

Reducing Your Carbon Footprint

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What's This All About?

Many of our devices (e.g., cars) burn fossil fuels, creating gases that trap heat in our atmosphere. The most common of those “greenhouse gases” (GHG) is carbon dioxide (CO₂).

Our planet neutralizes some CO₂, but much higher levels may cause irreversible harm.

We are rapidly approaching that point.

Even small changes to the average world temperature may have catastrophic results: deadly heat waves, more severe storms, floods that inundate coastal areas and islands. Avoiding such impacts requires a 50% drop in GHG by 2030.

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Quantifying Your Climate Impact

The annual GHG output attributable to a person, family, or business is called its “carbon footprint”. It’s an easy way to quantify your climate impact.

A typical family’s footprint may be 10 to 20 tons of CO₂ per year. To calculate your footprint, go to: www3.epa.gov/carbon-footprint-calculator/

Determining your footprint can help you understand what causes it, and to find ways to reduce it.

Communities and countries can do the same. The Paris Accord is an agreement among nations to cut their GHG outputs by 26%-28% by 2030, relative to 2005.



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First, A Quick Chemistry Lesson

There are 6 major GHGs. The first 3 have the biggest impact:

1. carbon dioxide (CO₂) [burning fossil fuels]
2. methane (CH₄) [coal/oil/gas, livestock, landfills]
3. nitrous oxide (N₂O) [burning fossil fuels]



The others come from equipment and industry:

4. hydrofluorocarbons (HFCs) [A/C refrigerants]
5. sulfur hexafluoride (SF₆) [utility power transformers]
6. perfluorocarbons (PFCs) [solvents, electronics]

Each affects climate to a differing degree, called its “Global Warming Potential” (GWP).

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Use GWPs to Compare GHGs

GWP is the impact a gas has on global warming, relative to CO₂. Here are the 6 main contributors:

1. carbon dioxide: GWP = 1.0 (same for 1,000+ yrs)
2. methane: ~28 (in 100 yrs, ~80 in 20 yrs)
3. nitrous oxide: ~300
4. hydrofluorocarbons: 100s to 1,000s
5. sulfur hexafluoride: ~23,000
6. perfluorocarbons: ~8,000 and higher



The climate impact (i.e., CO₂e) of an emission is its GWP X its weight. Fortunately, our atmosphere does not contain large amounts of the last 3 GHG. Here's their relative impact on global warming...

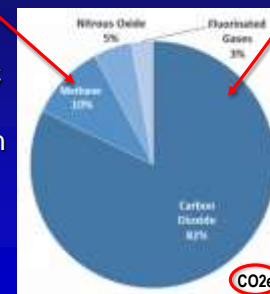
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Main Contributors Of CO₂e

In the U.S., burning fossil fuels (coal, oil, natural gas, propane) is the main source of CO₂e.

Methane is next, followed by nitrous oxide, and then gases used mostly for A/C refrigerants and industry. Each of us can take action to reduce our emissions of them. There are also low-cost ways to counter the impact of what we must continue to use.



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Bookkeeping Your Carbon

To focus on who/what is responsible for GHGs, a simple accounting system exists. Consider, for example, your washing machine:

CO₂e from manufacturing it is in the **factory's** footprint, not yours.

Fuel to deliver it to you is in the **shipper's** footprint, not yours.

But the CO₂e from the electricity to run it, and the fuel to heat the wash water, is part of **your** footprint.

That footprint may be shrunk by using an Energy Star™ washer, or running it on renewable energy.



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Understanding GHG By Source

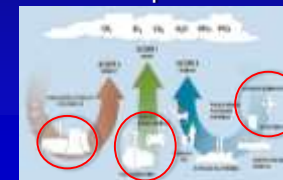
International standards divide sources of GHGs into three emission 'Scopes' (i.e., categories):

Scope 1 – on-site combustion (e.g., boilers, furnaces, cars)

Scope 2 – off-site combustion (power plants + line losses)

Scope 3 – waste disposal, product use/leakage, paid travel

For most homes, scopes 1 & 2 are responsible for ~90% of CO₂e. Scope 3 may be ~10% and harder to figure, involving issues like disposal, recycling, and CO₂e from product usage (e.g., paints).



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Scope 1: Easy to understand

Numerical factors convert gallons of fossil fuels used in boilers, furnaces, and cars into CO₂e: burning a gallon of fuel oil produces 22.2 lbs and burning a gallon of gasoline produces 19.4 lbs.

Best ways to cut Scope 1 carbon:

- energy efficiency / conservation / insulation (start with a free home energy assessment)
- use cleaner fuel / raise heating efficiency: nat. gas vs. oil, condensing boiler, wood pellet boiler, geothermal heat pump
- make next car an EV or plug-in hybrid



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Scope 2: Varies by location

Scope 2 covers CO₂e emitted by power plants that make the electricity used in your home.

Emissions vary among power grids: Calif. = .56 lbs/kWh, but Wyoming = 2.1 lbs/kWh. Why?



Creating power used in our area emits ~.67 lb/kWh

Note: electricity is **not** always the cleanest source: charging an EV in Wyoming is about as bad burning gasoline in a 27 mpg car to go the same miles.

Use LED lights, Energy Star™ appliances, ceiling fans, and renewables: rooftop solar, CCA power w/RECs.

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Scope 3: More complicated

Some gases much worse than CO₂ are emitted in smaller amounts as:

- leaking A/C refrigerants
- methane from landfills, livestock, etc.
- VOC: paints, thinners, sprays, carpeting
- discarded products: old gasoline, industrial solvents

Scope 3 also includes CO₂ from purchased travel:

- airplanes: jet fuel
- buses and trains: diesel fuel, electricity

Control waste: recycle / re-use / maintain / properly dispose, compost, incinerate instead of landfilling, choose low VOC products.



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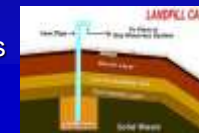
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How To Buy Down A Footprint

A Renewable Energy Cert. (REC) pays to ensure 1,000 kWh of renewable power displaces 1,000 kWh of fossil fuel power elsewhere on the grid. RECs now cost .3¢ -.5¢/kWh (as part of CCA power).



Carbon offsets pay for projects not related to power production, e.g., capping a landfill gathers and burns methane that would otherwise leak out. One offset pays to avoid 1 ton of CO₂e. Cost may vary from \$7 to \$11 per offset.



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Like A Voluntary Carbon Fee

A Westchester family that annually consumes 10,000 kWh, burns 1,000 gal of heating oil, and drives 10,000 miles @ 20 mpg would have a footprint of roughly 20 tons CO₂e/yr.

Buy RECs through a power contract (e.g., CCA) to displace fossil-fueled power, and buy offsets to counter other CO₂e. Total cost may be under \$20 a month: less than \$1.00 a day to zero out that family's *entire* carbon footprint.

~75% of Croton homes already get RECs through CCA. To neutralize other GHG, buy carbon offsets from Sterling Planet, TerraPass, etc. Green-e.org (a non-profit) verifies the impacts of renewable power and offset projects.

Cut your actual carbon output as best you can on your own, and then pay others to negate the rest.

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Commit To Shrink Your Footprint

Think globally...

Act locally...

Commit personally.

When next you're planning to buy a product that uses energy (i.e., electricity or any form of fuel), ask yourself: "is there a *different* one I can afford which does the same job but creates *less* GHG (e.g., is more energy efficient, or is Energy Star[™], or uses a cleaner energy source)?"



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Thank you for your time
and attention.



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