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May/June 2017 / www.greenbuildermedia.com

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EDITOR'S NOTE

The Inside Scoop

By Matt Power
Editor-in-Chief

Building Intelligence: A New Path to Multi-family Success

A growing list of machine-to-machine solutions vanquish many profit-killing variables of building rental properties.

THE FRONT END of a development project, once you get past the planning and permitting phase, is typically where good builders can really shine. And if you're a reader of this magazine, chances are you're already pushing the envelope in terms of craftsmanship, home performance and scheduling. But are you following the market, or leading the way? If current trends continue, the future of most residential construction lies in cities, not the old model of single-family production homes on greenfields. Sure, there will always be a market for one-off, high-end custom homes, but is this how you want to spend your twilight years, serving an ever-smaller group of ever-more-demanding clients?

When you sweep up the last sawdust from a custom home, you're stuck marketing yourself again. There's no additional income from that huge investment of your time and labor. Word of mouth can carry you a long way, yes, but will you swing a hammer while others are retiring and kicking back?

How about a rental property that keeps on paying the bills long after the crews have gone home?

Building a large, multi-family rental project is a years-long process. It requires some specialized knowledge, ambition and persistence. But multi-family rental housing is exactly what's needed now. A recent Trulia study of homeowners and renters finds that the market is shifting toward rentals, and not only because of affordability (although that's a large factor). The group most aggressively moving toward rentals and away from ownership is millennials in the upper-middle class, the group that traditionally becomes the next crop of homebuyers.

Big cities are where the biggest demand is, of course, but smaller cities are not far behind. Investment in rental properties in secondary markets hit a 16-year high in the last quarter of 2016, according to JLL. The market is hot, and money is available.

Now let's put a sustainability spin on this idea. Until recently, the potential risks of rental properties kept many traditional homebuilders from crossing over. We've all seen overly optimistic condo projects struggle to find renters. Add in strict rules requiring more market-rate units, parking, greenspace and so on, and the risk often seems to outweigh the potential benefits.

But Internet of Things technology has created a safety net, if you will. Assuming you do your homework, and build in an area with rental demand, you now have tools to help you control the operating cost of those rentals. If you've ever been a landlord, you know how a small oversight can result in long-term hemorrhaging of profits. To attract more reliable renters, many properties roll heat, cooling, water and electric utilities (and Wi-Fi access) into a single bill. But research shows that this arrangement often leads to irresponsible behavior by tenants, who have no financial incentive to reduce energy use or shorten showers.

The IoT adjusts for bad behavior. With the advent of smart thermostats, zoning control for mini-splits, smart shower controls, smart meters, smartphone-enabled HVAC monitoring, occupancy sensors, window sensors and the software to synthesize all of this information, you—the landlord—are back in the driver's seat.

Another advantage to smarter housing control: It makes affordable units feasible. A well-thought-out apartment management plan doesn't have to be draconian to reduce energy and water waste. Operating in the background, it can automatically shut off lights in unoccupied rooms; keep baths free of excess, damaging humidity; clear kitchens of greasy cooking fumes; and keep residents comfortable while also aware that opening windows with the heat on will not fly.

As you explore the multi-family projects in this issue, think of them with IoT systems in place, fine tuning their performance. A well-built unit, engineered with smart systems in mind, will require less maintenance, less energy and water, and command a more competitive rent than the "dumb" alternative. **GB**

Green Builder® Media *presents*

FLEX HOUSE

by Shelter Dynamics

To learn more about The Flex House, visit http://www.greenbuildermedia.com/vision-house-flex-house or contact Cati O'Keefe at cati.okeefe@greenbuildermedia.com

The Flex House: Right-Sized Living

Green Builder® Media and Shelter Dynamics proudly introduce The Flex House, a model for "Right-Sized" living in a small, flexible space that is completely connected, intelligent, resilient and sustainable.

To us, "Right-Sized" living doesn't just refer to square footage. It also means having the flexibility to adapt your home to your evolving lifestyle and consuming only the natural resources that you need—no more, no less.

The Flex House boasts a fully integrated smart + solar system, with an advanced smart home system that streamlines energy usage. The house serves as its own microgrid, producing all of its own energy. The Flex House is also designed to be super water efficient, featuring the most water conserving products and fixtures, with non-toxic, sustainable materials to ensure healthy indoor spaces.

Visit The Flex House at PCBC (June in San Diego), Solar Power International (September in Las Vegas), and CES (January, 2018 in Las Vegas).

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Millennials: The Next Great Marketing Challenge

As they head into their financial prime, the baby boomers' kids will be a tough but coveted sell.

GREEN BUILDERS WHO THINK it's been a boon marketing to ever-environmentally conscious baby boomers and Generation Xers over the past decade have an even bigger prize ahead. The millennials, who are heading into their prime earning years, will have the most spending power of all, but be very careful with their money, according to a San Diego investment planner.

As the largest segment of the adult population—the Census Bureau puts their number at 75 million, between ages 15 and 33—millennials will be influential for decades, according to Dennis Notchick, a certified financial planner with Safeguard Investment Advisory Group.

They've also learned a lot from their baby boomer parents, when it comes to saving and investing money. "Sixty-five percent of millennials believe their parents provided a good example of how to have a successful financial future," Notchick says in a company release. "They also realize that there is a cost to doing nothing, and also a potential risk."

Millennials have become very good at creating budgets, which help them do a better job at planning and saving, Notchick adds. Advice and examples from their parents have also taught them to spend money only on things they really deem important.

And, they've learned to change with the times. "The fact they grew up in a time of fast-developing technology and are quick to adapt to the changes also gives them an advantage," Notchick notes. "In the financial-investing world, new technology now provides for an instant snapshot of an investment or an entire estate on an app on their phone, and that's a domain they are comfortable working within."

CREDIT: FLICKR/JEFF DJEVDET

Behold the 'M' word. Thanks to their size and spending power, millennials are about to become a green sales force to reckon with.

Energy Star Labeling Wins Consumers

More than 9 in 10 shoppers prefer goods with the ES label.

IN 2016, 91 PERCENT of U.S. households recognized the Energy Star label, up from 88 percent a year earlier, according to a survey by the Consortium for Energy Efficiency (CEE). Last year's results are also the highest level of recognition observed in any survey year, up by 48 percent since CEE's first survey in 2000, CEE notes.

The household survey, conducted in the nation's top 57 Nielsen Designated Marketing areas, shows the strength of the Energy Star brand by measuring label recognition, understanding and influence on purchasing decisions, according to CEE Deputy Director John Taylor.

"Consumers continue to exhibit broad understanding of what the label means and look to Energy Star when purchasing energy using products," Taylor says. "The credibility and independence brought by the federal government, combined with the boots-on-the-ground of efficiency programs and industry partners, continue to bear fruit."

Forty-five percent of households reported that they knowingly purchased an Energy Star product in the last 12 months. Additionally, 85 percent of those households were likely to recommend an Energy Star-labeled product to a friend, which is "indicative of strong brand loyalty and emotional connection among those customers that use the label," Taylor says.

Environmental Protection Agency, National Awareness of Energy Star for 2016, **http://bit.ly/2pUCYiB**

CREDIT: ENERGY STAR

A rising 'Star.' More people than ever are seeking out and recommending products with the Energy Star label, according to the Consortium for Energy Efficiency's latest survey.

CREDIT: INOVATEUS SOLAR

From steel to solar. A former Indiana steel mill that underwent an environmental cleanup has become a solar farm that will power 1,000 homes.

Superfund Site Goes Solar

After more than 30 years, the Kokomo Project's environmental cleanup is over.

A DECADES-LONG EFFORT to decontaminate and repurpose a former Kokomo, Ind., steel mill was completed in May, when the property reopened as a 21,000-solar panel energy farm.

The one-time Continental Steel factory, which closed in 1986, was a $66 million U.S. Environmental Protection Agency Superfund cleanup site until 2011. The EPA and the Indiana Department of Environmental Management turned the property over to Kokomo and provided a $100,000 superfund redevelopment grant to the city to devise a plan to reuse the site, now known as the Kokomo Project.

City officials selected South Bend, Ind.-based Inovateus Solar and Vancouver-headquartered Alterra Power Corp. to develop and manage the farm. The Kokomo Project is capable of supplying power to 1,000 homes, according to EPA Acting Superfund Director Margaret Guerriero.

"The [joint effort] really made it possible for us to do what we needed to do to design the plan at a low cost, but stay within their covenants and make sure that we're keeping the site safe for the community," says Inovateus Solar Senior Account Executive Austin Williams.

Indiana Department of Environmental Management Commissioner Bruno Pigott says he is pleased to see the project finally come to fruition, because it will "benefit residents for generations to come."

Canada Considers Hemp-Based Materials

On the rise in the U.S., flax and hemp panels have good physical properties that could help northern sales.

CANADIAN HOMES COULD one day use flax and hemp fibers as key building components, according to research by a graduate of the University of British Columbia's Department of Forestry. Solace Sam-Brew says the plants' residues are technically better than the particleboard typically used in products like countertops, shelves and flat-packed furniture.

But don't start planting seeds in the yard yet. Sam-Brew says the costs of manufacturing flax and hemp particleboards in Canada are too high to make it a competitive material. Particleboard is held together by an inexpensive urea-formaldehyde, while flax and hemp products use the pricier pMDI as a stabilizing resin.

That doesn't mean flex and hemp fibers will never be a building option, she notes. Flax and hemp particleboards are lighter than wood, and making a lighter product could mean faster production rates and significant energy and transportation savings, according to Sam-Brew. Reducing the amount of resin or substituting the plant binder lignin for some of the pMDI would also cut costs.

"Flax and hemp are widely available in Canada, especially in the west," Sam-Brew says. "It's worth considering their viability as alternative raw materials to wood for particleboard production."

Hemp, a derivative of cannabis, has grown in popularity in the U.S. in recent years, largely due to legalization of marijuana products in many states. Builders are also recognizing the product's ability to absorb large quantities of carbon dioxide from the atmosphere when the plant is in hempcrete, or brick-like, form.

CREDIT: PUSH DESIGN

Homegrown housing. The Push House, the first home in the United States built with hemp, could serve as a template if the plant's use as a building material catches on in Canada as expected.

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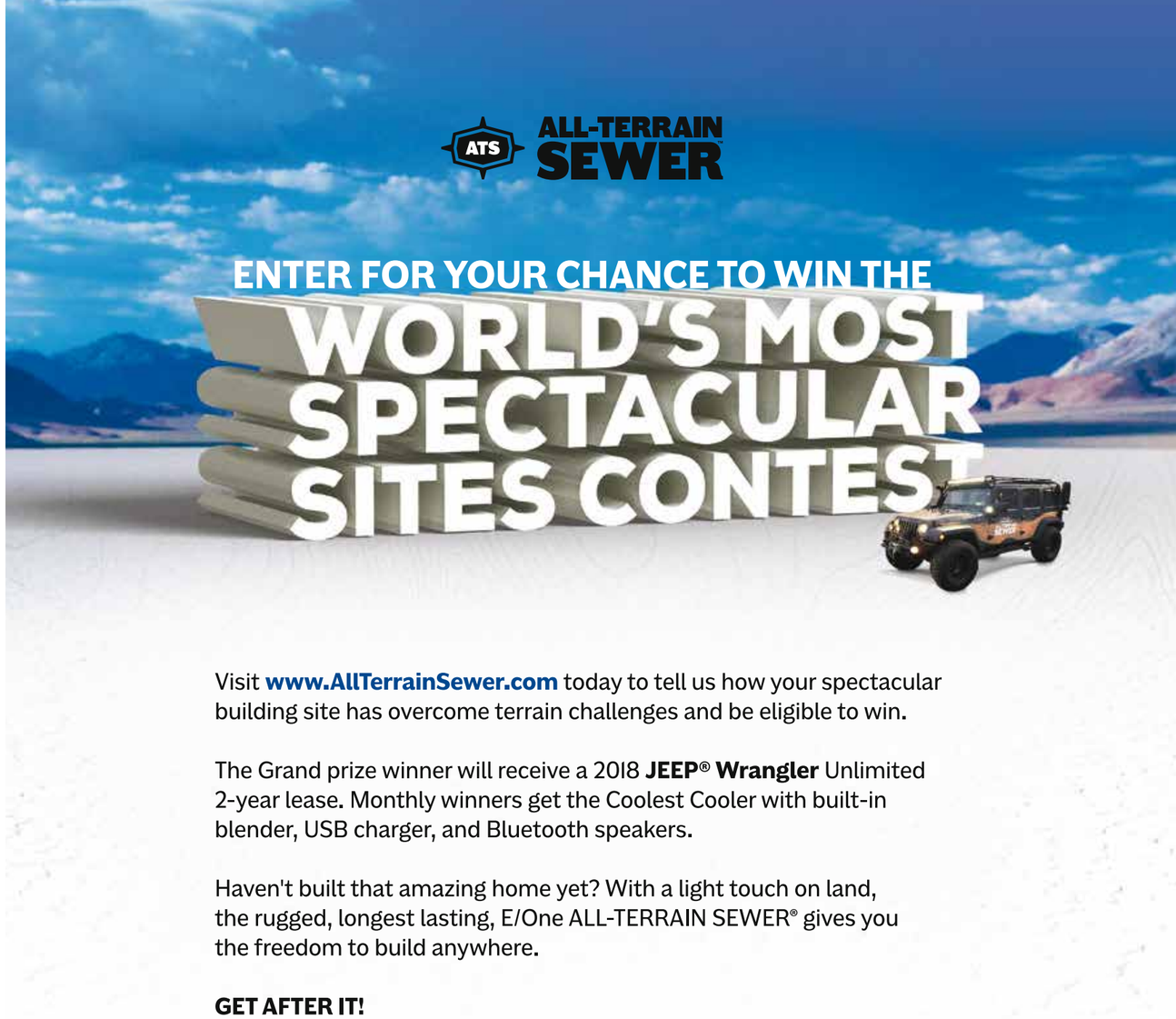

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HERE'S A SAMPLE OF WHAT'S INSIDE

"Smart cities understand there is no independent salvation on this planet. We're all in this together. We need each other. And we must learn from each other if we're going to succeed and thrive."

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ON THE COVER

HOUSING THE MANY

Artist: Kip Ayers

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FEATURES

DEPARTMENTS

CREDIT: ALIGN3D

Uniquely modern. Exterior materials, treatments and colors give The Flex House prototype a distinctive modern style.

Green Builder Media presents

THE FLEX HOUSE

"Right-sized" living goes on display with this net-zero-energy modular demonstration home.

BY JULIET GRABLE

IN 2016, GREEN BUILDER® MEDIA and Shelter Dynamics introduced The Arc House, a small-footprint, resilient demonstration home that showcased the convergence of intelligent, connected and solar technologies. Jim Gregory, founder of Shelter Dynamics and creator of The Arc House, called his prototype "a demonstration of a direction" in sustainable housing. This year, the two partners are expanding on that direction with the debut of The Flex House.

The Flex House is characterized by the same high-end craftsmanship as its predecessor, and the two homes share many features, including curving rooflines, vaulted interior spaces and abundant daylighting. Like The Arc House, The Flex House is net-zero-energy ready and is built with durable, high-performance materials. But this new prototype is designed to appeal to a broader audience. The first Flex House is currently being constructed in a factory in Ridgecrest, Calif., in preparation for its debut at the PCBC trade show this June.

Green Builder® Media *presents*

FLEX HOUSE

by Shelter Dynamics

Green Features

- Net-zero energy ready
- High-performance building envelope
- Flexible and optimized floorplan
- High-quality modular factory construction
- Customizable exterior design
- Long-lasting durable materials
- Spacious daylit interior
- Intelligent water solutions
- Integrated smart home technology
- Efficient appliances and HVAC

Flex spaces. The living room and office space in this floor plan could be combined into a single great room.

No More; No Less

Though still a small-footprint home, The Flex House, at 760 square feet, is significantly larger than The Arc House. The prototype includes a master bedroom, smaller bedroom or office, bathroom, two living areas, a full kitchen and a flexible "niche" space. Despite its high craftsmanship and customizable design, The Flex House was designed to be affordable. Mark Gautreaux, CEO of Shelter Dynamics, estimates the base model will range from $85,000 to $100,000. More than a tiny house, The Flex House represents a realistic alternative to today's oversized homes—a solution that could work for any number of customers, from young millennial families to empty nesters.

While the size of the average American home keeps growing, The Flex House speaks to the concept of right-sized living, or using good design to make the best use of every square foot.

"We live big here in America, but at the same time there's a growing awareness around resource conservation," says Green Builder® Media CEO Sara Gutterman. "What I like about The Flex House is we're not asking people to sacrifice; we're just asking people to not use any more than they need."

Multi-Faceted Flexibility

Flexibility may well become the new buzzword when it comes to desirable housing. With the changing architecture of families and the workplace, house design that can accommodate changing needs will have an edge.

The Flex House is flexible on several fronts. The initial prototype was designed to represent a "sweet spot" in square footage. But new modules—a "bedroom module" or "home office module," for example—can also be added to expand the home, should occupants' needs change. A second-story module can serve as either an extra bedroom, office or "getaway" space.

The Flex House also has another unique feature. When constructed in the factory, the floors are installed first, before the interior walls. This way, the dwelling can accommodate any number of different customized floorplans and wall configurations, and construction can begin before the design is finalized.

Finally, The Flex House is aesthetically flexible.

"Jim Gregory conceived of the idea of design flexibility, so that The Flex House can be adapted to any number of styles," says

Green Builder® Media *presents*

FLEX HOUSE

by Shelter Dynamics

Gutterman. The Arc House had a distinctive Craftsman aesthetic, with generous amounts of wood, knee braces and warm, earth-toned colors. But The Flex House can pull off modern and other styles, ensuring it will appeal to many different customers and fit into many different settings, including new modern developments and "pocket" neighborhoods.

Smart and Sustainable

Right-sized living applies to more than square footage; it extends to energy and water usage and material choices, too. The Flex House is built with a high-performance envelope, and it will showcase energy-efficient HVAC and appliances and water-saving plumbing fixtures. But smart home technologies will also play an important role in making it a sustainable dwelling.

Like The Arc House, The Flex House will demonstrate the convergence of smart home and solar technologies, and with its solar PV array and storage battery, it can be completely self-sufficient when it comes to energy. But The Flex House goes beyond energy efficiency and improved comfort by demonstrating the concept of "intelligent water"—responsive technologies that save water by communicating with users. Other technologies will demonstrate what Gutterman likes to call "Smart Home 2.0."

These include advanced geo-fencing capabilities—the ability of home systems to detect that the occupant's vehicle is near the home, and making appropriate adjustments to lighting, HVAC, etc.—but also to location sensing within the home. This capacity enables systems or components to adjust themselves or shut off when occupants aren't in the room.

"These are just a few of the ways that homes will start optimizing themselves," says Gutterman. "As homes become smarter, we'll start to live more efficiently and more appropriately."

Experience The Flex House

Shelter Dynamics and Green Builder® Media will exhibit The Flex House at three premier North American trade shows over the next several months. Attendees of PCBC in San Diego will have the first glimpse of this innovative dwelling while it is featured on the showroom floor.

- **PCBC:** San Diego, Calif., June 28-29, 2017
- **Solar Power International:** Las Vegas, Nev., September 10-13, 2017
- **Consumer Electronics Show:** Las Vegas, Nev., January 9-12, 2018

Factory Advantages

Both The Arc House and The Flex House are modular, factory-built homes. This controlled environment offers several advantages. Building materials are protected, and waste and site disturbance are minimized. The factory setting also ensures good quality control.

"When you have a stable work crew and you're making multiple units, whether or not they're customized, it takes some of the uncertainty out of the process," says Ron Jones, president of Green Builder® Media. "The result is improved quality and a streamlined production schedule."

To meet the allowable dimension thresholds for highway travel, the prototype will be transported as two modules. The Shelter Dynamics vision is to eventually create Flex House communities without having to transport the units for long distances.

"The idea is to build temporary factories and train local labor, which will have a vested interest in the subdivision," explains Gautreaux. "The factory area then becomes community space."

The prototype will travel to the PCBC show in San Diego at the end of June. Look for more coverage of The Flex House over the next several months, as Green Builder magazine takes a "deep dive" into the various aspects of its design, construction and performance. **GB**

"The factory environment encourages really good and detailed planning early on, down to the locations of outlets and switches."

Ron Jones, President, Green Builder® Media

HOUSING THE MANY

Sustainable Multi-family Projects, Products and Practices

Ready or not, millennial demographics and desires are reshaping the American Dream by reorienting future growth in denser urban areas. To profit and thrive in this new world, here are projects, products and design ideas for the kind of housing new buyers actually want. The dream of a single-family home in the 'burbs isn't dead. But for millions of (mostly) younger Americans, it's rapidly being eclipsed by a new narrative: a "hands-free" life in or near a city, where autonomous cars or affordable public transit and bikes provide transportation, where apartments and condos—not lawn care and auto-dependent jobs—are the new normal. Here are several stories to help you create your own roadmap into this emerging market.

HOUSING THE MANY

Eco-Smart Rentals with All the Bells and Whistles

Starting from the (high) end. When it opens this summer, The Quaye at Wellington will be one of Florida's largest sustainable luxury rental communities.
COURTESY OF FM CONTRACT SERVICES

At Florida's award-winning Quaye communities, there's always room for more green.

BY ALAN NADITZ

WHEN RICK LOCOCO AND HIS PARTNERS at FM Contract Services decided to build a truly green luxury rental apartment complex, they took a simple approach: If at first you succeed, do it again. And again. And again.

By early summer, FM Contract Services will have completed its third luxury apartment and townhome site in Palm Beach County, Florida. Like its two predecessors, Seabourn Cove and The Quaye at Palm Beach Gardens, The Quaye at Wellington offers its residents a wide range of sustainable products. All three locations are built to National Green Building Standard ICC 700 Gold Level. And occupants seem to love them, with developments leased to capacity within a few months.

But they're not quite perfect. And that's a problem FMCS partner Rick Lococo wants to solve the next time around. Or perhaps the time after that.

"We'll keep trying," says Lococo, who served as project manager for all three developments. "But so far, things have gone very well."

Indeed. In 2013, Seabourn Cove won "Multifamily Project of the Year" at the National Association of Home Builders Green Building Awards. Earlier this year, The Quaye at Palm Beach Gardens was recognized for "Best Amenities: Garden-Style Apartments" by the South East Florida Apartment Association. It also received "Best Green Project" in the *South Florida Business Journal*'s Structures Awards competition.

And to think it started with an economic downturn.

A GRAND IDEA

In 2010, as the building industry crawled through the recession, Lococo and partners Charles Funk and Jeff Meehan were considering a way to attract new business at a time when people weren't buying much of anything. "That's when we came up with the idea to design a rental building that was 100 percent energy efficient," Lococo says. "We wanted a luxury rental place where the residents' utility bills would be zero."

The project, which would become Seabourn Cove, consisted of 456 high-end rental units with every conceivable green product. As planned, it would be the nation's largest green multi-family community. But the price tag topped $10 million, a figure that just wasn't viewed as realistic by anyone, according to Lococo.

FMCS self-funded the project. "We sat down and said, 'Let's allocate X dollars to the project and see what we could do to bring down the cost, and make it as sustainable as possible,'" he says. "We came up with $4 million and made it work."

COURTESY OF FM CONTRACT SERVICES

Optimized equipment. It's all Energy Star-rated appliances inside every apartment and townhome, along with low-flow plumbing fixtures and other green amenities that help cut monthly energy and water bills by up to 50 percent.

The product list became a long one: Green features included LED and compact florescent lighting; water-saving faucets, showers and toilets; water piping with shorter runs to reduce heat loss; high-efficiency 16 SEER air-conditioning units; programmable thermostats; R-38 ceiling insulation; solar roof ventilation; ceiling fans; hurricane impact-resistant windows and doors; Energy Star-rated appliances; and even electric vehicle charging stations.

FM Contract Services supplemented the energy savings with other environmentally friendly efforts and conveniences, such as low-VOC paints, flooring, carpets and other materials; carbon monoxide sensors; fiber optic and high-speed wireless Internet access; the use of recycled content throughout the project, including interior doors, driveways, exterior wall coatings and interior wall structure; drought-tolerant landscaping; a half-mile-long stormwater retention system; and a construction waste plan that recycled at least half of all building and land waste. Occupants were also trained on how to properly operate the various control systems.

The combination made a dent in energy costs: At the time of Seabourn's opening in 2012, savings were estimated at 40 percent for electricity and 25 percent in water bills when compared to a traditional apartment. Later evaluations showed the reductions were closer to 50 percent each.

"Coming out of the recession, we were taking quite a gamble," Lococo says. "At that time, most people didn't understand this type of project—it seemed like a lot of hocus pocus. But I think we changed some minds."

WHAT YOU DON'T SEE AND HEAR IS WHAT YOU GET

One of the biggest complaints by residents is room temperature. All three communities counter this problem with hurricane-resistant window glass. Palm Beach and Wellington's product was so new, it had only been on the market for a few weeks before ground breaking.

All windows are Cardinal CG's *LoĒ³-340*, a non-tinted, double-pane item that greatly reduces solar heat gain by using virtually invisible layers of silver to reflect the sun's rays away from the window. Solar glare is also dramatically reduced, which makes windows easier on the eyes.

The window's untinted nature offers other advantages. Regular tinted glass works by absorbing sunlight, which causes the glass becomes hot in the sun. With *LoĒ³-340*, the space between the two panes is insulated with argon, which prevents the product's heat gain. The reverse is also true in colder months.

The color of traditional tinted glass also changes with its thickness. And, the potential for thermal stress breakage is greater, as is the potential need to heat treat the glass. And, of course, the tint-free window is less expensive for the builder.

Double-pane windows also help with a second renter concern: noise. The windows' high-tech construction, combined with each unit's solid concrete walls and 6-inch-thick concrete floors, and R-38 insulation, remind occupants of a Simon and Garfunkel song: "The Sound of Silence."

COURTESY OF FM CONTRACT SERVICES

Low-E glass. The Palm Beach Gardens and Wellington developments feature Cardinal CG's brand new *LoĒ³-340* dual-pane glass, which is ultra-efficient at reflecting heat and blocking sound.

COOL AND QUIET

At a landmark Rhode Island mixed-use project, an energy-efficient HVAC system means noise is no problem.

CREDIT: ANDRÉ ESTEY FOR LG ELECTRONICS USA

Out of (hot) air. Renovators used a variable refrigerant flow heat recovery system to keep indoor environmental conditions comfortable within the historic Foundry's loft-style apartments.

ORIGINALLY BUILT IN 1872, the Foundry has a rich history. Once the manufacturing campus of industrial powerhouse Brown & Sharpe, the 13 brick buildings located on 26 acres at the edge of downtown Providence, R.I., have been meticulously restored into a mixed-use complex that bridges old and new.

In the middle of the sprawling complex is the Sharpe Building at the Foundry, which served as a mill during the building's manufacturing years. The goal for the renovation of the 157,500-square-foot, six-story building was to develop 196 loft-style luxury residences. But because it was placed on the National Register of Historic Places in 2003, the Sharpe Building required a renovation that upgraded functionality of the building while maintaining its historic design.

TAKING SHAPE

The project team required an HVAC system that would both retain the Sharpe Building's unique architectural character, while appealing to young professionals migrating to Providence's urban center who expect modern comfort and conveniences. Therefore, the team looked for a system that was energy efficient, aesthetically pleasing and, equally important, quiet.

The project's mechanical contractor, Peregrine Mechanical Inc., turned to Trumbull Campbell Associates to help them design a super-efficient solution that would allow for individually controlled heating and cooling in the building's mix of metro, studio, one- and two-bedroom units.

A traditional water-source heat pump system was originally scoped for the project, but the rapid on-off cycling of compressors and fans can be noisy, and the system would not be able to match the cooling or heating loads without wide space-temperature swings—a problem for a luxury residential building.

After carefully reviewing the requirements, Trumbull Campbell Associates recommended installing the LG *Multi V IV VRF* (variable refrigerant flow) heat recovery system. This would preserve the architectural integrity of the historic building, while addressing space considerations by running small refrigerant lines throughout the structure without using bulky ductwork.

FITTING RIGHT IN

In addition to the small refrigerant lines and compact equipment, the LG *Multi V IV* does not require a large mechanical room. In turn, the Sharpe Building was able to repurpose that space for amenities for the residents including a gym and a theater. On a large portion of the roof that would have been occupied by a conventional system, the Sharpe Building created an outdoor space overlooking downtown Providence for the residents.

To create a comfortable and appealing indoor environment, the Sharpe Building features a mix of indoor units including ceiling cassettes and wall-mounted units, depending on the location. Selected for their minimal noise level, the LG indoor units provide precise temperature control while operating as quietly as the noise level in a library. By using individual zones, the LG *Multi V IV* systems only engage when there is enough demand, and then balance the load requirements across all spaces to use energy more efficiently. The system provides further energy efficiency through the heat recovery feature as heated return air is redistributed to the zones that need it, rather than heating new air.

The LG *Multi V IV VRF* system has met all of the Sharpe Building'scriteria flawlessly since the building opened in 2015, according to LG Air Conditioning Technologies Regional Sales Engineer Eric Peters.

Courtesy of LG Electronics

"These windows have the lowest [solar heat gain coefficient] factor in existence (a mere 0.18), and very high design pressures—this is all hurricane-rated stuff," Lococo says. "The sound quality is tremendous. When you'd go into one of these units, it's eerie how quiet it was."

LET'S DO IT AGAIN

After the initial success of Seabourn, Lococo and his partners contemplated how to do it again. "So many people wanted to know what was so special about what we did," he notes. "We decided to simply try to replicate the formula, with a few upgrades."

They went for a 2-for-1 this time, agreeing to build Palm Beach Gardens and Wellington about a year apart, and to the same Gold Level standards as at Seabourn. The only problem, if you want to call it that, was that the standards had changed. "Every category had been updated, which meant a higher price for everything," Lococo says. "It did help that we are our own construction company, and we buy directly from the manufacturer. And, these two projects were for nearly 700 units combined, so we ended up with a lot of buying power."

In the end, each development had about $4 million in green amenities, or about the same as Seabourn, despite each being about 90 units smaller.

A few new novelties appeared, such as keyless entry and an electric car charging station for each unit. FMCS even made both locations 100 percent smoke-free, a pair of firsts in Palm Beach County.

Palm Beach Gardens and Wellington each feature air quality boosters such as CRI *Green Label* carpets, low-VOC adhesives and sealants, and MERV 8 HVAC filters to reduce the chance of mold and water-related problems. But the smoking ban, which includes vaping as well as cigarettes, covers a different kind of air quality issue, according to property management company HG Management. Simply put, "no one wants to sit on their patio and smell smoke," HGM Regional Manager Nancy Crib says.

GIVE THE PEOPLE WHAT THEY WANT

Cribs' comment reflects how the typical FMCS client feels about sustainability. The people renting one of the Quaye units run the gamut, from young business executives to retired NFL players. Some of them, particularly the more established ones, simply like the luxurious lifestyle. "[At Palm Beach Gardens] we have one man who uses this as a home base when he doesn't want to be on his 168-foot yacht," Lococo jokes. "And then we have a unit where there's a *Ferrari* in the garage, and a *Bentley* in the parking space. The occupants are from up North, and they just leave their cars here until they come back down."

At the other end of the spectrum, you have the ones who like the idea of living green. Many of these are the younger- to mid-range Generation Xers, who arrive with a list of questions as they tour the grounds. "There are people who come in here who talk about how much they like fact that all the air ducts were sealed during construction. They like all the materials that went into the actual building of the home. They like how quiet it is; how all the windows are impact resistant. They like the charging stations in every garage. They like the fact their electric and water bills are cut in half, because for them, that's real money."

COURTESY OF FM CONTRACT SERVICES

Role model. Each unit's interior includes LED and compact florescent lighting, as well as low-VOC paints, adhesives and sealants, CRI *Green Label* carpets and smart thermostats.

Lococo notes that in this last case, his company does not necessarily gain an immediate financial benefit. "We spent all that extra money in order for the resident to experience a 50 percent reduction in their utility bills, and it worked," he says. "The younger people are very aware of sustainable living, and they really promote it and talk about it."

It's also a reason many occupants chose to pay up to $2,700 a month in rent instead of spending that much on a home mortgage, Lococo adds.

WORD GETS AROUND

All the interest in the FMCS properties has other builders dropping by in person or virtually to see what's going on. Some of them come away with ideas for their own projects, or a "so that's what I did wrong" personal primer.

While no one in Florida has taken on a project quite a large as the three Palm Beach County efforts, builders are increasingly shifting toward sustainability in their work. "They're all adding just a little bit more," Lococo says. "Whether it's a better air conditioner, or trying to get a [National Association of Home Builders] certification, this has definitely stirred up some interest."

So where to go from here?

"We go back to what we originally said: that one day, we'd like to have a net-zero within an apartment community," Lococo replies. "I think we've made dramatic changes in using less, such as with improved insulation and energy usage. Now we've got to learn what the most economical way is to renew. We'll just keep whittling away at it." **GB**

CASE STUDY: URBAN WASTE MANAGEMENT

CREDIT: GBD ARCHITECTS

On display. The trickling filter tanks are displayed prominently at the north end of the pedestrian corridor.

A multi-use project in Portland, Oregon, showcases onsite wastewater and stormwater treatment.

BY JULIET GRABLE

WALKING DOWN THE PEDESTRIAN CORRIDOR among the new modern buildings at Hassalo on Eighth, you'd never know the site was an asphalt parking lot just a few years ago.

Hassalo on Eighth is an ambitious multi-use project located in Portland, Ore.'s Lloyd Center District. Designed by GBD Architects, it consists of three new buildings and an existing office tower centered around a newly created pedestrian corridor and plaza. Together, the new buildings add 657 residential units and thousands of square feet of ground-level retail to a neighborhood previously dominated by office buildings and parking lots.

Benches and tables in the new plaza invite people to linger, and the many bike stalls and easy access to the MAX, Portland's light rail system, make it a pedestrian's and cyclist's dream. But the feature that has garnered the most attention is the project's onsite wastewater treatment system. The tanks and constructed wetlands, which treat wastewater from all three new buildings, aren't hidden away. They are showcased as the development's centerpiece.

A WIN-WIN SOLUTION

Portland has a combined sanitary sewer and stormwater system. During heavy storms, such systems are vulnerable to overflows, which can contaminate local waterways. The city has strict requirements for stormwater treatment in new developments. Still, the combination of aging infrastructure—some of the city's pipes are over 80 years old—and new development places stress upon this combined system.

"As we did our homework, we realized we had a capacity issue," says Kyle Andersen, principal at GBD Architects. The city would have to make changes upstream or they would have to lay new pipe—both very expensive options. "We started thinking, what if we treated the wastewater on site?"

The decision was a win-win: The City of Portland agreed to discount the project's systems development charges, and the onsite solutions keep up to 45,000 gallons of wastewater per day out of the city's combined system.

Portland has approved two other systems that treat wastewater from a building and use it onsite. One is for the OHSU Center for Health and Healing. This 16-story high-rise, which GBD Architects also designed, uses a membrane bioreactor to treat 15,000 gallons of wastewater each day and recycles the water for toilet flushing, irrigation and cooling tower make-up water. The Port of Portland headquarters building treats wastewater with a *Living Machine*, a tidal flow wetland.

Biohabitats, a firm specializing in conservation planning, ecological restoration and regenerative design, developed the system for Hassalo on Eighth.

"We have done systems for urban centers, but not to this scale," says Pete Muñoz, senior engineer and Cascadia bioregion team leader for Biohabitats. "It's the largest onsite urban system that I know of."

A Walkable, Bikeable Neighborhood

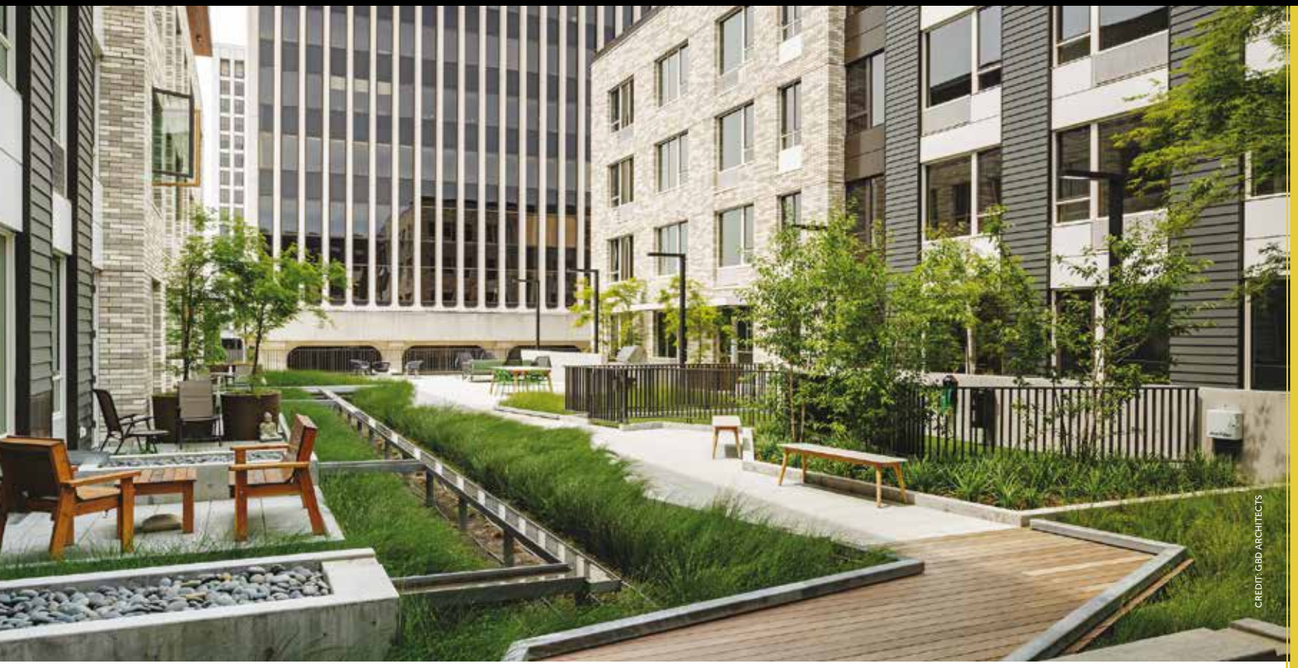
Hassalo on Eighth includes many features that support pedestrian and cycling lifestyles. The neighborhood has earned a high Walk Score and Bike Score.

- Access to public transportation, including light rail and bus lines
- EV-charging stations onsite
- Two dedicated *Zipcars* onsite
- 1,200 underground parking stalls
- 900-stall "bike hub"
- Access to bike valet and onsite mechanic
- Pedestrian walkway and plaza

Before starting, the team held a "regulatory summit," inviting representatives from the relevant agencies to attend a presentation, during which Biohabitats explained how the onsite system would work. They learned that it would require two main permits: one

Sustainable living. The units in all three LEED-certified buildings feature ample daylighting, efficient appliances and access to recycling and composting.

CREDIT: GBD ARCHITECTS



CREDIT: GBD ARCHITECTS

Going with the flow. Stormwater planters and a water feature that uses treated rainwater help create a peaceful atmosphere in an urban setting.

from the Oregon Department of Environmental Quality (DEQ) and one from the City of Portland Bureau of Environmental Services.

"It was invaluable to have that sort of clarity right away," says Muñoz.

THE NEW NORMAL

The onsite treatment system has a name: NORM, or Natural Organic Recycling Machine. A multi-stage treatment train uses natural biological processes to treat 100 percent of the wastewater from all three new buildings (see "How NORM Works," p. 19). The most prominent feature is the trickling filters, which are housed in four red tanks at the north end of the pedestrian corridor. Wastewater is pumped to the top of the filters, where it flows—or "trickles"—down media that supports bacteria growth. The bacteria feed on nutrients in the wastewater.

From there, the wastewater flows through a pair of tidal wetlands. Every two hours, as the first cell fills, the second empties. This ebbing and flowing promotes bacteria growth on the gravel; the bacteria and plant roots take up nitrogen and phosphorus from the wastewater. The tidal cells are 14 feet deep.

"This is unique," says Muñoz. "The cells are much deeper than the typical constructed wetland."

Next, the wastewater flows through "wood chip" wetlands, a denitrification reactor and a second set of tidal wetlands. Finally, the water is filtered and disinfected with UV light and ozone before being sent to the reuse tank.

The wastewater is treated to Class A standards, as defined by the Oregon DEQ. This most stringent classification also allows the most uses. At Hassalo on Eighth, the treated water is used to flush toilets, irrigate landscaping, resupply the cooling tower and recharge groundwater via recharge wells located next to the trickling filter tanks.

The system is monitored continuously and must meet strict criteria for turbidity (cloudiness) and pathogens. If turbidity exceeds standards, the treated water is automatically sent to the city sewer instead of to the reuse tanks. The system also monitors nitrogen levels to ensure treated wastewater does not contribute excess nutrients to the groundwater.

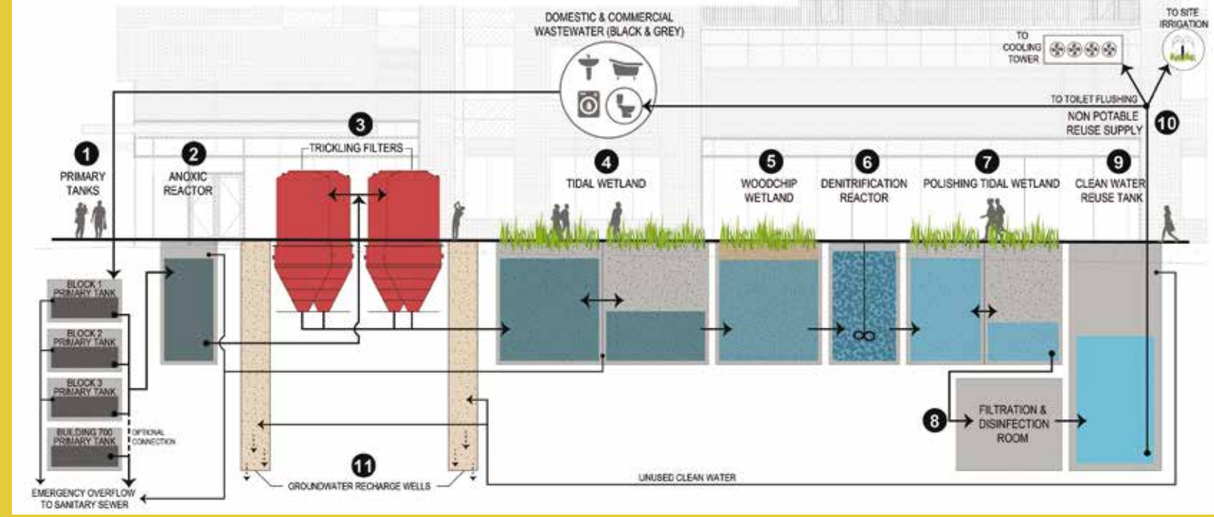
NORM saves energy, improves water quality and cuts potable water use by over 20,000 gallons per day. But the system also makes sense economically.

The project has meters installed which monitor water coming in and the water coming out of the buildings, to prove they aren't contributing wastewater to the sewer system. This way, Hassalo on Eighth avoids sanitary sewer charges.

Project Stats

NAME: Hassalo on Eighth
OWNER/DEVELOPER: American Assets Trust
GENERAL CONTRACTOR: Turner Construction
ARCHITECT: GBD Architects
LANDSCAPE ARCHITECT: Place Studio
NORM TEAM LEAD: Biohabitats
GREEN ROOF INSTALLATION: Teufel Landscape
GREEN ROOFS: Columbia Green Technologies
MECHANICAL/ELECTRICAL/PLUMBING: Glumac

How NORM Works



CREDIT: BIOHABITATS

1. Wastewater is collected in tanks for each of the three buildings.
2. An anaerobic process breaks down organic matter; solids are separated from the liquid portion.
3. Wastewater flows over media coated with bacteria, which consume nutrients in the effluent.
4. In the first set of tidal wetlands, plant roots and bacteria on the gravel take up nutrients from the wastewater.
5. Carbon-rich wood chips support the removal of nitrates from the wastewater.
6. Nitrate is converted to nitrogen gas, which evaporates into the atmosphere.
7. A second set of tidal wetlands "polishes" the wastewater, removing any remaining nutrients.
8. Microfiltration, ozone treatment and UV disinfection improve clarity and kill pathogens.
9. The treated water is stored in a reuse tank.
10. Treated water is used to flush toilets, irrigate landscaping and supply the cooling tower.
11. Any extra treated water is used to recharge groundwater.

Green amenities. A green roof surrounds a lounging area on top of the Velomor building.

CREDIT: GBD ARCHITECTS

CREDIT: JULIET GRABLE

Water feature. The tidal wetland and wood chip wetland cells enhance the public spaces between the buildings.

"Additionally, since we are using reclaimed water on site, we are saving 50 percent on our potable water bill," says Andersen. These savings, combined with the discounted SDCs, have helped the system see a payback of less than three years, despite the extra expenses of metering, ongoing testing and monitoring and hiring of an operator.

SOAKING IT IN

Stormwater treatment is also integrated into the landscaping. Over 38,000 square feet of green roofs on two of the buildings—the six-story Velomor and 21-story Aster Tower—double as amenities, enhancing the rooftop terraces.

Place Studio, a Portland landscape architecture firm, designed the rainwater system, which Andersen describes as "an onsite water feature that utilizes treated rainwater." Biohabitats provided engineering for the system.

A 60,000-gallon rainwater cistern collects runoff from one of the green roofs and delivers it to the water feature, which consists of a series of vegetated reservoirs flanking the pedestrian corridor. The southern portion of the corridor is lined with stormwater basins and reservoirs divided by a series of check dams. Bridges span the reservoirs, which create a threshold between public and private areas. The water circulates continuously, and the feature does not use any potable water from the city. Stormwater planters treat water from the other roof surfaces and sidewalks.

PLACE MAKING

Each of Hassalo on Eighth's three buildings is LEED Platinum certified, and GBD Architects is pursuing LEED for Neighborhood Development certification as well. American Assets, a San Diego-based real estate investment trust (REIT), owns the 15-acre development.

The project has breathed new life into a neighborhood that, well, wasn't really alive.

"At 5 p.m., it was dead. There was no night life," says Muñoz. "Now it is a much more well-rounded neighborhood."

Thousands of new residents, along with restaurants, a grocery store and a fitness center, are helping to transform this "non-place" into a vibrant community. The area is also an official Ecodistrict, modeling resource efficiency, livability and equity, in part by implementing appropriately scaled solutions.

"We took advantage of this opportunity to design a community with buildings that work together," says Andersen. "With Hassalo on Eighth, we have something tangible and successful we can point to, something that demonstrates the elements of an Ecodistrict and helps us create a sense of place from what was once an asphalt parking lot."

Andersen says people are drawn to Hassalo on Eighth in part because of its sustainability focus. The development's website features NORM on its home page, and new tenants are given a manual explaining how the wastewater treatment system works and how they can help keep the system healthy, primarily by not putting ammonia or chemicals down the drains. **GB**

The Buildings of Hassalo on Eighth

Velomor
- Six stories
- 177 studio, 1BR and 2BR apartments
- Green roof and "eco-terrace"

The Elwood Building
- Five stories
- 143 studio, 1BR and 2BR apartments

Aster Tower
- 21 stories
- 337 studio, 1BR, 2BR and 3BR apartments and penthouses
- Green roof, rooftop terrace and lounge
- Sauna, hot tub and community room

HOUSING THE MANY

A tall order. At six stories, 60,000 square feet and 85 residential dwellings, The Heights will be Canada's largest passive house.

CREDIT: CORNERSTONE ARCHITECTURE

Reaching New Heights

Canada's largest Passive House building takes on greenhouse gas emissions.

BY SARAH LOZANOVA AND GREEN BUILDER STAFF

AS THE CITY OF VANCOUVER, British Columbia, moves toward a goal of eliminating greenhouse gas emissions from new buildings by 2030, it's taking a bigger-is-better approach with a forthcoming passive house.

Under construction in the East Hastings corridor of Vancouver Heights, *The Heights* will be the largest Passive House project in Canada upon its completion in summer. The 60,000-square-foot structure is a six-story mixed-use building that will feature retail space on the first level and 85 units of rental housing above.

"A passive house is special because it is a more comfortable building to live in than a typical building," says Scott Kennedy, principal of Vancouver-based Cornerstone Architecture. "It doesn't have drafts, it has fresh air, it isn't cold near the windows, and it uses 10 percent of the heating energy for a typical building."

This ultra-high-efficiency project—an estimated 90 percent more energy friendly than a traditional multi-use structure—will be a certified Passive House development that easily meets the designation's rigorous standards. Its green traits include:

- **Heavy insulation.** The building uses 35-centimeter- (14-inch) thick double R-40 walls with a 2-by-6 external insulated wall, a two-inch layer of polystyrene insulation, an inside insulated 2-by-4 wall for plumbing and wiring, and an R-60-rated roof.
- **Passive House-certified windows.** Super-insulated frames help keep the home air-sealed to promote energy efficiency.
- **Exterior weather protection.** The building features a mass layer of polystyrene insulation and has very few locations where exterior and interior wood and cement make contact.
- **Heat recovery ventilators.** All fresh air comes through a Zehnder Passive House-certified *ComfoAir 550* heat recovery system.
- **Easy interior heating.** According to Kennedy, many of the suites require a mere 300 watts for heating, a total that can be reached with a simple electric baseboard heater.

GREENHOUSE GASES A NO-GO IN VANCOUVER

A 2016 study by the Pembina Institute in Calgary, Alberta, notes that the number of Passive House units in North America quadrupled from 2015 to 2016. More than a quarter were in Vancouver, and the trend is expected to continue.

Buildings are the largest source of greenhouse gas emissions in Vancouver, accounting for 56 percent of the city's emissions in 2014. The Heights complements Vancouver's Greenest City Action Plan and its zero-emissions building plan, according to Kennedy.

Vancouver's zero-emissions building plan encompasses a variety of projects including houses, office buildings and apartment towers. The initiative largely targets emissions from space heating; The Heights project is especially energy efficient in this area.

The Heights' air-sealed nature significantly reduces airflow in and out of the project through gaps and cracks in the building envelope. A blower door test was used to measure the air changes per hour in The Heights to ensure it complies with the Passive House standard.

"If I were to test an old house, I would probably get 10 or 12 air changes an hour [using a blower door test]," says Kennedy. "If I constructed a well-built modern house, I would probably get 5 air changes an hour. A passive house has 0.6 air changes an hour, which is a whole order of magnitude tighter."

Very tightly constructed buildings need proper ventilation to promote indoor air quality, however. The units' *ComfoAir 550* heat recovery ventilators provide a continuous stream of fresh, filtered air. These balanced ventilation systems supply and exhaust equal amounts of air throughout the project for optimum comfort and healthy home air.

Structures like The Heights will place Vancouver well on its way to being carbon-free by 2030, if not sooner, according to Karen Tam Wu, director of the buildings and urban solutions program at the Pembina Institute. That's actually good news for any builder involved in green projects. "Near-zero-emission homes and buildings will be commonplace in Vancouver and elsewhere within 10 years," Wu says.

CREDIT: ZEHNDER GROUP

Nothing in the air. Zehnder's *ComfoAir 550* heat recovery ventilators provide a continuous stream of fresh, filtered air for each of The Heights' residences.

"With lower energy and maintenance bills, green buildings should become an affordable and increasingly attractive option." **GB**

Source link: Pembina Institute: Accelerating Market Transformation for High-Performance Building Enclosures
www.pembina.org/pub/passive-house-report

CREDIT: CORNERSTONE ARCHITECTURE

The start of something big. As Vancouver accelerates toward a 2030 no-emissions goal, projects like The Heights will become more common and attractive to builders, investors and residents.

About Face

MeeFS' European, energy-saving retrofit project goes the distance. Will others take notice?

BY NAOMI HALBACH AND GREEN BUILDER STAFF

IN 2012, RESEARCHERS with the European Commission-backed Multifunctional Energy Efficient Façade System for Building Retrofitting (MeeFS) began a modular paneling project designed to make older multi-family residential buildings more energy efficient. The goal was to use passive and non-passive technologies, energy management, non-intrusive installation and new composite structural material to create a system that could cut power consumption by up to 55 percent, including up to 30 percent on heating bills and 10 percent on air conditioning costs.

The key components are multi-functional energy-efficient panels and technological modules, which are integrated with a small processor within the façade that enables full automation and monitoring of the building's energy consumption. The square, lightweight composite-based panels are easily inserted into structural modules within the building's exterior, and are designed to be aesthetically pleasing—which helps upgrade an aging building's appearance.

For almost five years, a team of 16 partners from nine countries collaborated on the façade's development, evaluation and real-life demonstrations of the process upon an apartment building in Merida, Spain. The project concluded in late 2016, with exact environmental efficiencies still to be determined this summer. Energy savings is expected to be 25 percent to 60 percent.

MeeFS architect Magdalena Rozanska was recently interviewed by European Science Communication Institute Science Media Producer Naomi Halbach. The following is a transcript of that interview:

The project is now crossing the finish line. What have you learned?

Well, the biggest challenges were actually administrative in nature, but in total it was five years of hard work, and we learned many lessons. As always, in the planning phase you think you have considered everything. Once the project starts, you realize that you have only covered maybe half of what should have been accounted for.

CREDIT: MEEFS

Hip to be square. The success of the MeeFS project lay in the multi-functional energy-efficient panels and technological modules on the building's exterior, which are designed to monitor energy usage.

The workflow was very challenging; [It required] communicating between designing, testing, redesigning, manufacturing and assembling. And all of this is done between the different European partners. Keeping everything together was difficult, especially [since] it took us over a year to obtain the licenses for the planned installation. Once the construction phase started, we were all very happy with how things evolved.

Why was Merida chosen as a [demonstration site] for the project?

We chose Merida because we already had a positive experience of working with the local government, and they were willing to support us in the research. Also, the building they proposed was owned by one institution, which always makes the execution a lot simpler.

Further into the project, we discovered how the [residents] were in a very critical social predicament. This led to a number of technical issues to solve on site, such as the distribution of the panels on the façade. In some cases we didn't have access to apartments, and so we had to change the installation because the panels had to fit [residents' needs], and some required monitoring.

What are the preliminary results at the demonstration building in Merida?

We already have good information on the technical development and fine-tuning of the construction process. However, we are still in the process of analyzing simulations and gathering energy data. We hope that we can sum up the impact of the panels in mid-2017 and present some data then.

MeeFS has claimed a breakthrough in developing two technologies: the advanced passive solar protector and energy absorption unit, and the advanced passive solar collector and ventilation unit. Why are they so innovative?

Both panels aim to increase energy efficiency, reduce the total energy demand and enhance the indoor comfort of the building. To achieve this, the panels combine several technologies that are automatically adapted to the position of the panel and the climate. Depending on summer, winter, and day and night for example, they are able to adjust to the specific energy demand of the building.

How can this multi-functional façade system be used as a retrofitting technique across Europe, with different buildings a nd climates?

We designed the panels to fit social housing buildings. After analyzing hundreds of housing typologies across Europe, we can say that the building standards do of course differ depending on the year of construction, aesthetics and function, but overall they are quite similar.

We developed the panels accordingly, using a modular system to fit any climate and housing situation. We also developed an anchorage system involving special trays that can easily be adjusted to allow for different building sizes.

Is that feasible in terms of costs?

Since this is an innovative technology, it costs more than the state-of-the-art technologies. [But] what we can already say is that our technology is easier to adapt to buildings and its effectiveness is higher than that of standard technologies.

We limit the payback time to seven years, so the panels are more energy efficient and offer greater savings in the long run. We designed the panels to be adaptable to future technology as well, so I think that they have a very good chance of being competitive in maybe five to 10 years.

Courtesy of **youris.com**

CREDIT: MEEFS

"We discovered how the [residents] were in a very critical social predicament. This led to a number of technical issues to solve on site ... in some cases, we didn't have access to apartments, and so we had to change the installation because the panels had to fit [residents' needs], and some required monitoring." – Magdalena Rozanska, MeeFS architect

HOUSING THE MANY

SEVEN Energy-Saving Products

These smart products offer turnkey upgrades for rentals old and new.

BY GREEN BUILDER STAFF

"Smart house" technology is rapidly becoming a sought-after feature for homebuyers, with many saying that they only want to purchase a house with such capabilities. While newer rental structures can hold their own as a suitable alternative to homeownership, renters and landlords of older apartment buildings might feel left out of this rush toward green tech. But SRV Network Inc. Chief Technology Officer Karl Volkman says there are many easily available products that can add luster to an otherwise dated dwelling.

Here are some everyday items that bring a high-tech feel to any multi-family home or apartment.

CREDIT: AUGUST

August *Smart Lock*

Renters and landlords can upgrade an existing lock (without harming the door). Users can use their Android or iOS smartphones to lock and unlock the door, create virtual keys for guests, and keep track of who comes and goes. Access can also be granted for only a few weeks, hours, minutes, or even specific dates and times. When done, guest access can be deleted time in an instant.

CREDIT: BELKIN

Belkin *Wemo Insight Smart Plug*

Anyone who has ever panicked that someone may have left an appliance on (a safety hazard and a possibly big electric expense for all concerned) can rest a bit easier, according to Volkman. *Wemo* grants control of lights and small appliances from anywhere via smartphones, tablets, Nest and Amazon *Alexa*.

CREDIT: DELTA BREEZ

Delta Breez *Integrity* Fan with Bluetooth Speaker

Residents can enjoy favorite music, or hear real-time news, weather, traffic or sports while the energy-efficient fan quietly ventilates the bathroom. The fan quickly pairs with most Bluetooth wireless devices, which makes for no-hassle use. Meanwhile, the product easily installs as a new or retrofit device, allowing for a fast apartment upgrade.

CREDIT: FLORIDA ECOPRODUCTS

Florida Eco Products *Waterpebble*

This eco-friendly gadget helps landlords and renters stay on top of water usage by monitoring the water flow and amount of time people spend in the shower. It uses a "traffic light" system: When the device is green, start showering; when it's yellow, time is half up; and at red, it's time to towel off. Providing the device to each apartment can reduce water bills while also lowering a building's carbon footprint, Volkman says.

CREDIT: WHIRLPOOL

Whirlpool Compact Washer and Dryer Combos

An easy green upgrade, Whirlpool's energy-efficient *True Ventless Heat Pump Compact Dryer* and *Compact Washer with Detergent Dosing Aid Option* fit perfectly in small laundry rooms or apartments due to narrow width and lack of dryer vent hosing. Plus, the convenient top-bottom setup of the stacked unit makes it easy to transfer clothes between cycles.

Getting More out of Going Green

If you build an eco-friendly apartment complex, don't miss any chance to enhance its green credentials.

BY DARREN NOVAK

AS A BUILDER OR LANDLORD, it is your decision whether you want your rental property to be more environmentally friendly. There is a lot of upside for property owners who decide to go green. You're attracting more would-be homeowners and encouraging them to continue renting, or perhaps convincing some to go back to apartment living. You're likely to draw renters of a higher quality. And you are contributing to global conservation efforts.

According to a recent study by J Turner Research, 60 percent of renters are willing to pay more for an environmentally friendly apartment. When you combine this finding with the fact that millennials make up a large portion of the rental population—and are the group most likely to seek out environmentally friendly homes for purchase—landlords and developers may want to consider emphasizing green features.

CREDIT: NICHOLAS WRAY

Eco-packed. **Apartments that are filled with green technology, such as 16 Powerhouse in Sacramento, Calif., are more like to command higher rents—and get them.**

Here are some of the key features tenants are looking for in sustainable homes and apartments that property owners will want to stress:

Walkability. If the property is "walkable," it is sure to attract the attention of environmentally friendly tenants. Walkability is defined by how easy it is to reach supermarkets, public transportation, restaurants, etc. on foot.

Appliance efficiency. Study results showed that tenants consider energy-efficient appliances to be the most important factor in a green home. On top of helping the environment, efficient appliances can save hundreds of dollars on annual utility bills.

Recycling. This is one of the easiest and cheapest ways to go green. If you are targeting multi-family communities, consider adding recycling with easy-to-follow directions. For single-family homes, you can always hand out step-by-step instructions on how to recycle curbside.

Building basics

There are hundreds of apartment building materials and building operations options that may be better for your specific sustainability goals. Here are some you might find interesting:

Paperless. Business activities often leave a very noticeable carbon footprint. By making your business 100 percent virtual, you can save hundreds of dollars on paper. In addition, property management software will give you the ability to collect rent payments online. This will save your tenants time and money in the long run. You will also have an easier time sending notifications to your tenants by doing it all through email.

Insulation. One of the most common ways homes lose money is on energy bills. Air conditioning and heating are the most demanding appliances in terms of electricity. Heat and cold easily escape your property through poorly insulated windows and doors. So invest in good quality insulation and your tenants are sure to thank you.

LED lighting. LEDs save much more energy than traditional light bulbs. In addition, they also last much longer, which means tenants will not have to replace bulbs often. In terms of savings, the simple switch to LED lights can save hundreds of dollars on electricity bills—which makes for a strong selling point.

Smart technology. The Internet of Things is enabling a future that, to date, has only been embodied by the most far-reaching science fiction stories. But smart home devices and gadget are becoming more affordable and are, of course, environmentally friendly. For example, outfitting your properties with a smart sprinkler system that adjusts automatically when the weather changes will save water—a key benefit if you're in a drought-stricken or "water-challenged" state. It's an even bigger one if you pay your residents' monthly water bills.

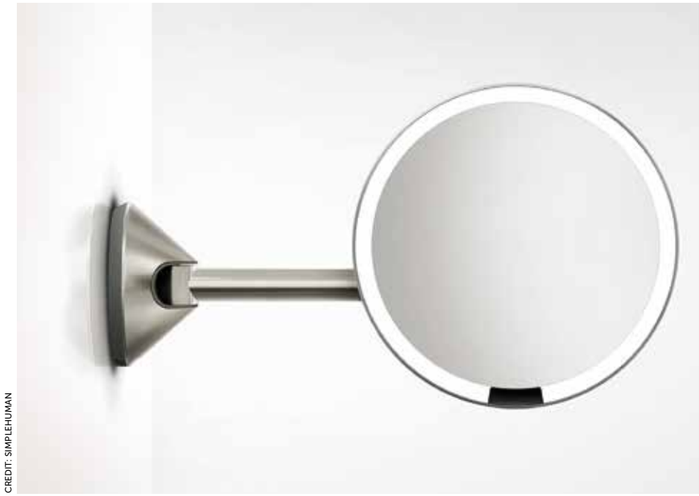
Switching over to sustainable products can give the profit boost you need from your rental properties—especially since you will definitely attract more renters who are willing to pay a bit more for an environmentally friendly place to live.

Darren Novak is a New York City-based real estate investor and property manager.

SimpliSafe

To upgrade an apartment's security, *SimpliSafe* is an awesome bet for renters and landlord, according to Volkman. It's easy to install, and requires no phone lines or yearly contracts. Users can access the system from a smartphone or laptop, and even set police alerts for items such as liquor cabinets or gun safes.

CREDIT: SIMPLISAFE



CREDIT: SIMPLEHUMAN

simplehuman *Sensor Mirror*

A prime amenity for a bathroom, the *Sensor Mirror* lights up automatically as a user's face approaches, Volkman says. It simulates natural sunlight, allowing a person to see full color variation. And, unlike traditional makeup vanity mirrors' bulb lighting, the long-lasting LEDs will be fully functional for many years.

RESOURCES

August *Smart Lock*, **http://august.com/products/august-smart-lock**
Belkin *Wemo Insight Smart Plug*, **http://bit.ly/1hyGzIZ**
Delta Breez *Integrity* 70 CFM Fan with Bluetooth Speaker, **www.deltabreez.com/ITG70BT.html**
Florida EcoProducts, *Waterpebble*, **http://waterpebbleus.com**
Simplehuman *Sensor Mirror*, **www.simplehuman.com/sensor-mirrors**
SimpliSafe, **http://simplisafe.com**
Whirlpool *True Ventless Heat Pump Compact Dryer* and *Compact Washer with Detergent Dosing Aid Option*, **www.whirlpool.com/laundry.html**

INFOGRAPHIC:
A Day in the Life of the Average American

Using our time

A study released by the Organization for Economic Cooperation and Development provides an overview of social trends in its 34 member countries. The study, based on OECD databases and other sources, attempts to show how nations' lifestyles are changing over time in relationship to each other. A look at how Americans compare with people elsewhere:

Cooking
30 min

Americans spend only 30 minutes per day on average cooking, the lowest in the OECD.

In minutes:

USA	**30**
Ireland	35
Canada	40
Germany	41
Finland	42
Average	52

Eating
1 hr 14 min

Americans also spend little time eating, the third lowest in the OECD.

In minutes:

Turkey	162
France	135
New Zealand	130
Japan	117
Italy	114
USA	**74**

Obesity
33%

One-third of Americans are obese.

Percent of total population (2007-08):

USA	**33.8**
United Kingdom	24.5
Canada	24.2
New Zealand	26.5
Australia	24.8

SOURCE: LIFESLITTLEMYSTERIES.COM

Fast times. Contrary to what you might believe if you watch cable cooking channels, the amount of life energy people want to spend at home cooking is minimal, and even less when times are good.

FUTURE KITCHENS: WHAT THE TRENDS SAY

Current preferences around eating, cooking and lifestyle anticipate a shift toward faster, urban lifestyles, designed more for socializing than cooking. Forget what you see on television or on cooking shows—future householders will cook less, order prepackaged food online and treat the kitchen more as a sanctuary than a meal factory.

When It Comes to Kitchen Forecasts, Myths and Misconceptions Abound

CREDIT: USA TODAY

Timing matters. Trends show that when times are tougher, people cook more. But cooking is not their preferred activity. It's driven by necessity, not passion.

BY MATTHEW POWER, EDITOR-IN-CHIEF

LOOK AT THE TRENDS BEHIND THE TRENDS. That was the theme of a presentation I did a few months ago on the future of "green" kitchens. After many hours of research and number crunching, I found as many truisms as myths about consumer preferences, eating and cooking—at the same time making connections with larger trends, such as online shopping. What about foodie fantasies of gourmet cooking at home? Surveys show that many Americans dislike cooking—or, at the least they consider it a lousy way to spend the afternoon.

Some of the familiar kitchen memes, of course, are correct. The preference for white is unshakeable. The kitchen continues to be the most actively used space in the modern home, but its use is shifting. It has gone from a place for a "Leave it to Beaver" -type family meal, to a "hang out" space, where diverse families can heat up a flatbread pizza or whip out some sushi and craft beers.

The reality is that in times of financial plenty, kitchens are used less than during down times. That doesn't mean we're headed for a world without kitchens and appliances. On the contrary, kitchens will be expected to run themselves, much like autonomous cars. Millennial buyers (and renters) will want quiet dishwashers, steampunk-looking expresso machines they can program from a smartphone, juicers, stain-free white countertops, and any number of what they perceive as labor-saving devices and gadgets. Throw in online grocery ordering and the texting of all but 10 words a day, and you're beginning to speak their language.

***Disney* dud.** Like most kitchen predictions, little of Disney's imagined future kitchen became reality. The plastic-centric Monsanto House of the Future® kitchen is long gone. A relic of the house that serves as a planter in the California theme park says it all.

The Cooking Conundrum

Despite an obsession with cooking shows and "foodie" tours, many simply don't feel warm and fuzzy about slaving over a hot stove.

RECENT SURVEYS SHOW that contrary to the way the "typical" American family is portrayed as happily turning out three squares a day, every day, few people actually prefer to use their time that way. In fact, almost ANY other activity is preferred over cooking. This trend is similar to what we've seen in the shelter magazine business forever. Many of us love to browse the pages of aspirational magazines like *Fine Homebuilding*, but we have no intention of taking on any of those projects ourselves.

Also of note, a Bosch appliances study found that 28 percent of adults have no cooking skills. Other research found that about half of Americans believe they have less cooking skill than their parents. Whether you blame it on bad parenting, or the cutting of domestic skill courses in high school, the results skew toward less cooking, not more.

CREDIT: ASHLEY WEBB, FLICKR

Q: If you suddenly had four extra hours per week, how would you likely spend that time?

		Groups most likely to select
Exercising	36%	Younger, Higher income, Better health
Socializing with friends/family	31%	Women
Relaxing/sleeping	29%	Younger, Lower income
Other household chores/tasks	20%	Women, Parents
Reading	20%	Older, College grads
Practicing a hobby	20%	Men
Using electronic devices	17%	Younger, Men
Watching TV	16%	Lower income, Men, Poorer health
Exercise/health/diet	13%	—
Cooking or baking	11%	Lower BMI
Shopping (non-grocery)	7%	College degree, Women
Volunteer for charity/church	7%	Older, College degree
Working	6%	Men
Grocery Shopping	4%	Lower income

SOURCE: INTERNATIONAL FOOD INFORMATION COUNCIL FOUNDATION, FOOD AND HEALTH SURVEY 2015

Sterile Dreams

If you think future clients will embrace a wider color palette for the kitchen, you may be betting on exceptions, not rules.

TAKE A LOOK AT THESE THREE PHOTOS (at right), and try not to go snow blind. These proto-typical sterile-white case studies were chosen by thousands of *HOUZZ* readers as their ideal kitchen look. The kitchen with the blue tile backsplash was the overall favorite.

Desire for clean, white spaces is nothing new, of course. Production builders have taken it as their template for decades. But perhaps it's no coincidence that the preference has grown even stronger now that we have been let to believe that we live in a world full of dangerous germs. It's rare to visit a public restroom these days without encountering a bottle of germ-killing hand sanitizer.

But germophobia, as WebMD succinctly points out, can actually be a type of obsessive-compulsive disorder (OCD), where people habitually try to wash away contaminants. The color white is not simply a matter of "taste," nor is it, as some might argue, a "neutral" option. It's an indicator of many other baseline assumptions about the world, an attempt to make order out of chaos, to maintain a clean and carefree sanctuary, free from messy realities. This is not a cooking kitchen. You don't haul in a load of beets from the garden and slap them on the countertop with soil still clinging. You order prepackaged, prewashed carrots online, and rinse them again before serving them up on a veggie platter.

Sanitation Nation: Backlash

The rise of germophobia and hand-cleaning mania may have unintended consequences.

As David Owen writes in *The New Yorker*, "Intuition is not an infallible guide to hygiene." Excessive use of bacteria-killing hand cleaners may actually reinforce the rise of stronger bacteria, for instance. Food workers using latex gloves may see no reason to wash their gloves, like they would their hands, after they handle raw chicken. Will our antiseptic new kitchens make it harder to create resilient food pantries, full of local, organic foods that don't come in prepackaged containers or non-staining colors?

CREDIT: HOUZZ SURVEY

Pristine. **These are not kitchens where cooking beets are a big priority. The trend toward white reinforces survey results showing that future kitchen design is more aspirational than operational.**

Air Quality: Talk Is Cheap

Mothers, in particular, express concern about asthma and other air pollution effects—but few seem willing to adjust their cooking habits in response.

IT'S NOT LIKE THE TOOLS DON'T EXIST. It's the lack of behavior change that is making kids sick indoors. As I've reported in the past, most people rarely use their range hoods by choice. In fact, one major study found that "Only 8 percent of the participants used their ventilation system whenever they cooked," while 8 percent used ventilation "almost never," and 15 percent used ventilation only "once in a while."

This flies in the face of all the evidence about cooking smoke, especially when foods are cooked in vegetable oils. Although there's some debate as to which oils are worse for your health when they start to smoke and give off free radicals, no cooking smoke is good for you.

Johns Manville did a study of Iowa homeowners, and found that about a third of them think their indoor air is cleaner than outdoor air. The reverse is generally true. And most people spend 90 percent of their time indoors.

What does this mean for kitchen designers and builders? Range hoods must include automatic sensors, or they will simply not be used.

Use of Kitchen Ventilation Systems

Note: Participants could give more than one response, so some figures don't equal 100.

Reasons for Using Ventilation	Get Odors Out	47%
	Get Smoke Out	45%
	Get Steam Out	23%
	Remove Heat	20%
	Control Grease	14%
	Clean the Air	11%
Reasons for NOT Using Ventilation	Too Noisy	48%
	Not Necessary	48%
	Don't Think About It	20%

CREDIT: CENTER FOR REAL LIFE DESIGN, VIRGINIA TECH

Excuses, excuses. Homeowners typically blame unit noise as a major reason they don't use range hoods. But newer products make less noise, and many offer particle or heat sensors for automatic operation.

Jewelry or appliance? Although most new kitchen installations feature range hoods, few occupants use them, other than for occasional extreme smoke issues. One of the most important uses, for example, is during an oven's self-cleaning mode, when large amounts of toxins are released.

Water: Undervalued Asset

Manufacturers keep improving technology in the kitchen. But they can't seem to imprint upon end users the real value of clean, potable water.

NOW THAT THE price of reverse osmosis filtration has dropped to about $100, for an off-the-shelf Whirlpool system from Lowes, you would think bottled water would begin to go away. RO-filtered water from the tap costs a tiny fraction of bottled H_2O.

Yet I can't tell you how many show homes and kitchen demonstrations I've visited where bottled water is handed out to guests, and used to line refrigerator shelves. This sends the message that home water supplies can't be trusted.

A series of high-profile stories about public water contamination have damaged our trust. These events reinforce the bottled water's scarcity-based PR sales model. But bottled water is not a sustainable response to the world's fresh water crises. We need to change the story, and break the addiction.

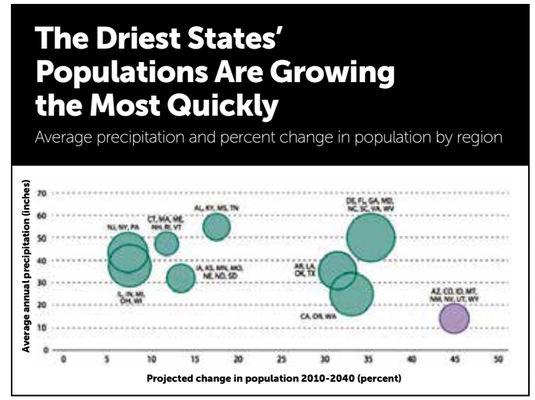
Kitchens are a good place to start retelling that story, where fresh water is treated with the greatest reverence. New dishwashers demand far less water than older models. Low-flow faucets are mandatory. Filtration is affordable and easy to install.

As fresh water supplies face ever more stress (see below), the kitchen of the future can serve as an oasis, where clean, drinkable water flows easily, and bottles are a thing of the past.

Smart, but Not yet Wise

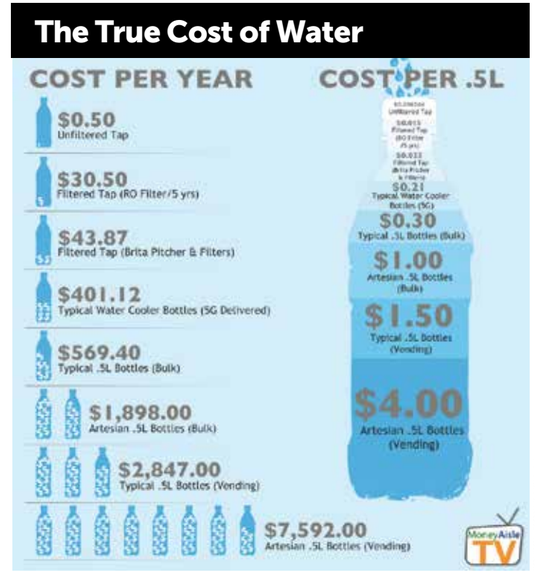
SOURCE:

Smart appliances, if programmed to respond without an environmental compass to consumer behavior, could result in more resource-intensive shopping. Water bottles are a good example. Some models contain scanners that can be used to automatically re-order supplies that are running low. And bottled water is easier to slap a barcode on than a filtered glass of local tap water.



SOURCE: THE HAMILTON PROJECT

Crisis in the making? Climate change-induced drought in areas with rapid population growth has made the availability of clean, fresh water an even more valuable public concern.



SOURCE: MONEY AISLE TV

Clear winner. Purifying local tap water is far less costly than buying bottled water. Consider that tap water is up to 2,000 times less expensive than bottled H_2O. If you need a home-sized filter, that adds just a few cents per gallon to the end cost for water.

Food: Generational Shift

Evolving attitudes toward food are affecting how it is purchased and stored.

HAVE YOU EVER TRIED TO TEACH A BABY BOOMER the finer points of using Instagram? Often, it's a real challenge, and that same dynamic is playing out in how, when and where we eat our meals. We've already pointed out that many young people are "cooking averse." The implications of that change send a ripple through traditional food networks and affect how how kitchens will be used.

You may have noticed the shadow side of this trend when going out to eat with friends. About 60 percent of people (skewing toward young people and women) now think it's important that they be able to customize their food choices at restaurants. What to older generations sometimes appears as entitlement and bad manners is the new normal for the nation's 20-something crowd. Thanks in part to "build your own" meal-making experiences at places such as Whole Foods, gourmet fast food joints such as Panera, and (lately) the digital tools to order healthier food online, expectations of instant, hyper-personalized meals are on the rise. No gluten? "No problem." On the side? "All of our salads come that way."

Don't get hooked on the idea that everything in the future will be local, organic and healthy. Labor saving is a MAJOR interest of the millennial generation. Anything that frees their hands up for mobile devices interests them. As the chart below shows, future "engineered" food may look like green vegetable protein or powder in its raw state (a brand called Soylent really exists), but if a machine can turn it into food, they'll bite.

Q: If you time traveled 30 years into the future and found the following had been invented, how excited would you be to try...

	Very excited	Somewhat excited	Total	Groups more likely to be excited:
An appliance that turns raw ingredients into any meal	43%	37%	80%	Younger Adults
Food with customizable nutritional value/ calories	40%	39%	78%	Younger Adults, College Degree
A 3D printer that can make any food you want from scratch	39%	30%	69%	Younger Adults

Soylent soufflé, anyone? Among younger adults, the idea of technology that automatically creates food from raw materials sounds like a great idea. This parses well with other research on autonomous vehicles and interest in cooking. Millennials would prefer to leave "mundane" tasks to robots and algorhythmns, leaving hands free for mobile devices.

Online Groceries: Peapod's Revenge

Once considered a failed idea, online food distributors are now growing exponentially.

BACK IN 2010, the age of online groceries seemed to have come and gone. The pundits announced the idea a non-starter. For example, *Forbes* in 2011 explained that "Families go to the grocery store together to browse the aisles and plan their next week's meals. Single people even visit specific stores in order to attract potential dates. None of these activities are feasible with the online shopping experience."

Beware punditry. Back then, of course, smartphones were just becoming popular. Today, the whole digital landscape has changed—not to mention the dynamics of families, and how younger people feel about cooking, eating and shopping. Online grocery shopping now appears likely to become more robust, not less.

International List of Online Grocers

1996
- Peapod
- Webvan
- HomeRuns

2010
- Peapod

2016
- AmazonFresh
- Asda
- Coles Online
- el Grocer.com
- Farmdrop
- FreshDirect
- Good Eggs
- Google Express
- Gousto
- Grocery Gateway
- GroceryRun
- Grofers
- Instacart
- InstaBuggy
- Mr Case
- Kozmo (defunct but possibly re-launching)
- LeShop
- MySupermarket
- NetTrolley
- Ocado
- PepperTap
- Peapod
- Pink Dot
- Riverford
- Sainsbury's Online
- Safeway Inc.
- SimonDelivers
- Smart and Final
- Sustainable Produce
- Urban Delivery
- Tesco
- Thrifty Foods
- Waitrose
- Winder Farms
- Yihaodian

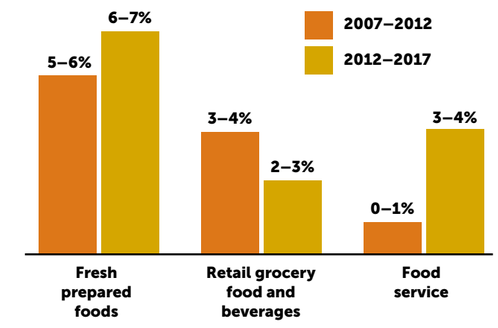
SOURCE: WIKIPEDIA

Virtual Gold Rush. Perhaps the rocketing success of online vendors such as Amazon has fueled corporate investment in online shopping.

Fresh Prepared Market Surges

A key indicator of why online groceries are becoming more feasible is the fast-growing market for ready-made, refrigeratable meals. Cooking-averse Americans are buying instant meals in greater quantities every year. The market is segmented, still in flux. Millennials, especially, want locally grown or fresh foods, Tapping this niche is a new category of pre-made food called "fresh prepared," sold as "restaurant quality" meals. New technology keeps these meals fresh longer, so some can be sold online, but they still require reliable and precise cold storage in the kitchen.

Sales Growth in U.S. Food and Beverage Segments



SOURCE: TECHNOMIC ANALYSIS

Current Market Penetration of Online Grocery Shopping

Japan	7.2%	Czech Republic	2.1%
United Kingdom	6.9%	Spain	1.7%
France	5.3%	Netherlands	1.7%
Taiwan	5.2%	United States	1.4%
China	4.2%		

DATA: KANTAR WORLDPANEL REPORT

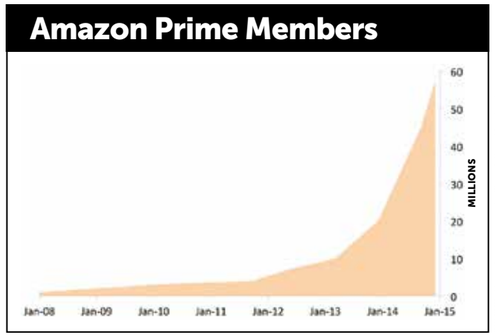
Late adopters. According to a study of online grocery shopping worldwide, the U.S. has been slower to embrace it because Amazon has created a model where people buy individual items. But that is rapidly changing.

Packaging and Leftovers

Cardboard packaging and plastics are crowding kitchen spaces, and food waste is not far behind.

DUE TO INCREASING USE OF ONLINE VENDORS, the volume of recyclable materials landing at homes keeps growing. Add to this a high volume of food waste, and you understand why clients are clamoring for recycling stations and composters.

Also, food waste in the U.S. sometimes makes up 40 percent of the waste stream. The fast-rising cost of city trash bags (right) makes curbside composting much more economically compelling. Future kitchens will need large, odor-trapping and flexible storage areas for both solid materials and food waste.



SOURCE: News Announcements, Piper Jaffray, Morningstar, RBC, BI Intelligence Estimates

Too much, too fast? Amazon's meteoric success has led to meteoric levels of packaging waste.

Out of Sight and Mind

New recycling centers (top) and curbside food composting are two obvious offshoots of packaging and greater awareness of food waste. The nearest photo shows Garbage to Gardens, in Portland, Maine.

Public pressure. One factor pushing consumers toward greater recycling and composting is the sudden and rapid increase in the costs of mixed waste disposal. Cities can and have dramatically increased the cost of disposal bags, forcing consumers to take recycling and composting options more seriously.

Keys to Selling Sustainability

Selling modern buyers on more-sustainable kitchens goes over better as giving them what they want than as a moral imperative.

NO ONE LIKES TO BE LECTURED, and that's doubly true for the next generation of renters and buyers. Most Americans, across all generations, would like to be told what they SHOULD eat, not what they shouldn't. Give them the tools and toys they like, and correct for blind spots in the background with technology. This is a key to improving the energy and water footprint of clients or renters. Often, sustainability overlaps with client interests, as in the case of upcycling, induction cooking and garden spaces (indoor and out).

Good news only. Modern buyers want to run the ship. Show them what's cool, and you'll win hearts and budgets.

Upcycling

Reuse and reconditioning of existing objects has become a big niche among hipsters.

Instant High-Tech Garden

Small, indoor gardens tap into a general interest among new buyers in local food, gardening and self sufficiency.

Fast Prep

Induction cooktops and convection microwaves are just two of the appliance trends that answer client desire for faster food prep at home.

Raising the Urban IQ

There's a profound shift taking place among cities and it's not just about technology. It's about people and our planet.

CREDIT: ALEXANDR TRUBETSKOY

Common sense. In Arlington, Va., the Crystal City Sensor Network project will implement and share data from rooftop sensor devices deployed in downtown Washington D.C., to Virginia Tech researchers and Arlington County officials.

BY MARTIN O'MALLEY

OVER THE LAST YEAR, I have been working with a new smart cities initiative called the MetroLab Network—a collaborative of leading cities and their university partners. The network came together to speed up the research, development and deployment of smart city solutions to big city challenges.

Our network—with the support of funders like the MacArthur Foundation and the Annie E. Casey Foundation—believes that progress can be greatly accelerated through: better, purpose-driven city-university partnerships; better multi-city collaborations across the country; green infrastructure; sensors that allow us to monitor air, water, traffic; big data for more effective and timely delivery of critical human services; carbon neutrality and renewable energy production.

These are among the innovations being advanced across this forward-leading network of smart cities and their university partners.

But what, you might ask, makes a "smart" city?

WHAT MAKES A CITY SMART?

We hear the adjective "smart" used so often these days it's become cliché. Smart phones, smart cars, smart this, that, and the other thing...

When effective and collaborative mayoral leadership is in place, one can identify a smart city by a few key characteristics.

First, a smart city is well governed. The old days of patronage politics and allocating city services based on how a particular neighborhood voted in the last election are rapidly fading away.

Smart cities instead make use of geographic information systems to create common platforms for agency collaboration and the delivery

Meet the MetroLab Network

BY BEN LEVINE

METROLAB NETWORK IS A COLLABORATIVE that includes 38 cities, four counties and 51 universities, organized in more than 35 regional city- (or county-) university partnerships. Network members are focused on research, development and deployment (RD&D) projects that offer technologically and analytically based solutions for challenges facing urban areas: inequality in income, health, mobility, security and opportunity; aging infrastructure; and environmental sustainability and resiliency.

WHY THE METROLAB AND CITY-UNIVERSITY PARTNERSHIP?

City-university partnerships are mutually beneficial relationships in which the university is the city's RD&D department and the city is a testbed. As new developments in urban science and technology grow, a new breed of university-based faculty, students and researchers are eager to impact local government by bringing their knowledge, expertise and creativity to the unique challenges facing local government. Faculty and students get access to real-life laboratories to test advanced approaches aimed at addressing city priorities and challenges.

Meanwhile, local city and county governments are increasingly turning to university-led RD&D focused on leveraging data, technology and analytics to advance their priorities. Cities and their residents benefit from technologies and policies that leverage digital and information technology, data analytics, sensing and more.

Individually, city-university partnerships are beneficial and help drive innovative approaches in government. When networked together, they present an opportunity to scale effective solutions, accelerate best practices and advance the understanding of urban science.

WHY NOW?

Enabled by changes in technology—increases in computing power and cloud storage, the proliferation of smartphones, decreasing costs of sensors and energy storage, and more—cities have opportunities to take advantage of new approaches to better deliver public services and manage their built and natural environments. Universities, motivated by the pursuit of new knowledge and the improvement of society, possess the expertise and creativity to serve as partners to cities in their pursuit of more effective, efficient and just government.

WHAT WE DO:

- **City-university partnership.** Encourage formal, institutionalized, cross-disciplinary, multi-agency partnerships focused on RD&D. City-university partnerships can serve as innovation engines in city government that transcends political cycles and industry contracts.
- **Cross-partner learning.** Facilitate the scaling of successful RD&D approaches. Leverage the network to develop tools and resources that support collaborative efforts between cities and universities. Accelerate best practices, data standards and methods.
- **National collaborative.** Organize initiatives that bring together similar but previously uncoordinated efforts in different communities. Creating a platform for multi-city, multi-university teams to address complex, long-term challenges.

HIGHLIGHTING CITY-UNIVERSITY PARTNERSHIPS

Among MetroLab university sites, there is a groundswell of interest from faculty and students in urban-focused technology, data and analytics innovations. Many of these efforts utilize city data, engage city agencies and generally have a potential for impact on policymaking. MetroLab has built a project library with examples of efforts underway between cities and universities to showcase some of the work these partnerships are undertaking. Topics being tackled across the country range from building energy, housing and environment to sensors, open data and public safety. Here are quick snapshots of some of the projects:

- **Cuyahoga County, Ohio: Advanced Building Materials for Affordable Housing.** In a partnership with Cuyahoga County and the Famicos Foundation, Case Western University researchers and engineers will utilize advanced materials and financial tools available to local government to develop more energy-efficient and affordable building materials for lower-energy-impact housing in the Glenville neighborhood of Cleveland. The County will also match energy efficiency and renewable energy contractors for design assistance with the project.

- **Boulder and Denver, Colo.: Gray vs. Green Infrastructure Analysis.** This project plan calls for a $1.5 billion investment in citywide storm drainage improvements as part of City of Denver's Storm Drainage Master Plan. The goal will be to develop a criterion that determines where green infrastructure (GI) solutions can be used rather than upgrading/upsizing traditional gray infrastructure. Researchers will identify needs through the GI/water quality Best Management Practices.

- **San Diego: Green Infrastructure and Urban Agriculture.** This project will develop participatory tools, spatial analytics models and civically engaged processes to help residents, municipalities, public agencies and tribes select best locations for green infrastructure, such as rainwater harvesting and stormwater biofiltration, and urban agriculture, such as community gardens and urban food forests.

We invite you to visit our website for more information and to access additional content.

Ben Levine is executive director of MetroLab Network, which works to strengthen and coordinate activity between cities and universities nationwide for research, development, and deployment of projects that improve our infrastructure, public services and environmental sustainability.

Source links:

MetroLab Network (http://metrolab.heinz.cmu.edu/)

Cuyahoga County, Ohio: Advanced Building Materials for Affordable Housing (http://metrolab.heinz.cmu.edu/projects/cuyahoga)

Boulder and Denver, Colo.: Gray vs. Green Infrastructure Analysis (http://metrolab.heinz.cmu.edu/projects/colorado)

San Diego: Green Infrastructure and Urban Agriculture (http://metrolab.heinz.cmu.edu/projects/san-diego)

of better outcomes. They use customer service technologies like a 311 call center for all citizen complaints, from potholes to water main breaks. And they drive progress through collaborative management regimens. Following the data wherever it leads. Asking the right questions for constant improvement. Doing what works best with a radical commitment to openness and transparency for all citizens to see and measure.

Second, a smart city is politically inclusive. Feedback from citizens isn't something that is merely tolerated in a smart city. It is intentionally and strategically solicited. It is welcomed. And it is incorporated into the operations, governance and progress-making of the city as a whole.

Mayors like Marty Walsh in Boston use technology to monitor social media mentions about city services and neighborhood quality of life in real time. Mayor Joe Curtatone in Somerville, Mass., engages citizens in an ongoing campaign to expand rooftop solar installations as his city drives toward a goal of carbon neutrality. In New York, the police department deploys online polling that rides atop free *iPhone* applications to gauge citizen trust in the courtesy and professionalism of policing, right down to the neighborhood level. This ongoing feedback loop tells commanders, in real time, where critically needed public trust in law enforcement is trending up or down.

And third, smart cities pursue sustainability agendas—better ways of human living that sustain the natural resources of our land, air and water for the benefit of future generations. In Southbend, Ind., Mayor Pete Buttegieg's city government is pioneering the use of sensors in his water system to better protect streams and rivers from stormwater pollution.

Cities across the U.S. are pursuing renewable energy and carbon neutrality goals, enacting green building codes and taking action to get their operations energy needs off the grid.

A CHANGE THAT'S GONNA COME

We reached a big tipping point just three years ago. Today—for the first time in history—a majority of the world's population lives in cities. By 2050, projections say 66 percent of all people will live in an urban environment.

In the words of the irrepressible Stephen Stills: "There's something happening here. What it is ain't exactly clear..."

What is clear is that cities will have to become smarter, better connected and more sustainable places for living if they are going to accommodate the big increase in density and population.

And all of this is happening at the same time our traditional ways of fueling our homes, industries and means of transportation have super-heated that thin layer of the Earth's atmosphere upon which all life depends.

Like the rapid shift of population to cities, climate change is real and it is happening fast.

CREDIT: GAGE SKIDMORE

"Feedback from citizens isn't something that is merely tolerated in a smart city. It is intentionally and strategically solicited. It is welcomed. And it is incorporated into the operations, governance and progress-making of the city as a whole."

Smart cities understand there is no independent salvation on this planet. We're all in this together. We need each other. And we must learn from each other if we're going to succeed and thrive.

The future of cities and the fight to reverse global warming are now joined in one urgent movement of human development.

Call it a crisis if you like. I prefer to see it as an opportunity. **GB**

Martin O'Malley served as governor of Maryland from 2007 to 2015 and as mayor of Baltimore from 1999 to 2007. He has lead widespread sustainability initiatives, from massive cleanup efforts in the Chesapeake Bay to strong advocacy for a 100 percent national renewable energy mandate by 2030.

Hotel Sustainability Secrets

A super-green hotel in New York showcases eco-conscious ideas fit for any large property.

BY GREEN BUILDER STAFF

IN THEIR OWN WAY, hotels are a form of multi-family residence, providing temporary living quarters for a day or weeks. And with travel groups like TripAdvisor and the Global Business Travel Association reporting hotel guests' continuously rising preference for green products, building eco-friendly hotels makes more sense now than ever.

Starwood Capital Group, the developer and operator of 1 Hotel, a 229-room "eco-conscious" hotel near New York City's famed Central Park, figured that out several years ago, according to Billy Lally, president of Mode:Green. Starwood began construction on the site in 2014, opened it in 2015 and has seen nothing but positives since, he says.

Starwood made 1 Hotel into "the ultimate green hotel" by including Earth-friendly features such as reclaimed wood, 100 percent organic cotton bed linens, and clothes hangers made from recycled paper. Fixtures are ultra-green as well, including *Triple Clear* water filters in taps, sinks and showers, state-of-the-art energy-efficient heating and cooling systems and built-in LED lighting.

CREDIT: STARWOOD CAPITAL GROUP

Bright idea. Lighting and environmental controls for each of 1 Hotel's rooms were made accessible with a mobile app designed to meet guests' demands and simplify matters for hotel staff.

Starwood's chief goal was to offer a guest experience driven by convenience, luxury and sustainability, according to Lally. Mode:Green was brought in to help Starwood achieve that goal by designing and installing lighting and custom automation solutions that addressed all customer needs.

ON THE BRIGHT SIDE

Mode:Green's task was not a small one. All 229 of 1 Hotel's guest rooms were outfitted with redesigned LED lighting fixtures, and the lobby was illuminated with over 250 zones of LED lighting. Starwood insisted on that type of lighting from a sustainability standpoint, according to Lally.

The company got smart with its lighting, installing a Crestron automated system that adjusted brightness using an astronomical clock. This effectively allowed the hotel to follow the sun. "The lights self-adjust every day of the year," Lally says. "Hotel staff rarely have to worry about them. They can focus on other parts of hotel management."

CREDIT: STARWOOD CAPITAL GROUP

New York role model. Billed as "the ultimate green hotel," 1 Hotel near Central Park in New York City uses eco-friendly tactics to provide guests with lodging that is convenient, luxurious and sustainable.

ANOTHER SUSTAINABLE SELLING POINT: MODE:GREEN

Mode:Green also partnered with mobile app Fingi to provide guests and staff automated remote control of numerous, must-have room features. Guests receive an Android smartphone upon check-in and can use the app to control their rooms' lights, temperature and television. Meanwhile, hotel operations staff can control room settings to ensure that energy usage is kept to a minimum once a guest checks out.

1 Hotel receives ongoing service and support from Mode:Green to keep everything running smoothly. "We often go in after the project is completed to tweak the system based on how it's being used by actual guests," Lally says. "It's very important here, given how much the lighting system is in use."

Starwood Capital has continued to open 1 Hotels in New York and other states, and has also ventured into locales outside the U.S. The corporation says it plans to use Mode:Green's services when possible.

"It's important that the industry stay ahead of the curve when it comes to green technology, and that's what we try to do," Lally says. "Who knows where things will be a few years from now?" **GB**

A Legislation Grab Bag

It was a busy spring for green activity among state governments. What's next?

Rule review. A pair of bills under review by Minnesota's state legislature would monitor the impact of new regulations on residential construction costs.

BY MIKE COLLIGNON

SPRING MAY BE OVER, but there's no summer vacation yet for lawmakers, who are hard at work on a slew of bills, regulations and hearings on environmental and coding issues. Here are some of the key topics under consideration:

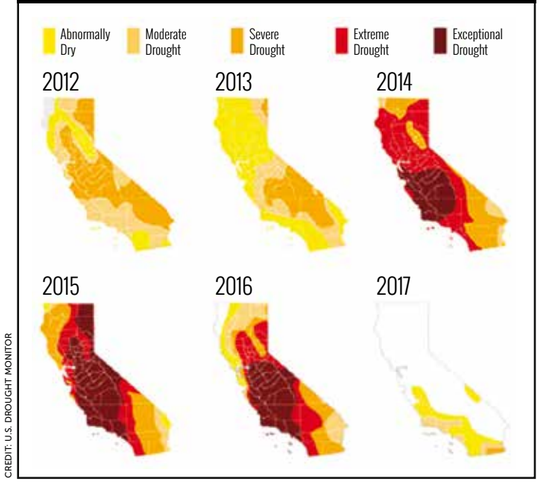
HIGHER CONSTRUCTION COSTS COULD COME UNDER SCRUTINY IN MINNESOTA

There are identical bills in the Minnesota House and Senate that would require that an unnamed state agency "determine if implementation of a proposed rule, or any portion of a proposed rule, will, on average, increase the cost of residential construction or remodeling by $1,000 or more per unit." House File 1001 and Senate File 745 go on to state that if the regulation does result in costs exceeding $1,000, the agency making that determination must notify the appropriate House and Senate committee members within 10 days.

The bills, which are still in their respective legislative chambers, only consider the costs, and are silent on the savings of a proposed rule. If passed, this new methodology would go into effect on Aug. 1.

Areas impacted by California's drought, 2012-2017.

All maps represent drought conditions as of the first week of April for a given year.



CREDIT: U.S. DROUGHT MONITOR

Parched planning. California's half-decade drought has come to an end, but conservation efforts on all levels must continue, according to Gov. Jerry Brown.

REVIEW CONTINUES FOR MAINE'S BUILDING CODE OPT-OUT PLAN

Legislation that would allow communities in Maine with more than 4,000 residents to opt out of some building codes has moved from the state's House to its Senate. LD 1392 would require such municipalities to adopt and enforce the Maine Uniform Building Code, the Maine Uniform Energy Code or the Maine Uniform Building and Energy Code. Initial public concern is that the legislation would allow some municipalities to become more lax in their code adoption, while it might not change anything in other communities. As of press time, the bill was in the Senate Committee on Labor, Commerce, Research and Economic Development.

RESNET SEEKS TIGHTER MORTGAGE INDUSTRY SAFETY STANDARDS

RESNET has proposed Addendum 26 to its *Mortgage Industry National Home Energy Rating Standards, Chapter 2: RESNET National Standard for Rater Training and Certification*. It would revise the Section 207.1.3.2 requirement for identifying potential combustion appliance safety hazards; add references in Chapter 1 to Chapter 2; remove the "Confirmed" requirement from the probationary ratings requirement of Chapter 2; and add Standard ANSI/RESNET/ICC 380-2016 to Section 209 Normative References.

FUTURE UNCERTAIN FOR MARYLAND ENERGY EFFICIENCY BILL

Maryland House Bill 970, which would require a homebuilder working on a development of 11 or more homes (by the same builder) to provide homebuyers with written information on energy efficiency options, has received an "unfavorable" report after judicial proceedings. This does not bode well for the prospects of this bill.

END OF THE LINE FOR IOWA CODING BILL

Iowa Senate File 388, which would have allowed jurisdictions to utilize the 2009 IECC instead of the statewide residential energy code enacted in 2012, has been referred back to the State Government Subcommittee. In doing so, the Senate ended further consideration of the bill.

DESPITE DROUGHT'S END, CALIFORNIA CONTINUES WATER-SAVING EFFORTS

California Gov. Jerry Brown has ended the five-year drought state of emergency over in all but four counties, but said the state must continue to make conservation "a way of life." A recently released report, *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*, proposes a suite of actions ranging from expanded technical assistance, to evaluation and certification of new technologies. These would be used to help the state implement four objectives: wiser use of water; eliminating water waste; strengthening local drought resistance; and improving agricultural water use and drought planning.

The proposed plan would be executed by the California Department of Water Resources, State Water Resources Control Board, California Public Utilities Commission, California Department of Food and Agriculture, and California Energy Commission. **GB**

Mike Collignon is the executive director and co-founder of the Green Builder Coalition.

RESOURCES

Minnesota State Senate, SF 745, **https://legiscan.com/MN/text/SF745/2017**
Maine State Legislature, LD 1392, **http://bit.ly/2pBFCcB**
RESNET, **www.resnet.us**
State of California, Making Water Conservation a California Way of Life, **http://bit.ly/2p9dCcE**

Keyless Entries and Augmented Security

Here's how the IoT is impacting multi- and single-family homes.

BY ROB MARTENS

THE INTERNET OF THINGS (IoT) is rapidly evolving, offering new and exciting benefits to our lives as smart devices become easier than ever to use and manage. IoT devices improve a homeowner's or renter's experience, and they allow for a whole new level of personalization and convenience.

Mega-tech companies such as Apple, Amazon, Google and Samsung are paving the way with simplified smart home platforms that allow homeowners to quickly install products and enable them to work together more intuitively. These platforms often allow homeowners to manage all products from a single app. Examples include Apple's *Home* app and voice activation assistants like Amazon's *Alexa*. From home security cameras to smart locks and thermostats, these platforms let users control the most intimate and important parts of a home while saving money and time—and they also provide peace of mind.

CREDIT: ALLEGION/SCHLAGE

Though IoT technology is fairly new in the multi-family space, it has already transformed the daily experience of tenants and property managers. For example, property managers can pair Schlage smart locks with their preferred third-party applications to allow renters to access the lock with their smartphones, rather than keeping track of keys. This offers the tenant more options and convenience and also provides a more personalized experience.

Property owners and managers also benefit from the added control and efficiency. Not only do they no longer have to worry about lost keys, but they can also reset the lock quickly and easily when it's time to transition the unit to a new resident.

However, understanding the benefits versus the risks is important, as the ultimate decision on the balance between security and convenience resides with the property owner. There are some basic questions that can and should be asked before incorporating any IoT technology into multi-family properties. Builders, installers and designers will want to prepare for these potential questions from anyone who is considering their services:

- How much information is available about you and/or the device provider? Are you and/or the device provider experienced in the category of equipment from which the customer is purchasing? Do you and/or the device provider know how to properly apply the technology?
- In terms of connected devices, does the item provide "over the air" (OTA) updates? In other words, can the device be upgraded over time to ensure that it is as secure and efficient as possible?
- If the device shares information, is that information protected by a recognized encryption standard?
- What other controls will help ensure that devices are being used in the fashion that the owner prefers?

OTHER WAYS PEOPLE WILL WANT TO BE 'SMART'

While connecting to these technologies via mobile device adds another level of convenience for property managers, tenants and homeowners, there is only so much you can jam into a mobile app screen while keeping it user friendly.

With that fact in mind, new forms of user interfaces are coming to the forefront with audio assistants and chatbots. These tools allow the tenant or homeowners to interact with devices via voice or text, with the hope of creating a more intuitive, simpler solution and offering more options.

Another new interface is augmented reality, which places an extra layer of data on an object that can be seen when looking through a phone or other communicating device.

These two areas will continue to advance, offering even more convenience to residents.

Overall, IoT-enabled devices can offer more personalization and convenience for tenants and homeowners, and better control and efficiencies for property managers. It's a win-win proposition for everyone involved within the multi- (and single-) family categories. **GB**

Ron Martens is futurist and vice president of Strategy and Partnerships for Allegion, maker of Schlage locking systems and tools.

AD INDEX

COMING NEXT ISSUE

GREEN BUILDER®

Eco-Leaders

Here are companies and brands that are taking real steps to mitigate Climate Change and "do right" by the environment.

CREDIT: NASA / GODDARD SPACE FLIGHT CENTER

FROM THE TAILGATE

New Offerings for the Sustainable Minded

By Ron Jones

The Beauty of Choice

"THE QUESTION IS NOT what you look at, but what you see."

When he wrote those words in the mid-19th century, Henry David Thoreau was possibly suggesting that beauty is indeed in the eye of the beholder. But perhaps he also meant that each of us is seeking what satisfies us the most, not necessarily what appeals to the greatest number of our neighbors.

It may be fair to say that for the most part humans are social creatures. Additionally, probably few other species are so specialized and as interdependent as people, which has a good deal to do with how we are able to avail ourselves of a seemingly endless set of options to choose from in our daily lives.

Imagine how narrow the choices for most of us would be if we were evenly distributed across the surface of the world. Instead, the majority of the human population of the planet resides in cities and towns, with all indications being that the trend to congregate will continue as urban populations increase and the percentage of those who reside in rural settings shrinks accordingly.

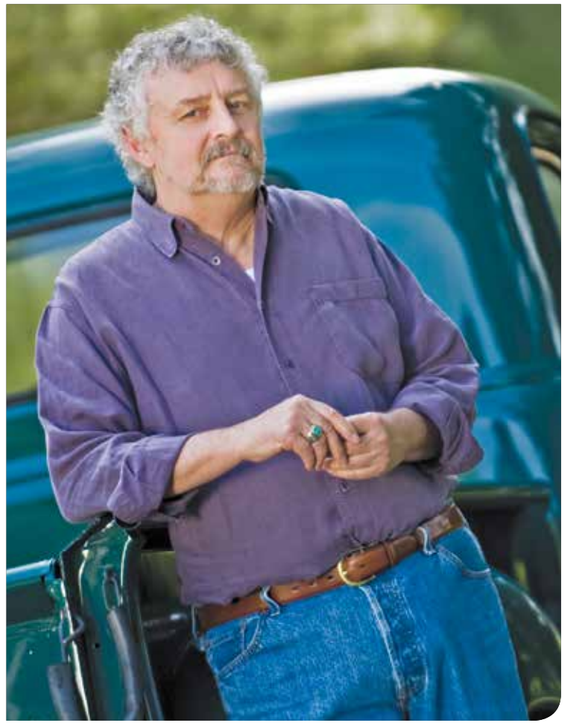
Those who promote sustainability generally agree that this is a good thing. A concentrated human population provides opportunities for greater efficiency in infrastructure and the distribution of goods and services. And urban dwellers can reduce their personal carbon footprints numerous ways, most notably in the area of transportation.

Fortunately, the shelter industry as we know it today has responded to urban dwellers in their collective search for basic protection from the elements and for things that help determine a person's quality of life. Comfort, security, convenience, efficiency, flexibility, affordability, privacy (which is increasingly hard to come by) and many other attributes combine to make multi-family living more desirable than ever for many people.

Architects, designers and engineers have made it possible for developers and builders to deliver safe, comfortable, attractive, high-performance housing options to millions of individuals and families in modern times. This allows urban planners and municipal governments to provide residents with access to basic services, culture, the arts, endless consumer options and the company of like-minded people.

Of course, not everyone seeks the close proximity of others in his or her living arrangements. Thoreau also wrote, "Nothing makes the earth seem so spacious as to have friends at a distance; they make the latitudes and longitudes."

For those of us who prefer solitude and the beauty of nature to the hustle and bustle of the urban environment, or the star-studded night skies to the bright lights of Broadway, it is important that we



recognize the fact that our chosen lifestyle is possible thanks to the desires of so many millions to gather in the population centers around the globe.

I am pleased that those who find enjoyment and security in the nearness of others are able to satisfy their wants and needs. And, I am admittedly grateful (perhaps somewhat selfishly) that by doing so they unintentionally contribute to my opportunity to reside where I do, in what is quietly known as the least-populated county in the lower 48.

If there is any worthwhile takeaway from this muse, I think it's that the most important thing those of us associated with the shelter industry can provide is the ability for people to be able to choose where they want to live. It is our duty to preserve that choice. I would like to think that Thoreau would agree it's a beautiful thing. **GB**

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