

[ENERGY]

AIMING FOR ZERO

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TWO SUSTAINABILITY-MINDED NON-PROFITS WORK TO UPGRADE THEIR BUILDINGS TO NET-ZERO ENERGY

The ICA's GreenRise Historic Restoration Project is featured in the January-February 2018 issue of Retrofit Magazine in conjunction with a new building owned by the American Geophysical Union in Washington, DC. The article is titled, "Aiming for Zero," and it appears on pages 64-68.

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The concept of net-zero energy building is ambitious. It also represents the very essence of sustainability. To truly live sustainably is to operate within the parameters of a natural system, without taking anything from it or leaving anything harmful behind. Net-zero buildings seek to do just that. Whether connected or off-grid, they are designed to produce as much energy as they use.

There are many different ways to approach net zero. Some designs go all-in on renewable-energy production to handle the load of whatever the building may need while others put a greater focus on superior levels of efficiency. There is a long continuum of means and methods.

If net-zero new construction is a lofty goal, net-zero retrofits are in the stratosphere. Taking an existing building and incorporating enough efficiency and energy production to get to zero is extremely difficult. But that doesn't stop people from doing it.

Two non-profit organizations in different parts of the country are currently undergoing transformations to their facilities with the idea of achieving net-zero. The organizations, situations and approaches to net-zero are different, but their goals are the same—to serve as an example and make the world a better, healthier place.

Capital Idea

The American Geophysical Union (AGU) is a non-profit dedicated to advancing Earth and space sciences for the benefit of humanity. Sustainability and climate-change mitigation are entwined in AGU's core mission.

In early 2017, AGU's board of directors agreed to a \$41.7 million net-zero renovation of its nearly 25-year-old, 62,000-square-foot headquarters building in the Dupont Circle neighborhood of Washington, D.C. This ambitious project would make AGU the first to complete a net-zero commercial renovation in the nation's capital.

An RFP went out, and the architects at Washington-based Hickok Cole Architects answered the call. The firm worked with project manager MGAC, general contractor Skanska and noted high-performance building engineer Interface Engineering to tackle the net-zero goals for the building.

"AGU had to upgrade their building, and they wanted to do it in a way that is reflective of who they are," explains Lindsey Falasca, project architect with Hickok Cole Architects. "They put cost aside and approached this asking, 'if we're going to do this, how are we going to do it right?'"

Any net-zero construction requires a combination of expensive, sometimes relatively untested strategies. Few owners are

American Geophysical Union, Washington, D.C.

Retrofit Team

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- Yolanda Cole, senior principal
- Holly Lennihan, director of sustainable design, project manager
- Lindsey Falasca, project architect

OWNER'S REPRESENTATIVE // MGAC, Washington, www.mgac.com

ENGINEER // Interface Engineering, Washington, www.interfaceengineering.com

DEVELOPMENT AND CONSTRUCTION // Skanska, Washington, www.usa.skanska.com

COMMUNICATIONS/COMMUNITY OUTREACH // Stratacomm LLC, Washington, www.stratacomm.net



ICA GreenRise, Chicago

Retrofit Team

OWNER // Institute of Cultural Affairs, Chicago, www.ica-usa.org

- Ted Wysocki, CEO/president
- Lesley Showers, property manager
- Mary Laura Jones, building fundraising
- Damien Blanchard, facility manager
- Jim Troxel, board chair

REAL-ESTATE CONSULTANT //

Henderson & Co., Chicago

- Irving Henderson, principal

ARCHITECT //

Farr Associates, Chicago, www.farrside.com

- Tony Holub, senior associate and project manager

ENGINEER //

dbHMS Engineering, Chicago, www.dbhms.com

willing to undertake those costs and risks, but with a membership of 65,000 scientists, AGU is refreshingly open to new ideas. And because the organization is the owner and long-term occupant of the building, the association could afford to look at the big picture.

"AGU intends to be there many more years, so they are looking at the life cycle and payback over a very long term," says Yolanda Cole, senior principal, principal in charge, Hickok Cole Architects. "It allowed them to justify some upfront costs to get to longer-term decisions."

Strategies, Synergies and New Technology

Nearly 50 different strategies were considered at the start. Over time those were whittled down, refined and bundled together. Although AGU is open to new technologies, the group is also very judicious in its choices.

"[The owners] are very diligent about reviewing product specifications, information and research," Falasca says. "They even did their own energy model to test some of our assumptions. They're not afraid of new technology, as long as the facts and research are there to back it up. We eventually narrowed it down to just over 20 strategies that were implemented in the building."

One example of the kind of cutting-edge technology set to be employed on this project is a hydroponic phytoremediation wall, which helps filter toxins out of the air and assists in recirculating clean air without requiring an air-handling system to pull in unconditioned, outside air.

Another, more conventional approach was the incorporation of more than 700 solar panels on the roof of the building. While a boost to the energy equation, the PV did bring up some issues with historic neighborhood zoning and required a historic preservation review. Ultimately, smart design alleviated concerns of the PV array going over the property line, and the installation could move forward.

Energy will flow directly from the PV array to a direct current LED lighting system in the building, rather than converting the power to alternating current and sending it out to the grid. This limits the energy lost

in conversion and transmission and creates more efficient building power generation. "How we use energy in this country may change when people start generating power onsite because there are great efficiencies," explains Holly Lennihan, Hickok Cole Architects' project manager.

The AGU retrofit also will include a municipal sewer heat-exchange system that recovers thermal energy from wastewater and a radiant cooling system that will circulate chilled water through a network of pipes. The building also will feature enhanced envelope insulation and dynamic glass that shades itself in sunlight to limit heat gain. Work on the retrofit is underway and a complete move-in is expected by spring of 2018.

Rise of GreenRise

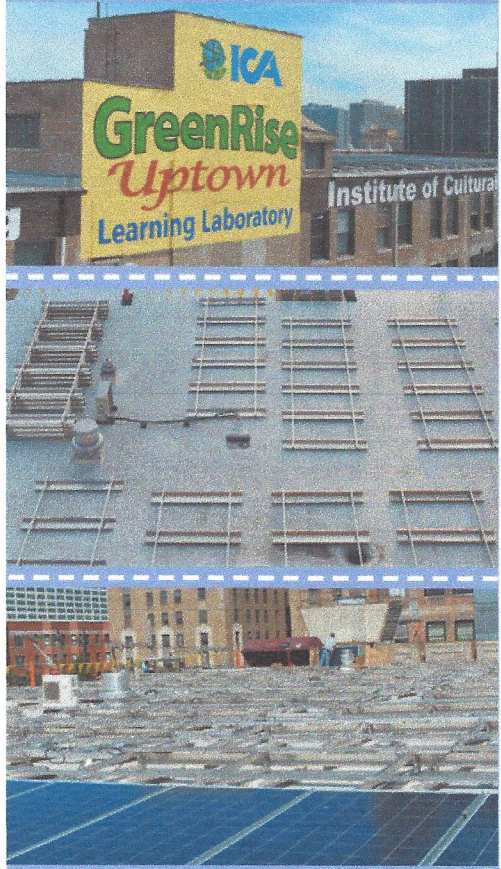
In another part of the country, another non-profit is tackling a different kind of net-zero challenge. This one looks to upgrade a much older building while dealing with numerous restrictions and a tighter budget.

The Chicago-based Institute of Cultural Affairs (ICA) in the USA is dedicated to building a just and equitable society in harmony with planet Earth through empowering cultural dimensions of the social process. ICA's home is in a terra-cotta-clad building that was originally built in 1921 with additions in 1926 and 1966. Known today as the ICA GreenRise, the building was given landmark status in 2013.

It is a mixed-use facility and home to a diverse range of tenants. Along with ICA, it has office space, a bank, medical office, pharmacy, worship space, retail and even is home to a number of families. What everyone in the building has in common is a desire to make the world a better place.

"ICA has always tried to address the social issues of our time, and we consider the environment and climate change to be a major issue," says Lesley Showers, ICA GreenRise's property manager. "We do a lot of neighborhood work to try to bring awareness and connect people. The largest asset we have is this building. We asked how we can use it to demonstrate our mission and share what we're learning so others can be just as energy efficient."

The real process of retrofitting the building for energy savings began in 2013



ICA GREENRISE PHOTOS: COURTESY ICA GREENRISE



with an initiative of buildings in Chicago committed to lowering their energy use by 20 percent in five years. This fit with ICA's mission and they became the first non-profit to join.

A total lighting overhaul was followed by an elevator upgrade and a new roof on the third addition to the building. By

grabbing low-hanging fruit, the building became ENERGY STAR certified for the first time in 2014 and was able to reduce its energy usage by 23 percent in just three years. This was the beginning of the drive to net zero, but the process was further pushed by necessity.

"Around 2014 or 2015, a lot of our

systems started to fail," Showers recalls. "Our boilers started to fail. We have a 300-ton absorption chiller that was having problems. We started asking whether we should take a step back and look at what we want to accomplish with this building."

In 2014, ICA installed a solar array that now produces approximately 25 percent

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of the building's power. "That's when we really started looking at doing the whole building holistically and how we could cut our energy consumption," Showers says. "We started talking about getting the building off the grid and decided we were going to try to get this building as close to net zero as possible."

Aspiration and Challenge

Two years of planning produced a 78-page document outlining ICA GreenRise's sustainability strategies, which include swapping existing steam boilers with high-efficiency hot-water boilers, replacing a 300-ton absorption chiller with a new 200-ton chiller, replacing existing air-handling units with a dedicated outdoor air system and installing radiant ceiling panels. Accomplishing all of this is not without its challenges. For starters, the building's

historic status creates limitations on what can be done on the exterior façade.

"The landmark status has a real interest in keeping the terra cotta as it is, so we've started looking at insulating the interior walls on those façades," Showers explains. "But the façades on the back, on the south and west sides of the building, are brick so we can do a cladding on the outside to insulate there."

Another challenge stems from the fact that the building is occupied and the construction needs to work around the tenants.

"We can't just move everyone out," Showers says. "So we are juggling. As we move tenants off a floor, we're able to gut that floor totally, insulate the interior walls, change the windows out, and put all the new plumbing, electric and HVAC systems in."

And finally, there is the challenge of funding these kinds of upgrades to the building. The original budget for the project was \$20 million but that has been pared down to \$15.8 million.

"We are financing through a combination of New Market Tax Credits, Historic Tax Credits, help from the city of Chicago through Adopt-A-Landmark, as well as grants and our capital campaign," Showers explains. "We're trying to close the funding on the first phase and then start the funding for the second phase so we can continue on with construction and not have to stop and regroup."

First phase construction is expected to take six to eight months with all phases set to be completed by the end of 2019. "It's really ambitious to try to get this building as close to net zero as we possibly can, but what's really rewarding is the reason we are doing this," Showers says. "We have 25 different non-profits in this building that all serve the very vulnerable communities around this area and the homeless that are here. ICA is trying to inject its spirit into this building."

In spite of challenges with budget and logistics, the organization sees the chance to make its building a symbolic beacon. Showers notes: "We really believe that people who are struggling and come to our building to receive services should be able to enjoy a space that honors them and gives them hope. This building really has a purpose in serving vulnerable populations."

For both groups and both buildings, the journey to net-zero is ongoing. There will be bumps along the way, but both projects provide an important example. On the technical side, the successes and failures of the strategies employed on these buildings will help give a blueprint to future owners and designers striving for net zero.

But on a deeper level, both organizations demonstrate the most important aspect of net-zero energy construction—the will to do it. AGU and ICA will push through any challenges they face because they are dedicated to the true promise of sustainability. And where there is a will, there is a way. 