Ottawa Community Housing Case Study

Weatherization and Air Sealing Saves Energy, Improves Tenant Comfort and Enhances Building Stock

PROPERTIES

Four townhouse communities were targeted for weatherization retrofit repairs: Morrison Gardens, Albion Gardens, Albion Heatherington and Foster Farms. The communities were constructed between 1970 and 1974, and each contains between 124 and 209 units, for a total of 611 units across the four sites (table 1). Each site had uninsulated basement walls and exposed first floor framing, that is, the perimeter header above the foundation walls was either lightly insulated or uninsulated.

The program focused on retrofitting the uninsulated basement walls and headers as well as applying air sealing measures on all penetrations through the basement walls and first floor framing that were typically unsealed, contributing to cold basements and complaints of cold drafts.

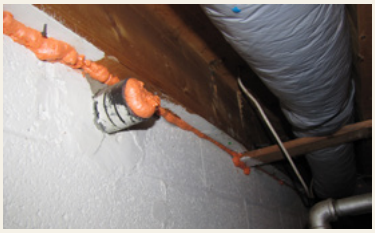

Table 1: Site information and project costs at Morrison Gardens, Albion Gardens, Albion Heatherington and Foster Farms

Site	Number of Units	Number of Units Retrofitted	Total Project Cost ($)
Morrison Gardens	129	90	$145,487
Albion Gardens	124	88	$115,510
Albion Heatherington	149	94	$130,759
Foster Farms	209	168	$297,335
TOTAL	611	440	$689,091

OPPORTUNITY

Ottawa Community Housing (OCH) had an opportunity to save energy, improve the building stock and enhance tenant comfort in its townhouse communities by retrofitting uninsulated and poorly sealed basement walls.

OCH took advantage of a free Enbridge Gas incentive program to implement weatherization projects across additional communities. The Enbridge Gas Home Winterproofing Program aims to improve energy efficiency through weatherization retrofits in social housing communities that are heated using natural gas.

PROCESS

Mock-up retrofit projects were completed at several units in each community in order to estimate the potential for energy efficiency improvements. Following the mock-ups, a comprehensive program was implemented within the four communities. The retrofit program was completed in three phases, as described below. Access to each unit was required for each phase.

Phase 1

Energy auditors hired by Enbridge's service provider EnviroCentre assessed existing conditions and conducted pre-retrofit audits. This included a visual review and blower door test to identify air leakage paths. Units with water infiltration concerns, foundations requiring maintenance repairs or tenant-finished basements were not upgraded as part of this program. As a result, approximately 75 per cent of the units at each community participated in the retrofit program. The information gathered during the pre-retrofit audits was then used to model and estimate energy savings potential.

Phase 2

Contractors applied insulation to the exterior basement walls and sealed plumbing and ventilation stacks, as well as other penetrations where air leakage was identified during the pre-retrofit audit. A layer of R-12 fibreglass insulation sandwiched between a moisture/vapour barrier was affixed with anchors to the basement walls from the top of the foundation wall to approximately 300 millimetres above the basement floor. No finishing was applied as the basement is considered storage space. The headers were sealed and insulated to R-20.

Phase 3

The blower door test was repeated and results were used to model the energy savings from the insulation and sealing. Auditors confirmed that all issues identified during the pre-retrofit audit had been addressed.

RESULTS

In the 12 months prior to the retrofits, Morrison Gardens, Albion Gardens, Albion Heatherington and Foster Farms consumed approximately 1.49 million cubic metres of natural gas.[1] In the 12-month period following the retrofits, annual natural gas consumption decreased to 1.24 million cubic metres across the four communities (figure 1).[2] This represents an average natural gas savings of 16 per cent and an estimated $91,000 in cost savings (table 2). This is equivalent to natural gas savings of 466 to 650 cubic metres per unit.

Natural gas savings of 16 per cent and an estimated $91,000 in cost savings

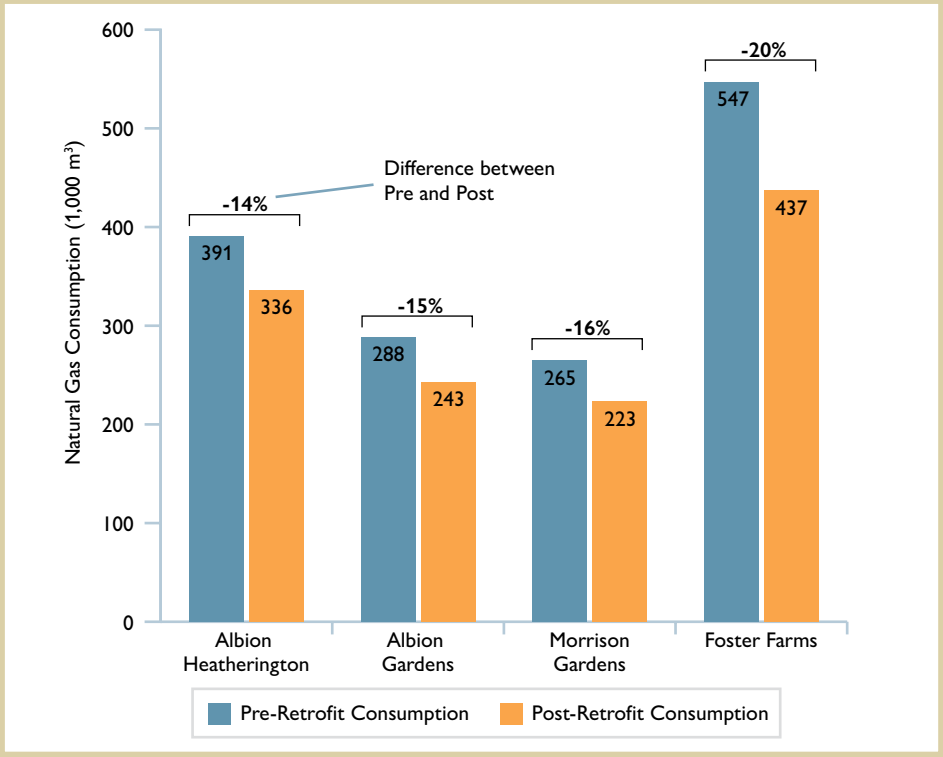

Figure 1 Natural gas consumption at Morrison Gardens, Albion Gardens, Albion Heatherington and Foster Farms

Table 2: Natural gas and cost savings and ACH reduction at Morrison Gardens, Albion Gardens, Albion Heatherington and Foster Farms[3]

Site	Natural Gas Savings (m^3)	Cost Savings ($)	Natural Gas Savings Per Unit (m^3/unit)	Air Change Per Hour (ACH) Reduction
Morrison Gardens	42,000	$15,000	466	0.11
Albion Gardens	44,000	$16,000	504	0.08
Albion Heatherington	54,000	$20,000	578	0.08
Foster Farms	109,000	$40,000	650	
TOTAL	**249,000**	**$91,000**		

[1] Pre-retrofit consumption data was based on the following periods and was normalized for weather:
Morrison Gardens – September 1, 2011, to August 31, 2012
Albion Gardens – January 1, 2012, to December 31, 2012
Albion Heatherington – March 1, 2012, to February 28, 2013
Foster Farms – July 1, 2012, to June 30, 2013

[2] Based on October 1, 2013, to September 30, 2014, data for all four sites, normalized for weather.

[3] Cost savings were based on an average 2014 natural gas rate of $0.36/$m^3$.

Table 3: Estimated payback period for Morrison Gardens, Albion Gardens, Albion Heatherington and Foster Farms

Site	Total Project Cost ($)	Cost Savings ($)	Estimated Payback Period (years)
Morrison Gardens	$145,487	$15,000	9.6
Albion Gardens	$115,510	$16,000	7.2
Albion Heatherington	$130,759	$20,000	6.5
Foster Farms	$297,335	$40,000	7.4
TOTAL	**$689,091**	**$91,000**	

LESSONS LEARNED

This retrofit project highlights the importance of supportive partners. In addition to providing a financial incentive to minimize OCH's costs, Enbridge supplied contractors and other service providers to handle project logistics, conduct pre- and post-retrofit audits, complete energy modelling and prepare fact sheets. OCH found that the project benefited from regular oversight and coordination with the contractors given the work taking place within tenants' homes and the variation in conditions being addressed.

Communities were informed of retrofit status by flyers, and tenants received specific notices 24 hours in advance of each entry into their units. To minimize disruption, property managers coordinated their entries with unit visits being performed for other purposes. Maintenance staff were also helpful in recommending optimal entry times based on their familiarity with tenants' schedules.

In addition to natural gas and cost savings, the biggest success of the weatherization projects was increased tenant comfort. Effective insulation and sealing eliminated drafts and contributed to warmer and more consistent indoor air temperatures in the winter. Post-retrofit follow-up has revealed that tenants are more satisfied with the warmth and comfort of their units.

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ALTERNATIVE TEXT AND DATA FOR FIGURES

Figure 1: Natural gas consumption at Morrison Gardens, Albion Gardens, Albion Heatherington and Foster Farms

Site	Pre-Retrofit Consumption	Post-Retrofit Consumption	Difference Between Pre and Post
Albion Heatherington	391	336	-14%
Albion Gardens	288	243	-15%
Morrison Gardens	265	223	-16%
Foster Farms	547	437	-20%