

Achieving Energy-Efficient Demonstrations in Both Residential and Commercial Settings

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ABSTRACT

Demonstrations of energy-efficient technologies in residential and office settings not only display innovative and energy saving products, but also serve as interactive, effective educational tools for consumers. This paper explores several demonstration showcases, including three ENERGY STAR® residence hall demonstrations, a technology center, and a city council chamber. The purpose in each case was to demonstrate the energy savings potential of typical products in each setting, to educate the users on the benefits and options for purchasing, installing, and operating highly energy-efficient products, and to serve as a model teaching tool for future retrofit projects.

Through partnering with and gaining support and collaboration from local vendors, retailers, and national manufacturers, the project team obtained donations of energy-efficient equipment for each of the demonstration showcases. In addition to displaying the availability of energy saving products and services, the demonstrations also focused on educating consumers (through tours, workshops, and signage) on ways to decrease their personal consumption of electricity and on how to rethink their related behaviors and purchasing habits.

This paper outlines the recent success of these interactive, energy-efficient demonstrations and educational programs. This review will include an assessment of project methodologies, lessons learned, and ways these programs can positively influence the energy behaviors and purchasing decisions of consumers.

Background

Buildings consume approximately 36% of the nation's energy and are also responsible for 36% of U.S. emissions of carbon dioxide produced by human activities (ORNL 2000). With increasing costs of energy and resultant pollution from electricity generation, demonstration showcases can be leveraged to reduce energy consumption, serving as tangible, interactive educational tools. The primary objectives of developing energy-efficient and sustainable/green demonstration showcases are to:

- increase energy awareness and display the energy savings potential of typical products found in each setting
- promote responsible behaviors and decision-making by educating the users on the benefits and options for purchasing, installing and operating the various energy-efficient products available in the market
- serve as a teaching tool for appliance and electronic changeouts/upgrades or future retrofit projects

The projects described in this paper required the collaboration of a variety of key players and project stakeholders, city planners and managers, architects, students, faculty, university staff, vendors, manufacturers, and retailers. In each case, the demonstrations shared similar strategies in initial planning and development, product and technology research and recruitment, and project marketing and promotion. Specifically, these demonstration showcases include:

- computer technology center room at the Marin County Office of Education in California
- City Council Chambers of the City of Larkspur City Hall facility in California
- university residence halls in California and Hawaii

Marin County Office of Education

The Marin County Office of Education hosts a demonstration showcase at its facilities in San Rafael, California. This room serves as a computer technology training and work room for the staff and visitors at the Office of Education facility—an excellent opportunity to showcase efficiency technologies and behaviors. Vendors and manufacturers donated a variety of products and technologies to the project, including efficient direct/indirect lighting fixtures equipped with daylight harvesting photosensors that measure the ambient daylight in the room and adjust the electric light levels accordingly. Occupancy sensors ensure that lights do not stay on when the room is unoccupied, and computers are equipped with software that automatically shuts off the system and/or monitor. In addition, an 18-SEER HVAC rooftop unit was donated as part of the demonstration, along with a programmable control panel that serves as a thermostat and mini-energy management system for up to 40 HVAC units. Skylights were donated to bring additional daylight into the room, and a high-reflectance paint was applied to the interior walls to help bounce daylight throughout the space.

Larkspur City Hall

The City of Larkspur hosts a demonstration showcase in the City Council Chambers of their City Hall facility. The room was chosen for its high-profile location: Larkspur community members and media visit the room each month for City Council meetings, hearings, and other gatherings. Several stories in the local newspapers have highlighted the improvements in the chambers.

Because the City Hall is an historic building, special pendant-style lighting fixtures were donated in part, along with dimmable compact fluorescent lamps and occupancy sensors. Window film, to reduce heat gain in the sunny space, and radiant barriers, to provide additional insulation in the building, were also donated for the project. Though originally proposed as an energy efficiency demonstration, the City of Larkspur took the opportunity to make additional acoustical and aesthetic improvements to the space, working with the historic preservation board, city manager, and council members to ensure that the improvements met the needs and requirements of these stakeholders.

University Energy Star/Sustainable Residence Halls

Through funding from the U.S. Department of Energy, the project lead, Strategic Energy Innovations, a San Rafael, California-based non-profit that helps communities and businesses become more energy-efficient, oversaw the design, installation and publicizing of three college residence hall demonstration showcases: two in California (the University of California at Berkeley and California State University at Chico) and one in Hawaii (the University of Hawaii at Manoa.) Project objectives included demonstrating the energy savings potential of ENERGY STAR labeled and other energy-efficient product donations in a residence hall room setting, and educating University staff, faculty, students and the campus community on the benefits and options for purchasing these high efficiency and eco-friendly products.

Vendors and manufacturers donated a variety of products typically found in a student's residence hall room, including energy-efficient compact refrigerators, televisions, DVD players, telephone answering machine units, T-8 fluorescent lamps, lighting fixtures and controls, printers, stereos, and floor and desk lamps equipped with compact fluorescent lamps.

To demonstrate the potential energy savings and benefits of purchasing these products, informational signs were attached to individual products detailing their average purchasing price, energy consumption compared to their conventional counterparts, and how the energy savings related to reduced electricity costs and greenhouse gas emissions. Emphasis was also placed on the environmental impacts that less energy-efficient products create because these residence hall students do not pay for their utility bills. Additionally, these demonstrations not only serve as teaching tools for students and the campus community providing the availability and options for purchasing ENERGY STAR certified products, but the projects may also serve as models for future retrofit and changeout projects, providing examples of energy-efficient technologies and their applications available in the market.

At the *University of California at Berkeley* a single occupant room in an eight story residence hall building was transformed into a "Green Room" equipped with ENERGY STAR rated lighting, electronics, and appliances, in addition to environmentally friendly cleaning and personal care products. Similar to the energy-efficient products, educational and awareness building signs were attached to green eco-friendly products as well. The student demonstration host is a Resident Assistant, whose room was specifically chosen because it receives high traffic from other students who approach the Resident Assistant for regular advice and counseling.

The *University of Hawaii at Manoa* ENERGY STAR demonstration houses four students in a two-bedroom, one bath, kitchen, and living room apartment. The lighting fixtures and controls were retrofitted to enable ENERGY STAR rated and energy-efficient technology, and most of the electronics and appliances were upgraded to ENERGY STAR models. To designate that this apartment was a more energy-efficient living space and to raise awareness of the demonstration, a large banner hangs outside of the apartment's front entrance that states, "University of Hawaii Energy Star Dorm Room Demonstration Project."

The *California State University at Chico* demonstration is located in a residence hall honors themed house. This "Sustainability House" is hosted by 16 academic honor students and consists of eight bedrooms, two bathrooms, a large kitchen, living room, and dining room. In the first phase of this demonstration project, the house's common areas and one bedroom were retrofitted with energy-efficient lighting and controls, and its standard appliances and electronics were upgraded to ENERGY STAR rated or more energy-efficient models. Similar to the UC

Berkeley Green Room, students in the Sustainability House also showcase more environmentally friendly and green cleaning and personal care products in their demonstration. In subsequent phases of this project, Chico State University intends to retrofit the remaining seven bedrooms of this residence hall house with energy-efficient technology as well as integrate the demonstration project into a for-credit academic honors service-learning course.

However, these demonstrations are not the only ones that have been developed to increase energy awareness and promote conservation practices. In October 2001 an ENERGY STAR residence hall demonstration was created at Tulane University in New Orleans, Louisiana (Tulane 2006). Students and staff created this project to demonstrate to students how their purchasing decisions could greatly effect the overall campus energy use, which in turn effects the environment due to the pollution emitted from the burning of fossil fuels in electricity generation. As shown below in Table 1, Tulane students measured the energy consumption and savings in their ENERGY STAR demonstration room, and after projecting their calculations to include all students and rooms in their residence halls, they discovered that in one academic year, the University Housing department had the potential to save approximately \$118,000 in utility bills and prevent 129 million pounds of carbon dioxide from entering the atmosphere.

Table 1. Total Energy Consumption and Savings from Residence Hall Lighting, Electronics, and Appliances

Tulane University ENERGY STAR Showcase Dorm Room, Fall 2003							
Appliance	Estimated Time Running Hours (On/Standby)	ENERGY STAR		Non-Energy Star		Savings	
		Energy Used kWh (Nine Months)	Cost to Run \$ (Nine Months)	Energy Used kWh (Nine Months)	Cost to Run \$ (Nine Months)	Dollars	Lbs of CO ₂
Microfridge 2.9 cubic feet Refrigerator	24 Hours	217.5	14.14	317.0	20.61	6.47	154.2
IBM NetVista X41 Computer + Monitor	2 Hours / 6 Hours	75.6	4.91	302.4	19.66	14.74	351.5
Canon S300 Bubble Jet Printer	8 hours	64.8	4.21	172.8	11.23	7.02	167.4
IBM TFT 15" Flat Screen Monitor	2 Hours / 6 Hours	24.3	1.58	162.0	10.53	8.95	213.4
IBM NetVista A21 Computer	2 Hours / 6 Hours	34.6	2.25	118.8	7.72	5.48	130.6
GE Lighting Profile Torchiere	5 hours	85.1	5.53	405.0	26.33	20.80	495.9
GE Ultra Soft White 60 Light Bulb (1)	5 hours	101.3	1.32	405.0	5.27	3.95	470.8
GE Profile Desk Lamp (2)	2 Hours	123.1	2.67	194.4	4.21	1.54	110.5
Panasonic AM-FM Digital Clock	0 Hours/ 24 Hours	9.1	0.59	25.9	1.68	1.10	26.1
Panasonic SC-PM03 Micro Audio System	4 Hours/ 20 Hours	8.1	0.53	28.9	1.88	1.35	32.3
Panasonic CD Clock Radio w/Dual Alarm	0 Hours/ 24 Hours	9.1	0.59	25.9	1.68	1.10	26.1
	Total For One Suite (2 Person)	752.4	38.31	2158.2	110.80	\$72.49	2,178.9
	Total For One Person in the Suite	376.2	19.15	1079.1	55.40	\$36.25	1,089.5
	Estimate for all 3257 students in residence halls		62,383.54		180,434.48	\$118,050.94	1,899,249.9

Chart created by Maureen Deveny, updated in Fall 2003 by Cassandra Pace.

Source: Tulane University. 2006

An additional energy-efficient demonstration in the academic setting includes Blacow Elementary School in Fremont, California. With assistance from Rebuild America and its Business Partners, the school's multipurpose room and portable classroom were retrofitted with energy-efficient technologies, including skylights, T-8 fluorescent lamps, dimming controls and occupancy sensors for lighting, and reflective polymer coating paint for both interior and rooftop applications, which are anticipated to save the school approximately \$2000 per year in energy costs (USDOE 2003). The highly visible multipurpose room is frequented by large numbers of students, parents and teachers, serving as the school's dining hall and space for community events and sports activities. In addition to saving energy, the demonstration also serves as a teaching-learning tool for other schools in its Fremont Unified School District. Custodial workshops are held in the multipurpose room to teach workers maintenance and operations practices that can reduce energy use at their corresponding facilities.

Measuring the Success of the Demonstrations

For the purposes of this paper and the three demonstrations discussed at length, “success” is defined as the following:

- increased knowledge and awareness of energy-efficiency and conservation practices shown by the demonstration’s audience
- changed purchasing behaviors and consumption practices of those who view the space
- high traffic runs through the demonstration, increasing the level of exposure to the installed products and educational materials

Steps for Developing Successful Energy-Efficient Demonstration Showcases

This section of the paper discusses the suggested steps to achieving similar demonstration showcases as well as key project milestones.

Solicit Appropriate Organizational and Administrative Support

Involving individual project stakeholder and decision maker support is critical to successfully implementing a demonstration showcase project. Projects described in this paper all had individual or group champions that provided the necessary assistance in obtaining critical, overall up-front project buy-in and support, helped to resolve administrative or political barriers that emerged during the initial phase of planning and implementation, and ensured that the projects proceeded and progressed in a timely fashion. In these projects, it was vital to obtain project buy-in from key players early in the initial planning phases. Onsite or internal champions can serve as ideal individuals to help form an overall stakeholder consensus to support the project.

In addition to obtaining broad project buy-in, a Memorandum of Understanding between invested project parties helped to clarify the details and commitments of the project. Such responsibilities and commitments may include agreeing to identify and install technologies and other energy-efficient applications within a decided set time period, creating a variety of marketing materials to publicize the project, holding an open house media event to promote the demonstration to local communities, or determining which individual or party has ownership of the products after installation.

In the case of developing energy-efficient and green residence halls on college campuses, finding students, staff and/or faculty members to work as onsite project coordinators or as a Project Committee was crucial to the projects' success. In the initial planning phase of these demonstration showcases, on-site project coordinators arranged several in-person meetings with key university stakeholders (primarily from the University's Housing, Facilities and Environmental departments) to obtain necessary project buy-in and support—meetings that may have otherwise been very difficult for outside entities and third parties to arrange or even accomplish. In the case of Larkspur’s City Council Chambers demonstration room, it was critical to identify who would act as the project manager to avoid liability for incorrect project installation and assign day-to-day responsibility for working with contractors.

A successful example in obtaining administrative and institutional support is shown by the ENERGY STAR demonstration apartment at the University of Hawaii at Manoa. After the successful completion of the ENERGY STAR demonstration apartment, the campus made a commitment to purchasing energy-efficient and ENERGY STAR rated models for future lighting retrofits and large appliance change outs in their housing facilities. As the largest and most central campus in the University of Hawaii system, the campus' decision to procure and integrate energy-efficient technology into future retrofits and new housing developments may contribute to the growing demand for ENERGY STAR products, and as a result, provide a considerable opportunity for local vendors to offer ENERGY STAR rated products.

The resulting benefits of developing an ENERGY STAR demonstration at the University of Hawaii were not the only advantages to implementing energy-efficient showcases. Given the project scopes, the California campuses recognized the opportunity and potential benefits of taking the projects to the next shade of "green." UC Berkeley created a residence hall "Green Room" furnished with energy-efficient technologies and other environmentally friendly products, and the Chico State University stakeholders expanded their residence hall ENERGY STAR room to encompass an entire "Sustainability House." The campuses may have recognized the significant teaching tool a demonstration showcase could provide, and maximized their opportunity to influence campus and student behavior and purchasing decisions.

The UC Berkeley Green Room obtained support from its Housing and Dining Services department as well. Eco-friendly products featured in the Green Room have been made available for purchase on the campus' online store "Cal Club," which students can use to purchase bulk groceries, paper goods, health and beauty products, and cleaning supplies. This collaboration between the University's Cal Club program and the demonstration project provides students an additional opportunity to learn more about and purchase these environmentally friendly products.

Choose the Demonstration Space

Demonstration showcases offer attendees the opportunity for hands-on learning about new energy-efficient technologies and green products available in the market. Ideally, this space is highly visible and easily accessible, providing enough room to adequately demonstrate the available technologies incorporated in the building.

The Larkspur City Hall Chamber and Marin County Office of Education facilities were chosen because both are active participants in the energy efficiency programs, both showed interest in committing their own time and resources to work with the team on these projects, and both are high-profile locations where people from all over the county gather for meetings and/or trainings. These characteristics gave both locations a high probability of both being completed and of affecting and/or educating a relatively large number of visitors.

Demonstrations located in university residence halls focused on educating students, staff, faculty and related groups. At the three participating universities, informational meetings were held between the Project Committee and University stakeholders to determine which residence hall room, apartment, or house was best-suited for showcasing the high-efficiency and other environmentally friendly products. Resident Assistant rooms were chosen for the demonstrations at the UC Berkeley and CSU Chico campuses because of the Resident Assistant's high level of connectedness to and interaction with their students in the residence

halls. Resident Assistant responsibilities span from easing students' transitions into the college realm to offering guidance and support when needed. This living situation provides a great opportunity to create a demonstration that has a high probability of influencing and educating students in the residence halls. Since the Green Room's opening in late October 2005, over 250 people have toured the space during its one day per month viewing schedule.



UC Berkeley "Green Room" Resident Assistant host leads a tour group through her demonstration room



Students observe the ENERGY STAR electronics in the "Green Room" demonstration

By modeling residence hall room settings and providing regular tours and educational flyers and brochures, which detail the key takeaways and purpose of the demonstration, the schools can leverage their respective demonstrations to positively influence student and staff behavior and product purchases to be more energy sustainable and environmentally conscious. With regards to the UC Berkeley Green Room, students in an Environmental Science seminar class toured the demonstration, and for their final exam were asked to write an essay drawing upon key lessons learned throughout the course of the academic year. Many students pointed to their experiences with the Green Room of which two students specifically stated:

The seminar, especially the tour of the Green Room and the presentation on recycling and food, has helped me form new habits and effectively use my consumer power to benefit my surroundings. I have shared these pieces of information with my roommates and hope to continue influencing those around me.

I thought that the Green Room was really interesting as well. I am a more visual person so walking around the room looking at different sustainable products really helped me better understand what I can do to conserve. For instance, I can replace my old bulb in my lamp for a bulb that saves a great deal of energy. (Bauer 2005)

Furthermore, Green Room viewers were also given evaluation sheets following their tours to provide feedback and comments on their overall experience with the demonstration. In a question that asked about a participant's knowledge of energy-efficient and green products prior to and after viewing the demonstration, 15 out of 17 attendees indicated that their level of awareness increased after the tour. The remaining 2 attendee evaluations indicated that they knew as much entering the demonstration as they did leaving (Bauer 2005). As shown in the UC Berkeley follow-up and post evaluations, this form of outreach can effectively educate and possibly influence the practices of some individuals who tour the model demonstration space.

Obtain Commitments for Product Installations

Through partnering with and gaining support and collaboration from vendors, retailers, and national manufacturers, the demonstration showcases obtained a variety of energy-efficient and green products. To convince vendors to fully commit and to introduce their products and technologies to the other stakeholders, a design or kick-off meeting can be helpful. For the Marin County Office of Education and the City of Larkspur, for example, design meetings were attended by vendors/manufacturers, the City Manager, school district Facilities Director, technical advisors (lighting specialists, architect, engineers), and outreach specialists. During the design meetings, specific technologies were discussed and selected with agreement from all parties.

Several months prior to the opening of the residence hall demonstration showcases, the project committees contacted retailers and manufacturers to request energy-efficient technologies and products appropriate for the demonstration's specific showcase space. Some typical elements used in the demonstration residence halls were: ENERGY STAR labeled compact fluorescent bulbs in desk lamps, TVs, DVD players, stereos, torchieres, laptop computers, printers, compact refrigerators, T5 and T8 lamps with electronic ballasts, and lighting controls (occupancy sensors). The demonstrations also focused on educating the campus community on reducing unnecessary electric loads and rethinking their behavioral energy consumption habits.

For example, the electric loads of consumer electronics such as TVs, stereos, microwaves, printers, and cell phone/laptop chargers, which consume energy even when turned "off" (also known as standby or phantom electric loads), are also addressed in the residence hall demonstrations. Such electric loads can be eliminated by plugging the electronics into power strips, and then turning off the power source at the switch of the power strip. This component of the demonstration focused on increasing awareness by educating the campus community about plug loads and how they could change their daily habits to conserve more energy.

Promote the Showcase

An energy-efficient demonstration showcase, however compelling in its design, will not serve as an effective educational tool if it is not sufficiently promoted. To successfully inform target audiences and communities about the showcase, significant and well-placed publicity is critical. This is typically accomplished by organizing a large media event and grand opening of the demonstration showcase, in addition to promotions leading up to and following the open house media event. The following outlines strategies used to market the demonstrations.

Develop an outreach strategy. The project teams worked to develop ways to best leverage their demonstration sites to maximize their targeted audience’s awareness and interest. The specific audiences varied depending on the demonstration site and function at the facility. Students, faculty, and staff at universities were the target populations for the residence hall demonstrations. City workers and politicians were the focus audiences for the Larkspur City Hall demonstration, and teachers, students and other office workers were targeted for the Marin County Office of Education demonstration. These projects found success because they were developed where their focus audiences were located and in spaces that received high traffic.

Marketing plans were developed and outlined to guide each project's promotional efforts. Key plan elements included a review of project objectives, and then the strategies and tactics designed to accomplish these goals. Specific goals varied among the three discussed demonstrations, but overall, the projects’ overarching objectives included having a highly attended opening event with media outlets present to cover the event, increasing general knowledge of energy-efficiency and conservation practices among those who visit the demonstrations, and encouraging viewers to practice these energy conservation methods at home, school, or work. A weekly implementation schedule, spanning the initial planning efforts to the final publicity tactics, was incorporated into the marketing document, which covered a range of actions pertaining to:

- Identifying potential partners, marketing venues, and opportunities to promote the demonstrations
- Creating and distributing informational materials on the energy-efficient and green demonstration projects including flyers and brochures
- Planning for and participating in large meeting/conference events, providing a booth to make ENERGY STAR informational materials available, and holding project information meetings and energy efficiency discussions
- Creating and issuing a press release to local print media outlets
- Developing and updating website links/descriptions to promote the project
- Developing an agenda for on-site educational “workshops”
- Holding an open house media event to showcase the retrofitted demonstration space

Create promotional materials. To fully market and generate interest in the energy-efficient and green demonstrations, it’s imperative to develop a variety of promotional materials for the target audiences. With regard to the university demonstrations, informational flyers and brochures were produced and distributed to campus residence hall students in their ‘Welcome Week’ packets, and table tents promoting the project and its energy-efficient technologies were developed for display in the residence hall dining commons. A website was also created specifically for the demonstration showcase, and a large banner was hung outside the residence hall to promote the grand opening event. The projects also utilized campus resources by collaborating with their University Public Relations and Marketing Departments to promote the showcases.

Hold a grand opening event. A demonstration project will likely receive more press coverage and recognition if it includes a large open house event. For this grand opening, invite newspaper

and magazine journalists, television reporters, radio broadcasters, and other media outlets to cover details of the demonstration, in addition to project stakeholders and the community.

The residence hall demonstration projects held grand openings and received significant amounts of press for their event. The campus newspaper and surrounding city newspapers printed articles detailing the event, colleges and departments featured the project on their home pages and websites, and the UC Berkeley project was broadcast on a local radio station's morning show for a full week—reaching out to other populations. Due in large part to the publicity and recognition that the Green Room received, the Environmental Protection Agency also awarded the Green Room Committee an Environmental Achievement Award (EPA 2006).

The Marin County Office of Education demonstration space and the Larkspur City Hall demonstration facility project teams will be hosting peer networking events in the rooms. Here, meeting and event attendees will have the opportunity to learn more about the demonstration technologies incorporated into their facility.

Lessons Learned

It is important to schedule product and technology installations prior to any large events, such as media tours and the open house. It may take a significant amount of time for a donating partner to ship their products to the demonstration site and additional time to arrange for installation. It is also crucial to have the product selection match the site's expectations when conducting product recruitment. Some projects may prefer to use one technology over another, or opt to exclude a specific product from the demonstration.

Sometimes, an installed energy-efficient technology may not function properly. Specifically, the daylight harvesting photo sensors did not work as expected. Photosensors may be advantageous in theory and design, but a primary component to their installation, namely commissioning, must be correctly executed. After installation, it is critical to measure light levels in the room and test the ballasts to be sure they are functioning correctly. The Marin County Office of Education center received about 15% less light than expected, and it was finally determined that the photosensors had been pre-set at a level of sensitivity that did not work with the designated room. Also, the project team eventually put covers on the photosensors to make them less sensitive to ambient light and allow for the specified level of light to enter the room. Thus, it is important to commission not only photosensors (which may be complicated devices that frequently need adjustment after installation) but all energy-efficient technologies so that they work as designed and specified.

Specific to the residence hall demonstrations, it was easier to obtain local retail store sponsorship than support from large national and international manufacturers. Local stores have a greater incentive to participate in the demonstrations by providing donations because they are in close proximity to the location of the project and its target audiences and communities.

Having an on-site, committed project coordinator or leader is critical. These energy-efficient and green demonstration projects involve many stakeholders, and as a result, require a significant amount of coordination. A dedicated champion can serve as the liaison between invested off-site parties and ensure that the project moves forward meeting program goals and objectives.

Cultivate and foster project institutional memory. Not all stakeholders and project coordinators stay where the demonstration is located over the course of its lifetime. The local

project champion should pass his/her knowledge of and experience with developing and implementing the demonstration to other champions so that future tours and promotion can continue. It is also important to follow-up with these initial champions to determine whether they are continuing to communicate these ideas and information to those at their new venue. This could play a role in helping to expand the outreach scope of these energy-efficient demonstration concepts and practices. At the same time, it is also necessary to follow-up with the project coordinators at an original demonstration site to ensure that project goals are met.

Next Steps

In the course of this paper, we have presented three interactive demonstration showcases of energy-efficient technologies and green/sustainable building methods, which can serve as effective educational tools for consumers. They provide valuable avenues for showcasing new technology and testing new developments. Demonstrations also create opportunities to educate consumers, influence purchasing behaviors, and possibly effect the availability of energy-efficient and eco-friendly products offered in the market. Moreover, such demonstrations can serve as models for other facilities and buildings planning future retrofits.

There are several potential next steps to improving these programs, such as building upon what has already been accomplished, expanding these demonstrations to encompass a greater number of sites, collecting more quantifiable measurements, and if not already achieved, possibly broaden their focus to not only include energy-efficient technology, but also include sustainable living and green building practices. These projects can aim to stimulate a broader acceptance for the use of energy-efficient and other sustainable green practices.

Consider incorporating interactive aspects to marketing and showcasing the demonstration project. Innovative, interactive, and tactile displays draw audiences into the project and allow them a chance to engage in the showcase beyond reading forms of passive programming, such as educational fliers, descriptive posters, brochures, and promotional signs. An example of this could include a lighting display that allows individuals to interact with lighting technology, seeing the differences in energy consumption and corresponding light output between various types of lighting, such as incandescent light bulbs, halogen bulbs, and compact fluorescent lamps.

In regards to collecting more quantifiable measurements, the individual demonstration spaces lacked metering systems that collect energy use, thus energy savings were projected approximations, as opposed to actual data sets. Sub-meters can be installed to monitor energy use in the demonstration spaces. Baseline data can be recorded prior to the project installation and then after project completion to calculate energy savings. This information can then be disseminated and used to educate buildings users and tour attendees.

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