

CASE STUDY

BOULDER COMMONS

REPLICABLE NZE SOLUTIONS FOR MULTITENANT BUILDINGS



ABOUT US



ABOUT ROCKY MOUNTAIN INSTITUTE

Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; Washington, D.C.; and Beijing.

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Boulder Commons is the largest multitenant net-zero energy (NZE) project in the U.S. and among the first multitenant buildings in the U.S. to achieve net zero energy. This project proves that NZE-leased buildings can have a compelling value proposition for the developer, landlord, and tenant—providing a replicable model for the industry to scale cost-effective and high-performance leased spaces.

PROJECT SNAPSHOT	
Location	Boulder, CO
Project Size	100,000 square feet (two buildings)
Developer/Landlord	Morgan Creek Ventures
Principal Architect	Coburn Architects
Tenants	10–15 tenants including office, salon, restaurant, and coffee shop
Estimated Energy Use Intensity (EUI)	26 kBtu/sf before solar PV, 70% lower than the average office in Boulder.
Construction Completion	2017
Warm Core and Shell Construction Costs (Excluding Solar PV, Site, and Soft Costs)	\$235/sf (12% hard cost premium compared to code-compliant office buildings in Boulder)
Solar PV Costs	\$2,300,000 (\$4.05/W)
Estimated Energy Cost Savings	\$146,000/year, compared to standard energy costs for an office building in Boulder.
Solar PV Installed	575 kW mounted on the roof and SE façade. Produces 716,397 kWh/yr, enough to offset the building's annual energy use excluding the restaurant.

“After doing an NZE building, I don’t think I could go back. We’re already in the design phase and have approvals for our next NZE office.”

—Andrew Bush, Principal at Morgan Creek Ventures



Boulder Commons photo courtesy Morgan Creek Ventures



AWARDS AND ACCOLADES

PAVING THE WAY

This project demonstrates that NZE multitenant leased buildings are not only possible but also financially compelling. Additional information and resources on [Boulder Commons](#) can be found on RMI's website. Developers and landlords can use [Boulder Commons' NZE lease](#) and [excerpts from other NZE leases](#) as a reference along with the *Best Practices for Net-Zero Energy Leased Buildings Guide* in order to begin the discussion with their teams and tenants on how they can work toward NZE operation in their existing building stock and have their next new construction project be NZE.

RMI was recognized as a [2017 Green Lease Leader](#) by the Institute for Market Transformation and the Department of Energy. Boulder Commons expects to achieve the International Living Future Institute Zero Energy Certification as well as ENERGY STAR certification after a year of occupancy. RMI is a Charter ENERGY STAR Tenant (one of the first) and expects to achieve [ENERGY STAR for Tenants](#) certification.

Boulder Commons, Suite 200 Kitchen photo courtesy Morgan Creek Ventures



GETTING TO NZE

Morgan Creek Ventures (MCV), the developer and landlord for Boulder Commons, took a very thoughtful approach to NZE from the onset of this project. Its goal was to achieve NZE with an attractive financial return while keeping tenant costs comparable to the local market, both while delivering attractive, desirable, and comfortable spaces. Achieving NZE requires developers to strike a balance between aggressive energy efficiency and renewable energy generation. NZE was achievable using off-the-shelf technology with proven results including the following:

- Windows: triple pane windows tuned per façade (center of glass U-0.13, solar heat gain coefficient of 0.49 on N, 0.24 on S, E, W).
- Lighting: all LEDs with lighting power density of 0.35 W/sf, 61 percent better than required by Boulder energy code.
- Lighting controls: continuous dimming daylighting controls throughout open office. Vacancy sensors throughout open office and conference rooms.
- HVAC: variable refrigerant flow with energy recovery and energy recovery ventilation.
- Renewables: 575 kW solar PV with 71 percent total generation capacity on the roof and 29 percent capacity on the southeast façade.

BOULDER COMMONS INNOVATIVE SOLAR PV

Boulder Commons took an innovative approach to solar PV design. Since Boulder Commons is a four-story building in a cold climate, it was not able to achieve NZE through rooftop solar PV alone. Rather than pursue deeper energy efficiency measures, it was more cost-effective to install 205 kW of solar PV on the southeast façade, which had the additional benefit of offsetting exterior cladding costs. The vertically mounted solar PV cost approximately \$84/sf, but since it eliminated the need for a metal panel wall system at \$42/sf, the incremental cost for solar PV was only \$42/sf. The southeast facing solar PV has lower performance than the rooftop solar PV by about 28 percent due to its vertical orientation, but at a \$42/sf incremental cost, each unit of energy generated from the southeast facing solar PV has a faster payback than rooftop solar PV.



Boulder Commons, Suite 200 photo courtesy Morgan Creek Ventures



Boulder Commons photo © Romy Purshouse



BUSINESS CASE FOR DEVELOPERS

Boulder Commons achieved NZE at a 12 percent incremental hard cost excluding solar PV compared to a typical office building in Boulder. Between an anticipated 10 percent greater tenant retention and overall 5 percent higher occupancy rates, Boulder Commons will see 5 percent higher net cash flow over 10 years versus a comparable non-NZE building without factoring in a sales premium. Additionally, when the property is sold, the anticipated half a percent lower cap rate would generate an additional \$33/sf premium at the point of sale.

- Profiting from Solar PV:** MCV chose to purchase the solar PV instead of entering into a PPA because it expects to see a 6.2 percent return on its investment. Because MCV could not charge its tenants directly for the energy produced by the solar PV due to local regulatory restrictions, it added an energy charge to the base rent calculated using energy expenses for a standard office in Boulder. To determine a fair energy charge, MCV studied the energy bills of other local properties and found a range between \$1.80/sf and \$2.50/sf annually. It then used the lower end of that range and added it to the base rent. MCV will pay the actual utility bill, so any reduction in energy cost beyond the roughly \$2/sf will go to the building owner to help recover the solar PV costs. This also provides an incentive for the landlord to continue reducing energy costs over time and investing in technologies like energy storage, demand response, or load flexibility, which would increase the return by reducing demand charges.
- Competitive Rent:** With the added energy charge in the base rent, Boulder Commons is in line with other Class A office buildings in Boulder.
- Tenant Retention and Attraction:** In addition to the energy savings value stream, MCV expects Boulder Commons will offer the company additional value during market downturns. Studies have shown ENERGY STAR and LEED-certified buildings have **3 and 8 percent lower vacancy rates respectively**. A conservative 5 percent lower vacancy rate than market average results in \$151,000 of avoided rent lost annually. This lower vacancy rate is due to higher tenant retention, faster lease-up, and shorter downtime between tenants. Better tenant retention has the greatest impact of these factors since finding a new tenant instead of renewing a tenant results in higher tenant improvement (TI) packages and broker fees in addition to lost rent. Retaining a tenant results in savings to the landlord estimated at \$28/sf in tenant spaces when the tenant chooses to renew its lease at the end of the term.^x MCV expects to see 10 to 15 percent higher tenant retention based on a more comfortable and desirable building.
- Market Value:** Because NZE buildings have reduced risk through lower utility bills and increased tenant retention, they typically have lower capitalization rates than standard buildings. Boulder Commons has an anticipated cap rate of 5.5 percent, which is half a percent lower than **typical office buildings**. Because of this lower cap rate, Boulder Commons has an anticipated added value at point of sale of \$33/sf.
- Recognition:** As the largest NZE multitenant leased building in the U.S., **Boulder Commons has received significant press**, amplifying MCV's role as a sustainability leader in the industry.

^xBased on landlord-estimated new-tenant improvement costs and broker fees of \$40/sf and 5 percent respectively compared to renewal costs and broker fees of \$15/sf and 3 percent respectively.



VALUE TO TENANTS

Some tenants, like Rocky Mountain Institute (RMI), place a high value on NZE to meet sustainability goals, but Boulder Commons is also desirable to companies that may not prioritize sustainability.

- **Lower Cost to Rent:** While tenants are paying market rate for base rent, they see an overall lower cost due to lower operating expenses. Tenants don't have to pay a utility bill as long as they stay within their energy budget, so they are insulated from any utility rate increases. This reduces their anticipated operating expenses by approximately 13 percent.^{xi}
- **Increased Productivity:** The greatest benefit to the tenant comes from higher employee productivity and satisfaction due to improved thermal comfort, natural daylight, and residing in a healthy building—all proven to increase productivity by **6–16 percent**. A recent U.S. Department of Labor study showed that people (salaries) cost a company 100 times more than energy, so while a lower utility bill is great, increasing employee productivity makes residing in an NZE office building very compelling. An analysis for a tech company that is leasing a space in Boulder Commons found that a mere 2 percent increase in productivity from residing in this building would offset its entire base rent cost.
- **Customer Marketing Tool:** One of Boulder Commons' tenants owns a hair salon and wanted to differentiate her business by making it a "green salon." The salon owner chose to reside in Boulder Commons specifically because it was an NZE building, and she saw being a tenant as a first step toward marketing her business as a green salon.
- **Employee Recruitment and Retention Tool:** Companies can use their occupancy in Boulder Commons to help recruit new employees and embody corporate sustainability objectives. **Research from the Society for Human Resource Management** found that 67 percent of employees place a high importance on their company's commitment to a "green workplace."

Boulder Commons, Suite 200 photo courtesy Morgan Creek Ventures



^{xi}The broker assumed operating expenses of \$14.50/sf including energy for Boulder Commons. Since the tenant doesn't pay the energy bill, the anticipated operating expenses are \$12.60/sf excluding energy.

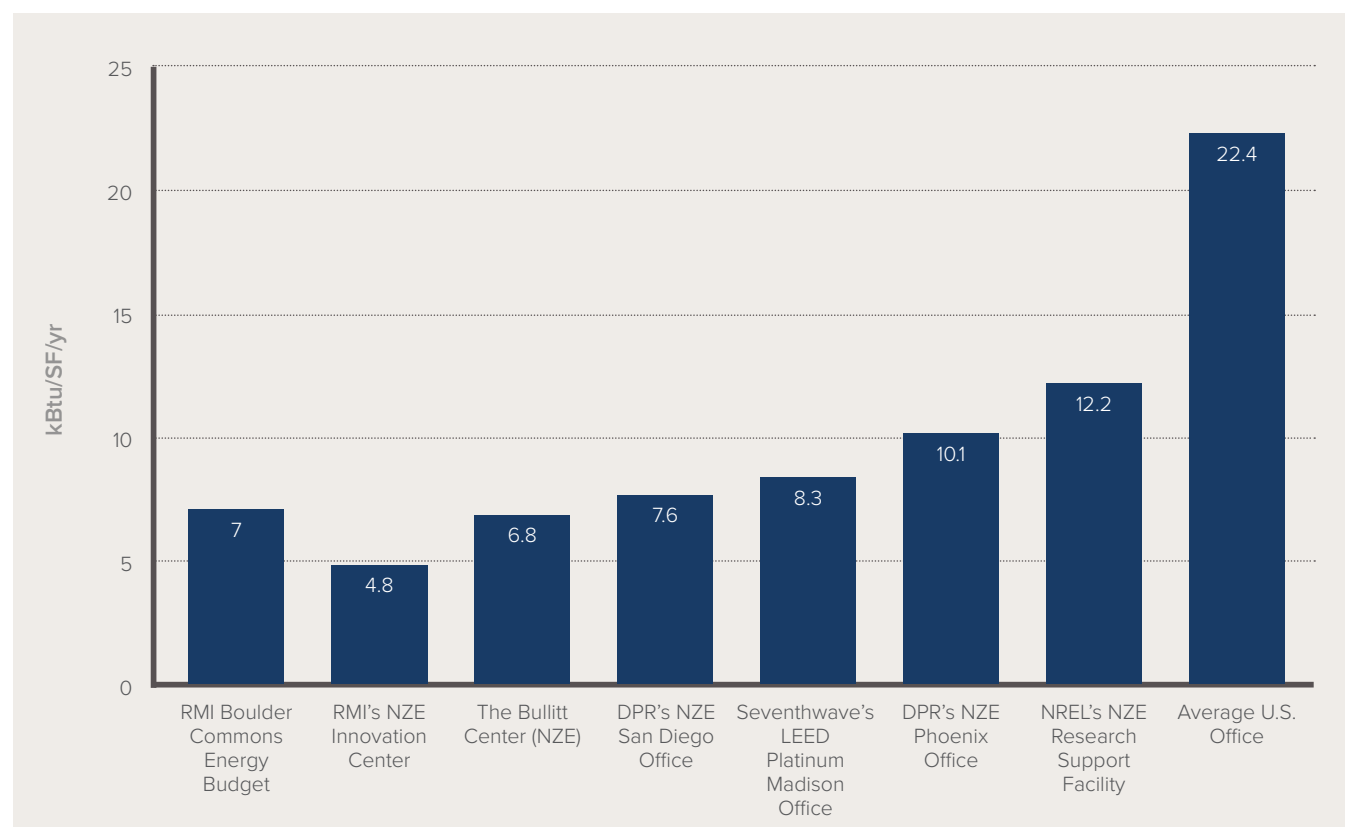
CREATING A NET-ZERO LEASE MODEL

MCV worked with RMI and its counsel at Holland & Hart to develop a new lease structure to meet the net-zero energy goals. In order for this building to successfully achieve NZE, all tenants were required to have NZE provisions in their lease. The key NZE components of the Boulder Commons lease include the following:

1. **Energy Budget:** All tenants are given a plug load budget of 7 kBtu/sf, which is **69 percent below U.S. average office plug load usage**. Tenants' plug load energy is monitored separately, and they receive reports monthly on how their plug load usage compares to the budget. If they exceed their budget, they are responsible for paying

the incremental utility bill as well as purchasing renewable energy certificates (RECs) to offset their excess usage. This is crucial to net-zero energy operation, since plug loads are the largest energy end use in typical net-zero energy buildings, and are entirely the responsibility of the tenants.

FIGURE 1
PLUG LOAD ENERGY USE



2. **Annual Recommissioning:** Base building systems will be recommissioned annually to ensure they are operating at optimal performance. This expense will be passed through to tenants as an operating expense. The lease provides clear delineation as to what counts as recommissioning vs. asset improvements vs. standard operations and maintenance. Also, tenants who exceed their plug load budget are required to have their space recommissioned with the cost being passed specifically to the individual tenants.
3. **NZE Requirement:** NZE was set as a clear goal in the lease so all parties are on the same page. If the on-site renewable energy system does not generate as much energy as the building uses (excluding the restaurant) over the course of a calendar year, the landlord will purchase RECs to make up any shortfalls. The cost of RECs is a landlord expense, not passed through to tenants, unless the failure to achieve NZE was caused by the tenant exceeding its plug load budget, in which case it is passed through to that specific tenant.
4. **Disclosure:** In addition to the monthly plug load usage report, tenants will receive an annual report on the building's energy consumption and production.
5. **Cost Recovery:** Since the landlord is responsible for the utility bill, any energy improvements will directly benefit the landlord, and therefore cost recovery language in this NZE lease is unnecessary.

Boulder Commons, viewed from above photo courtesy Coburn Architecture





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