

Comparing Footprints — What Is the Right Size?

There are a variety of ways to measure the impact that human society is having on the planet.

Personal Carbon Footprint

RoundTable readers are probably most familiar with carbon footprint calculators that estimate the amount of carbon dioxide (CO₂) generated by a person's daily activities. (Some calculators include other greenhouse gases and report emissions in terms of carbon dioxide equivalents, written as CO₂eq.)

One example is the Zerofootprint Evanston calculator sponsored by Citizens for a Greener Evanston. Residents can use this calculator to measure the CO₂ emissions associated with various aspects of their lifestyle, e.g., their home energy consumption, travel, food choices, and recycling practices. The Zerofootprint calculator also allows users to explore the effectiveness of changes they can make to reduce their carbon footprint.

Per Capita Emissions

Carbon footprint calculators typically measure only the emissions that individuals can most directly and easily control. A more complete picture emerges when emissions from all sectors of the economy are included, such as those from manufacturing goods and providing public services. This per capita measure is obtained by dividing a country's total emissions by its population.

Per capita figures allow comparisons to be made between countries. According to the Energy Information Agency (Department of Energy), U.S. emissions of CO₂ were 20 metric tons per capita in 2006. This was more than four times the global per capita average of 4.5 metric tons.

China made headlines that year when it overtook the U.S. to become the world's largest emitter of CO₂. China accounted for almost 21 percent of the world's CO₂ emissions, just ahead of the U.S. with 20 percent. With more than four times the population of the U.S., however, China's per capita emissions of 4.6 metric tons of CO₂ were still well below the U.S. average.

And new research from the Center for International Climate and Environmental Research-Oslo shows that about one-third of China's carbon emissions are the result of producing goods for export — particularly for developed nations like the U.S.

Emissions Under Waxman-Markey

Climate scientists have concluded that sustained global warming of more than 2°C (3.6°F) above pre-industrial levels could lead to irreversible damage to the planet. According to the Intergovernmental Panel on Climate Change, to have a reasonable chance of limiting warming to 2°C, the U.S. and other developed countries must reduce emissions 25-40 percent below 1990 levels by 2020 and 80-95 percent by 2050.

The Waxman-Markey cap-and-trade bill that passed the U.S. House of Representatives in June falls short of these reduction targets. The proposed cap would cover up to 87 percent of U.S. emissions, and complementary policies included in the legislation would mandate additional reductions from uncapped sources, e.g., performance standards for landfills. An analysis by the World Resources Institute indicates that total U.S. emissions under the Waxman-Markey cap and with the proposed complementary policies would be 17 percent below 1990 levels by 2020 and 71 percent by 2050. U.S. per capita emissions in 2050 (based on a projected U.S. population of 400 million) would be about 4.5 metric tons of CO₂eq.

Ecological Footprint

Addressing emissions of heat-trapping gases is essential to slowing global warming and avoiding potentially catastrophic damage to the planet. But another critical lens with which to assess human society's impact on the Earth is to measure its ecological footprint.

The ecological footprint measures the cropland, forest, and fishing grounds that a country (or an individual) needs to produce the resources it consumes and absorb the waste it generates — and compares this measurement to the amount of land and sea area available. According to the Global Footprint Network, the world as a whole is using the equivalent of 1.3 planets to obtain the resources it uses and to absorb its waste.

The Network calculates the ecological footprint of more than 200 countries. The calculation takes into account a nation's imports and exports to help in determining whether or not a country's ecological footprint exceeds its biocapacity. Most countries today are running ecological deficits — in part by importing resources but to an even greater extent by dumping their CO₂ emissions into the atmosphere.

In 2005, just ten countries accounted for half of the global footprint. The U.S. and China each used 21 percent of the Earth's biocapacity. The U.S. and the United Arab Emirates had the highest per-person footprints. If everyone in the world lived like an average American, it would take 4.5 Earths to support humanity's consumption.

Looking to the Future

Assessing our impact on the Earth can be sobering. But examining how we use energy and resources can also help us identify meaningful things we can do in our everyday lives that will make a positive difference. Above all, these analyses underscore the importance of passing strong climate change legislation in the U.S. Congress and successfully negotiating a new international climate treaty in Copenhagen in December.