

CASE STUDY:

North Boulder Recreation Center Boulder, Colorado

PROJECT DESCRIPTION

In 2000, the city of Boulder embarked upon a project to renovate and expand its North Boulder Recreation Center (NBRC), one of three public recreation centers in the city. Looking to build on Boulder's reputation as an environmental leader and demonstrate its commitment to environmental sustainability, the city's Parks and Recreation department set the goal of having the remodeled building become the first silver-level LEED-certified building in the state of Colorado.

The LEED Program (Leadership in Energy and Environmental Design) [Green Building Rating System™](#) is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings.

Administered by the [U.S. Green Building Council](#), LEED provides a complete framework for assessing building performance and meeting sustainability goals by emphasizing state-of-the-art strategies for sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.



In pursuing LEED certification, the Parks and Recreation department developed three specific goals for the NBRC renovation project: 1) reduce the amount of landfill waste generated by the renovation; 2) reduce the consumption of natural resources used in renovating and operating the center; and 3) improve the efficiency of the center's heating, ventilation, and air conditioning systems. The project also provided the city an opportunity to demonstrate the LEED certification process to local developers and builders; as a result, the local community hospital was inspired to also pursue LEED certification for a second campus it is building in Boulder.

Building and site design for the renovation and expansion began in 1999, with the city using a consultant to assist with determining the most efficient and cost-effective LEED options for the project. Construction began in late August 2001, and was completed in March 2003, although parts of the building were opened to the public in November 2002. The facility, which sees over 1,000 residents and visitors use its wide variety of athletic and recreation services on an average day, was expanded from 34,000 square feet to 61,700 square feet. Estimated total project cost is \$11.65 million, with the incremental cost to pursue LEED being \$540,000, or 4.6 percent of the project budget.



MEETING THE LEED STANDARD

The NBRC renovation project received LEED points for its accessibility by public transit, inclusion of bicycle racks and connection to bicycle paths, and providing a charging station for electric vehicles. Drought-tolerant and native landscaping was used to reduce the amount of water

needed for irrigation. The building's HVAC systems are R-22 HCFC systems, and thus do not use CFC-based refrigerants. In addition, construction waste was recycled or reused, and salvaged, refurbished, and reused materials or products were used in the building's construction.

Examples of environmentally sustainable design include the re-use of overhauled air conditioning units, doors, and flooring materials; the re-use of countertops in other city buildings; and the use of recycled-content building materials, lockers and benches made of recycled plastic, and low-flow showerheads and toilets throughout the building. Low-emission carpet, adhesive, and hardwood floor finishes were used to lower the levels of volatile organic compounds in the facility.

ENERGY EFFICIENT DESIGN

The NBRC renovation team searched out opportunities to make the re-designed building as energy efficient as possible, starting at the top. A "cool roof," manufactured by [Firestone Building Products](#), was installed on the flat sections of the building's roof. It is a modified bitumen roof with a white reflective coating, and is ENERGY STAR-certified with a reflectivity of at least 0.65. The sloping portion of the roof is a standing seam metal roof.



The NBRC uses 6,000 square feet of solar panels to pre-heat the water for the center's two swimming pools, and for domestic hot water use. This is the largest flat-plate solar unit installed in the U.S. in twenty years, according to the system's designer, [Industrial Solar Technology](#) of



Golden, Colorado. Water is pumped through the solar unit to bring it closer to the desired temperature before being heated by boilers, reducing natural gas consumption by an estimated 50 percent. The cost of the solar array was

\$265,000, and included design and structural modifications necessary to support the unit on the existing structure. New boilers are 90 percent efficient, as compared to the approximately 70 percent efficiency levels of the old boilers. The building also employs a carbon dioxide monitoring system that adjusts the amount of ventilation air to match the number of people using the facility – during off-peak hours, when building use is light, the system reduces outside air intake.

The project incorporates daylighting techniques throughout the building to reduce electricity needs. Dimmers and occupancy sensors are employed, as are low-energy lighting fixtures. Double-paned, low-E insulating glass is used to reduce the amount of solar radiation filtering in through windows, thus lowering air conditioning requirements. The windows were engineered specifically for their location in the building. The entire renovation was constructed to 2000 IECC code requirements.





In addition to the energy-efficient design of the building, the NBRC has a two-year contract to purchase wind power to meet at least 50 percent of its electricity needs.

ENERGY SAVINGS

Modeling done by the city’s LEED consultant shows avoided annual energy costs of just over \$56,000. With the incremental cost to reach the LEED standard at \$540,000, this results in a simple payback period of 9.6 years. The relatively long payback is due primarily to the inclusion of the solar water heating system.

The table below compares the average energy cost per square foot of the city’s three recreation centers. The East Boulder Community Center (EBCC) was constructed in 1992, and the South Boulder Recreation Center (SBRC) was renovated in 1997.

Facility	Avg. energy cost per square foot
NBRC (estimated)	\$1.57
EBCC (2002 actual)	\$2.31
SBRC (2002 actual)	\$2.16

Energy costs per square foot for the North Boulder Recreation Center are 32 percent less than the East Boulder Community Center, and 27 percent less than the South Boulder Recreation Center.

To learn more and for contact information, visit the city of Boulder’s [Parks and Recreation website](#).