



LOW-INCOME DIRECT INSTALLATION PROGRAM

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

More than 2.9 million New Yorkers live below 125% of the poverty level, which is just over \$20,000 annual income for a family of four. The private housing stock for this population is generally in poor condition, and as a result, residents typically face relatively high energy bills. The energy burden (defined as the percentage of household income required to pay residential energy bills) for low-income customers can range as high as 20 to 30%, compared to three to eight percent for average income households. When compared nationally, in 1999, New York's low-income households spent about 28% of their income on energy, compared to 22% among other states, as illustrated in Figure 1.

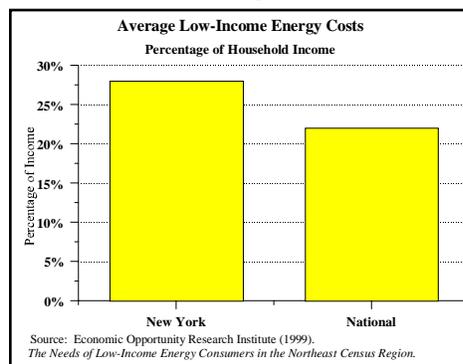
PROGRAM OVERVIEW

While the combination of poor housing stock, higher than average energy costs, and New York's cold climate pose many challenges for low-income households and policy makers, they also present an opportunity to provide a well-crafted set of public benefit programs to reduce the energy burden of low-income citizens. The New York State Energy Research and Development Authority's (NYSERDA) **New York Energy Smart**SM low-income

energy efficiency programs are based on the principle that affordable housing can be achieved by improving energy efficiency in low-income households. The **New York Energy Smart**SM Low-Income Direct Installation program builds on the New York State Weatherization Assistance Program (WAP) to deliver electric energy efficiency services to low-income households in the service territories of Central Hudson Electric & Gas Corp. (CHG&E), Consolidated Edison Company of New York, Inc. (ConEd), and Orange and Rockland Utilities, Inc. (O&R) (See description on following page).

Through the Direct Installation program, the following types of electric efficiency services and appliances are provided: energy-efficient lighting products, such as compact fluorescent bulbs and hard-wired fixtures for apartment hallways, common areas and outdoors; energy-efficient appliances, including refrigerators and washing machines; and replacement of inefficient elevator motors. Replacement of electric water-heating and electric resistance space-heating, with non-electric

FIGURE 1: Low-Income Energy Burden



THE WEATHERIZATION ASSISTANCE PROGRAM

Weatherization grew out of the Nation's desire to make more efficient and affordable use of energy resources while reducing dependence on foreign oil. In the mid-1970s, the federal government created the Weatherization Assistance Program (WAP) in response to its concern that high fuel and utility costs were creating hardships for low-income people living in inferior housing, particularly the elderly and disabled living on fixed incomes. The U.S. Department of Energy administers the WAP through individual state agencies, including the New York State Division of Housing and Community Renewal (DHCR). Supplementary funding is provided through the Low Income Home Energy Assistance Program (LIHEAP) of the U.S. Department of Health and Human Services, and private monies leveraged by community agencies from building owners, utility companies, and other sources.

New York has one of the largest and most innovative weatherization programs in the country. WAP innovations originating in the State include: computer-instrumented energy audits, rental owner contribution policies, mandatory combustion appliance efficiency testing, incorporation of health and safety protocols, etc. Adding electric measures to the WAP through the Direct Installation program further emphasizes New York's ability to innovate in the weatherization arena.

Source: Association for Energy Affordability, *Energy Affordability through Energy Efficiency*.

alternatives, is also covered under the program since this can directly and significantly improve energy affordability for low-income consumers.

The objectives of the Direct Installation program are to: (1) integrate electric energy efficiency measures within the WAP to further reduce the energy burden of low-income households; (2) promote awareness of the benefits of energy efficiency to low-income consumers; and 3) facilitate energy education through targeted training and outreach.

The Direct Installation program began field implementation in October 1999. The program budget includes \$8.7 million for the installation of electric reduction measures and \$1.2 million for contractor services to design and implement this program through June 2001.

PROGRAM FEATURES

The Direct Installation program offers several advantages over past low-income energy initiatives. These include:

Participation is Determined by Need, Rather than Payment Status. Investor-owned utilities previously offered payment programs to low-income customers in arrears on electric bills. While these payment programs prevented some families from having their utility service terminated, they did little to address the under-

lying problem that household incomes simply were not sufficient to cover energy costs. The Direct Installation program addresses the affordability issue by reducing energy use and utility bills. Rather than having to fall into arrears with utilities, in order to qualify, applicants are approved by local community-based agencies using State guidelines to determine eligibility. Program participants must have household incomes that fall at or below 150% of the federal poverty level, or a \$2,088 monthly income for a family of four. This participation level makes those with annual income just above \$25,000 – for a family of four – eligible (this is more inclusive than the statistic cited previously indicating that 2.9 million New Yorkers live at or below 125% of the poverty level). Multifamily building owners can participate if at least 66% of renter households meet this guideline.

Coordination of Low-Income Energy Funds. Through a memorandum of understanding with the New York State Division of Housing and Community Renewal, the Direct Installation program ensures coordination between New York's System Benefits Charge (SBC) public benefits funds (addressing the electric use of low-income customers) and WAP funds supporting heating-related efficiency measures. Most of the program funding is used to install energy-efficient electric measures. Technical assistance funds support energy auditing activities and the

identification of appropriate energy efficiency measures.

Leveraged Building Owner

Investments. Building owners renting to low-income residents must match WAP investments. The Direct Installation program also requires owners of low-income rental properties to pay a portion of the costs for some electric measures (i.e. owners contribute up to one-third of refrigerator costs). The information and training that NYSERDA provides to building owners also encourages additional investment in energy efficiency. In neither case are the low-income consumers required to match investments.

Comprehensive Training and Information.

NYSERDA's implementation contractor, the Association for Energy Affordability, Inc. (AEA), provides extensive classroom and field training, and technical support to help the 28 participating WAP agencies integrate the most cost-effective electric use reduction measures into their WAP work scope. The program also fosters awareness in the low-income community regarding the many quality-of-life benefits that energy efficiency provides, including better lighting and more comfortable surroundings. Weatherization staff is trained to inform building superintendents and residents of the benefits of new and upgraded equipment, proper operating and maintenance practices, and

health and safety enhancements.

Extensive Benchmarking and Measurement.

Direct Installation program benefits are measured in four areas: (1) reduced energy consumption and improved housing affordability; (2) improved health and safety; (3) improved comfort; and (4) broader Statewide environmental benefits. An energy use baseline is being developed, through metering data where possible, for each electric reduction measure. If metering data is not available or is cost-prohibitive, the baseline is established using the U.S. Department of Energy (DOE) Residential Energy Consumption Survey and/or Association of Home Appliance Manufacturers (AHAM) data. Methods for data collection are depicted in Table 1.

CUSTOMER PERSPECTIVES

As a WAP subgrantee participating in the Direct Installation program, Northern Manhattan Improvement Corporation is working with building owners and low-income households in the Washington Heights/Inwood community to lower electric energy costs. Through a combination of consumer information and the installation of high-efficiency lighting and appliances, Washington Heights residents are seeing a significant reduction in their utility bills and an improvement in their overall quality of life.

Measurement Area	Methodology
Energy Consumption and Affordability	A minimum of one-year of pre-installation utility data will be collected. Building owners then provide utility bills for one year post-installation. Changes in consumption, and consequent changes in energy burden, will be calculated from this information.
Health and Safety (primarily lighting related)	Determination of the baseline and subsequent changes in the baseline will be measured through customer surveys provided by the Lighting Research Center.
Comfort	Comfort issues related to lighting will be analyzed through the above-referenced surveys and, in some instances, case studies.
Environment	Environmental benefits will be estimated by the reduction in pollution resulting from the final electricity savings of the installed Electric Reduction Measures.



Ms. Azcona with her new Magic Chef high-efficiency refrigerator.

After the owner of her building joined the Direct Installation program, Washington Heights resident Ms. Surgey Azcona became one of five tenants to receive a 15-cubic foot Magic Chef high-efficiency, no-frost refrigerator (rated at 437 kWh per annum), as well as high-efficiency, compact fluorescent bulbs. According to Ms. Azcona, the changes have been dramatic. Not only are her rooms brighter, but her new refrigerator is easier to maintain. A comparison of Mrs. Azcona's electric bills during 1998, 1999, and post-installation, indicates a significant reduction in electricity used. Mrs. Azcona's electric utility bill, which ranged from about 230 to 241 kilowatt-hours (kWh) per month during the fall and winter of 1999, has been reduced to 165 to 174 kWh per month during the fourth quarter of 1999 and the first quarter of 2000.

These lower kWh use levels (about a 28% reduction) directly coincide with the installation of the new refrigerator and compact fluorescent lights. At 15.5 cents per kWh, Ms. Azcona expects to save about \$100 per year. Similar results have been noted by single family home owners.

Ms. Rosemary Fitzgerald of Staten Island reports that her utility bill has dropped to \$35 per month from \$50. She attributes this 30% savings to the energy efficient refrigerator installed by the program. Mrs. Fitzgerald's benefits will further increase as other measures are added to her single-family home, including compact fluorescent bulbs.

The Direct Installation program has also installed high-efficiency exterior lighting and fluorescent lighting in the hallway of Ms. Azcona's building, making these areas brighter and safer. The additional

light has added significantly to Ms. Azcona's feeling of personal security when entering and leaving her apartment at night. The weatherization measures installed in Ms. Azcona's building include radiator vent covers and double-glazed, argon-filled windows.

Building owners estimate a 22-23% reduction in heating-related energy bills as a result of weatherization. Heating expenses are typically included in the resident's monthly rent in most buildings participating in the Direct Installation program.

Coordinating the Low-Income Direct Installation program with WAP results in triple leveraging of funds. The combined investment of the WAP funds, the building owner, and NYSERDA's Direct Installation program makes possible a comprehensive scope of work that upgrades the heating system, lighting, and appliances, and also improves the safety and "livability" of the entire building. This provides a major incentive for building owners to reinvest in poorer communities. The net result is more comfortable residents who are less likely to withhold rent in order to force the building owner to make necessary upgrades and improvements.

EARLY PROGRAM RESULTS

The Direct Installation program intends to install electric energy efficiency measures in approximately 9,400 units by June 2001. The average per-unit investment is expected to be about \$920. The 9,400 unit goal assumes a market penetration of 72% (e.g., 72% of the WAP jobs carried out during the life of this project incorporating electric reduction measures). It also

Compact fluorescent bulbs installed to replace incandescent lighting.



"Compact fluorescent, common-area lighting also prevents accidents and crime."

– DAN RIEBER
WEATHERIZATION DIRECTOR
NORTHERN MANHATTAN
IMPROVEMENT COALITION

"Coordinating the Direct Installation Program with Weatherization leverages additional funds for low-income energy efficiency and stimulates increased building owner reinvestment in our poorer communities."

– DAVID HEPINSTALL, EXECUTIVE DIRECTOR
ASSOCIATION FOR ENERGY AFFORDABILITY, INC., NEW YORK CITY

	Small Homes (1-4 units)	Multifamily (>4 units)	Total Units	Estimated Total Buildings
Units/year served by WAP (ConEd)	1,046	4,716	5,762	858
Units/year served by WAP (CHG&E)	400	36	436	358
Units/year served by WAP (O&R)	255	65	320	138
Total units/year served by WAP	1,701	4,817	6,518	1,354
Units/year served by Direct Install	1,225	3,468	4,693	975
Units Served/2 years - Direct Install	2,449	6,936	9,386	1,950
Direct Install Investment/unit	\$1,200	\$825	\$923	–
Total Direct Install Investment (2 years)	\$2,939,328	\$5,722,596	\$8,661,924	–

assumes that the investment level in small homes is higher on a per-unit basis than in multifamily buildings. The projected number of units to be served in designated utility service territories is provided in Table 2.

The Low-Income Direct Installation program has served more than 1,200 units during the first nine months of field implementation. Typically, households will see about a 25% reduction in their electric energy costs. Ms. Azcona's experience indicates that clients can save up to 600 kWh, or \$100 per year. According to AEA staff, this is a relatively conservative estimate and average energy savings per unit may be closer to 1200 kWh per year. Of course, AEA also notes that actual savings will depend on the penetration rates for equipment available under the program, including refrigerators.

Extrapolating from Ms. Azcona's experience on a large scale, the Direct Installation program could potentially save low-income households as much as \$940,000 per year and reduce electric use by 5.6 million kWh per year by June 2001. Additional savings will result from the electric reduction measures installed in common areas of the buildings participating.

Based on the projected kWh savings, the Low-Income Direct Installation program could effectuate the environmental emission reductions estimated in Table 3. These affordability and environmental

improvements are in addition to the health and safety benefits derived through measures provided in common areas of their buildings and the heating-related measures installed under the Weatherization Assistance Program. To date, the program has made progress in the following areas:

Training WAP agency representatives:

Regional classroom and field training sessions (six days) were held during the first two weeks of September 1999. Follow-up technical assistance sessions have been held periodically since then.

Training of building owners and low-income residents:

As of June 30, 2000, about 50 building owners and their low-income residents have received information on reducing electric energy use.

Installation of electric reduction measures:

As of June 30, 2000, 1,086 refrigerators were installed in low-income households. By that same date, nearly 5,700 in-unit compact fluorescent bulbs were installed in both small homes and multifamily units, and almost 2,200 hard-wired (in-unit), common area, and outdoor lighting fixtures were installed in multifamily buildings. The Direct-Install Program awarded about \$720,000 for these measures, with building owners and WAP contributing an additional \$400,000 toward these measures. Installations are expected to increase significantly over the next

	Estimated Emission Reduction (tons/year)
Nitrogen Oxides	4.2
Sulfur Dioxide	8.5
Carbon Dioxide	2,470.0

six months as the program approved nearly 5,500 units for participation.

Data Collection: Utility billing data are being collected to provide a baseline for measuring energy efficiency impacts from the Direct Installation Program.

PROGRAM PERFORMANCE: INITIAL FEEDBACK

Below are Direct Installation program performance observations as they relate to the **New York Energy \$martSM** program goals.

Goal 1: Address the energy affordability issues of low-income households by managing and improving energy use.

These tenants pay their own electric bills; therefore, they see the cost reductions resulting from installing higher-efficiency lighting systems and appliances. AEA, and its partner community organizations, help inform building owners and residents about electric savings that can be achieved through the installation of electric reduction measures. This awareness may translate into additional, long-term energy-efficiency behaviors by tenants. Unlike many energy efficiency programs that have required extensive advertising and outreach, interest in the Low-Income Direct Installation program is "growing by word of mouth." According to AEA staff, the current demand for the program is greater than the capacity to respond.

Qualification for the Direct Installation program is based on income, not arrearage status, whereas most utility-run programs require that a customer be in arrears before becoming eligible for efficiency measures and related services. As a result, there are many low-income households not eligible to be served by the **New York Energy \$martSM** program that could benefit from electric reduction measures and services. The eligibility of low-income households to be served by public benefit pro-

grams should be considered in future program planning.

Goal 2: Foster the energy efficiency industry and provide information encouraging customers to regard energy efficiency as a value-added service, measured in terms of energy savings, increased affordability, improved environmental quality, and other non-energy benefits.

Not only do the electric reduction measures save money for tenants, but by being integrated with WAP, the program addresses safety problems associated with using electric space heaters in apartments where heating is inadequate. Also, under WAP, coal-fired boilers are being replaced by oil-fired boilers that add efficiency and comfort, while reducing air pollution.

The program is producing a broad range of non-energy benefits, including improving the quality of life for elderly residents. Adding efficient lighting to hallways and stairwells increases safety for the elderly, who are often seriously injured in falls.

Early indications are that coordinating the Direct Install program with the Federal weatherization program might become an important stimulus for leveraging increased building owner reinvestment in communities. Additionally, the program helps owners capitalize the cost of building upgrades through financial incentives. The integration of electric measures into WAP is an efficient use of an existing program.

WAP managers report that the Direct Installation program has allowed the installation of a much broader range of measures than the conventional program. Also, it allows managers to perform more weatherization activities since high-efficiency measures previously drawn from weatherization budgets are now independently funded.

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

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