# CO2 Emissions for electriciy production by source in 2015

If not otherwise indicated, data from: data/raw/electricity/electricity_fuel_2015.csv

CANSIM Database Table: 127-0004

| Fuel | Amount | Amt. Unit | Density [kg/m^3] | Density Source | Mass [kg] | Percentage |
|---|---|---|---|---|---|---|
| subbituminous coal | 24479385 | t | | | 24.48E+09 | 48.78% |
| natural gas | 10870993 | Ml | 0.90 | [1a] | 9.78E+09 | 19.50% |
| lignite | 8846528 | t | | | 8.85E+09 | 17.63% |
| bituminous coal | 2897518 | t | | | 2.90E+09 | 5.77% |
| wood | 2680909 | t | | | 2.68E+09 | 5.34% |
| heavy fuel oil | 698003 | kl | 930.00 | [2a] | 649.14E+06 | 1.29% |
| petroleum coke | 577519 | t | | | 577.52E+06 | 1.15% |
| diesel | 155734 | kl | 874.61 | [2a] | 136.21E+06 | 0.27% |
| methane | 182914 | Ml | 0.72 | [1a] | 131.15E+06 | 0.26% |
| light fuel oil | 57115 | kl | 719.23 | [2a] | 41.08E+06 | 0.08% |
| propane | 58 | kl | 1.70 | [2a] | 98.60E+00 | 0.00% |
| **total** | | | | | **50.22E+09** | |

**Sources**

[1a] http://www.engineeringtoolbox.com/gas-density-d_158.html
[2a] http://www.engineeringtoolbox.com/fuels-densities-specific-volumes-d_166.html

Energy Production: 631.86E+09 kWh

CO2 per kWh: 0.20

| KCO2 | KCO2 Unit | KCO2 Source | KCO2 [kg/MJ] | ΔC | ΔC Unit | ΔC Source | ΔC [MJ/kg] | KCO2 [kg/kg] | CO2 mass [kg] |
|---|---|---|---|---|---|---|---|---|---|
| 93.3 | kg/Mbtu | [1b] | 88.43E-03 | 31.3 | MJ/kg | [3b] | 31.30 | 2.77 | 67.76E+09 |
| 53.07 | kg/Mbtu | [1b] | 50.30E-03 | 47.7 | MJ/kg | [3b] | 47.70 | 2.40 | 23.47E+09 |
| 97.7 | kg/Mbtu | [1b] | 92.60E-03 | 22 | MJ/kg | [3b] | 22.00 | 2.04 | 18.02E+09 |
| 93.3 | kg/Mbtu | [1b] | 88.43E-03 | 31.3 | MJ/kg | [3b] | 31.30 | 2.77 | 8.02E+09 |
| 0.39 | kg/kWh | [2b] | 108.33E-03 | 15 | MJ/kg | [3b] | 15.00 | 1.63 | 4.36E+09 |
| 73.16 | kg/Mbtu | [1b] | 69.34E-03 | 41 | MJ/kg | [3b] | 41.00 | 2.84 | 1.85E+09 |
| 102.1 | kg/Mbtu | [1b] | 96.77E-03 | 34.2 | MJ/kg | [3b] | 34.20 | 3.31 | 1.91E+09 |
| 3.2 | kg/kg | [2b] | | | | | | 3.20 | 435.86E+06 |
| 2.8 | kg/kg | [2b] | | | | | | 2.80 | 367.22E+06 |
| 2.6 | kg/kg | [2b] | | | | | | 2.60 | 106.80E+06 |
| 63.07 | kg/Mbtu | [1b] | 59.78E-03 | 46.3 | MJ/m3 | [3b] | 1.63 | 2.77 | 272.90E+00 |
| **total** | | | | | | | | | **126.30E+09** |

**Sources**

[1b] https://www.eia.gov/electricity/annual/html/epa_a_03.html
[2b] http://www.engineeringtoolbox.com/co2-emission-fuels-d_1085.html
[3b] http://www.manualihoepli.it/media/doc/pr243.pdf

# Emissions by Households Appliances

data from:
http://www.torontohydro.com/sites/electricsystem/residential/yourbilloverview/Pages/ApplianceCh

An average tree can absorb 48 pounds of CO2 per year
CO2 Absorption per month in kg: 1.82
source: https://projects.ncsu.edu/project/treesofstrength/treefact.htm

| Appliance | Consumption [W] | Avg. Usage per Month [h] | Avg. Energy Consumption [kWh] | CO2 Emissions [kg] | Trees Needed |
|---|---|---|---|---|---|
| Air Cleaner (Room & Furnace) | 40 | 400 | 16.0 | 3.20 | 5.81 |
| Clothes Dryer | 5000 | 20 | 100.0 | 19.99 | 36.31 |
| Clothes Washer | 500 | 10 | 5.0 | 1.00 | 1.82 |
| Computer (Monitor & Printer) | 200 | 100 | 20.0 | 4.00 | 7.26 |
| Dishwasher | 1300 | 10 | 13.0 | 2.60 | 4.72 |
| Food Freezer | 350 | 60 | 21.0 | 4.20 | 7.63 |
| Microwave oven | 1000 | 5 | 5.0 | 1.00 | 1.82 |
| Stove (Oven) | 5000 | 100 | 500.0 | 99.94 | 181.56 |
| Fridge | 500 | 150 | 75.0 | 14.99 | 27.23 |
| Television | 100 | 200 | 20.0 | 4.00 | 7.26 |
| Water Bed Heater | 500 | 150 | 75.0 | 14.99 | 27.23 |
| Water Heater typical family of 4 | 3500 | 118 | 413.0 | 82.55 | 149.97 |
| **total** | **17990.00** | **1323.00** | **1263.00** | **252.45** | **458.62** |