
URBAN HEATING ISLAND EFFECT

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LANDSCAPE ARCHITECTURE
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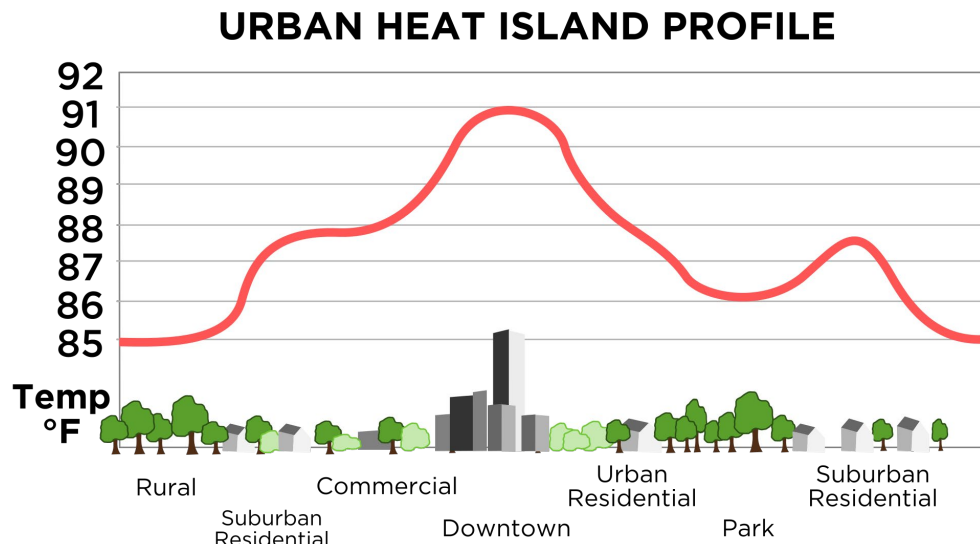


Source: Olmsted Network

WHAT IS URBAN HEAT ISLAND EFFECT?

According to the Environmental Protection Agency (EPA)(n.d.), urban heat island effect is the phenomena that happens in urbanized areas due to infrastructure like roads and buildings that hold onto and “re-emit the sun’s heat”. These areas get called islands due to how concentrated they are and are hotter compared to a natural landscape (EPA, n.d.).

- **How hot can it get?**
 - 1 to 7 degrees (F) hotter in the day, 2 to 5 degrees (F) in the night



Source: Wikipedia

A BRIEF HISTORY OF URBAN HEAT ISLANDS

- It's a rather recent phenomena, being investigated in European cities by E. Renou in 1868 and J. Hann in 1885, both who observed 3-hourly and daily minimum and maximum temperatures (Stewart et al., 2021).
- Alfred Angot in 1896 reported the heat island in Paris hourly, noting “the maximum values in the later half of the night” and the “negative values...at noon or several hours before noon, depending on the season” (Stewart et al., 2021).
- T. R. Oke in 1982 comprehended the studies before him and had done other diurnal cycle experiments, with a conclusion like Angot on how the night typically would have drastic changes in temperatures compared to the day (Stewart et al., 2021).

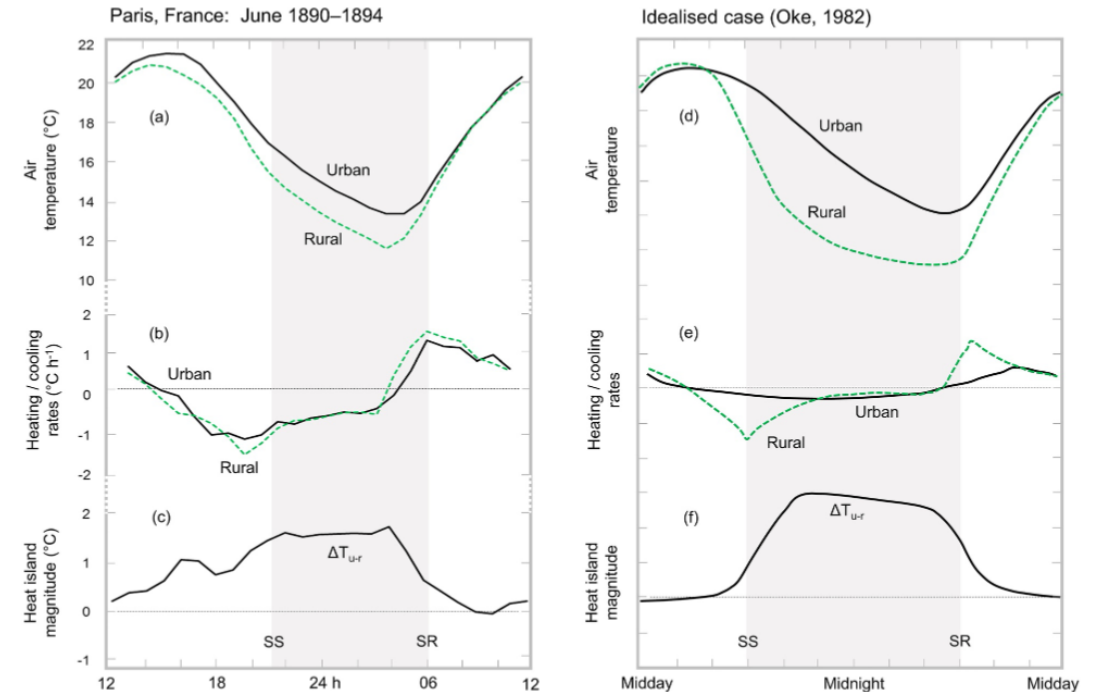


Figure 1. Time evolution of the 2-m atmospheric urban heat island. Left: (a) Hourly air temperatures for a pair of synchronously operating urban and rural climate stations in Paris (France) for the month of June, 1890 to 1894, and the corresponding (b) heating/cooling rates and (c) urban heat island magnitudes (ΔT_{u-r}). In June, weather in Paris is moderately wet with light winds and abundant sunshine. SS = sunset; SR = sunrise. Data sourced from Angot (1896). Right: The idealized form of (a), (b), and (c) developed by Oke (1982) for urban and rural environments in clear, calm summer weather. *Urban* line represents the compact core of a large city (pop. > 100,000); *rural* line represents the flat, open countryside. Vertical units in right panel are $^{\circ}\text{C}$ for (d) and (f), and $^{\circ}\text{C h}^{-1}$ for (e). Redrawn from Oke (1982).

Source: Earth's Future Volume 9, Issue 10

LAWS CONCERNING URBAN HEAT ISLANDS

Excess Urban Heat Mitigation Act of 2022

Introduced in House on 4/18/2022, the Act establishes a program for heat mitigation in urban areas. The program gives a grant to select projects to fight off or mitigate urban heating (Excess Urban Heat Mitigation Act of 2022, 2022)

Unfortunately, there aren't many laws that concern urban heat islands besides this Act. However, there are many things urban planners can do to combat urban heat islands including:

- Green roofs
- Cool pavements
- Tree and vegetative covers
- Rain gardens

Important actors include Representatives Ruben Gallego and Bonnie Watson Coleman, and The International Federation of Red Cross and Red Crescent Societies.



THE BENEFITS OF HEAT ISLAND MITIGATION TO THE EPA

- Cool cities
- More habitat for wildlife
- Potential storm management (rain gardens, green roofs, green infrastructure)
- Depending on the size, potential for recreational activities
- Cleaner air
- Lower greenhouse gas emissions
- Reduce the impacts of climate change
- Betterment of the people in urban areas



FINAL TAKEAWAYS

- It gets hotter in an industrious city vs. a rural area
- As cities popped up and climate change does its course, we notice the effects of urban heat islands
- There aren't many laws concerning urban heat island effect
- There are many ways to mitigate the effects with better and greener urban planning
- Greener planning also carries other benefits



SOURCES

Excess Urban Heat Mitigation Act of 2022, H.R.7534 (2022). <https://www.congress.gov/117/bills/hr7534/BILLS-117hr7534ih.pdf>

Stewart, I. D., Krayenhoff, E. S., Voogt, J. A., Lachapelle, J. A., Allen, M. A., & Broadbent, A. M. (2021). Time evolution of the surface urban heat island. *Earth's Future*, 9, e2021EF002178. <https://doi.org/10.1029/2021EF002178>

United States Environmental Protection Agency. (n.d.) *Reduce Heat Island Risks*. <https://www.epa.gov/heat-islands/reduce-heat-island-risks>

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