

Green Roofs

à la montréalaise

A demonstration project

A presentation of the Urban Ecology Centre



May 2005

GREEN ROOFS À LA MONTRÉLAISE

1.0 Introduction

Since January 2003, the Urban Ecology Centre has developed a project by which a demonstration model of a green roof on an existing flat-roofed triplex/duplex would be used to encourage surrounding homeowners to do the same. This example would document the effects on the surrounding air quality, the retention of water run-off and the interior temperature and energy use of the dwelling in question. The demonstration model would be used to encourage the City of Montreal's housing service to subsidize interested homeowners, and could eventually be part of the City's building regulations. This project proposes concrete measures to promote urban sustainable development that can be undertaken by citizens to improve their community.

In preparation to apply for the funding needed for this three-year project, we commissioned the background research illustrating the need, practicality and potential benefits of green roofs in Montréal. To this end, in 2004, the Urban Ecology Centre hired a bilingual researcher, Maude Landreville, on a HRDC summer student programme who carried out the research and wrote our Green Roof report which was launched in February 2005. She was carefully supervised by Lucia Kowaluk, the coordinator of the Urban Ecology Centre and by Owen Rose, a member of the board of directors and an architectural intern at Smith Vigeant architectes - a firm known for its promotion of 'green' architecture.

The first year of this project began in 2004 with the background research that covered the following aspects:

1. Gathering and analysing the literature on green roofs;
2. Finding and documenting the green roofs already in existence in Montreal;
3. Visiting and/or talking to the scientists at the National Research Council about green roof technology and learning about the methods of measuring air quality and water retention;
4. Summarizing the substantial academic work on green roofs;
5. Visiting green roof projects in Quebec City, Ottawa and Toronto;
6. Gathering information on the technology for building a green roof. This information is particularly available from major roofing manufacturers in Montreal, local architects, landscape architects, and structural engineers;
7. Making contact with government officials and politicians; and
8. Writing a substantial document that presents the findings of this research.

In June of 2005, the demonstration project will be built in the Milton-Parc neighbourhood on the roof of the Coopérative la petite cité located at 3518, rue Jeanne-Mance.

2.0 Green Roofs – Demonstrating the Possibilities

In Montréal, about 80% of the city's urban territory is covered with buildings and paved surfaces. Green roofs are one strategy to increase the percentage of green coverage within the city. Green roof technology is not new; however, proving that it works and installing it at lower costs is the current challenge. Montréal has a massive stock of existing residential buildings, notably the Montréal triplex that is found in the city's dense central pre World War II neighbourhoods. Part of our cultural heritage, these triplexes, with their flat roofs are ideal spaces to begin encouraging residents to install green roofs.

Among others, two commercial systems which are currently in use in Québec are produced by Soprema and Hydrotech. They both can function in a wide temperature range from -30 to as high as 110 degrees Celsius. The earth and vegetation covering protect and prolong the life of the roof's waterproof membrane. It is these improved qualities of the membrane that make it more durable, at least twice as much as that of the conventional roofing system, and at a cost which is lower or equal to the traditional system when amortized over a longer period of time. In addition, the expected energy cost savings are estimated at 10-20 percent per annum. Although intensive garden roofs exist for recreational use, the type of green roof proposed in this project has simple robust vegetation that survives in soil depths of about 150 mm (6"); thus, it would not be used as a garden. This is the least expensive installation. At higher installation costs, usable green roofs could also be promoted as additional recreational space and sources of urban vegetable gardens.

Approximately one third of the Plateau's entire surface area is covered by flat roofs. The majority of these roofs are privately owned. There are very real cost benefits to green roofs for urban infrastructure. For instance, rainwater retention can be higher than 50% of what would normally be transferred directly into the city's storm sewer system. This reduction alone reduces a city's water treatment costs. Green roofs filter airborne pollution and are proven to reduce ambient temperatures in the summer. Both of these effects reduce smog alerts and the resultant medical costs treating smog victims and the long-term effects of poor air quality on human health.

Putting a green roof on public buildings in this residential neighbourhood helps; however, they provide only part of the solution for the city. The data accrued from such public buildings is less convincing to individuals who own flat roofed triplexes. Our commitment is to encourage private residents to transform their roofs into healthy green spaces. Not only do we want to demonstrate to residents that the initial conversion costs are not as high as they may fear, but we also want to show them that a green roof could actually be a financial benefit to them. Economic incentives are a very important element in bringing about positive environmental changes in our society. To this effect, our documentation will be used to not only educate municipal, provincial and federal officials about the opportunities to further encourage environmental activities, but the project will also inform citizens of actions that they can take to improve their communities.

The goal of this project is to install a planted roof on an existing Montréal triplex or duplex owned by a cooperative on the Plateau Mont-Royal. This will demonstrate the possibilities of planted roofs in the city and help develop more local expertise in order to contribute to the reduction in building costs. The project will document and publicise the beneficial effects of green roofs; encourage more government and private subsidies; and create a concrete example for local residents to see that they are feasible.

3.0 Motivation

Urban population density offers many ecological advantages such as, the use of shared infrastructure, broad community and cultural amenities, specialized workforces, and economic efficiencies. However, this density of population and industry does present environmental impacts in the form of air, water, and noise pollution. There is also the heat island effect which is the heat generated by the urban built form as a result of the concentration of hard surfaces, and the loss of vegetation. This further increases city temperatures by 2-3 degrees Celsius as compared with those of the surrounding region. Many ecological problems associated with urban centres, to a certain degree, can be reduced with more natural green spaces. According to the Saskatoon Star Phoenix of May 3, 2003 Environment Canada estimates that utilizing just 6 percent of roof space in Toronto for vegetation could reduce summer temperatures by 1-2 degrees Celsius and result in energy cost savings of up to 5 percent.

Along with conservation efforts, green spaces can reduce atmospheric carbon dioxide and rainwater runoff. Increased vegetation filters airborne pollutants and helps reduce water pollution. Plants absorb and reflect solar radiation. Their transpiration and shade are ways of cooling the surrounding environment. This cooling effect then reduces the need for energy demanding air conditioning.

4.0 Objectives

- 4.1 Over three years, researching green roofs; installing a model planted roof on a typical Montréal triplex owned by a cooperative; and organizing education programmes to publicize the benefits of green roofs. The process will develop knowledge about the necessary structural and architectural interventions for the typical triplex in order to encourage this adaptation in the existing housing stock.
- 4.2 Seeking the participation of the National Research Council, led by Dr Karen Liu, for collecting and measuring the thermal, energy, and water retention performance of the project. This knowledge will be precise and convincing.
- 4.3 Documenting the process, its costs and effects in order to educate homeowners, builders, and politicians with the publication of a final report.
- 4.4 Distributing information describing the project and its results around the demonstration project inviting the public to visit the project and attend information workshops.
- 4.5 Collaborating with local environmental organizations, governmental departments, and private sector suppliers to promote the project.
- 4.6 Attracting media attention to ecological actions that local residents can take themselves.
- 4.7 Encouraging the City of Montréal to implement a green roof subsidy programme and green roof requirements in its building regulations.

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