grow green

earth-wise guide to

Cool Spaces

green strategies:

1. Trees and leafy plants
2. Green roofs
3. Green walls

light strategies:

4. Reflective roofs
5. Permeable pavement
6. Shade structures


1.


4.


2.


5.

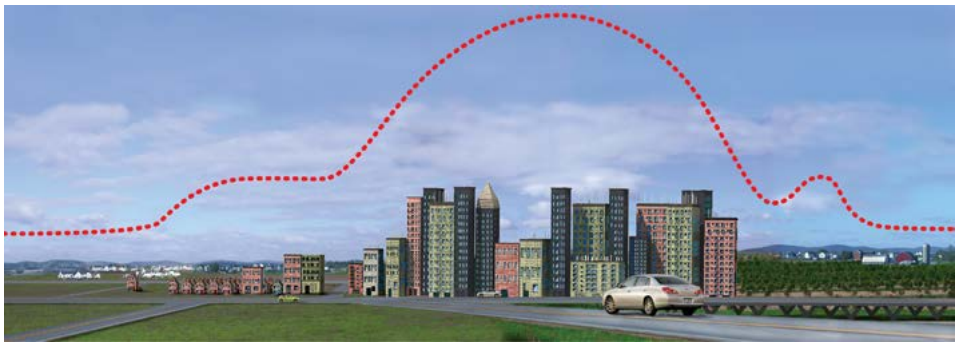

3.


6.

Urbanization alone, without projected climate change, could drive urban temperatures up by 7°F by 2050. Climate change projections show Central Texas' climate gradually becoming hotter, with temperatures rising three to seven degrees over the next 50 to 100 years.

Keep Austin Cool

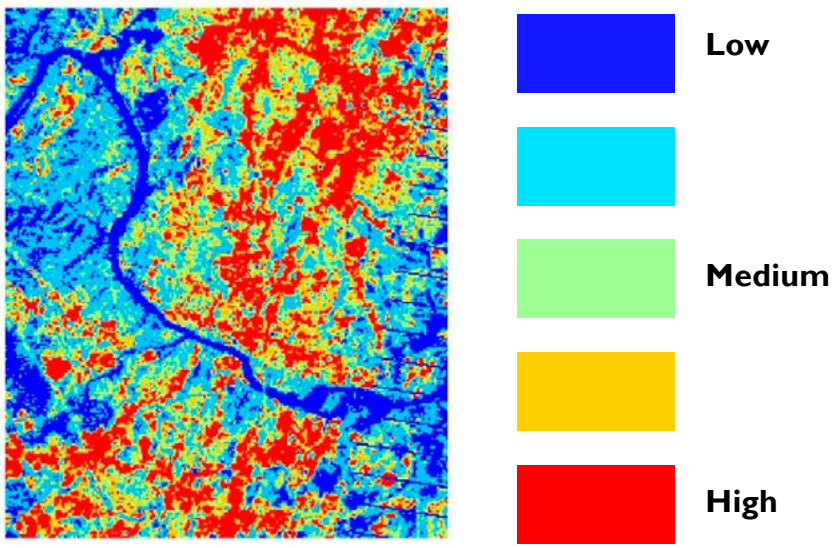
Have you ever noticed that it's hotter in the city than when you're out in the countryside? The built environment absorbs heat far more than the natural materials found in less developed areas. Cities show up as bright red islands on thermal satellite images and are referred to as heat islands. That extra heat can be a serious problem for our health, our environment, and our A/C related energy use.



More hard surfaces and less vegetation keep cities in the red.

Choose the cool space technique for you based on your needs and available resources such as a new or existing building and your budget. Cost will vary based on aspects of the project such as size, complexity and maintenance requirements.

Austin Heat Levels



Go Green

1. Trees and Leafy Plants

Trees and leafy plants cool the air around them and reduce cooling related energy costs.

Through shading, solar reflectance and absorption, and the natural process of evapotranspiration, trees and other leafy plants can help reduce peak summer temperatures by 2–9°F and can keep surface temperatures 20–45°F cooler than similar unshaded materials at peak temperatures.

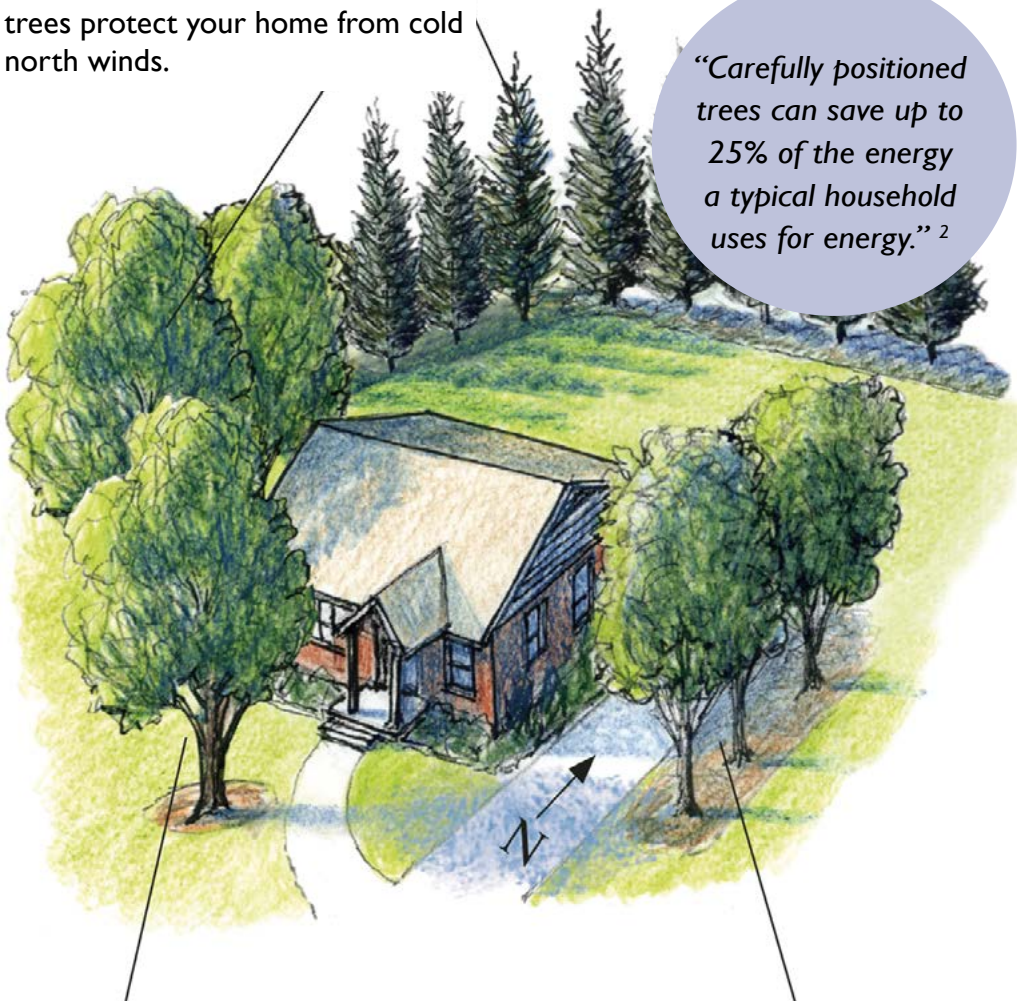
Use trees and leafy plants to shade your home and pavements like sidewalks, driveways and patios.

"Big, beautiful trees in a neighborhood can add from 3% to 5% to home values." [1]

Plant deciduous shade trees on the east and west sides of your home to reduce your cooling energy needs in the summer and your heating needs in the winter. Shaded A/C units work more efficiently and have been shown to use up to 10% less electricity.

Plant windbreak evergreen trees on the west and northwest to provide mid-to-late afternoon shade in most locations. In winter these windbreak trees protect your home from cold north winds.

"Carefully positioned trees can save up to 25% of the energy a typical household uses for energy." [2]



Shade east and west windows with deciduous trees, but prune lower branches to prevent blocking the view. In winter, after leaf fall, warming sunlight comes through.

Plant shade trees over patios, driveways, and air-conditioning units to cool areas around your home.

Image courtesy of the Arbor Day Foundation

2. Green Roof

Through shading, and the natural cooling process of plants, green roofs cool your home inside and out.

Dark colored rooftops on homes and businesses can reach temperatures up to 90°F hotter than surrounding air, while surface temperatures of a green roof can be cooler. Evapotranspiring green roofs have been shown to perform above and beyond light colored, 'cool' roofs in terms of energy conservation and urban cooling. They add value to the structures they grace, enrich the views that include them, and help create a connection between nature and the built environment.

[1] *Kathleen Wolf, Ph.D*
[2] *US Department of Energy, Energy Efficiency and Renewable Energy*

Green roofs can be designed for aesthetics and for function. They can be as simple as a thin layer of light weight planting media over a water tight membrane to a patented multi-layer system from a manufacturer. Green roof costs can vary greatly and is heavily influenced by the components in the system and the structure of the building beneath it.

Use sturdy native and adapted low water need plants that are more likely to thrive and plan to use non-potable, reclaimed water whenever possible.

Learn more at www.austintexas.gov/greenroofs.

Cool Spaces

6 Cooling Strategies

GO GREEN with:

1. Trees and leafy plants
2. Green Roofs
3. Green Walls

LIGHTEN UP with:

4. Light-colored, reflective roofs
5. Light-colored, permeable pavement
6. Shade structures

3. Green Wall

Grow your own green wall and reap the cooling benefits of shady vegetation.

Above: Different stages of growing a green wall

Green walls, like trees, keep spaces cool through solar reflectance, shading and evapotranspiration. Their designs range from the simple to the complex and can address many different design challenges.

There are two basic categories of green walls, green façades and living walls. **Green façades**, trellis systems, must have access to planting media for the base of the plants to root in and have the structural integrity required for the added weight of the vegetation. Use them to create a buffer on a busy road, deflect solar heat, or to give a visual break to manmade materials. Green facades work well when you don't have room to plant trees but need similar cooling benefits.

Living walls may be used inside or outside and are used in a variety of ways from art installations to organic air filtration systems. They are usually pre-planted before installation, are made up of a combination of plastic containers, geotextiles, irrigation systems, growing medium, and vegetation. They are generally more resource intensive than green facades.

All green walls require maintenance during the establishment phase as the plants mature. This can last 2–3 years after installation.

Lighten Up

4. Light Colored, Reflective Roofs

Put a light colored roof on a building to reflect away solar energy and heat.

Wear a dark shirt on a sunny day and you will feel the heat. Dark materials absorb more heat from the sun than light-colored materials do. Put dark material on top of a building and that increasingly hot surface will transfer solar energy down into the building below, driving up energy costs and your carbon footprint. Dark roofs make a hot environment even worse by radiating solar energy back out into the environment late at night when it should be cooling down.

Cool roofing products are made of highly reflective materials that reflect away solar energy and can remain 50–60°F cooler than traditional materials during peak summer weather (*EPA*). Buildings with light colored, high reflective roofs use up to 40% less energy than buildings with darker roofs.

Factoid:

A California study found that cool roofs provide an average yearly net savings of almost 50 cents per square foot.

5. Cool Pavement

Use light colored and pervious pavement to keep your space cool.

Pavements make up 30–45% of land cover in Austin and can reach peak summertime temperatures of 120–150°F. Extremely hot pavements are problematic because the heat gained is later released into the air making it hotter for longer. Choose light colored paving materials which naturally have a higher solar reflectance than darker colors. Whenever possible choose materials that allow water to filter through to the soil beneath to reduce storm water run-off.

Carefully evaluate opportunities to cool your space when installing new or replacing old impervious materials like driveways, patios, and walkways.

6. Shade Structures

Keep cool by shading your space.

Trees are ideal for providing shade, but unfortunately they can't be used in every situation. When they are not an option, shading still is. Shade sails, free standing pavilions, patio and walkway covers, and carports can all help keep your space cool by reducing the amount of solar radiation soaking into hard surfaces like driveways, sidewalks and patios. In some cases shading can even reduce your energy use if an east or west facing exterior wall is shaded. Sun conscious design that reduces exposure to solar energy makes sense in terms of human health and for extending outdoor livability. Shade installations come in many forms and provide a wide range of services.

Learn more at www.austintexas.gov/coolspaces.

Urban Heat and Climate Change

Rising temperatures in the built environment and extreme weather due to climate change could create a nexus of heat for cities in America's sunbelt. It's clear that Austin is heating up.

Taking steps to reduce urban heat fits within the principles of climate adaptation, a prudent planning practice being employed by cities around the world. Climate change data suggests that we should prepare for heat waves that last longer, are more intense, and occur more frequently. Extreme heat and associated drought can kill Austin trees and plants that would otherwise cool the city. When extreme heat and other factors disrupt nature's cooling cycle, it becomes and stays even hotter. **Do your part to create cool spaces and take care of the plants we already have.**

"When Texas has very dry conditions in summertime, the temperature tends to skyrocket. Anything that increases the rate of evaporation, such as warmer overall temperatures, makes skyrocketing temperatures more likely. So global warming might have a relatively small influence on cool summers and a relatively large influence on hot summers. Also, when you make a very hot weather event even slightly hotter, the effects are magnified."
Texas State Climatologist John Nielsen-Gammon is Regents Professor in the department of atmospheric sciences at Texas A&M University.

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