Prairie Stewardship Network

*Engaging people and communities in climate change solutions*

# Carbon Dioxide ($CO_2$) Emissions Worksheet

Tailored for North Dakota, Minnesota and South Dakota – providing an estimate of emissions

**Number of people living at home:_____**

| Transportation | Miles driven (year) | Miles per gallon | *Emissions $CO_2$ lbs per unit of measurement | How to calculate $CO_2$ emissions | Pounds of $CO_2$ emitted |
|---|---|---|---|---|---|
| Vehicle 1 | | | 19.56 lbs per gallon unleaded gasoline | Miles driven **divided by** mileage per gallon **multiplied by** emissions $CO_2$ lbs per gallon | |
| Vehicle 2 | | | 22.38 lbs per gallon of diesel | | |
| Vehicle 3 | | | | | |
| Vehicle 4 | | | | | |
| Vehicle 5 | | | | | |
| | | | | **Subtotal Transportation** | |
| **Air Travel** | **Number of trips (year)** | **Miles traveled** | | | |
| Short Haul Flights (<280 miles) | | | 0.64 lbs per mile | Number of trips **multiplied by** miles traveled **multiplied by** emissions of $CO_2$ lbs per gallon | |
| Medium Haul Flights (280 to 1000 miles) | | | 0.44 lbs per mile | | |
| Long Haul Flights (>1000 miles) | | | 0.39 lbs per mile | | |
| | | | | **Subtotal Air Travel** | |
| **Home Energy (year)** | **Usage (year)** | | | | |
| Kilowatt hours (kWh) electricity | | | 2.24 lbs per kWh in ND<br>1.52 lbs per kWh in MN<br>0.80 lbs per kWh in SD | Usage **multiplied by** emissions of $CO_2$ lbs per unit of measurement | |
| Gallons of heating oil | | | 22.28 lbs per gallon | | |
| Therms of natural gas | | | 11 lbs per therm | | |
| Gallons of propane | | | 12.67 lbs per gallon | | |
| | | | | **Subtotal Home Energy** | |
| Household lbs of $CO_2$ emitted | | | | (**Add** subtotals) | |
| Per Person lbs of $CO_2$ emitted | | | | **(**Grand total **divided by** number of people living at home**)** | |
| Household tons of emitted | | | | **(**Household lbs emitted **divided by** 2000**)** | |
| Per Person tons of $CO_2$ emitted | | | | **(**Per person lbs emitted **divided by** 2000) | |

**Average national per capita tons $CO_2$ emissions: 20.18 tons.

***(more over)***

*Sources: Energy Information Administration Voluntary Reporting of Green House Gases Program http://www.eia.doe.gov/oiaf/1605/coefficients.html; WRI; What's My Carbon Footprint; and Energy Information Administration: Updated State-and Regional-level Greenhouse Gas Emission Factors for Electricity (March 2002) http://www.eia.doe.gov/oiaf/1605/ee-factors.html or http://www.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/e-supdoc.pdf

**Energy Information Administration: World Per Capita Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, 1980-2004

**Significance of per capita emissions of $CO_2$ and what can be done to stabilize emissions**

To understand the significance of per capita emissions and the need for reduction, a helpful read is **"The crucial limit: Nine billion tonnes of carbon dioxide a year"** by Optimum Population Trust. Website: http://www.optimumpopulation.org/opt.af.limitco2.html. Excerpts and link to the site can be found on the PSN website "Challenges/Solutions" webpage, under "Publications": http://www.prairiestewardship.org/challengesandsol.html.

It is equally important to be aware of the following publication **"Stabilization Wedges: Solving the Climate Problem for the next 50 Years with Current Technologies"** S. Pacala and R. Socolow, Science, August 13, 2004. Website http://www.princeton.edu/~cmi/resources/stabwedge.htm. This site also includes a *"Teachers' Guide to the Stabilization Wedge Game: a team-based exercise in which players build a portfolio of stabilization strategies and assess their impacts and costs."*

**Reducing greenhouse gas emissions from waste**

The worksheet on $CO_2$ emissions does not include emissions from waste. To calculate waste emissions and estimated reductions through recycling see below. US EPA estimated average of greenhouse gas emissions from waste for a household of two people over a year: 2,020 lbs.

**For a household of 1**, a reduction of an estimated 423 lbs of $CO_2$ emissions could be achieved through recycling all of the following when possible:
Newspaper: -184 lbs of $CO_2$ per year
Glass: -26 lbs $CO_2$ per year
Plastic: -47lbs $CO_2$ per year
Aluminum and steel cans: -166 lbs $CO_2$ per year.
To find total waste emissions after recycling, subtract reductions through recycling from 1,010lbs of $CO_2$. To convert to tons, divide new total by 2,000.

**For a household of 2**, a reduction of an estimated 845 lbs of $CO_2$ emissions could be achieved through recycling all of the following when possible:
Newspaper: -369 lbs of $CO_2$ per year
Glass: -51 lbs $CO_2$ per year
Plastic: -93 $CO_2$ per year
Aluminum and steel cans: -332 lbs $CO_2$ per year.
To find total waste emissions after recycling, subtract reductions through recycling from 2,020lbs of $C0_2$. To convert to tons, divide new total by 2,000.

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*In partnership with the Episcopal Diocese of North Dakota Environmental Stewardship Committee, Presbyterians for Restoring Creation, Northern Plains Presbytery and Troop 123 (including Eagle Scout Service Projects) sponsored by Faith Lutheran Church, Bismarck*