Sustainable Design, LEED, and the Rawlins Field Office Building

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Sustainability is integral to the mission of the Bureau of Land Management (BLM). The U.S. Green Building Council (USGBC) is a nonprofit organization formed by a coalition of industry leaders to promote the concepts of sustainable design and construction. The Council has developed the Leadership in Energy and Environmental Design (LEED) Green Building Rating System—a voluntary, consensus-based national standard for assessing and advancing the principles of sustainability in the design, construction, and performance of buildings. The LEED program provides a means for buildings to be certified upon meeting certain prerequisites. The total point value awarded for a project determines whether the building achieves a certified, silver, gold, or platinum rating. An example of the LEED scorecard may be viewed at the following Web link: *http://www.aisc.org/Template.cfm?Section=Technical_Answers&template=/ContentManagement/ContentDisplay.cfm&ContentID=22061*

A new BLM field office in Rawlins, Wyoming, was designed and is being constructed with sustainability in mind. The planned 32,540-square-foot building will accommodate a 100-member staff responsible for managing public lands in south-central Wyoming. The consulting design team accepted BLM's challenge to make sustainability a priority, and all key project team members met for a sustainable design charrette.

The Charrette

The charrette, which met in May 2002, served as a forum for gaining a mutual understanding of the principles of sustainable design and for identifying and selecting sustainable design goals for the field office. All key design team members were represented, including those from the BLM, Sellards & Grigg (civil engineering consultants), Chamberlin Architects (architects), the RMH Group (mechanical, electrical, energy, and sustainability consultants), and Wenk Associates (landscape architects). Each member of the design team provided an overview of the project's design parameters. Sustainable design strategies for the project were then analyzed according to the LEED Green Building Rating System.

Table 1. Sustainability goals and objectives for the Bureau of Land Management (BLM) Rawlins Field Office project.

Sustainability goal	BLM Rawlins Field Office objectives
Minimize site impact	Sustainable site selection Erosion control plan Storm water management plan Storm water treatment Highly reflective roofing material Reduced light pollution Living snow fence
Minimize effects of transportation	Bicycle racks with shower apparatus Minimized parking capacity Preferred parking areas
Minimize energy usage from conventional sources	No CFC, HCFC, or Halon usage Commissioning Measurement and verification On-site wind power generation Reduced energy consumption
Select environmentally responsible materials	Recycled-content materials Forest Stewardship Council certified wood products Local materials Storage and collection of recyclables
Ensure good indoor air quality	Carbon dioxide monitoring Construction indoor air quality plan High-efficiency filters Low-VOC materials Indoor chemical and pollution source control
Provide comfortable buildings for occupants	Conform to current standards for ventilation and comfort Daylighting and views for majority of occupants Individual control of airflow and lighting on exterior and interior zones
Minimize water usage	Native plants Zero permanent irrigation systems Low-flow water fixtures to reduce water onsumption by 31%
Community awareness	Educational displays highlighting sustainable features

LEED

The BLM set a progressive target of a LEED Gold certification for the Rawlins Field Office, making it the first LEED-registered building in Wyoming and the first BLM project in pursuit of LEED Gold status. As the sustainability consultant, the RMH Group facilitated the charrette, follow-up collaborative sessions, and integrated design (Table 1). Because more than half the available LEED points relate to mechanical and electrical design, the RMH staff was able to closely coordinate the mechanical and electrical design with its in-house LEED-accredited professional. The landscape, civil, and architectural consultants also worked closely with RMH personnel to help create a highly sustainable project. After the completion of construction documents in early 2003, the total LEED points pursued for the project stood at 44—five more than required for a LEED Gold rating.

Energy

Energy usage plays a significant role in many of the LEED criteria. An important goal for the project is to reduce the annual cost of energy consumption by at least 30% from the recognized code-compliant design industry standard, developed by the American Society of Heating, Refrigerating,

Table 2. Summary of energy analysis for American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) standard compliant and design cases.

Energy cost and parameters	Base case compliant to ASHRAE Standard 90.1 (1999)	Design case
Energy cost ($ per year)	21,465.0	12,946.0
Energy cost index ($ per sq ft per year)	0.68	0.41
Percent reduction		40.0
Annual gas (MMBtu per year)	1,503.3	1,302.7
Annual electricity (MWh per year)	248.07	93.7
Annual peak demand (kW)	114.1	56.16
Energy use index (kBtu per sq ft per year)	74.5	51.4
Percent reduction		31.0

and Air-Conditioning Engineers (ASHRAE).

Table 2 depicts the energy parameters of the base case and the recommended design case. On the basis of the 100% construction documents, with the energy offset from wind generation, a 31% reduction in energy usage and a 40% reduction in annual energy cost are expected over the code-complaint case. Other factors, such as maintenance and life cycle costs, are also important considerations. Thus, 6 of 10 possible points for LEED's Optimizing Energy Efficiency criteria will be achieved.

Wind Energy

The BLM recently joined with the Department of Energy's National Renewable Energy Laboratory (NREL) to help Federal land managers promote land-use activities that will increase the development of renewable energy resources in the West. They found that the Rawlins planning unit, where wind speeds often exceeded 15 mph, was one of the top six sites studied. The RMH Group worked with Aerofire Windpower and NREL to devise a system for taking advantage of these favorable wind conditions. Two 20-kW wind turbines were originally proposed for meeting the existing building load. Unfortunately, because the local utility provider had a maximum net metering limit of 25 kW the BLM reduced the project to one 20-kW wind turbine, which is still predicted to offset electrical energy usage by 40% and save $1,260 per year according to research by NREL's National Wind Technology Center. Rawlins will still earn two of three LEED points possible for renewable energy credits.

Resource Conservation

The building design implements recycled content and local materials; sustainably harvested wood products; a white roof; a direct digital control system to monitor humidity, temperature, and carbon dioxide; and ultra–low-flow water fixtures. To reduce the effects the building might have on the site, the project team employed significant storm-water management and treatment with detention ponds and bioswales; selected native plants so that no permanent irrigation system is required; designed a living snow fence; minimized light pollution; and specified bicycle racks.

Conclusion

Although the term sustainable design was introduced only in the past decade, consultant teams are increasingly proficient in applying it and learning through the design process. The Rawlins Field Office project demonstrates that a highly sustainable building design based on the LEED program is achievable for BLM buildings. Once constructed, commissioned, and occupied, the building is expected to offer a comfortable and efficient workplace for BLM staff as it achieves its LEED certification.

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