reliability of this important electronic infrastructure and prevent loss of data. Besides the power interruptions, generators require regular maintenance, on-site fuel storage, and are costly to maintain and operate, while UPS have their own maintenance issues and requirements. Emergency generators are inefficient — only 30-40 percent of the input energy is output as electricity; the rest is wasted as dissipated heat. They are also an environmental nightmare, spewing toxic exhaust into the air, which is why most are only permitted to be used for emergency back-up use. How can FMs ensure that their facility has a reliable supply of the power required to maintain uninterrupted operations, lower operating costs and reduce the operation's environmental impact?

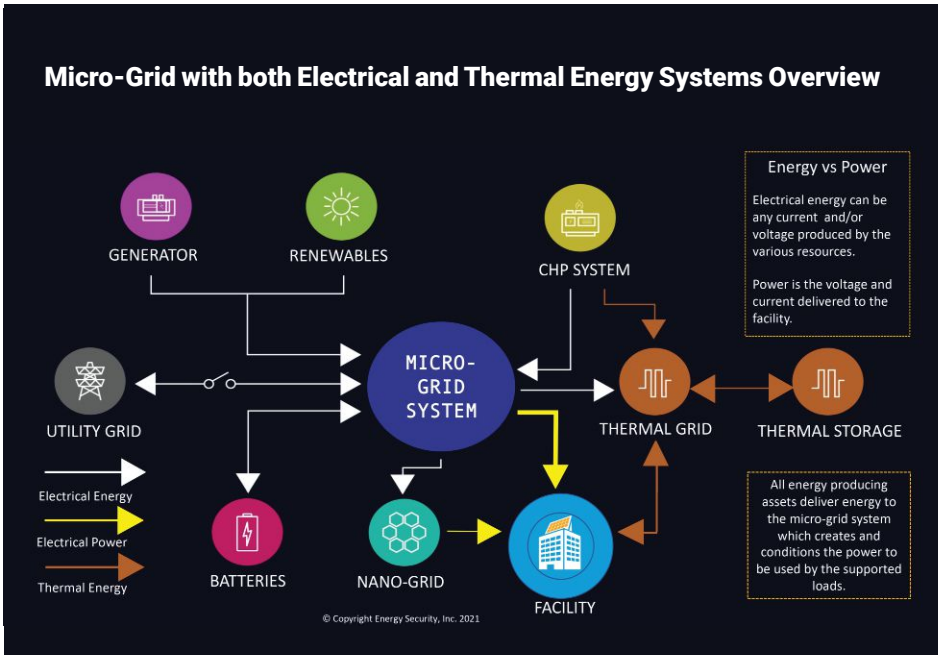
A viable solution may be a microgrid system.

The benefits of implementing a microgrid rather than relying on stand-by generators alone include reduced cost of operations and carbon footprint while ensuring an uninterrupted flow of power to maintain business operations no matter the situation. A microgrid not only guarantees energy resiliency in case of emergencies but can reduce overall energy costs while helping to meet company carbon reduction and sustainability goals.

What is a Microgrid?

A microgrid is a facility's own energy grid with on-site control and energy production capabilities. A microgrid can disconnect from the utility's grid when necessary and operate autonomously (island mode). Energy is produced primarily by on-site renewable resources, whatever is appropriate for the site, backed-up by batteries and/or generators (distributed energy resources) as well as the utility grid. Utility power is used when economically advantageous to do so. Depending on design and requirements, a microgrid could run indefinitely in island mode.

A microgrid connects to the utility's grid at a common coupling point maintaining the voltage at the same level as the utility's grid unless there is a problem on the grid or other reason to disconnect. An automatic transfer switch separates the microgrid from the utility's grid when the utility's power is out. At that point, the microgrid functions autonomously. It can also send excess



energy generated by on-site resources back into the utility's grid, further enhancing the economics of installing a microgrid.

Some entities will help subsidize the cost of installing a microgrid with grants or other incentives.

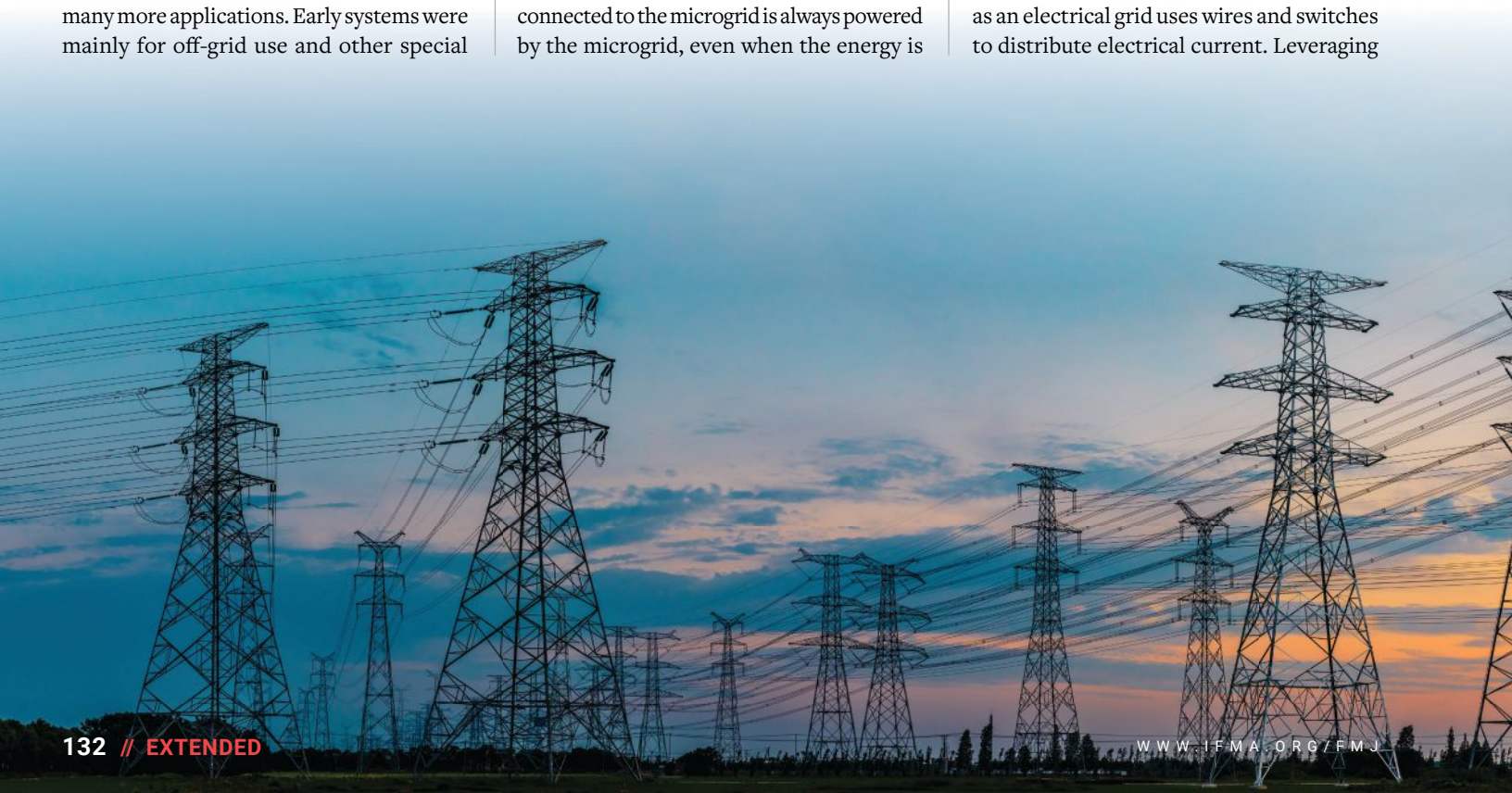
On-site renewable energy assets supplement the utility's power to reduce a facility's dependance on power supplied by the utility. Organizations may use on-site energy production resources when utility rates are high and utility power when rates are low. For example, a facility may charge the batteries at night using the utility's power when the cost of electricity is lowest, then use that stored energy to reduce peak demand charges during the day. These techniques are especially beneficial in peak-demand shaving and time-of-use billing scenarios enabling organizations to time shift reliance on the utility's energy. It is a win/win for the consumer and the utility, lowering energy bills for the consumer and lessening demand on the utility's resources.

While microgrids have been around for many years, the technology and components have been evolving to make them smarter, more efficient and economically viable for many more applications. Early systems were mainly for off-grid use and other special applications such as military and prisons. Today there are commercially available microgrid systems available to meet varied needs, even systems that can be delivered to the site fully assembled and tested. These plug-and-play systems can greatly reduce the time needed to install a system and keep operational interruptions to a minimum. Advances in controls and software have given microgrids the ability to prepare for and/or react to changing conditions such as extreme weather events, time of use or peak-demand shaving. A smart microgrid can optimize efficiency and economic payback while ensuring uninterrupted business operations with reduced environmental impact.

Depending on requirements, a microgrid may support the entire facility and all its systems. This may not be economically feasible because the huge demand for power means that the microgrid's on-site resources must be able to meet the peak demand electrical load of the facility. A more economically palatable way is to design the microgrid in such a way as to support only those loads that are critical to safety, security and specific ongoing operations.

In a well-designed system every load connected to the microgrid is always powered by the microgrid, even when the energy is being supplied by the utility. The power the microgrid delivers is clean and stable, with no sags, glitches or spikes. The supported load's clean power is always on, without interruption, known as blinkless. When the utility's grid has a problem or outage, the microgrid's own energy resources carry the load without incident. In effect, all the loads supported by the microgrid are powered by a sophisticated UPS. This enhances the connected equipment's reliability, lifespan and reduces the time it takes to get back to normal operations. For absolute reliability, critical control systems should be powered by their own nano-grids, further isolating them from any potential electrical problems and ensuring up-time.

Traditionally, microgrids have only addressed the electrical power needs of the facilities they supported, which can leave a big gap in many facilities' energy needs. Many businesses use more thermal energy (BTUs) than electrical energy (kWhs). There are microgrid systems available that can also provide for thermal as well as electrical energy needs by incorporating a thermal grid, which uses pipes, valves and pumps to distribute thermal energy much the same as an electrical grid uses wires and switches to distribute electrical current. Leveraging



the efficiency of combined heat and power systems (CHPs or cogenerators), heat pumps and thermal energy storage with a thermal grid can increase the facility's overall energy efficiency. Natural gas-powered CHPs are efficient and relatively clean with fuel cells becoming clean alternatives with very low to zero carbon footprint.

Thermal storage — storing heated (or cooled) working fluid in insulated tanks for use when needed — is less costly than batteries with the added benefit of much longer life. It enables the production of heat (or cold) when energy is expensive. Designed and implemented in an integrated system further reduces the cost of operations and increases return on investment.

Controlling the facility's various energy infrastructure components (HVAC, heat pumps, boilers, distributed energy resources (DERs), etc.) and loads as a comprehensive integrated system using a microgrid system's overarching control system can yield even more benefits. An overarching energy infrastructure control scheme acts like an orchestra's conductor, always determining the best and most economically efficient energy production resources to power operations and how best to leverage the use of that energy.

With proper security measures, the microgrid, and the infrastructure components integrated into the system, energy production and use can be monitored, controlled and problems diagnosed remotely via any authorized connected device from anywhere. The ability to use remote diagnostic capabilities can enhance up-time by reducing the mean time to repair. It can even alert FMs to impending equipment failures before they cause a real problem. Having this kind of visibility into a facility's infrastructure is especially valuable in eliminating finger pointing if a problem does occur.

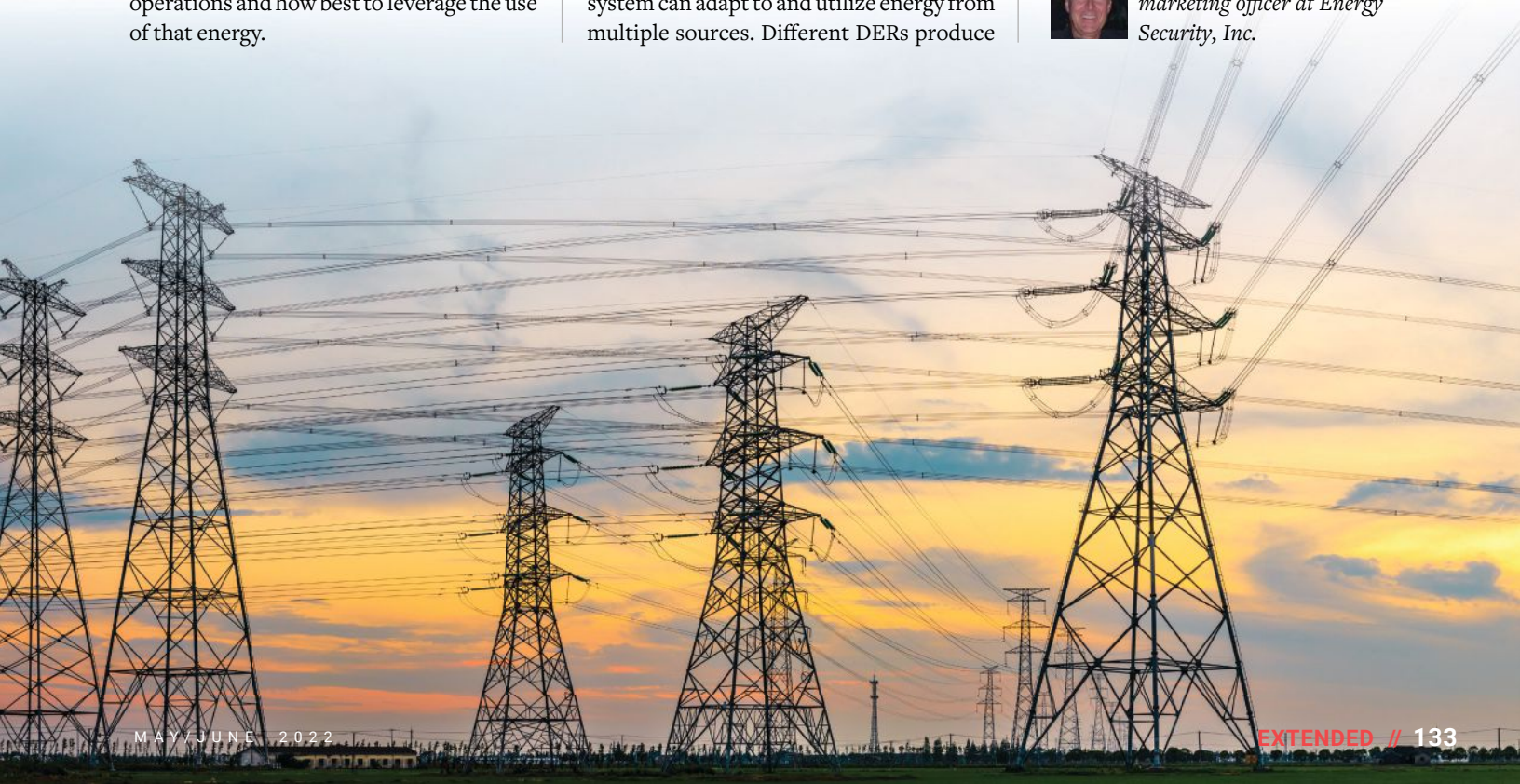
Real-time and remote monitoring of energy production from all sources and energy use at each supported load, as well as cumulative and historical data provides valuable insights, helping FMs understand how the microgrid is performing and control energy costs.

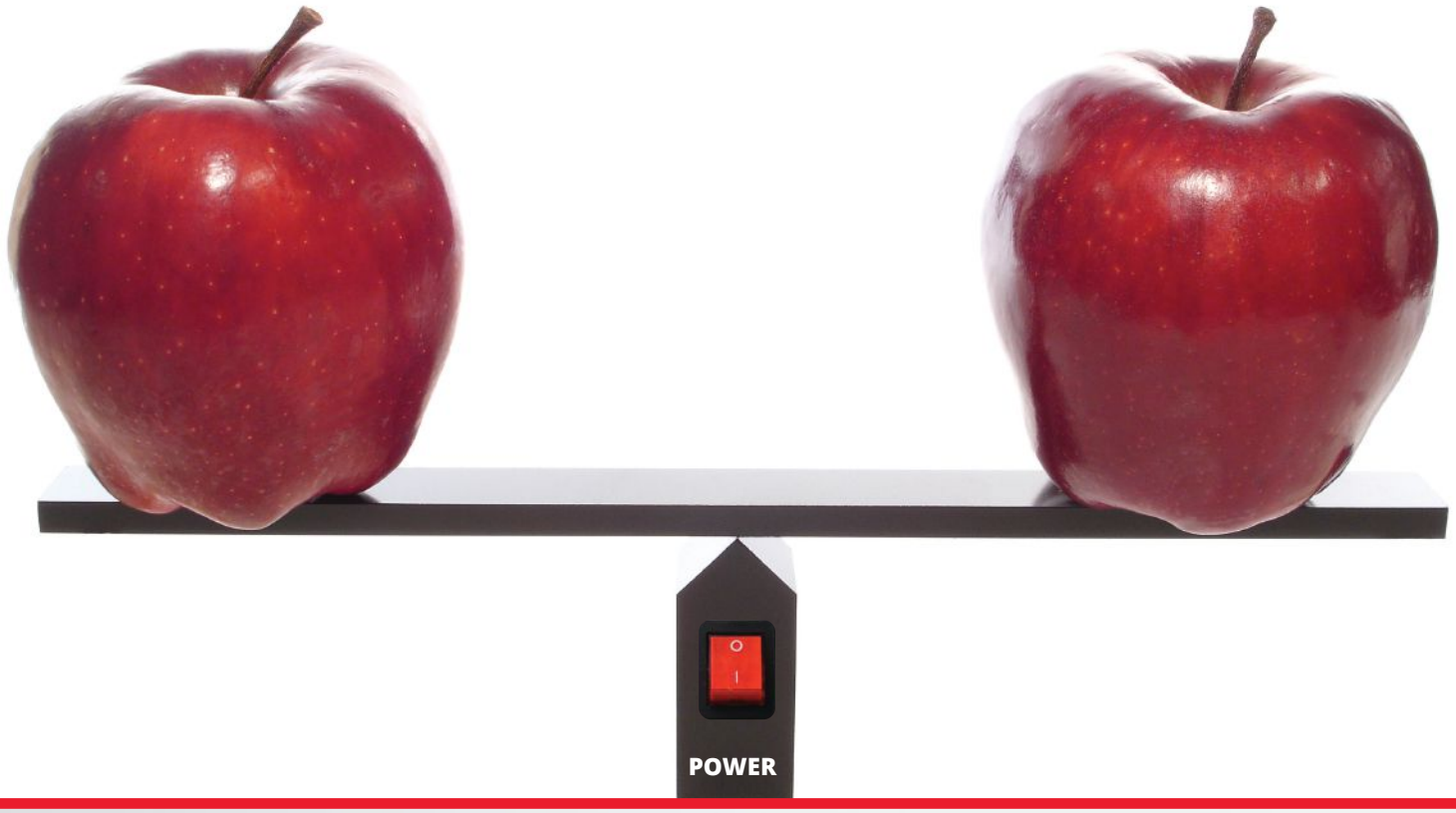
Real-time alerts and remote-control capabilities can help FMs adapt to changing conditions, avoid higher utility bills or disruptions to operations enabling the ability to intervene when nature does not cooperate or an equipment failure is detected.

It is also important that the microgrid system can adapt to and utilize energy from multiple sources. Different DERs produce energy in different voltages and currents. Billions of dollars are spent in the search for better, cheaper, more efficient clean energy systems and battery tech is evolving rapidly. Solar panels from 10 years ago were more expensive and much less efficient than what is currently available. Future-proofing a microgrid by ensuring that whatever comes in the way new energy technologies can be utilized will increase the life expectancy and ROI of the entire system.

Implementing a microgrid system is not cheap; but a comprehensive and well-designed system pays for itself over time in energy savings alone, not to mention tax incentives and utility grants that may be available. The added bonuses of ensuring that critical business operations are never threatened due to power interruptions while helping to meet company environmental goals are priceless. FMJ

Mark Wialbut *is the chief marketing officer at Energy Security, Inc.*





Apples TO Apples

Developing a sustainable energy strategy

BY **AZI FEIFEL**

From electricity for lighting and technology systems to natural gas for air conditioning, energy usage is always a hot topic in facility management — but especially during times of global energy volatility. Geopolitical events and market swings drive energy prices, impacting the bottom line in terms of energy consumption. Facilities' energy usage ebbs and flows according to needs.

Office buildings abandoned during the COVID-19 pandemic may never regain full occupancy. Shopping centers losing customers due to both the pandemic and a shift to online shopping may need to reevaluate their operating needs. Large apartment complexes may find their hours of peak energy consumption changing with work-from-home trends.

FMs can reduce the impact of energy volatility and improve sustainability by making better decisions about when, where, how much and how often to purchase energy according to their facilities' specific needs.

Different facility types, different demands

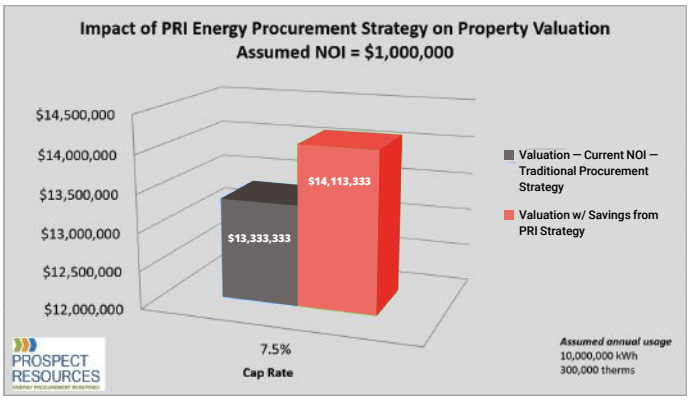
Strategic planning for energy use enables facilities to make the best purchasing choices based on facility type. Before signing 12-, 24- or 36-month contracts with power suppliers, the first step for FMs involves evaluating a property's energy demand. This includes calculating current energy usage and understanding the location's distinct patterns of energy consumption.

Different types of buildings have different energy demand patterns:

COMMERCIAL FACILITIES

Commercial facilities, such as office buildings, typically consume the most energy during the peak hours of 9 a.m. to 5 p.m., Monday through Friday, when they are in use by businesses and employees. Building systems may run during off-peak hours, but those energy needs are relatively less compared to the weekday push.

This seemingly simple pattern of peak-hour usage can become extremely expensive, especially if large facilities that were full of tenants during pre-pandemic times are now underutilized during traditional business hours. FMs must find creative ways to reduce energy demand during those peak hours to purchase only the energy they need and maintain a profitable net operating income (NOI).



Impact of planned energy strategy on net operating income (NOI)

First, managers must determine their facility's demand. Whereas usage or consumption is measured in kilowatt-hours (kWh) and reflects how much electricity is used over a period of time, demand is measured in kilowatts (kW) and reflects how much electricity is needed at a point in time. Utility charges will often be based on peak demand, which will be reflected on the utility bill. Demand can be reduced by replacing equipment or changing equipment that is running at any given time.

Once a facility estimates its demand, FMs should try to optimize energy usage during peak hours to reduce costs. Mitigating energy demand is not a simple task; buildings cannot just shut off the power on people who are trying to be productive during the workday. What are some ways FMs can rein in demand during peak hours?

a. **Divide and conquer:** Evaluate each tenant's daily physical presence in the facility. Consider requesting that tenants use only specific floors or sections of the building and cordon off unused areas here power can be turned off or limited.

b. **Restrict hours:** Survey tenants to determine which hours are less utilized and when power usage can be shut off or reduced.

c. **Switch to greater efficiency:** Consider changing the energy mix to include sources that are more cost-effective in the long term. Installing solar panels on the roof of a sunny Arizona facility may be a large capital investment upfront, but it could mean cost savings over time.

If a commercial building includes retail establishments, determining which hours yield the best return on investment (ROI) is key to reducing energy usage and overall energy costs. Obtaining data on daily and hourly sales of retail businesses in the commercial facility can help reveal which times of day are most profitable. Business owners can then set their best hours for operation and potentially save money — for themselves and for building owners — by limiting power during less-frequented times.

MULTIFAMILY HOUSING

Apartment complexes and condominium associations typically use the most energy during off-peak hours, when tenants are home and use the pool, gym and other common areas. This means FMs may be able to curtail usage during typical work hours from 9 a.m. to 5 p.m. Restricting power to certain parts of the facility or installing motion-detecting light sensors during peak hours can help manage energy use on evenings and weekends.

This off-peak power-usage pattern changed for residential facilities during the COVID-19 pandemic, when many tenants began working from home. A recent study showed that, globally, 62 percent of workers aged 22-65 occasionally work remotely. The study indi-

cated that this trend may be reversing, however, as only 16 percent of companies are fully remote, and 44 percent do not permit remote work at all. Where people are going back to offices, multifamily housing facilities may be able to consider limiting energy demand during working hours.

24/7 FACILITIES

Some facilities, like health care establishments, must keep all systems running 24 hours a day, seven days a week, so there is no option to limit energy demand. This type of usage pattern has its advantages and disadvantages.

On the one hand, 24/7 facilities have consistent, reliable energy demand patterns, so it is simple to calculate energy supply needs. Facilities typically use a certain amount of energy — kilowatts or megawatts — during specific blocks of time. Though some hours may require more energy than the typical block and others may need less, facilities with steady, reliable patterns of usage have better load factors, so their electricity will be slightly cheaper — even though more power is being used overall because the power must be on all the time.

On the other hand, these 24/7 facilities are at the mercy of energy market price swings, making their energy procurement potentially costly. Being "on" all the time makes them more sensitive to market fluctuations.

In these cases, facilities must be extremely discriminating in their energy purchasing strategies — essentially controlling energy supply — to weather the difficulties of energy price volatility.

Manipulating demand for energy is not always possible. What can be done if facilities cannot reduce energy demand during peak hours? If they cannot shift to more off-peak operations? If they cannot reduce their energy usage at all?

Different types of facilities have different options. Some, like universities, have a complex mix of energy demand patterns for each type of building. Classrooms may follow the peak-hour weekday schedule, while dormitories and recreational facilities require more energy during off-peak hours and on weekends. Medical facilities, laboratories and technology centers may need power 24 hours a day, seven days a week. Each type of building would require a different purchasing strategy to minimize risk and maximize ROI.

In these cases, better managing the energy supply for specific types of facilities can help combat price volatility and promote sustainability. Purchasing energy at the right times and under the right market conditions is a good option to reduce costs and make energy planning more sustainable over the long term.

FMs should consult energy procurement experts who not only understand how to assess risk in energy purchasing but can also make targeted purchasing decisions according to specific daily conditions.

Energy hedging is one strategy for making data-based purchasing decisions that save facilities money and keep them sustainable in the long term.

Energy hedging

Rather than purchasing energy at fixed prices over 12 or 24 months (the typical energy strategy widely thought to be the most cost-effective), skilled procurement specialists can help property managers get the best ROI by purchasing energy at short intervals, based on daily calculations of risk, global and local prices, utility rates, occupancy levels and tariffs.

Called "layered hedging," the strategy involves making a series of energy purchases that are planned, flexible and able to take advantage of market opportunities as they arise. This calculation is based on the weighted average of all "hedges," or percentages of a facility's total energy load that are locked in at a fixed rate. Facilities "top up" the remaining energy needed by purchasing at a floating rate when market conditions are favorable.

Considerations

When choosing an energy purchasing strategy, FMs should consider:

- What percentage of energy supply will be part of an energy hedging plan?
- Should the electricity and natural gas strategies be the same?
- Should the same strategy be used across different locations and types of facilities?
- What local, state and utility regulations may influence purchasing options?

The bottom line

FMs must understand their options for managing energy demand and delivery in a given facility to positively impact the company's bottom line.

As each facility has distinct needs, professional energy advisers can develop targeted strategies that maximize purchasing outcomes. Trusting experts to make daily energy procurement decisions, rather than signing long-term contracts under which suppliers are more hands-off, empowers facility managers to take control of their energy procurement — and realize significant savings and peace of mind.

Using analytic tools and proven methods, skilled energy procurement specialists can develop and deliver energy strategies that mitigate risk, reduce the impacts of energy volatility, increase budget certainty and reduce energy expenditures. By auditing energy supply accounts, advocating vis-a-vis suppliers, overseeing system updates and discovering appropriate savings programs, advisers can assist managers in making more sustainable decisions about their facilities' energy plans. FMJ

Azi Feifel *is Chief Operating Officer at Prospect Resources Inc. He is a veteran of the hydronics industry, with many years of experience in the production of pumps, valves, boiler controls, steam specialties and fire pump systems, with a focus on pump and motor redesign for energy efficiency. Feifel is an adjunct professor of economics and finance and holds a number of technical certifications, including Certified Quality Engineer, Certified Reliability Engineer, and Six-Sigma Black Belt.*

RESOURCES

resources.owllabs.com/state-of-remote-work/2020

Decarbonization Pathways

MEETING SUSTAINABILITY GOALS

BY TONY LIOU

Since 196 parties adopted the Paris Agreement in 2015, the goal of limiting global warming to 1.5 C compared to pre-industrial levels has gained momentum. This goal has been the driving force for both government and corporate policies as they collectively seek to decrease carbon emissions and reach net zero by 2050.

To date, 191 countries, 5,893 companies and 2,061 organizations have submitted climate actions to the United Nations Framework Convention on Climate Change, while the Net Zero Asset Managers Initiative, an international group of asset managers who support reaching net zero by 2050 or sooner, currently has 236 signatories representing US$57.5 trillion in assets under management.

In addition to the Paris Agreement, more investors are using environmental, social and governance (ESG) as a barometer for assessing risks in their investment portfolio, further driving corporations to address sustainability issues. This is especially true for the commercial real estate industry, where investors are asking for higher environmental standards.

The building and construction industry was responsible for 38 percent of total global energy-related CO2 emissions in 2019, so there is plenty of room for improvement. As companies strive to meet their sustainability goals, it is vital for facility managers to understand the various pathways to decarbonization as they work on implementing carbon reduction measures. Due to the uniqueness of each building, there are no one-size-fits-all solutions, so FMs will play a key role in identifying and implementing the measures necessary for individual properties to achieve their goals.

DECARBONIZATION PATHWAYS TO REACH GREENHOUSE GAS (GHG) REDUCTION GOALS

1. GHG reduction goal setting

Overall GHG reduction targets are generally set by a company's management, after which asset managers may work on setting goals for each property or portfolio to achieve those targets. However, it is beneficial for FMs to understand the types of goals that can be set.

There are two well-known frameworks that corporations use to help define their decarbonization goals and report on their progress: the Science Based Targets initiative (SBTi) and Carbon Risk Real Estate Monitor (CRREM). Both align their objectives with the Paris Agreement and provide decarbonization pathways that are based on climate science. They have recently joined forces to provide a single standard for building decarbonization. While SBTi and CRREM provide helpful frameworks for goal setting and tracking, they are not mandatory. Aside from these frameworks, companies could establish their own specific goals that align with their corporate policies and the state of their properties.

With individual properties and portfolios, the asset manager should be setting discrete goals, whether they are performance based (e.g., reducing carbon of all assets by 25 percent by 2030 based on a 2020 benchmark) or prescriptive based (e.g., replacing fossil fuel equipment with electric equipment, with a target of 100 percent electrification of all properties by 2035). The goals should be reachable by the determined date, even if they are aggressive.

Not all properties within a portfolio need to reduce the same amount of carbon for a portfolio to reach its overall reduction target. High-performance buildings could compensate for high GHG emitting buildings that cannot decarbonize. However, it is still best to have minimum standards across all assets, such as 100 percent LED lighting by 2025.

Conversely, when it comes to setting goals for individual properties, it may not make sense to set a goal of 50 percent reduction in carbon if the property already has an ENERGY STAR certification with an ENERGY STAR score of 75 or above. The goal should be determined by the current status of the property and what is achievable. For FMs, it is important to know how the property is performing to assess whether the goal set for that property is feasible.

2. GHG emissions benchmarking

After the general goals are set by the asset manager or owner, the next step is benchmarking the current GHG emissions levels of each property and systematically analyzing the GHG emissions sources. This is where FMs would be needed to help with inputting or aggregating the utility bills and gathering all the data. For multitenant properties, FMs would need to engage with the tenants to access their utility bills for analysis.

The data collected will help set the actual reduction targets and would be used to show emissions reductions year-over-year. Each property's data could also be used as a comparative tool between the individual assets or aggregated to compare portfolios against each other.

GHG emissions are divided into three scopes.

- **Scope 1** includes emissions from all the company's owned or controlled sources, such as the equipment on site that burn fossil fuels or any company vehicles.
- **Scope 2** includes indirect emissions from electricity purchased and used, or generation of heating and cooling that was purchased by the company but are produced elsewhere and provided by a utility company.
- **Scope 3** includes other indirect emissions that are generated by the company's activities upstream or downstream in the value chain and not controlled by the company, such as business travel or employee commuting.

3. Energy and water audits

Reducing GHG emissions begins with a detailed inspection and analysis of the property's energy and water consumption, also known as an energy and water audit. For example, in the U.S., auditors go by the ASHRAE energy audit standards.

There are three levels of ASHRAE audits: Level I is a walk-through analysis; Level II is an energy survey and analysis; and Level III provides a detailed analysis of capital-intensive measures and expenditures. The purpose of these audits is to establish baseline consumption rate and quantify the energy and water usage. The audits will also include recommended energy efficiency measures, estimated costs of implementation, estimated energy and cost savings, simple payback periods and estimated carbon reduction.

The FM is a key component of the audit, as they usually walk with the energy auditor as the auditor surveys the property and answer questions about the physical systems of the property, operations of the property, control set points and provide intel for data collection. More importantly, FMs determine the scope of work after the energy audit is finished and decide on which measures to implement. They oversee implementation, as well as choosing any contractors necessary to perform the scopes of work.

The FM plays a critical role when it comes to implementing capital-intensive energy efficiency measures, such as replacing old HVAC equipment with an energy efficient item. Often, the measures recommended in an audit may not be implemented immediately, as the owner may want to wait until equipment reaches its end-of-useful life before replacing it. In this case, the FM must ensure that when the time comes, they are following the recommended measure to purchase the energy efficient item instead of like-kind equipment.

Additionally, FMs should document any changes in policies regarding the implementation of efficiency measures, such as using efficient LED lights, so that the company continuously follows the recommended measures instead of reverting to its old ways.

4. Retrocommissioning

Retrocommissioning (RCx) is the process by which existing building systems and equipment are optimized so that they perform more efficiently and their useful lives are extended. As buildings age, systems and equipment may degrade from wear and tear, sensors may become miscalibrated, and building control sequences may accidentally become modified/obsolete/turned off, thus losing their original performance. RCx is a low-cost way to improve the property's efficiency while also reducing maintenance costs. There may be on-site staff who can perform RCx; but if not, the FM could hire someone with RCx experience.

RCx, along with energy and water audits, and utility benchmarking are required as part of local ordinances in some municipalities, such as the Los Angeles Existing Buildings Energy and Water Efficiency Ordinance. FMs should be aware of any such ordinance in their cities and comply to avoid incurring late fees or other penalties.

5. Electrification

Electrification is the process of replacing technologies that use fossil fuels with those that use electricity as their source of energy. The electric grid is decarbonizing and getting cleaner, as areas that are still using dirtier fossil fuels (e.g., coal) for electricity generation are transitioning to cleaner fossil fuels such as natural gas and renewables, such as solar or wind. The International Energy Agency projects that clean energy will make up 95 percent of all new power generation globally through 2026. This means that if a property's equipment and systems are all electric, the property will decarbonize when the electric grid decarbonizes. Switching to all electric equipment may increase overall cost now depending on the property location, but electrification is necessary for the property to achieve net zero overall.

FMs can work with engineers or contractors to determine if existing equipment that is burning fossil fuel can be replaced with electric equipment. Additionally, they can work with their utility company to purchase green power, which is electricity generated by renewables. This usually comes with a premium, and the utility provider may not be able to provide enough electricity using a renewable source such as solar PV and wind. However, it is something worth exploring to reduce GHG emissions now.

6. Renewable Energy Systems

To reduce the property's reliance on fossil fuel and the electric grid, FMs can weigh the option of installing renewable energy systems, such as solar PV or solar thermal, which will reduce utility bills. Renewable energy technology is also maturing and costs have decreased. For example, the cost of solar panels has fallen 89 percent in the last decade, making it a more viable option than ever before.

7. Carbon Offset

Sometimes, direct emissions reduction and renewable energy may not be feasible. In this case, purchasing carbon offsets could be an attractive option for lowering the property's net GHG emissions. These certificates help fund projects that reduce emissions; so by purchasing them, the company is compensating for, or offsetting, their own emissions.

GETTING TO NET ZERO

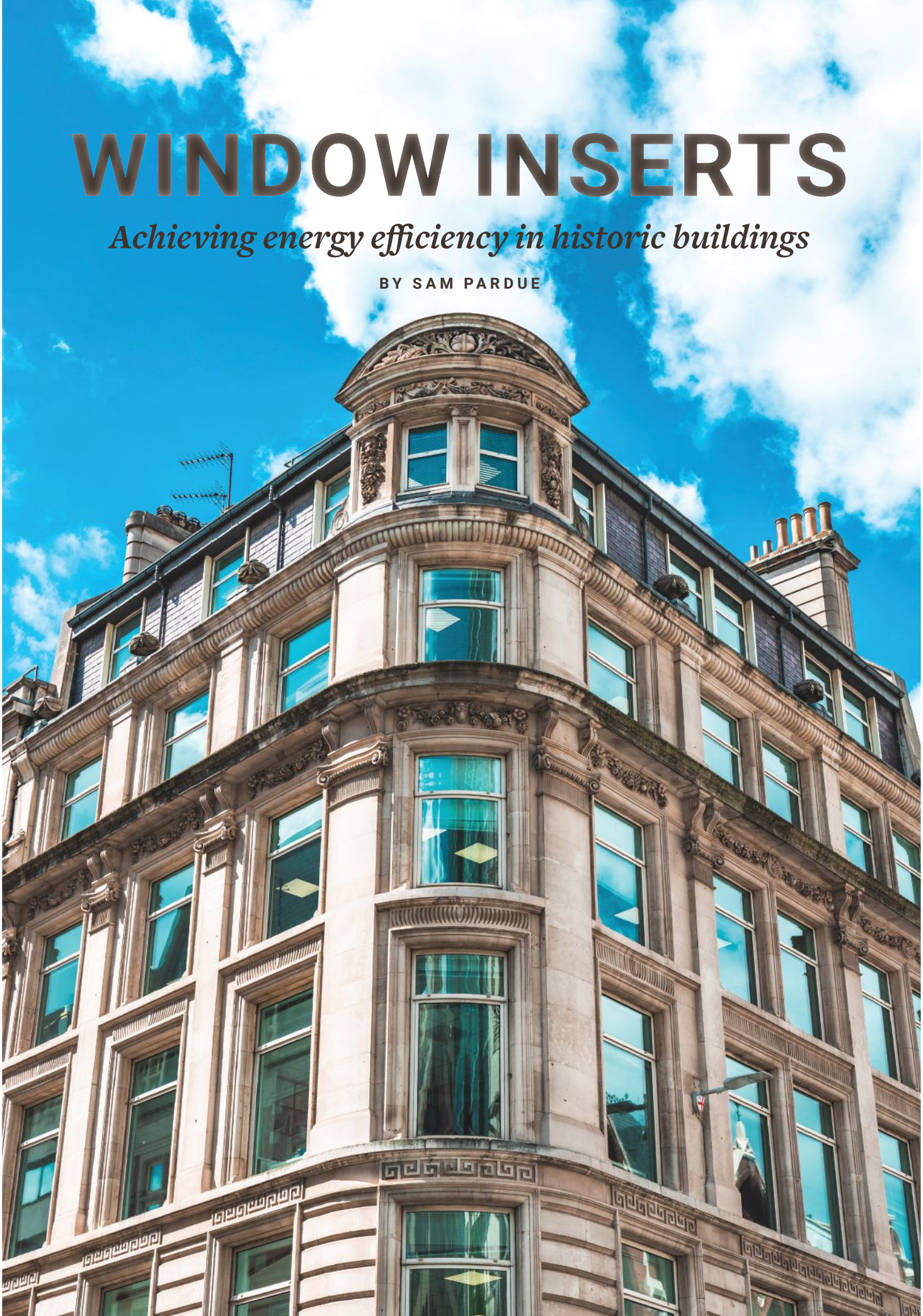
There is no one path to decarbonization and reaching net zero. However, there are numerous ways to improve the efficiency of a property, and a portfolio-wide goal can be net zero without all the assets having to achieve the same. As the focus on climate change intensifies, there is a tremendous amount of work to be done. But decarbonization is worth it, whether from a risk-mitigation point of view or to improve the asset. FMJ

Tony Liou *is co-founder and president of Partner Energy. He has a Master of Business Administration from University of Southern California and a Bachelor of Science in Mechanical Engineering from Cornell University.*

WINDOW INSERTS

Achieving energy efficiency in historic buildings

BY SAM PARDUE



Many historic buildings cannot and should not be torn apart to have their original parts replaced by new, higher performing materials. Yet the need for energy efficiency is not just popular, it is necessary.

Denver, Colorado, USA, is a leading city when it comes to green initiatives, such as the Denver Green Roof Initiative, but the city's love for historic preservation is not at odds with its concerns around the environment – they are commingled. This makes energy efficiency upgrades such as interior storm windows, or window inserts, perfect for both business and residential buildings. However, a 2020 Northwest Energy Efficiency Alliance report suggests there is little awareness of the full breadth of window insert, or in this case secondary window, products and manufacturers that are available to the commercial market. This means window inserts are less frequently considered for window upgrade projects or building renovations that require window improvement.

The National Institute of Building Science's Whole Building Design Guide Historic Preservation Subcommittee reinforces the idea that historic window replacement is rarely the only option for meeting building performance goals, suggesting the most environmentally responsible approach is to maintain, repair and retrofit historic windows for improved performance, as opposed to replacing them.

The U.S. federal government supports retaining historic homes and buildings with the Federal Rehabilitation Tax Credit, also known as the Historic Preservation Tax Credit. This tax credit is specifically for those who preserve, rather than replace, historic residential and commercial buildings.

This can feel counter-intuitive. How do building managers keep current tenants happy? How do property owners manage cost? How does one factor in resale value?

Turning to Windows for Energy Efficiency Updates

Compared to historic windows, many modern replacement windows have a relatively short lifespan and are made of glazing assemblies that cannot easily be repaired, leading to a cycle of disposal and waste. This can conflict with both sustainability goals for protecting the environment and the U.S. Secretary of the Interior Standards for protecting cultural resources.

Forty percent of a building's energy is consumed by heating and cooling, so checking air sealing and insulation is the first step toward energy efficiency. Regulating temperature in a historic home with older windows is challenging, and many property owners assume window replacement is the best option. However, replacing windows in old homes or historical buildings can rob them of their unique character, which can also decrease the value of the structure. Alternatively, window inserts can be custom made to address the individual needs of a building manager or homeowner, while also preserving the integrity of historic structures and preventing old windows from being tossed into a landfill.

Interior window inserts offer an effective way to boost comfort and save money on energy bills without having to replace windows or alter the character and value of a home or building.

Old windows come with old-growth wood frames. Because old-growth wood grew slowly, compared to the rapid-growth wood cultivated for construction today, its rings are closer together, resulting in a denser wood that can last for generations when cared for or restored properly.

Window inserts are barely visible from the inside of landmark New York City building, blocking drafts and city noise.

Exploring Storm Windows: Exterior vs. Interior

Storm windows add insulation to help regulate temperature without requiring window replacement construction. They also keep the original windows where they belong, adding to the building's value; but when it comes to options, there are some significant differences between exterior and interior storm windows.

Exterior storm windows detract from the curb appeal of a building, attaching to the window frame using a wood or aluminum casing via screws and caulk. This not only mars the building's aesthetic, but can also cause physical damage to the building.

Interior storm windows can provide the same energy savings as exterior storm windows without damaging the structure or appearance. Interior storm windows can be custom made and pressed into the window frame. They increase resale value because the upgrade, and energy savings, stay with the building.

Energy Efficiency in a Historic New York City Building

Project manager Joseph Casillo wanted to preserve what made his landmark building beautiful: moldings, fixtures, wavy glass and old-growth wood frames. However, modern efficiencies save money and bring convenience to tenants, which ultimately led Casillo to incorporate interior window inserts into his New York building.

The original windows were more than 100 years old and let in drafts, grime and city noise. Casillo wanted to provide comfort to his tenants without having to rip out, restore and reinstall each window in his multifamily building. New York has stricter landmark laws in place than some cities. Interior window inserts required no construction and adhered to all of New York's Landmark Preservation Commission regulations.

The inserts cannot be seen from the outside and are barely visible from the inside. Casillo says the tenants have noticed a difference in drafts and noise, and he expects the green addition will help facilitate sales.

Noise-canceling Window Inserts in a Portland Building

Existing window coverings or other hardware obstructions inside window frames can sometimes block the installation of window inserts, adding complexity to an installation. A great example of overcoming this challenge is the addition of window inserts in the Olympic Mills building in Portland, Oregon, USA.

A marketing firm was looking for a new office space when they came across the iconic Olympic Cereal Mills. Though the space was the perfect size, being next to train tracks was a big concern, not only for the firm but for anyone interested in the office space. Property manager Mike Larkin identified window inserts as a solution to reduce 70 percent of outside noise and stop drafts.

Plus, the window inserts offer flexibility for tenants who do not want to drown out the train noises, such as being easily reversable and ready to store based on preference. This customer needed to hire additional carpentry at a relatively high investment in relation to the cost of the window inserts. However, the property manager's return on investment analysis showed increased lease rates would quickly cover the added expense. The response the building received influenced the property manager to upgrade the entire west side of the building with window inserts.

Storm Windows in a Treasured Richmond Building

Window inserts help decrease noise and provide an energy efficient solution to historic Mezzo Lofts.

An older apartment building in the middle of a rich cultural downtown area was suffering from too much noise and not enough energy efficiency. The property managers were tasked with finding storm windows in Richmond, Virginia, USA, that would not harm the history held inside its walls and windows.

The majority of apartment tenants were students attending Virginia Commonwealth University and the Medical College of Virginia. They needed a quiet place to focus on work.

Instead of completely replacing the windows, the Mezzo Lofts manager chose window inserts, which not only blocked the noise from Broad Street, the iconic main street in Richmond, but also kept the cold drafts out, resulting in less heat being used in each apartment and a smaller bill at the end of the month. Window inserts helped the building achieve the ultimate goal of preserving the structure's character, while also creating a more relaxing place for students to live and lowering the energy bill for the managers.

When considering whether to replace windows, the inconvenience caused by construction also warrants careful consideration from building managers. It is one thing for a single family to tolerate construction in their home, but quite another to ask that of renters. Window inserts can provide a quick, clean way to address loud noises and drafty windows, without adding construction mess or inconvenience to a renter's living space.

Historic Mezzo Lofts, Richmond, VA, USA

The convenience factor of using window inserts rather than conducting a window replacement project was a big factor in Mezzo Lofts' decision — one that resulted in seamless installation with no resident complaints and a sooner-than-expected completion.

In Conclusion

Often, balancing the preservation of historic buildings without replacing the original windows can feel like a complicated challenge. Today, there are creative options, such as window inserts, for historic home and building owners to reduce the carbon footprint of the building, while providing a quiet, healthy and enjoyable space for themselves or their tenants. FMJ

Sam Pardue *is a serial entrepreneur who has formed start-up ventures and social impact initiatives in Portland, Oregon, USA. In 2010, Pardue founded Indow, a company that manufactures and markets a window insert. He has also formed the social impact ventures We Hire Refugees and Clean Practice in response to community challenges.*

RESOURCES

denvergov.org/Government/Agencies-Departments-Offices

neea.org/img/documents/Commercial-Window-Attachments-Secondary-Window-Market-Characterization.pdf

wbdg.org/design-objectives/historic-preservation sustainable-historic-preservation

SUSTAINABLE FACILITIES ARE ESSENTIAL FOR THE FUTURE

BY NAYAB KHOKHAR

Creating sustainable facilities is essential for the future of the planet. According to the United Nations, up to 40 percent of the globe's energy usage comes from real estate. Additionally, research shows that unless the world achieves net-zero emissions by 2050, the risks of climate change will continue to accelerate. That means that how facility managers choose to implement sustainability mandates in their facilities will have a sizable impact on the climate crisis into the future.

Facilities are much more than just real estate. They need to be constructed and maintained with sustainability in mind. This is necessary to mitigate their environmental impact to achieve global net-zero emissions. Implementing sustainability mandates codifies these environmentally sustainable practices, putting the pursuit of sustainability into the heart of everything the facility does.

FMs can have a sizable impact on climate change through the sustainability mandates they implement in their facilities. They must engage in a balancing act of considering best practices for running the facility efficiently while also minimizing the environmental impact caused by its operations.

Sustainability mandates are beneficial for businesses in the long term

Bloomberg reports that environmental, social, and governance (ESG) investments will account for over a third of the globe's total assets under management by 2025. Going forward, sustainable practices will be more cost-effective and beneficial for businesses in the long term.

Generally, consumers are changing how they engage with companies. They are rewarding companies that show a commitment to the betterment of the world, including when it comes to environmental sustainability. Millennial consumers may have pressured companies to consider sustainability more, but Generation Z is more interested in seeing results and positive impacts from sustainability mandates. Generation Z ages into a demographic that has a direct affect on the economy and where they choose to spend money, it is up to facility managers to show true commitment to sustainability.

Going paperless to go green

Transitioning to a paperless facility is a powerful step towards achieving environmental sustainability. From an environmental standpoint, paper is a highly wasteful material. Roughly 35 percent of trees cut down annually are used in the paper industry. Nine percent of those trees are from old growth forests, which include trees over a century old. Paper production is also a contributor to greenhouse gas emissions, and water pollution through the release of toxic by-products.

Paper waste accounts for 40 percent of all waste produced in the United States. This translates to 71.6 million tons of paper waste per year. Moving just 1 million tons of paper fiber to fully recyclable paper would have the same environmental impact as taking 248,000 cars off the roads. Facilities going completely paperless would have an even greater impact on environmental sustainability.

Redundancy in paper

The average business document has 19 copies. Moreover, more than 81 billion sheets of paper are copied every month. Printing all these redundant copies is needlessly expensive for any business, including facilities. More than $5 billion is spent on printed materials annually, and a large portion of these materials end up becoming obsolete.

By going paperless, facilities are not only making an impactful choice towards environmental sustainability, but also cutting down on unnecessary costs towards printing. A digital solution over a paper one will save facilities both time and money, as well as increase efficiency by greatly reducing the time it takes to locate documents.

By removing paper from the equation, facilities can become industry leaders that avoid producing unnecessary waste that continues to be harmful for the environment.

Other methods for sustainable FM

Transitioning into a paperless facility is one of many ways that leaders can practice sustainable FM. Implementing any form of mandate for sustainable FM is a step towards achieving global net-zero emissions.

SUSTAINABILITY MANDATES FOR A LOWER CARBON FOOTPRINT

There are several strategies that can be implemented to work towards lowering a facility's carbon footprint. FMs can set a designated standard and monitor the performance of their facilities and operations. They can find areas where electricity, fuel, and other operating costs can be reduced. Operating managers and building occupants can be expected to participate in practices that lower the facility's carbon footprint. FMs can also enact other policies that work towards a lower carbon footprint.

Setting goals and targets is an effective way to ensure that mandates are proving effective. FMs can track the performance of their enacted sustainability mandates over time to ensure that the expected targets are being met. If the targets are not being met, FMs can re-evaluate whether the set targets are realistic or whether further changes need to be made to meet them.

PREVENTATIVE MAINTENANCE AIDS SUSTAINABILITY BY KEEPING FACILITIES RUNNING SMOOTHLY

Machines and equipment wear down and stop operating at peak performance over time. While this may not always seem like an urgent problem, especially if the equipment is still getting the job done, it can lead to bigger issues if left unchecked.

What began as a slight decrease in efficiency can lead to equipment requiring expensive and resource-intensive repairs or replacements.

A less visible issue may lead to increased energy or resource consumption that adds up over time, to a degree far beyond what preventative maintenance would cost.

Preventative maintenance, including maintenance assisted by software that automates processes, can lead to saving a lot of energy and resources in the long term.

EMBRACE NEWER TECHNOLOGIES TO ENHANCE ENERGY EFFICIENCY

Old and outdated technologies typically were not designed with energy efficiency in mind. This means that older buildings may have outdated systems in place that use an unnecessary amount of energy or other resources. FMs should embrace newer technologies where possible to boost sustainability while also cutting back the extraneous costs the old technologies are draining.

If possible, solar and geothermal energy solutions may require a big budget at first, but pay for themselves over a period of time. Installing new insulation and green roofing can conserve heat and energy, and automated lighting can also save energy by making sure lights are only on in rooms that are in use.

Daylight detection lighting systems connected to automatic dimmers can be used to regulate the amount of energy being used for lighting throughout the day. LED light bulbs are also much more energy efficient than incandescent or fluorescent light bulbs, especially when paired with energy-efficient light fixtures.

ENVIRONMENTALLY-FRIENDLY CLEANING SUPPLIES ARE BETTER FOR FACILITIES AND THE PEOPLE WITHIN

Many cleaning supplies found around the typical workplace contain harmful chemicals that have negative effects on the environment, and also on the people working or visiting there. These chemicals often find their way into natural water systems, causing harm to the plants and animals that make up natural fresh and saltwater ecosystems. These chemicals can even end up affecting the water that people drink.

In 2002, the United States Geological Survey found traces of detergent in 69 percent of US streams, and traces of disinfectants in 66 percent of those streams. These numbers have likely grown since then.

Chemicals found in cleaning supplies that cause environmental harm include triclosan, phosphates and volatile organic compounds. Triclosan is typically found in antibacterial cleaning supplies, and has been linked to cancer and hormone disruptions in humans. Phosphates are used in floor cleaners and other detergents. Volatile organic compounds include chemicals such as ammonia, nitrogen, and phosphorus. They can cause excess growth of algae and bacteria, which can lead to water sources becoming poisoned.

Using sustainability mandates to limit the amount of toxic chemicals used by facilities can improve sustainability and reduce a facility's negative impact on the environment.

PRACTICE SUSTAINABLE WASTE DISPOSAL METHODS

Recycling policies can be an effective form of sustainability mandate for facilities. Recycling should not be limited to just paper, plastics, and metal cans. Composting is an effective way to recycle lunch waste and other organic waste.

Some more complex items may be more difficult to recycle, but the effort to recycle them will be worth not releasing harmful by-products into the environment. For example, batteries and fluorescent lights contain hazardous materials and should not be thrown into the regular garbage receptacle. Chemicals and large pieces of equipment should be properly disposed of to ensure that they do not leave a negative impact on the environment.

Sustainable FM is achievable and necessary

To achieve global net-zero emissions by 2050, facilities must practice sustainable FM. FMs can have a sizable impact on climate change by implementing sustainability mandates that will ultimately benefit their facilities in the long term.

As awareness of climate change spreads and consumers place increasing expectations on businesses to continue to shift towards environmentally sustainable policies, implementing effective sustainability mandates will become increasingly cost-effective and necessary for facilities in the long-term. There is only one Earth, and FMs are in a powerful position of responsibility to help ensure this planet will continue to thrive for generations to come. FMJ

Nayab Khokhar *is a Drawing Specialist Writer Aficionado at DCM Inc. A graduate of the Communications and Professional Writing program at Centennial College, he has volunteered as an English as a Second Language tutor in his home town of Cobourg, Ontario.*

RESOURCES

reminetwork.com/articles/sustainability-is-now-a-priority-in-facility-management/
facilitiesnet.com/energyefficiency/article/Sustainability-Must-Start-with-Energy-Management--19365
bloomberg.com/professional/blog/esg-assets-may-hit-53-trillion-by-2025-a-third-of-global-aum/
ifwe.3ds.com/home-lifestyle/the-sustainability-mandate
sciencing.com/how-does-recycling-paper-affect-the-environment-5171772.html
drawingspecialists.com/paperless-plans-go-digital/
horizantsolutions.com/facilities-management/striving-for-environmental-sustainability-in-facilities-management/
aspenclean.com/blogs/sustainable-living/the-environmental-dangers-of-using-cleaning-products

The following product and service providers offer solutions for your everyday and specialized facility management needs.

BUSINESS SERVICES

4SITE by CORT, A Berkshire Hathaway Company

No matter what size your workspace, 4SITE works for you. Overhead costs, renewing a lease...or not, employee productivity and even more important, their safety. These are the tough decisions you are having to make on a daily basis, which can be challenging without all the information. At the heart of 4SITE is a desire to empower businesses to make better decisions. By harnessing data collected from your workplace, you now have insights into planning, operations, space usage, and employee utilization like never before.

4sitebycort.com

CEILINGS

Armstrong Ceiling & Wall Solutions

Armstrong World Industries, Inc. (AWI) is a leader in the design and manufacture of innovative commercial and residential ceiling, wall and suspension system solutions in the Americas. With $937 million in revenue in 2020, AWI has approximately 2,800 employees and a manufacturing network of 15 facilities, plus six facilities dedicated to its WAVE joint venture.

armstrongceilings.com/commercial

CONSTRUCTION/DESIGN

Construction Specialties

Founded in 1948, Construction Specialties (CS) is a specialty building products manufacturer. CS provides solutions to complex challenges that architects, designers, building owners, facility managers, and contractors face every day. Since inventing the extruded louver, CS has become a global leader in interior wall protection, impact-resistant doors, entrance flooring, expansion joint covers, architectural louvers and grilles, sun controls, specialty venting, cubicle curtains and tracks. CS draws upon extensive expertise to design custom, high-quality products—many of which are a part of the Cradle to Cradle Certified™ Products Program.

c-sgroup.com

ENERGY MANAGEMENT

CBRE

CBRE Group, Inc. (NYSE:CBRE), a Fortune 500 and S&P 500 company headquartered in Dallas, is the world's largest commercial real estate services and investment firm (based on 2021 revenue). The company has more than 105,000 employees (excluding Turner & Townsend employees) serving clients in more than 100 countries. CBRE serves a diverse range of clients with an integrated suite of services. Please visit our website at www.cbre.com.

cbre.com
@cbre
linkedin.com/company/cbre/

FACILITY MANAGEMENT SERVICE PROVIDERS

ABM

ABM is a leading provider of facility solutions, including janitorial, electrical, lighting, energy solutions, facilities engineering, HVAC, mechanical, landscape, turf, mission critical solutions, and parking. Developed by experts in infectious disease and industrial hygiene, ABM's EnhancedClean™ and EnhancedFacility™ programs help foster healthier spaces. For more information, visit www.abm.com.

abm.com
@ABM_Industries
linkedin.com/company/abm-industries

FOOD/BEVERAGE

Fooda

Fooda is a national, technology-driven, food service company that is taking the lead on redesigning food in the workplace in offices, hospitals, warehouses, the military, and other settings. Fooda offers a platform of services including Popups, cafeterias, online boxed lunch delivery, and pantry services. All food is provided by local restaurant partners who have used the platform to grow their lunch business and acquire new customers. For more information, visit www.fooda.com.

fooda.com
@GoFooda
linkedin.com/company/fooda

HVAC/IAQ

Heraeus Noblelight America LLC

Heraeus Noblelight is a manufacturer of photonic solutions having invented the first ultraviolet lamp. Its line of Soluva UVC (UVGI) airstream disinfection devices includes in-room and in-duct solutions. Powerful UV-C light effectively inactivates COVID variants, flu and other viruses and bacteria. Soluva devices contain the UV-C light within for safe use in occupied spaces without producing harmful byproducts or using chemicals. An internal fan moves air through for faster air changes per hour.

soluva.com
linkedin.com/company/heraeus-noblelight

JANITORIAL PRODUCTS/SERVICES

GDI Integrated Facility Services

One Company, One Culture

We work hand in hand with our sister companies to fully integrate all facility services to fulfill our customer needs as they continue to demand more from us, challenging us to go above and beyond the scope of our agreements to deliver value in both qualitative and quantitative ways.

gdi.com
@gdifacilityservices
linkedin.com/company/gdi-integrated-facility-services

OFFICE PRODUCTS/ACCESSORIES/SUPPLIES

Vaask

Clean by design

The Vaask® touchless hand sanitizing fixture is available in customizable finishes and designed to complement the style of any space. It uses AC power or POE (power-over-ethernet) – no batteries required. Vaask is available recessed into the wall, in a wall-mounted stand or freestanding. Built to last, the U.S.-manufactured fixture is made of aluminum and backed by a 5-year warranty. The large-capacity, refillable cartridge is compatible with any alcohol-based sanitizer gel. Its PalmPilot® sensor accurately detects hands, eliminating mess. An array of LEDs both attract users and notify staff when it's time to refill. Learn more at Vaask.com.

vaask.com
@hello_vaask
linkedin.com/company/vaask/

PEST CONTROL

Xcluder

Xcluder® is the global leader & innovator in pest exclusion, offering a full line of commercial & residential pest control solutions, including patented Xcluder fill fabric, rodent-proof door sweeps, and rodent-proof garage door and dock leveler seals. Xcluder is trusted by pest professionals worldwide and is proven effective by the USDA/APHIS, providing effectiveness unmatched in the industry. Made in America, Xcluder contains no harmful chemicals and is safe to use around people, pets & food.

BuyXcluder.com
@XcluderRodent
linkedin.com/showcase/

RELOCATION MANAGEMENT/EQUIPMENT

Sustainable Office Solutions Ltd

SOS is a specialized sustainable asset management business that works with corporations, landlords and property managers to facilitate responsible reuse and redistribution of material assets during their relocation. With 30 years of experience in architectural & product services, we strive to make sustainable asset management simple & easy. Our program enables organizations to maximize their asset's value, benefit their community & make a positive impact on the environment.

sos-action.com
linkedin.com/company/sos-action/

VEHICLES/TRANSPORTATION

Blink Charging

Blink Charging Co. is a leader in electric vehicle charging equipment and has deployed over 30,000 charging ports across 13 countries, many of which are networked EV charging stations, enabling EV drivers to easily charge at any of the Company's charging locations worldwide. Blink Charging's principal line of products and services include its Blink EV charging network ("Blink Network"), EV charging equipment, and EV charging services.

blinkcharging.com/
@BlinkCharging
linkedin.com/company/BlinkCharging

ROOFING

The Garland Company

The Garland Company, Inc. manufactures high-performance roofing and building envelope solutions. For over 125 years, Garland has raised the bar of performance while exceeding the needs of customers throughout the world. Our network of over 220 local building envelope professionals located throughout the U.S., Canada and the U.K. provide quality building envelope solutions for single and multi-property facilities. Garland, headquartered in Cleveland, Ohio, is an ISO 9001:2015 certified company.

www.garlandco.com
@GarlandWorks
linkedin.com/company/the-garland-company-inc-/

Connect with other facility management professionals at the largest FM events.

Tap into today's industry trends and standards for tomorrow's built environment.

At IFMA's events and conferences, FM professionals gain knowledge, share best practices and discover cutting-edge technologies.

Make connections and grow your professional network at some of the most exciting facility management events in the world.

World Workplace Asia-Pacific
26-27 July 2022 | Hybrid Event
Marina Bay Sands | Singapore

IFMA Global China '22
Suzhou, China

IFMA WORLD WORKPLACE
SEPTEMBER 28-30, 2022
MUSIC CITY CENTER | NASHVILLE, TENNESSEE, USA

IFMA Global India '23

WORLD WORKPLACE EUROPE '23

IFMA Global LATAM

IFMA's Facility Fusion 2023 Conference & Expo
April 11-13 | San Francisco, CA, USA

Explore IFMA Events

Scan me