

# **How Can You Capture the Other Half of the Market? Efficiency Vermont's Strategy for Small Commercial New Construction**

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## **ABSTRACT**

The commercial new construction market is dominated by projects less than 50,000 square feet in size. According to the Energy Information Administration, these buildings accounted for 95 percent of commercial new construction projects and 53 percent of new floor space added between 1990 to 1999 (EIA 1999a; EIA 1999b). There is a generally widespread perception that efforts to secure energy efficiency in this small commercial market through project-level technical and financial assistance has high transaction costs relative to a small savings potential, and that the most cost-effective strategy is through the use of prescriptive incentives and programs.

The experience of Efficiency Vermont is that it is possible to cost-effectively provide detailed and comprehensive services to the whole commercial new construction market – small and large – to leverage energy efficiency. This is accomplished by pairing project- and market-level strategies. The project-level strategy offers three different levels of service (prescriptive, targeted, and comprehensive) and matches a project with the appropriate level of service. The market-level strategy consists of active outreach, education, and training efforts. Efficiency Vermont has found that these strategies yield 27 percent more present-value, total resource benefits (on a per-square-foot basis) on small commercial new construction projects than on large ones. This finding suggests that substantial energy savings would have been lost by only using a prescriptive approach to small commercial new construction projects. This paper provides an overview of these strategies and tabulates the four-year achievements.

## **Introduction**

Efficiency Vermont, the state's "energy efficiency utility", provides statewide technical and financial assistance for commercial new construction projects and builds working relationships with strategic partners (e.g., trade associations, state agencies), design professionals (e.g., architects, engineers), and trade allies (e.g., general contractors, electrical contractors, mechanical contractors). All Efficiency Vermont services are delivered by an independent non-utility contractor under a multi-year, performance-based contract with the state's Public Service Board. Funding for services provided to all residential and business markets is provided by an energy efficiency charge that is phasing in over five years. In 2000, the charge averaged 1.5 mills/kWh, rising to an average of 2.9 mills in 2003. The resultant spending by Efficiency Vermont across all markets ranged from \$5.6 million in 2000 to \$12.6 million in 2003.

In evaluating the commercial new construction market at its outset in 2000, Efficiency Vermont recognized that prescriptive approaches to efficiency overlook significant energy efficiency opportunities, both in interactive effects as well as non-electric benefits. To capture these missed opportunities, Efficiency Vermont developed a project-level strategy of offering

three different levels of technical and financial services on commercial new construction projects:

1. A traditional, prescriptive approach;
2. A “targeted” approach delivering custom technical and financial services to leverage the best energy efficiency opportunities on a given project; and
3. A comprehensive, whole-building approach tailored to fewer, larger projects.

Efficiency Vermont then carefully matches these levels of service to a given project to balance implementation costs with customer needs and energy efficiency opportunities. At the project level, Efficiency Vermont staff can most effectively influence energy efficiency and improve the lifetime performance of a new building – small or large – while meeting customer, design team, and contractor demands for timely estimates of costs, benefits, and financial incentives. Simultaneously, Efficiency Vermont undertakes outreach, education, and training efforts with customers, design professionals, and trade allies to build demand for energy efficiency in the marketplace.

These strategies have proven cost-effective over the first four years of operation. From 2000 through 2003, Efficiency Vermont’s commercial new construction work achieved \$11.3 million in present-value, total resource benefits and 14,060 annual MWh savings relative to the \$4.5 million in administrative, operating, and financial incentive costs allocated to the commercial new construction market over that time period.

### **Project-Level, Prescriptive Approach**

Efficiency Vermont continues to utilize prescriptive incentives to leverage both market opportunity and retrofit installations of energy-efficient equipment. The prescriptive incentives applicable to commercial new construction projects affect the selection of lighting fixtures, cooling equipment, and motors. Efficiency Vermont utilizes the regional CoolChoice and MotorUp incentives to promote high-efficiency cooling equipment and premium efficiency motors. There are plans for a major mechanical contractor outreach effort in 2004 to increase market penetration of “Tier 2” cooling equipment. Finally, Efficiency Vermont has developed its own prescriptive incentives for commercial refrigeration equipment (both solid door and walk-in components) and ENERGY STAR<sup>®</sup>-rated transformers.

### **Project-Level, Targeted Approach**

Efficiency Vermont’s “targeted” approach on commercial new construction projects begins with a minimum scope of lighting and cooling system design review and encompasses additional energy efficiency measures as appropriate. Project Managers provide a range of services, including participation in the design process, reviewing plans and construction documents, assisting with research and product selections, analyzing energy savings, and verifying installation of specified measures. Efficiency Vermont offers financial incentives to leverage the final scope of energy efficiency opportunities.

This approach allows the Project Manager to focus on the energy efficiency measures that make the most sense for a given project and customer. The “minimum scope” includes attaining at least 15 percent lower lighting power densities (LPDs) than specified in

ASHRAE 90.1 (while ensuring use-appropriate photometrics), sizing cooling systems according to design LPDs and building envelope components, and installing high efficiency air conditioning equipment. The potential range of other opportunities is quite broad. Opportunities can include chilled water packages, variable speed drive controls, daylight dimming, demand-controlled ventilation, boiler and furnace efficiencies and controls, and building envelope improvements. Even water efficiency improvements can be incorporated. Finally, Project Managers also try to identify potential interactive savings, such as the elimination of perimeter baseboard heat through the use of high-performance windows.

A critical element to this approach is the Project Manager's ability to play the role of a third-party "energy consultant" through the completion of the project. Following initial discussions and review, the Project Manager identifies those additional energy efficiency opportunities that (a) "push the envelope" to make a good project a great project, (b) provide a positive societal net present value, and (c) give a solid overall cash flow for the customer. The incentive agreement identifies the costs and benefits of the full set of efficiency measures and a financial incentive, based upon electricity savings, to leverage them all. As appropriate, financial or technical assistance incentives may be offered to leverage operational testing of equipment or verification of performance (e.g., metering, blower door testing). Depending upon the nature of the project, the Project Manager can maintain contact to review subsequent sets of plans and specifications to ensure that the identified measures remain in the design. Staff can also visit the construction site to provide assistance on air sealing, perform inspections to ensure implementation, and conducting functional tests such as blower door tests. Offers of these services balance costs with their necessity for ensuring the installation of the identified measures and their long-term, "market transformation" potential.

### **Whom Does It Serve?**

The targeted approach serves the majority of Efficiency Vermont's commercial new construction customers, particularly projects less than 50,000 ft<sup>2</sup> in size. The determination that the Project Manager should use this approach is made – often in consultation with supervisors and/or senior management – following an initial project review and discussions with the customer and design team. The factors that influence the potential scope of services and efficiency measures considered include:

1. Nature of the project (e.g., warehouse, office building, industrial plant) and relative savings potential for various systems and components;
2. The stage of the project (e.g., schematic design, design development, construction drawings);
3. Customer level of interest and commitment, both to energy efficiency and in working with Efficiency Vermont;
4. Design team levels of expertise, interest, and commitment, both to energy efficiency and in working with Efficiency Vermont.

This approach has proven to be very successful at leveraging key energy efficiency improvements and building long-term relationships with design professionals and customers. Focusing on just a few efficiency measures increases the likelihood of their integration into the design of the building. Architects, engineers, and contractors appreciate being involved in the

identification of these opportunities and are likely to include these particular design strategies in their subsequent projects. Having the financial incentive tied to these few measures keeps these measures “on the radar screen” of customers during value engineering. All participants – customers, design team members, and contractors – tremendously appreciate the cost-benefit analysis provided by Project Managers, either in terms of simple payback, cash flow, or rate of return. Finally, architects, engineers, and contractors who work through this process are more likely to contact Efficiency Vermont at an earlier stage on subsequent projects, increasing the range of potential efficiency measures and possibly setting the stage for the “comprehensive/whole-building” approach, discussed next.

### **How Does Efficiency Vermont Lower Implementation Costs in this Approach?**

Efficiency Vermont has lowered the “per-project” implementation costs associated with this approach over time by developing institutional capacity and relying upon the assistance of architects, engineers, and contractors in determining key technical criteria. Over time, Efficiency Vermont staff has standardized several analysis spreadsheets to determine energy savings for many efficiency measures (e.g., variable frequency drives on VAV systems, dual-enthalpy economizers, demand-controlled ventilation) and used industry standard software packages for evaluation of systems. To determine incremental costs, Efficiency Vermont Project Managers rely upon R.S. Means data, past projects with similar measures, or estimates provided by architects, engineers, contractors, or vendors. Staff adjusts incremental cost estimates as more information becomes available, but only adjusts financial incentives if there is substantial deviation from original estimates. Through these mechanisms, Efficiency Vermont has streamlined its internal processes for providing cost-benefit analyses and determining financial incentives, thus minimizing labor associated with each project.

For opportunities that fall outside of the range of past experience, Efficiency Vermont can enter into a subcontract with technical experts to develop energy savings and incremental cost estimates. Efficiency Vermont has several standing subcontracts with experts in energy modeling, commissioning, lighting and daylighting design, mechanical system design, and cost estimating. Project Managers work with supervisors to determine appropriate scopes of work and oversee subcontractor participation. Additionally, Project Managers can establish subcontracts with active members of the design team when appropriate to determine energy savings and added project costs. The results of these analyses are shared with other staff and are added to the in-house expertise at Efficiency Vermont.

### **Example – Smugglers’ Notch Day Care (“Treasures”)**

Smugglers’ Notch is a year-round recreational resort in Jeffersonville, Vermont. The project was the construction of a “ski-in,” 6,000-ft<sup>2</sup> day care center, and the customer provided Efficiency Vermont with a “design-development” copy of the architectural, lighting, and mechanical drawings. Due to the stage of design, size of the project, and relative energy use, the Project Manager “targeted” lighting and cooling controls in addition to LPD and cooling equipment sizing/efficiency. By working with the lighting designer, LPDs were lowered to less than one watt per square foot (W/ft<sup>2</sup>). The cooling load was re-calculated using the actual 1 W/ft<sup>2</sup> LPD, reducing the cooling equipment design from 17.5 tons to 15 tons. CoolChoice “Tier 2” efficiency was attained with the air conditioning system. Dual-enthalpy economizer controls

and occupancy sensors were added. Efficiency Vermont offered a \$4,535 incentive based on an estimated additional equipment cost of \$7,800, and the changes in design yielded \$2,250 in annual electricity savings compared to what was required for the project under ASHRAE 90.1.

## **Project-Level, Comprehensive/Whole-Building Approach**

Efficiency Vermont also offers a “comprehensive/whole-building” approach on certain commercial new construction projects. This approach uses an energy simulation model to test the improvements of individual energy efficiency measures against an ASHRAE 90.1-compliant design, identify a set of cost-effective improvements, and project the energy savings associated with that set of energy efficiency measures. Efficiency Vermont uses this approach strategically, depending upon certain project characteristics:

1. Stage of the project (it must be at the schematic design stage and preferably pre-design stage);
2. Customer level of interest and commitment to take the time to evaluate a wide range of design options;
3. Design team levels of expertise, interest, and commitment to take the time to optimize the whole building design;
4. Size of the project (while there is no minimum size, this approach has not been used on a project smaller than 25,000 ft<sup>2</sup>);
5. Unique building system characteristics (e.g., underfloor air distribution system) that require a systemic evaluation of interactive energy savings; and
6. Ability to leverage significant energy and other resource savings above what would be accomplished via the “targeted” approach.

The Project Manager enrolls a project in this approach using a Memorandum of Understanding (MOU). The MOU commits, at a minimum, Efficiency Vermont, the customer, architect, and engineer to engage in an agreed-upon process that sets energy design goals, evaluates a wide range of opportunities, and integrates energy efficiency options that meet pre-determined cost-effectiveness criteria. Ideally, the design team adds a third-party energy consultant to oversee the analysis and champion the integration of these energy efficiency improvements. The financial incentive offered on the project leverages the entire energy efficiency package.

The key role played by the Efficiency Vermont Project Manager throughout the project cycle is a critical element of this comprehensive approach. The role can involve supporting the energy simulation modeling effort, facilitating discussions (and typing up minutes), or researching incremental cost information. Efficiency Vermont has also found that design team participation in this process does not necessarily guarantee that the agreed-upon design elements appear in design development or subsequent plans and specifications. Consequently, the Project Manager reviews these documents to ensure consistency with the envisioned energy-efficient design and forwards inconsistencies or recommendations to the entire design team. Project Managers are also available to visit the construction site to verify nameplate data or check on other design elements. Upon project completion, the Project Manager can verify installation of equipment and performance of buildings systems (e.g., through blower door testing) in accordance with the incentive agreement.

The Efficiency Vermont performance-based contract with the Public Service Board requires that a certain number of commercial new construction projects be enrolled in this comprehensive/whole-building approach (about 10 percent of new construction projects greater than 10,000 ft<sup>2</sup> in size, or about 45 projects over the three-year contract period). However, because the use of this approach involves significant effort by in-house staff, meeting the contract target is balanced against staff resource constraints when selecting projects for this approach.

### **Whom Does It Serve?**

The comprehensive/whole-building approach serves a relatively small portion of Efficiency Vermont's commercial new construction customers. Projects enrolled in this approach frequently have building owners with a commitment to sustainable development in their business mission and/or are following the Leadership in Energy and Environmental Design (LEED<sup>TM</sup>) process for either guidance (i.e., "LEED<sup>TM</sup>-certifiable") or certification. Design team members either asking for, or being receptive to, this approach have typically completed one or probably more projects with Efficiency Vermont and are interested in the opportunities presented by this approach.

### **How Does Efficiency Vermont Lower Implementation Costs in this Approach?**

The advent of the LEED<sup>TM</sup> program and its promotion of integrated design and energy modeling are lowering Efficiency Vermont costs for this approach. Many customers evaluating the LEED<sup>TM</sup> program are already committed to funding integrated design process and the use of an energy model to estimate savings. Efficiency Vermont Project Managers can provide financial incentives to include an evaluation of incremental costs and energy savings for each individual efficiency opportunity. In addition to meeting Efficiency Vermont's administrative requirements, this provides a valuable benefit to the customer and design team above what is provided through the LEED<sup>TM</sup> program; namely, quantification of the added costs of the energy efficiency points and a simple payback, cash flow, or rate of return analysis of their benefits. The development of in-house capacity to support the process and institutional knowledge about the types of energy efficiency measures evaluated in this approach does lower implementation costs. Still, the use of this comprehensive, whole-building approach is more costly than the "targeted" approach described earlier, so its use is reserved for when it can leverage an appropriate level of additional benefits.

### **Example – Northern Power Systems' New Office Building**

Northern Power Systems is a Vermont-based manufacturer of renewable energy generation and cogeneration equipment. Due to the commitment on the part of the customer and the architects to optimize the building's efficiency, and the interest in evaluating a unique building envelope design, Efficiency Vermont enrolled this project as a "pilot" of the comprehensive, whole-building approach. Efficiency Vermont provided the energy modeling via a subcontract with a third-party energy consultant, and the Project Manager played an active role through all phases of design (including a final blower door test with infrared assessment). The completed 30,000-ft<sup>2</sup>, office and manufacturing space achieved a whole-building LPD of 1.1

W/ft<sup>2</sup> and uses daylight provided by a fiberglass curtain wall and skylight system, dimming control of open office areas, nighttime flush cooling, demand-controlled ventilation, and variable frequency drive control of all air handling units. The estimated energy costs are 42 percent lower than an ASHRAE 90.1-compliant building. Efficiency Vermont offered a \$30,000 incentive based on an estimated additional equipment cost of \$93,000. The estimated energy savings are \$13,600 annually.

## **Efficiency Vermont's Market-Level Strategy**

The dynamics of the commercial new construction market are complex. While customers look to their design team and contractors to make specific decisions regarding energy efficiency, the customer drives the investment of needed additional design and installation effort. On projects where a customer is interested in energy efficiency but the design team offers a more "tried-and-true" design, efforts by Efficiency Vermont to "bypass" the team by giving recommendations directly to the customer have threatened the professionals' credibility and control over the project. Because the delivery of the targeted and comprehensive/whole-building approaches relies strongly on commitment by the customer as well as teamwork with design professionals (i.e., architects and engineers), contractors, and vendors, Efficiency Vermont has invested considerable resources in building relationships throughout the market.

Through the efforts of Business Development and Project Management staff, design professionals have realized that a partnership with Efficiency Vermont adds value to the services offered to their customers, provides them with "on-the-job" training on energy efficiency, and educates their customers on the benefits of energy efficient equipment. Additionally, by having better communication with the design team, the Efficiency Vermont Project Manager better understands the uniqueness of each project, the timeframe demands and budgetary constraints. Across projects, the relationships provide insight into market trends and the possibility of adjusting and adapting approaches to the needs of the market.

Efficiency Vermont has developed a market-level strategy to engage customers, design professionals, contractors, and vendors and to build these relationships. The elements of this strategy include:

1. Outreach to Customer Associations – Efficiency Vermont has established strong working relationships with specific trade associations or agencies, such as the Vermont Ski Areas Association (VSAA) or the Vermont Department of Buildings and General Services. Efforts include energy efficiency options and design process training for staff, publications in newsletters, and co-sponsoring events to highlight accomplishments.
2. Better Buildings by Design Conference – Efficiency Vermont presents an annual comprehensive conference on high performance residential and commercial new construction. This gathering of the top construction and design professionals in the Northeast is viewed as a key resource for information about the latest innovations in energy efficiency, superior building performance, and indoor air quality. In addition to its important educational aspect, the conference also provides an opportunity for Efficiency Vermont staff to build and strengthen relationships with many of the builders and designers in the state.
3. Partnerships with Professional Organizations – Efficiency Vermont Business Development and Project Management staff has joined the membership of other design

professional organizations in the state and is actively serving on the boards of some of these organizations. These organizations include the Vermont chapters of the American Institute of Architects (VT AIA), American Society of Heating Refrigeration and Air conditioning Engineers (ASHRAE), and the Construction Specification Institute (CSI).

4. Brown Bag Presentations – Efficiency Vermont Business Development staff will either team with a Project Manager or go on their own to host a “brown bag” session at design and contractor firms across the state. At this session, Efficiency Vermont staff provides energy efficiency education and information about Efficiency Vermont’s approaches, and solicits feedback on professionals’ experiences with Efficiency Vermont.
5. High Performance Design Guide to Energy-Efficient Commercial Buildings – Vermont and the Northeast Region – with the co-sponsorship of VT AIA, Efficiency Vermont developed a Design Guide to illustrate the “integrated” design process, stressing the needed collaborative effort to achieve a high-performance building. While certain technologies and case studies are discussed in detail, the *Guide* organizes itself around the design process, with chapters dedicated to schematic design, design development, construction, and post-construction. Copies of this *Guide* are being distributed to firms across the state, and it is available on the Efficiency Vermont website (<http://www.efficiencyvermont.com/index.cfm?L1=86&L2=454&sub=bus>).
6. Sponsorship of the Advanced Building Guidelines – Efficiency Vermont served as a sponsor of the New Buildings Institute’s “E-Benchmark” tool and distributed copies at an E-Benchmark training session at the 2004 Better Buildings by Design conference. Efficiency Vermont is now integrating E-Benchmark into its targeted and comprehensive/whole-building approaches and will host additional training sessions throughout the state in 2004.

## Results

### Characterization of the Vermont New Construction Market

The state of Vermont has approximately 600,000 residents and an average population density of about 66 people per square mile. There are only 15 urban areas with a population of greater than 15,000 people. An evaluation of data from the Vermont Department of Labor and Industry shows 1,568 total major renovations or new construction projects were permitted from 2000 through 2002. Approximately 95 percent of these projects were less than 50,000 ft<sup>2</sup> in area and contributed to 56 percent of the total newly constructed commercial floor space. This trend closely matches the national average for new commercial buildings.

**Table 1. Breakdown of Permitted Vermont New Construction Projects, 2000-2002**

Area Category	Number of Projects	% of total Projects	Total Area (ft <sup>2</sup> )	% of Total Floor Area
1,000 to 9,999 ft <sup>2</sup>	1,170	75%	4,420,133	22%
10,000 – 24,999 ft <sup>2</sup>	217	14%	3,212,437	16%
25,000 – 49,000 ft <sup>2</sup>	101	6%	3,580,398	18%
50,000 ft <sup>2</sup> & greater	80	5%	8,616,272	43%
Totals	1,568		19,829,240	

Source: Vermont Department of Labor and Industry



**Vermont's new construction regulatory environment:** Vermont currently lacks a mandatory statewide energy code. Many commercial new construction projects are subject to a land use development law entitled "Act 250," which regulates land use and environmental impacts that arise from development. Project proponents need to demonstrate compliance with 10 basic criteria; a subsection of one criterion is dedicated to energy efficiency, calling for the use of "best available technology" that yields the lowest life cycle costs for the project. Currently, guidance documents establish modifications to ASHRAE/IESNA Standard 90.1-1999 as compliance with the minimum requirements of this criterion.

**Vermont design firms:** There are an estimated 126 architecture firms and 67 mechanical and electrical engineering firms in the state. Contractor firms include an estimated 205 general contractors, 152 electrical contractors, and 149 mechanical contractors. The majority of design firms and construction companies are small; 80 percent of architecture firms, 46 percent of engineering firms, and 25 to 35 percent of contractor firms (depending upon type) have four or fewer employees (GDS Associates 2003).

**Vermont's energy costs:** In 2000, Vermont ranked 2<sup>nd</sup> highest in the nation in overall energy prices including electricity and fossil fuels (EIA 2000). It currently ranks 4<sup>th</sup> in the nation for the price of electricity for the commercial market, at an aggregated average cost of \$0.111/kWh, after Hawaii, New York and California (EIA 2002). High costs of energy have favored the concept of energy conservation and efficiency.

### **Efficiency Vermont New Construction Market Cost-Effectiveness**

Since the beginning of operations in March 2000, Efficiency Vermont has successfully completed 258 commercial new construction projects. Table 2 summarizes the costs and energy savings associated with these projects and compares them to the overall Efficiency Vermont averages. Since March 2000, Efficiency Vermont's relative commercial new construction expenditures have been 32 percent in financial incentives, 23 percent in direct technical assistance, and 45 percent in outreach, training, strategic planning, business development, marketing, and administrative effort ("operating" costs). The relative amount provided in financial incentives is increasing over time, reaching 43 percent in 2003.

Efficiency Vermont's commercial new construction strategy has yielded highly cost-effective results. In 2003, Efficiency Vermont leveraged \$1 of total resource benefits for an expenditure of only \$0.30. Even taking into consideration project participant and third-party costs, commercial new construction market efforts leveraged \$1 of total resource benefits at a cost of only \$0.57. Across all markets (i.e., residential and commercial, existing and new buildings), Efficiency Vermont's efforts have delivered energy efficiency at about half of the cost of generation in Vermont. In 2003, commercial new construction market efforts delivered electrical energy savings at a cost of \$260/annual MWh saved, compared to the 2003 Efficiency Vermont average of \$255/annual MWh saved. (The weighted lifetime of energy savings was 18 years in commercial new construction and 14 years overall.) Efficiency Vermont's commercial new construction market efforts are less expensive than generation in Vermont.

The data in Table 2 also highlights the "front-loading" of costs on the commercial new construction market. The project cycle on commercial new construction projects varies considerably. For some projects, design and construction occur in the same year, while in others,

schematic design begins a year or more before construction will be complete. Consequently, commercial new construction market costs relative to energy savings are considerably lower in 2003 than across the full four-year time span. In 2003, costs per annual MWh saved are \$260/MWh, 18 percent lower than the four-year average of \$315/MWh. Also, in 2003, Efficiency Vermont leveraged \$1 of present-value, total resource benefit savings for an expenditure of only \$0.30, 25 percent lower than the four-year average of \$0.40. Even as Efficiency Vermont is now realizing the energy savings from past efforts, the commercial new construction efforts are also leveraging higher levels of non-electric benefits. The ratio of present-value, total resource benefits to annual MWh savings in 2003 is 12 percent higher than the four-year average.

**Table 2. Efficiency Vermont New Construction Costs and Savings**

	New Construction Market		Efficiency Vermont (Since March 2000)
	2003	Since March 2000	
Efficiency Vermont Costs			
o Operating (1)	\$740,000	\$2,025,000	\$15,490,000
o Technical Assistance (1)	\$350,000	\$1,020,000	\$6,830,000
o Incentive	\$810,000	\$1,390,000	\$14,700,000
<i>Subtotal</i>	\$1,900,000	\$4,435,000	\$37,030,000
Participant Costs	\$1,780,000	\$2,860,000	\$23,680,000
Annual MWh Savings	7,270	14,060	148,000
Total Resource Benefit Savings (2003\$)	\$6,500,000	\$11,260,000	\$138,840,000
Efficiency Vermont Cost per Annual MWh Saved	\$260	\$315	\$250
Efficiency Vermont Cost per TRB Saved	\$0.30	\$0.40	\$0.27
TRB Saved per Annual MWh Saved	\$895	\$800	\$940

Sources: Efficiency Vermont 2002 Annual Report, Efficiency Vermont 2003 Preliminary Report  
(1) Efficiency Vermont either tracks or allocates these costs on a market basis for annual reporting

### **Small versus Large Commercial New Construction Projects**

An evaluation of normalized commercial new construction market data shows that Efficiency Vermont's efforts were more effective on smaller projects (less than 50,000 ft<sup>2</sup>) than larger ones (greater than 50,000 ft<sup>2</sup>). Table 3 presents per-square-foot data on energy savings, incremental costs, and financial incentives on those projects for which Efficiency Vermont collected building area data, as well as New York State Energy Research Development Authority (NYSERDA) data for comparison (Eggers and Fisk, 2002). The data show that Efficiency Vermont efforts on smaller projects yielded 27 percent more present-value, total resource benefit savings and 8 percent more electrical energy savings than larger projects, at lower incremental costs. While a breakdown of savings by the prescriptive, targeted, and comprehensive/whole-building approaches are not available, Table 3 suggests that substantial savings would have been lost by only applying a prescriptive approach to projects less than 50,000 ft<sup>2</sup> in size.

**Table 3. Efficiency Vermont Projects from March 2000-2003**

	< 50,000 ft2	> 50,000 ft2	NYSERDA
No of Projects	136	8	702
Average area (ft2)	14,100	73,000	95,412
Avg kWh saved/ ft2	4.26	3.96	3.85
Average added cost / ft2	\$1.28	\$1.73	
Average annual savings/ft2	\$0.45	\$0.33	
Average TRB/ft2	\$3.48	\$2.73	
Average incentive/ft2	\$0.43	\$0.38	\$0.61
Incentive/added cost (%)	34%	22%	
Average incentive/kWh	\$0.10	\$0.10	\$0.16
Average incentive/kW	\$525	\$580	

Sources: Efficiency Vermont Fast Track database; Eggers and Fisk, 2002

The data suggest that the Efficiency Vermont strategy is more expensive than NYSERDA's program. Incentive costs have accounted for 32 percent of commercial new construction expenditures since March 2000. At an average incentive cost of \$0.42 per square foot, the Efficiency Vermont overall cost has been about \$1.30 per square foot. However, Efficiency Vermont allocates its marketing, business development, technical assistance, training, outreach, and some (but not all) administrative costs to each served market. Without identifying costs for NYSERDA's commercial new construction program beyond the \$0.61 per square foot incentive cost, a comparison cannot be made.

### **Efficiency Vermont Experience with Design Firms**

Efficiency Vermont has also been quite successful in partnering with the design professional market. Attendance at the Better Buildings by Design Conference has increased steadily each year, from 315 in February 2001 to 600 in February 2004. A 2002 survey of design professionals and trade allies indicated that 47 percent of Vermont architects and 81 percent of engineers had utilized Efficiency Vermont services, with 60 percent of those surveyed rating those services highly (GDS, 2003). As of the writing of this paper, Efficiency Vermont staff has worked with 42 different architecture and 21 different engineering firms on projects, and outreach efforts to these and contractor firms continue. The full 1,500 copies from the first printing of the *High Performance Design Guide* have been distributed to design firms throughout the state, and demand has necessitated a second printing of 3,000 copies. Efficiency Vermont also continues to partner with other local organizations, having sponsored tours of completed comprehensive/whole-building projects with the local AIA chapter and an HVAC Trade Expo with the local ASHRAE chapter.

### **Conclusions**

The experience of Efficiency Vermont is that the small (less than 50,000 ft2) commercial new construction market can benefit from the cost-effective delivery of technical assistance, outreach, education, and business development services. This is accomplished through the implementation of a project-level strategy to tailor technical and financial assistance to individual new construction projects, and a market-level strategy to build demand for and supply of energy efficient design in the marketplace. The project-level strategy utilizes three approaches, a traditional "prescriptive" approach, a "targeted" approach that focuses on key

energy efficiency opportunities, and a “comprehensive/whole-building” approach. Efficiency Vermont has found that these services provide higher present-value, total resource benefit savings on small commercial new construction projects than on larger ones. Overall, every dollar of Efficiency Vermont new construction efforts has yielded \$2.50 in present-value, lifetime total resource benefits, an indicator of the cost-effectiveness of these strategies.

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