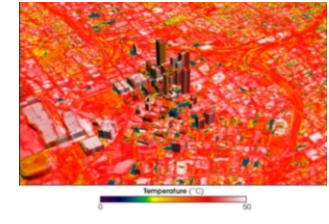




Michaels Engineering LEED® Brief

URBAN HEAT ISLANDS



SUGGESTIONS...

Do you have certain LEED® topics you'd like to know more about? Send an email with your suggestion to the author listed below and your topic might become a future LEED® Brief!

DID YOU KNOW...

...if all buildings in the United States were to switch to white roofs, the energy savings would be about 10 TWh per year (10,000,000,000 kWh per year)!

...reducing the Urban Heat Island effect increases comfort in the surrounding environment for workers, tenants, or anyone visiting the building.

MEET THE AUTHOR



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→ URBAN HEAT ISLANDS

Los Angeles spends an extra \$100 million each year due to the "Urban Heat Island" effect, according to a study by the Heat Island Group at the Lawrence Berkeley National Lab. This is not only a problem for sun-belt cities, although the effects are more pronounced in those areas due to their mild climates.

The Urban Heat Island effect is caused by dark, massive materials used in building construction and paving of parking lots & roads, which absorb more of the sun's heat than lighter colored materials. This result is coupled with the removal of vegetation, which would otherwise provide shade and water transpiration to the surrounding area.

The effect can actually be seen in this image of "Hot-lanta", taken by NASA from a Lear jet in 1997. The daily high temperature when this picture was taken was 80F (26.7C). Still, surface temperatures on buildings in the city rose as high as 118F (47.8C)! (Image from NASA/Goddard Space Flight Center Scientific Visualization Studio. Image obtained from NASA Earth Observatory webpage)

Not only does the Urban Heat Island effect increase cooling demand (and consequently energy costs, power plant construction, and pollution), but it also makes outdoor areas increasingly hot and uncomfortable.

There is a mild heat gain benefit in the winter in Northern states due to Urban Heat Islands, but these effects are outweighed by electricity savings, taking transmission into effect. Since electricity is more expensive than gas, there is a pronounced financial benefit from reducing the heat island effect in most city locations. (See the 'Cool Roofs' Energy Brief).

→ COMBATING THE URBAN HEAT ISLAND EFFECT FOR LEED® CREDIT

The LEED® program gives credit for combating the Urban Heat Island effect on both fronts listed above: introducing shade and reflecting more solar energy off of surfaces by using lighter colored materials.

Credit 7.1 includes landscape shading requirements. This credit results in more comfortable ambient conditions around buildings, providing a better environment for people in business districts and neighborhoods. It also reduces the ground and air temperatures directly around the building, reducing summer air temperatures supplied to building ventilation and subsequent cooling requirements.

Credit 7.2 includes roof reflectance and green roof criteria. Following this credit results in lower surface temperatures (potentially 30-35F lower peak skin temperatures) on the roof, which reduces the heat transferred into the building through the roof and the corresponding cooling load. One study estimated that if all buildings in the United States were to switch to white roofs, the energy savings would be about 10 TWh per year (10,000,000,000 kWh per year). By reducing the skin temperature on the roof, a white roof also increases roof life by reducing thermally induced stresses.

→ CONCLUSIONS

Implementing strategies to reduce the Urban Heat Island effect has financial and societal benefits in most urban areas in the United States. It reduces peak cooling demand, which reduces the need for power plant construction. It also increases comfort in the surrounding environment for workers, tenants, or anyone visiting the building.