



# ROSEMONT- LA PETITE-PATRIE

Mandatory cool roofs to mitigate urban  
heat islands

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*Source: Arrondissement Rosemont - La Petite-Patrie*

## THE SCIENCE

The urban heat island (UHI) effect is a phenomenon that makes urban areas warmer than their rural surroundings. Within an urban setting, many factors can enhance the likelihood of UHIs affecting a specific area. Several of these factors are directly linked to human interventions on the environment. For instance, the decrease of the urban forest and other green surfaces and the use of construction materials with high heat retention properties can contribute to the UHI effect. Cities can implement various measures to reduce these higher urban temperatures. For instance, some might decide to increase their urban forest coverage while others may choose to transform different types of urban surfaces by using alternative types of pavements or roofs.

The implementation of cool or green roofs helps reduce UHIs by reflecting solar radiation away from the roof (i.e. white and reflective roofs) or by cooling the air through evapotranspiration (i.e. green roofs). Unlike traditional roofs, cool roofs are designed with materials that give them both high reflectance and high emissivity allowing for minimal absorption of solar radiation and greater release of outgoing radiation. Indeed, cooling roof products are composed of highly reflective and emissive materials that can stay more than 10°C cooler than traditional roofs. Cool roofs can also help lower indoor temperatures, particularly on the top floors of buildings. When used on several buildings within a community, cool roofs can help reduce local air temperatures and lower peak electricity demand.

## THE TRIGGER

Located east of the downtown core in a central area of the City of Montreal, the borough of Rosemont-La Petite-Patrie is highly populated and densely built. In 2009, a new mayor was elected for the borough and had committed to work on initiatives that would reduce UHIs in the community as part of his electoral promises. In 2010, a study looking at various adaptation measures that could mitigate the impacts of UHIs in the area was commissioned and later presented to residents of the borough. As the area counts a large number of flat roofs with dark surfaces, one of the recommendations of the study was to promote the construction of cool roofs in the area. The borough therefore decided to revise its zoning by-law to mandate property owners to obtain a permit before either building a new roof or retrofitting an existing one. This amendment included the addition of new regulatory measures specifying that property owners wishing to replace or build a new roof must install a green (vegetative) roof, a white roof, a highly reflective roof, or a combination of these different types.

## THE APPROACH

Two public consultation meetings were first organized in Rosemont-La Petite-Patrie in collaboration with the researchers that led the UHI study. During these meetings, the researchers explained the causes of UHI to residents and presented the various initiatives that would be implemented in the borough and the reasons behind them. While the borough targeted all three adaptation options included in the study (increasing the tree canopy, transforming dark impervious pavement to vegetated



**Figure 15:** *The image above shows a residential building with a cool roof in Rosemont-La Petite-Patrie (Source: Arrondissement Rosemont-La Petite-Patrie)*

surfaces, and promoting eco-roofs), the community became the first in Canada to develop a comprehensive white and green roof regulation.

One amendment was made to the cool roof by-law since its implementation. Initially, the program allowed all white roofs to use a white gravel to cover the roof surface. Later, an amendment required the use of a white polymer membrane instead as they are known to be more efficient to reflect solar radiation away from the property. The use of white gravel remained permitted for older buildings built prior to 1960 as the construction style of these roofs made it impossible to use a white polymer membrane.

## THE OUTCOME

Approximately 2,000 roofs have been retrofitted since the implementation of the by-law, which represents roughly 10 percent of the flat roofs in the borough. While it is too early to tell if the roofs themselves had a significant impact on the temperature in the area on hot summer days, homeowners who have installed them have reported a decrease in temperature inside their homes combined with a reduction in energy use.

Some residents were initially worried that the installation of cool roofs would result in

higher heating demands in wintertime. However, these fears were proven unfounded because of several factors. First of all, there are fewer hours of sunlight in winter combined with a less direct angle in which sunrays hit buildings' roofs, which results in a very small amount of warming potential for buildings. In addition, if heating was to be generated from solar energy through the roof, the hot air would remain at the top of a building's structure and only provide minimal heat savings on rare occasions.

## **A WORD FROM ROSEMONT-LA PETITE-PATRIE**

According to François Croteau, mayor of the borough of Rosemont-La Petite-Patrie, the implementation of the cool roof by-law has been successful due to several factors. For instance, "the borough itself was ideal for this type of initiative as it is densely built and mostly composed of flat roofs. The cool roof program was therefore more likely to be adopted on a higher number of properties and have a greater impact on the UHI effect in the area." Mr. Croteau also believes that "the involvement of experts in the public consultation process contributed to both a higher acceptance and participation rate among homeowners of the borough." Since the implementation of the program in Rosemont-La Petite-Patrie, four other boroughs in the City of Montreal have implemented a similar cool roof by-law.