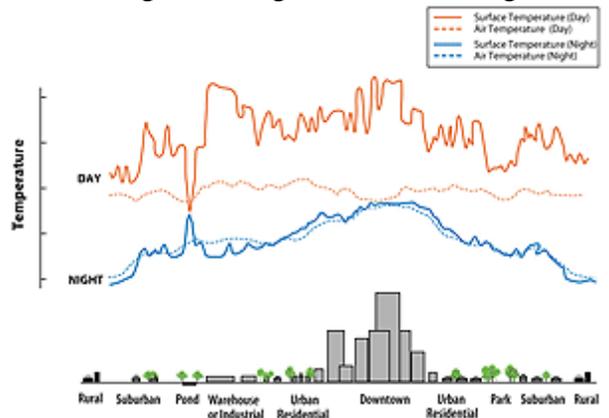


What Is an Urban Heat Island?

As urban areas develop, changes occur in their landscape. Buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist become impermeable and dry. These changes cause urban regions to become warmer than their rural surroundings, forming an "island" of higher temperatures in the landscape.

Heat islands occur on the surface and in the atmosphere. On a hot, sunny summer day, the sun can heat dry, exposed urban surfaces, such as roofs and pavement, to temperatures 50–90°F (27–50°C) hotter than the air, while shaded or moist surfaces—often in more rural surroundings—remain close to air temperatures. Surface urban heat islands are typically present day and night, but tend to be strongest during the day when the sun is shining.



Why Do We Care About Heat Islands?

Elevated temperature from urban heat islands, particularly during the summer, can affect a community's environment and quality of life. While some heat island impacts seem positive, such as lengthening the plant-growing season, most impacts are negative and include:

- *Increased energy consumption:* Higher temperatures in summer increase energy demand for cooling and add pressure to the electricity grid during peak periods of demand.
- *Elevated emissions of air pollutants and greenhouse gases:* Increasing energy demand generally results in greater emissions of air pollutants and greenhouse gas emissions from power plants.
- *Compromised human health and comfort:* Warmer days and nights, along with higher air pollution levels, can contribute to general discomfort, respiratory difficulties, heat cramps and exhaustion, non-fatal heat stroke, and heat-related mortality.
- *Impaired water quality:* Hot pavement and rooftop surfaces transfer their excess heat to stormwater, which then drains into storm sewers and raises water temperatures as it is released into streams, rivers, ponds, and lakes. Rapid temperature changes can be stressful to aquatic ecosystems.

What Can Be Done?

Communities can take a number of steps to reduce the heat island effect, using four main strategies:

- increasing [tree and vegetative cover](#);
- creating [green roofs](#) (also called "rooftop gardens" or "eco-roofs");
- installing [cool—mainly reflective—roofs](#); and
- using [cool pavements](#).

Typically heat island mitigation is part of a community's energy, air quality, water, or sustainability effort. Activities to reduce heat islands range from voluntary initiatives, such as cool pavement demonstration projects, to policy actions, such as requiring cool roofs via building codes. Most mitigation activities have multiple benefits, including cleaner air, improved human health and comfort, reduced energy costs, and lower greenhouse gas emissions.

Initiatives for Florida

Locality	Mitigation Strategy	Title & Description
Cocoa Beach	Cool Roofs	Our Savior's Elementary School - Our Savior's Elementary School in Cocoa Beach participated in a study conducted by the Florida Solar Energy Center. The school applied a simple white acrylic coating to its roof. As a result, the reflectivity of the roof increased from 23% to 68%. Despite being an energy-efficient building, adding the roof coating reduced annual energy consumption by approximately 13,000 kWh and average electricity power demand to decline by 10%. The roof coating saved the school approximately \$850 per year and increased student and employee comfort.
Miami-Dade County	Trees and Vegetation	Million TREES Miami (MTM) - MTM is a communitywide effort to plant one million trees by 2020. Miami-Dade County created the Street Tree Master Plan as a framework to design and implement street tree planting. This complements the city's landscape and tree ordinances and will help reach the goal of 30% tree canopy cover in the city by 2020. The program will help mitigate the urban heat island effect in Miami and reduce the city's energy consumption. Other co-benefits include reduced stormwater runoff and improved air quality.
Orlando	Trees and Vegetation	Code of the City of Orlando - Orlando, Florida, specifies that trees must be planted along both sides of a street, with one tree every 50 to 100 feet (15-30 m). The selected trees must eventually be capable of reaching a minimum height of 40 feet (12 m) and a crown spread of 30 feet (9 m).
Port St. Lucie	Cool Roofs	Oxbow Eco-center - The Oxbow Eco-Center is an environmental learning center that was constructed using green building technologies. The building was painted with light-colored or reflective paints and built using recycled and recyclable materials. The floors were built from salvaged pine trees from the St. Johns River, and a cistern system was installed to catch rainwater to flush the toilets.
Tallahassee	Cool Roofs	The City of Tallahassee - The City of Tallahassee offers loan programs for residential home or commercial upgrades to more energy efficient practices. One of these upgrades is for the installation of a reflective roof. The programs offer \$500 to \$20,000 for these loans, depending on the residents' needs. The terms of the loan are for 5 years at 5% annual interest and a 1% processing fee, with no penalty for early payoff. There are no income requirements; residents only need to have 12 months of account history.

Urban Heat Island Reading Questions

Directions: Answer the following questions on your own paper. Write complete sentences.

1. What is an urban heat island? Explain in your own words.
2. Use clues from the reading to provide a definition for permeable.
3. How much hotter can urban surfaces be heated in comparison to natural surfaces?
4. When is the effect of the urban heat island the greatest? Explain why.
5. Provide four reasons why learning about urban heat islands is important.
6. How can an urban heat island impact water quality?
7. What are some steps communities can take to reduce the effect of urban heat islands?
8. Read about the initiatives and strategies Florida is taking to reduce urban heat islands. Summarize the five initiatives.
 - a.
 - b.
 - c.
 - d.
 - e.
9. Which of the Florida initiatives do you think is the effective? Why?
10. Do you think that the urban heat island is an environmental issue that is worth investing time and money to reduce? Explain.