Home, Auto Repair Library, Auto Parts, Accessories, Tools, Manuals & Books, Car BLOG, Links, Index

How Carbon Dioxide Emissions from Cars Affect the Environment

by Larry Carley copyright 2020 AA1Car.com

We've come a long way in our struggle to reduce air pollution from cars. Today's vehicles are the cleanest ever, and getting cleaner all the time. Advances in emission control technology have cut hydrocarbon (HC) and carbon monoxide (CO) emissions to almost nothing. Oxides of nitrogen (NOX) emissions, which also contribute to smog, have also been reduced to a fraction of what they once were. Evaporative emissions from the fuel system have also been eliminated, and gasoline has been reformulated to burn cleaner and reduce emissions even more. Consequently, today's cars are probably 99 percent cleaner than their pre-emission counterparts of 30 years ago.

As the next level of emission standards are phased in for cars, light trucks and heavy trucks, emissions will further drop. Reduced sulfur content in fuels and "Tier II" emission regulations have lowered vehicle emissions another 20 to 25 percent.

Today's emission controls have done an amazing job of minimizing pollution from motor vehicles. But one thing emission control technology has not been able to change is the basic chemistry of combustion itself. The issue now is Carbon Dioxide (CO_2) emissions from cars.

See Emissions of Greenhouse Gases in the U.S. for the latest reports on carbon dioxide emissions and its impact on global warming.

Almost all motor vehicles today burn some kind of "hydrocarbon" fuel be it gasoline, diesel fuel, propane or alcohol. A hydrocarbon is any substance that contains hydrogen and carbon. This includes crude oil, gasoline, diesel fuel, natural gas, coal, wood and even you and me. In other words, hydrocarbons are the chemical building blocks of all living matter past and present. The crude oil we pump from underground today came from ancient peat bogs, swamps and forests from millions of years ago.

THE CARBON CYCLE

When anything that contains hydrocarbons is burned, the bonds that bind the hydrogen and carbon atoms together are broken. This releases heat energy, which can then be put to use to power a motor, heat a boiler, cook a meal or whatever. Burning also causes the hydrogen and carbon atoms to combine with oxygen in the air forming water vapor (H20) and carbon dioxide (CO2). That's the basic chemistry of all combustion.

Water vapor is no problem because two-thirds of the Earth's surface is covered with it. So what's a little more? The problem is carbon dioxide. CO2 is a colorless, odorless, nontoxic, harmless gas. Human beings and animals exhale carbon dioxide with every breath they take. Add to this all the CO2 that's being produced by every motor vehicle that's being driven, by every furnace that's burning some type of fuel, by every flame that's burning anywhere in the entire world and it adds up to zillions of tons of CO2.

Were it not for plants, we all would have suffocated in our own CO2 a long time ago. Fortunately, plants have the ability to absorb CO2 from the atmosphere and convert it back into organic carbon compounds (hydrocarbons) that become part of the plant. The process requires sunlight and is called "photosynthesis." At the same time, plants release oxygen back into the atmosphere, which we can then use to breathe and burn up more hydrocarbons.

Back to CO2. Historically, the amount of naturally occurring CO2 in the atmosphere has been 290 parts per million (only 0.0003 percent). Air is mostly nitrogen (78 percent) and oxygen (21 percent). CO2 is not a pollutant in the traditional sense, but it does retain heat in the Earth's atmosphere. That's why scientists refer to CO2 as a "greenhouse gas." It traps and holds heat just like the glass in a greenhouse.

Based on analysis of air bubbles trapped in ice cores taken at the north and south poles, scientists say the level of CO2 has been gradually rising since the dawn of the Industrial Revolution in the 1700s. When people started burning wood and coal to fuel industrial steam engines and heat their homes, CO2 levels started to rise and have been going up ever since. And since World War II, the rate of increase has been accelerating at an ever quickening pace.

According to U.S. government research, the concentration of CO_2 in the atmosphere exceeded 419 parts per million at the end of 2019. That's a 25% increase since 1958, and a 40% increase since the Industrial Revolution.

As CO_2 levels continue to rise, scientists fear it will cause a potentially catastrophic warming of the Earth's average temperature -- which they say has already gone up almost a couple of degrees based on historical data. This, they say, has the potential to upset ocean currents, global weather patterns and rainfall -- which may have far reaching and negative consequences for agriculture, fishing and life in general. There is amble evidence that Global Warming is causing a significant loss of glacial and polar ice. This, in turn, will cause sea levels to rise and flood low laying coastal areas and islands. The average elevation of Florida, for example, is only about 3 to 6 feet above sea level!

In Al Gore's documentary, An Inconvenient Truth - the Sequel, he quotes a lot of scary statistics about what's happening with the earth's climate as a result of rising levels of CO_2 in the atmosphere. I would highly recommend seeing this movie, whether you think rising levels of CO_2 in the atmosphere is causing climate change or not.

KYOTO PROTOCOL & PARIS CLIMATE AGREEMENT

Concerns over such dire predictions lead to a world summit meeting in Kyoto, Japan in December, 1997. The outcome of this meeting was a proclamation calling for significant reductions in CO_2 emissions by industrialized nations as well as developing nations. The Kyoto Protocol, as it was called, has yet to be finalized. Though many others nations have signed it (including most of the Europeans), the U.S. has balked at signing it because it would call for drastic changes in the American lifestyle.

To reduce CO_2 emissions from cars, we would have to drive smaller, more fuel efficient cars, raise the fuel economy requirements for trucks, and adopt a variety of conservation measures to reduce energy consumption. This includes the Kyoto Protocol and the Paris Agreement

The Paris Agreement is an international treaty on climate change. It was adopted by 196 Parties in Paris, on 12 December 2015 and entered into force on 4 November 2016. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. The Obama administration signed on, but President Trump pulled the U.S. out of the agreement (because of his support for coal and oil). As of this writing, President Biden is expected to have the U.S. rejoin the agreement.

SUVS VERSUS TREES

If cars and trucks put carbon dioxide into the atmosphere and trees remove it, how many trees does it take to offset the carbon released by one sport utility vehicle?

The following calculations may be subject to debate, but here are my ballpark guesstimates:

One gallon of gasoline weighs about 6.2 lbs. Of that, over 5 lbs. is carbon (the rest is hydrogen). According to the EPA, burning one gallon of gasoline produces about 19.4 pounds of carbon dioxide (CO_2).

If a SUV that gets 15 mpg is driven 15,000 miles a year, it will burn 1,000 gallons of gas. That puts about 19,400 lbs. of carbon into the atmosphere (combined with oxygen as CO_2).

A mature tree 40 to 50 feet high weighs around 10,000 lbs. Of that, at least 7,000 lbs. is organic carbon compounds (the exact amount will vary depending on the species and the density of the wood). To reach this size, most trees need 30 to 40 years of growing time. This too will vary depending on the species of tree, its geographical location, soil conditions and weather. Trees in hot, wet tropical climates grow a lot faster than trees in northern climates.

Assuming these estimates are reasonably accurate, one to two mature trees contains about as much carbon as the gasoline burned by a typical SUV in a year.

But remember it takes 30 to 40 years for the tree to absorb all that carbon from the atmosphere. The process of "photosynthesis" takes time. Leaves use sunlight and water to convert CO_2 from the atmosphere into sugar that the tree uses to grow and build more wood fiber. The tree's average carbon uptake, therefore, may only be about 200 lbs. of carbon a year.

To offset the carbon released by driving a SUV 15,000 miles a year, therefore, it takes at least 35 medium-sized healthy trees to convert CO_2 into wood.

What happens to the carbon once it's been taken out of the atmosphere by the trees and bound up in the wood? It stays there until something happens to the tree.

If a tree dies of old age or is blown down in a storm, the wood eventually rots. Some of the carbon is slowly released back into the atmosphere as CO_2 while the wood rots, but this may take several years. Much of the carbon remains in the soil as organic nutrient for other plants, worms and insects.

If the tree is cut down and made into lumber, the carbon also stays bound up in the lumber until something happens to whatever the lumber was used to build.

But if the tree is destroyed in a forest fire, is burned to clear land or is cut for firewood, all of the carbon that's been stored in the tree since it was a sapling is immediately released back into the atmosphere as CO_2. Consequently, burning a tree is the carbon equivalent of driving a gas-guzzling SUV for a year.

Here's another fact to ponder. Every time a farmer in a Third World country clears and burns an acre of heavily wooded forest to grow sweet potatoes or graze cattle (a practice called "slash and burn" agriculture), he releases as much carbon into the atmosphere as 400 SUVs do in a year! And many of these farmers will slash and burn 20 to 50 acres a year.

Deforestation of the Amazon rainforest in Brazil has surged to its highest level since 2008, according to recent reports. A total of 4,281 square miles of rainforest was destroyed from August 2019 to July 2020. This is a 9.5% increase from the previous year. Multiply this loss times the amount of carbon that is being put back into the atmosphere and it far outweighs the CO2 that's being released by the entire U.S vehicle fleet!

The point here is that no matter what we do to minimize pollution or improve fuel economy will make much difference in restoring the atmospheric carbon balance if deforestation continues to run rampant in other parts of the world. The Amazon and other tropical forests are the lungs of the world. They need to be protected to reduce and hopefully reverse much of the damage that has already been done.

What's really sad about all of this is that forest land cleared by slash and burn agriculture is only productive for a few years because the soil is thin and poor. It soon becomes rock hard forcing the farmers to clear even more land. To make matters worse, the cleared land doesn't come back. The trees are gone forever along with their ability to absorb carbon from the atmosphere. And without the trees, there's not much hope of restoring a natural atmospheric carbon balance.

The world's oceans also absorb CO2 from the atmosphere, but they can only absorb so much before the water turns more acidic. No one knows how this will affect aquatic life, fish populations and fisheries that supply food for much of the world's population.

FUTURE CONSEQUENCES OF CO_2 EMISSIONS

We now have more motor vehicles than we do licensed drivers in this country (over 300 million). What's more, the worldwide vehicle fleet is now estimated to be more than ONE AND A HALF BILLION cars and trucks (up from 50 million in 1950)! The explosive growth of the domestic Chinese auto market has accounted for much of this new growth. Only about 2 to 3% of the world's vehicle fleet is electric, which means 97 to 98% of the vehicle fleet is burning gasoline, ethanol or diesel fuel, and producing

A typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year. This assumes the average gasoline vehicle on the road today has a fuel economy of about 22.0 miles per gallon and drives around 11,500 miles per year. Every gallon of gasoline burned creates about 8,887 grams of CO_2. Multiply these emissions by the number of vehicles in the world an you get megatons of CO_2 being pumped into the atmosphere.

Yet transportation only accounts for about 28% of manmade carbon dioxide emissions. Power generation and heating account for the lion's share of emissions, with China being the world's worst polluter of CO_2. China alone was responsible for 28.5 percent of global carbon dioxide emissions in 2018.

The CO_2 Balance

With fewer trees left to absorb carbon and more and more vehicles producing carbon, don't expect the atmosphere's carbon balance to improve any time soon. The scales have probably tipped irreversibly toward higher and higher levels of CO_2 for the foreseeable future.

The biggest unknown is what effect all of this will eventually have on all of us. Nobody argues with the fact that the amount of CO_2 in the atmosphere is steadily rising because of human activity. What we don't know is what the long term consequences of a CO_2 imbalance will be or how it will actually affect our daily lives. Waiting to find out may prove costly if we miss the window of opportunity to make significant changes now. We are already seeing the weather consequences of Global Warming: more hurricanes per season, more tornadoes during the spring, warmer winters, stronger winds, more storm damage, longer droughts and more forest fires in many areas, loss of sea ice at both poles (and the impact it has had on polar bear, seal and penguin populations). It's not looking good, folks!

Many environmentalists say one step we can take now to reduce CO_2 emissions is to improve the fuel economy of all classes of vehicles. U.S. fuel economy standards have nearly doubled since the energy crisis days of 1973 -- but have remained relatively flat at 27.5 mpg for passenger cars for the last 15 years. For trucks, the average fuel economy is only about 20 mpg. Yet because of the increased popularity of trucks and SUVs in recent years, the average fuel economy of all new vehicles in the U.S. has sunk to the lowest level since 1980!

The Obama administration set much higher fuel economy goals, Back in 2011, President Obama announced an agreement with thirteen large automakers to increase fuel economy to 54.5 miles per gallon for cars and light-duty trucks by model year 2025. But President Trump rolled back those requirements, proposing instead an increase in fuel economy of only 1.5% a year, with a goal of achieving an average of about 40 miles per gallon by 2026. Initially, Trump wanted to roll back ANY requirements for improved fuel economy. Fortunately, that did not happen.

According to government reports, Americans were consuming 392 million gallons of fuel per day in 2019. Then the COVID-19 pandemic hit. The lockdown slashed fuel consumption back to 1997 levels. The average daily consumption of fuel for most of 2020 has been about 343 million gallons per day. That's still a LOT of fuel being burned, even though it is down from previous years.

If the Corporate Average Fuel Economy (CAFE) standards for trucks/SUVs were raised to match that of cars (27.5 mpg), it could save one million barrels of oil per day. That's a lot of carbon! Raising the CAFE standards for cars and light trucks could save millions of barrels of oil per day.

Higher fuel taxes and gasoline prices has been proposed as an incentive to get people to buy more fuel-efficient vehicles such as hybrids or even electric cars. But with fuel prices averaging from slightly under $2.00 a gallon to $2.50 a gallon in the U.S. in 2020, there is little incentive to buy more fuel efficient vehicles.

WILL TECHNOLOGY SAVE US?

One solution that can allow us to keep our big SUVs and get good fuel economy too is "hybrid-electric" technology. With this approach, a small displacement, fuel-efficient gasoline or diesel engine is used in conjunction with an electric motor and battery to power the vehicle. The regular motor is used for highway driving and to charge the battery. The rest of the time the vehicle runs on electric power or a combination of battery and gasoline.

Depending on how the control strategy is set up, a hybrid-electric can deliver 25 to 30% better fuel economy than a conventional non-hybrid vehicle in normal driving. Stop-Start systems that momentarily turn off the engine when the vehicle comes to a stop also saves fuel.

More Hybrid and Electric Vehicles Can Help Reduce Manmade CO2 Emissions

More and more vehicle manufacturers are selling and introducing new hybrid cars, minivans and SUVs. This trend shows no signs of slowing as we move beyond the pandemic of 2020 and into 2021.

Electric vehicles sales are also growing, albeit it slowly (only about 2 to 3% of all new vehicle sales in 2020) . Yet almost every auto maker says they will be introducing more plug-in electric models in the next few years. Tesla has showed the world that electric vehicles can be practical and fun to drive. Battery technology continues to improve with each new year, so many experts predict that over the next decade there will be a significant shift to Battery Electric Vehicles (BEVs). For more information on this subject, see The Coming Electric Car Revolution.

Skeptics say it's questionable electric vehicles actually reduce air pollution and CO_2 emissions. The electricity needed to recharge the battery has to come from another power source. As long as the power source is nuclear, hydroelectric, wind, solar or geothermal, electric vehicles do reduce air pollution and CO_2 emissions. But if the power comes from a coal or natural gas fired power plant, there are still pollutants and CO_2 going into the atmosphere.

No new nuclear power plants have been built in the U.S. for over 25 years, and many nukes are now reaching retirement age and will have to be decommissioned. Unless there is a rebirth of nuclear energy or a large scale shift to alternative sources of clean power (more wind farms and solar panels), electric vehicles will need a cleaner source of electricity.

FUEL CELLS & HYDROGEN

Hydrogen Fuel cells currently hold the greatest promise for solving our environmental concerns over pollution and CO_2. A fuel cell produces electricity by combining hydrogen and oxygen. The only byproduct is water vapor -- provided the fuel source is pure hydrogen.

Hydrogen is one of the most abundant elements on Earth. It can be made from natural gas, oil or even coal, or by using electricity to break down water into hydrogen and oxygen. Even so, it is expensive to produce and contains much less energy per liter than other hydrocarbon fuels.

Hydrogen is also a hard-to-store fuel. Because hydrogen is a gas, it has to be compressed at extremely high pressure (3,000 to 4,800 psi). This requires large, heavy, expensive fuel tanks that reduce a vehicle's driving range and fuel economy. It can be liquefied to increase its storage density, but this requires special insulated cryogenic storage tanks to keep the fuel at -253 degrees C. Another storage method is to use "metal hydrides" or activated carbon that absorb hydrogen like a sponge. But these approaches are also bulky, heavy and expensive. What's more there is no distribution system for hydrogen like there is for gasoline, diesel fuel or even natural gas. So even if you had a hydrogen powered vehicle today, you would have a very difficult time finding a place to fill it up.

One solution for storing hydrogen is to not store it as a gas but to extract it from another fuel such as gasoline or methanol alcohol. A device known as a "reformer" can break down these fuels to release the hydrogen. But adding a reformer adds cost and complexity, and also reduces its fuel efficiency. A reformer also does nothing to reduce our dependence on oil. Even so, BMW, Chrysler, GM, Mercedes. Toyota and several other vehicle manufacturers have all demonstrated fuel cell powered vehicles.

Toyota's next generation 2021 Mirai hydrogen fuel cell powered luxury car is one example of what's possible. The car features an improved fuel cell design that is lighter, smaller and more efficient than the previous generation Mirai. The car has three high pressure hydrogen storage tanks and a driving range of up to 402 miles. Refueling takes only about 5 minutes. The fuel cell operates at 650 volts, can start the vehicle at temperatures down to -22 degrees F., and stores excess energy onboard in a lithium ion battery.

Toyota, predicts that fuel cell electric technology will one day be as common as the company’s hybrid electric technology. Fuel cell technology actually preceded the invention of the automobile itself. In 1838, a Welsh physicist combined hydrogen and oxygen in the presence of an electrolyte and produced an electric current, though not enough to be useful. By the 1960s, the technology was being used in America’s Gemini and Apollo spacecraft, where it provided crews with both electricity and water from stored hydrogen and oxygen. In recent years, fuel cell technology has become a practical and cost-effective alternative to batteries or hydrocarbon fuels.

Time will tell which technologies will eventually help us meet our environmental challenges.

Historical Happenings Regarding CO_2 Emissions

December 2006

Burning Palm Oil No Solution Either

In recent years, some power generating plants in Europe have been using palm oil as a substitute for petroleum because palm oil is a renewable biofuel that is carbon neutral, and it is relatively cheap. But a new report issued in late 2006 by Wetlands International, Delft Hydraulics and the Alterra Research Center of Wageningen University in Holland found that burning palm oil isn't such a great idea after all. The study measured the carbon released from peat swamps in Indonesia and Malaysia that had been drained and burned to plant palm oil trees. About 85 percent of the world's palm oil comes from the two countries, and about one-quarter of Indonesia's plantations are on drained peat bogs.

The four-year study found that 600 million tons of carbon dioxide seep into the air each year from the drained swamps. Another 1.4 billion tons go up in smoke from fires lit to clear rain forest for plantations, smoke that often shrouds Singapore and Malaysia in an impenetrable haze for weeks at a time.

Together, those 2 billion tons of CO_2 account for 8 percent of the world's fossil fuel emissions, the report said. Draining the peat swamps to grow palm trees has had a very negative impact. Not only has it increased carbon emissions significantly, but it has also destroyed wetland ecosystem that can take carbon out of the atmosphere.

November 29, 2007:

Report Says U.S. Can Reduce Greenhouse Gas Emissions Significantly Without Significant Pain

A new report called "Reducing US Greenhouse Gas Emissions: How Much at What Cost?" published jointly by McKinsey & Company a management consulting firm) and The Conference Board (a business research organization) says the United States could reduce projected 2030 emissions of greenhouse gases by one-third to one-half at manageable costs to the economy and without requiring big changes in consumer lifestyles.

The report is based on detailed analysis of 250 opportunities for reducing emissions of carbon dioxide and other gases thought to contribute to global warming.

If no changes are made, annual U.S. greenhouse gas emissions will increase by 35 percent to reach 9.7 gigatons of carbon dioxide equivalent (CO_2) in 2030, according to an analysis of government forecasts. At this level, emissions would overshoot by 3.5 to 5.2 gigatons the targets implied by economy-wide climate change bills introduced in Congress. A gigaton is one billion metric tons.

The report shows a reduction of 3.0 to 4.5 gigatons in 2030 is achievable at manageable cost using proven and emerging high-potential technologies, but only if the U.S. pursues a wide array of options and moves quickly to capture gains from energy efficiency.

Almost 40 percent of the greenhouse gas emission reductions identified come from options that more than pay for themselves over their lifetimes, thereby creating net savings for the economy. For example, improving energy efficiency in buildings, appliances and industry could yield net savings while offsetting some 85 percent of the projected incremental demand for electricity in 2030.

However, the report warns that private sector innovation and policy support will be necessary to unlock these and other opportunities. The report analysis focused on options likely to yield greenhouse gas reductions at a cost of less than $50 per ton of CO_2 equivalent (CO_2e). Among the main findings:

* Opportunities to reduce greenhouse gas emissions are highly fragmented and widely spread across the economy. The largest single option, carbon capture and storage (CCS) for coal-fired power plants, offers less than 11 percent of total potential identified. The largest sector, power generation, accounts for less than one third of the total.

* Reducing emissions by 3 gigatons of CO_2e in 2030 would require $1.1 trillion of additional capital spending, or roughly 1.5 percent of the $77 trillion in real investment the U.S. economy is expected to make over this period.

* Investment would need to be higher in the early years, in order to capture energy efficiency gains at lowest overall costs and accelerate the development of key technologies, and would be highly concentrated in the power and transportation sectors.

* If pursued, such investment would likely put upward pressure on electricity prices and vehicle costs. Policymakers would need to weigh these added costs against the energy efficiency savings, opportunities for technological advances, and other societal benefits.

* Five clusters of initiatives, pursued in unison, could create substantial progress towards the targets implied by bills currently before Congress. From least to highest average cost, they are: Improving energy efficiency in buildings and appliances (710 to 870 megatons); Increasing fuel efficiency in vehicles and reducing carbon intensity of transportation fuels (340 to 660 megatons); Pursing various options across energy-intensive portions of the industrial sector (620 to 770 megatons); Expanding and enhancing carbon sinks, such as forests (440 to 590 megatons); Reducing the carbon intensity of electric power production (800 to 1,570 megatons.)

The report was produced in association with DTE Energy, Environmental Defense, Honeywell, National Grid, Natural Resources Defense Council, PG&E and Shell.

Dec 20, 2007

EPA REJECTS CALIFORNIA GREENHOUSE GAS REGULATIONS

The U.S. Environmental Protection Agency has denied California's waiver request to regulate carbon dioxide (CO_2) emissions from automobiles starting in 2009. The CO_2 rules were issued by the California Air Resources Board and adopted by 12 other states. The EPA overturned the regulations on the same day that President Bush signed into law an energy bill to raise the Corporate Average Fuel Economy (CAFE) Standards for passenger cars and light trucks by 40 percent to an industry average of 35 miles per gallon by 2020. SEMA worked with the automakers and other industry associations as part of the CAFE Coalition to help negotiate a compromise to the new fuel economy standard.

Under the new federal law, the amount of renewable fuel used will increase to at least 36 billion gallons. According to the EPA, the new CAFE law and renewable fuel provisions will achieve greater greenhouse gas savings than the California program. Additionally, the federal approach provides a national solution, as opposed to a potential patchwork of state rules.

Under the Clean Air Act, California may seek a waiver to establish its own air quality rules (which can then be adopted by other states). This is the first time the EPA has completely rejected a waiver request. The agency noted that previous waiver petitions covered pollutants that predominantly impacted local and regional air quality. The EPA reasoned that a national framework for addressing greenhouse gases is necessary since the emissions are global in nature and impact every state.

California intends to appeal the EPA decision. Additionally, the Supreme Court recently directed the EPA to study the problem of greenhouse gases, paving a path to for EPA to potentially recommend even more stringent regulations if, in consultation with the National Highway Traffic Safety Administration, it deems them necessary.

More to come . . . . . .

June 2010

Obama Administration Announces New Fuel Economy Rules for Auto Makers

In April, the Obama administration said auto makers will have to increase their Corporate Average Fuel Economy (CAFE) numbers significantly over the next six years. The new rule sets a goal of 35.5 mpg by 2016, and a fleet average of 54.5 miles per gallon by 2025. This will lower greenhouse gas (GHG) emissions produced by the average vehicle to 250 grams per mile. Achieving this goal will require roughly a 5 percent increase in fuel efficiency each year, starting in model year 2012. The gains will be achieved by switching to smaller displacement engines, more fuel efficient engines (many of which will use direct gasoline injection and turbocharging), and reducing vehicle weight by downsizing and using lighter weight materials.

July 2012

Global Warming Skeptic Finally Admits It Is True!

Physics professor Richard A. Muller of the University of California-Berkeley says he is no longer a skeptic of Global Warming. His investigation of climate data proves that human activity is increasing the release of carbon dioxide, and that CO2 is causing a gradual rise in average temperatures worldwide. Furthermore, he says Global Warming is likely to accelerate in the coming years.

Muller has long been an outspoken critic of Global Warming, saying that some studies were flawed or that the data was not very accurate. After undertaking an exhaustive study of his own (the Berkeley Earth Surface Temperature Project), he is now singing a different tune. Three years of research confirmed everything other scientists have been saying about global Warming. Yes, it is real and yes Global Warming is mostly due to human activity.

Muller says he is worried about the ultimate consequences of Global Warming, and how far it will go and how fast it will proceed. The long term outlook is not good, he says.

November 2012

Atmospheric CO2 Levels Hit All-Time High

Carbon dioxide levels reached 390.9 parts per million last year, according to a new report from the World Meteorological Organization (WMO). The new level is 140 percent higher than the pre-industrial level of 280 parts per million and nearly 2 parts per million higher than the 2010 carbon dioxide level.

The WMO estimates that about 413 billion tons (375 billion metric tons) of carbon have been released into the atmosphere since 1750, primarily from fossil fuel combustion. About half of this atmospheric carbon dioxide remains in the atmosphere, and much of it will linger for centuries, causing the planet to warm further warns the WMO.

To view current WMO projects and reports, visit the WMO website.

To read more dire predictions of what will happen if CO2 emissions are not reduced, see Report Warns Mankind Approaching Carbon Cliff.

May 3, 2013

Atmospheric CO2 to Hit Highest Level in 3-Million Years!

According to the latest data from the Mauna Loa Observatory in Hawaii, where atmopsheric levels of carbon dioxide (CO2) have been monitored daily since 1958, CO2 levels are set to surpass **400 parts per million (ppm)** this spring. This is the highest recorded level of CO2 since the Pliocene Epoch 3 to 5 million years ago. At that time, the planet was much warmer and wetter averaging 5.4 to 7.2 degrees F than today with sea levels as much as 131 feet higher than today.

The "Keeling Curve" is a graph that shows how quickly CO2 levels are rising. The curve shows that CO2 has been rising at a faster and faster rate every year. Back in 1958 when they first started measuring CO2 levels, the average concentration was around 313 ppm.

The actual level of CO2 varies by season, rising through May and then dropping until it reaches a seasonal minimum in October. The rising and falling levels result from the growth of trees and vegetation that absorb CO2 from the atmosphere during the growing season, and release it in the winter.

Prior to the Industrial Revolution (late 1700s to early 1800s), atmospheric CO2 levels has been relatively constant, averaging around 270 to 280 ppm. But as the world became more and more industrialized and the use of fossil fuels exploded, so has the release of CO2 from human endeavors. In the 1950s and 1960s, the rate of increase in CO2 was slightly less than 1 ppm. But in the past 50 years, it has skyrocketed to 2 to 2.5 ppm per year.

Though the U.S. and many European countries are trying to reduce CO_2 emissions by requiring more fuel efficient vehicles and lighting, and shifting more power generation to wind mills, China and India are more than offsetting any gains in other parts of the world by rapidly expanding their use of coal for power generation. China and India have both announced plans to build hundreds of new coal fired power plants to feed their growing economies. Given the current trends, it seems unlikely we can reverse this CO_2 trend any time soon (if ever!).

Currently, China accounts for nearly one fourth of all carbon dioxide emissions worldwide, releasing 10 billion tons a year into the atmosphere. To make matters worse, China's CO_2 emissions are increasing about 10 percent a year. By comparison, the U.S. (which is the 2nd largest producer of CO_2) has reduced its CO_2 emissions to 5.9 billion tons per year (mostly by outsourcing manufacturing jobs to China).

June 2018

Trump Administration Denies Climate Change, Promotes Increased Coal Burning to Help Coal Industry

The Trump administration denies human activity is having any impact on climate change and global warming in spite of overwhelming scientific evidence to the contrary. President Trump wants power companies to burn more coal, and has proposed rolling back smokestack emissions to make coal more cost competitive with natural gas (which is far cleaner and produces significantly less CO_2). Environmentalists have called this a huge step backwards, and counterproductive in reducing global CO_2 emissions.

The move has generated considerable pushback from clean energy companies, consumer groups and environmentalists. Even oil and natural gas trade groups have joined with wind and solar organizations in condemning the plan, saying that it probably violated clean air laws and would increase the cost of electricity for consumers.

According to the Sierra Club, 25 coal-fired power plants have shut down since Trump took office, primarily because natural gas, wind and solar power are far cheaper.

August 2018

Latest Report Says Atmospheric CO2 Hits Record 410.79 PPM

According to the latest report from CO2 Earth, the concentration of atmospheric CO_2 measured at the Mauna Loa Observatory in Hawaii hit a high of 410.79 in June, and has remained in the 408 to 409 range during July and August.

The globally-averaged temperature across land and ocean surfaces was the fifth highest on record for June at 0.75 degrees C (1.35 degrees F) above the 20th century average of 15.5 degrees C (59.9 degrees F). The ten warmest Junes on record have occurred since 2005, with 2016 the warmest June at +0.91 degrees C (+1.64 degrees F). June 2018 also marks the 42nd consecutive June and the 402nd consecutive month with temperatures, at least nominally, above the 20th century average.

June 2018 was characterized by warmer-than-average conditions across much of the land and ocean surfaces, with the most notable warm temperature departures from average across central Asia where temperatures were 4.0 degrees C (7.2 degrees F) above average or higher. Record warm June temperatures were present across parts of central Asia as well as portions of the Atlantic, Pacific, and Indian Oceans, and Mediterranean Sea. Cooler-than-average June temperatures were observed across eastern Canada, Greenland, western and eastern Russia, and across portions of the Atlantic and Pacific oceans. The only area with record cold June temperatures was the northern Atlantic Ocean, off Greenland's southern coast. (NOAA global analysis accessed July 18, 2018).

Related Articles:

Global Warming and Climate Change: What Do We Know Now?

Automotive Environmental Issues

Alternative Fuels

Diesel or Hybrid-Electric, Which Is Best?

E85 Ethanol Alcohol Fuel

Gas Pains

Toyota Prius Hybrid Car

Who Killed The Electric Car?

Tech Library Free Online repair articles Click Here to See More Carley Automotive Technical Articles