

RETROFITTING A CITY

A Guide for Municipalities to Implement a Building Retrofit Program



HOME TO CANADIANS
Canada 

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A GUIDE FOR MUNICIPALITIES TO IMPLEMENT A BUILDING RETROFIT PROGRAM

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DISCLAIMER

The content, views and editorial quality of this report are the responsibility of the authors, and the Sponsors accept no responsibility for them or any consequences arising from the reader's use of the information, materials and techniques described herein.

INTRODUCTION

Municipal governments directly manage about 5% of Canada's buildings, including hockey arenas, office complexes, social housing, libraries and community centres. That represents 20 million square metres of space and over \$1 billion in annual operating costs, including \$280 million in energy and water bills.

Building energy retrofits have the potential to reduce those bills by 20% or more through improvements to infrastructure as well as operating and management practices. In most regions, this can also translate into significant reductions in greenhouse gas and acid gas emissions.

Within the boundaries of Canadian municipalities, there are many other buildings, owned by either private or public sector organizations, or by individuals. These also represent a very significant potential reduction in energy consumption and emissions. Municipalities have the opportunity to influence, assist, direct and motivate owners of those buildings to capture the savings.

Building energy retrofits should follow a process which includes the following steps:

- Audit – a study of the building and the way it uses energy which leads to a definition of appropriate measures
- Implement – the implementation of the measures including engineering, project management, subcontracting, and commissioning
- Monitor – the monitoring and tracking of energy savings to be sure they are achieved as expected, and they are sustained.

This AIM process, and the steps on which it is based, are described in detail throughout this manual.

In the preparation of this manual, the authors reviewed over 35 municipal energy retrofit programs across North America. Four of these were examined in greater detail, and case studies were prepared. This wealth of information forms the basis of this manual.

RETROFITTING A CITY

A GUIDE FOR MUNICIPALITIES TO IMPLEMENT A BUILDING RETROFIT PROGRAM

1. DETERMINING THE SCOPE AND DELIVERY METHODS OF YOUR PROGRAM

The determination of the scope of the program is a key decision point in planning and developing a Building Energy Retrofit Program. Buildings can be categorized by:

- Ownership (municipal, public sector, private sector, individual)
- Type of Use or Occupancy (institutional, commercial, industrial, residential)
- Size (small, large)

Some municipalities start with their own buildings as a manageable first step, which offers a wide variety of building types and the ability to develop processes and build a corps of staff with the required expertise. Others set a goal of reducing energy use in all buildings contained within their borders. Retrofit programs can be designed to target any group or type of buildings within municipal boundaries.

Retrofits can be managed and/or delivered in different ways, including:

- In-house resources
- Outside Energy Management Firms
- Outsourced Program Manager
- Volunteers

The method by which retrofits will be undertaken or delivered is an integral part of the program scope decision. Will only the program management and promotion be done in-house, or will complete engineering and project management be undertaken by municipal staff? Will volunteers be involved? Will project design and construction management be performed by in-house staff or outside consultants? Because of the variety of building ownership, types and sizes, it is likely that a portfolio of options within the program will be necessary to target individual sectors within the entire building stock.

An overview of the Program Scope decision is presented in Figure 1-1, with a recommendation for the types of program delivery suitable for each building category. Each detail of the program design is presented and discussed in this section.

Figure 1-1: Municipal Retrofit Programs
Recommendations for Program Type By Building Ownership/Type/Size Category

Building Ownership Category	M	I		P					S
Building Ownership	Municipally Owned/ Occupied	Other Public Sector		Private Sector					Single-Family Residential
		<div> <div></div> <div></div> </div>		<div> <div></div> <div></div> <div></div> </div>					
Building Type Sub-Category		I1	I2	P1	P2	P3			
Building Type		Institutional	MUR	Commercial	Industrial	MUR			
				<div> <div></div> <div></div> </div>			<div> <div></div> <div></div> </div>		
Building Size Sub-Category				P1a	P1b		P3a	P3b	
Building Size				Large	Small		Rental MUR	Condominium MUR	
Retrofit Program Delivery Methods									
In-House Resources	R	NR	R	NR	NR	NR	NR	R	R
Energy Management Firms	R	R	R	R	R	R	R	R	NR
Outsourced Program Manager	R	R	R	R	R	R	R	R	R
Volunteers	NR	NR	NR	NR	R	NR	NR	NR	R

R - Recommended

NR - Not Recommended

1.1 Categories of Buildings in the Retrofit Program by Ownership, Occupancy Type, and Size

The four categories of buildings (and associated sub-categories) that may be covered in Municipal Retrofit Programs are described below, along with examples from municipalities that have successfully implemented such programs.

Figure 1-1 shows in chart form the recommendations for the type of program suitable for each type of building. The chart should help you to decide the scope of the retrofit program that will best suit your municipality. The chart is colour coded to match the headers of the building categories described in the text.

1.1.1 Category M: Municipally Owned and Occupied

M

Retrofitting buildings owned and/or occupied by the municipality offers several advantages as a starting point:

- They are under the direct control of the municipality.
- They can be used as a means of becoming familiar with the technical requirements.
- They provide a testing ground for designing programs.
- They permit the development of expertise within the organization, and within the greater community.
- They can be used as a flagship for the remainder of the non-municipal building stock.



What to Do

For any project structured within the municipal organization, the downside risk is that the program will lose momentum. For this reason, we suggest the following steps:

- Monitor monthly energy use in all municipal buildings, and develop target benchmarks by building type and occupancy
- Define with staff the buildings in need of renewal and energy retrofit
- Determine outside firms having the capability to undertake the audit, feasibility, retrofit and monitoring
- Determine the role of staff, and of outside firms
- Have staff prepare RFPs for specific buildings or groups of buildings, including timelines
- Ensure adequate project management skills, and monitoring and evaluation are included.
- Monitor and evaluate energy use after completion, and evaluate the impact of the retrofits. Use the information to motivate operating staff to continuously improve their performance.

Example

Phoenix, Arizona's Energy Management Program (EMP) is an excellent example of a comprehensive retrofitting program for municipally owned buildings. The original scope of the program when it was first launched, had five key goals:

- Elimination of inefficient energy use.
- Development of cost effective alternatives.
- Enhancement of employee awareness.
- Promotion of the use of renewable energy resources.
- Provision of leadership for the community.

The EMP scope concentrated wholly on the three hundred city-managed municipal buildings including an airport, the water and waste treatment plant, office facilities, libraries, fire and police stations and public works service facilities. (Note: schools and hospitals were not serviced by the EMP).

By keeping the scope solely focused on municipal buildings, serviced exclusively by the Facilities and Energy Management department at the City of Phoenix, the EMP has been able to effectively produce energy savings results. Future expansion of the program includes a plan to provide energy efficient design assistance to architects working on municipal buildings as a proactive approach to energy management.

1.1.2 Category I: Other Public Sector (Institutional) Buildings **I**

Public sector buildings include schools, hospitals and other health care, colleges and universities, federal and provincial government, and multi-unit residential buildings. Because these buildings are purpose-built and have stable occupancy and use, they make good targets for energy retrofit programs, especially for the energy performance agreement (EPA) approach. Their owners tend to make investments for the longer term. Such buildings have been successfully retrofitted with guarantee periods of 10 years or more.

1.1.2.1 I-1: Institutional Buildings **I-1**

The owners of institutional buildings are likely to have a large portfolio of buildings to manage. It may take some persuasion to convince them to address the building in your municipality, but having a program that offers technical assistance, financing and recognition can be a powerful motivator. Such owners also have a strong sense of good corporate citizenship.

1.1.2.2 I-2: Multi-Unit Residential (MUR) Buildings **I-2**

Public sector MUR buildings are usually financially supported by one or more levels of government. The decision to undertake energy retrofits is made by a central building manager, and on a building portfolio rather than an individual basis. The occupants are shielded from energy cost increases, and are much more concerned with IAQ and comfort issues. Energy retrofit projects are usually evaluated in the same manner as building renewal projects, rather than as an investment having a definable payback. Once the

managing organization has committed to a retrofit program, there can be considerable energy reduction achieved. They also appreciate recognition for their efforts.

Example

The City of Minneapolis, Minnesota, as a participant in the Urban CO₂ Project, has a mandate to increase energy conservation and reduce CO₂ emissions and air pollutants. Among the various municipal areas identified for greenhouse gas (GHG) emissions reduction was the Minneapolis Public Housing Authority (MPHA). Beginning in 1997, the MPHA has improved energy efficiencies at 32 of its buildings, with the housing authority retaining its energy related savings. This initiative saves an estimated 5,144 tons of CO₂ annually.

1.1.3 Category P: Private Sector Buildings **P**

1.1.3.1 P-1: Commercial Buildings **P1**

Private sector commercial buildings include offices, shopping malls, retail stores, hotels & motels, theatres, and arenas, to name a few. This sector is diverse in both type and size. Nationally, it is made up of Offices (41%), Retail (33%), Warehouse (15%), Accommodation (8%), and Other (3%). Such buildings have a less predictable occupancy type and level of use. For this and other reasons, such as a desire to not encumber the title of the building to allow flexibility of ownership, the owners tend to operate with a much shorter investment time frame. For building improvements and upgrades, this is usually about 3 years for payback or write-off. In the case of rental/leased buildings, the tenants usually pay the energy and water costs, either directly or through a proportional calculation undertaken by the landlord, and the owner sees little or no benefit in energy retrofits, at least in the short term.

Owners in this sector can be responsive to recognition, although both technical assistance and financing are also useful to encourage their participation.

1.1.3.2 P-2: Industrial Buildings **P2**

Industrial buildings, associated with manufacturing or processing plants, tend to have very low energy use for the building as compared to the energy used by the manufacturing or processing activity. Often there is no simple and accurate way to separate the two energy end uses. For this reason, energy retrofits affecting only the building are very low on the list of the owner's priorities. They are, however, usually very interested in the productivity of their employees so where an energy retrofit also improves the work environment, they will be interested. Recognition of their efforts is often useful for raising the profile of their operation within a corporate environment having several plants in other locations.

Example

The City of Peterborough, Ontario designed the scope of Sustainable Peterborough to encompass the needs of the industrial and commercial sectors, through the following activities:

- retrofitting
- capital projects
- renewable energy/cogeneration
- education and awareness
- supply side management.

This broad based scope also covers emerging technologies such as wind generators and methane recovery from landfill sites.

Example

Osage, Iowa recognized the value in energy conservation programs in the mid-1970's in order to lower costs in the municipally owned gas and electric utilities. In 1988, Osage expanded their program to include free audits on all industrial and commercial businesses. When a walk through audit indicated a potential for savings, the city then conducted an in depth audit which included estimated savings and payback period.

The city also provided free to any business an engineering review of plans for renovation projects. This community-wide program enabled Osage to reduce overall power consumption through conservation/retrofitting activity, which in turn lowered gas and electricity rates. The competitive utility rates have attracted new industrial/commercial business to Osage, while saving the city the expense of adding additional power plants.

1.1.3.3 P3: Multi-unit Residential (MUR) Buildings

P3

1.1.3.3.1 P3a: Rental

P3a

Rental MUR buildings can vary widely in energy use and in attitude to reinvestment. Where rents have been controlled at lower levels by regulation or market conditions, there is little motivation for an owner to reinvest in energy or any other retrofit. Tenants do not pay for energy use directly, and are often unaware of the amount of their rent committed to that cost. For these reasons, considerable reductions in energy use can often be achieved. Much of this can come by encouraging and motivating tenants to modify their behaviour, for which they will expect to receive a benefit. Where individual tenant metering has been installed, reductions of 10% - 30% have been demonstrated due solely to occupant behavioural changes.

Example

The Environmental and Conservation Services Department (ECSD) of the City of Austin, Texas offers a Multifamily Energy Rebate program. Targeted exclusively for multifamily properties, the program provides a free walk-through energy audit performed

by an ECSD representative. Apartment buildings that have completed weatherization and air conditioning retrofits may qualify for rebates.

Rebates are offered for building envelope retrofits such as:

- ceiling insulation
- window treatments
- air infiltration control
- lighting including fixtures, ballasts, optical reflectors, occupancy sensors, and high efficiency lamps
- improved HVAC systems.

Example

The city of Portland, Oregon launched a similar program for multi-residential units called the Multifamily Energy Savings program in 1987. The city's aggressive commitment to CO₂ reduction programs was at the heart of the program. The program was designed to provide incentives for landlords including rebates, loans, energy audits and state tax credits for retrofitting activities.

1.1.3.3.2 P3b: Condominium

P3b

Condominium buildings are collectively owned by the owners of the individual dwelling units, who usually pay directly for their own energy use and pay on a joint basis for common area energy use. As noted above, studies have shown that individual metering in MUR buildings will result in savings of 10% to 30% per dwelling unit, so behavioural factors which affect energy use are already under some control. The owners as a group are interested and motivated to reduce their energy expense, but they manage by committee, which slows the decision-making process.

1.1.4 Category S: Single Family Residential Buildings

S

This sector is a difficult one to reach, but one that a municipality has the best potential to influence. Individual homeowners can be contacted with an energy message through regular mailings such as tax, water or energy bills. Programs featuring weatherization and other retrofit advice can be delivered in a more cost effective way than from any other source. Background information and promotion can be provided by politicians and civic staff through announcements in the local media, and through targeted messages delivered in the local utilities billing envelopes.

Example

Peterborough Green Up's original program goals encompassed the conservation of energy and water, the reduction of waste and the naturalization of green space in homes and workplaces. The commercial sector was incorporated into the scope at the launch of the program but was not maintained due to lack of funding and response in this area.

Example

The German city of Saarbrücken has made a commitment to reduce greenhouse gas emissions while increasing energy obtained from renewable sources. A solar energy initiative for the residential sector is an ideal way in which to satisfy both commitments, while reducing reliance on fossil fuels such as coal. A residential rooftop solar power program features a two way meter that runs in reverse during the summer months with excess power sold back to the utility at market rates.

To make this initiative more attractive to residents, the state subsidizes installation by 50%, and has an agreement with local banks to provide the rest of the financing at discounted lending rates. As part of the push for solar energy, new single-family residences are being constructed utilizing passive solar energy designs.

1.2 Retrofit Program Methodology

A municipality may choose from many different methods for implementation and operation of a building energy retrofit program, or may use a combination of methods.

1.2.1 Method 1: In-House Resources

A staff specialist or team of specialists in building energy retrofits and energy management can be assigned to develop a program for municipal buildings. This individual and his/her team can operate a program totally in-house, with technical and managerial expertise within the municipal office.

Example

The Energy Management Program (EMP) in Phoenix, Arizona was designed to be implemented solely by city employees in the Energy Management and Facilities department in order to develop and maintain expertise in-house and promote buy-in for energy management initiatives. Some early projects, sponsored by the Energy Task Force, utilized outside firms for design and implementation that created difficulty when equipment breakdown occurred or complex routine maintenance was required.

1.2.2 Method 2: Energy Management Firms

The municipality can take on the role of promoter and facilitator by matching consultants, project managers and contractors specializing in building energy retrofits (collectively referred to as Energy Management Firms or EMFs) to building owner/manager clients. The clients will have a reasonable expectation that the EMFs recommended by the municipality have met some criteria established by the municipality as to their competency and overall business ethics.

Example

The Better Buildings Partnership (BBP) at the City of Toronto uses outside consultants and contractors exclusively to develop and deliver energy retrofits. Beginning with just

three Energy Management Firms (EMFs) at the pilot stage, the BBP now lists 36, each with their own area of expertise. The BBP has a qualification procedure for EMFs, and this qualification status must be maintained to continue their participation in the program.

1.2.3 Method 3: Employ An Outsourced Program Manager

The municipality can subcontract the operation of the building energy retrofit program to an outside organization having overall responsibility for promotion, information dissemination, and delivery of services. Such an organization would be set up on a non-profit basis, having close ties to the municipality, with a mandate to implement a policy towards improving energy efficiency. The organization would be required to report to the municipality on a regular basis, and would be funded partly by the municipality, and partly by collecting a portion of the costs paid by the building owner clients. This arrangement ensures the municipality can exert a degree of control over the operations.



Example

The City of Toronto has supported and assisted a non-profit organization, Green\$aver, for over a decade to deliver energy and water efficiency programs to single family and small multi-family buildings. This organization is non-profit, has a volunteer board of directors, and a staff of energy efficiency specialists who deliver weatherization and water conservation services, as well as offering advice on heating and cooling systems. They have become the delivery agent for the city's storm sewer downspout disconnect program, and have also become the prime delivery agent for the Natural Resources Canada EnerGuide for Houses¹ program in the Toronto area. For more information on Green\$aver, see <http://www.greensaver.org>.

1.2.4 Method 4: Volunteers

Volunteers who are interested in assisting others to save energy and cost can be very useful in simple buildings such as single family and small multifamily dwelling units. They can deliver weatherization and water conservation programs, and offer straightforward advice. This is particularly applicable to low-income housing, where the need is greatest and there is a restricted ability to pay for services. Operating such a program requires a manager with experience in working with volunteers, some training, and a standardized approach to providing the service. Leveraging existing resources for promotion, such as inserting stuffers in water bills, and developing a corps of active volunteers can result in a very low cost program.

¹ EnerGuide for Houses® - tells the homeowner, mortgage lender, builder, or realtor whether or not a house is energy efficient. A house is assigned a score on a 0-100 scale. The higher the score, the more efficient the house. It also provides an estimate of the energy consumption required to operate the house.

EnerGuide for Houses® is a national standard created by Natural Resources Canada (NRCan) for analyzing the energy performance of houses. NRCan maintains the standard, ensures its proper use, and performs quality control. The ratings are carried out across Canada by certified professional evaluators from the private sector who have been licensed by NRCan to provide the service. For more information see http://oee.nrcan.gc.ca/houses-maisons/english/choose_e.htm

2. STAFFING REQUIREMENTS

Once the policy to have a retrofit program has been put in place, it is important to have a department, office, or individual who is responsible for implementing that policy.

2.1 *Naming the Office*

The title of the office can have a number of words, including “efficiency,” “energy efficiency,” “water conservation,” “greenhouse gas emissions reduction,” or even “sustainable development.” In the framework of current international opinion, a name incorporating the words “climate change” will have a significant impact.

2.2 *Required Skills*

The skills required to manage a municipal building retrofit program are wide ranging, and ideally include the following:

- **Political:** report writing, policy recommendations, the ability to make presentations to council, the public at large, the media, or stakeholders.
- **Marketing:** preparation and execution of a marketing plan, preparation of marketing materials, make direct market contacts, integrate with marketing efforts of others, ensure public recognition of individuals and organizations.
- **Technical:** ability to understand technical issues related to building retrofit, select outside consultants and advisers, ensure retrofits meet defined standards.
- **Coordination:** work with other civic departments, including building, legal, public relations, public works.

Successful programs share common staff attitudes and aptitudes including:

- **Vision:** To ensure long-term success, staff must take a comprehensive look at future goals of the program as well as what exists today. In Phoenix, the first Energy Management Program (EMP) director laid solid groundwork for retrofitting activity by developing processes to prove savings existed. Concurrently, a partnership with the national Energy Task Force secured more innovative projects for the future.
- **Teamwork:** The partnership-oriented nature of retrofitting programs is best implemented by a manager with good team building and negotiation skills. The manager must consider and meet the various needs of partners involved such as environmental groups, corporations, and government. The Better Buildings Partnership in Toronto utilized a team-oriented approach in the design phase of the pilot program by hosting a charette—a two-day workshop—that included numerous stakeholders such as business, city, and environmental groups.

2.3 Staff Size

The size of the “Climate Change” group will depend upon a number of factors:

- Size of municipality.
- Scope of the program.
- Available funding.
- Number of partners.
- Number of outside financial sources.

A minimum of one staff position should be assigned initially to the responsibility, with careful monitoring of performance against plan to determine when additional staffing is required.

Staffing levels will be very much dictated by resources and program structure. The EMP in Phoenix is currently staffed with eight full time positions, not including Public Works Facilities staff, whose time is billed to the Energy Management section. Programs where retrofitting projects are contracted out will require less staff, such as the Better Buildings Partnership (BBP) in Toronto.

Peterborough (Ontario) Green Up, an example of a grassroots based organization, works with limited resources and only maintains a staff of four positions on a four-day work week, with some assistance from volunteers and additional staff as grant monies allow.

2.4 Volunteers and Part-Timers

The issue of climate change can embrace the entire community. Because climate change affects everyone, the program may attract many volunteers and part-time staff. Most of these people will be dedicated to improving their community through assisting individuals and businesses to reduce energy use.

It remains the role of the municipality to capture the efforts of these committed individuals, direct their efforts, and provide the opportunity to make a difference in their community. Without direction and supervision, volunteers eventually lose their enthusiasm. A paid Volunteer Coordinator should find suitable roles for all those willing to work, and ensure that volunteers complete the tasks assigned. If budget does not allow for a staff Coordinator, a well-organized and dedicated volunteer may handle the job of overseeing other volunteers.

3. FINDING THE FUNDS

Financing requires consideration of funds for two purposes:

- “Enabling” funds to set up and operate the administration of the program, source outside legal, financial and technical expertise, and
- “Financing” funds to lend or grant to building owners to undertake retrofits.

In the case of enabling funds, the municipality may be able to provide a base level of staff, and a place for them to administer the program. Other funding sources can be:

- Utility partners
- Senior levels of government
- Retrofit industry associations
- Municipal associations
- Community minded financial institutions
- A dedicated energy retrofit investment fund

These will be discussed in greater detail in Part 4: Setting Up Partnerships.

3.1 *Financing Retrofits – Leverage, Leverage, Leverage*

Implementation of a program to retrofit municipal buildings relies on one fundamental principle.

The Fundamental Principle for Financing Retrofits

Energy retrofits do not consume internal capital, but will generate sufficient savings to repay any investment. This will result in making funds available for other purposes.

A program for retrofitting other public and private sector buildings is usually implemented on a similar basis.



Example

Enbridge Private Label Financing Model - Better Buildings Partnership (BBP)

The Better Buildings Partnership Enbridge Private Label Financial Model is an excellent example of leveraging all available funding to receive the maximum dollar stretch for retrofitting projects. The company undertaking the retrofitting project, along with Enbridge Consumers Gas, the City of Toronto, and the Toronto Atmospheric Fund (TAF) all contribute to increase the security for a third party loan which generates a more favourable interest rate structure and decreases risk. This arrangement is formalized through a *Retrofit Facilitation Agreement*, which clearly outlines each party's responsibility.

The Enbridge Private Label financing model was set up to leverage the limited funds of the BBP. The City of Toronto issues a letter of guarantee to the Toronto Atmospheric

Fund. TAF then issues a Letter of Direction to Enbridge for the same amount. Enbridge makes available an amount 5 times greater than the \$2 million in funds guaranteed by the City for retrofitting projects. The five times rate assumes that a maximum of 20% of loans could be at risk. The amount provided and guaranteed by the city is referred to as the Securitized Fund, and will be the first amount drawn down in the event of a default. The structure of this program ensures security for Enbridge and its third party financiers, allows the Toronto Atmospheric Fund to keep its funding invested in one place and makes the best possible use of BBP funds held through the City Treasurer in accordance with the Municipalities Act.

The following table illustrates the four main methods of financing retrofits of municipally owned buildings, and the commitment of, and potential for success to, the municipality. These methods are discussed in more detail below the table.

Table 3-1 Methods of Financing Retrofits and Their Impact on the Project

	Requirement for Managerial Oversight	Degree of Financial Risk	Potential for Project to Proceed	Potential Energy Savings	Impetus to Implement Expedientiously	Motivation to Verify Savings
Self-financing from capital budgets	High	High	Low	Low	Low	Low
Direct borrowing – loans, bonds or debentures	Low	High	Low	Low	High	Low
Self-managed revolving loan fund	High	High	High	High	High	High
Innovative financing –performance contracting	Low	Low	High	High	High	High

Desirable attribute
 Undesirable attribute

3.1.1 Self-financing from capital budgets

This is the traditional method of financing upgrades and retrofits to municipal buildings. Requires allocation of capital from municipal budgets – usually difficult to meet on a consistent basis. Energy retrofit projects are often replaced by capital projects having a higher priority. The project must be carefully managed from start to finish. Savings are rarely verified, but this is a necessary step to ensure future budget allocations can be justified.

3.1.2 Direct borrowing

Similar to self-financing, but the municipality borrows from a lender, floats a bond, or issues a debenture. Repayment is generally not linked to energy savings, so verification is not undertaken.

3.1.3 Revolving Loan Funds

The principle of a revolving loan fund involves setting aside a sum of money from which loans are made for the purpose of building energy retrofits. The loan is paid back from energy savings over time, thereby ensuring that the same amount of funds can “revolve”

to finance a continuing stream of retrofit projects over time. Terms of repayment must be defined and closely adhered to. Since repayments come from savings, energy monitoring and tracking is usually required, unless the parties agree to make payments based on projected savings. Revolving funds may be set up either with a large cash infusion, such as the BBP in Toronto, or by a commitment to reinvest the savings stream generated by low cost, high return projects, as was the case in Phoenix.

Example

The City of Toronto has an \$8 million revolving loan fund in place for private and public non-profit retrofitting projects. The revolving fund was originally established through funds received in the Canada-Ontario Infrastructure Works program which were used by ESCOs to retrofit public sector buildings and then repaid to the city. For these projects, the federal and provincial portion of the Infrastructure funds was loaned at no interest, while the ESCO portion was provided at market interest rates.

3.1.3.1 Self-Managed Revolving Loan Fund

The municipality establishes a fund from which loans are made to complete projects. Repayment comes from energy savings. This method requires management of the fund, management of projects, monitoring and evaluating savings for repayment, and commitment to actively implement new projects as the fund is repaid.

The concept of a self-managed revolving loan fund has been implemented in several municipalities for municipally owned buildings. The municipality manages a fund of fixed size to which its building or property managers can apply for funds to improve and retrofit their buildings for increased energy efficiency. The funds are repaid through energy savings.

The implications are that the retrofit must be carefully designed to generate energy cost savings, those savings must be verified, and the municipality must manage the cash flow so that the savings generated by the project return to the fund. The fund must remain outside of the normal budgetary process so that it can be used over and over to improve energy performance.

All of these steps are difficult to manage. Designing retrofits for energy efficiency is a specialty that requires experience and expertise unlikely to be found within the municipal staff. Monitoring and verifying savings is another field of expertise not found within the municipal staff, but having an independent audit and verification is desirable.

Accounting for the energy savings and ensuring that they are transferred from operating cost accounts to the revolving loan fund requires a high degree of commitment from the elected council, and organization from the finance/accounting department. It is all too easy at budget time to want to claim the savings to reduce the operating budget, rather than recognizing that the cost to that budget must stay at a consistent level until the loan is repaid. Decisions about what steps would be taken in the event the savings are not achieved, and repayment made, must be written into the agreement between the loan fund and the borrowing department.

Nevertheless, this approach has been successfully implemented by communities such as Phoenix, AZ and Peterborough, ON.

Example

Savings Reinvestment Plan - Phoenix

Phoenix's Energy Management Program municipal building retrofit projects are funded through the Savings Reinvestment Plan (SRP). The SRP was approved by council in 1983 and was designed to ensure a long term, secure funding source for energy initiatives. This financial model encouraged thoughtful planning, as all future initiatives would be dependent on the measurable results of the projects preceding them. As the SRP technically represents a re-appropriation of funds, the EMP budget is formally approved by City Council each year.

Under the SRP model, 50% of documented, cumulative savings to a maximum of \$750,000 a year are reinvested in further efficiency improvements, with additional revenues taken into the City's general fund. For the first twelve years of the program, the reinvestment cap was set at \$500,000. In 1995, City Council approved an increase of \$50,000/year in the SRP cap to a new maximum of \$750,000. City Council recognized the EMP's need for increased funding both as a hedge against inflation and to fund the city's participation in the EPA's Green Lights program at a cost of \$300,000 annually. The increase not only protected the program from shrinkage by inflation, but also facilitated wider project scope with the intent to increase city revenues and overall energy savings.

From 1982 – 1995, the City of Phoenix realized \$25 million in net repayments from the SRP generated by \$30 million in energy savings.

3.1.3.2 Securitization Principle

Securitization can be an important component for successful retrofitting programs because it addresses the barrier of availability of suitable financing. Guaranteed, or securitized, funds provided by the municipality for 5% to 20% of the loan fund are the first funds to be drawn down in the event of default. This method allows borrowers to negotiate more favourable interest rates, confirms the stability of the project and lends support to the long-term benefits gained through retrofitting activities.

3.1.4 Innovative Financing – Energy Performance Contracting

A specialist contractor defines the measures, projects the savings, guarantees a maximum period for repayment, provides the financing, designs and implements the project, monitors energy consumption to calculate savings, and assumes all risk for the success of the project. Financing is provided on an “off balance sheet” or limited recourse basis.

Often referred to as Energy Performance Contracting (EPC) and undertaken by specialist companies called Energy Service Contracting Contractors (ESCOs), this approach

requires that the municipality place the responsibility for all aspects of the retrofit for its buildings into the hands of the ESCO. This includes:

- Selection of the retrofit measures: The ESCO works in consultation with the municipal property department. The ESCO offers ideas, and can quantify those ideas from a capital cost and energy cost savings perspective. Some measures may not save a lot of energy, or even a little, but if the overall retrofit program has an acceptable payback, those measures can be included. These are deemed "renewal" measures, and examples include new ceilings with a lighting retrofit, or new windows that typically have a very long payback.
- Feasibility of the overall retrofit program: This includes all financial and technical aspects of the program. At this stage the ESCO defines capital costs, project management costs, financing costs, projected energy cost savings, risk assessment, and length of the performance guarantee period.
- Implementation of the program: The ESCO undertakes the design, project management, sub-contracting, and commissioning for performance and energy savings.
- Monitoring and evaluation of savings: The ESCO, or an independent agency, monitors and evaluates energy cost savings, usually on a monthly basis, following a methodology which has been defined in the contract, and which is reviewed and agreed to by the client. On the basis of the agreed cost savings, the ESCO submits an invoice to the client.

The Energy Performance Contracting approach has been used very successfully in retrofitting municipal, institutional, commercial, multi-unit residential and industrial buildings.

3.1.5 Utility DSM Programs

Many utilities have operated demand-side management (DSM - programs which address energy use on the customer side of the meter) programs to assist their customers to implement energy conservation programs in their buildings. Such programs fit into one of the following categories:

- Information/Suasion
- Incentive/Financing
- Codes & Standards
- Research and Development

Utilities have developed a considerable depth of knowledge and expertise in addressing market barriers to adopting energy efficiency in the building sector. This represents a major resource for municipalities. Where a local utility has an incentive or finance program, this can often be utilized by the municipality in developing their own building energy retrofit program.



Example

In Ontario, Enbridge Consumers Gas and Union Gas have a number of programs aimed at different building markets, including residential, multi-residential and commercial.

3.1.5.1 Residential (Enbridge Home Services)

A renovation service program for residential customers, which includes heating and cooling systems, water heaters, roofing, windows, attic insulation etc. Renovations may be done for any reason and are not solely limited to energy savings return. Enbridge contractors must perform all work and homeowners are required to sign a contract for services. Payment for renovations under this program may be made through on-bill financing with Enbridge, or paid by cash or credit card. The average loan is \$5,000, with the interest rate contingent on the value of the project and the credit worthiness of the applicant.

3.1.5.2 Commercial (Enbridge Commercial Services)

This program makes funds available using third party financial services from an in-house list of preferred institutions to supply commercial project loans at rates as low as 1.5% above prime. In the past, loans ranging from \$5,000 - \$250,000 have been made to commercial and industrial sectors.

Generally, the monthly payment is equivalent to the savings stream generated by the retrofit, making this financing method cash flow neutral until the loan is paid off. Additionally, Enbridge Consumers Gas offers a rebate of five cents for every cubic meter of energy saved during the first year that the high efficiency measures are implemented. The rebate may be applied to the outstanding loan or taken in as revenue.

3.1.5.3 Multi-residential Program

Enbridge Consumers Gas has a current promotion offering a double incentive for multi-residential energy efficiency projects that include three or more efficiency measures (of which two measures must relate directly to gas consumption). The rebate is ten cents per cubic meter of energy saved annually.



Example

The City of Austin, Texas offers fifteen DSM programs including both residential and commercial initiatives, all under the control of the Environmental and Conservation Services Department (an agency of the city).

Residential programs include Energy Star Homes, the Green Builder (which address the entire home impact on the environment), free home energy audits and rebates, low interest loans for retrofitting, free low income weatherization, appliance efficiency rebates, shade tree rebates and gas conservation.

Commercial programs include new construction design assistance, technical and financial incentives in the form of rebates for various retrofitting activities and thermal energy storage .

3.1.6 Climate Change Funds

Municipalities may decide to establish a dedicated Energy/Environmental Investment Fund. There can be many sources for these funds, including a grant, a levy on energy and water utility rates, or a windfall capital gain that the municipality designates for energy/environmental purposes.

Example

The City of Toronto established The Toronto Atmospheric Fund (TAF) through a windfall capital gain resulting from the sale of a large parcel of land. Council agreed to use this \$23 million to establish a fund that would be maintained at the original value, and would use excess funds generated from the investment of the principle to assist the city to meet its objective of reducing GHG emissions. The fund is used to finance projects that:

- save energy and money
- cut emissions that are changing the climate
- create jobs, and
- make the city a healthier place to live and work.

The fund makes loans and grants to community groups, government organizations and businesses, who work in partnership with TAF to reduce emissions.

This fund has made a major contribution to the municipality and the community in meeting the objective. It has been an excellent source of enabling funds for city programs. The foresight of council in establishing the fund has been validated many times over. For more information on TAF, see <http://www.city.toronto.on.ca/taf/index.htm>.

Example

The Unlimited Fund Financial Model

The city of Oslo, Norway set up a revolving fund in 1982 by increasing the cost for electricity and designating the extra funds to be used for energy efficiency projects. The fund, set without a cap, grew too quickly to be consumed by energy efficiency projects, which included both grants and loans for retrofitting activities.

3.1.7 The Role of Traditional Lenders

Traditional lenders maintain their place in residential, commercial and industrial retrofitting funding.

Example

Homeowners in Peterborough can apply for a loan through the Enviro Loan program. EnviroLoan was developed in 1994 by Peterborough Green Up in partnership with Canada Trust (now TD/Canada Trust) to promote Home Visits and remove financial barriers to retrofitting. TD/Canada Trust offers Ontario homeowners \$1,000 - \$15,000 in

loans to implement energy saving retrofits, which can be repaid over a maximum of ten years.

Homeowner loans for retrofitting projects have not been as popular as expected in the area, perhaps due to reluctance to incur further debt and/or a lack of awareness of payback in terms of energy savings.

Example

Another form of traditional lending with a third party guarantor is available to the not-for-profit sector in Peterborough through the Sustainable Peterborough program. Sustainable Peterborough identified a specific group of Cultural and Heritage Board member non-profit buildings requiring similar retrofitting activity. Using a portfolio management approach, retrofitting activities are coordinated at multiple sites, generating savings on supplies and equipment. Loans through traditional lenders are available at more favourable rates collectively than individual non-profits could negotiate on their own, with the City of Peterborough acting as a loan guarantor.

3.1.8 The EPC Option (Energy Performance Contracting)

All funding for private sector projects is provided by the Energy Management Firms (EMFs) for energy performance agreements on a project-by-project basis, and by the client on fee-for-service projects.

4. SETTING UP PARTNERSHIPS

4.1 *Who to Target*

Partnerships will keep the project responsive to the needs of the community, and will help maintain the energy and enthusiasm required to carry on through the inevitable setbacks and difficulties. Partners can contribute financially, administratively, or politically, or they may serve as outreach or liaison associates.

4.1.1 **Utility Partners**

Utilities have a significant stake in the local community. They are usually willing to contribute to activities related to their business, including participating or assisting in programs with administrative or financial help. They are also in very regular contact with their customers through monthly or bi-monthly billings. In addition, some utilities operate very extensive demand-side management (DSM) programs that can complement a municipal retrofit program.

In some parts of Canada, the role of utilities is changing as natural gas and electricity are deregulated. Under the deregulated model, the traditional utility no longer generates earnings from the sale of the commodity, but only from transmission and distribution. Energy conservation may still impact on those earnings by reducing the amount of energy transmitted and distributed, but the regulator may be open to innovative approaches to financing the energy conservation efforts of utilities.



Example

In Ontario, the natural gas utilities have entered into a novel “Shared Services” agreement with the Ontario Energy Board. In return for their efforts at energy conservation through DSM programs, the utility receives money back from the regulator for demonstrated reductions in gas consumption. These reductions are tracked on a project-by-project basis, and are normally based on engineering estimates of savings. The savings are reviewed by an independent audit, which is then subject to review by a consultant committee made up of representatives from non-government organizations from the environmental sector. The same body reviews all programs at the design and implementation stages.

The gas utilities have returned some of these shared savings to the municipality for use in their conservation program where the conservation resulted from the efforts of the municipal retrofit program.

Enbridge Consumers Gas has been very active in its retrofitting partnership activities, undertaking a variety of financial incentives directed at both residential and commercial markets at local and national levels.

Example

The Home Performance Rating Rewards Program

Enbridge Consumers Gas and the Ontario Ministry of the Environment sponsored this pilot project in Peterborough. The Home Performance Rating Rewards program offered cash rewards for home retrofitting projects that generated an increase of three points or more on the EnerGuide for Houses scale (see Section 1.2.3 for an explanation of EnerGuide for Houses). As of February 2001, Enbridge had dispersed a total of \$54,000 in homeowner rewards in support of this program. The Green Communities Association acts as the project administrator, with home inspections pre- and post-retrofit carried out by Peterborough Green Up on a fee-for-service basis. For more information on the program, see <http://www.greenup.on.ca/RewardsProgram.html>.

4.1.2 Senior Levels of Government

The federal government has offered many different programs for municipalities to improve or retrofit their buildings. These may be offered as energy related programs through Natural Resources Canada, environmental programs through Environment Canada, tax based incentives through Canada Customs and Revenue Agency, or through general programs such as the Infrastructure Works program.

Program managers must maintain contact with the federal government to stay abreast of the changes in programs. Natural Resources Canada publishes a directory of energy efficiency programs in Canada. You may download the current edition, *1998 Directory of Efficiency and Alternative Energy Programs in Canada*, at:
<<http://oee.nrcan.gc.ca/infosource/businesses/>>

Provincial and territorial governments maintain ministries or departments of energy or the environment. These bodies focus on reducing energy use within their region, and offer some types of programs to achieve this goal. While they have been somewhat dormant through the 1990s, the changing energy landscape will bring them back into the picture in the future.

Climate change has become an important driver in energy conservation. The federal government established the National Climate Change Program, from which a number of Issues Tables were established to focus on energy conservation and greenhouse gas (GHG) emissions reduction. Municipalities contemplating retrofits should read the reports from two of these tables, *Buildings*, available at http://www.nccp.ca/NCCP/national_process/issues/buildings_e.html#foundation, and *Municipalities*, available at http://www.nccp.ca/NCCP/national_process/issues/municipalities_e.html.

Example

Phoenix had strong municipal support for its retrofitting activities and built upon this success by forging a partnership with the Urban Consortium Energy Task Force on a national level. This partnership was critical to the success of the Energy Management

Program (EMP), because it provided access to additional project specific funding (from the Department of Energy), and innovative technical assistance for new projects.

Example

Toronto's early success in enabling retrofitting activity was linked to the establishment of an \$8 million dollar revolving loan fund, set up from a federal and provincial government program, Canada Infrastructure Works. As a requirement for participation in the BBP, the city required energy management firms (EMFs) to contribute the remaining \$4 million through the energy performance contract approach. This money was allocated solely for the retrofit of buildings in the public sector, with the federal and provincial portions offered at zero interest, and the EMF portion to be provided at market rates.

4.1.3 Retrofit Industry Associations

Associations representing companies with a stake in their business in the community may be cooperative in contributing to the enabling funds, either in cash or in kind. They should always be considered as potential partners in the program.

The Canadian Association of Energy Service Companies (CAESCO) is the primary organization representing the energy performance contracting industry in Canada. CAESCO has approximately 50 member organizations with over 100 individual members including Energy Service Companies (ESCOs), suppliers and distributors of energy efficient products and systems, utility companies, governments, lawyers and consultants. For further information, see: <http://www.ardron.com/caesco/> .

Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) is a national partnership of industry sector organizations that represents HVACR (Heating, Ventilating, Air Conditioning, Refrigeration) manufacturers, wholesalers and contractors. For further information, see: <http://www.hrai.ca/hraihome.html> . They also provide an excellent page of links to other related industry associations at http://www.hrai.ca/industry_links.html .

Other potential sources of information or contacts could include groups such as:

- Canadian Window and Door Manufacturers Association (CWDMA) <http://www.cwdma.ca/index.htm>
- Canadian Institute of Plumbing and Heating (CIPH) <http://www.ciph.com/>
- The Radiant Panel Association <http://www.radiantpanelassociation.org/>
- Plumbing, Heating, Cooling, Contractors Association <http://www.naphcc.org/>
- Mechanical Contractors Association of Canada <http://www.mcac.ca/>

Many of these web sites have links to other industry associations that may lead to valuable contacts or resources.

Example

The City of Toronto set up an alliance with CAESCO to further the aims of the BBP and to ensure that qualified CAESCO members were included in the list of BBP approved contractors.

4.1.4 Financial Institutions

Local financial institutions have a stake in the community. They are interested in being viewed as good corporate citizens, and may be partners in retrofit financing on special terms or conditions. In many cases, their head office may have a green initiative underway which they will link to the municipal program. Such initiatives have generally focused on residential buildings, but attempts have been made to include small commercial buildings within their scope.

4.1.5 Energy Service Contractors

ESCOs are in business to find and implement long range solutions to energy management problems in commercial, institutional and industrial facilities. Reduced operating costs and improved performance are provided to facility owners in exchange for a portion of the savings that result. Owners enter into energy performance contracts with no capital outlay and leave the risk of program failure to the ESCO.

A typical ESCO brings a unique combination skills and expertise to the table, including:

- engineering and energy management expertise,
- project management expertise
- project financing capabilities
- sources of project financing
- energy monitoring, accounting and analysis.

These skills are used to undertake the following tasks:

- Identify and evaluate energy-saving opportunities;
- Develop engineering designs and specifications;
- Arrange for financing;
- Contract with suppliers and subcontractors to implement the measures
- Manage the project from design to installation to monitoring;
- Train onsite staff and provide ongoing maintenance services; and
- Guarantee that savings will cover all project costs within a defined period of time.

ESCOs can be described as:

- developers of projects that will permanently reduce energy and operating costs in existing buildings;

- turnkey contractors who assume total responsibility for analysis, design, construction, commissioning, performance monitoring and operator training, for the life of the contract;
- performance contractors whose payment for work undertaken is contingent on actual energy, water and other cost savings;
- experts in the creative and effective application of energy management, environmental control, project management principles and project financial control.

ESCOs are entrepreneurial, private sector businesses that provide a highly technical and specialized energy management service to the buildings and industrial sectors. Because a significant proportion of their revenue comes from a markup on their subcontracts, they are motivated to invest as much money into the facility as can be justified by the return on that investment, while still meeting the payback criteria. In this way, the owner also derives the maximum benefit from the retrofit program.

4.1.6 Municipal Retrofit Associations

Listed below are two vital associations that will facilitate municipal retrofits. Early contact will help ensure a successful project.

4.1.6.1 International Council for Local Environmental Initiatives (ICLEI)

ICLEI is the international environmental agency for local governments.

ICLEI's mission is to build and serve a worldwide movement of local governments to achieve tangible improvements in global environmental and sustainable development conditions through cumulative local actions.

ICLEI functions as a democratic, international association of local governments. Serving a worldwide movement requires that ICLEI operates as an international environmental agency for local governments.

More than 350 cities, towns, counties, and their associations from around the world are full Members of the Council, with hundreds of additional local governments participating in specific ICLEI campaigns and projects. As a movement, association, and agency, ICLEI continues to work towards its environmental and sustainable development goals.

See section 4.1.6.2 below for ICLEI's role in the 'Partners for Climate Protection: For a Better Quality of Life' (PCP), dedicated to assisting municipalities in climate action plans.

For more information about ICLEI, see their web site at: <http://www.iclei.org/>.

4.1.6.2 Federation of Canadian Municipalities (FCM)

Municipal Building Retrofit Process

FCM recommends that municipal governments follow an eight-step process for undertaking a program of comprehensive retrofits in municipal buildings. The Sustainable Communities Guide: Municipal Building Retrofits provides detailed assistance for municipal staff to obtain senior management and council support, assess

existing information and current energy use, decide what financing and implementation options work best for them, to develop the business case for a comprehensive retrofit program, and to move forward with implementation and verification of savings. The Guide provides templates, model documents, and a detailed resource manual. FCM offers three training workshops for municipal governments: Strategic Energy Planning; Spot the Energy Opportunities; Monitoring and Verification. The Sustainable Communities Guide: Municipal Building Retrofits can be obtained from FCM, along with current workshop schedules.

Particularly innovative retrofit projects, especially those involving renewable energy or co-generation systems may be eligible for grants and loans with FCM's Green Municipal Funds. Following the MBR process creates a strong basis for prospective Green Municipal Fund applications.

Partners for Climate Protection

In 1997 the Federation of Canadian Municipalities merged with the International Council for Local Environmental Initiatives' Canadian Cities for Climate Protection™ Campaign. This united effort is now called 'Partners for Climate Protection Program' (PCP).

The goal of the merged program remains to support Canadian municipal governments, to prepare and implement local climate action plans. FCM is the political partner for PCP, assuming responsibility for all formal relations with the Canadian federal government, and the formulation of federal climate policy within Canada with respect to local governments. ICLEI is the technical partner, assuming direction for activities such as software tools, technical manuals, training materials, reporting protocols, energy management, and monitoring and verification activities.

The priorities of the program are to:

- **BUILD CAPACITY:** training workshops, inventory and projection software, case studies, toolkits;
- **SUPPORT CHAMPIONS:** information sharing, research support, presentations;
- **PROVIDE UP-TO-DATE INFORMATION:** climate change science, government programs, municipal experiences through the PCP electronic newsletter;
- **ENSURE ACCESS:** to international municipal experience through ICLEI's global CCP Campaign™;
- **CREATE MODEL PLANS:** local action plans, ordinances, bylaws;
- **FACILITATE PARTICIPATION:** international negotiations on climate change, up-to-date information on the status of negotiations, national consultations;
- **GENERATE FEEDBACK:** what works, what doesn't, what it costs, what it saves;
- **UNDERTAKE QUANTIFICATION:** surveys of progress, monitoring of the milestones achieved;
- **BUILD PARTNERSHIPS:** networking and partnerships with supporting organizations such as Green Communities, Institute for Catastrophic Loss Reduction, Natural Resources Canada's Renewable Energy Deployment Initiative, Energy Innovator program, ICLEI Energy Services and the Climate Action Fund.

Cities of both ICLEI and FCM's efforts are automatically members of PCP, and ICLEI's international campaign of 500 cities worldwide. That brings PCP participation to 92 communities from across Canada, representing 61% of the population in rural and urban centres in almost every province and territory.

For more information on PCP and to learn about the Green Municipal Enabling Fund and the Green Municipal Investment Fund, see the FCM web site at <http://www.fcm.ca/> .

4.1.7 Local Community Groups

In every community, there are local community groups who have an interest in the environment, energy efficiency, or buildings. These groups are a good source of ideas and resources that can help move a municipal program forward, especially where support is required to ensure the political will is behind the initiative.

4.1.7.1 Grassroots Environmental Organizations

Every community will have one or more groups who are interested in preserving or improving the environment. Many of these have developed considerable expertise in some aspects of environmental performance, and they should be engaged as allies to help reduce energy and save costs. They can bring their expertise, and their considerable energy, to bear on the design and implementation of the municipal energy retrofit program.



Example

In Toronto, the original pilot programme of the BBP was designed with the assistance of environmental groups working together with business. The consultants hired to design the pilot, Conservation Strategies Consortium, started the process by holding a three-day charrette that attracted over 80 representatives from every group having an interest in developing such a program. This included business, labour, politicians, utilities and environmental groups. As a result of the providing the opportunity to hear their views and to offer the ability to influence the program design, the BBP garnered wide support.



Example

Peterborough Green Up's inception came about as a result of local grassroots environmental action. Once the community identified the need for green space development and energy conservation measures, Green Up naturally evolved to take on these projects.

4.1.7.2 Chambers of Commerce

Local Chambers of Commerce can be invaluable as boosters for retrofit programs. They may participate as partners in retrofit programs by supplying publicity, administration aid, office facilities, and membership support. Civic responsibility and good corporate citizenship will be the motivating factors in getting the Chamber of Commerce involved.

4.1.7.3 Other Local Non Governmental Organizations (NGOs)

In any community many local groups maintain interests that impact on the development of a municipal retrofit program. These can include unions, organizations with interest in

health and welfare, social action, environment, or women's issues, philanthropic or charitable institutions. These groups can be of great assistance if they see the project is consistent with their aims and objectives. They can also represent a negative force if their views are not sought or ignored.

4.2 What to Ask For

4.2.1 Publicity

Every group or association has a means of communicating with its members, and a desire to provide information and informed advice. Mechanisms include newsletters, magazines, and regular meetings. Such devices are only useful if they can offer current information or news, so organizers welcome the opportunity to disseminate newsworthy items to their members. Speakers on topical subjects of interest to the members are always welcome at regular meetings. Don't wait to be asked to speak. Take the initiative to promote the retrofit program by advising on the availability of a speaker and topic.

Community newspapers, radio and television require news for their readers, and will welcome delivery of information by local politicians or community leaders. Programs addressing housing will resonate well with local media.

4.2.2 Access to Information

Utility data will form an important component of the monitoring and measuring of results of the retrofit program. Ensure that high quality data will be available for before and after figures by enlisting the support of local utilities. Other associations may have their own utility usage data, surveys, or studies that may be useful in painting a complete picture of the scope of the retrofit program.

4.2.3 Funding

Enabling funds to start a program can come from many sources. Industry associations will contribute to the development of a program that will result in work for their members. Utilities, financial institutions, downtown redevelopment associations, to name a few, will all want to assist the municipality in the launch of a program with the clear goal of improving the environment and the building infrastructure of the community.

Finding funds for a revolving loan or a securitization fund requires a source or group of sources who will "step up to the plate" and make a contribution without looking for repayment or a return. The municipality itself, other levels of government, energy utilities, or donations from a variety of sources can be used to set up these pools of capital.

Project financing funds can be obtained from more traditional lenders, although longer-term loans rely heavily on the creditworthiness of the building owner.

4.2.4 Technical Information

There is a large resource of technical information available from governments, utilities, building owners associations, and professional organizations, on the retrofit of buildings to reduce energy use. Much of this is available at no cost, or it may require the purchase of a document. The Internet is a remarkable resource for this type of information. For the most part, there is no need to “re-invent the wheel” as the technology is well understood, and the experience has been recorded.

4.2.5 Monitoring Data

Data collection, both pre- and post-retrofit is integral to proving the value and size of energy savings and to measure greenhouse gas emissions reduction. The fundamental unit of data comes from the utility meter that has verifiable accuracy. The scope of an individual program will determine the amount and type of data collection. Larger urban centres such as Toronto and Phoenix gathered large amounts of information to reflect their needs of GHG reduction and energy conservation respectively. The key to data collection is a clear understanding with partners as to who will be responsible for collecting and sharing data.

Pre-retrofit data provides a standard by which all progress is measured, as well as determining the potential value in energy savings as a qualifier for financing.



Example

Baseline studies conducted in Toronto prior to the BBP launch also provided a measurement for GHG, a first step towards realizing the aggressive goal of reducing CO₂ emissions by 20%. Toronto’s Energy Efficiency Office implemented an energy accounting and tracking system for each of the more than 800 buildings owned by the city.



Example

In Phoenix, the original audit of eighty municipal buildings assisted the city in setting baselines and future goals for energy conservation. The early work of the Utilities Monitor established patterns for energy consumption in all city buildings. Once this early work had been completed, progress could be quantified and early successes duplicated in other buildings.

Post-retrofit data confirms the integrity of the project and allows for cost savings measurement. Phoenix undertook a massive monitoring measure in 1989, which saw *all* past projects verified to ensure that reported energy savings had continued as originally projected. The audit confirmed that 80% of energy management projects were still fully operational. As a result of the audit experience, monitoring of past projects continues today, with non-operational projects identified and removed from the savings database. The EMP routinely monitors energy use in twenty of its largest buildings in order to identify energy use patterns out of the norm and confirm individual project savings.



Example

In Peterborough, under the new EnerGuide for Houses program, database information is gathered by Green Up assessors and forwarded to the Green Communities Association. Natural Resources Canada partially sponsors the home visit—to a maximum of one visit per house. Green Up keeps records to ensure that homes are not visited more than once.

The Sustainable Peterborough initiative has the partner ESCO (VESTAR) collecting data on energy consumption in municipal buildings as part of its commitment to the project. Sustainable Peterborough staff have taken on the role of collecting CO₂ emissions data for the City of Peterborough in order to meet their commitment in the Partners for Climate Protection Program.



Example

In the Toronto BBP, data is collected on an ongoing basis by either the EMF in its normal course of business, or by the Energy Efficiency Office (EEO), including pre- and post-retrofit. The EEO amalgamates data into a central database and monitors city progress towards their target CO₂ emissions reduction of 20%.

Monitoring of specific projects is carried out throughout the retrofitting process by qualified inspectors to ensure that project goals are being met. The frequency of monitoring may also be increased at the client's request.

5. INTEGRATING EMFs, EXISTING REGULATIONS, AND OTHER MUNICIPAL DEPARTMENTS

5.1 Public Expectations for Referrals to EMFs

Where a municipality develops a list of recommended or approved firms to undertake energy retrofits and offers this to program participants, the public has an expectation that all firms on that list meet a defined standard which will ensure the quality of the work they perform. A partial list of required standards would include:

- Meets provincial and/or municipal licensing standards.
- Has a defined level of experience in the services offered.
- Employs only qualified staff.
- Provides regular skills training to ensure currency is maintained.
- Has a satisfactory track record of delivering the product or service on time, at the agreed upon price, and at a satisfactory level of quality.
- Maintains insurance for public liability, property damage, and continuing operations, at coverage levels consistent with the value of the work undertaken, and with the potential liability.

Such lists must be monitored and updated on a regular basis. Part of this monitoring will include recording customer complaints, and their ultimate resolution. The municipality may offer a mediation or arbitration procedure for the resolution of any disputes.

5.2 Existing Regulations

Municipalities and provinces have a number of regulations which apply to building energy retrofit work. Some of these include:

- Provincial building code and associated permit applications
- Fuel safety licensing and practices
- Trade licenses and practices
- Labour standards
- Health and safety standards
- Construction safety regulations
- Electrical codes and standards
- Hazardous materials handling and disposal (asbestos, mercury, PCBs, CFCs)

Where work is to be undertaken, it must be a condition of the contract that all such regulations must be followed.

A document that specifically addresses office operations, and provides guidance in the area of legal and other requirements is the *Resource Conservation and Cost Savings*

Opportunities Guide for Office Buildings, (1997) by the Ministry of Environment and BOMA Toronto. The document is available from BOMA Toronto, phone 416-596-8065.

5.3 Other Municipal Departments

A municipal retrofit program cannot operate in isolation within the civic administration. Project managers should approach other departments to obtain their cooperation and buy-in as the program is under development, and on a regular basis thereafter. Departments with an interest in the program may include:

- **Building Department:** Request their cooperation in expediting permit applications for work undertaken under the Building Energy Retrofit program. This is a benefit that can be passed on to participating EMFs, at no cost to the municipality, the EMF, or the client.
- **Property Department:** The buildings of the municipality “belong” to this department, and they are usually proud of their management and maintenance. Offering them benefits from retrofitting “their” buildings to be more energy efficient is only consistent with the steps that would be undertaken with any building owner.
- **Water Department:** Since many of the retrofits will affect water efficiency, this department should be brought on board. In many cases, they will have a defined list of efficiency measures that can be undertaken, and will welcome the opportunity to assist in the operation of a program.
- **Waste Management Department:** Building retrofits generate waste, some of which is hazardous. Fluorescent lamps contain significant amounts of mercury; some older fluorescent lamps ballasts may contain PCBs; undertaking work in the ceilings and boiler rooms of older buildings may involve removing or encapsulating asbestos. This department will want to ensure that these wastes are properly handled, and that disposal will be carried out in a manner consistent with their standards or regulations.
- **Health Department:** Where work is undertaken in municipal buildings, this department will want to ensure that the quality of the indoor environment will meet standards and recommendations.

6. PROMOTING THE PROGRAM

6.1 *Developing a Profile*

A well-recognized retrofit program whose name (see Section 2.1) becomes a hallmark that immediately identifies it in the mind of the public stands a better chance of success than one whose name is known only by a few individuals at city hall. Potential participants will want to know that the program is a legitimate enterprise from which they will benefit by becoming involved.

As soon as the program is assured of moving forward, it's a good idea to plan a kick-off event. Invite the media to witness the Mayor or other high-profile local celebrities "cut the ribbon" on the inception of the program. Invite all those who participated in the planning process, as well as current and potential partners and clients.

6.2 *Recognizing and Rewarding Participation*

One of the most important ways of promoting a program is to recognize those who participate. This recognition should be undertaken in a very public way, by presenting a plaque or other symbol of their achievement. The presenter must be an individual with a significant public profile, such as the mayor, a well-known councillor, or a provincial or federal politician. Other options include individuals with a high profile in the energy conservation or environmental arena. Press notices should be sent out well in advance, and press releases must be distributed at the event. This recognition will help to expand the program once it gets past the initial startup period.

Adopt the same approach for retrofits in municipally owned buildings. Municipal employees having responsibility for one or more buildings will welcome receiving recognition for their efforts at implementing an energy retrofit program. It will also ensure that they will be willing participants in the next phase for their building.



Example

The BBP focuses on publicity for its partners and clients offered an exposure far greater than any purchased media campaign could attain. This media exposure was of tremendous value, both to the BBP in terms of publicity for the program and its objectives, and as a value added benefit to the commercial building owners to increase their corporate profile as environmentally aware community members.

6.3 *Working with Program Champions*

A municipal building energy retrofit program can benefit greatly from having one or more program champions within the municipality. Such champions will lead the discussion on program development at council meetings, act as a spokesperson at public gatherings, and may even assist with marketing the program to high profile clients.

Program champions may also be drawn from the public at large where an individual is seen as having a public profile in an area consistent with the program goals and objectives.

 **Example**

Support by environmentally aware Toronto City Councillors and other political champions, who believed in the concept of sustainable development, was critical to the eventual development of the Better Buildings Partnership. The BBP has also invited David Suzuki to speak at major retrofit project launches. Mr. Suzuki has become a strong and visible supporter of the BBP.

7. OTHER PROGRAM OPTIONS AND ISSUES

7.1 Monitoring Energy Savings

Each program needs a clear process of monitoring energy savings, on a project-by-project basis. Some projects may operate on the basis of projected savings by calculation, but this is not sufficiently accurate for determining the amount of energy cost savings to be repaid to an ESCO or to a revolving loan fund. Additionally, energy savings have a tendency to be lost over time as good energy management practices are overtaken by other priorities. This can only be managed by monitoring and tracking energy use on a regular basis, and then reviewing the results.

The fundamental basis for energy monitoring for savings is that the client and the EMF agree on the methodology. A base year or “baseline” is established at the commencement of the project, which is usually determined by a careful analysis of energy use during a recent 12 month period when the use and occupancy of the building were consistent with current conditions. Correction for weather to a “standard” weather year is made. Energy consumption after the retrofit has been completed is then measured, corrected to the standard weather year and compared to the baseline. The difference represents the energy saved.

Because building occupancy and use change over time, adjusting for this type of change requires a baseline readjustment. The EMF will collect information from the client on the type and timing of the change, and prepare an evaluation of the impact on building energy use. For instance, if a school building that was not previously used for community purposes began to offer night school classes, this would extend the hours of operation, requiring a baseline readjustment. The details of the proposed readjustment are submitted to the client, and agreement is reached on the impact on energy use. This is then reflected in the calculation of savings.

There is now a protocol that is internationally accepted as the standard for monitoring and evaluating energy savings, entitled *The International Performance Measurement and Verification Protocol*. This document provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. It may also be used by facility operators to assess and improve facility performance. Energy conservation measures (ECMs) covered in the protocol include fuel saving measures, water efficiency measures, load shifting and energy reductions through installation or retrofit of equipment, and/or modification of operating procedures.

The MVP is maintained with the sponsorship of the U.S. Department of Energy by a broad international coalition of facility owners/operators, financiers, Energy Services Companies (ESCOs) and other stakeholders. Continued international development and adoption of MVP will involve increasingly broad international participation and management of the document as well as its translation and adoption into a growing number of languages and application in a growing number of countries.

The protocol document is available at no cost at <http://www.ipmvp.org/>

Example

In Phoenix, baseline information was collected through an initial audit process in 1981, as well as on an individual project basis before and after retrofitting activity. As future funding was contingent on the success of each project, careful monitoring of every initiative is carried out.

One of the early initiatives carried out by the EMP was the implementation of a Utilities Monitor position within the Energy Management section. The Utilities Monitor is responsible for checking every municipal energy bill for errors and inconsistencies, as well as establishing a history of energy consumption in individual buildings. With an energy consumption history in place, the energy monitor may gauge trends and pinpoint areas of potential efficiency measures. As of the end of the 1994-95 fiscal year, \$573,794 had been saved as a result of the Utilities Monitor identifying billing errors and correcting rate structures.

The EMP monitors energy use in twenty of its largest buildings in order to identify energy use patterns out of the norm while confirming project savings. The EMP reports annually to the City on the ongoing status of retrofitting projects and their savings to date. The City Auditor has taken on the responsibility of reviewing the savings reports.

7.2 Influencing Technical Requirements

Within its program, the municipality may want to set minimum standards for retrofits to which all participants must adhere. This is much easier to achieve if the program includes some contribution to the financing, such as a securitization or revolving loan fund, or other tangible assistance. Without this leverage, the program is usually reduced to the level of moral suasion, and it is less practical to exercise technical control.

As an example, there is a strong tendency in energy retrofits to “cream skim” or “take the low hanging fruit.” This results in only those measures with very short paybacks being included in the retrofit. The better approach is to include a mix of shorter term and longer-term-payback measures, resulting in a program that has an overall payback that meets the criteria of the client. The municipality could require such an overall approach by specifying a minimum payback period for any projects to be included in the program.

Where an experienced EMF has proposed a project that the client has accepted, it is unlikely that the municipality will bring sufficient expertise to the table to influence the project design and the selection of measures. EMFs are generally motivated to undertake the largest possible project, and this will include measures having both short and long paybacks. The project will have an overall payback that meets the tolerance of the client for the length of the contract term.

7.3 Liability and Other Legal Issues

The municipality will want to ensure that it is protected from any legal liability resulting from work undertaken by contractors for clients under the program. This would extend to ensuring that any recommendations made by the municipal program would not have any potential repercussions.

The legal departments or advisers to municipalities are experts at preparing the necessary documents to protect the municipality, but where this documentation exceeds normal commercial practice, it can have the effect of dampening the enthusiasm of prospective participants. Program managers should strive to maintain a balance between the need to encourage participants, and the need to protect the municipality.

7.4 The KISS Principle

Keep It Simple and Straightforward. This maxim applies in all dealings the municipality may have with public and private sector building owners. Through the use of standardized forms, documents drafted using common business language, and colourful descriptive informational publications, the program can be promoted and administered in an easy-to-participate manner.

Municipalities are not well known for taking this approach. Carefully drafted documentation, written in “legalese,” are more the norm. We counsel program designers to practice the KISS principle throughout the operation of the program. Ask your legal department to incorporate only those terms and conditions that are absolutely necessary.


7.5 An Integrated Approach: Implementing an Environmental Management System

If your municipality decides to implement an Environmental Management System (EMS), you may wish to consult the *Guide to the Implementation of an EMS Based on ISO 14001 for Municipal Facilities* (A joint publication of The Ministry of the Environment, CSA International, Enbridge Consumers Gas, and Union Gas). Order through CSA International at <http://www.csa-intl.org/onlinestore/> Publication No. PLUS 1154-01. This Guide provides assistance to municipal facilities for the development and implementation of an environmental system (EMS) based on ISO 14001. The scope of the Guide is limited to buildings or facilities used for commercial or institutional purposes.

An organization may choose to extend the scope of its EMS beyond that of the Guide. For the municipal sector, the most practical unit of consideration for an EMS is a municipal building, along with any associated buildings, such as parking garages that serve the main building. Where several municipal buildings are located on a single site, the site would be the unit of consideration. A municipality with more than one site could have one EMS for the entire municipality, with site-specific detailed management

practices and procedures for each location that address and describe the requirements of the municipal EMS.

7.6 Using the Internet

 Help and information on retrofitting municipalities is available on the Internet. The following will give general information, and suggest other routes and links for further help.

- Municom Network (an intranet service with a fee)
<http://www.amo.on.ca/municom/municom.html>
Policies, rules and regulations specific to Ontario municipalities
- Partners for Climate Protection Program
http://www.fcm.ca/vti_bin/shtml.dll/index.html
Federation of Canadian Municipalities (FCM) and International Council for Local Environmental Initiatives (ICLEI) joint program to support Canadian municipal governments to prepare and implement local climate action plans.
- Natural Resources Canada, Office of Energy Efficiency
<http://regulations.nrcan.gc.ca/menue.htm>
Energy efficiency regulations
- CSA International
<<http://www.csa.ca>>
CSA International is an independent not-for-profit organization that is a leader in the field of standards development and the application of these standards through product certification, management systems registration, and information products.
- TC207
<www.tc207.org>
Technical Committee 207 oversees the ISO 14000 family of international standards. The Secretariat of ISO/TC207 is held by CSA International on behalf of Canada's member body, the Standards Council of Canada.
- ISO 14000 Integrated Solutions (IIS) Online
<<http://www.iso14000.org>>
Operated by the Global Environment & Technology Foundation (GETF) and the American National Standards Institute (ANSI). Subscribe online. Chat rooms, information on consultants, trainers, and registrars, news about ISO 14000 related developments and info on the ISO 14000 series of standards.
- ISO World
<http://www.omninet.co.jp/isoworld/>
ISO 14000 information and lists statistics about companies certified to ISO 14001 and

EMAS in the EU.

- 14000 Registry
<http://www.14000registry.com>
Organizations that meet the requirements of ISO 14001, and other standards, may post their corporate profile, connecting them to the global marketplace.
- International Network of Environmental Managers
<http://www.inem.org>
Valuable tips and tools related to EMS/ISO 14001/EMAS.
- The ISO 14000 InfoCenter
<http://www.iso14000.com>
Advertisements for books, newsletters and other resources, as well as lists of acronyms dealing with ISO 14000.
- Management Alliance
<http://www.mgmt14k.com>
Information on integrating ISO 14000 with ISO 9000, and articles on ISO 14000.
- Standards Council of Canada
<http://www.scc.ca> or info@scc.ca
General information on standards, including a price list.
- ISO Online: International Organization for Standardization
<http://www.iso.ch>
Demystifies ISO 9000 and 14000; listing of technical committees, meeting schedules, and ISO member bodies. Free brochures. Excellent FAQs.
- Metro Works
<http://www.metrotor.on.ca/works/index2.htm>
Blue Box Recycling, Solid Waste Management, Water Efficiency, Composting, Public Consultation. References Toronto; also good general information.
- Pilot Performance Resource Management Inc.
<http://web.idirect.com/~pilotiso/>
ISO 14001 training courses, FAQs, environmental awareness links.
- NSF International
http://www.cssingo.com/nsfgate.html#EnvironmentalManagement_Systems_ISO_14000
The document entitled “Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations” can be downloaded from the above site. This document provides ISO 14000 Implementation guidance regardless of the type of business and provides numerous tips and suggestions for implementation.

- Health Canada: Environmental Health Program
<http://www.hc-sc.gc.ca/main/hc/web/ehp/ehd/>
Publications, information, What's New, Chemical Hazards, Product Safety, Tobacco Control, Radiation Protection, Environmental Health Assessment, Toxic Substances, Research Initiative, Commercial Products Office.
- Saxe Fax
<http://www.envirolaw.com/faxletters>
A regular Internet newsletter published by Canadian environmental lawyer Dianne Saxe, which gives updates on legal cases and environmental legislation. Excellent links to other environmental law sites.
- Willms & Shier
<http://www.willmsshier.com/index.htm>
Environmental publications, Faxflashes, newsletters, articles, books. Wealth of information, well laid out.
- Ontario Ministry of Environment
<http://www.ene.gov.on.ca/>
Publications, Environmental Bill of Rights, articles, information and:
<gopher://govonca.gov.on.ca:70/11/env/manual>
For MOE Policy Manual: official policies on air, water, waste, land use, environmental assessment guidelines
- Recycling Council of Ontario
<http://www.rco.on.ca/>
Waste minimization and resource conservation, Waste Minimization Awards, fact sheets, library and research service.
- U of T. Environmental Information Office
<http://www.utoronto.ca/env/esnewmay.htm>
Information about all environmental research and teaching at the University. Courses, seminars, research papers, Environews.
- American Society for Quality Control
<http://www.asqc.org>
Information on all of ASQC's standards related activities and information about ISO 14000 and 9000 registration accreditation programs in the United States.
- U.S. Environmental Protection Agency(EPA)
<http://www.epa.gov>
Information on environmental compliance, including the new EPA policy on environmental auditing, links to EPA regional offices, and links to other government web sites.

APPENDIX A: ACRONYMS USED IN THIS DOCUMENT

BBP - Better Buildings Partnership
BOMA – Building Owners and Managers Association
CAESCO - The Canadian Association of Energy Service Companies
CIPH - Canadian Institute of Plumbing and Heating
CO₂ - Carbon dioxide – may also be used to mean carbon dioxide equivalent, which designates the inclusion of other greenhouse gasses on the basis of their Global Warming Potential
CWDMA - Canadian Window and Door Manufacturers Association
DIY - Do-It-Yourself
DSM- Demand-side management
ECSD - Environmental and Conservation Services Department
EEO - Energy Efficiency Office
EMF - Energy management firm
EMP - Energy Management Program
EMS - Environmental Management System
EPA - Energy performance agreement
EPC - Energy performance contracting
ESCO - Energy Service Company
FCM - Federation of Canadian Municipalities
GCA - Green Communities Association
GHG - Greenhouse gas
HRAI - Heating, Refrigeration and Air Conditioning Institute of Canada
HVAC - Heating, ventilating, air conditioning
HVACR - Heating, ventilating, air conditioning, refrigeration
IAQ - Indoor air quality
ICLEI - International Council for Local Environmental Initiatives
KISS - Keep it simple and straightforward
MBRP - Municipal Building Retrofit Process
MPHA - Minnesota Public Housing Authority
MUR - Multi-unit residential
NCCP - National Climate Change Program
NRCan - Natural Resources Canada
PCP - Partners for Climate Protection Program
RFP - Request for proposal
SRP - Savings Reinvestment Plan
TAF - Toronto Atmospheric Fund