

## 2016 ACE AWARDS

Category 9: Best Building Project  
(\$10 –\$40 Million—General Contractor)

# Rocky Mountain Institute Innovation Center

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### PROJECT TEAM

OWNER'S REPRESENTATIVE True North Management	ELECTRICAL ENGINEER PAE Consulting Engineers
OWNER Rocky Mountain Institute	STRUCTURAL ENGINEER KPF Consulting Engineers
GENERAL CONTRACTOR/ CONSTRUCTION MANAGER JE Dunn Construction	LANDSCAPE ARCHITECT DHM Design
ARCHITECT ZGF Architects	CIVIL ENGINEER Sopris Engineering, LLC
	MEP ENGINEER PAE Consulting Engineers

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### PROJECT NARRATIVE

#### Project overview

When Rocky Mountain Institute set out to create their new innovation center, they did so with a eye on their purpose to *transform global energy use to create a clean, prosperous, and secure future*. RMI's Innovation Center was developed as a “living lab” to demonstrate how deep green buildings are contracted, designed, constructed, occupied, and most importantly, replicated. The two-story, 15,610 SF net-zero-energy office and convening center is similar in size to 90% of U.S. commercial offices while operating at the highest efficiency.

Located in the challenging climate of Basalt, Colorado, the Innovation Center redefines how its occupants experience and control their individual comfort. The building focuses on heating and cooling people, not the air around them. By using a passive design strategy to address the key factors that affect a person's thermal comfort the team eliminated the need for a central air conditioning system and reduced the heating to a small, distributed system - equivalent to roughly 16 hairdryers – used only on the coldest days.

Awards and Ratings:

- LEED Platinum (NC v2009)
  - Anticipating ILFI Net Zero Energy Certification
  - Anticipating Living Building Challenge Petal Recognition
  - PassiveHouse Certified
  - PHIUS+ Source Net Zero project
  - Exceeds Architecture 2030 Challenge goals
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- Anticipating Energy Star target score of 10

#### Green Facts:

- Achieves net-zero energy, producing more energy on site annually than it consumes - one of only 200 buildings in the U.S. to achieve this distinction as of 2015
- Is the most energy-efficient building in the coldest climate zone in North America, with a predicted energy use intensity (EUI) of 17.2 kBtu/SF
- Uses 74% less energy than the average office building in this climate, as determined by Energy Star
- Earns all 19 LEED energy points
- Meets the architecture - 2030 goal of a 70% energy reduction
- Is powered by a 83 kW solar-electric system that is expected to exceed the power demands of the building

#### **Solutions of special projects**

Building the most energy-efficient building in the coldest climate zone in North America in a remote town is no easy task. The final performance of the building envelope is a testimony to the quality of craftsmanship on the project. With an architect located out of state, the team relied on the use of live video technology to review installation details and testing as they were happening in the field. Air tightness is critical to the performance of a Passive House and net-zero building. Through a collaborative effort between the design and construction experts, our team was able to better the performance for the Passive House Blower Door Test air infiltration testing requirement by almost three times.

Our team shaved five days off the construction schedule—a remarkable feat considering the ongoing challenges with the delay in delivery of some key materials throughout the duration of the project. Delivery of glazing frame material was almost one and one-half months behind schedule; delivery of heavy timber material was almost one month behind schedule. We were able to alter the construction sequence to first install the first floor interior walls and exterior SIP walls. We then infilled the support structure once the delayed material arrived onsite. We were able to overcome the delay of the delivery of the window systems by resequencing the interior construction activities.

This well-executed project was delivered under budget with cost savings returned to the Integrated Project Delivery (IPD) team. The cost savings can be attributed to the collective team working together to develop offsets or smart solutions to cost issues during the project.

### **Excellence in project execution and management/team approach**

Design and construction of a leading edge, net-zero energy, Passive House building in a difficult climate required a team with integrative behavior, information and idea sharing, and a whole new level of problem solving. The project utilized an Integrated Project Delivery (IPD) contract model that rewarded such behavior by aligning financial incentives around an integrative design and construction process. The risk/reward system and shared goals of IPD allowed the individual team members to step outside the boundaries of their conventional roles into ones of real collaboration and transparency.

The IPD delivery approach created a highly collaborative and non-confrontational team right from the start. Ample time was taken to bring most of the team on board from the very beginning to engage in project concept development and validation as well as the identification of a number of research and investigative tasks. This served several purposes, such as effective team building and buy-in goals, the creation of a significant knowledge platform, and a collective team effort on solving project challenges.

Our delivery model inspired innovation and allowed for the integration of specific high performance technologies, occupant engagement, and innovative thermal comfort approaches, such as personalized heating/cooling chairs; electric floor mats that provide targeted, radiant heat; personal USB fans that plug into computers; high efficiency ceiling fans; custom windows; and the development of a sun control and shading system. Most significantly, the process created clarity on key design tradeoffs, such the size and adjacencies of office and convening space, passive versus active heating and cooling strategies, onsite solar generation, grid and electrical vehicle integration, and certification strategies.

### **Construction innovations/state-of-the-art advancement**

One of the primary challenges for the team was to both minimize space heating energy in a very cold climate and also keep the building cool during hot summer days.

To deliver thermal comfort to its occupants, thermal mass is vital to ensure the proper functioning of a minimal heating system. The Innovation Center, however, did not contain enough sunlit space for the heating system. After intensive research our team developed a number of solutions that enabled a net-zero building. For one, our team developed a low profile, ducting, integrated cross laminated timber (CLT) system that saved inches of valuable headroom, which in turn allowed for more daylight penetration. Second, phase change materials were installed in the walls ceilings, cabinets and light shelves. Third, our team learned how to make the building extraordinarily tight by creating a strict construction protocol. The result is the largest Passivhaus-certified building in the U.S today – three times better than the exacting standard.

And finally, the shading during the summer needed to be almost complete so a full active shading system was conceptualized and, after exhaustive computer analysis, developed to cover the entire south face of the building where most of the windows are located. The windows also

had to be good thermal performers – in fact, a custom design had to be created and a supply chain of best-in-class manufacturers from Europe and North America teamed together to deliver the window system. At R-12 and R-14, the windows were still automatically or manually operable to admit breezes or vent hot air, when needed.

### **Environmental/Safety**

Our team developed a culture of safety on the Innovation Center job site that was centered around a position of everyone, everywhere, all the time.

Safety issues and expectations were the first item discussed with each trade partners at each pre-installation meeting. A site-specific orientation was conducted for each worker prior to working onsite. Our management approach was based on a philosophy of active caring rather than reactive enforcement. The team leadership was actively and visibly engaged in safety; they held frequent talks on safety issues and publicly recognized workers who exhibited safe behavior.

Our team was also fast to act. After witnessing an incident of unsafe behavior by one of our trade partners, our superintendent visited their office to educate their entire workforce about the potential safety issue. To help make the job site safer, our team installed several permanent fall protection anchors on multiple roof elevations, as well as on the top of the second floor office and conference rooms.

Another challenge for our team was the safe installation of the Structurally Insulated Panels (SIPS) on the exterior walls and the roof system. Our project team worked with the wood framing contractor to develop a plan that incorporated fall protection at all times during the installation.

### **Excellence in client service and/or contribution to the community**

In the end this project will not only help the community of Basalt, but will also be new benchmark for green office buildings throughout North America.

“RMI has a rich history of collaboration and innovation in the Roaring Fork Valley,” said Basalt Mayor Jacque Whitsitt. “The Town of Basalt has been an enthusiastic partner in this development project since day one. RMI’s innovation center will anchor the long-term plan to enhance the town economically and culturally”

“This has been one of the most personally fulfilling projects that I’ve had an opportunity to work on. Our team is second to none - the collaborative way the design and construction teams worked together was inspiring and rewarding for everyone involved. We’ve had some brilliant and highly motivated individuals working on this project.” -- Cara Carmichael, Senior Consultant at Rocky Mountain Institute.









