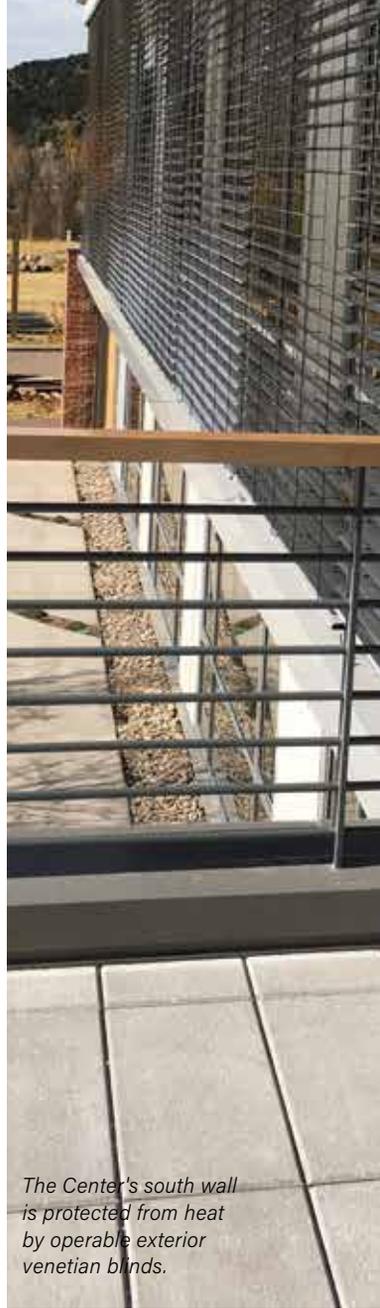




Rocky Mountain Institute Opens  
*Deep Green* Innovation Center  
 Building for an Era of Climate Change



*Living green wall; photo by Kelly Vaughan.*

*The Center's south wall is protected from heat by operable exterior venetian blinds.*

## ARTICLE NICOLETTE TOUSSAINT | PHOTOGRAPHY PROVIDED

In mid-January, the Rocky Mountain Institute will cut the ribbon to open its new Innovation Center in Basalt. The 15,610 square-foot office building has already been recognized as one of the world's most energy-efficient structures, an example of how to construct buildings in an era of climate change.

That example is needed, because as architect/author Edwin Mazria has written, "it's architects who hold the key to turning down the global thermostat." Mazria is the founder of Architecture 2030, a movement that calls for all new buildings and building renovations to be carbon-neutral by 2030.

RMI's Innovation Center shows how those goals can be met. To achieve "carbon neutrality" a building's net greenhouse gas emissions must equal zero. A "net-zero energy building" is achieved when a structure produces at least as much energy as it uses each year. The Innovation Center's tests show that it's on track not only to be a net-zero energy building, but also to be *the most efficient building in the coldest climate zone* in the U.S.

The Center not only meets the highest standard of the U.S. Green Building Council – LEED Platinum – it also meets Europe's stringent Passivhaus standards for a thermally tight (unleaky) building envelope. As of August 2010, only 13 U.S. buildings met the Passivhaus standard and only a few dozen others were being built to meet it. The Passive House Institute noted that the Innovation Center was the tightest building they had ever measured!

All of that matters to the Rocky Mountain Institute (RMI) because the organization aims to "transform global energy use to create a clean, prosperous, and secure future" by changing the way energy is produced and used. A nonprofit that has offices in Boulder and near Old Snowmass, RMI works to transform energy use in multiple areas: transportation, manufacturing, community planning, energy production and buildings.

Since 2011, for example, RMI has been working with the U.S. government's General Services Administration (GSA) on its National Deep Energy Retrofit Program, remodeling federal buildings to move toward the net-zero goal. RMI also helped the owners of the Empire State Building by insulating the historical skyscraper and by replacing 6,514 leaky windows with new "super windows," cutting energy costs from \$11 million to around \$6.6 million a year.

Cara Carmichael, an architect/engineer who has served as the project manager for the Innovation Center, says that RMI "wanted to build a replicable, model office building that would perform at net-zero energy consumption. We wanted to be able to say, 'Yes, at 6,600 feet, it's possible to eliminate all summer cooling equipment and also significantly downsize the heating system.'"

As Carmichael and RMI's chief scientist Amory Lovins enter the sandstone and brick-clad building in early December, accompanied by several guests, they gesture to a living-room-sized area on the first floor. That 200-square-foot area is left over from space that would be taken up by the air conditioning system in a conventional building.

The Center's interior is washed with natural light streaming in from south- and north-facing windows. It's 22 degrees outside, but the building enfolds visitors with comfortable warmth. Although contractors are still wielding power tools, noise and echoes quickly disappear. The carpeting is new and painting is still being done, but they contribute not a whiff of chemical scent to indoor air quality.

An experienced observer will note the use of beetle-kill pine, recycled materials, acoustical ceilings and a colorful cascade of tropical plants on a living wall, but there's nothing here that announces itself as uber-modern or conspicuously green. And that's intentional. "We wanted this to be something any- **CONTINUED >**



First floor interior

body could do," Carmichael says. Although the Innovation Center cost just over \$500 per square foot to build, the premium to achieve net-zero energy, compared to a typical LEED Silver building, was only about \$57 per square foot. When taking into account the building's operational energy savings and the value provided to occupants, the simple payback is under five years.

"A net-zero energy office building is entirely possible, and it's critical," comments Carmichael. "We need to double-down on the performance of commercial buildings as the climate changes and weather becomes more volatile." Carmichael, who has been with RMI for ten years and has been working with the GSA's deep building retrofits, says, "There's a big conversation going on right now about building resiliency – the ability of buildings to adapt to climate change. Buildings contribute the biggest slice of CO<sub>2</sub> to the U.S. energy usage pie. If every building was as efficient as the Innovation Center, we could change that."

The new Innovation Center will hold RMI's local staff and will allow RMI to convene global energy and business leaders and to demonstrate how deep-green buildings should be designed, contracted, constructed and occupied.

To do all that, the structure has pushed the building envelope: It has been built with foot-thick SIPs (structurally insulated panels) to hold inside temperatures at comfortable levels. Its south wall is protected by outdoor operable venetian blinds that shield it from summer heat. Motion sensors detect empty rooms and turn off unused lights. On summer nights, windows will open automatically to let in air that will cool the building during warm days. And those windows, in Carmichael's words, are "the best in the world."

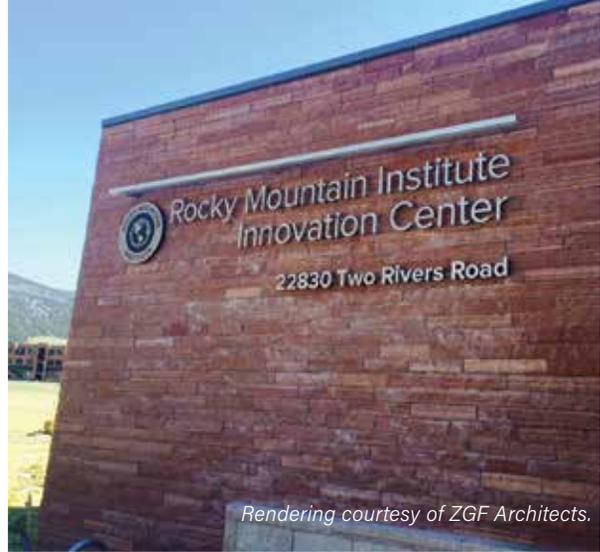
The Center's windows are quad-paned sandwiches that contain two layers of glass and two HeatMirror films. The cavities are filled with Krypton gas, which is more insulating than the more-common Argon gas fill. The windows have an R-value of 13.2 (U-value of 0.076), which means that they are about as efficient as a two-by-four-inch wooden stud wall; they're several times more efficient than a code-compliant window.

To keep people comfortable, most buildings regulate just one thing – interior air temperature. But Carmichael explains that six different factors combine to prompt people to feel hot or cold: clothing, people's activity levels, air temperature, humidity, air velocity and surface temperatures. The Innovation Center is managed and furnished in ways that deal with several of those factors. Its heat, for example, radiates from multiple surfaces, including electric units in the floors and walls that are thermostatically controlled.

The Center's upstairs conference room is equipped with Hyper chairs, which are somewhat akin to seats in high-end cars. Each chair is built from a breathable mesh and contains both heating coils and fans that allow its occupants to control their own comfort. The chairs are run by battery packs that hold a charge that will last for three or four days.

RMI anticipates that the Innovation Center's operating cost will be 70 percent lower than that of a typical office building. RMI anticipates a return of over \$3 million over 10-year period, including not only operating costs, but also the value a deep-green building delivers via factors such as increased worker productivity, increased building longevity and reductions in insurance. Carmichael notes that those are "squishy numbers" but that the savings numbers are drawn from a growing body of recognized green building studies.

Rocky Mountain Institute is holding five open houses for the Innovation Center between January 6 and February 25. See [RMI.org](http://RMI.org) for details.



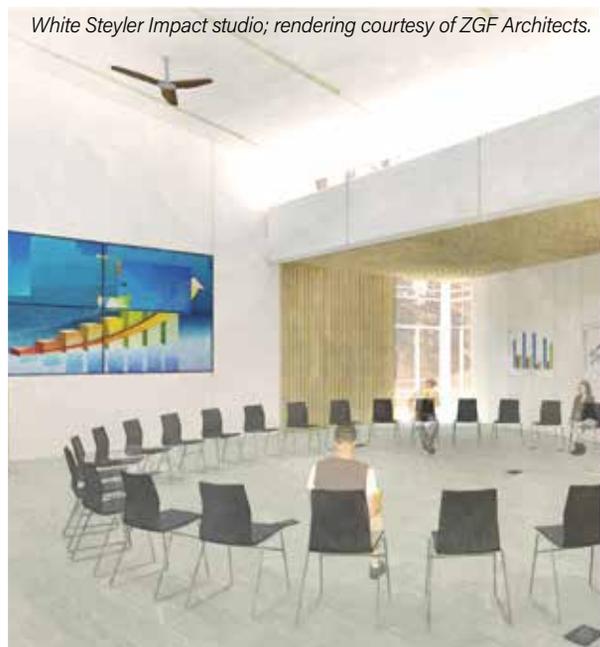
Rendering courtesy of ZGF Architects.



The Innovation Center enables RMI to convene global energy and business leaders to seek solutions in a time of rapid change and challenge. Rendering courtesy of ZGF Architects.



With approximately 80 kW in roof-mounted solar photovoltaic panels, the building will produce as much or more energy than it uses each year.



White Steyler Impact studio; rendering courtesy of ZGF Architects.