



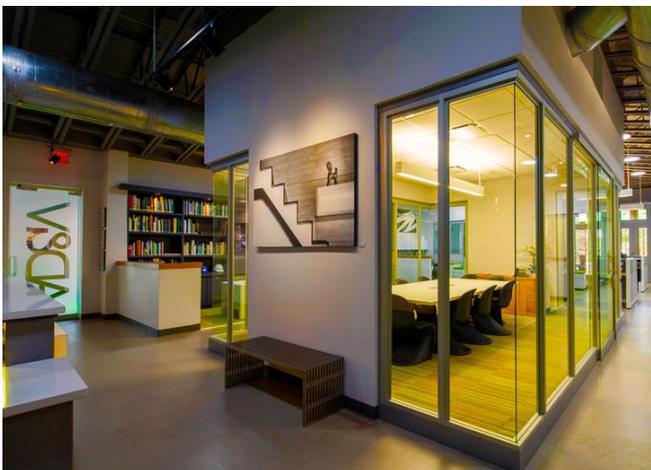
PROFILES OF RESILIENCE: LEED IN PRACTICE

As part of our commitment to building a more resilient future for the built environment, USGBC defines resilience as “**the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.**” To meet this goal, USGBC is driving [resilience](#) in more ways than one by making buildings more sustainable, durable, and functional through the application of LEED. Through integrative design and key credits, LEED guides project teams to invest in climate adaptation strategies to enhance building and community resilience.

This brief dives into several examples of LEED-certified buildings that have been tested and have demonstrated exceptional resilience. These LEED project teams attest that the LEED process – including purposeful design and third-party validation – has helped these projects achieve critical resilience outcomes.

ÁLVAREZ-DÍAZ & VILLALÓN OFFICES SAN JUAN, PUERTO RICO

Originally built in the early twentieth century, the building that is home to the offices of Álvarez-Díaz & Villalón (AD&V) was [renovated](#) in 2013 to maximize sustainability and resilience. In 2014, the AD&V offices became the first architecture and interior design firm in Latin America to earn [LEED Platinum](#) certification. The resilient features of both the office space and the building at large (outlined below), contributed to its quick recovery from Hurricane Maria in 2017.



AD&V Offices

FEATURES

AD&V recognized that, as architects and designers who put [sustainability](#) into practice, they had a responsibility to “walk the walk” as well. To do so, the firm committed to implement green features and practices in their own offices by pursuing LEED

certification. Each energy conservation measure (ECM) implemented as part of the project’s renovation helped contribute to overall greater efficiency, cost savings, and a shorter period required to restore building operations.



AD&V Offices

Following the devastation of Hurricane Maria, the AD&V office space returned to a fully functional work space within a few days, a feat not typical in the area at the time. Because of this quick recovery, the office also served as a community gathering place and a temporary command center. Critical features include:

- A back-up power generator and satellite internet reduce reliance on ground infrastructure, which was heavily damaged following the storm.
- Air conditioning units with 20 SEER rating minimizes energy consumption, thus facilitating running cooling operations off the generator.
- Solar tube lighting enables people to work without the need for electricity by using natural light.
- Lighting control systems minimize energy use helping reduce the load on the generator.
- A rainwater cistern allows occupants access to running water when municipal systems are compromised.
- Location in a dense area of the city enables many workers to walk to work or use non-motorized transport when vehicles are compromised.

These features not only helped fortify the AD&V offices to serve a makeshift shelter for employees during the recovery but also broadcast a beacon of hope to the community that more resilient buildings could solve many of the problems in the wake of the hurricane.

At Greenbuild 2017, Founder and Principal of AD&V Ricardo Álvarez-Díaz recounted stories of his offices' immediate recovery, while also stressing the importance of resilience in particular in rebuilding efforts. As devastating as it has been, the hurricane may help prioritize resilience in the long-run, he argued. "In a way, sometimes when things like this happen, it is a great opportunity for us to look within ourselves and actually do things better... not only to save money and energy, but because you can create a better quality of life for you and your family."

For more details, check out the project's LEED credit [scorecard](#).

SILVER STAR APARTMENTS LOS ANGELES, CALIFORNIA

This 49-unit apartment building was completed in 2017, achieving LEED Platinum certification. The development also earned the distinction of being the first Zero Net Energy multi-family affordable housing project in Los Angeles. [Silver Star Apartments](#) fully serves veterans with disabilities or those who were previously homeless. The project's physical resilience and reliability can serve as a consistent, beneficial environment for its residents, as well as contributing to the social resilience of the neighborhood and city.



Silver Star Apartments courtyard, photo credit Natalia Knezevic Photography

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Silver Star is a prime example of how high-performance buildings can be achieved within budget and with the resilience-enhancing features necessary to properly serve its residents. This Zero Net Energy [project](#) exhibits social resilience by accommodating many of its residents' unique physical needs, while also supporting their individuals returning to civilian life. The project also provides an

overall welcoming, community-centric environment. The project achieves high levels of efficiency while also addressing the unique needs of its occupants:

- First commercial on-site greywater system for indoor use in the City of Los Angeles, offsetting irrigation demand and allowing for indoor usage of recycled non-potable water.
- Passive solar design and thoughtful building orientation utilizes natural light and reduces need for artificial light sources.
- Photovoltaic system offsets 105% of all site energy use, and enhances project resilience by providing backup power to the community room in the event if power from the grid is lost.
- Publicly accessible herb garden at the street front and edible landscaping throughout the site promotes healthy eating and sustainable practices.

The project's greywater system is expected to reduce on-site potable water demand by 40%, saving around 700,000 gallons of water each year. Varied outdoor spaces and naturally flowing indoor areas promote healthy lifestyles and a sense of community.



Silver Star Apartments community room, photo credit Natalia Knezevic

The Silver Star Apartments project was designed and built on the [premise](#) that integrated supportive services along with permanent affordable housing is the most effective way to reduce homelessness, promote wellness, support recovery, and build individual resilience among its residents.

COLD CLIMATE HOUSING RESEARCH CENTER'S RESEARCH AND TESTING FACILITY

FAIRBANKS, ALASKA

Located on the campus of the University of Alaska Fairbanks, this project is the world's northernmost [LEED Platinum](#) commercial building. The Cold Climate Housing Research Center's Research and Testing Facility (RTF) [building](#) is a living laboratory for building technologies for use in circumpolar regions around the world.



CCHRC Research and Testing Facility

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The 22,000 square foot building provides office and laboratory space for building energy research, product testing, and also hosts a classroom, library, and meeting space. The RTF is resilient to the effects of extreme subarctic temperatures, exhibited by certain features inspired by the LEED certification process:

- Adjustable foundation enables building to adjust to effects of permafrost.
- Ground source heat pump transfers energy from the earth for heating purposes.
- Two [solar thermal](#) storage systems are self-regulating and heat water for the building, including during a power outage, helping to offset energy demand and related emissions.
- More than 400 [sensors](#) throughout the RTF enable monitoring of building system operations and performance
- [Rainwater](#) is caught from the roof and stored in two 2,500 gallon storage tanks in the basement, to operate all toilets and the fire sprinkler system. This system has also allowed the University of Alaska to study the corrosive potential of the rainwater on plumbing systems.

The RTF research team is able to research and develop tactics to exhibit resilience to the effects of cold weather – and doing so within a building that demonstrates the effectiveness of many of these features.

For more information, see the project's LEED credit [scorecard](#).

GAF HEADQUARTERS BUILDING

PARSIPPANY, NEW JERSEY

In 2016, GAF's headquarters building was the first building in the world to earn a LEED pilot credit for resilient design. North America's largest roofing manufacturer, GAF ensured that its [LEED certified](#) facility in Parsippany, New Jersey would be resilient in the event of an emergency. Previously offered for a limited time (and now being incorporated into the RELi resilience standard in partnership with USGBC), this pilot credit (IPpc98) required a pre-design hazard assessment, including identification of and specific assessment requirements for potential natural hazards, such as flooding, tornados, high winds, and earthquakes.



GAF Headquarters Building

FEATURES

For this project, GAF wanted to ensure the building's resilience in the event of a severe hurricane, like what the area experienced following Hurricane Sandy in 2012. Some of the project's features contributed to its hurricane-readiness:

- Flood preparation and backup capabilities allow operations to continue during long-term outages.
- Roof exceeds local code requirements, meeting FEMA Wind Zone II velocities.
- Site selection process included assessment of floodway mapping of roads for a complete look at all flood-prone areas.
- GAF's Business Continuity Disaster Recovery Plan details chains-of-command, POCs, departments, and contact information to access in the event of a disaster event. This implemented plan exceeds LEED pilot credit requirements.

Each of these resilience-enhancing features helped the GAF Global Headquarters earn the LEED pilot credit(s) on resilient design, and ensure both the facility and the company stand strong in the face of a future storm.

For more details, check out the project's LEED credit [scorecard](#).