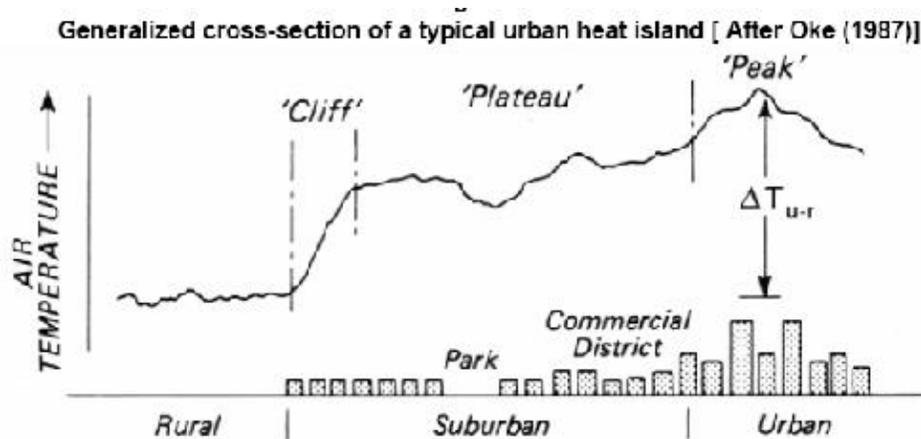


Reduction of the Urban Heat Island (UHI)

The urban heat island (UHI) is defined as an increase in temperature in an urban center relative to surrounding rural or natural areas due to increases in dark surface area such as roofs or pavement (Bass & Baskaran, 2003, p. 2; Liu, 2004).



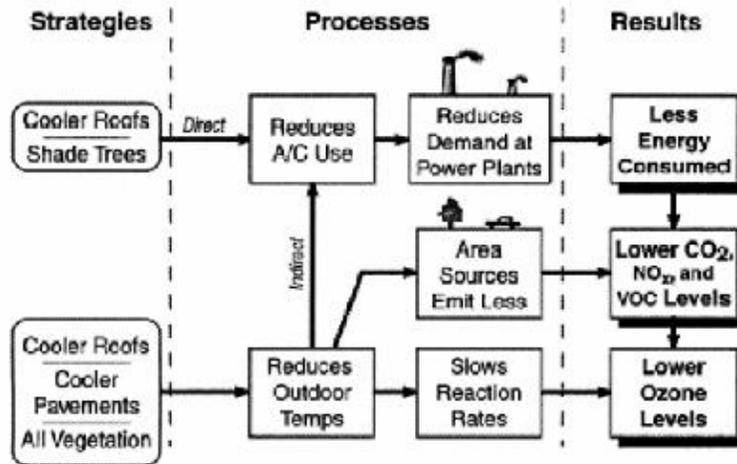
Source: Banting et al., 2005, p. 12

UHI can have tremendous impacts on the human and natural environment. Higher temperatures lead to greater energy consumption with frequent air conditioner use. Although electrical use is static up to a certain temperature, an increase of 2° C due to UHI may increase electrical use by 5 % with every increase of 1 °C (Bass & Baskaran, 2003). In addition, higher temperatures increase smog production and can negatively impact the health of the young and elderly as higher temperatures make it difficult to breathe and increases the risk of dehydration (Liu, 2003).

Green roofs can reduce temperatures through two processes: shading and evapotranspiration. Green roof vegetation has a solar albedo of 0.23 or absorbs 77 % of incoming solar radiation. Whereas a conventional roof (bituminous roof) has a solar albedo 0.12 or an absorption of 88 % of incoming solar radiation. Thus, the green roof reflects 23 % compared to a conventional roof's 12 % (Lazzarin et al., 2005). Overall, computer modeling with 50 % green roof coverage in the city of Toronto indicates a reduction in city wide temperature of 0.1 – 0.8 °C and with a wet enough substrate, temperatures could be reduced up to 2.0 °C (Bass et al., 2003; Banting et al., 2005).

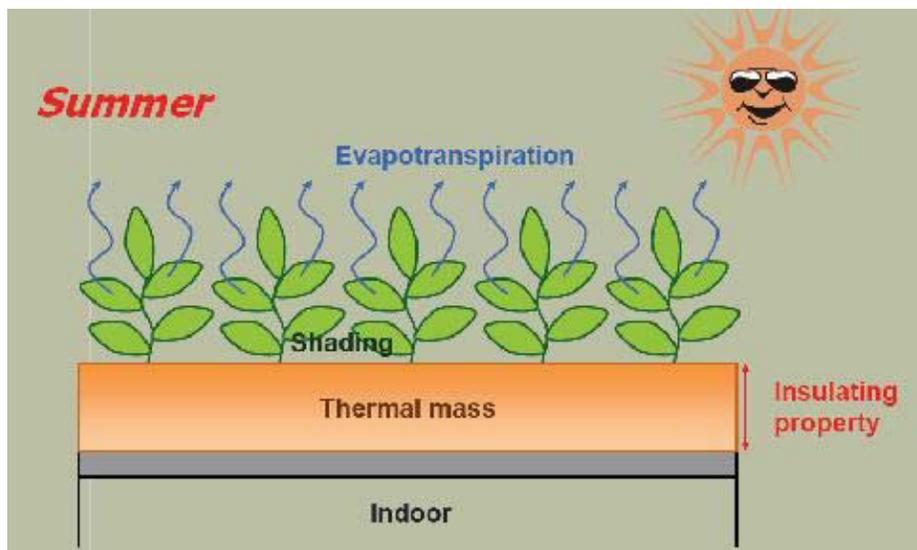
Reduction of the Urban Heat Island (UHI)

Methodology to analyze the impact of cool roofs and cool pavements on energy use. [After: Akbari et al. (2001)]



Source: Banting et al., 2005, p. 9

Water loss from vegetation through the processes of evapotranspiration can create a cooling effect. Heat (energy) is absorbed as water evaporates liquid to a vapor. Evapotranspiration from the green roof can potentially reduce ambient air temperature and roof temperature. Thus, on a wide scale application, green roofs can potentially reduce a city's UHI.



Source: Liu, (2006), Slide 3