Edmonds Greenhouse Gas Emissions by Source

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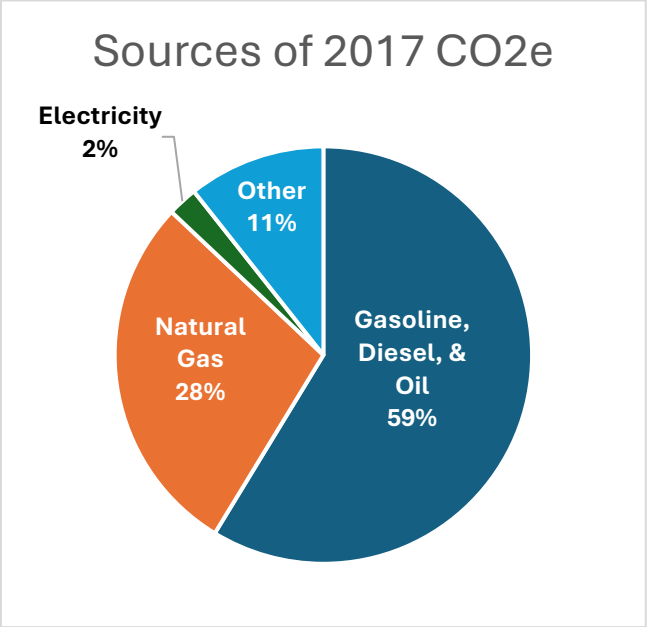
Summary

Figure 1 shows what portion of greenhouse gas emissions come from different sources in Edmonds, WA.

Figure 1



Emissions by Greenhouse Gas

The chart above is a re-presentation of findings reported in the Good Company & Environmental Science Associates (GC/ESA) report on Edmonds greenhouse gas emissions.

"Other" emissions are mostly refrigerant leaks. They also include some natural gas, oil, and electricity used in the wastewater treatment plant that are not reported separately.

The GC/ESA report includes greenhouse gas emissions from electricity that are based on what Snohomish PUD reported about emissions per watt of Snohomish PUD electricity.

The GC/ESA report also includes electricity-related emissions based on how much greenhouse gas emissions are released on average by electricity generation in the Northwest Power Pool sub-region. The Northwest Power Pool sub-region includes Washington, Oregon, Idaho, Utah, almost all of Nevada, most of Montana, half of Wyoming, and a small portion of northern California,

Because Snohomish PUD purchases almost all its electricity from hydroelectric generators, the Snohomish PUD emissions are much lower per watt than the regional grid emissions.

GC/ESA felt that regional emissions rates better reflected Edmonds emissions because all electricity in a regional grid is available anywhere in the grid. If Edmonds uses more of the available hydro-sourced electricity, that cleaner electricity is not available for consumers elsewhere, which prompts more production elsewhere. On average, the electricity generation that is caused by Edmonds consumption is generated at the average rate of the Northwest Power Pool sub-region.

The chart shown above is based on the electricity generation emissions reported by Snohomish PUD.

Data & Calculations

Table 1 shows greenhouse gas emission quantities reported on page 12 of the GC/ESA report.

Table 1

Greenhouse Gas Emissions by Source from Page 12 of the GC/ESA Report

Local Emissions: Stationary Energy (Buildings)	2017 MT CO2e
Residential Buildings	
Electricity (Market-Based)	3,039
Natural Gas	47,440
Other Fuels (oil)	4,312
Commercial Buildings and Facilities	
Electricity (Market-Based)	1,893
Natural Gas	15,682
Other Fuels (oil)	4,738
Industrial Facilities	
Electricity (Market-Based)	261
Natural Gas	73
Wastewater energy use	583
Local Emissions: Transportation	122,585
Local Emissions: Waste	5,962
Local Emissions: Industrial Process and Product Use	
Product Use (refrigerants)	17,339
Fugitive Emissions from Natural Gas Systems	303

Table 2 sorts the emissions by energy and other.

Table 2

Local Emissions	2017 MT CO2e
Gasoline, Diesel & Oil	131,635
Local Emissions: Transportation	122,585
Residential Other Fuels (Oil)	4,312
Commercial Other Fuels (Oil)	4,738
Natural Gas	63,498
Residential Natural Gas	47,440
Commercial Natural Gas	15,682
Industrial Natural gas	73
Fugitive Emissions from Natural Gas Systems	303
Electricity	5,193
Residential Electricity	3,039
Commercial Electricity	1,893
Industrial Electricity	261
Other	23,884
Wastewater energy use	583
Local Emissions: Waste	5,962
Product Use (Refrigerants)	17,339

Table 3 reports the totals.

Table 3

Totals

Totals	2017 MT CO2e	Percent of GHG Pollution
Gasoline, Diesel, & Oil	131,635	59%
Natural Gas	63,498	28%
Electricity	5,193	2%
Other	23,884	11%

Table 3 is based on emissions reporting from Snohomish PUD. Table 4 shows the quantities based on the regional data.

Table 4

Emissions by Source Based on Regional Emissions per Watt

Totals	2017 MT CO2e	Percent of GHG Pollution
Gasoline, Diesel, & Oil	131,635	43%
Natural Gas	63,498	21%
Electricity	86,947	28%
Other	23,884	8%

Either way, the emissions from oil products (gasoline, diesel, heating oil) create about twice the emissions of natural gas.

Purchased Emissions Rates or Regional Rates?

How should we count electricity emissions? Should Edmonds residents focus on gasoline and electricity emissions before natural gas, because regional emissions per watt make electricity look like a bigger problem than natural gas? Or should Edmonds residents trust that Edmonds electricity is generated with almost no greenhouse gas emissions, and instead focus on gasoline and natural gas emissions? How we count electricity emissions directs us in different directions. If we go with Snohomish PUD's emissions rates, it appears that natural gas is a much bigger problem than electricity. If we go with regional rates, electricity looks like a bigger problem than natural gas.

A Dynamic Energy Production System

The GC/ESA argument that every watt purchased from the Northwest Power Pool grid produces the average emissions of the entire grid is based on the idea that the ratio of fossil fuel production and renewable production is steady. The idea is that, when a household or PUD signs up for a renewable electricity program, renewable production is not increased relative to fossil fuel production. The idea is that all that happens is that that household pays a higher rate to signal their support for renewable energy, the electricity generators continue the same mix of clean and dirty electricity production, and other customers get to pay less.

Electricity generation is more dynamic than that. Fossil fuel generators can be turned off, and may even be shut down. More wind and solar can be built. Hydroelectric generation can be turned off and on. Hydroelectric operators decide how much of the water that they collected behind dams in the winter they should use each month. In some years, water levels get low by the end of the dry season, threatening to incapacitate hydroelectric generation. Hydroelectric operators make decisions at the start of a dry season: Do they produce as much as they can right away, and run the risk of running out of water before electricity prices get higher at the end of the dry season?

There is not yet reason to worry about hydroelectric generation in the Northwest. Northwest hydroelectricity has not yet ever run out of water for generation, and global warming is not reducing annual Northwest rainfall. Global warming is shifting rainfall to heavier rain in the winter and longer dry seasons in the summer and fall, but total rainfall is holding steady. But hydroelectric operators may reduce early-dry-season production to avoid risks of missing out on higher profits later.

When people and PUD's purchase renewable energy at slightly higher prices, they provide the hydroelectric generators higher prices throughout the year, removing the incentive to hold back at the start of the dry season. Purchasing renewable energy also raises prices specifically for renewable energy and diminishes demand for fossil-fuel based electricity. Those price changes incentivize installation of solar and wind generation. In a single month, Edmonds purchasing of

renewable energy may have small impacts on the portion of Northwest Power Pool electricity that is renewable. Within the coming year, it has large impacts.

Greenhouse Gas Emissions Inventories Guide Action

Purchasing Renewable Energy

When Edmonds and Snohomish PUD purchase renewable energy, should their greenhouse gas inventory indicate that they reduced their carbon footprints? If purchasing renewable energy has no effect on carbon emissions or very little effect, their greenhouse gas emission inventory should reflect that the actions they have taken have little or no effect. The inventory should guide them to more effective actions.

Similarly, when Edmonds buys renewable energy, should their greenhouse gas emission inventories indicate that they are doing something better than the citizens of Wyoming, who support fossil fuel generation more than any other state and who also purchase electricity from the Northwest Power Pool?

The Federal Energy Star program reports,

> *One way you can do your part to reduce your carbon footprint is by switching to green power. Green power consists of electricity produced from solar, wind, geothermal, biogas, some forms of biomass, and low-impact small hydroelectric sources. Options to switch to green power are steadily growing, so no matter where you live, there is an opportunity for you to make an energy choice that counts and supports a clean energy future. However, to make sure that it is actually green power, EPA recommends that you choose third-party certified green power.*
>
> (https://www.energystar.gov/products/green_power_options)

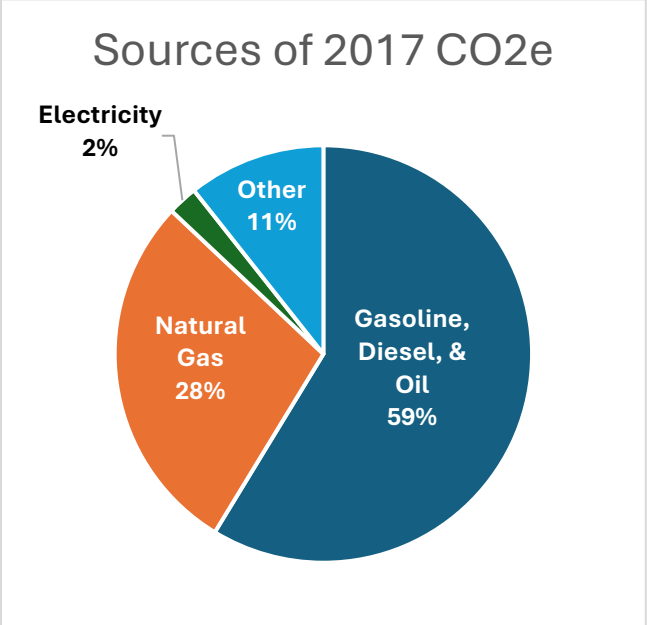
The EPA reports,

> *Green power purchases have and continue to play an important role in driving the development of new renewable energy projects in the United States*
>
> (https://www.epa.gov/sites/default/files/2016-01/documents/purchasing_guide_for_web.pdf)

When a greenhouse gas emissions inventory fails to recognize the contribution citizens or a PUD make by buying renewable energy, the inventory fails to reward that contribution and fails to highlight the harm of other people and PUD's buying fossil-fuel based electricity. That's a mistake.

The sensible approach is to report the reality of what is happening and summarize the results to reflect the credit that is due to decisions about renewable energy. In this case, that means reporting that Edmonds's electricity-related emissions reflect the renewable-energy choices of Snohomish PUD and Edmonds residents. The summary of Edmonds emissions should be as shown in the chart at the start of this report, copied here as figure 2.

Figure 2



That summary should then be accompanied by an explanation of the Northwest Power Pool, and how progress in Edmonds has less of an immediate impact than it appears, because Edmonds consumption of renewable energy reduces how much renewable energy is consumed elsewhere in the Northwest Power Pool geography, and increases fossil fuel burning in places like Wyoming.

Preparing for 2050

The portion of electricity that is generated renewably has grown 6.6% annually since 2010 (https://www.eia.gov/todayinenergy/detail.php?id=53459, https://www.eia.gov/todayinenergy/detail.php?id=53779). At the current rate of growth, renewable generation will match total electricity consumption before 2050.

For private citizens, stopping natural gas is more important than reducing electricity consumption. If all electricity is generated renewably in 2050, and non-electricity-generation consumption of gasoline and natural gas is unchanged, America will have reduced greenhouse gas emissions by less than 50%. If Americans stopped burning gasoline, natural gas, and oil, even if they did nothing to address any other sources of greenhouse gases, they would have eliminated about 80% of U.S. global warming pollution.

It would be a mistake for a greenhouse gas inventory to focus action on reducing electricity consumption at the expense of stopping natural gas burning. Edmonds citizens should not be encouraged to invest in more efficient refrigerators before installing heat pump hot water heaters.

Accounting for Embodied Emissions in Food and Consumer Products

The estimates of embodied emissions in food and consumer products that GC/ESA provide deserve a section in the report, but should not be included in the overall conclusions.

The GC/ESA report includes estimates of the greenhouse gas emissions that were released during the creation of food and consumer products that were then purchased by Edmonds residents. This is a metric that may someday guide action. Someday, a grocery shopper may review options for cereal purchases or milk, and see markings on their boxes and bottles indicating the greenhouse gas emissions of each. The consumer could then purchase the cereal or milk with the lowest greenhouse gas emissions. So far, a consumer cannot do that, because the greenhouse gas emissions scores are not provided in grocery stores or for consumer goods.

There is an additional problem. The GC/ESA report is based on estimates from the Cool Climate Network. Even if embodied greenhouse gas emissions reporting were available on foods and consumer goods, and a household shifted their purchasing to lower greenhouse gas emissions, that shift would not be completely reflected in the Cool Climate Network inventory reporting. The Cool Climate Network inventory is primarily based on

- demographics (income, household size, race, education),
- home characteristics (home size, home ownership, structure type, heating fuel),
- travel behavior (vehicle ownership, commute mode, commute times),
- geographic variables (population density, weather), and
- economic data (energy prices).

(https://escholarship.org/uc/item/4k19r6z7)

The Cool Climate Network does not collect this data at the household level. Instead, it relies on publicly available zip-code level data collected by government agencies. A household will not be able to change most of its demographics, and there can only be a weak relationship between choosing lower carbon emission foods and goods through geographically summarized economic characteristics to how much greenhouse gas emissions were created in producing that food and those consumer goods. It would be necessary for the new purchases to be measured by Federal agencies before they could be counted.

The result of these challenges for what the Cool Climate Network provides mean that their reporting should not dominate the conclusions from the inventory. Prominently highlighting the Cool Climate Network estimates implies consumer choices provide a better opportunity to reduce carbon emissions than reducing burning gasoline and natural gas.

It is very unlikely that even the researchers who developed the Cool Climate Network would suggest that reducing gasoline and gas burning should be placed on a back burner while households

focused on reducing the embodied greenhouse gas emissions of their food and consumer products.

Corroboration

In 2022, Snohomish County published a report on the County's greenhouse gas emissions in 2019. That report provides the following figure on page 16:

Figure 3

Reporting from Snohomish County Greenhouse Gas Emission Report

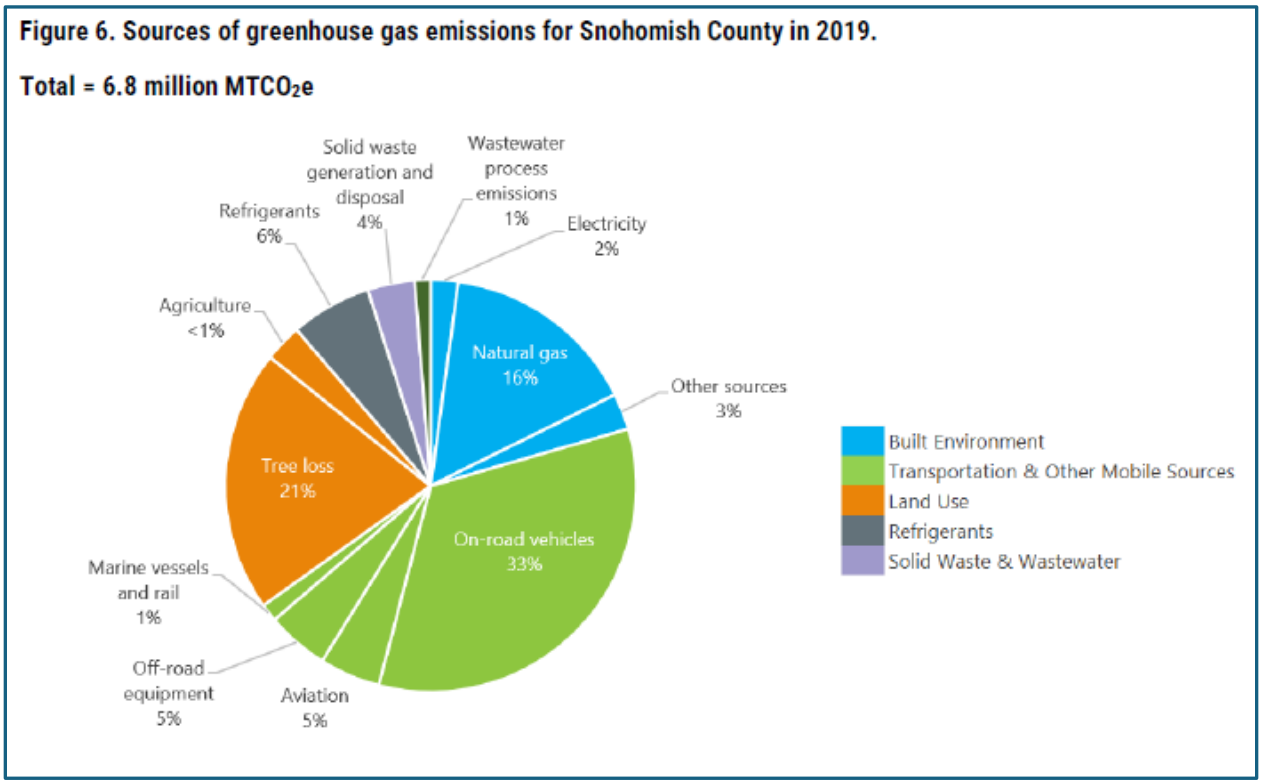


Table 4 shows what Edmonds emissions would be estimated to be, if Edmonds's emissions were estimated to match Snohomish County emissions, after excluding emissions sources that do not appear in Edmonds.

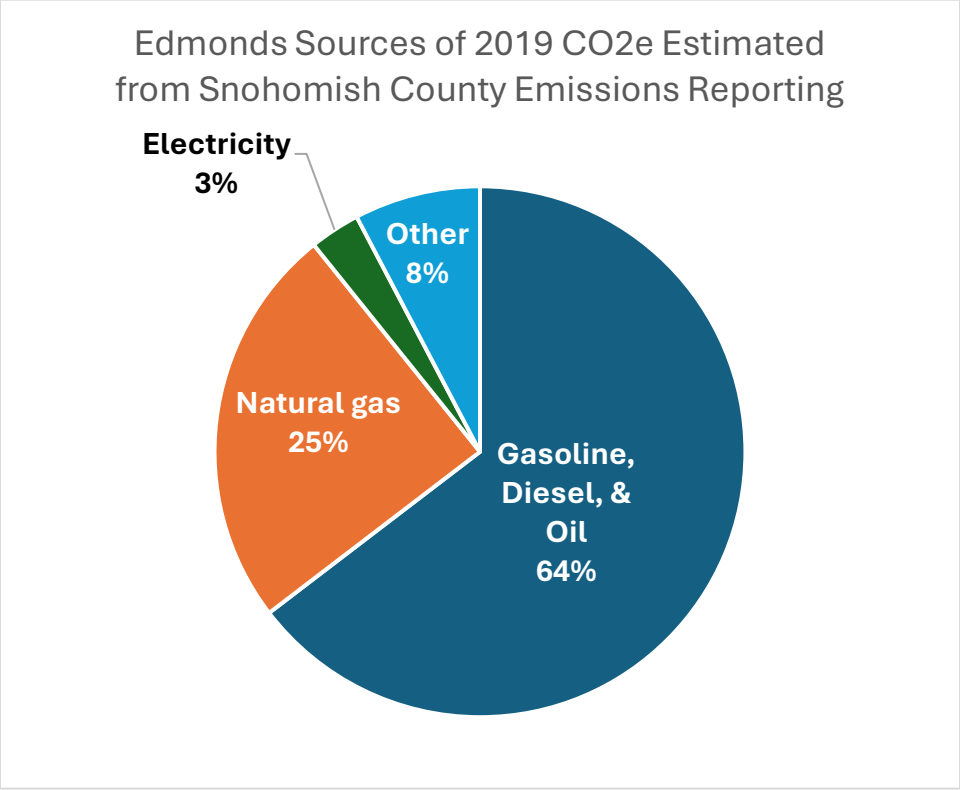
Table 4 lists the percent of greenhouse gas emissions shown in figure 3 (Snohomish figure 6), after excluding tree loss, agriculture, and aviation. Tree loss was not counted in Edmonds's inventory, partly because the Edmonds tree canopy has been increasing a small amount in recent years. Edmonds has no significant agriculture. Edmonds has no aviation.

Table 4

Source	Reported Percent	Percent of Edmonds-Relevant Sources
Gasoline, Diesel, & Oil	42%	65%
Built Environment Other sources (heating oil)	3%	
On-road vehicles	33%	
Off-road equipment	5%	
Marine vessels and rail	1%	
Natural gas	16%	25%
Electricity	2%	3%
Other	5%	8%
Solid waste generation and disposal	4%	
Wastewater process emissions	1%	
Total (Edmonds Relevant)	65%	

Figure 4 shows the portions from each source.

Figure 4

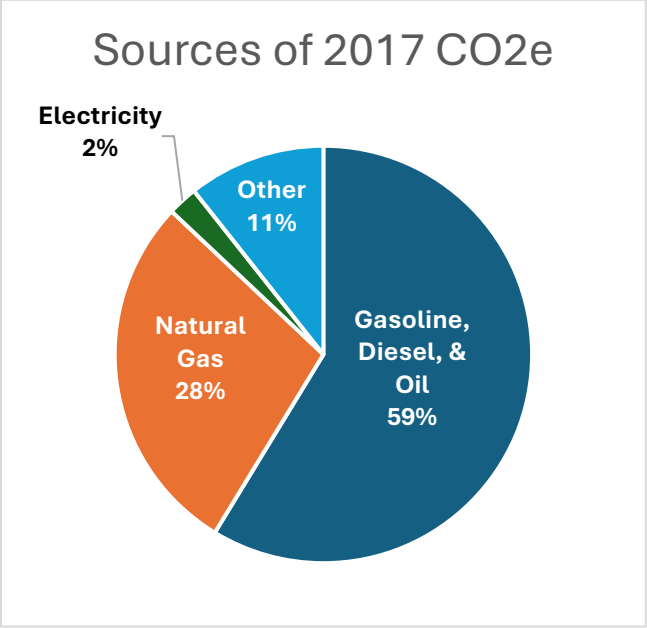


The rough agreement between the re-presentation of the GC/ESA report's findings and what would be concluded for Edmonds from the Snohomish County inventory is an indication that the data re-presentation is a reliable conclusion that can be expected from future greenhouse gas inventories.

Conclusion

The best reporting on local Edmonds greenhouse gas emissions is that oil products (gas, diesel, and heating oil) create about 60% of Edmonds greenhouse gas emissions. Natural gas creates another 30%, and the rest is primarily leaking refrigerants, as shown in figure 5 below:

Figure 5



References

Good Company and ESA (2019). *2017 Community Greenhouse Gas Inventory.* Retrieved 10/28/24 from https://mrsc.org/getmedia/e4314661-05aa-4c7d-adc9-bbdbfe671d6c/e3gginventory.pdf