

Rosenthal abstract:

Air temperatures in cities can register 2 to 10 degrees higher than in surrounding suburbs in summer and fall, resulting in a hotter urban environment, uncomfortable conditions, higher energy demand, and accelerated smog formation. Urban "heat islands" (UHI) are created principally by man-made surfaces, including concrete, dark roofs, asphalt lots and roads, which absorb most of the sunlight falling on them and reradiate that energy as heat. Also important is that many urban streets have fewer trees and other natural vegetation to shade buildings, block solar radiation and cool the air by evapotranspiration.

One of the fundamental characteristics that sets New York City and other urban areas apart from their suburban surroundings is this creation of the warmer climate that prevails over cities. (USEPA, 1997) Solar energy absorbed into asphalt roofs and paved surfaces causes the surface temperature of structures such as rooftops to become 50 - 70 degrees F higher than ambient air temperatures. (Taha, Akbari & Sailor 1992) The urban heat island is affected by a lack of moisture availability due to the large fraction of impervious surfaces. Stormwater runs off quickly, leading to a reduction in the cooling effects of evaporation (Sailor 1998).

These urban "hot spots" can create heat stress and other public health consequences for urban residents. Incoming solar radiation is absorbed by the roof and walls of structures, creating large differences in surface and ambient temperatures. The resulting higher temperatures increases demand for cooling energy in commercial and residential buildings in summer, costing residents and municipalities thousands of additional dollars in electricity bills. Increased summer electricity demand leads to increased peak load demand, increasing the need for electricity generation by power plants, creating higher emissions of sulfur dioxide, carbon monoxide, nitrogen oxides, and suspended particulates, as well as carbon dioxide, the greenhouse gas that contributes to global warming and climate change. Higher temperatures accelerate the formation of harmful smog, as ozone precursors combine faster to produce ground level ozone.

While researchers and policy makers have long understood the primary causes of urban heat islands, strategies to prevent, reverse or mitigate them in has only started recently in the United States. (USEPA, Gorsevski, Taha, Quattrochi, Luvall). Several urban areas, including Chicago, Salt Lake City, Los Angeles and Sacramento, are now exploring mitigation strategies involving design and engineering approaches that improve the thermal characteristics of buildings, such as green or reflective rooftops, to reduce the capacity of buildings to retain heat during hot and sunny days. The techniques and potential public health benefits of a pilot project to mitigate the urban heat island effect in New York City through implementation of green roofing techniques on residential buildings will be discussed.

Q: Q: There are many linkages between the design and condition of the built environment and environmental quality and human health. Many of these relationships -- e.g., between urban design and physical activity, are just now being explored by the public health community.

In what ways can public health researchers and practitioners influence land-use planning policies and urban management? Describe some examples of possible research strategies and points of interventions for improving the relationship between the impacts of community and urban design and public health.