Don't Blame the Petro-Guys for Climate Change

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August 2024

1. Introduction

I will do what I rarely do with my papers – pivot away from my title-thesis. Recently *United States House Committee on Oversight and Accountability completed its three-year investigation into how U.S. oil companies sought to avoid accountability for climate change.*[1]

The full scale of this misinformation was revealed in May 2024, when the United States House Committee on Oversight and Accountability completed its three-year investigation into how U.S. oil companies sought to avoid accountability for climate change.

The report — tellingly titled Denial, Disinformation and Double-Speak: Big Oil's Evolving Efforts to Avoid Accountability for Climate Change — explores Big Oil's decades-long campaign of deception and denial finding that:

"Documents demonstrate for the first time that fossil fuel companies internally do not dispute that they have understood since at least the 1960s that burning fossil fuels causes climate change and [that they] then worked for decades to undermine public understanding of this fact and to deny the underlying science".[2]

Of course they did. If any major industry found out that their products damage the environment, consumers or any other major part of our economy, their first reaction is to go on offense, and deny, deny, deny. The major goals of the corporations that comprise this industry are to (1) generate profits, (2) funnel those profits to their employees and shareholders, and above all, keep doing (1) & (2) for as long as they can. Being unflinchingly honest is not in their playbook.

I'm not being cynical with the above paragraph, this is the way any capitalistic economy operates, and it is the most efficient system we have found so far. But sooner or later the leadership of any society need to make sure we (collectively) are not doing major damage to any resource required for that society to function and serve its citizenry in the future. As of now, a large majority of our leaders (at least the sane ones) have decided climate change is real, and a real threat to our society currently and in future years.

I have another hard-reality for my readers. As of today, and least for the next two or three decades, we will be heavily dependent on the Petro-Industry. We cannot snap our fingers and transition to a greenhouse gas (GHG)-free economy. In order to gain the support of the Petro-Guys (and Girls, etc.) we need to stop playing the blame-game, and lay out a plan for this transition that includes their industry.

In this post, I will have a description of the history of the Petroleum Industry, current greenhouse gas emissions and some possible roles that this industry can play in a GHG-free economy.

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[1] Gordon McBean, The Conversation, "The oil and gas industry has been lying about global warming for decades — accountability is long overdue," May 29, 2024, https://theconversation.com/the-oil-and-gas-industry-has-been-lying-about-global-warming-for-decades-accountability-is-long-overdue-230160

[2] https://www.budget.senate.gov/imo/media/doc/fossil_fuel_report1.pdf

2. U.S. Petroleum Industry History

The US natural gas industry started in 1821 at Fredonia, Chautauqua County, New York, when William Hart dug a well to a depth of 27 feet (8.2 m) into gas-bearing shale, then drilled a borehole 43 feet (13 m) further, and piped the natural gas to a nearby inn where it was burned for illumination. Soon many gas wells were drilled in the area, and the gas-lit streets of Fredonia became a tourist attraction.[3]

On August 27, 1859, George Bissell and Edwin L. Drake made the first successful use of a drilling rig on a well drilled especially to produce oil, at a site on Oil Creek near Titusville, Pennsylvania. The Drake partners were encouraged by Benjamin Silliman (1779-1864), a chemistry professor at Yale, who tested a sample of the oil, and assured them that it could be distilled into useful products such as kerosene for lamps.

The Drake well is often referred to as the first "commercial oil well." Before the Drake well, oil-producing wells in the United States were wells that were drilled for salt brine, and produced oil and gas only as accidental byproducts. Historians have noted that the importance of the Drake well was not in being the first well to produce oil, but in attracting the first great wave of investment in oil drilling, refining, and marketing:

2.1. Appalachian Basin

The success of the Drake well quickly led to oil drilling in other locations in the western Appalachian Mountains, where oil was seeping to the surface, or where salt drillers had previously found oil fouling their salt wells. During the American Civil War, the oil-producing region spread over much of western Pennsylvania, up into western New York state, and down the Ohio River valley into the states of Ohio, Kentucky, and the western part of Virginia (now West Virginia). The Appalachian Basin continued to be the leading oil-producing region in the United States through 1904.

The first commercial oil well in New York was drilled in 1865. New York's (and Northwestern Pennsylvania) crude oil is very high in paraffin.

The principal product of the oil in the 19th century was kerosene, which quickly replaced whale oil for illuminating purposes in the United States. Originally dealing in whale oil which was widely used for illumination, Charles Pratt (1830–1891) of Massachusetts was an early pioneer of the natural oil industry in the United States. He was founder of Astral Oil Works in the Greenpoint section of Brooklyn, New York. Pratt's product later gave rise to the slogan, "The holy lamps of Tibet are primed with Astral Oil." He joined with his protégé Henry H. Rogers to form Charles Pratt and Company in 1867. Both companies became part of John D. Rockefeller's Standard Oil in 1874.

2.2. Mid-Continent

The Mid-continent area is an area generally including Kansas, Oklahoma, Arkansas, North Louisiana and the part of Texas away from the Gulf Coast. The first commercially successful oil well drilled in Kansas was the Norman No. 1 near Neodesha, Kansas, on November 28, 1892.

[3] Wikipedia Article on "History of the petroleum industry in the United States," https://en.wikipedia.org/wiki/History_of_the_petroleum_industry_in_the_United_States

Additional oil production areas before 1900 included Corsicana, Texas in 1894, that produced more than 44,000,000 barrels.

Oil was discovered at Bartlesville and Burbank, Oklahoma in 1897. But the initial discoveries created no great excitement until the discovery gusher of the Glenn Pool in 1905. The Glenn discovery came when Gulf Coast production was declining rapidly, and the operators were eager for new areas to drill. The increased drilling resulted in major discoveries at Cushing in 1912 and Healdton in 1913.

In 1906, the Caddo-Pine Island Field in northern Caddo Parish, Louisiana was discovered, and a rush of leasing and drilling activity ensued. In 1908, the first natural gas pipeline was constructed to transport gas from Caddo-Pine Island to Shreveport, Louisiana. This was one of the earliest commercial uses of natural gas, which was commonly viewed as an undesirable by-product of oil production and often "flared" or burnt off at the well site.

Other innovations in the Caddo-Pine Island Field included the first over-water oil platform, which was constructed in the field on Caddo Lake in 1910. In that same year, a major oil pipeline was constructed from Caddo-Pine Island Field to a refinery built and operated by Standard Oil Company of Louisiana in Baton Rouge, Louisiana. The refinery continues to operate today.

Author's comment: I visited the big Baton Rouge Refinery in the late 1980s when I worked for Landis & Gyr System. Our primary customers for these systems were electric utilities, but the largest refineries also used them to manage their electric grids.

Other early petroleum discoveries in North Louisiana included the Bull Bayou Field, Red River Parish, Louisiana (1913), Monroe Gas Field, Ouachita Parish, Louisiana (1916), Homer Field, Claiborne Parish, Louisiana (1919) and Haynesville Field, Claiborne Parish, Louisiana (1921).

Greater Seminole, Oklahoma, initiated in 1926, produced more than 200,000,000 barrels.

Oklahoma City, No. 1 Discovery Well, 1928, Oklahoma. The Mary Sudik No. 1, "Wild Mary Sudik", gusher did not blow until March 25, 1930, and she sprayed an estimated 3,000 barrels an hour for the next 14 days.

The largest oil field in the lower 48 states, the East Texas oil field, was not discovered until 1930, when wildcatter Columbus Marion Joiner (more commonly known as "Dad" Joiner) drilled the Daisy Bradford No. 3 well, in Rusk County, Texas.

2.3. California

Despite the abundance of well-known oil-seeps in southern California, the first commercial oil well in California was drilled in Humboldt County, northern California in 1865.

Some attempts were made in the 1860s to exploit oil deposits under tar seeps in the Ventura Basin of Ventura County (west of Los Angeles) and northeastern Los Angeles County. The early efforts failed because of complex geology, and, more importantly, because the refining techniques then available could not manufacture high-quality kerosene from California crude oil, which differed chemically from Pennsylvania crude oil. Most California crude oil in the early years was turned into the less lucrative products of fuel oil and asphalt.

Oil production in the Los Angeles Basin started with the discovery of the Brea-Olinda Oil Field in 1880, and continued with the development of the Los Angeles City Oil Field in 1893, the Beverly Hills Oil Field in 1900, the Salt Lake Oil Field in 1902, and many others. The discovery of the Long Beach Oil Field in 1921, which proved to be the world's richest in production per-acre of the time, increased the importance of the Los Angeles Basin as a worldwide oil producer. This increased again with the discovery of the Wilmington Oil Field in 1932, and the development of the Port of Los Angeles as a means of shipping crude oil overseas.

Production in Santa Barbara County (west of Lost Angeles) began in the 1890s with the development of the Summerland Oil Field, which included the world's first offshore oil wells. With the discovery of the Orcutt and Lompoc fields, northern Santa Barbara County became a regional center of production; towns such as Orcutt owe their existence to the quickly growing industry.

Oil in the San Joaquin Basin was first discovered at the Coalinga field in 1890. By 1901, the San Joaquin Basin was the main oil-producing region of California, and it remains so in the 21st century, with huge oil fields including the Midway-Sunset, Kern River, and Belridge fields producing much of California's onshore oil.

***Author's comment:** The San Joaquin Basin refers to the San Joaquin Valley (a.k.a. the Southern Central Valley, see the map right)) not San Joaquin County. The latter county is east of the southern SF Bay Area.*

A map of the counties encompassing the San Joaquin Valley ecoregion

2.4. Rocky Mountains

The first commercial oil well in the Rocky Mountains was drilled near Cañon City, Colorado in 1862. The wells in the Cañon City-Florence field, drilled near surface oil seeps, produced from fractures in the Pierre Shale.

Other producing regions in the Rockys are listed below with links.

Bighorn Basin

https://en.wikipedia.org/wiki/Bighorn_Basin

Denver Basin

https://en.wikipedia.org/wiki/Denver_Basin

Green River Basin

https://en.wikipedia.org/wiki/Green_River_(Colorado_River_tributary)

North Park (Colorado basin)

https://en.wikipedia.org/wiki/North_Park_(Colorado_basin)

Paradox Basin

https://en.wikipedia.org/wiki/Paradox_Basin

Piceance Basin

https://en.wikipedia.org/wiki/Piceance_Basin

Powder River Basin

https://en.wikipedia.org/wiki/Powder_River_Basin

Raton Basin

https://en.wikipedia.org/wiki/Raton_Basin

San Juan Basin

https://en.wikipedia.org/wiki/San_Juan_Basin

Uinta Basin

https://en.wikipedia.org/wiki/Uinta_Basin

2.5. Alaska

Petroleum seeps on the North Slope have been known for many years, and in 1923, the federal government created US Naval Petroleum Reserve No. 4 to cover the presumed oil fields beneath the seeps. Some exploration drilling was done in the reserve during World War II and the 1950s, but the remote location deterred intensive exploration until the 1960s. The Prudhoe Bay Oil Field, the largest oil field in the United States in terms of total oil produced, was discovered in 1968. Production began in 1977, following completion of the Trans-Alaska Pipeline. Through 2005, the field has produced 13 billion barrels of oil (an average of 1.5 million barrels/day), and is estimated to contain another 2 billion barrels of economically recoverable oil.

2.6. North Dakota

The North Dakota oil boom, lasting from 2006 to 2015, involved rapidly expanding oil extraction from the Bakken formation in the state of North Dakota. The boom began with the discovery of Parshall Oil Field in 2006, and peaked in 2012, but with substantially less growth noted since 2015 due to a global decline in oil prices. The boom relied upon horizontal drilling and hydraulic fracturing to recover oil from tight oil deposits.

2.7. Gulf Coast

Capt. Anthony Francis Lucas, an experienced mining engineer and salt driller, drilled a well to find oil at Spindletop Hill. On the morning of January 10, 1901, the little hill south of Beaumont, Texas began to tremble and mud bubbled up over the rotary table. A low rumbling sound came from underground, and then, with a force that shot 6 tons of 4-inch diameter pipe out over the top of the derrick, knocking off the crown block, the Lucas Gusher roared in and the Spindletop oil field was born. Spindletop became the focus of frenzied drilling; oil production from the field peaked in 1902 at 17,400,000 barrels, but by 1905 production had declined 90% from the peak.

Spindletop Hill turned out to be the surface expression of an underground salt dome, around which the oil accumulated. The Spindletop gusher started serious oil exploration of the Gulf Coast in Texas and Louisiana, an area that had previously been dismissed by oil men. Other salt dome mounds were quickly drilled, resulting in discoveries at Sour Lake (1902), Batson (1904) and Humble (1905).

The Standard Oil Company was slow to appreciate the economic potential of the Spindletop oil field, and the Gulf Coast generally, which gave greater opportunity to others; Spindletop became the birthplace of oil giants Texaco and Gulf Oil. Although in 1899 Standard Oil controlled more than 85% of the oil production in the older oil regions in the Appalachian Basin and the Lima-Indiana trend, it never controlled more than 10% of the oil production in the new Gulf Coast province.

2.8. Regulatory Moves -- Federal Price Regulation

By the Natural Gas Act of 1938, the federal government-imposed price controls on natural gas in interstate commerce. The Federal Power Commission was mandated to set interstate gas prices at "just and reasonable" rates. The FPC at first only regulated the price at which pipelines sold gas to utilities and industry, but later put limits on the wellhead price of gas sold to an interstate pipeline. Gas producers challenged the controls, but lost in the Supreme Court in Phillips Petroleum Co. v. Wisconsin (1954).

The federal government had controlled the price of natural gas that crossed state lines, but not of gas produced and sold within a state. In the 1970s, the low interstate price set by the federal government caused supply shortages of gas in consuming states, because gas producers sold as much as they could of their product for higher prices in the local markets within gas-producing states. In the Natural Gas Policy Act of 1978, the federal government extended price controls to all natural gas in the country. At the same time, the government created a complex price system in which the price paid to the producer depended on the date the well was drilled, the depth of the well, the geological formation, the distance to other gas wells, and several other factors. The price system was an attempt to keep the average price low while encouraging new production.

The last federal price controls on natural gas were removed by the Natural Gas Decontrol Act of 1989, which phased out the remaining price control as of 1 Jan 1993.

3. Greenhouse Gas Emissions

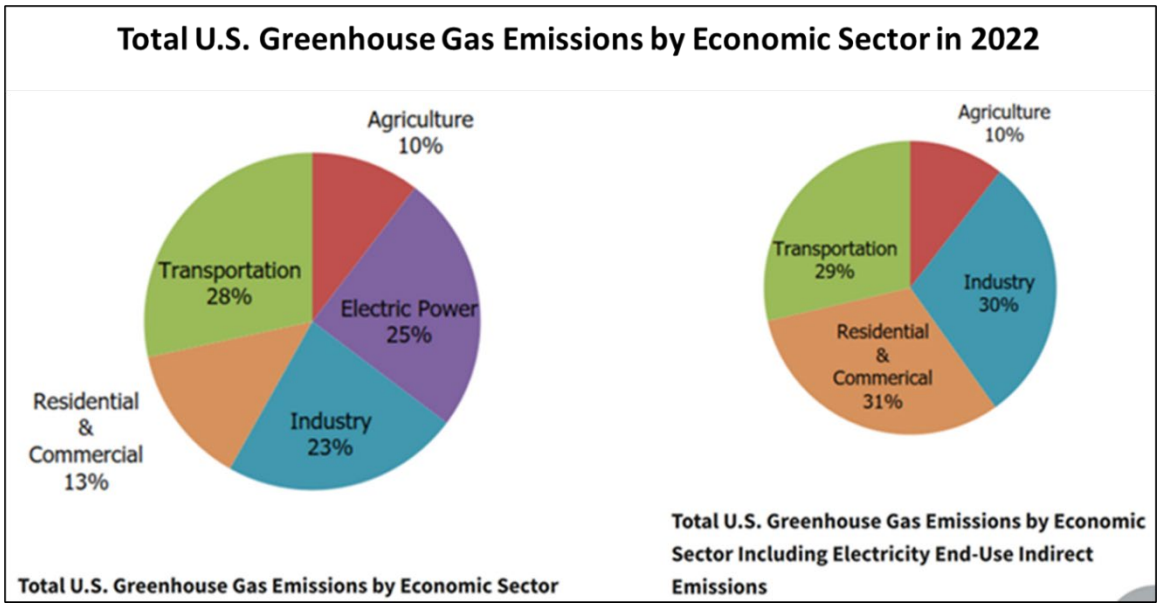
After looking at multiple sources for the information below, I decided to go with the U.S. Environmental Protection Agency, because they are the only ones that get to vote via regulations.

Greenhouse gases trap heat and make the planet warmer. Human activities are responsible for almost all of the increase in greenhouse gases in the atmosphere over the last 150 years. The largest source of greenhouse gas emissions from human activities in the United States is from burning fossil fuels for electricity, heat, and transportation.[4]

EPA tracks total U.S. emissions by publishing the Inventory of U.S. Greenhouse Gas Emissions and Sinks. This annual report estimates the total national greenhouse gas emissions and removals associated with human activities across the United States by source, gas, and economic sector.

Total emissions in 2022 are 6,343.2 Million Metric Tons of CO_2 equivalent. Percentages may not add up to 100% due to independent rounding. Greenhouse gas emissions from the commercial, residential, and industrial sectors increase substantially when indirect emissions from electricity end-use are included, due to the relatively large share of electricity use by buildings (e.g., heating, ventilation, and air conditioning; lighting; appliances and plug load) and use of electricity for powering industrial machinery. More information is also in the electricity end-use emissions section of this page.

[4] EPA, "Sources of Greenhouse Gas Emissions," 2022, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions



3.1. Primary Sources of Greenhouse Gas Emissions & Sinks

Transportation *– Greenhouse gas emissions from transportation primarily come from burning fossil fuel for cars, trucks, ships, trains, and planes. Over 94% of the fuel used for transportation is petroleum based, which includes primarily gasoline and diesel and results in direct emissions. The transportation sector is the largest source of direct greenhouse gas emissions and second largest source when indirect emissions from electricity end-use are allocated across sectors. The transportation sector is an end-use sector for electricity but currently represents a relatively low percentage of total electricity use. Indirect emissions from electricity are less than 1 percent of direct emissions.*

Electricity production *– Electric power includes emissions from electricity production used by other end use sectors (e.g., industry). In 2022, 60% of our electricity comes from burning fossil fuels, mostly coal and natural gas.*

Industry *– Greenhouse gas emissions from industry primarily come from burning fossil fuels for energy, as well as greenhouse gas emissions from certain chemical reactions necessary to produce goods from raw materials. Industrial emissions are the third largest source of direct emissions. If indirect emissions from electricity use are allocated to the industrial end-use sector (e.g. to power industrial buildings and equipment), industrial activities account for a much larger share of U.S. greenhouse gas emissions as shown above.*

Commercial and Residential *– Greenhouse gas emissions from the commercial and residential sector come from fossil fuels burned for heat and the use of gases for refrigeration and cooling in buildings, and non-building specific emissions such as the handling of waste. The commercial and residential sector emissions increase substantially when indirect emissions from electricity end-use are included, largely because buildings use 75% of the electricity generated in the US (e.g., for heating, ventilation and air conditioning; lighting; appliances, and plug loads). When emissions from electricity use are distributed to the commercial and residential end-use sector, commercial and residential activities account for a much larger (and the largest) share of U.S. greenhouse gas emissions as shown above.*

Agriculture – Greenhouse gas emissions from agriculture come from livestock such as cows, agricultural soils, and rice production. Indirect emissions from electricity use in agricultural activities (e.g., powering buildings and equipment) are about 5 percent of direct emissions.

Land Use and Forestry – While not shown in the figure, land areas can act as a sink (absorbing CO_2 from the atmosphere) or a source of greenhouse gas emissions. In the United States, since 1990, managed forests and other lands are a net sink, i.e., they have absorbed more CO_2 from the atmosphere than they emit, offsetting 13% of total gross greenhouse gas emissions.

3.2. Trends

Since 1990, gross U.S. greenhouse gas emissions have decreased by just over 3%. From year to year, emissions can rise and fall due to changes in the economy, the price of fuel, and other factors. In 2022, U.S. greenhouse gas emissions increased 0.2% compared to 2021 levels. In 2020, there was a sharp decline in emissions largely due to the impacts of the coronavirus (COVID-19) pandemic on travel and other economic activity. In 2021 and 2022, the increase in total greenhouse gas emissions was driven largely by an increase in CO_2 emissions from fossil fuel combustion due to the continued rebound in economic activity after the height of the COVID-19 pandemic. In 2022, CO_2 emissions from fossil fuel combustion increased by 8% relative to 2020 and 1% relative to 2021. CO_2 emissions from natural gas consumption increased by 5% relative to 2021. CO_2 emissions from coal consumption decreased by 6% from 2021. The increase in natural gas consumption and emissions in 2022 is observed across all sectors except for U.S. Territories, while the coal decrease in primarily in the electric power sector. Emissions from petroleum use increased by less than 1% in 2022.

4. Future Roles

Evolving to a GHG-Free Future will be a very tough journey, and we need all of the help we can get. Below are the GHG reduction sectors that are likely to experience growth, along with potential roles of the Petro Industries, and links to past posts for readers that would like more information.

Geothermal Generation Development: The Petro-Industries are already major technology providers for geothermal development. It is expected this role will continue, and in the short-term, these two industries can provide synergy for each other.

Hot Rocks – The Perfect Renewable Energy:

https://energycentral.com/c/cp/hot-rocks-%E2%80%93-perfect-renewable-energy

Very-Low GHG Fuels: If there is anything that the Petro Industries are expert at, it producing fuels. They can produce these fuels from renewable feedstocks.

Four paths to Sustainable Mobility:

https://energycentral.com/c/ec/four-paths-sustainable-mobility

Expansion of Chemical Industry to Displace Petro-Chemicals with very-low to zero GHG chemicals: The Petro Industry can evolve to become a major feedstock and process provider customer / supplier for the Chemical Industry as they are now.

Industrial Decarbonization Roadmap, Part 3, Chemical Manufacturing:

https://energycentral.com/c/cp/industrial-decarbonization-roadmap-part-3-chemical-manufacturing

Direct Air GHG Capture and Sequestration: If nothing else the Petro Industry will have a leading role in geologic sequestration. Also, (along with chemical industries) they may help to develop and/or manufacture the direct air capture technology.

Roads to Removal, Part 2:

https://energycentral.com/c/ec/roads-removal-part-2