

Answers to Your Questions About Sustainability

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Q:

How can we make the case to our visitors that gardening is one of the most important things they can do to help combat global climate change?

A:

Because growing plants is the essence of gardening, and plants pull carbon dioxide from the atmosphere in the process of photosynthesis, we figure gardening must be beneficial in an age of climate change fueled mostly by this greenhouse gas. In reality, the amount of energy used to construct and maintain gardens can result in an astonishing amount of carbon dioxide. But it is possible to create landscapes that are carbon-neutral or, even better, that function as “carbon sinks.”

Gardeners unwittingly contribute to global warming in a number of ways. For starters, we consume energy directly, by deploying the entire panoply of power equipment, from mowers to blowers. Whether powered by gasoline or electricity, these tools collectively result in significant CO₂ emissions.

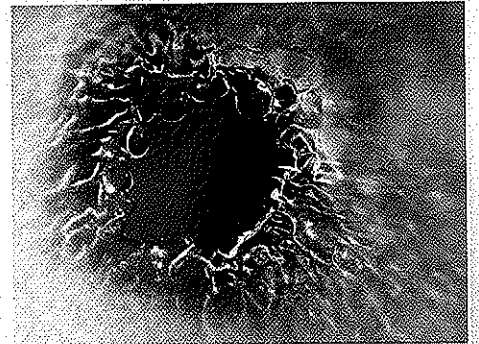
The energy involved in pumping and distributing the water we use for irrigation can be another major source of CO₂. Generally, the more arid the area, the higher the water’s “embodied energy,” the technical term for this indirect form of energy consumption. The fertilizers and pesticides routinely used in gardens account for still more energy consumption and CO₂ emissions. “Most gardeners are surprised to learn that often the biggest contributor to greenhouse emissions from home gardening and lawn care is associated with use of nitrogen fertilizers,” says David Wolfe, Professor of Plant and Soil

Ecology at Cornell University. The manufacture of synthetic fertilizer is extremely energy intensive. Manures and other organic sources are better because the CO₂ emissions associated with manufacture are mostly eliminated. But using either synthetic or organic fertilizers releases nitrous oxide gas, which in Wolfe’s words “has 300 times more global warming potential per molecule than carbon dioxide.” Chemical pesticides have high embodied energy, and they are also toxic.

Garden maintenance is just one part of the problem. Garden construction can be so energy intensive that it may take many years to offset the CO₂ emissions. Paving surfaces represent an especially large amount of embodied energy. Throw in planters, fences, furniture, and the other accoutrements of a well-appointed landscape and the emissions pile up.

In his book *Gardening in a New Era*, Douglas Kent, a landscape designer who teaches at California State Polytechnic University, divides the process of going carbon neutral into four steps. The first is to determine the largest sources of energy consumption and therefore greenhouse gas emissions in the garden. Cutting the garden’s energy consumption is the logical next step in reducing its carbon footprint.

However, conservation alone won’t make a garden carbon neutral. For that, it’s necessary to accumulate biomass—the fancy way of saying that you need to grow a lot of woody plants—and then store the resulting biomass for as long as possible.



What are the best ways for gardeners to save energy and capture and store carbon? Following are some tips for public garden visitors:

- They should reduce the size of their lawn unless it requires little or no maintenance—eliminate it entirely if possible. Lawn is a major source of greenhouse gas emissions in most gardens due to the amount of energy involved in using mowers and other power tools, pumping water for irrigation, and manufacturing the fertilizers and pesticides commonly applied to turf.
- They should use hand tools instead of power equipment. Once the lawn is downsized, all they’ll need is a push mower.
- They should choose materials with low embodied energy. Brick, cement, and concrete have large carbon footprints compared to gravel and especially wood. Using local and certified woods is also a great way to store carbon. Used brick and other recycled materials are good choices, too.

- To capture as much carbon as possible, they should maximize the planting area on their property and minimize the paved areas.
- Woody plants capture more carbon than herbaceous species, so it's a good idea for gardeners to plant most of their property with trees and shrubs. (Preferably those that provide food and nesting and resting places for birds and other wildlife.)
- Trees and shrubs should be located where they will block winter winds and provide shade in summer. This reduces the amount of energy required to heat and cool their homes and thus decreases their carbon footprints even further. The particular landscape strategy depends on their climate. A good resource is "Landscaping for Energy Efficiency," a booklet produced for the U.S. Department of Energy and available online.
- To save water and energy, they should replace moisture-loving plants with drought-tolerant ones.
- They should minimize or, better yet, eliminate the use of fertilizers and pesticides on their property, and use compost and mulch produced from garden trimmings to enrich the soil instead.
- Growing a backyard vegetable garden can also help reduce their carbon footprint. For more on how the carbon footprint of homegrown food compares with that of imported produce, see "Growing Greener" in *Public Garden* Vol. 23, No. 2 (2008).

After sixteen and a half years at Brooklyn Botanic Garden, Janet Marinelli started her own planning, interpretation, and publishing company, Blue Crocus Consulting. She has written several books and numerous articles on sustainable buildings and landscapes; you can find many of them on her website, www.janetmarinelli.com. Send any questions you would like answered to Janet at jmarinelli@earthlink.net.



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Plant-Animal Connections

