



Send to Printer

Close Window



## Colorado Construction

### Cover Story - November 2009

#### Power to the People

##### NREL technologies applied in its own zero-energy office building

After its scientists researched and defined zero-energy, NREL is putting the research in practice through the construction and operation of its Research Support Facilities in Golden.

*By Melissa Leslie*

When it comes to defining zero-energy, the U.S. Dept. of Energy's National Renewable Energy Laboratory in Golden is writing the book.

Scientists at the South Table Mesa campus have developed technologies such as transpired solar collectors and are investigating the benefits of night purging—cutting-edge ideas that are fueling the sustainable-energy movement and stretching the skills of the design and construction industry.

Next June, when construction on NREL's Research Support Facilities is complete, the campus will have a living example of its research, with many of its own technologies put into practice. It will also have created a model for future sustainable office buildings.

advertisement

NREL's new three-story building will include two long wings, connected at the middle by a lobby and conference area, in a 220,000-sq-ft complex employing more than 700 employees.

"We need this building primarily to get our employees out of leased spaces and to accommodate our growing staff, but the DOE also believes that if we are going to be doing renewable-energy research, then we need to be 'walking the talk,'" says NREL's Eric Telesmanich, RSF project manager.

**Design-Build on Steroids** To select the project team, NREL developed a performance-based, design-build procurement process. It required prospective teams to develop a concept design and substantiate how they would achieve the 23 sustainable project requirements while staying within the \$64-million budget, says Greg Bollette, DOE project officer.

#### Related Links:

- [Green Innovations at RSF](#)

Requirements include LEED-Platinum certification leading to net-zero-energy operation; demonstration of active alternative-energy technologies; and creation of a model for competitive, high-performance commercial buildings.

NREL selected the design-build team of Haselden Construction of Centennial, Denver's RNL and Stantec Consulting Inc., also of Denver, for the project.

"We have created a seamless team," says Byron Haselden, president of Haselden Construction. "You couldn't tell today who is the architect or who is the general

contractor. It is a prime example of great minds thinking alike.”

Haselden dubbed the design-build partnership “collaborative project delivery,” but Phillip Macey, RNL senior associate and RSF project manager, calls it “design-build on steroids.”

Before starting design, RNL asked Stantec to build a model based on the 23 sustainable requirements and the budget. The engineers produced a long building with a short breadth that accommodates daylighting requirements, Macey says.



Telesmanich adds: “The project team took a nonstandard, nontraditional approach to achieve the sustainable requirements. The design from the engineering team led to the architectural design, instead of the other way around.”

When the project is complete, Haselden, RNL and Stantec will submit a “how-to” manual to the DOE that outlines the design, construction, project delivery and materials used to create the building.



*The RSF is under construction at NREL’s South Table Mountain Campus near Golden. It was designed to achieve LEED Platinum certification from the USGBC. Its energy saving features will be shared with, and hopefully replicated by, commercial builders across the country. (Photo by Carl Cox, NREL)*

“We want this building to be a ‘living laboratory,’” Bollette says. “It will show the commercial sector that it can deliver a building that uses half the energy of traditional buildings—and we will have a record of how to make it happen.”

The DOE plans to make the manual available on its Website.

**Zero-Energy Design** The RSF design intends to create a building that produces as much energy as it uses, and whenever possible, puts electricity back into the power grid.

The new office building will be certified LEED Platinum because of energy-efficient features that include natural ventilation through operable windows, daylighting and radiant heating and cooling.

“Many of the technologies we are including in this building were developed by NREL but have never been used in this scope or at this scale,” Haselden says.

Daylighting in the office spaces and low-energy consumption are primary considerations. “All work spaces are redesigned to receive adequate daylight, based on LEED criteria, by utilizing the narrow floor plate and an advanced light-bouncing device on the south face of the building,” says Rich von Lührte, RNL principal-in-charge of the RSF project.

Final design took the form of a “lazy-h” influenced by

Stantec's plan. No office is more than 30 ft from an operable window, but building users will not be overwhelmed by too much light from a wall of windows.

"When designing for environment, we have discovered we are also designing for people whose quality of work increases when they feel comfortable within the spaces they work," Macey says.



**Sustainable Challenges**

People, lights, computers and other office equipment produce varying amounts of heat. "In traditional buildings, mechanical systems are constantly working to overcome the inconsistencies produced by building users," Macey says. "In the RSF, the design is making the building do some of the work necessary to heat or cool the work stations."

*The 218,000-sq-ft RSF will have a rooftop photovoltaic system implemented through a power-purchase agreement, daylighting, natural ventilation and a next-generation, energy-efficient data center. (Photo by Pat Corkery, NREL)*

The design allows floors to be built in sections, including a raised-floor system that houses information technology for workstations, radiant heating, and space for the ventilation system to deliver fresh air when windows are closed.

"Not only does the raised-floor system provide more sustainable technologies in work stations, it also gives NREL the ability to complete quick and low-cost internal office reconfigurations if needed," Macey says.



*The main entrance of the RSF will allow visitor access to the mostly restricted building. Mountain Pine Beetle-kill wood from Granby will be used in the lobby connector space between the two wings. (Rendering courtesy of RNL)*

DL Adams Associates of Denver engineered the acoustical design around sustainable elements and to accommodate the many employees accustomed to working in private offices who are now moving into an open-floor plan.

"Generally, for good acoustics, we want soft, fuzzy surfaces," says Andrew Kowalyshuyn, project manager with DL Adams. "But daylighting and natural-air-ventilation systems require mostly hard, reflective surfaces. We had to get creative."

Haselden says the RSF "will be completing at the perfect time" because the focus on sustainable projects will increase as the construction industry begins to recover from the recession.

"This building shows that the industry is capable of building the nation's energy future," he says.

**Project Team:**

**NREL Campus, Golden**

**\$64 million**

**Owner:** U.S. Dept. of Energy

**Design-Builders:** Haselden Construction, RNL, Stantec

**Engineers:** KL&A Inc., Martin/Martin Inc.

**Start:** July 2009

**Finish:** June 2010

[Click here for past Features >>](#)

[http://colorado.construction.com/features/archive/2009/1109\\_C\\_NRELTechnologies.asp](http://colorado.construction.com/features/archive/2009/1109_C_NRELTechnologies.asp)