MATTERHORN® METAL ROOFING

Urban Heat Island Fact Sheet

The main contributing factors to UHI are large asphalt surfaces with low reflectance values. As these surface warm, they heat the interiors of buildings and the air outside (1). Matterhorn Metal roofing products are made with a highly reflective surface to prevent heat absorption. This reduces roof surface temperature significantly, providing cooler homes and a more comfortable outdoor environment.

- Summer temperatures in urban areas are on average 13-16°F warmer than their surroundings (4).
- At night, urban temperatures can be as much as 22°F higher (3).
- Roofs comprise 20-25% of the exposed urban area that contributes to urban heat island (2).
- Cool Roofs, such as Matterhorn, can stay more than 50°F cooler than asphalt under the same conditions (5).
- These higher temperatures can double the air conditioning load of buildings and triple peak electricity demand (2).
- In US, 5-10% of community-wide electricity demand is used to compensate for the higher temperatures caused by the urban heat island effect (3).
- Urban heat islands raise demand for electrical energy in the summer, which intensifies greenhouse gas emissions and air pollution (3).
- Higher temperatures caused by heat islands facilitate chemical reactions that turn atmospheric compounds into smog (1).
- The increased temperatures and higher air pollution associated with urban heat islands can lead to respiratory difficulties, heat exhaustion, heat stroke, and heat-related mortality in sensitive populations (3).
- The EPA estimates that, between 1979 and 2003, heat exposure has caused more than 8,000 premature deaths in the US. This is more than hurricanes, lightning, tornadoes, floods, and earthquakes combined (4).

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Source

1. *Wang, Yupeng, Umberto Beradic, and Hashem Akbarib. "Comparing the effects of urban heat island mitigation strategies for Toronto, Canada." Energy and Buildings (2015). Web. 21 Aug. 2015.*
2. *Santamouris, M. "Cooling the cities – A review of reflective and green roof mitigation technologies to fight heat island and improve comfort in urban environments." Solar Energy 103 (2012): 682-703. Web. 21 Aug. 2015.*
3. *"Heat Island Effect." United States Environmental Protection Agency. N.p., n.d. Web. 21 Aug. 2015.*
4. *"Satellites Pinpoint Drivers of Urban Heat Islands in the Northeast." NASA. N.p., 13 Dec. 2010. Web. 28 Sept. 2015. <http://www.nasa.gov/topics/earth/features/heat-island-sprawl.html>.*
5. *"Cool Roofs." Energy.gov. N.p., n.d. Web. 28 Sept. 2015. <http://www.energy.gov/energysaver/coolroofs>.*

Roofing Surface & The Urban Heat Island Effect

The term Urban Heat Island refers to a phenomenon that causes air temperatures in urban areas to be significantly higher than their surrounding rural areas. The main contributing factors to UHI are large asphalt surfaces, such as roofs and roads, which absorb energy from the sun and radiate heat back into the atmosphere to increase city temperatures (1). In addition to making the city environment more uncomfortable, these higher temperatures increase a city's energy consumption, air pollution, and heat-related health complications.

Much of the problem with UHI can be attributed to roofing materials. Roofs comprise 20-25% of the exposed urban area that contributes to urban heat island and are most commonly made of asphalt shingles that reflect only 5% of incoming solar radiation (2). This property causes asphalt shingles surface to reach temperatures of up to 160°F in the summer (6). As a result, Urban Heat Islands can experience temperatures as much as 16°F higher during the day and 22°F higher at night (4,3).

The key to eliminating this effect on roofs is increasing roof reflectance values, which can significantly decrease roof surface temperatures. ENERGY STAR rated roofing products employ Cool Roof Technology to reflect a large percentage of incoming solar radiation and lower roof surface temperatures by up to 50°F (5).

Figure 1 shows that greater temperatures induced by the Urban Heat Island Effect cause increased energy consumption due to heightened air conditioner use. In fact, studies show that UHI can actually double the air conditioning load of a building and triple its peak electricity demand (2). In the US, 5-10% of community-wide electricity demand is used to compensate for the higher temperatures caused by the urban heat island effect (3). This surge in electricity consumption intensifies greenhouse gas emissions and air pollution from energy production plants, which degrades the urban environment and contributes to global warming. Higher urban temperatures also facilitate the chemicals reactions that turn atmospheric compounds into smog, further adding to urban air pollution.

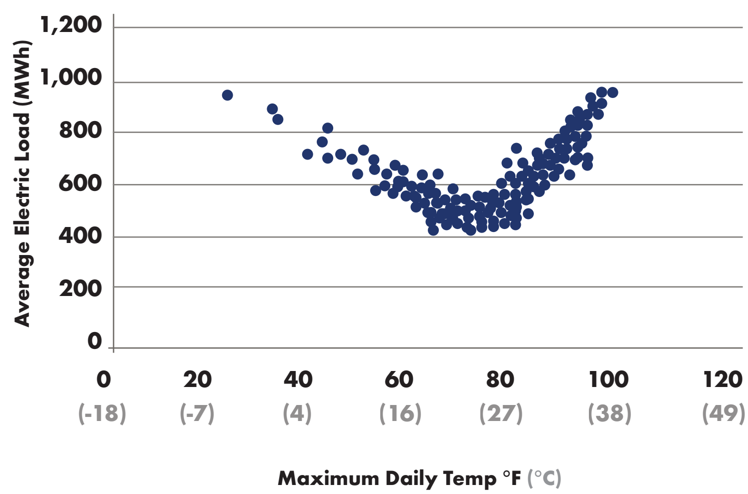

Figure 1: As maximum daily temperature increases above 65F, the average electricity load of the city increases by hundreds of MWh (1).

The increased temperatures and higher air pollution associated with urban heat islands can substantially impair human health. According to the EPA, the problems incurred by UHI can lead to respiratory difficulties, heat exhaustion, heat stroke, and heat related mortality in sensitive populations (3). Data collected between 1979 and 2003 indicates that exposure to extreme heat has caused more that 8,000 premature deaths in the US (4). This is more than hurricanes, lightning, tornadoes, floods, and earthquakes combined (4).