NEW INITIATIVES IN FINANCING MULTIFAMILY ENERGY CONSERVATION: RECENT DEVELOPMENTS IN CHICAGO

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ABSTRACT

This paper describes a new program aimed at multifamily energy conservation in Chicago. The $15 million Chicago Energy Savers Fund is a unique public-private partnership aimed at preserving affordable housing in Chicago. Financed jointly by the City of Chicago and the local natural gas utility, People's Gas Light and Coke, the program provides low-interest financing (6%-8%) and a comprehensive package of technical services for energy conservation improvements in single-family homes and apartment buildings. Targeted primarily (but not exclusively) at the city's shrinking rental housing stock, the program is administered by an unusual consortium of local, non-profit community-based agencies in partnership with city government and the local utility.

Approximately 175 buildings have been audited (3,758 units), and some $2 million committed in ultifamily loans, making the program one of the largest of its kind in the country.

The paper provides an overview of (1) regulatory issues at the Commerce Commission (2) technical issues, including the development of a a multifamily energy audit for the program, and training of community-based energy auditors; (3) marketing and implementation issues; (4) loan underwriting and financing issues; and (5) results after 18 months.

Energy audits project average savings of 28% per building, at an average retrofit cost of $1,242/unit. Measured savings range from 26% to 42%, exceeding projected savings by an average of 10%.

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INTRODUCTION

A number of multifamily energy conservation programs have been initiated in Chicago over the past two years. A key element of these programs has been the provision of financing for energy conservation improvements. The financing provided has been of the traditional loan, or direct financing type, as distinct from the shared savings approaches being tried elsewhere in the country. The major intiative has been the Chicago Energy Savers Fund. In addition, a secondary Energy Efficient Rehabilitation Program aimed at buildings undergoing substantial or moderate rehab and utilizing "Solar Bank" subsidies was implemented.

THE CHICAGO ENERGY SAVERS FUND

With its large multifamily housing stock, the Chicago Energy Savers Fund ("the Fund") was established in August, 1984, to provide below-market interest rate loans (6%-8%) and related technical assistance to Chicago's low-moderate income apartment building and single-family homeowners for energy conservation improvements. The Fund is the result of a 1983 Illinois Commerce Commission order requiring Illinois utilities to implement energy conservation programs, and a broad-ranging analysis undertaken by a group or business, labor, community and church leaders of the financial drain represented by the $4 billion spent each year on energy by Chicagoans -- $750 million in the residential sector alone.

The Fund's overall goals are (1) to preserve affordable rental housing in Chicago by providing a lower cost alternative to traditional, more expensive rehab programs; (2) to create neighborhood-based jobs through the stimulation of a local energy conservation industry; (3) to reduce the continuing impact which escalating utility costs have had on low-moderate income families, the great majority of whom are renters; and (4) to expand the capacity of neighborhood groups to deliver energy services in their own communities. Specific objectives are to assist 7,000 multifamily rental units, and 2,500 single-family homes over a three-year period.

The budget is $15 million over a three-year period, for both single- and multifamil loans. The City has committed $5 million in Community Development Block Grant (CDBG) funds; and the balance of $10 million is provided by People's Gas Light and Coke, financed through the utility's rate base with a surcharge on all customers' utility bills.

Unique Features of the Program

The Energy Savers Fund was created in the context of a number of public-private initiatives to deal with the twin problems of housing and energy. It represents a significant departure from traditional previous energy assistance and weatherization programs with their historical focus on single-family homes (low-income weatherization; "RCS" audits; conservation tax credits etc).

By focussing on rental housing -- 62% of the city's housing stock -- it tackles the problem of the "split incentive" between tenants and landlords to reduce utility costs.

The Fund has several unique features. First, in contrast to traditional, more expensive housing rehab programs, the Fund is aimed at stabilizing large numbers of housing units at relatively low cost -- an average of $1,500/unit. This will be increasingly important as federal housing subsidies such as Section 8 come to an end. Second, the Fund combines public and private sector financing with a non-profit, community-based delivery system. This unlikely group of players has resulted in substantially enhanced program effectiveness. And third, the Fund provides an unusual package of comprehensive technical services in conjunction with low-interest financing to ensure borrowers realize projected cost savings.

The Fund has had to overcome a number of technical, organizational and political difficulties. First, a variety of traditionally competing institutional interests needed to be meshed: (1) the City of Chicago, with its primary interest in job creation, neighborhood development and housing rehabilitation; (2) The utility, People's Gas, Light and Coke, with its primary focus on retaining market share against its electric utility competitor; and (3) the regulatory agency under whose aegis the program operates, the Illinois Commerce Commission, which saw the program primarily as a "test" of energy-efficient technologies and their cost-effectiveness.

Second, the program had to overcome the challenges and objections of consumer and industry intervenors during the regulatory proceedings at the Commerce Commission, before the Commission could approve ratebasing the utility's financial contribution.

Third, the technical capacity of the non-profit organizations making up the consortium which administers the program on a day-to-day basis had to be substantially upgraded -- through, for example, the development of a computerized multifamily energy audit, and intensive training of neighborhood-based energy technicians in implementing the audit and related services, as well as the training of local program managers in originating and processing loans.

And fourth, the primary audience for the program, apartment building owners, was initially slow to respond, and needed to be convinced of its benefits. This was achieved through an unusual blend of traditional media advertising and neighborhood-based marketing/ promotion efforts.

CHICAGO'S RENTAL HOUSING

According to 1980 Census data, there are 1.174 million housing units in the city. Of these, 24 percent are single-family homes, while 42 percent or 489,819 are in multifamily buildings with five or more units. Over two thirds of these multifamily units, or approximately 330,000, are in smaller, 5-50 unit buildings.

TABLE I: Number of Housing Units in Chicago

	Units	Percent
Single-family	290,356	24%
2-4 units	394,461	34%
5-50 units	332,367	28%
51 or more	155,558	14%

61 percent, or twice the national average, of all households in Chicago are renters, paying median rents of $190/month. Virtually all of these buildings are heated with natural gas: 94% are gas- heated; 2% with electricity; and 2% with fuel oil. Unlike many other cities, multifamily housing in Chicago is overwhelmingly master-metered or centrally-heated (71 percent).

Like many other northeastern and miwestern cities, Chicago has experienced a significant loss of low-income housing. Housing abandonment resulted in the loss of some 71,000 housing units between 1970 and 1981.

The Impact of Rising Energy Costs

Rapidly rising energy costs have had a particularly damaging affect on multifamily housing. While relatively low compared to other cities, current natural gas costs average $0.59 /Therm, an increase of 130% since 1978, or 600% since 1971. People's Gas shows a dramatic increase in utility shutoffs and delinquent accounts during this period.

A 1978 study of seven multifamily buildings in the low-income South Shore neighborhood showed that whereas in 1968 the group of buildings studied showed a relatively healthy operating margin (before debt service) of 23%, this had declined to 1.2% by 1975 -- largely due to an increase of 142% in energy costs. (Giloth, Multifamily Housing in South Shore, 1976).

A more recent study of 18 multifamily buildings by the Housing Abandonment Task Force confirmed these trends (Basler, Tholin, Energy Costs and Housing Abandonment, 1984). Energy costs averaged 52 percent of operating costs, or $1,100 per unit. Projections indicated that, even if energy consumption were reduced by as much as 45%, all the buildings would be operating in the red by 1993.

PILOT PROGRAM

A pilot multifamily energy conservation program was described at the 1984 ACEEE summer study session (Freedberg and Schumm, Financing Multifamily Energy Conservation: Private Funding for Energy Loans). This was implemented in 18 buildings in 1983-84, and showed dramatic opportunities for energy savings, primarily through relatively low-cost improvements to their aging, inefficient, and oversized heating plants. A total investment of $562,747 in 346 units ($1,600/unit) was projected to yield an average savings of $5,315 per building, or 29 percent. The average payback was projected at 5.9 years.

The Energy Savers Fund represents an extension of the results achieved in the pilot program, but on a larger scale, sufficient to have a broad impact in the city's low-income neighborhoods.

THE FUND'S ORGANIZATIONAL STRUCTURE

The Fund's delivery system operates on two levels:

First, the City formed a new, non-profit entity made up of city and utility representatives, and a representative of the private Chicago Energy Commission to oversee the program.

Second, on a day-to-day operational level, the program is administered by a consortium of non-profit groups, including: the Community Investment Corporation, administrator of the multifamily program; Neighborhood Housing Services (NHS), administrator of the single-family component; the Center for Neighborhood Technology, manager of technical services; and eight community groups who formed three-person "Community Energy Centers".

This consortium is responsible for marketing and loan origination, and delivering a comprehensive package of technical services to building owners, including energy audits, construction specifications, energy management training, and one-year performance monitoring. The cost of these services is partially financed by building owners through Fund loans.

FINANCING ISSUES

The program provides for multifamily loans to buildings with more than 5 units, as well as a smaller amount for owner-occupied, 1-4 family loans. Single-family loans are financed entirely from utility funds, whereas financing for the multifamily sector is jointly provided by the City and utility.

Figure 1. Multifamily underwriting and eligibility criteria

Loan to value	90%
Debt coverage	1.2/1.1:1
Maximum loan/unit	$3,000
Maximu loan/borrower	$98,000
Collateral/security	Loans over $10,000
Loan term	10 years
Income requirements	None
Interest rate	7 percent
Application fee	$125
Points	None
Closing costs	$110-$367
Technical service fees	5% of retrofit costs

With the exception of somewhat more flexible debt coverage criteria, borrowers must meet relatively standard underwriting criteria. Multifamily loan terms are 10 years and 7 percent. Underwriting criteria include a 90% loan to value requirement; and a debt coverage ratio of 1.2:1. In some cases, debt coverage can be reduced to 1.1:1.

An unusual feature of the underwriting process, however, is the inclusion of projected energy savings (maximum of 30%) in determining debt coverage requirements.

Loans of under $10,000 are unsecured, with amounts over $10,000 secured with mortgages.

No points are charged. An application fee of $125 is required. In addition, owners are charged 5% of the loan for technical service fees.There are no income requirements. A "priority" was established for buildings housing low-moderate income residents -- as determined by rent levels. There has been no problem meeting these priority levels.

Loan limits are $3,000/unit, up to a maximum loan amount of $98,000.After the program was underway, the concept of "tandem loans" was introduced -- allowing energy loans to be "piggybacked" on larger rehabilitation loans.

MARKETING ISSUES

Traditional marketing and promotional efforts (radio, television etc) failed to generate much initial interest in the multifamily sector. More successful have been non-traditional methods. The most productive marketing efforts involved media relations, utilizing Mayoral press conferences, coverage in city-wide and neighborhood newspapers, and radio/TV talk shows geared to different audiences. These outreach efforts needed to be followed up with hard "sales" at the community level, by the participating Community Energy Centers. Talks at local real estate and property managers associations; block clubs; chambers of commerce, with one-on-one follow-up client interviews were critical in reaching the target audience.

COMPUTERIZED PROJECT MANAGEMENT SYSTEM

An unusual feature of the program was the creation of a computerized management/data base system. This system established a detailed tracking and client processing system, using data base software, and for implementation at each of the Community Energy Centers on personal computers. This allows coordinated processing of clients through the large number of steps which the client must go through from the time of application until completion of the project.

The major components of the computerized management system are as follows:

1. Project scheduling. This is a scheduling module, which establishes an "optimal schedule" for each project. As audits, specifications, construction and other components of the program are completed, a comparison is automatically made with the optimal schedule. Project managers can thereby determine how far ahead or behind they are in relation to the optimal schedule.

2. Contractor log/bid management. This maintains a a central data base of all contractors participating in the program (approximately 150). A record of participation in all projects for each contractor is available. In addition, detailed outputs of bids for each contractor and each project are available.

3. Production reports. By utilizing the management system for all correspondence and tracking of project activity, each Energy Center is able to forward a floppy diskette on a monthly basis to the Center for Neighborhood Technology, which then is able to generate a system-wide report on production, client activity etc.

MULTIFAMILY AUDIT

A customized multifamily energy audit was developed for the program. This is described in a separate paper (Anne Evens, The Development of a Computerized Multifamily Energy Audit: Technical And Implementation Issues). Its key features are:

- o It is user friendly -- i.e. usable on IBM or IBM-PC compatible personal computers;
- o It "interacts" energy conservation measures automatically;
- o It utilizes a life-cycle costing methodology to develop benefit to cost ratio's (BCR's) for each ECM, and for the package as a whole.
- o It includes a larger number of mechanical system ECM's than is normally available in residential energy audits.

OTHER TECHNICAL SERVICES

In addition to an energy audit, a full package of "comprehensive" technical services is provided each client. These include:

1. Specifications. These are maintained on a word processor, allowing both the use of boilerplate and custom specifications. These specifications must be used by the client to solicit bids.

2. Bid management. Assistance is provided with soliciting and reviewing competitive bids for each project, from a list of pre-approved contractors .

3. Construction inspections. Before any funds are advanced, a Fund technician must inspect the work and authorize payment.

4. Performance monitoring. This is conducted for a period of one year after completion of construction. Utility bill printouts are automatically supplied by the utility.

RESULTS

As of March 31, 1986, 193 multifamily buildings have been accepted into the Chicago Energy Savers Fund. Of these buildings, energy audits have been conducted on 172, representing 3,758 units of audited housing. Of the 193 buildings (4,218 units) accepted into the program, the distribution of building size (in units) is contained in Table II.

Table II: Profile of Buildings in the Chicago Energy Savers Fund

	# of Units	# of Buildings
	6-9	57
	10-20	71
	21-30	24
	31-40	14
	41-50	11
	51-60	3
	61-70	6
	71-80	2
	81-90	1
	91-100	4
Total	4,218	193

To date, loans have been approved for 71 multifamily buildings, representing just under $2 million in loan commitments. Loans have been closed on 31 buildings for a total of just over $1 million.

Profile of Participating Buildings

Figure 3 provides a profile of building characteristics of a sample of 35 selected buildings participating in the Fund, for which comprehensive data is available.

Although most of the information comes from direct observation, some of the temperature measurements are the result of spot measurements of two or three interior locations and interviews with tenants and owners. The temperature data therefore is not "scientifically" derived, and may reflect a certain degree of error resulting from auditor judgement.

Figure 3: Building Characteristics (35 sample buildings)

Average # of dwelling units	-	16
Average heated area	-	13,035 Square Feet
Pre-retrofit Space Heating Index	-	1.18 Therms/Sq.Ft./Year
Average Day Time Temperature	-	72°F, (weighted average includes 3% @66°F, 9% @77°F, 9% @75°F, and 15% @76°F)
Average Temperature Spread	-	6°F, Range is 2°F - 16°F
One Pipe Steam	-	97% of buildings
Steel Boiler	-	46% of buildings
Cast Iron Boiler	-	51% of buildings
Individual Heat (Furnace)	-	3% of buildings
Atmospheric Burner	-	63% of buildings
Power Burner	-	37% of buildings
Average Steady State Efficiency	-	74%
Average Seasonal Efficiency	-	50%
Typical Controls	-	Pressuretrol, Timeclock, Return Line Aquastat
Percent of Windows with Storms	-	39%
Percent of Insulated Roofs	-	15%

Participating buildings reflect the overall small and medium-sized multifamily housing stock. Buildings are generally uninsulated, and heated with one-pipe steam heating systems controlled with relatively unsophisticated temperature controls. Boilers generally consist of older fire-tube units with Hastings burners, or newer, cast-iron sectional boilers with atmospheric burners.

Savings Projections and Audit Results

An analysis of seventy (70) audited buildings provides us with significant data on the mix of ECM's and projected fuel savings for these buildings. In addition, data on the actual retrofit costs and projected savings on the final set of measures implemented (often somewhat reduced from the audit recommendations), provides projected costs and savings for the "final" package of ECM's. These projections are based on data for thirty-two (32) buildings with an average of 16 units/building.

Table III:Cost and Savings Projections (32 buildings)

Average Space Heating Gas Bill	$ 10,475
Average Retrofit Cost/Building	$ 19,872*
Average Retrofit Cost/Unit	$ 1,242*
Average Space Heating Saved	$ 2,933
Average Space Heating Saved/Unit	$ 183
Average Space Heating Gas Savings	28%

*Estimated

(All figures are based on gas space heating savings. Although ECM's were recommended/implemented which will result in gas hot water savings and electric savings (lighting), this data has not yet been discretely analyzed as a part of the package as a whole.)

Although building owners often reduce the "final" package from the audit "recommended" package, Table IV below provides a summary of the frequency with which typical ECM's have been recommended in CESF buildings, and average projected savings and simple payback for these ECM's. Audit estimated costs are generally quite close to final costs (within 10%). Therefore, the costs listed below can be viewed as "typical".

Measured Savings Results

The most critical measure of program success is measured post-retrofit energy savings. In order to obtain this information, and provide feedback and assistance to building owners during the post-retrofit period, the program monitors the performance of buildings' energy usuage for a one year period following the close-out of construction.

Twelve (12) buildings had completed construction as of March 31, 1986. Of these, nine (9) completed construction too late in the heating season to provide an accurate measure of actual savings as of this writing. The results of performance monitoring on the remaining three have been extremely encouraging. These are contained in Table V.

In all cases, actual savings, to date, have exceeded savings projected in the audit. It is too early to tell if these results are an indication of future trends. By April of 1987 performance monitoring results should be available for as many as seventy (70) buildings. This is not to downplay the results to date, but only to insert a conservative note of caution in what appears to be extremely encouraging savings results.

Table IV:Frequency of Energy Conservation Measures (70 buildings)

Recommended Measure	Frequency of Instal-lation	Avg. Cost Per Bldg ($)	Avg. Savings Per Bldg ($)	Simple Payback (Yrs)
Roof Insulation	90%	5,591	1,046	5.5
Storm Windows	83%	9,785	1,597	6.1
Fluorescent Lights/Fixts.	78%	870	434	2.0
Top-Side Bypass Sealing	70%	1,842	288	6.4
Balance Distribution	58%	633	476	1.3
Indoor Thermostat/Sensors	56%	1,120	540	2.1
Clean & Tune Boiler	43%	519	212	2.5
Window Caulk/Weatherstrip	37%	2,519	110	22.9
Hot Water Flue Damper	32%	164	108	1.5
New DHW Heater	29%	3,324	1,235	2.7
Flue Damper	29%	1,227	274	4.5
New Boiler	27%	16,074	1,341	12.0
Outdoor Cutoff	25%	152	346	0.4
DHW Heater Insulation	17%	328	212	1.5
Storm Doors	16%	4,426	237	18.7
Replacement Windows	15%	18,409	1,241	14.8
Insulate Steam Pipes	12%	1,437	280	5.1
Turbulators	7%	878	537	1.6
Draft Control	4%	1,850	700	2.6
Steam Cycle Control	3%	2,666	1,682	1.6

Table V: Measured Energy Savings

	Projected Savings	Actual Savings	Difference Between Projected/ Actual
Building A: 13 unit three story masonry building (New Boiler, Indoor Thermostat with Remote Sensors, Balance Distribution System, DHW Flue Damper, Roof Cavity Insulation, Window Weatherstripping, Storm Windows)	30%	42%	+ 12%
Building B: 6 unit three story masonry building (Clean and Tune Boiler, Flue Damper, Indoor Thermostat with Remote Sensors, Outdoor Cutoff, Roof Cavity Insulation Balancing Distribution System)	21%	26%	+ 5%
Building C: 14 unit three story masonry building (Clean and Tune Boiler, Flue Damper, Hot Water Flue Damper, Indoor Thermostat with Remote Sensors, Balance Distribution System, Roof Cavity Insulation, Storm Windows)	20%	32%	+ 12%