

MAKING IT HAPPEN: ACHIEVING ENERGY EFFICIENCY IN MULTI-FAMILY BUILDINGS HOUSING LOW-INCOME TENANTS

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ABSTRACT

Saving energy in multi-family buildings is a comparatively easy task to accomplish in theory: engineering science has shown us how to reduce heatloss and air infiltration, how to balance systems and improve heating plant efficiency, and how to capture warmth from the air, the earth and the sea. But getting this knowledge into multi-family buildings and making them energy efficient in fact is very difficult, especially if those buildings house low-income and elderly tenants, the people for whom saving energy is most urgent.

Energy practitioners have found that multi-family building owners are not buying energy efficiency because it is not being marketed intelligently; affordable financing is very difficult to obtain, and energy education tailored to the needs of owners, occupants and maintenance crews is practically unknown. This paper discusses how four non-profit energy companies, located in major cities, overcame these obstacles. It explains how they market energy conservation improvements, how they finance them, and how they involve tenants in energy education; i.e., how they make energy efficiency happen in multi-family buildings.

How do you achieve energy efficiency in multi-family buildings housing low-income and elderly tenants?

THE GORDIAN KNOT

For more than a decade, this deceptively simple question has perplexed and frustrated energy technicians, researchers, policymakers, government officials, utility executives, and community activists in major municipalities all over the country. Each has approached the problem of energy conservation in multi-family buildings from the perspective of his or her particular profession, only to discover that residential rental properties are energy efficiency's Gordian knot; the technologies and strategies that have been used to successfully convert single-family, commercial, industrial, and public buildings into energy efficient structures have not been readily transferable to multi-family buildings. Consequently, with few exceptions, the knot has remained a complex tangle of variables and anomalies that defy unraveling, and apartment buildings, particularly those housing low-income and elderly tenants--the people hardest hit by the energy crisis--remain, as a class, the most wasteful energy-consuming structures in the United States. A quick survey

of this problem from the perspective of the concerned professionals reveals some of its complexities.

Beginning with the physical structure itself, it quickly became obvious to energy technicians working in the field that, on a national level at least, there is no "typical" multi-family building. And even within large metropolitan areas, while there may be dominant building types (the triplex in Boston, for example, or the row-house in Philadelphia, or the three-story walk-up in Chicago), the variety of structural configurations and types of heating, ventilation, and air conditioning systems seem almost endless. Consequently, although many attempts have been made, energy technicians have not been able to devise a single generalized, prescriptive approach to the multi-family energy audit, nor have they found a list of retrofit technologies applicable to most multi-family buildings across the country.

Researchers at Lawrence Berkeley Laboratory and the Princeton Center for Environmental and Energy Studies have found the problem equally perplexing. They have studied energy efficiency in multi-family buildings for many years, and, like energy technicians, they have yet to devise a generic energy audit that is universally applicable, nor have they been able to determine what percent of a building's historic energy consumption will be saved through the installation of specific conservation measures. In fact, in a well-known study by the Princeton Center at Twin Rivers, it was found that although identical energy conservation measures were installed in identical multi-family buildings, each saved a significantly different percentage of energy.

This is not to say that research has been inconclusive. Both institutions have demonstrated that energy efficiency is a worthwhile investment, and they have been able to categorize the many energy investments on the market according to relative probable effectiveness, warning investors against worthless devices, of which there are many.

Policymakers have been similarly stymied in their efforts to create incentives that would induce most landlords to invest in energy conservation. Political considerations prevent legislators from giving building owners grants or energy conservation tax incentives. For, while taxpayers do not generally object to taking deductions for insulating their own home or to using tax revenues to install conservation measures free of charge in single-family residences owned by low-income people, they undoubtedly would object to widespread public investment in commercial, income-producing properties.

The exception to this generalization is the national Solar Energy and Energy Conservation Bank.

It permits its funds to be used to reduce the principal on commercial energy conservation loans to low-income multi-family buildings, but, thus far, actual investments have been miniscule in comparison to the need. This is due partially to the fact that the program is woefully underfunded, and it is often encumbered by federal, state and local regulations; but even under the best of circumstances, it has not attracted many users. Frustrated government officials have found that the reasons for this failure are many: multi-family building owners have demonstrated relatively little interest in government-supported programs; the number of skilled people who are willing and able to work with these buildings, and with their owners and tenants is extremely limited, and the buildings are often in very poor repair, requiring much more than conservation improvements to reduce energy consumption and to make them habitable. Even when owners are interested, they often have difficulty borrowing money for any improvement, and the tenants frequently have habits or lifestyles that are not conducive to saving energy. Further, private, profit-making energy management firms have shown little interest in working with these buildings, because of the risks associated with poverty neighborhoods, and because they do not promise significant profits.

Gas and electric utility executives in almost every region of the country have also grappled with the problems and complexities associated with delivering energy conservation improvements to low-income multi-family buildings, and they, too, have been perplexed and frustrated. Many major utilities, either as an alternative to expensive power plants, or in response to escalating gas prices, or in an effort to reduce "uncollectables," have offered residential building owners energy conservation loans at reduced interest rates, some as low as zero percent. The Tennessee Valley Authority, for example, has loaned approximately \$300 million at zero interest to thousands of residential building owners throughout its multi-state service area. Yet, in spite of intensive TVA staff assistance and special incentives designed specifically to reach low-income multi-family buildings, fewer than 10 percent of the eligible units have been weatherized.

Community activists, i.e., certain mayors, neighborhood group leaders and organizers, anti-poverty program officials, and similar non-profit organization employees committed to improving living conditions in inner cities are equally frustrated and perplexed by these problems, if not more so. They work in poverty communities every day; they see already inadequately funded government programs cut back each year; they see apartment buildings abandoned because owners can't keep up with mortgage payments, repairs and fuel costs, and they see tenants whose gas or electricity has been shut off because of the inability to pay monthly utility bills that often exceed their total income. Yet those sources of traditional national leadership in this area--the federal government, foundations, the insurance and real estate industries--have not stepped forward with solutions; they have, in effect,

left each community to its own devices.

CUTTING THE GORDIAN KNOT

In the absence of national direction and guidance, local leaders in key cities around the country have designed and initiated a variety of programs directed toward turning multi-family buildings housing low-income and elderly tenants into energy efficient structures. One of the most effective such effort has been the non-profit energy company, a relatively new institution in the energy management field.

At least half a dozen such companies were started in the early 1980s. Each attempts to cut the Gordian knot of energy inefficiency in multi-family buildings through a comprehensive approach, pooling the resources, knowledge, and support of a wide array of individuals and institutions, and offering building owners attractive financing, expertise in energy technology, and energy education.

This paper discusses four of these programs--Citizens Conservation Corporation in Boston, Community Energy Development Corporation in Philadelphia, the Energy Resource Center in St. Paul, and the Center for Neighborhood Technology in Chicago. Using these non-profits as subjects, the paper focuses on three non-technical areas: marketing, financing, and energy education. These are areas often overlooked when energy conservation is discussed in engineering circles, but they are, nevertheless, areas essential to the achievement of energy efficiency in multi-family buildings.

The paper's purpose is to share with the reader the lessons practitioners have learned through hard-won experience, to encourage others to undertake or support similar initiatives, and to contribute to the general understanding of local multi-family energy conservation programs currently operating in four major cities. The information contained in the paper has been gathered through firsthand experience (the writer was vice president and general manager of Citizens Conservation Corporation from its inception in 1981 until June of 1984), and through the generous cooperation of the directors of the other programs.

MARKETING

Marketing multi-family energy efficiency entails selling a program not only to building owners, but to sources of start-up capital and loan pools as well. Each of the non-profits discussed in this paper tailored their approach to marketing after first determining both the needs of the communities they serve and what would appeal to potential funders.

The energy services organizations in Chicago, Boston, St. Paul, and Philadelphia, all began as pilot projects whose initial markets were defined by funding sources and demonstration concepts. The Center for Neighborhood Technology in Chicago initially provided energy services for non-profit buildings, such as churches and YMCAs, and then, recognizing the need, sought and received funding from the Amoco Foundation and a consortium of local lenders, enabling it to offer reduced interest

loans and energy conservation expertise to small apartment building owners. Given the vast market potential in Chicago, the effort is establishing eight satellite service centers in key low-income neighborhoods. Like the Community Energy Development Corporation in Philadelphia, CNT sees job development as an equally important community purpose. Their objectives are to save energy, conserve housing stock, and create jobs; purposes that attract financial support from government, utilities, and foundations. Both CNT and CEDC have created new job opportunities for neighborhood residents as energy technicians, installers, and support staff.

Citizens Conservation Corporation in Boston and Energy Resources Center in St. Paul, on the other hand, have developed programs emphasizing tenant involvement and innovative energy conservation technology. CCC, whose start-up funding came from its parent corporation, Citizens Energy Corporation, and from Chevron Oil Overcharge Funds granted by the Massachusetts Energy Office, developed and tested a rebate concept that rewards the building owner and occupants for practicing energy conservation. ERC has experimented with this concept as well. Its funding comes from the local utility and city government.

SELLING ENERGY EFFICIENCY

One of the first discoveries made by practitioners from each of the programs under discussion was that multi-family building owners were not interested in buying energy efficiency. In fact, the phrase itself is enough to turn them away. They, or their colleagues, have had too many sour experiences with audits that project gigantic energy reductions, but which, upon close examination, turn out to be little more than computer number games; siding and storm window salesmen who have promised them huge fuel savings, only to discover aluminum does not resist, but rather, conducts heat; and energy management systems that have managed to do little more than turn reasonable occupants into irate tenants.

What multi-family building owners are in the market to buy, and what successful non-profits have learned to package and to sell, are:

- * Attractive improvement financing
- * Improved cash flow
- * Increased property values
- * Enhanced tenant comfort
- * Reduced tenant turnover
- * Reliable cost-effective service

They have also learned some very basic, as well as some rather sophisticated selling techniques. They have learned that owners will indicate which of the program's selling points are most important to them. The marketing representative, alert to the owner's interests, simply emphasizes those aspects of the program package. Selling owners what they want to buy, these novices have found, is a fundamental law of economic survival.

Advertising. Practitioners from non-profit energy companies have also discovered that, as with most businesses, the best advertisement is a satisfied customer. Experience has demonstrated

that one of the most successful approaches to marketing energy conservation in multi-family buildings has been to utilize what sociologists refer to as the conversion/dispersion approach. Put simply, this marketing method entails locating a building owner who not only has a building that qualifies for the program, but who is also well-known in the community as a reputable individual and who is highly respected by his peers. The non-profit focuses its efforts on selling the program to this particular owner, and then makes certain that all services are delivered with the utmost efficiency and consideration for landlord and tenants. The aim is to turn the client into a "convert," not just a customer. The convert is then inclined to sell his or her peers on the company. This begins a "word-of-mouth" campaign which is by far the most effective and certainly the least expensive advertising media available. CCC has used this approach with considerable success in communities where landlord associations are active, and in buildings financed by the Massachusetts Housing Finance Agency.

A second, inexpensive advertising technique is the news conference or "media event." Most programs hold a press conference when their first building is completed, or when they receive additional support from a funder. They find that these events are ideal opportunities to thank government, foundation, utility, and bank officials who support the program, and to legitimize the company in the public mind. Handouts describing the program and the measures installed in the building, listing the names and affiliations of invited guests, and summarizing the points the company wishes to make, are made available at the site and mailed to those media who fail to attend.

Mass mailing has been used, somewhat successfully, by CEDC. This agency has found that a series of mailings are necessary to generate prospect response. Beginning companies, however, are usually constrained by the size of their loan fund pool from marketing very extensively. Individuals and organizations that benefit from the program--installers, auditors, contractors, neighborhood and city groups--also contribute effectively to marketing efforts. Selling, an activity usually alien to non-profit organization employees, is a skill these groups have mastered.

FINANCING

One of the major obstacles impeding the installation of energy conservation improvements in multi-family buildings, especially in lower-income communities, is the inaccessibility and unaffordability of financing. No matter where building owners turn, impediments to energy conservation loans loom large before them. Nationally, the problem of inner city disinvestment continues to plague all property owners; interest rates remain prohibitive, and many banks avoid making small loans to multi-family building owners because of high transaction costs, concerns over security, marginal cash flow projections, and general fears of default.

In some poverty communities, building owners are equally reluctant to deal with bankers. While getting its program started in Boston's Roxbury

section, for example, Citizens Conservation Corporation found itself working with owner-occupants who had never borrowed money from a traditional lending institution and who have never established a credit history. They commonly acquire property through "contracts for deeds" or "contract purchases"; i.e., financing provided by the seller; or they had inherited the building. Such owners do not understand or are suspicious of traditional mortgage financing--the variable rates, points, and closing costs--and see bankers as outsiders concerned exclusively with risk-free investments. Consequently, CCC spent a great deal of its staff time leading these owners by the hand through the loan application process.

The Roxbury experience may be a problem that is unique to the most severely depressed communities. However, even those building owners who have historically borrowed money from traditional lending institutions, and who have established sound credit histories, find interest rates and loan terms prohibitive when it comes to obtaining funds for energy efficiency purposes. Interest rates in the high teens quickly wipe out the financial gains an owner can expect to enjoy after conservation improvements are installed, and thus turn an attractive package into a questionable investment. Further, stringent security requirements, such as first mortgages or 50 percent equity, will squelch the most promising investment.

The programs examined in this paper have succeeded in at least partially bridging this gulf in the communities they serve by forming loan pools featuring reduced interest rates, liberal underwriting criteria, and reasonable security requirements, and by taking advantage of state and federal government loans guarantee programs.

LOAN POOL SOURCES

St. Paul's Energy Resource Center, and the Community Energy Development Corporation in Philadelphia have tapped foundation grants to start revolving loan funds. ERC received a grant from the Minneapolis-St. Paul Housing Fund; CEDC received funds from Philadelphia-based foundations as well as from the Local Initiatives Support Corporation established by the Ford Foundation. ERC's loan pool also includes funds contributed by two local utilities, Northern States Power and Northern States Gas Company, and CEDC provides 8 percent loans from a pool provided by the Philadelphia Gas Works. Both programs, and the Chicago-based Center for Neighborhood Technology, use Solar Energy and Energy Conservation Bank funds to further reduce interest and principal on energy conservation improvement loans.

CNT, in cooperation with the Chicago Community Investment Corporation and a consortium of local community groups, has amassed a \$15 million loan pool--The Chicago Energy Savers Fund--consisting of \$5 million in Community Development Block Grant funds and \$10 million from People's Light and Coke Company, a gas utility. The Fund has committed 80 percent of this pool to multi-family loans. CIC uses standard underwriting procedures to secure the investments, while the

ERC and CEDC programs use foundation and utility funds, and federal loan guarantees to secure investments.

Citizens Conservation Corporation has located five separate sources of funds to establish a growing loan pool now in excess of \$4 million, which is loaned to building owners at around 5 percent. The sources are a start-up \$50,000 grant from Citizens Energy Corporation; \$312,000 in Chevron Oil Overcharge funds granted CCC by the Massachusetts Energy Office; \$200,000 from the Massachusetts Office of Communities and Development; \$680,000 in Louisiana First Use Tax refund revenues granted by Bay State Gas Company, and a \$2.5 million loan pool available to apartment buildings financed by the Massachusetts Housing Finance Agency.

The CEC, Oil Overcharge, and Bay State Gas Company funds are administered by CCC acting as a bank. CCC developed this capacity after discovering that working through a large, local lending institution was enormously time-consuming and frustrating. CCC has also developed a variety of means to secure its investments. Loans under \$10,000 are secured by the building owner's signature; those over \$10,000 either by a second mortgage or, in those cases where second mortgages are unobtainable, a chattel mortgage is required. A chattel mortgage amounts to a first position on all movable fixtures and appurtenances in the building.

In the MHFA-financed buildings, the first mortgage is extended and the loan is made by MHFA at 9 percent, which in turn is subsidized down to 5 percent with oil overcharge funds from the state energy office. Most buildings financed through the CCC/MHFA program are large, containing more than 100 units, and receive energy conservation improvements costing up to a total of \$150,000 per apartment complex.

Like marketing, developing or tapping into existing loan pools to finance energy conservation improvements in multi-family buildings is a task that requires a knowledge of locally available resources and an ability to negotiate with a variety of resource holders. As the examples cited above illustrate, loan pools have been established that are unique to each community. In some cases new loan pools have been created where none existed; in other instances, loan funds or subsidies (viz., the Solar Energy and Energy Conservation Bank) were available, and the program developer was able to tap into these resources on behalf of its particular clientele.

ENERGY EDUCATION

Human understanding and behavior are the most important determinants in energy use. This truism is universally acknowledged. Yet the total investment in effective energy education and behavior modification research and incentives has been miniscule when compared to public and private support for physical energy conservation improvements in residential buildings, both multi- and single-family.

Utility companies, through the Residential Energy Conservation Service, have invested millions of rate-payer dollars in energy "audits" intended to guide homeowners' private investment in insul-

ation, storm windows, and caulking, while the federal government has committed billions of taxpayer dollars to grant programs that help pay for physical improvements in homes occupied by low-income and elderly citizens. Such investments have been further encouraged by tax incentives to homeowners and grants for research institutions to develop and test new energy-saving devices.

But, in spite of vast investments, incentives, and research, residential energy conservation has fallen far short of projections, both on a national level and in specific buildings. There are, of course, multiple explanations for this shortfall: Residential Conservation Service audits, and other ballpark projections, notoriously overestimate post-retrofit consumption; energy prices have stabilized, lessening the financial imperative to save energy, and some energy-saving devices, it has been discovered, simply don't work.

The non-profit energy companies discussed in this paper agree, however, that the most important single explanation is the lack of human understanding and informed behavior. Old habits are hard to break, especially when you don't know what they are. Large investments in storm windows are rendered valueless when building occupants leave them open in the dead of winter; expensive, high-efficiency boilers become a liability when building owners or their superintendents don't know how to operate or maintain them; and attic insulation or flue dampers are a waste of money if contractors don't know how to install them properly.

Multi-family energy programs encounter such energy-wasteful habits and knowledge gaps every day. An expensive, high-efficiency boiler installed in an apartment complex by the Energy Resource Center in St. Paul was nearly destroyed, and the building set afire, because the owner either neglected or did not know how to put water in the system. A flue damper improperly installed in an apartment building in Boston caused a significant increase in fuel consumption, rather than an energy savings. And every building owner has experienced the frustration of seeing storm windows wide open in 20° below zero weather.

Reaction to this frustration, and the need for energy education, has been clearly expressed by John Rasmussen, an Energy Engineer, who worked with more than 30 buildings and hundreds of tenants through Citizens Conservation Corporation's programs. Summing up his experience after three years of intensive activity, John wrote in a long, reflective letter:

"I feel that the most important element of a good conservation program is education. You just can't get away from the need to modify people's behavior. Machines might be predictable and therefore, to some twisted people, more fun to deal with, but if we're ever to effect real, enduring conservation, people's habits will have to be changed."

Mr. Rasmussen makes a convincing argument; one which non-profit energy companies accept as valid. But developing the capacity to train

owners, residents, maintenance crews, and contractors in energy education requires skills and resources not easily acquired. In spite of limited resources, Citizens Conservation Corporation and the Center for Neighborhood Technology have begun to develop programs in energy management training for building owners and custodians, which are tailored to individual buildings.

All the programs considered in this paper emphasize the importance of tenant cooperation in the energy saving effort, and CCC has experimented with a building occupants' energy education program for four years. From this experience, CCC has concluded that a successful energy education program for tenants has five elements:

Tenant/Landlord Cooperation. If the building owner and occupants are not on civil terms (as sometimes is the case), a campaign which asks tenants to cooperate with the landlord is doomed from the start. In fact, fuel savings which might accrue a financial benefit to the owner will be intentionally avoided. One of CCC's most disappointing experiences was in a building where the owner attempted to raise rents sharply, but was not permitted to do so by the Rent Control Board. No amount of education or persuasion could induce these tenants to reduce their energy consumption.

To gain tenant cooperation, non-profit programs have found it beneficial to establish a dialogue with them from the first day of a project. Both CCC and the Energy Resource Center interview tenants during the audit or building energy study, asking them about their comfort, concerns, and for suggestions. This approach not only helps to encourage owner/occupant cooperation, it also helps the engineers identify each building's energy usage patterns.

Feedback. Tenants, like homeowners, need to know when they are successfully saving energy, and when they are not. The monthly utility bill is probably the most effective energy conservation device known. Unfortunately, in centrally metered buildings where the fuel costs are included in the rent, tenants often have no idea how much energy they use, or what conservation behavior is effective and what is not. Programs that do not include feedback, preferably monthly, are usually found to be cost-ineffective. In a 132-unit all-electric highrise in which Citizens Conservation Corporation installed a check-metering system that provided monthly printouts showing energy use in each apartment, energy savings paid for the \$30,000 installation in two years. Once the tenants knew what to do and how to do it, behavioral patterns changed from wasteful to conserving.

Refresher Courses and Motivational Campaigns. It takes time and encouragement to change habits. Additionally, tenant turnover requires non-profits return to buildings, at least once a year, to give refresher courses. During refresher courses, tenants are praised when they have saved energy and encouraged to make their own suggestions regarding energy conserving practices. CCC has contemplated awarding certificates, buttons, gold stars, whatever works. People, including tenants,

are motivated by public recognition.

Cash Incentives. People are also motivated by rewards. CCC has found that cash incentives are helpful in motivating energy conservation. However, without an ability to tie the rebate to specific savings in each apartment, they are sometimes viewed by building owners, and occasionally by tenants, as unearned windfalls. This is especially true in smaller buildings where the owner has observed open windows in the winter. Consequently, CCC altered its program for small buildings: instead of dividing the extra energy savings among all tenants, as was the original policy, the "rebate" was reinvested in a comfort improvement selected by the tenants as a group. This practice satisfies the landlord, whose building is improved, and enhances resident living conditions.

Capable Educators. Not the least of the essential elements of a tenant education program is the teachers. This is particularly true in buildings housing low-income, elderly, and minority renters. Some of the qualities of a capable educator are: (1) an understanding and appreciation of the students' culture, concerns, and needs. Too often, energy "experts" convey an overbearing sense of superiority which may be interpreted by tenants as a lack of respect for their race or circumstances. Such a posture inevitably results in hostility and a refusal to learn. (2) An ability to explain energy use and how it affects rents or utility bills in language laymen understand. Practitioners have found that esoteric terms such as U or R values, balance points, and heat loss recovery are gobbledegook to those not schooled in energy conservation (and may be to those who are). Needless to say, educators should be fluent in the tenants' native language; this not only enhances communication, it reinforces the sense of respect for the student, which is vital to any educational program. (3) Enthusiasm. Simply handing out the brochures or showing movies, videos, and slides is a poor excuse for education. Students must be engaged. This is achieved when they sense the educator's personal commitment to the subject. If the teacher is infected with concern for energy conservation, comfort, and landlord/tenant cooperation, the tenants will catch it.

CONCLUSION

There is no single, simple solution to the problem of energy inefficiency in multi-family buildings housing low-income and elderly tenants. However, non-profit energy companies in half a dozen major cities have devised comprehensive delivery systems capable of surmounting many of the obstacles that impeded progress in this field. Powered by more than mere profit motive, these companies are able to address the human as well as the technical issues involved in saving energy. This paper has discussed non-profit energy companies in Boston, Philadelphia, Chicago, and St. Paul, focusing on their successful multi-family marketing, financing and energy education strategies, and sharing with the reader the lessons they have learned over the past five years.

Needless to say, the learning goes on. Citizens Conservation Corporation, Community Energy Development Corporation, the Center for Neighborhood Technology, and the Energy Resource Center continue to test new ideas and seek new ways to turn wasteful multi-family buildings into energy efficient, comfortable homes for their low-income and elderly residents. In addition to the work they have done in marketing, financing and energy education, they have made important breakthroughs in the applied sciences of energy auditing, retrofit technology, and construction management. Further, they are developing internal management and accounting systems that improve efficiency and enhance job satisfaction.

In February these non-profit energy companies were joined at a three-day conference in Philadelphia by more than sixty energy conservation practitioners from eleven states. At the conclusion of the intensive workshops, they agreed to form a practitioners association dedicated to the improvement of their own skills and knowledge through information sharing and staff exchanges, and to the establishment of additional multi-family energy conservation programs in communities where none now exist. To this end, an informal association called Energy Practitioners Exchange (EPE) has been formed. A Handbook for Practitioners in Multi-Family Energy Conservation is being written, and EPE members are conducting conferences in major metropolitan areas for utilities and government. Anyone interested in EPE and its activities should contact the writer for more information.