



Don Fitzmartin is a man on a mission.

Over the past three decades, Fitzmartin has managed more than \$2 billion worth of commercial development and renovation projects in 19 major cities across the United States. This long experience convinced him there are many missed opportunities to save energy and reduce operating costs for tenants and owners in commercial building renovations.

Fitzmartin was part of the 2007 inaugural class of the National Renewable Energy Laboratory's (NREL) Energy Executive training program, which confirmed his suspicions. Although many of the large commercial building owners and tenants he worked with had their doubts, Fitzmartin was sure he could cost-effectively improve energy efficiency.

CB Richard Ellis Group, Inc. (CBRE), the world's largest real estate services company, recruited Fitzmartin in 2006 to work with them as an independent, exclusive consultant. To better serve a wide range of clients, Fitzmartin launched his own company, Fitzmartin Consulting, in November 2009. He is finishing up his last project for CBRE as a consultant and can now share his knowledge and experience with all real estate services companies and end-users. This arrangement allows him to have a bigger impact on the commercial building community.

### Collaborating for Energy Efficiency

Fitzmartin Consulting is working on a Commercial Building Partnerships (CBP) retrofit project, which focuses on the renovation of one floor of the five-floor, 110,000-square-foot law offices of Holme, Roberts & Owen LLP (HRO). The offices are located in the Wells Fargo Center, a 1980s vintage downtown Denver high-rise office building. The floor is approximately 20,000 square feet in area, and HRO is reconfiguring the space to include enhanced reception for clients, private offices, state-of-the-art conferencing, and support personnel offices.

The project requires coordinating a number of players, their priorities, and their schedules. For starters, there's the building owner, the tenant, the architect, the engineer, and the builder. In addition—because this is a CBP retrofit—there are NREL researchers and NREL private-sector subcontractors involved. The person responsible for synchronizing all of these talents and resources into an effective team is the project manager—Don Fitzmartin.

"A lot of pieces fell into place to make this project work," Fitzmartin said. "For one thing, HRO is a forward-thinking international law firm that views this retrofit as an opportunity to do its part to reduce energy consumption and increase efficiency in its workspace."

Fitzmartin sold HRO, architect Burkett Design, engineer Hadji and Associates, Inc., and owner MPG Office Trust, Inc. on the energy-efficiency upgrade by stressing the CBP initiative offered a unique opportunity to reduce operating expenses while working with the best and brightest minds and the latest energy-saving technologies. They all quickly embraced this opportunity and have gone out of their way to make it successful. The project had a firm budget, and an initial concern was that the need for data collection and energy monitoring would create expensive delays or workflow disruptions. The team worked diligently to avoid these obstacles.

"NREL's willingness to perform on-site evaluations and guide us through multiple design alternatives allowed us to create a win-win from a budget and schedule standpoint," Fitzmartin said. "HRO and all the participants were very accommodating about embracing and facilitating the process."



Image courtesy of BURKETTDESIGN

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### Cost-Effective Energy Savings

NREL researchers and subcontractors installed submetering equipment to monitor heating, cooling, HVAC fan energy, lighting energy, and plug load energy. They also installed combination occupancy and lighting sensors to determine how often offices are occupied and whether occupants turn off the lights when they leave their offices.

To evaluate the effectiveness of various energy-efficiency measure (EEM) combinations, NREL researchers used the submetering data to perform whole-building energy modeling. They explored various options by adding each EEM to a baseline model and assessing its energy-use impacts. Finally, they investigated promising configurations of EEMs and compared them to existing energy use.

The results indicated that updating lighting, lighting controls, and the mechanical system and its controls would be effective energy-efficiency strategies. In addition, the researchers suggested a plug load reduction strategy that would reduce loads during unoccupied hours. Whole-building energy modeling shows that these updates are likely to reduce energy use by approximately 37 percent compared to existing energy use (see table below).

Energy-Efficiency Strategy	Approximate Energy Savings
Increase thermostat deadband from $\pm 1^{\circ}\text{F}$ to $\pm 3^{\circ}\text{F}$	3%
Install variable speed fans on air handling units combined with supply air temperature reset	9%
Reduce lighting power in the corridor	5%
Install occupancy sensors (also addresses nighttime lighting)	9%
Upgrade downlighting from incandescent to fluorescent	7%
Reduce nighttime plug loads from 50% to 20%	4%
<b>Estimated Total Energy Savings Compared with Existing Energy Use</b>	<b>37%</b>

In addition to saving energy, the EEMs had to make business sense. NREL's detailed energy analysis allowed the participants to determine which combination of EEMs would most cost-effectively achieve the project's goals.

"We modeled new variable air volume air handling units and daylight harvesting in detail, and both strategies would contribute to energy savings," said Greg Stark, NREL project lead. "But we couldn't justify the cost of these EEMs based on the client's business model, so we eliminated them from consideration."

NREL's team pointed out that the energy savings achieved by installing new air handling units fell far short of what could be achieved by simply retrofitting the existing air handling units with variable frequency drives and adding supply air temperature reset controls. This strategy was also much less costly than installing new units.

The situation was similar in the case of daylighting. The NREL lighting research group did a thorough assessment of the client space and found that they could not justify the cost of implementing daylighting controls. The limiting factor was the low transmittance glazing, and upgrading the glazing was outside of the scope of this retrofit.

The EEMs that the team agreed upon are relatively inexpensive and are replicable in a large number of high-rise office buildings throughout the United States. The impacts of widespread deployment would be impressive. If the identified EEMs were applied throughout this building alone, the energy and carbon savings per year would be almost 7 million kWh of electricity and 9 million pounds of carbon.

"We have more than 50 million square feet of commercial office space in the Denver Tech Center and downtown Denver areas alone," Fitzmartin said. "If—as a community—we can reduce utility costs by 37 percent, that amounts to between \$30 and \$40 million in annual operating savings. Across the United States, we could save billions of dollars and billions of pounds of carbon."

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### **Taking It Viral**

But broad adoption of energy-efficiency strategies will require more than just identifying cost-effective EEMs. It is also critical that commercial building professionals experience the benefits of increased energy efficiency and encourage their clients and colleagues to adopt the strategies.

"In the projects I manage, I introduce the benefits of reducing energy consumption to everyone early in the process," Fitzmartin said. "Although each situation is different, examples of similar projects that included cost-effective EEMs can help sell the concept. CBP provides those examples."

CBP also helps identify energy-efficiency advocates such as Fitzmartin and give them the tools they need to integrate the value of energy savings into the culture of their own and their clients' organizations.

"One of the lessons we've learned in our CBP work with private-sector companies is that having someone on the inside who champions energy efficiency is critical," NREL's Stark said.

Knowledgeable, enthusiastic people who stress the benefits of cost-effective energy-saving strategies may be as important as innovative EEMs in accelerating the deployment of advanced energy-efficiency strategies. And teaming them up with researchers and technical experts may just be a match made in heaven.

"I'm on a mission to transform the commercial building marketplace one project at a time, and having NREL on my team has been a huge asset," Fitzmartin said. "It's like having continual access to the Google of energy efficiency."