SMART STARTS
RESOURCE-SIPPING CONCEPTS AT EVERY SCALE
GET SMART

CHICAGO ARCHITECTS ARE BUILDING SMART PROJECTS AT EVERY SCALE

By Ben Schulman
AS ENERGY SOURCES BECOME EVER MORE FINITE, creative fixes that smartly remedy the unsustainable—and expensive—scale of conventional building practices are increasingly in demand. Responding to this call for action, architects are drawing up solutions that mesh good design with technological prowess. Smart buildings, which combine physical, digital and performance-based infrastructures to enhance efficiency, are becoming the new standard.

Chicago architects are at the forefront of this emerging trend, designing smart buildings at every scale, such as a rehabbed transient hotel on Chicago’s West Side; a single-family home in Northbrook; and designs for a seven-story, 1.4 million-square-foot, positive-energy building in Masdar City, United Arab Emirates.

**Smartly Rehabbed Affordable Housing**

A mix of grandeur, grit and renewal is on display at the southern edge of Union Park on Chicago’s West Side. The only parcel on the short block of Warren Boulevard between Ogden Avenue (to the east) and Ashland Avenue (to the west) is a striking Art Deco, six-story building. Originally built in 1929-30 as the Union Park Hotel and designed by architect Benjamin Albert Comm, the handsome building evokes Chicago’s Jazz Age heyday with its façade of polychromatic terra cotta panels. Renamed the Viceroy Hotel in 1963 and converted into a transient hotel, the building fell into disrepair, eventually closed and was purchased by the city of Chicago for $5.1 million in 2006 with the intent to maintain the city’s stock of affordable housing.

The nonprofit Heartland Housing purchased the building from the city for $1 in 2011 and re-visualized the Viceroy as Harvest Commons Apartments, featuring 89 below-market affordable housing units, and an additional 17 units of transitional housing for women recently released from prison. Heartland joined forces with Landon Bone Baker Architects to simultaneously rehab the historic structure—named a Chicago landmark in 2010—while implementing a series of zero-waste and smart features meant to soften the building’s footprint.

Jeff Bone, AIA, said the balancing act required a “negotiation between the energy efficiency of green tech with a lot of the historic design ideas we meant to incorporate.” Their program seamlessly marries the two. The preserved plasterwork in the ground-floor communal space and the restored luster of the wildly colored terrazzo floors in the lobby are just a few of the historic elements upheld within the rehab. These restorative touches mingle with smart technology, such as a building-wide intranet that will connect to a bank of screens that show residents the real-time energy usage of their 250- to 300-square-foot units. The building’s connectivity will also allow Harvest Commons to take transit-oriented development to the next level, with a set of monitors displaying arrival times for every bus and train line that runs adjacent to the site.

The building uses National Fenestration Rating Council-rated windows with a U-factor no higher than 0.35—meaning heat will have a hard time escaping. Accentuating the green roof is an eight-panel solar thermal system for domestic hot water and a series of 12 geothermal wells 450 feet deep and used for heating and cooling. Harvest Commons Apartments is designed to produce 103 percent of its annual energy needs, ensuring a comfortable home for its residents and a model for future affordable housing developments.
A green roof accentuates Landon Bone Baker Architects’ technique of, as Jeff Bone, AIA, says, “sneaking new technology into an old frame.”

Commons also contains a “brain room” on the top floor, filled with monitoring equipment that keeps the building humming along. Standing atop the permeable pavement between the on-site urban farm (most of the building’s former parking lot is now dedicated to farming) and the refurbished yellow face brick, Bone says the building is about “sneaking new technology into an old frame.”

The rehabbed building was officially given new life with a ribbon cutting ceremony in April. “At Harvest Commons, nearly 90 Chicagoans will have a safe and green place to live and restart their lives,” says Michael Goldberg, executive director of Heartland Housing. “Smart, environmentally friendly design will help those who are the most vulnerable gain stability and improve their quality of life.”

A SmartHaus for Suburbia
Suburbia isn’t often thought of as a cradle of sustainability. Yet Prairie View-based architect Michael Kollman, AIA, LEED AP, believes that paradigm is changing, as the culture is “in the middle of a shift. The economy forced everyone to look at how they build buildings and how they consume, too.”

Kollman’s SmartHaus model, inspired by the old Sears Homes, uses energy efficiency and smart technology as part of a cost-efficient template to design the home of the future. “The aesthetics of each home might be different, but there’s a proven formula to what we do,” Kollman says. He has designed what he calls “a 21st century Craftsman,” a four-bedroom, 2,500-square-foot home due to be completed in late 2013/early 2014 in suburban Northbrook.

The design begins with a “super-insulated and super-tight envelope,” Kollman says, which allows the homeowner to save on mechanicals in comparison to conventional suburban homes. It takes advantage of the site’s east-west orientation by incorporating passive solar design techniques. The home is outfitted with bamboo floorings, LED lighting throughout, recycled drywall, no-VOC paints and a conditioned energy recovery ventilation system—or CERV—to monitor and manage the home’s air quality.

CERV is a product from Urbana engineering firm Building Equinox, which homeowner Aaron Stash says “will not only circulate air throughout our home, but will monitor CO₂, H₂O and VOCs in the air and continuously exhaust and mix outside air in order to maintain desirable indoor air quality.” The CERV system is sensitive to indoor and outdoor temperature and humidity, and can automatically intuit when to open or close the filtered ventilation system.

The home is also equipped with an energy management system that will allow Stash, his wife and two children to see where they are using the most energy and remotely monitor the home. “If you’ve got an iPhone or iPad, you can use this technology,” Kollman says. “The ubiquity of technology makes being smart second nature.”

The Northbrook SmartHaus has been preliminarily awarded a LEED Platinum rating from the U.S. Green Building Council, and Kollman estimates that when complete, the house will use 60 percent less energy than a conventional home. “Green homes already have a focus on comfort, air quality and energy efficiency, but they don’t always have advanced monitoring and controls,” explains Jason La Fleur, a third-party green verifier and rater. “As technology improves and becomes more affordable, we see more design teams using smart home technology to help control and deliver the benefits that homeowners have come to expect from a new green home.”
A Smart Oasis in Masdar City

Gordon Gill, FAIA, of Adrian Smith + Gordon Gill Architecture (AS+GG) wants to talk about relationships. “Just as my ability to work on this desk is directly related to the light above me, we know there are deep relationships between the systems that make a building work,” Gill says.

It’s an approach used in the plans for Masdar Headquarters, the winning entry in an international competition for one of the premier sites in the zero-waste desert city that was master planned by Foster + Partners. Although development of the 1.4 million-square-foot, seven-story mixed-use building is currently in a holding pattern, the plans reveal a holistic, systems-wide strategy that is both site-specific and applicable for smart buildings everywhere.

AS+GG is creating data-driven models that can analyze and interpret the systems within a building, and incorporate those measurements into the design. “We can look at a vernacular building design in response to particular conditions anywhere in the world, and assess results of scenarios and make [design] decisions,” says Peter Kindle, AIA, ASLA, director of urban design at AS+GG.

Looking to the idea of an oasis—a “natural, harmonious system in the desert,” says Gill—as inspiration, AS+GG set out to integrate the ancient vernacular of sun-shading Arabic architecture specific to a desert site like Masdar, with the latest advances in universal sustainable technologies. Masdar Headquarters is equipped with on-site greywater recycling and rainwater collection/treatment networks; geothermal cooling systems; and a sawtooth façade of high-thermal-mass exterior glass cladding to mitigate solar heat gain while maximizing natural light. The defining design feature of the building is the 11 wind cones intended to provide natural ventilation and cooling, leading up to communal rooftop gardens with indigenous fruit trees and other vegetation. The gardens will rest underneath the roof’s massive photovoltaic arrays, which are expected to produce 103 percent of the building’s annual energy needs.

Even if Masdar Headquarters remains as a plan only, its balance of form and technology offers lessons that can be applied on a scale as small as a single building and as large as an entire city. “If stage one was just developing the right model for the building, stage two is to scale it up so it’s not just about measuring the system within one building, but many buildings,” Kindle says. It’s about smart buildings and smart building.

Essentially, Gill says, it all boils down to “measuring performance while maintaining the beauty of architecture.”

Plans for the development of the 1.4-million square-foot, mixed-use building may be in a holding pattern, but AS+GG’s systems-wide strategy for implementing energy-efficient capacities into large-scale buildings are models that can be applied to a variety of projects.