

# EARTH TALK™

Questions & Answers About Our Environment

**Dear EarthTalk: Isn't the increasing urbanization of our world good for reducing our carbon footprint given the efficiency benefits of greater density?**

– Simon Vorhees, Oak Park, Illinois

No doubt, the increased density of big cities leads to less energy use and fewer greenhouse gas emissions per capita.

"The biggest factor is transportation, first, simply because trips get shorter, and second, because trips are more likely taken by transit, biking and walking, which are more energy efficient than cars," said Dan Bertolet of Sightline Institute, a Seattle-based sustainability think tank.

"Density also leads to less energy use in buildings for two reasons: The housing tends to be smaller, and the shared walls/floors/ceilings in multifamily buildings help conserve heating and cooling."

To Bertolet's point, a recent study published in the Proceedings of the National Academy of Sciences examining projected emissions from buildings in a variety of urban areas confirms that denser development is more effective at reducing greenhouse gas emissions than weather-proofing or other efficiency-oriented infrastructure upgrades.

But researchers warn that increased density alone isn't enough to drive emissions lower overall given a host of other factors.

"Urbanization is often accompanied by higher incomes, higher economic activity and more consumption," said Burak Güneralp, geosciences researcher at Texas A&M University and the study's lead author.

"So any gains in per capita consumption due to greater density in urban areas may be exceeded by the increase in per capita consumption due to higher incomes."

Also, said Güneralp, efficiency benefits of increased density can backfire if not directed by thoughtful policy. "For example, too high a density coupled with poor planning



San Francisco, with upwards of 18,000 people per square mile, is the second densest major U.S. city behind New York. (Photo by Dave Glass, FlickrCC)

can lead to traffic congestions, which can increase fuel consumption hence carbon emissions."

Another downside of density is the so-called "heat island effect," where development-crammed, pavement-capped city centers can be some 20 degrees hotter than surrounding areas.

This leads to increased energy consumption as more people crank the air conditioning, elevated emissions of potentially hazardous air pollutants from tailpipes and outflow stacks, and impaired water quality as streams, rivers, lakes and coastal areas get flushed with overheated toxin-laden run-off.

Poorly managed development outside the urban core, a.k.a. urban sprawl, can also counteract the carbon footprint gains of increased density downtown.

Sprawling suburban development uses more land per capita and forces people to drive long distances in private cars to get to work, school and shopping.

"Metropolitan areas look like carbon footprint hurricanes, with dark green, low-carbon urban cores surrounded by red, high-carbon suburbs," said Chris Jones, a researcher with UC

Berkeley's Renewable & Appropriate Energy Lab.

"Unfortunately, while the most populous metropolitan areas tend to have the lowest carbon footprint centers, they also tend to have the most extensive high-carbon footprint suburbs."

For his part, Güneralp said careful planning is key. "The important point is that when we think about urbanization and its environmental impacts, we need to consider trade-offs and co-benefits of different approaches as well as the local context," he concluded.

"Particularly in growing cities in the developing world, such efforts can improve the well-being of billions of urban residents and contribute to mitigating climate change by reducing energy use in urban areas."

Contacts: Sightline, [www.sightline.org](http://www.sightline.org); National Academy of Sciences study, [www.goo.gl/sxqH0E](http://www.goo.gl/sxqH0E); Renewable & Appropriate Energy Lab, [www.rael.berkeley.edu](http://www.rael.berkeley.edu).

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