



NEW CONSTRUCTION PROGRAM

A CASE STUDY PREPARED BY OAK RIDGE NATIONAL LABORATORY AND THE NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY

In 1998, \$19.1 billion was spent for energy in New York's commercial, institutional, and multifamily buildings, accounting for 64% of the State's energy use. Recurring costs, like energy, are the largest component of a building's life-cycle costs. By applying energy-efficient design practices and technologies, energy costs in buildings can be reduced by 15% to 20%. To realize these savings, the construction industry must move beyond a "first-cost" orientation and consider life-cycle costs.

The primary goals of the **New York Energy SmartSM** New Construction program are to promote energy-efficient measures in the New York State new construction industry and to increase the energy efficiency standards used in building designs. Through a combination of technical assistance and financial incentives, the program eases some of the risks that building designers and owners associate with energy-efficient technologies.

PROGRAM OVERVIEW

The program has several levels to accommodate project complexity:

- **Whole-Building Design Incentives** are

designed for very large or complex new construction or renovation projects. The building owner and design team evaluate energy efficiency improvements to the various building components, including the building shell, heating and cooling systems, and lighting. Incentives may reach up to 70% of incremental cost.

Structures rated as "Green Buildings" are eligible for 80% of the incremental costs of equipment. To receive this rating, buildings must meet siting, water efficiency, energy and atmosphere, materials and resources, and indoor air quality criteria. NYSERDA offers computer modeling and materials analysis to assess building design relative to Green Buildings criteria.

- **Custom Measure Incentives** are for medium-sized, new construction and substantial renovation projects where the building owner and design team explore electric energy-saving technologies. Incentives may reach up to 70% of incremental cost.
- **Pre-Qualified Equipment** is for small-to medium-sized, new construction and substantial renovation projects where

building owners apply for incentives on pre-qualified lighting, motors, and HVAC equipment. Incentives are approximately 50% of the incremental cost of higher-efficiency measures, up to \$50,000 per building.

- **Equipment Replacement** is for existing buildings where lighting, motors, or unitary heating and cooling equipment are being replaced. Generally, incentives amount to 50% of the incremental cost of higher-efficiency measures, up to \$5,000 per building.

Building owners who participate through the whole-building and custom measure options are eligible for up to \$10,000 of technical assistance from NYSERDA-provided technical assistance consultants. These consultants assess potential electric energy savings measures and design features. For projects with more extensive

technical assistance needs, NYSERDA will cost-share half the assistance costs in excess of \$10,000, up to \$50,000 of cost sharing.

Commissioning services, a systematic process of ensuring that specified equipment operates as designed, are also available through NYSERDA-provided consultants. NYSERDA will cost-share half of any commissioning costs. Commissioning is required for those projects receiving more than \$100,000 in equipment incentive.

New England Electric Service (NEES) Global assisted NYSERDA in developing the **New York Energy SmartSM** New Construction program. NEES helped design participant applications, set incentive levels, and develop a marketing plan.

“The NYSERDA technical assistance team provided energy-efficiency actions that will have long-term operational cost implications. NYSERDA’s help has been as beneficial as the incentive dollars provided by the program.”

**JACK REILLY
DEPUTY DIRECTOR
CAPITAL DISTRICT TRANSPORTATION AUTHORITY**

CUSTOMER PERSPECTIVES

CAPITAL DISTRICT TRANSPORTATION AUTHORITY RAILWAY STATION

A dramatically designed, 80,000 sq. ft. railway station for New York’s Capital District is under construction in Rensselaer, across the Hudson River from Albany. The Capital District Transportation Authority (CDTA) Railway Station is the first large, inter-city station built in the U.S. within the last 50 years and will replace a 20,000 sq. ft. Amtrak facility. The station building project is budgeted at about \$12.0 million and has an estimated annual operating budget of \$600,000. About \$136,000 of the \$600,000 annual operating budget (or 23%) is allocated to energy costs.



Steven Winter Associates, a New Construction program technical assistance consultant, working with the construction planning team, identified a variety of potential energy savings measures, including the use of energy-efficient windows that will significantly cut cooling costs in the westward facing building. Table 1 summarizes the savings from the proposed measures.

The total cost difference between the baseline and the proposed system is

approximately \$160,000. CDTA was awarded \$115,000 in equipment incentives, reducing the incremental cost to \$45,000 and yielding a payback period of less than 2 years. NYSERDA provided \$20,000 in technical assistance funding. This high-profile project will showcase energy-efficient technologies for the design and construction teams, as well as the large volume of travelers who make this among the top 10 Amtrak terminals in the country.

Interior view of the Capital District Transportation Authority railway station.

| BASELINE SYSTEM | PROPOSED SYSTEM | ESTIMATED ANNUAL kWh SAVINGS | ESTIMATED ANNUAL COST SAVINGS |
|------------------------------------|--|-------------------------------------|--------------------------------------|
| Fluorescent lighting | High-efficiency lighting | 177,105 | \$11,673 |
| No dimming control | Automatic dimming control | 32,560 | \$2,146 |
| Insulated glazing | Low-E reflective glazing | 23,487 | \$1,548 |
| High-efficiency motors | Premium efficiency motors | 5,917 | \$390 |
| Constant-speed pump and fan motors | Variable frequency drive for pump/fan motors | 100,303 | \$6,611 |
| Pneumatic control | Direct-digital control | 19,876 | \$1,310 |
| TOTAL | | 359,248 | \$23,678 |

EQUINOX SHELTER

Equinox, founded in 1969, is a private volunteer organization dedicated to helping children, adults, and families in need. Equinox is renovating a circa 1830s, 12,000 sq. ft. building on South Ferry Street in Albany to become an 18-bed youth shelter. Primary funding for the rehabilitation of the building, is being provided by the New York State Homeless Housing Assistance Program, and is expected to cost about \$1.4 million.

NYSERDA became involved with the youth shelter project after some of the design was completed, but was able to recommend several energy efficiency upgrades through Science Applications International Corporation (SAIC), the

Equinox youth shelter on South Ferry Street, Albany.



technical consultant. One upgrade was the installation of multiple HVAC systems rather than one large heating and cooling system. These units allow more natural zoning, which produces better overall performance. During the day, when residents are in school, the amount of air conditioning in the upper-floor bedrooms can be reduced. At night, air conditioning for the downstairs rooms can be reduced.

SAIC also recommended upgrading to higher efficiency air-conditioning units and low-E film, Argon-filled, double-glazed windows. As shown in table 2, estimated energy savings from the proposed system is about 42,000 kWh per year, or \$4,224.

The incremental cost of the proposed systems is \$18,360. NYSERDA is funding \$11,000 for the upgrades, leaving a reduced incremental cost to Equinox of \$7,360. The payback period for Equinox is less than two years.

Both Francis Kramer, the project architect, and Dean Shepler, construction foreman, found NYSERDA's suggestions helpful and have expressed a willingness to incorporate more energy-efficient techniques, including natural zoning in their future projects. Mr. Shepler noted that the baseline energy use and potential savings data might be better understood by a broader audience if the details and language were expressed in less technical terms.

TABLE 2: BASELINE VS. PROPOSED SYSTEMS FOR THE EQUINOX YOUTH SHELTER PROJECT

| BASELINE SYSTEM | PROPOSED SYSTEM | ESTIMATED ANNUAL kWh SAVINGS | ESTIMATED ANNUAL COST SAVINGS |
|---------------------------------------|--|------------------------------|-------------------------------|
| Single HVAC | Multiple HVACs | 26,685 | \$2,668 |
| Standard-efficiency cooling equipment | High-Efficiency Cooling Equipment | 5,040 | \$504 |
| Double-glazed clear windows | Low-E film, Argon-filled double-glazed windows | 10,516 | \$1,052 |
| Total | | 42,241 | \$4,224 |

A second New Construction program project for Equinox, arising from the first success, involves the substantial renovation of an existing building, and conversion into a Community Services Center. Knowledge gained from the Equinox-NYSERDA relationship is being transferred to other non-profit agency projects where reduced operating costs can mean more community services.

ects. Annual savings from these projects are estimated to be about 7.5 million kWh or \$750,000 per year. It is estimated that each dollar in incentives results in a reduction of 3.5 kWh per year. Therefore, the projected energy savings after the program is fully subscribed is 50.4 million kWh (3.5 X \$14.4 million) per year and 10,100 kW in demand savings. Table 3 summarizes the activity for the program and projected outcome by program end.



Equinox project architect Frances Kramer stands beside multiple HVAC units.

PROGRAM PERFORMANCE: INITIAL FEEDBACK

The program began in December 1999, and by the end of the first quarter of 2000, the New Construction program received 80 applications for \$4.3 million in incentives for buildings of a median size of 40,000 sq. ft., with construction costs ranging from \$10,000 to \$1.5 million. By the end of the second quarter, the program received 119 applications for incentives totaling \$7.2 million on buildings with a median size of 65,000 sq. ft. Figure 1 presents applicant location by utility service territory. Based on the current application rate, the \$14.4 million in incentives funds are expected to be fully subscribed by early 2001.

Goal 1. Improve the efficiency of electricity use through cost-effective energy-efficient measures and services.

By the end of June 2000, \$2.5 million of incentives was approved to fund 27 proj-

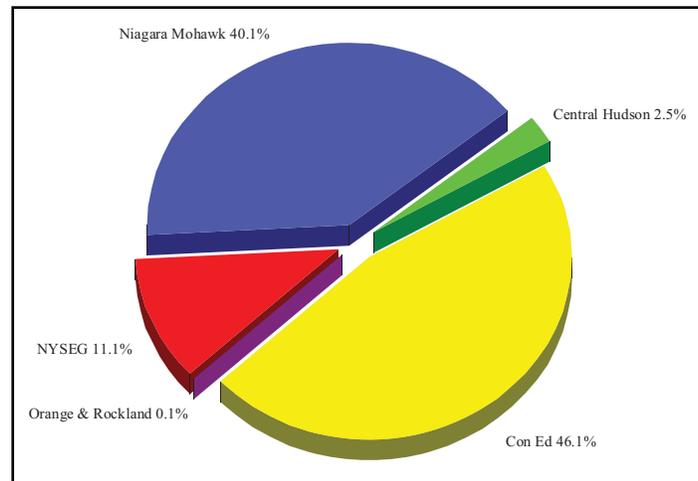


FIGURE 1: Value of Incentive Applications by Utility District

To be considered for cost-sharing, measures must be cost-effective over their lives. Cost/benefit criteria, based on economic and societal impacts, qualify measures for incentives (measures with limited electric energy savings, such as increased insulation levels, generally do not qualify for incentive payments).

Early design intervention is crucial for

TABLE 3: ACTIVITY SUMMARY OF THE NEW CONSTRUCTION PROGRAM

| | DEC. 31, 1999 | MARCH 31, 2000 | JUNE 30, 2000 | PROJECTED BY PROGRAM END |
|---|---------------|----------------|---------------|--------------------------|
| Number of applications | 40 | 80 | 119 | 156 |
| Total application incentive dollars | \$2.2 million | \$4.3 million | \$7.2 million | \$14.4 million |
| Number of projects with approved incentive offers | 4 | 12 | 27 | 156 |
| Approved incentives | \$207,000 | \$800,000 | \$1.2 million | \$14.4 million |

cost-effectiveness and maximum energy savings. Several projects were well into the planning stage before building owners joined the program. This limited the types of energy measures incorporated, but as awareness grows, NYSERDA's technical assistance consultants are becoming involved earlier. Several applicants have included the New Construction program in their bids for architecture/engineering services.

Goal 2. Transform the markets for energy efficiency products and services, informing the public about the full range of energy-efficiency opportunities.

NYSERDA collaboration with consultants is an important educational resource for the design and construction communities, and for building owners and developers. Although the program provides incentives for equipment replacement projects, the primary emphasis is on integration of design with higher-efficiency equipment options. Figure 2 shows that, based on the applications to date, the bulk of the incentives will be applied to whole-building projects, where designers and the technical assistance consultant work as a team.

The New Construction programs seeks to increase energy design standards through education among members of the design community. Architectural and engineering firms with program experience are likely to apply those principles to their average 20 to 40 projects completed per year.

Figure 3 shows the New Construction Program applications by sector. As more businesses and institutions benefit from cost savings, the demand for energy efficiency equipment and design services is expected to increase. Similarly, as improved building efficiency becomes widespread, tenants of commercial buildings will view energy efficiency as an important benefit, and even those who build on speculation will no longer be able to ignore energy costs in building design.

For further information about New York Energy SmartSM programs, contact NYSERDA's Communications Department at: (518) 862-1090, ext. 3250; or visit our website: www.nyserda.org

New York State Energy Research and Development Authority
286 Washington Avenue Extension
Albany, New York 12203-6399