ENERGY SOLUTIONS CENTER

Track: Commercial Natural Gas I
Unit #12: Environmental Considerations

An overview of Environmental Issues for Commercial Facilities

Eric Burgis, Energy Solutions Center

Presentation Outline

- Air Emissions
  - Greenhouse Gasses
  - Carbon Footprint
  - Energy Use and CO_2
  - Reducing CO_2
- Heating Oil
  - Emissions
  - Tank Leaks

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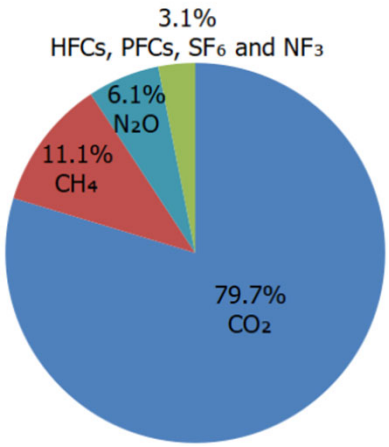
Air Emissions

Greenhouse Gasses

Greenhouse Gas Emissions

- Carbon Dioxide (CO_2)
- Methane (CH_4)
- Nitrous Oxide (N_2O)
- Fluorinated gases (HFC, PFC, SF_6, NF_3)



Total U.S. Emissions > 6,300 Million Metric Tons per year.

EPA United States Environmental Protection Agency

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https://www.epa.gov/ghgemissions/overview-greenhouse-gases

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Global Warming Potential (GWP)

Compares the ability of a greenhouse gas to trap heat in the atmosphere relative to another gas. GWP-weighted emissions are provided in million metric tons of CO2 equivalent (MMT CO2 Eq.)

	Gas	GWP
	CO_2	1
	CH_4*	25
	N_2O	298
Fluorinated gases	HFCs	Up to 14,800
Fluorinated gases	PFCs	Up to 12,200
Fluorinated gases	SF_6	22,800
Fluorinated gases	NF_3	17,200

* The GWP of CH4 includes the direct effects and those indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to production of CO2 is not included.

https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-chapter-executive-summary.pdf

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Carbon dioxide (CO_2)

Carbon dioxide (CO_2) : Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials, and also as a result of certain chemical reactions (e.g., cement production). Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle

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https://www.epa.gov/ghgemissions/overview-greenhouse-gases

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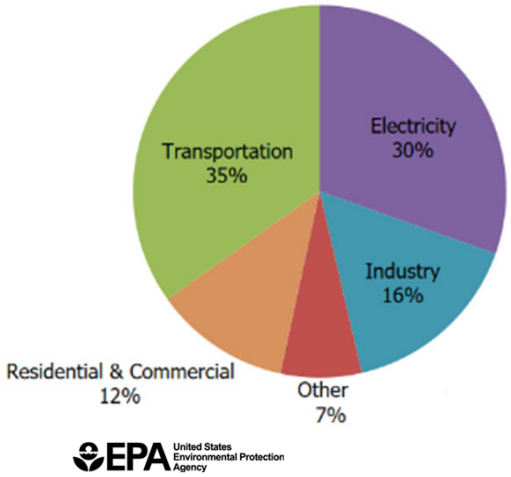
Sources of Carbon dioxide (CO_2)

- **Transportation:** The combustion of fossil fuels such as gasoline and diesel to transport people and goods is the largest source of CO_2 emissions.
  - Accounts for 35% of total U.S. CO_2 emissions and 28% of total U.S. greenhouse gas emissions.
- **Electricity:** Electricity is the 2nd largest source CO_2.
  - Accounts for 30% of total U.S. CO_2 emissions and 24% of total U.S. greenhouse gas emissions.
- **Industry:** Industrial processes emit CO_2 through fossil fuel consumption.
  - Accounts for 16% of total U.S. CO_2 emissions and 13% of total U.S. greenhouse gas emissions.



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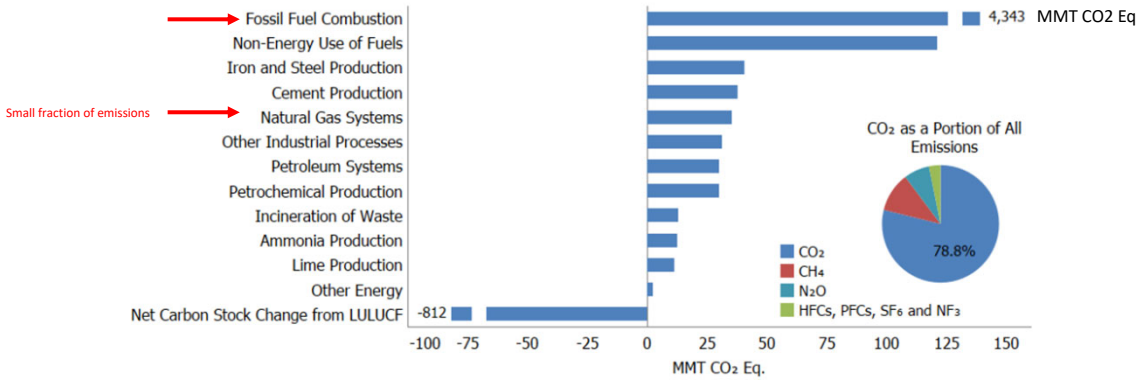
Sources of Carbon Dioxide (CO_2) Emissions



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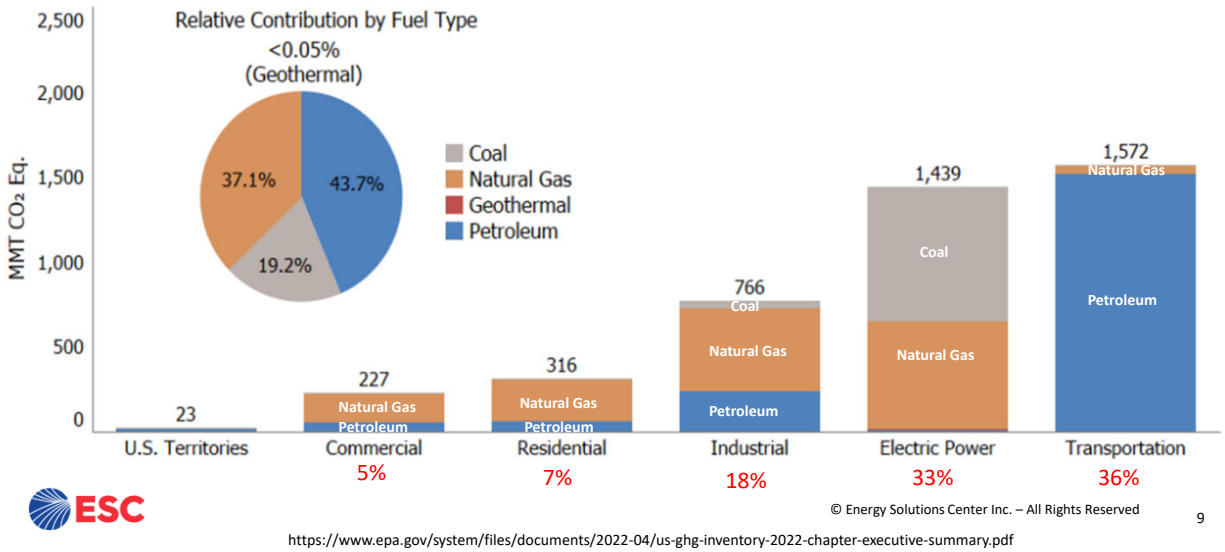
CO_2 Emissions from Fossil Fuel Combustion



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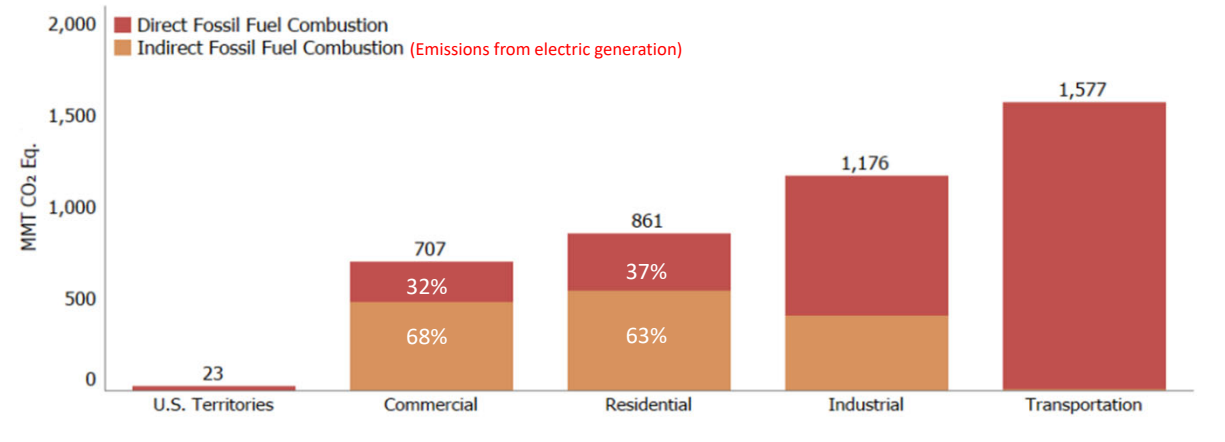
https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-chapter-executive-summary.pdf

CO_2 Emissions from Fossil Fuel Combustion
(Direct + Indirect Emissions)



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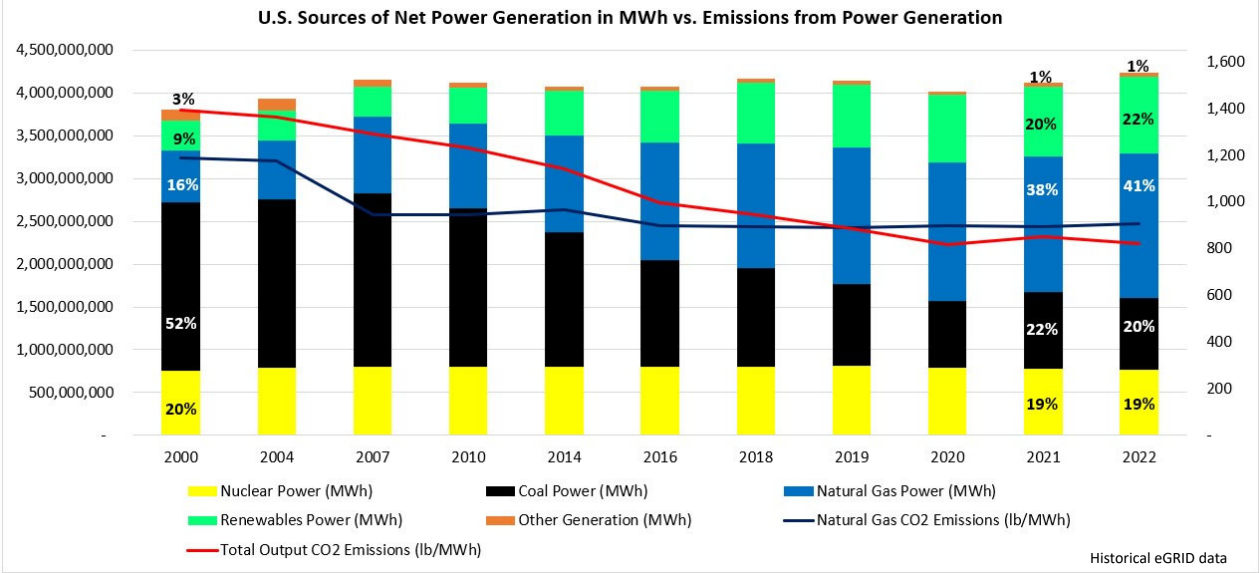
https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-chapter-executive-summary.pdf

Historical Grid Power Mix and CO_2 Emissions



Other Greenhouse Gas Emissions & Where They Come From

Methane (CH_4) : Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

https://www.epa.gov/ghgemissions/overview-greenhouse-gases

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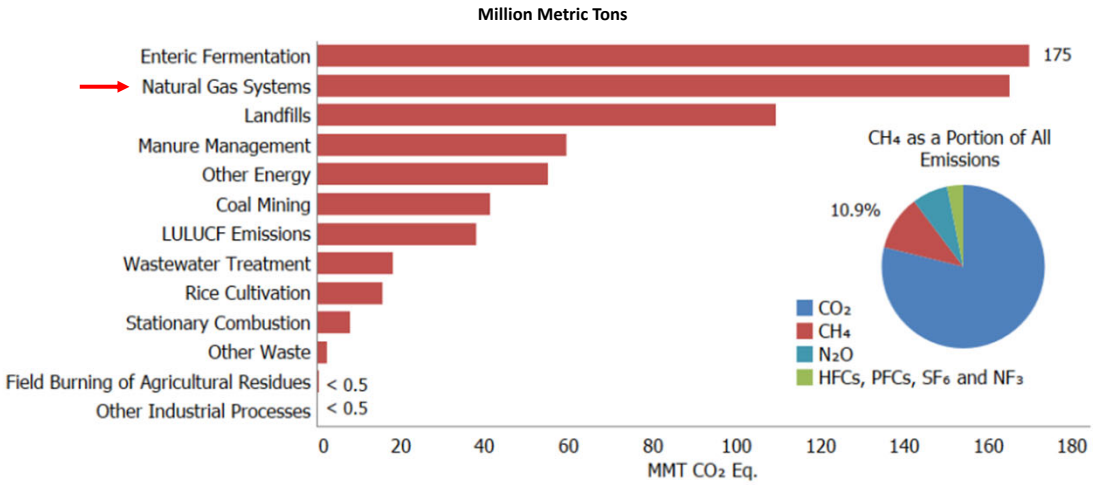
Source of Methane Emissions



https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-chapter-executive-summary.pdf

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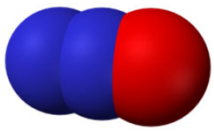
Nitrogen oxides (NO_x):

Nitrous oxide (N_2O): Nitrous oxide is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during treatment of wastewater.

- Lifetime in Atmosphere: 114 Years
- Global Warming Potential: (100-year)

https://www.epa.gov/ghgemissions/overview-greenhouse-gases



Nitrogen oxides (NO_x): generic term for a group of highly reactive gases, which contain nitrogen and oxygen in various amounts and chemical configurations:

- Nitric Oxide (NO) comes mainly from engines
- Nitrogen Dioxide (NO_2) formed by burning fossil fuels
- **Nitrous oxide (N_2O)** is emitted during agricultural and industrial activities as well as from power stations

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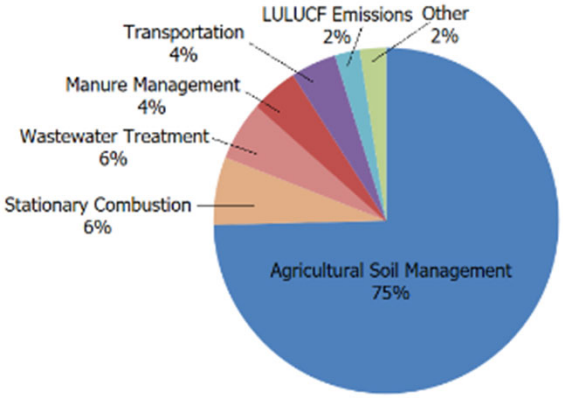
Sources of Nitrogen Oxides (NO_x)

- **Agriculture:** The application of nitrogen fertilizers accounts for the majority of N_2O emissions in the United States.
- **Fuel Combustion:** Nitrous oxide is a byproduct of fuel combustion.
- **Industry:** Nitrous oxide is generally emitted from industry through fossil fuel combustion.



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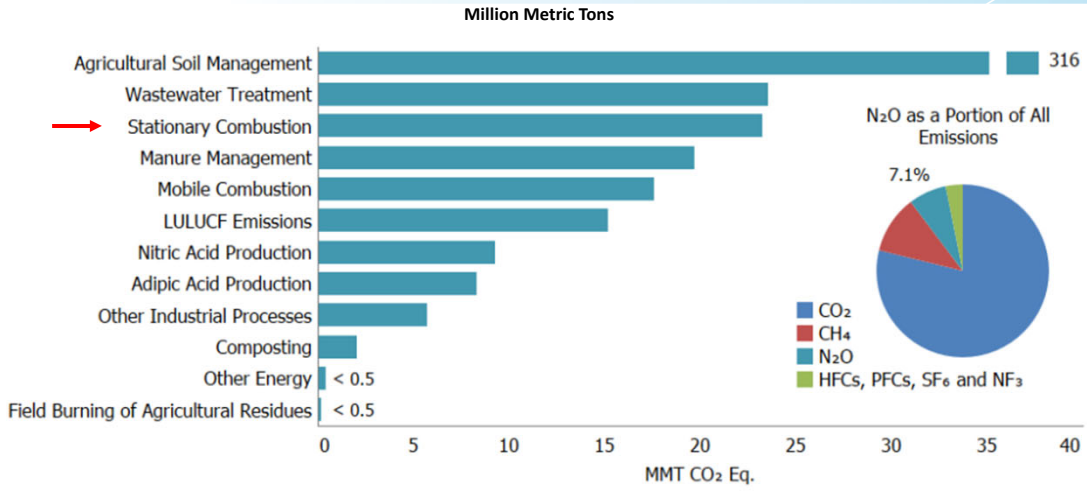
Sources of Nitrogen Oxides (NO_x)



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https://www.epa.gov/ghgemissions/overview-greenhouse-gases

Other Greenhouse Gas Emissions & Where They Come From

- **Fluorinated gases**: Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful greenhouse gases that are emitted from a variety of household, commercial, and industrial applications and processes. These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential (GWP) gases.

https://www.epa.gov/ghgemissions/overview-greenhouse-gases

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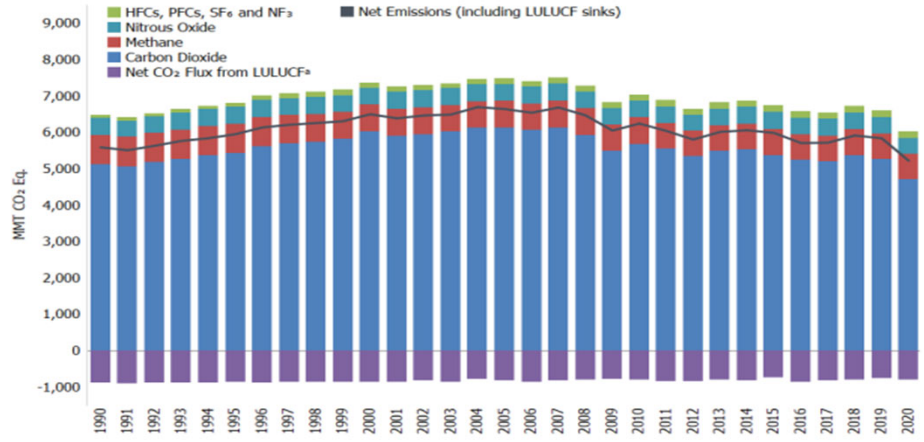
Historical U.S. Greenhouse Gas Emissions

Figure ES-1: U.S. Greenhouse Gas Emissions and Sinks by Gas



[a] The term "flux" is used to describe the exchange of CO_2 to and from the atmosphere, with net flux being either positive or negative depending on the overall balance. Removal and long-term storage of CO_2 from the atmosphere is also referred to as "carbon sequestration."

https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-chapter-executive-summary.pdf

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Carbon Dioxide Emissions From Combustion of Fossil Fuels

Carbon dioxide emitted per quantity of energy for various fuels

Cleanest

Fuel Type	CO_2 Emitted (lbs/10^6 Btu)	CO_2 Emitted (g/MJ)
Natural Gas	117	50.30
Propane	139	59.76
Automobile Gasoline	156	67.07
Kerosene	159	68.36
Fuel Oil	161	69.22
Coal (bituminous)	205	88.13

Dirtiest

Energy Information Administration. https://www.eia.gov/tools/faqs/faq.php?id=73&t=11

Other Fossil Fuel Emissions

Pollutant	Pounds per Billion Btu's of Energy Input		
	Natural Gas	Oil	Coal
Carbon Dioxide	117,000	161,000*	205,000*
Carbon Monoxide	40	33	208
Nitrogen Oxides	82	448	457
Sulfur Dioxide	1	1,122	2,591
Particulates	7	84	2,744
Mercury	0.000	0.007	0.016

The amount of CO_2 produced far exceeds any other harmful pollutant. Natural Gas has much lower emissions of greenhouse gases than oil or coal

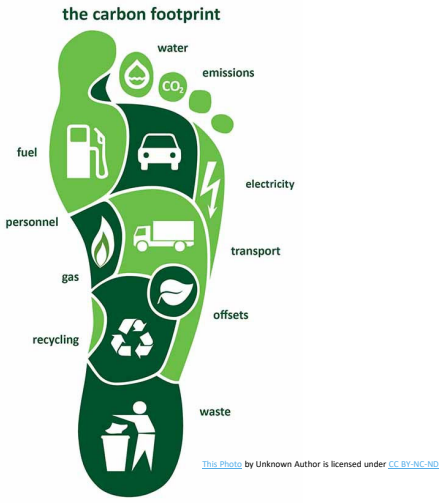
http://www.climate.org/topics/clean-energy
* Adjusted to more current data available

Air Emissions

Carbon Footprint

What is a Carbon Footprint

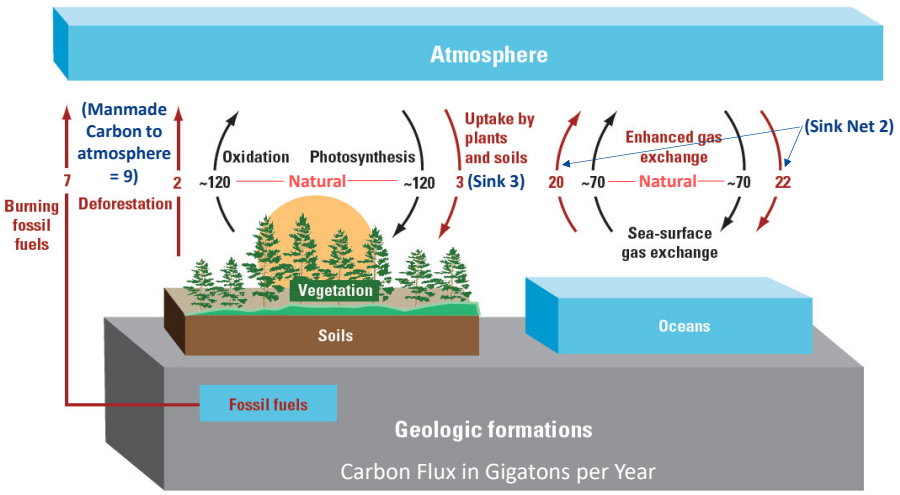
- A carbon footprint is a measure of the impact human activities have on the environment in terms of the amount of greenhouse gasses produced – measured in units of carbon-dioxide (CO_2)



What's All the Hype About?

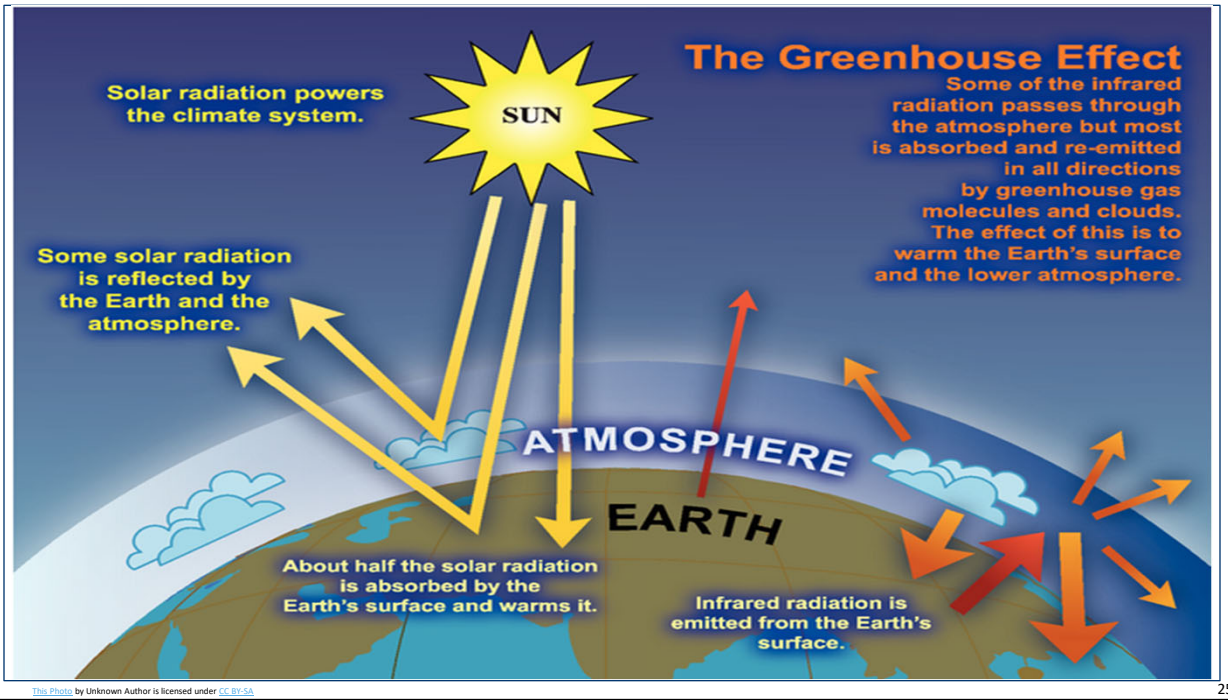
- High School Chemistry taught us that CO_2 is used by plants and trees.
- Trees use the sun for photosynthesis to convert the CO_2 into carbon to help the tree grow and Oxygen that we breath.
- So if CO_2 is turned into the oxygen we need for life on this planet, what's the concern with having too much CO_2?

Global Carbon Cycle?



Manmade Carbon = 9 – 5 sequestered = 4 gigatons net CO_2 to atmosphere/year

 https://pubs.usgs.gov/fs/2008/3097/pdf/CarbonFS.pdf



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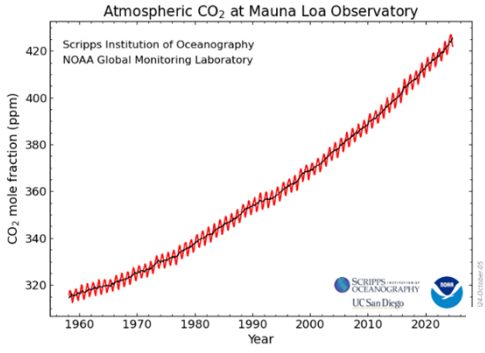
The Increase in CO_2 has Occurred Over Decades

- Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years
- The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use changes



https://gml.noaa.gov/ccgg/trends/

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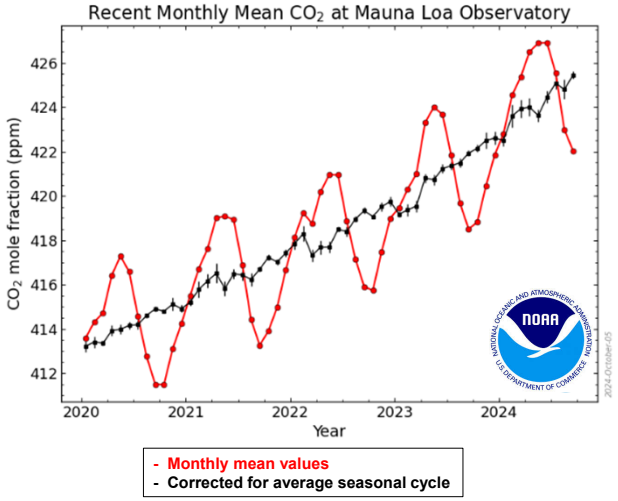
CO_2 Production Steadily Increasing

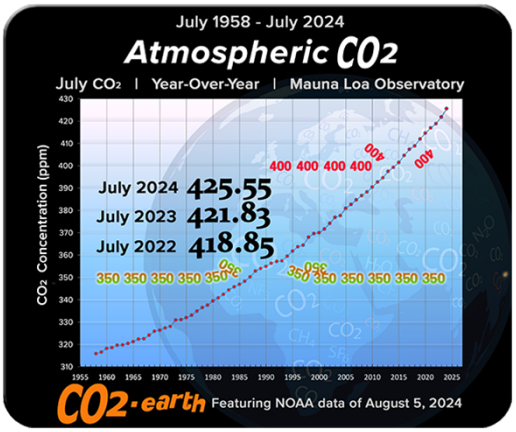
- Atmospheric CO_2 is accelerating upward from decade to decade.
- Today's monthly average CO2 rate is ~ 422 parts per million (ppm).

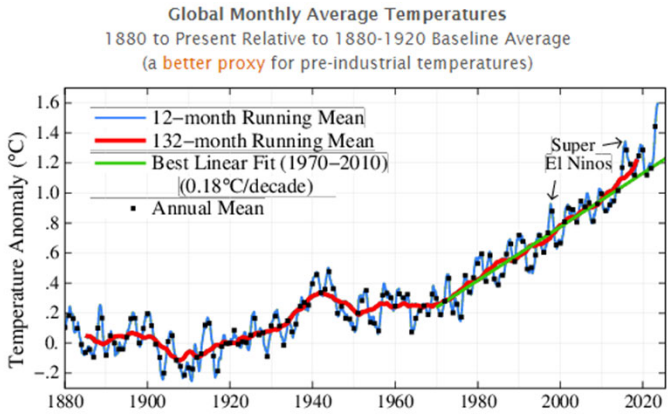
The **red** lines and symbols represent the monthly mean values, centered on the middle of each month. The **black** lines and symbols represent the same, after correction for the average seasonal cycle.



https://gml.noaa.gov/ccgg/trends/

Goal is 350 ppm CO_2





https://www.co2.earth/

Impacts of Climate Change

- Changing climate impacts society and ecosystems in a broad variety of ways
- Climate change can increase or decrease rainfall, influence agricultural crop yields, affect human health, cause changes to forests and other ecosystems, or even impact our energy supply
- Climate-related impacts are occurring across regions of the country and across many sectors of our economy

http://www.epa.gov/climatechange/impacts-adaptation/index.html

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Recent Climate Changes

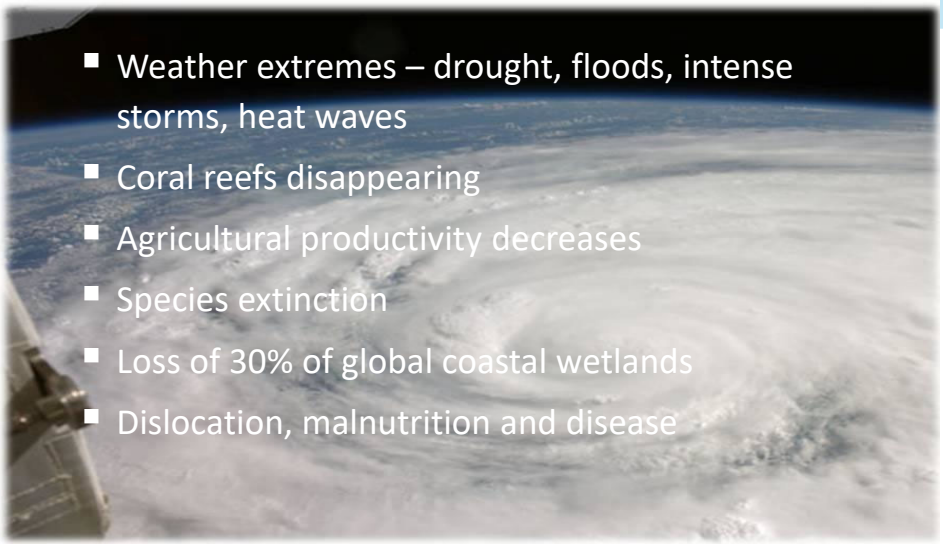

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Photo Credit: NASA

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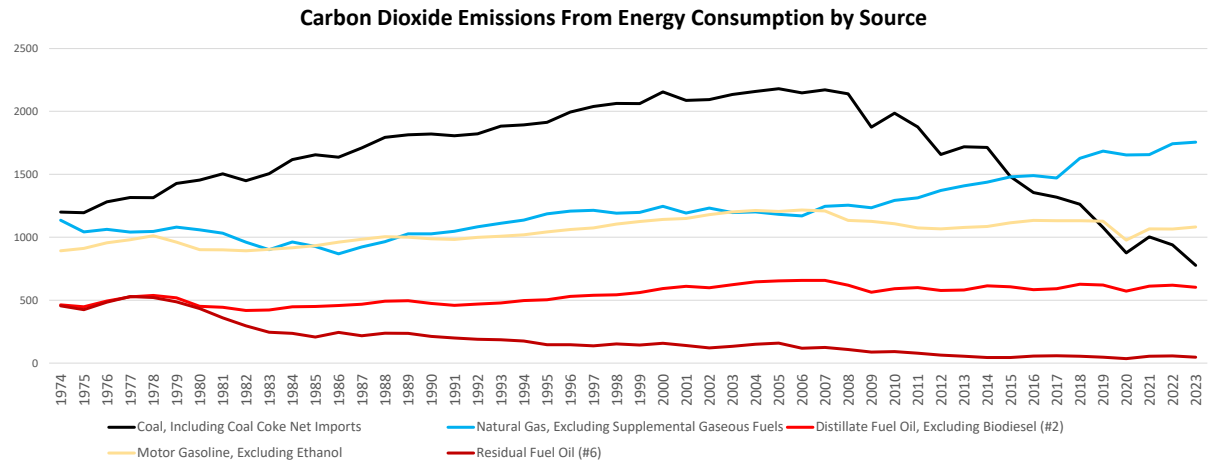
Air Emissions

Energy Use & its Impacts on CO_2 Emissions

Energy Related CO_2 Emissions



https://www.eia.gov/totalenergy/data/browser/xls.php?tbl=T11.01&freq=m

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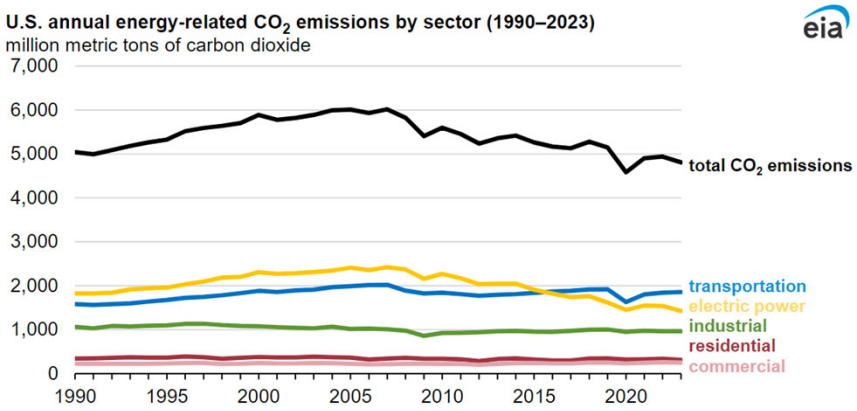
Market Sector CO_2 Emissions

Two Things impact Electric emissions:

1. **Source to Site Efficiency**
2. **Fuel Mix used in generation**

U.S. energy-related CO_2 emissions decreased by 3% in 2023



Data source: U.S. Energy Information Administration, *Monthly Energy Review*, March 2024

https://www.eia.gov/todayinenergy/detail.php?id=61928

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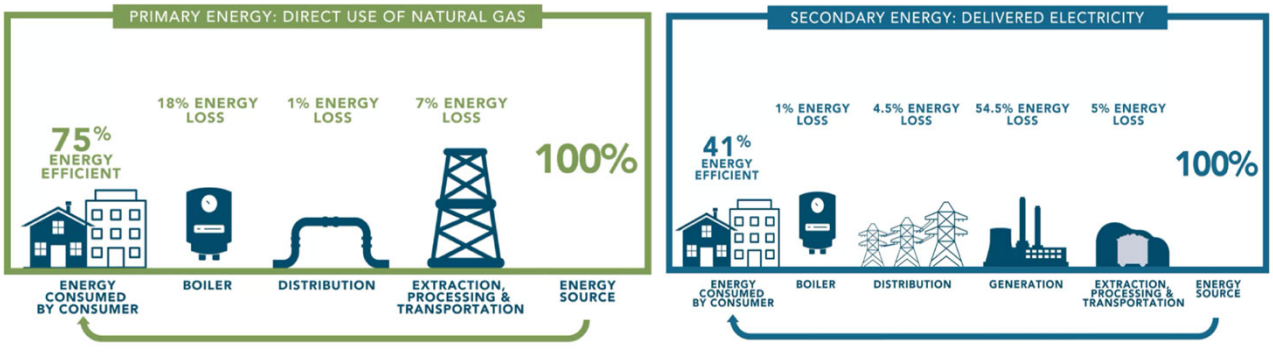
Energy Supply Source to Site Efficiency



1 www.aga.org
2 https://www.icf.com/

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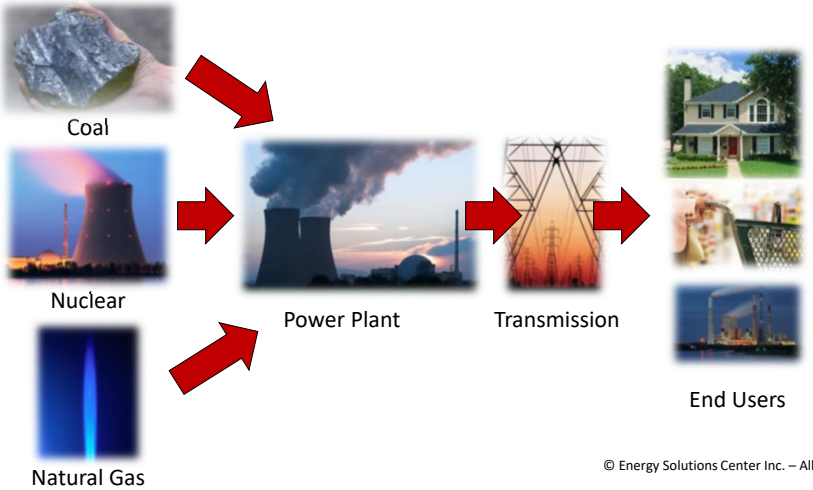
Electric Generation Options

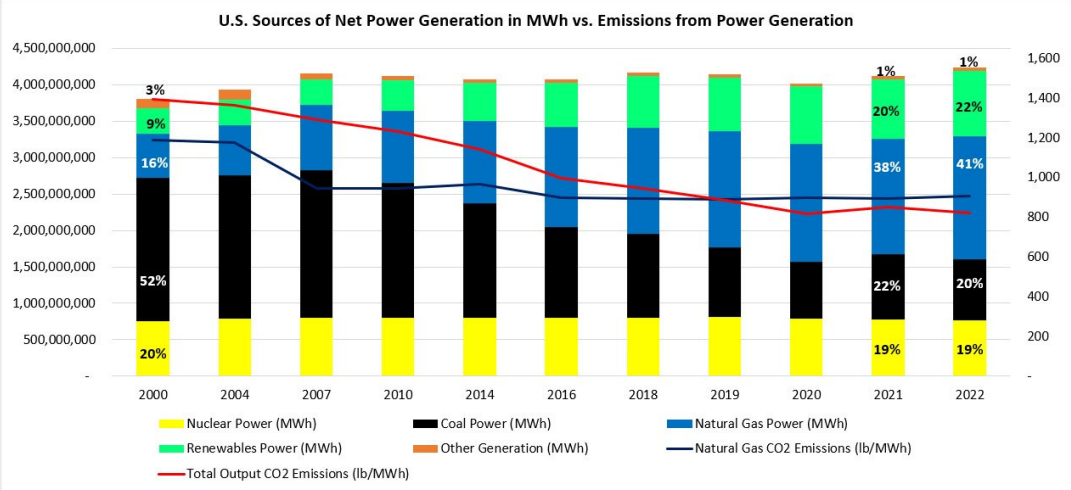
- Fossil Fuels
  - Coal
  - Oil
  - Simple Cycle Gas Turbines
  - Combine Cycle Gas Turbines
- Other Power Generation
  - Hydro
  - Nuclear
  - Renewable – Solar & Wind

Electric Generation Mix

How does the mix impact the CO_2 produced annually?



Typical Electric Generation Fuel Mix



eGRID data

Generation Pecking Order

- Generation Priority Schedule
  - Nuclear Power Plants run 24/7, 365 days a year
  - Renewables produce power as able from sun, wind, and hydro
  - Fossil fuel power plants are the first shut off and last turned on – often serve peak loads
    - Within the fossil fuel make up Natural Gas is typically the one turned on and off to meet peak loads

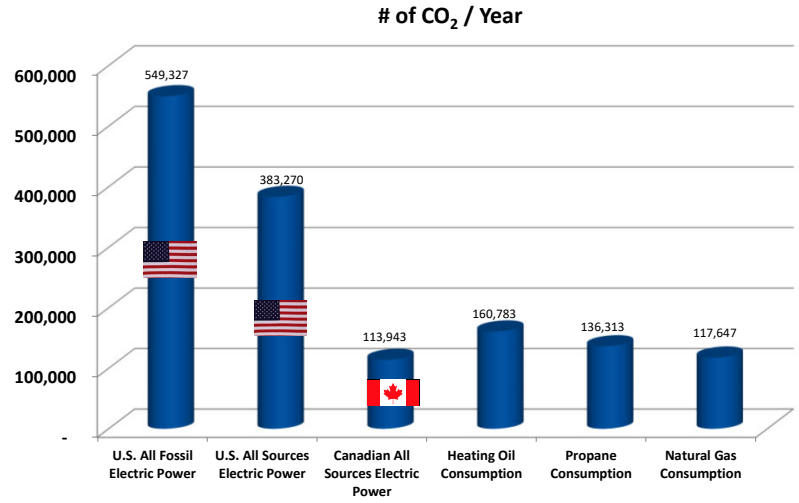
Comparison Example

Emissions Example, 1,000 MMBTU Site Energy Use per Year

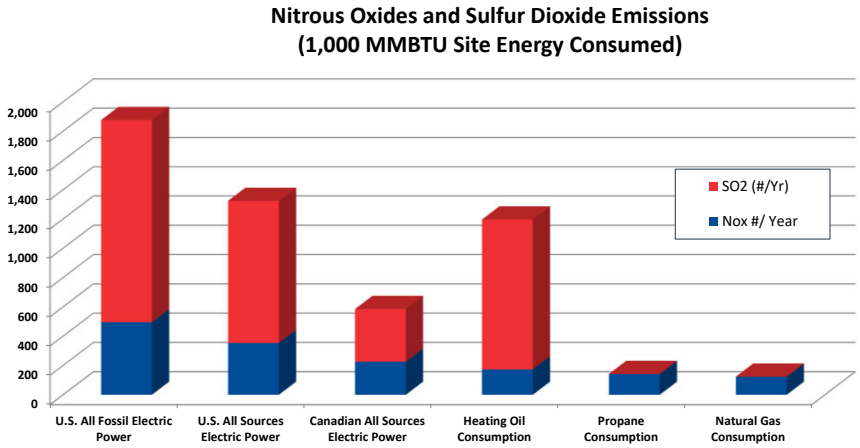
Electric Consumption	293,083	KWH/Year
Heating Oil Consumption	7,210	Gallon/Year
Propane Consumption	10,905	Gallon/Year
Natural Gas Consumption	1,000	MMBTU/Year

Analyses often use an all power generation mix to calculate emissions, but they should consider using the fossil fuel mix as these are the plants to be turned on and off to meet peak demand.

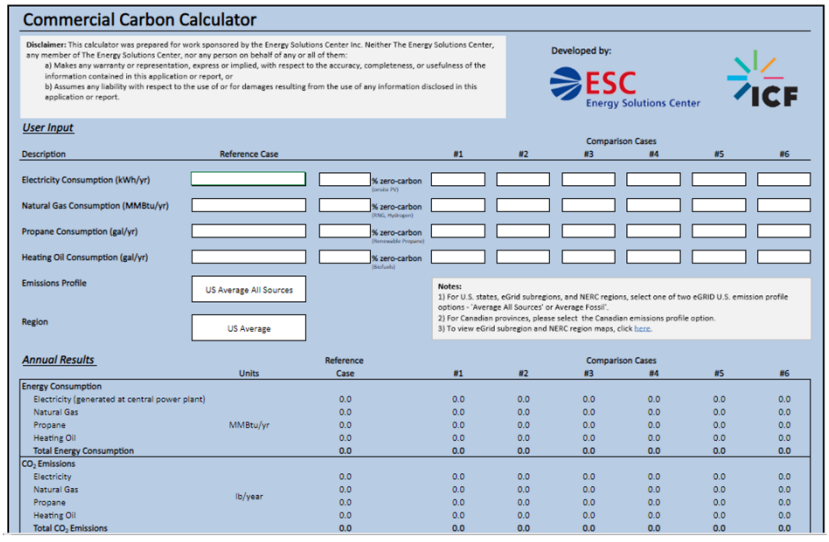
Example: 1,000 MMBTU Site Energy Usage



Example NOx & SO2



Carbon Calculator



Commercial Carbon Calculator

Disclaimer: This calculator was prepared for work sponsored by the Energy Solutions Center Inc. Neither The Energy Solutions Center, any member of The Energy Solutions Center, nor any person on behalf of any or all of them:
a) Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this application or report, or
b) Assumes any liability with respect to the use of or for damages resulting from the use of any information disclosed in this application or report.

Developed by: ESC Energy Solutions Center, ICF

User Input

Description	Reference Case		Comparison Cases #1	#2	#3	#4	#5	#6
Electricity Consumption (kWh/yr)		% zero-carbon (Grid+ PV)						
Natural Gas Consumption (MMBtu/yr)		% zero-carbon (RNG, Hydrogen)						
Propane Consumption (gal/yr)		% zero-carbon (Renewable Propane)						
Heating Oil Consumption (gal/yr)		% zero-carbon (Biofuels)						
Emissions Profile	US Average All Sources							
Region	US Average							

Notes:
1) For U.S. states, eGrid subregions, and NERC regions, select one of two eGRID U.S. emission profile options - 'Average All Sources' or Average Fossil'.
2) For Canadian provinces, please select the Canadian emissions profile option.
3) To view eGrid subregion and NERC region maps, click here.

Annual Results

	Units	Reference Case	Comparison Cases #1	#2	#3	#4	#5	#6
Energy Consumption								
Electricity (generated at central power plant)	MMBtu/yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Gas		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Propane		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heating Oil		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Energy Consumption		0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO_2 Emissions								
Electricity	lb/year	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Gas		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Propane		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heating Oil		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total CO_2 Emissions		0.0	0.0	0.0	0.0	0.0	0.0	0.0

https://www.energysolutionscenter.org/tools-and-calculators/

"80% reduction by 2050" What Does it Mean?

- We need to reduce greenhouse gas emissions by 80% from 2000 levels by the year 2050. We call this the "80% Solution."
  - The average person generates 17,500 lbs of CO_2 per year. We would have to get down to 3,500 lbs per year.
  - At an 80% reduction, temperatures are still projected to rise 3°F or more.

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Reducing CO_2 Emissions

What can we do to reduce our Carbon Footprint?

- Gas utilities can introduce Lower Carbon Gases
  - Renewable Natural Gas
  - Hydrogen
  - Purchase Certified Gas certificates
- Consumers can become more energy efficient
  - Energy conservation
  - Use utility EE and weatherization programs
  - Replace technologies with higher efficiency products
  - Work towards Zero Net Energy
  - Add Carbon capture and utilization technologies
  - Purchase carbon offsets or renewable gas certificates
  - Fleet CNG vehicles

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Renewable Natural Gas (RNG)

- Renewable natural gas (RNG) from biomass helps to meet America's growing demand for a low-carbon, affordable, and reliable fuel. RNG is fully compatible with conventional natural gas and the existing pipeline infrastructure.
- RNG is made by capturing and refining biogases released from decomposing organic waste material.
- RNG is considered a carbon neutral fuel, with even greater benefits when it is produced from organic waste that would otherwise decay and create methane emissions.[1]

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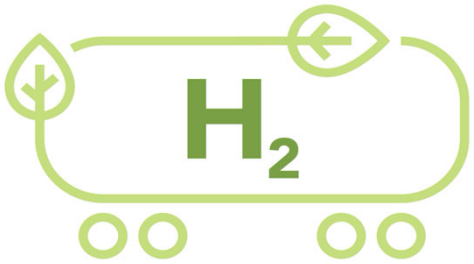
1 SoCalGas, What is Renewable Natural Gas?

2 U.S. EPA, Renewable Natural Gas, 2022

Hydrogen's Role in the Low-Carbon Economy

Hydrogen will play a key role in the transition to a clean energy economy across many sectors. Hydrogen does not release greenhouse gas emissions during combustion and can generate electricity, fuel vehicles, and provide heat for homes, businesses, and industry.



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Certified Gas Certificates

Responsibly sourced gas is a key strategy to minimize methane emissions that might occur across the natural gas supply chain.

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Energy Conservation

"Choose Not to Use"

- Turn up the thermostat in summer and down in winter
- Weatherization
- Eliminate spaces that are unnecessarily heated or cooled
- Consider July or August / December or January vacation shut downs
- Track energy use and set goals

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Utility Energy Efficiency and Weatherization Programs

Energy Efficiency and weatherization programs work together to cut household energy expenditures, reduce greenhouse gas emissions, and increase the resiliency of our buildings.

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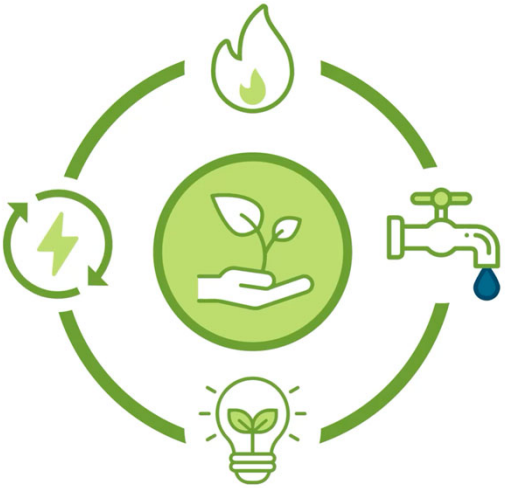
Energy Efficient Technologies



Energy Efficient technologies can play a pivotal role in a low-carbon future. Gas-powered technologies can offer efficient and cost-effective methods to reduce energy requirements, fuel consumption, and greenhouse gas emissions.

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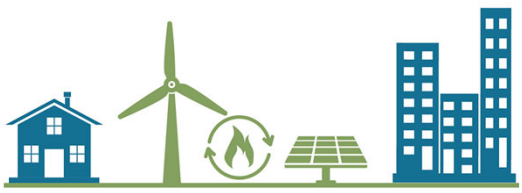
Zero Net Energy Buildings

Zero net energy buildings combine renewable energy technologies and energy efficiency measures to reduce greenhouse gas emissions and improve the resiliency of our built environment.



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Carbon Capture & Utilization

Carbon Management offers solutions to leverage existing infrastructure and processes while preventing emissions by making use of carbon that would otherwise be emitted to the atmosphere.

CARBON MANAGEMENT

Carbon Offsets

The natural gas industry is committed to reducing carbon emissions. By leveraging carbon capture, carbon offsets, and Renewable Natural Gas (RNG) certificates, natural gas can help achieve our low carbon energy goals and affordably, while maintaining reliability.

Compressed Natural Gas (CNG) Vehicles

Natural gas vehicles can reduce emissions from the transportation sector, currently the largest source of emissions in the United States and second largest in Canada.

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Heating Oil

Emissions

Oil versus Natural Gas Emissions

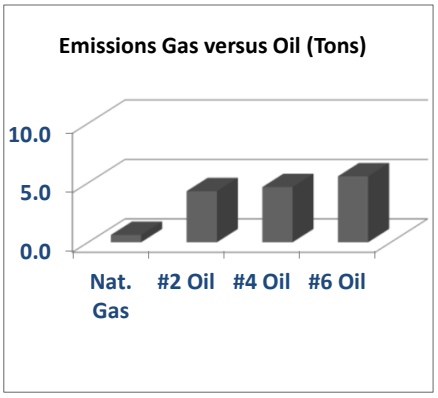
Degrading Boiler Efficiency and Impact on Emissions

Environmental Emissions other than CO2

Lower emissions from Natural Gas than oil

- Here is an example: 50,000 Gallons of #2 oil compared to other fuels

Emissions (Pounds)	Uncontrolled			
	Nat. Gas	#2 Oil	#4 Oil	#6 Oil
Part	20.20	100.00	347.97	555.91
PM10	20.20	54.00	223.69	361.34
SOx	4.04	7180.00	7456.45	7347.26
NOx	942.55	1000.00	994.19	2547.92
VOC	18.85	17.00	16.90	52.35
CO	235.64	250.00	248.55	231.63
Lead	0.00	0.02	0.02	0.19
Total #s	1,241	8,601	9,288	11,097



What About CO_2?

- Emissions EPA Factors
  - 22,300 # CO_2/1000 Gal #2 (~160.7 # CO_2 / MMBTU)
  - 25,000 # CO_2/1000 Gal #6 (~ 167 # CO_2 / MMBTU)
  - 116.8 # CO_2 per MMBTU Natural Gas
- Example: 50,000 Gallons #2 Oil
  - 557 Tons of CO_2 from #2 Oil
    - Compare to 4.3 tons of all other emissions on previous slide
  - 392 Tons of CO_2 from equivalent Natural Gas
    - Compare to less than 1 ton of all other emissions on previous slide
- **Save 165 Tons CO_2 with Natural Gas**

Degrading Boiler Efficiency

- Soot is produced because of the oil combustion process
- This soot adheres to the tubes in a boiler creating a layer of insulation between the fire and the water to be heated
- Soot builds up between boiler cleanings and effectively degrades the efficiency of the boiler over the heating season
- This reduction in efficiency leads to higher oil consumption than typical

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Degrading Boiler Efficiency Example

Month	Oil Use Scenario (Gallons)	Boiler Efficiency over season	Oil Use at constant 78% efficiency
October	4,000	78%	4,000
November	7,000	75%	6,731
December	10,000	72%	9,231
January	12,000	69%	10,615
February	9,000	66%	7,615
March	8,000	63%	6,462
	50,000	(15% reduction)	44,654

- **Boiler consumed approx. 12% more oil during the season because of efficiency drop of 15% between cleanings**
- **557 Tons of CO_2 from 50,000 Gallons #2 Oil**
  - **60 Tons of this CO_2 was a result of degrading efficiency**

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Heating Oil

Tank Leaks

Underground Storage Tanks and Leaks

Using environmental issues as a sales strategy

Oil Storage

- Underground Storage Tanks are viewed as a liability
- Clean up/Remediation costs associated with a leak can be substantial
- Indemnification insurance costs money

Oil spills: Don't be left out in the cold

By BILL ADAMS

In 2011, an elderly Dartmouth couple was forced out of their home after a thief cut a small piece of copper line worth about $6 from their outdoor furnace tank, leaving their basement flooded with oil. That criminal act made news. And rightly so.

But so, too, should the news released in a major report on oil spills — the first-ever for the Atlantic region — from insurance Bureau of Canada (IBC) last summer. It showed that 565 families had their lives turned upside down due to an oil spill on their home property.

Those families fortunately had insurance to cover the cost of clean-up, which totalled $78 million from 2008 to 2011. Those numbers do not account for the displacement of those families while clean-up took place, the backhoes in their front yards for months in some instances, or the endless list of other impacts and frustrations created from the occurrence of an oil tank leak. And that's why learning more about them is critical.

Forty-two per cent of all homes in the Atlantic region are heated with oil. The report showed that over 50 per cent of spills were the result of corrosion of the tank or lines. Other report highlights included:

- Of the 356 claims for corrosion, 279 involved outdoor tanks.
- Outdoor tanks were responsible for the largest number of claims (500).
- Newer tanks were not immune to failures, as 115 insurance claims were made where the tank was zero to five years old, and 293 for tanks six to 10 years old.

IBC believes such data support regulations to control the quality, installation and replacement of domestic fuel tanks.

But consumers have a role. There are steps they can take to protect themselves from oil spills; for example, regularly checking fittings and lines to ensure that they don't become the cause of a leak.

The winter season presents unique strains for oil tanks. Here are a couple of tips to help protect your tank:

- If it's located outdoors, make sure your tank, the lines, the connections and all the areas around them are kept clear of snow and ice. Ask if your fuel oil company provides shielding devices.
- Keep your roof clear of snow and ice that could fall on your tank.

At the same time, it's important to understand how your insurance policy covers your home oil heating system. Consider these questions for your insurer:

Do I have coverage for oil spills if my tank leaks in my house or outside?

Does my oil spill coverage have a limit that my insurer will pay out?

Does my policy cover any damage to my own home (basement/contents)?

Am I covered if my neighbour's yard is affected by my oil spill?

Find out what replacement requirements your insurer has placed on the various type of tanks (i.e. corrosive versus non-corrosive).

Bottom line: Talk to your insurance representative. An ounce of preventive maintenance and a knowledgeable insurance representative will help ensure your oil heating system keeps you and your family safe and warm. When storms swirl across the region this winter, hopefully you will be safe and warm.

Bill Adams is vice-president, Atlantic, Insurance Bureau of Canada.

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Underground Storage Tank (UST) National Program Status

UST Performance Measures (as of March 31, 2024)	
Number of active underground storage tanks at approx. 192,000 facilities	**534,534**
Number of confirmed releases since 1984 (1,945 in recent 6 months)	**575,275**
Number of cleanups completed (2,198 in recent 6 months)	**518,843**
Number of cleanups in backlog to be completed	**56,432**

https://www.epa.gov/ust

https://www.epa.gov/ust/ust-performance-measures

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Underground Storage Tanks (USTs)

- ***All USTs*** installed in U.S. after December 1988 must have leak detection when installed
- USTs installed before December 1988 had to meet leak detection compliance deadlines that were phased in over 5 years. **By December 1993, *all of these USTs* had to have leak detection**
- As of March 2024, 534,534 UST leaks have been confirmed.
- At sites without leak detection, leaks were discovered late, after contamination had spread, requiring difficult and costly cleanups

https://www.epa.gov/ust/ust-performance-measures

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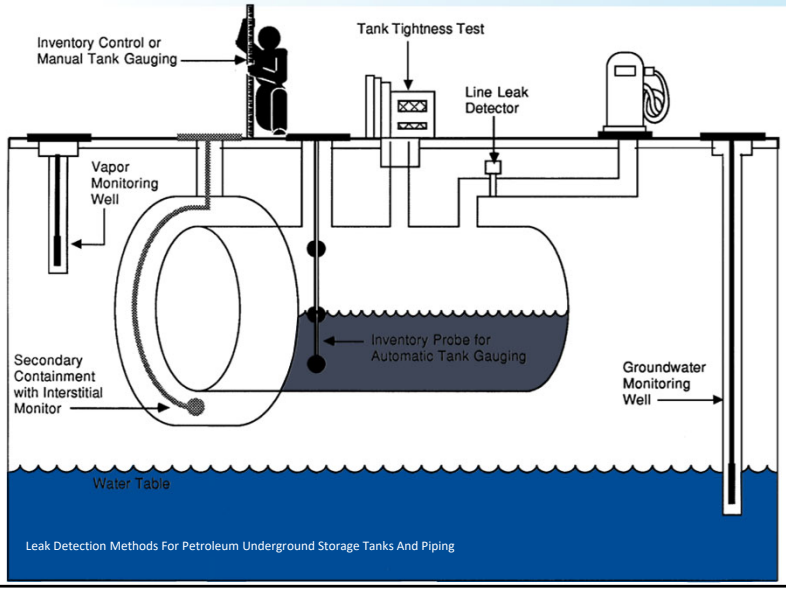
Leak Detection



Leak Detection Methods For Petroleum Underground Storage Tanks And Piping

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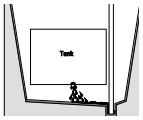
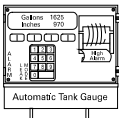
Leak Detection Methods

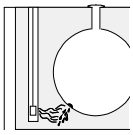
Secondary Containment With Interstitial Monitoring

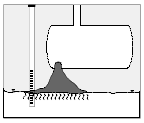




Automatic Tank Gauging Systems

Vapor Monitoring





Groundwater Monitoring

Other methods

https://www.epa.gov/ust/release-detection-underground-storage-tanks-usts-interstitial-method#interstimon

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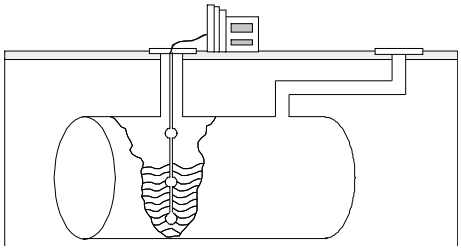
Tank Tightness Testing

- When performed according to the manufacturer's specifications, periodic tank tightness testing combined with monthly inventory control can ***temporarily*** meet the federal leak detection requirements for ***tanks*** (this method does not detect piping leaks).
- Be carful not to perform the test while your boiler is running or the test could come up inconclusive or fail



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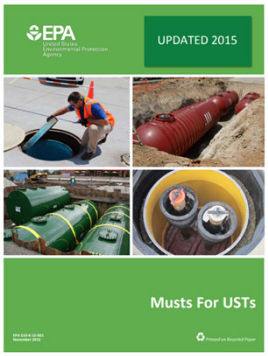
Underground Tank Resource

- The EPA regulates over 500,000 underground storage tanks that contain petroleum or other hazardous substances
- Many of these USTs have leaked or are currently leaking
- More USTs will leak unless owners and operators make sure their USTs meet the requirements



https://www.epa.gov/ust/musts-usts

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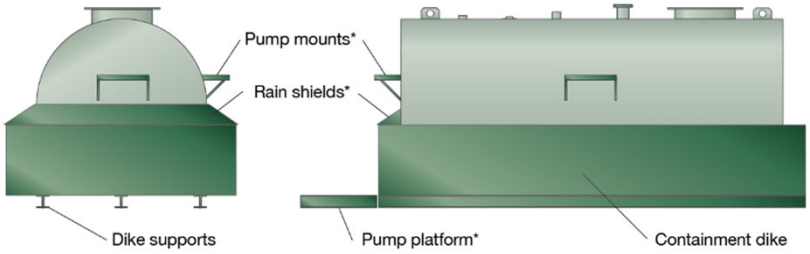
Replacement Tanks

- Aboveground Dike Tanks
- Estimated 240-30,000 Gallon Tanks
- Typically sized for 110% containment



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* Highland Tank & Mfg. Company, https://www.highlandtank.com/

Converting and Oil Customer to Natural Gas

Environmental Tactics:

- Ask customer how big their tank is
- Ask how old the tank is
- Ask if they plan to replace the tank anytime soon

Use this information to help coax them into making a change. Confirm their own fears of a potential oil release & potential clean up costs. Offer gas solutions and present customer projected energy cost savings with gas.

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Sales Tactics to Help Convert Oil Customer to Gas

- **Price:** Cost of gas versus oil. Gas is king. Use this!
- **Dual Fuel:** Steppingstone that allows customer to have oil as a back-up or for the future if oil is less costly than gas.
- **Smaller Oil Tank:** Always suggest that they save money by installing a smaller above ground oil tank versus UST replacement.
  - This limits run time on oil and also forces smaller oil deliveries which increases the cost of oil to the user.
- **Switch Oil Grades:** Work to get the customer to switch from heavier grades of oil towards #2 oil whether they are converting or not.
  - #2 Oil is more expensive & has less BTU/Gallon than #6 Oil.
  - Natural gas competes better against #2 than #4 or #6 oil.

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Thank You

Consider taking the on-line test while course material is fresh in your mind

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