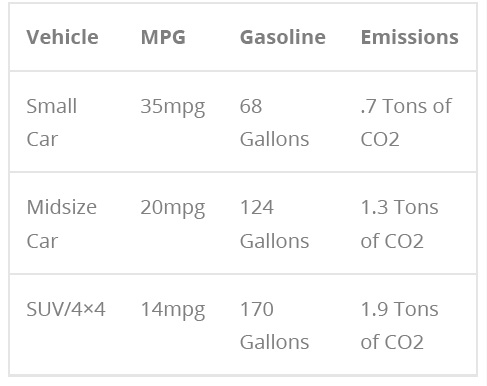
* mid sized vehicle conservative 25 MPG -  [According to the EIA](http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=10) - average motor vehicle produces about 19.64 lbs / Gallon
* University of North Carolina Highway Safety Research Center:
  + university's research – 80% of the carbon monoxide in the atmosphere came from motorized vehicles that operate on gas and diesel
  + 55% of the nitrogen oxide pollution in the air
  + motorized vehicles guzzle millions of barrels of oil each day
  + 60% of the pollutants created from motorized transportation was produced during the first few minutes of the ride
  + 15 pounds of pollution could be saved if drivers would park their cars on short trips of four miles or less and ride a bike instead
* U.S. DoE estimates that approximately 10 million barrels of oil were used each day in 2010
* Sealed surfaces (roads and parking lots) - vegetation removal eliminates vital air cleaners that help reduce the quantity of carbon dioxide in the air
* 20 parked bicycles in the same space as one car
* 5% of the materials and energy used to make a car to build a bike
* Approx. 3x fast as walking for the same amount of energy and, taking into account the ‘fuel’ you put in your ‘engine’, you do the equivalent of 2,924 miles to the gallon
* you’re about six times heavier than your bike, but a car is 20 times heavier than you.
* Imperial College:
  + taxi passengers - more than 100,000 ultraﬁne particles per cubic centimetre
  + Bus passengers - just under 100,000
  + In cars - about 40,000
* bike to work rather than driving can cut down on your household emissions by at least 6%
* Cars produce .97 pounds of pollution / mile annually
* Bikes can be 50% faster than cars during rush hour
* make cars - pollution 1.2 billion cubic yards of pollution each year
* biking help combat noise pollution, which affects wild animals, but it results in less roadkill, too
* Transportation is one of the [leading causes (if not the #1 cause) of global warming](http://planetsave.com/2009/06/07/global-warming-effects-and-causes-a-top-10-list/). It is also what [over 70% of oil](http://planetsave.com/2010/07/12/where-oil-comes-from-and-how-we-use-oil/) is used for in the U.S.
* County Stockholm - analysis - if all car drivers living within a distance corresponding to a maximum of a 30 min bicycle ride to work - > 111,000 new cyclists, corresponding to an increase of 209%
  + population exposure reduced by about 7% for both NOx and black carbon (BC)
* 10 mile round trip commute 5 days a week for a year



* Car - Several tons of waste and 1.2 billion cubic yards of polluted air are generated in its manufacture
* 2008 the US produced 1.6 million billion metric tons of waste mining ore for automotive production
* US each year, painting and coating cars produces 40 million pounds of air releases and 24 million pounds of hazardous wastes
* lifetime, on the road, each car produces another 1.3 billion cubic yards of polluted air and scatters an additional 40 pounds of worn tire particles, brake debris worn road surface into the atmosphere
* total number of pounds of pollutants, (comprised of hydrocarbons, carbon monoxide, nitrogen oxides and carbon dioxide), emitted per year is 12,140.30 lbs/year (or 0.97 lbs/mile) for passenger cars and 17,025.80 lbs/year (or 1.21 lbs/mile) for light trucks
* Hybrid cars are much larger than bikes. 14,000 pounds of carbon are produced in the production of each vehicle
* Hybrids - large batteries; nickel metal hydride batteries - known carcinogens, cause a variety of teratogenic effects. Nickel mining, in open cast mines - pollution by excavating large holes in the ground
* Hybrids do use some gas
* **How much tailpipe carbon dioxide (CO2) is created from burning one gallon of fuel?**
  + CO2 Emissions from a gallon of gasoline: 8,887 grams CO2/ gallon
  + CO2 Emissions from a gallon of diesel: 10,180 grams CO2/ gallon
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* **What are the average annual carbon dioxide (CO2) emissions of a typical passenger vehicle?**
  + 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 CO2.
* **Are there other sources of greenhouse gas (GHG) emissions from a vehicle?**
  + In addition to carbon dioxide (CO2), automobiles produce methane (CH4)and nitrous oxide (N2O) from the tailpipe and hydrofluorocarbon emissions from leaking air conditioners. The emissions of these gases are small in comparison to CO2; however, the impact of these emissions can be important because they have a higher global warming potential (GWP) than CO2.
* 2 new vehicles enter the roads every single second. By 2030 will > than four.
* By 2030, an estimated 127 million vehicles will be produced globally. By 2035, the total number of vehicles could be 2 billion.
* The environmental impact of cars will depend on how effectively we move towards electrified cars (and more fuel efficient cars but that’s not a long term solution).
* 80-90% of cars’ environmental impact comes from fuel consumption and emissions of air pollution and greenhouse gases.
* Particulate matter in the air alone is responsible for up to 30,000 premature deaths every year.
* EV can produce 189 grams of carbon dioxide / mile
* Gas car 385 grams of carbon dioxide / mile
* Batteries: cobalt, lithium and rare earth elements — that have been linked to grave environmental and human rights concerns

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[helloinspire.com--The Environmental And Financial Benefits Of Biking To Work.pdf (nwclug.org)](http://nwclug.org/me/biking/Benefits_of_Biking-environmental_health_economic_community--1804/helloinspire.com--The%20Environmental%20And%20Financial%20Benefits%20Of%20Biking%20To%20Work.pdf)

<https://www.inspirecleanenergy.com/blog/clean-energy-101/bike-to-work-benefits>

Let's say you drive a sensible mid sized vehicle that gets a conservative 25 MPG. This is also - coincidentally - around the national average[2](https://www.inspirecleanenergy.com/blog/clean-energy-101/bike-to-work-benefits#fn2) in miles per gallon of gas, according to a study conducted by the University of Michigan. [According to the EIA](http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=10), your average motor vehicle produces about 19.64 lbs of carbon per gallon of gasoline burned, the average retail cost per gallon of gasoline in the United States is around $2.25. This means that – daily – your ten mile round trip commute costs you around .90 cents for gas, and produces around 7.856 lbs. of CO2.

All things considered, those aren't huge sums, but over a full year, they add up fast. There are 261 workdays[3](https://www.inspirecleanenergy.com/blog/clean-energy-101/bike-to-work-benefits#fn3) on the calendar in 2016. Let's assume you're a very industrious worker, you never call in sick, and you never take superfluous days off. But - because you're not a robot and you need to recharge - you take a two week vacation. So the other 251 days of the year, you're hard at work. That means 251 days of commuting. This means your commute by car is only costing you $225.90 in gas per year, and producing a whopping **1,971.86 lbs of carbon dioxide.** When you look at the above numbers, riding your bike to work becomes a pretty attractive alternative. You save a little cash, you help the earth, and you get some exercise.

<https://www.inspirecleanenergy.com/blog/sustainable-living/impact-clean-energy-vs-biking-to-work>

<http://nwclug.org/me/biking/Benefits_of_Biking-environmental_health_economic_community--1804/homeguides.sfgate.com--The%20Pros%20for%20the%20Environment%20of%20Riding%20Bikes%20_%20Home%20Guides%20_%20SF%20Gate.pdf>

<https://homeguides.sfgate.com/pros-environment-riding-bikes-79378.html>

* The environmental hazards of motorized vehicle traffic are no secret. According to the University of North Carolina Highway Safety Research Center, transportation emits large amounts of pollutants into the atmosphere. The university's research found that 80 percent of the carbon monoxide in the atmosphere came from motorized vehicles that operate on gas and diesel. These sources also contribute 55 percent of the nitrogen oxide pollution in the air. Riding a bike, however, contributes zero pollutants, a statistic that is definitely a pro for the environment. (References 1)
* The University of North Carolina Highway Safety Research Center has also found that motorized vehicles guzzle millions of barrels of oil each day in the form of gas and diesel (See References 3). The U.S. Department of Energy estimates that approximately 10 million barrels of oil were used each day in 2010 (See References 2). Individuals riding bikes are not in cars, so they help reduce petroleum consumption. An increase in bike ridership could cut down on oil consumption over the next decade, because bicycles consume no fuel.
* Short car trips waste more fuel and create more pollutants than long car trips. The University of North Carolina Highway Safety Research Center found that 60 percent of the pollutants created from motorized transportation was produced during the first few minutes of the ride. In fact, starting the car cold and then driving up to four miles produces more air pollutants than driving on a long trip. The university found that 15 pounds of pollution could be saved if drivers would park their cars on short trips of four miles or less and ride a bike instead (See References 3).
* Parking lots are a problem for the environment, especially with the increasing number of motorized vehicles on the road. This means clearing more land for parking that was once home to plant and animal life. The asphalt, roadway tars and other chemicals poured to make parking lots also release pollutants into the air and create heat islands that contribute to global warming. The removal of trees and complementary vegetation eliminates vital air cleaners that help reduce the quantity of carbon dioxide in the air. Bicycle parking requires little space, which means that bikes help minimize the heat island effect and also preserve habitats.

<http://nwclug.org/me/biking/Benefits_of_Biking-environmental_health_economic_community--1804/bikeradar.com--30%20reasons%20to%20take%20up%20cycling%20-%20BikeRadar.pdf>

<https://www.bikeradar.com/advice/fitness-and-training/30-great-benefits-of-cycling/>

Twenty bicycles can be parked in the same space as one car. It takes around 5 per cent of the materials and energy used to make a car to build a bike, and a bike produces zero pollution.

Bikes are efﬁcient, too. You travel around three times as fast as walking for the same amount of energy and, taking into account the ‘fuel’ you put in your ‘engine’, you do the equivalent of 2,924 miles to the gallon.

You have your weight ratio to thank: you’re about six times heavier than your bike, but a car is 20 times heavier than you.

You’d think a city cyclist would suck up much more pollution than the drivers and passengers in the vehicles chucking out the noxious gases. Not so, according to a study carried out by Imperial College London.

Researchers found that passengers in buses, taxis and cars inhaled substantially more pollution than cyclists and pedestrians.

On average, taxi passengers were exposed to more than 100,000 ultraﬁne particles – which can settle in the lungs and damage cells – per cubic centimetre. Bus passengers sucked up just under 100,000 and people in cars inhaled about 40,000.

Cyclists, meanwhile, were exposed to just 8,000 ultraﬁne particles per cubic centimetre. It’s thought that cyclists breathe in fewer fumes because we ride at the edge of the road and, unlike drivers, aren’t directly in the line of exhaust smoke.

<http://nwclug.org/me/biking/Benefits_of_Biking-environmental_health_economic_community--1804/movoto.com--10%20Ways%20Riding%20a%20Bike%20Can%20Save%20the%20World%20-%20Movoto%20Blog.pdf>

<https://www.pinterest.com/pin/391531761332670960/>

<https://bikeattack.com/blog10-ways-riding-a-bike-can-save-the-world-and-make-your-life-better-/>

<https://www.smartcitiesdive.com/ex/sustainablecitiescollective/infographic-10-ways-riding-bike-can-save-world/187346/>

Riding your bike to work rather than driving can cut down on your household emissions by at least 6%.

Cars produce .97 pounds of pollution per mile annually; bikes produce none. Bikes are also up to 50% faster than cars during rush hour.

Bikes take fare fewer natural resources to make than cars, the pollution of which generates 1.2 billion cubic yards of pollution each year.

Far less rubber is involved in making bikes and their tires, which helps prevent the clearing of forests for rubber plantations.

Not only does riding a bike help combat noise pollution, which affects wild animals, but it results in less roadkill, too.

20 bikes can fit in the space of once car, so if more people rode them, we’d need to clear less land for paring lots.

<http://nwclug.org/me/biking/Benefits_of_Biking-environmental_health_economic_community--1804/planetsave.com--Benefits%20of%20Bicycling.pdf>

**2. You’ll protect the climate and environment.**Transportation is one of the [leading causes (if not the #1 cause) of global warming](http://planetsave.com/2009/06/07/global-warming-effects-and-causes-a-top-10-list/). It is also what [over 70% of oil](http://planetsave.com/2010/07/12/where-oil-comes-from-and-how-we-use-oil/) is used for in the U.S. (So, if you’re concerned about global warming or peak oil — AND YOU SHOULD BE — bicycling is an easy, quick, fun solution you can implement today.)

**7. Bicycling makes streets and cities nicer**. There’s no doubt about it — people don’t like pollution, including noise pollution, traffic, or unsafe streets. Bicycling cuts down on pollution, noise, and traffic tremendously. Additionally, it makes streets much safer. I lived in [Groningen](https://www.expertsure.com/2009/10/30/6-groningen-netherlands-great-bicycle-city-photo-tour/) in the Netherlands for 5 months, a city named “World Bicycling City” on a number of occasions and boasting a 50-60% bicycle commute rate. I noticed after awhile that I lived on one of the busiest and ‘largest’ streets in the city — I was right in between the city center (and the whole rest of the city) and the city’s huge University. It took me awhile to realize because the street was so tranquil, only two lanes, and despite thousands and thousands of people going by my window every morning, I could mostly just here the clicks of broken bicycles (there are a lot in the Netherlands) or their bells (used well when bicyclists pass each other in the wide bike lanes). There’s hardly a street nicer to live on, but if the bicycle commute rate were, say, 1% instead of 50-60%, the street and living on it would be an absolute nightmare!

<http://nwclug.org/me/biking/Benefits_of_Biking-environmental_health_economic_community--1804/safety.fhwa.dot.gov--case15--FHWA-PD-93-15.pdf>

Many stats but from January 1993

<http://nwclug.org/me/biking/Benefits_of_Biking-environmental_health_economic_community--1804/sciencedirect.com--Impacts%20on%20air%20pollution%20and%20health%20by%20changing%20commuting%20from%20car%20to%20bicycle%20-%20ScienceDirect.pdf>

<https://www.sciencedirect.com/science/article/pii/S0048969717301559>

**Abstract**

Our study is based on individual data on people's home and work addresses, as well as their age, sex and physical capacity, in order to establish realistic bicycle-travel distances. A transport model is used to single out data on commuting preferences in the County Stockholm. Our analysis shows there is a very large potential for reducing emissions and exposure if all car drivers living within a distance corresponding to a maximum of a 30 min bicycle ride to work would change to commuting by bicycle. It would result in > 111,000 new cyclists, corresponding to an increase of 209% compared to the current situation.

Mean population exposure would be reduced by about 7% for both NOx and black carbon (BC) in the most densely populated area of the inner city of Stockholm. Applying a relative risk for NOx of 8% decrease in all-cause mortality associated with a 10 μg m− 3 decrease in NOx, this corresponds to > 449 (95% CI: 340–558) years of life saved annually for the Stockholm county area with 2.1 million inhabitants. This is more than double the effect of the reduced mortality estimated for the introduction of congestion charge in Stockholm in 2006. Using NO2 or BC as indicator of health impacts, we obtain 395 (95% CI: 172–617) and 185 (95% CI: 158–209) years of life saved for the population, respectively. The calculated exposure of BC and its corresponding impacts on mortality are likely underestimated. With this in mind the estimates using NOx, NO2 and BC show quite similar health impacts considering the 95% confidence intervals.

<http://nwclug.org/me/biking/Benefits_of_Biking-environmental_health_economic_community--1804/tmr.qld.gov.au--Cycling%20benefits%20(Department%20of%20Transport%20and%20Main%20Roads).pdf>

<https://www.qld.gov.au/transport/public/bicycle-riding/benefits-of-riding>

* Bicycle riding uses minimal fossil fuels and is a pollution-free mode of transport.
* Bikes reduce the need to build, service and dispose of cars.
* Bicycle riding conserves roadway and residential space, thereby providing opportunities for less concrete and more plant life in urban areas.

Find out more about the [benefits of riding in the Queensland Cycling Strategy](https://www.publications.qld.gov.au/dataset/queensland-cycling-strategy-2017-2027).

Now that you know why more people riding bicycles is so good for Queensland, [find where to ride](https://www.qld.gov.au/transport/public/bicycle-riding/where-to-ride) and start experiencing the benefits for yourself.

[Health and Environmental Benefits of Walking and Bicycling - Resources - Bicycle and Pedestrian Program - Environment - FHWA (dot.gov)](https://www.fhwa.dot.gov/environment/bicycle_pedestrian/resources/benefits_research.cfm)

<http://nwclug.org/me/biking/Benefits_of_Biking-environmental_health_economic_community--1804/youcanbikethere.com--Environmental%20Benefits%20_%20Bike%20to%20Work%20Day.pdf>

ENVIRONMENTAL BENEFITS

HOW DOES BICYCLE COMMUTING CONTRIBUTE TO A CLEAN ENVIRONMENT?

1. Bicycling uses no fuel.

2. Bicycles take a lot less energy to make

than a car.

3. Bikes don’t require toxic batteries or

motor oil.

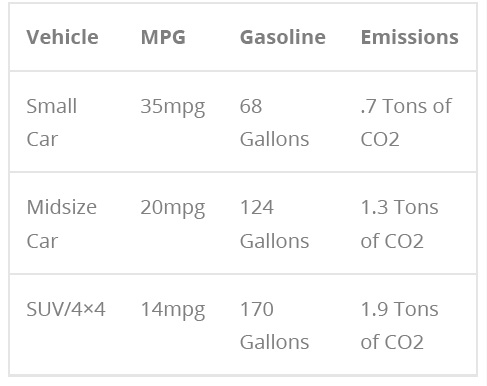
HOW MUCH AIR POLLUTION IS

PREVENTED BY COMMUTING BY

BICYCLE?

The actual calories you burn while riding your bike depend on your weight, speed, distance and other factors.

10 mile round trip commute 5 days a week for a year



And those are just the pollutants from fuel use. From the foam and plastic in its seats to the petroleum in its tires, each car is a small pollution factory. Several tons of

waste and 1.2 billion cubic yards of polluted air are generated in its manufacture alone! In 2008 the US produced 1.6 million billion metric tons of waste mining ore for

automotive production. In the US each year, painting and coating cars produces 40 million pounds of air releases and 24 million pounds of hazardous wastes.

During its lifetime, on the road, each car produces another 1.3 billion cubic yards of polluted air and scatters an additional 40 pounds of worn tire particles, brake debris

worn road surface into the atmosphere.

Bicycling signi􀃒cantly reduces transportation emissions while also reducing tra􀃕c congestion and the need for petroleum. The total number of pounds

of pollutants, (comprised of hydrocarbons, carbon monoxide, nitrogen oxides and carbon dioxide), emitted per year is 12,140.30 lbs/year (or 0.97 lbs/mile) for

passenger cars and 17,025.80 lbs/year (or 1.21 lbs/mile) for light trucks.

HOW MUCH MORE ENVIRONMENTALLY FRIENDLY IS BICYCLING COMPARED TO DRIVING A HYBRID

1. Hybrid cars are much larger than bikes. 14,000 pounds of carbon are produced in the production of each vehicle.

2. Most hybrids require large batteries such as nickel metal hydride batteries which are known carcinogens, and have been shown to cause a variety of teratogenic effects. Also, nickel mining is often done

in open cast mines with all the attendant pollution that goes along with excavating large holes in the ground.

3. Hybrids do use some gas to run, while bikes require none.

4. When you rely on a car for transportation, you are more likely to go further for errands and not rely on completely carbon free forms of transportation such as walking and

bicycling. You support your local businesses when you get there by bike or walking.

<https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

* **How much tailpipe carbon dioxide (CO2) is created from burning one gallon of fuel?**
  + CO2 Emissions from a gallon of gasoline: 8,887 grams CO2/ gallon
  + CO2 Emissions from a gallon of diesel: 10,180 grams CO2/ gallon
* **How much tailpipe carbon dioxide (CO2) is emitted from driving one mile?**
  + The average passenger vehicle emits about 404 grams of CO2 per mile
* **What are the average annual carbon dioxide (CO2) emissions of a typical passenger vehicle?**
  + 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 CO2.
* **Are there other sources of greenhouse gas (GHG) emissions from a vehicle?**
  + In addition to carbon dioxide (CO2), automobiles produce methane (CH4)and nitrous oxide (N2O) from the tailpipe and hydrofluorocarbon emissions from leaking air conditioners. The emissions of these gases are small in comparison to CO2; however, the impact of these emissions can be important because they have a higher global warming potential (GWP) than CO2.
* **What are the tailpipe emissions from a plug-in hybrid electric vehicle (PHEV) or an electric vehicle (EV)? What about hydrogen fuel cell vehicles?**
  + A vehicle that operates exclusively on electricity (an EV) will not emit any tailpipe emissions. A fuel cell vehicle operating on hydrogen will emit only water vapor.
  + Calculating tailpipe emissions for PHEVs is more complicated. PHEVs can operate on electricity only, gasoline only, or some combination of electricity and gasoline. A PHEV operating on electricity only (like an EV) does not generate any tailpipe emissions. When a PHEV is operating on gasoline only, it creates tailpipe emissions based on the PHEV’s gasoline fuel economy. Tailpipe emissions for a PHEV operating on both electricity and gasoline cannot be calculated without detailed information about how the PHEV operates. The overall tailpipe emissions for a PHEV can vary significantly based on the PHEV’s battery capacity, how it is driven, and how often it is charged.
* **Are there any greenhouse gas emissions associated with the use of my vehicle other than what comes out of the tailpipe?**
  + Driving most vehicles creates tailpipe greenhouse gas emissions. Producing and distributing the fuel used to power your vehicle also creates greenhouse gases. Gasoline, for example, requires extracting oil from the ground, transporting it to a refinery, refining the oil into gasoline, and transporting the gasoline to service stations. Each of these steps can produce additional greenhouse gas emissions.
  + Electric vehicles (EVs) have no tailpipe emissions; however, emissions are created during both the production and distribution of the electricity used to fuel the vehicle. Visit the [Beyond Tailpipe Emissions calculatorEXITEXIT EPA WEBSITE](http://www.fueleconomy.gov/feg/Find.do?action=bt2)to estimate GHG emissions for an EV in your region of the country.
* **I thought my gasoline was blended with ethanol. Does that change my tailpipe CO2 emissions?**
  + Most of the gasoline sold in the U.S. is a mixture of gasoline and up to 10% ethanol (often referred to as E10). The exact formulation of the gasoline in your vehicle will vary depending on season, region in the U.S., and other factors. While your fuel economy when using an ethanol blend in your vehicle will be slightly lower than when using gasoline without ethanol, the CO2tailpipe emissions per mile will be similar. This is because ethanol has less carbon per gallon than gasoline.
* **How does EPA measure CO2 emissions from vehicles?**
  + EPA and automobile manufacturers measure vehicle fuel economy and CO2 emissions using a set of standardized laboratory tests. These tests were designed by EPA to mimic typical driving patterns. EPA and the Department of Transportation use these values to ensure that manufacturers meet federal greenhouse gas and corporate average fuel economy (CAFE) standards.
  + For every new vehicle, the test results are used to determine real world fuel economy and CO2 emissions. These adjusted results are used on the Fuel Economy and Environment Labels and on [Fueleconomy.govEXITEXIT EPA WEBSITE](http://fueleconomy.gov/).
* **How can I find and compare CO2 emission rates for specific vehicle models?**
  + Visit [Fueleconomy.govEXITEXIT EPA WEBSITE](http://fueleconomy.gov/) and click on “Find a Car.” From the vehicle search results page, click on the “Energy and Environment” tab. A vehicle’s greenhouse gas emissions rate (g/mile) and GHG rating can be found there.
  + When shopping at a dealership, check out tailpipe CO2 emission rates on vehicle[Fuel Economy and Environment Labels.](https://www.epa.gov/greenvehicles/learn-about-fuel-economy-label) The labels also feature a 1-to 10 Fuel Economy and Greenhouse Gas Rating to enable easy comparison shopping.
* **Where can I find information on the emissions of the transportation sector as a whole?**
  + You can find documents on greenhouse gas emissions on [Carbon Pollution from Transportation](https://www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation).
  + EPA also publishes industry-wide data in the report, [“Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends.”](https://www.epa.gov/automotive-trends/highlights-automotive-trends-report) This report analyzes trends in fuel economy and CO2 emissions for new light duty vehicles from 1975 to the present.

<https://www.theworldcounts.com/challenges/consumption/transport-and-tourism/cars-impact-on-the-environment/story>

**Cars impact on the environment**

The transport sector is one of the largest sources of CO2 emissions and a major source of air pollution.

Two new vehicles enter the roads every single second. By 2030 it will be more than four.

By 2030, an estimated 127 million vehicles will be produced globally. By 2035, the total number of vehicles could be 2 billion.

The environmental impact of cars will depend on how effectively we move towards electrified cars (and more fuel efficient cars but that’s not a long term solution).

**Cars are a heavy CO2 emitter and air polluter**

The transport sector burns most of the world's petroleum and is one of the largest sources of global greenhouse gas emissions. It's also heavy on air pollution. cars are a major contributor to air pollution producing significant amounts of nitrogen oxides, carbon monoxide, and particulate matter.

80-90% of cars’ environmental impact comes from fuel consumption and emissions of air pollution and greenhouse gases.

Particulate matter in the air alone is responsible for up to 30,000 premature deaths every year.

<https://greenercars.org/why-buy-green/automobiles-environment>

**Automobiles & the Environment**

Automobiles affect the environment in many ways. Impacts begin when a vehicle is manufactured (including the production of all the parts and materials that go into the car) and end with its scrappage in a junkyard (which can recycle many parts but also involves the disposal of many wastes). Over the life of an average motor vehicle, however, much of the environmental damage occurs during driving and is greatly associated with fuel consumption. Over the dozen or so years of a vehicle's life, nearly 90 percent of lifecycle ("cradle to grave") greenhouse gas production for a typical automobile is due to fuel consumption.

Petroleum products now provide 96 percent of America’s transportation energy needs. Air pollution isn't the only problem associated with these petroleum-based fuels. Oil extraction lays waste to many fragile ecosystems, harming tropical forests in South America and Southeast Asia, deserts and wetlands in the Middle East, our own coastal areas, and the fragile tundra and arctic coastal plains of Alaska. Millions of gallons of oil are spilled every year. Sometimes the disasters are well known, such as the 1989 Exxon Valdez spill in Prince William Sound. More often there are rarely reported but still tragic smaller spills that occur in the oceans and in coastal waters, bays, and rivers throughout the world. In our own communities, groundwater is sometimes tainted by leaks from underground fuel storage tanks and miscellaneous spills that occur during shipping and handling of the 120 billion gallons of fuel we use each year.

In addition to these environmental harms, gasoline and diesel consumption bring economic and security risks. The Middle East contains the largest concentration of the world's oil. The United States maintains a global military presence partly to maintain access to foreign oil. The 1991 war with Iraq was directly related to securing our oil supply. The tragic situation in which the United States finds itself since September 11, 2001, presents many grave challenges for national defense and security. Choosing more fuel-efficient vehicles to reduce our reliance on a world oil market in which Middle Eastern countries play a dominant role is one way we, as individuals, can assist in energy-related aspects of national security.

<https://www.nytimes.com/2021/03/02/climate/electric-vehicles-environment.html>

An all-electric Chevrolet Bolt, for instance, can be expected to produce 189 grams of carbon dioxide for every mile driven over its lifetime, on average. By contrast, a new gasoline-fueled Toyota Camry is estimated to produce 385 grams of carbon dioxide per mile. A new Ford F-150 pickup truck, which is even less fuel-efficient, produces 636 grams of carbon dioxide per mile.

**Raw materials can be problematic**

Like many other batteries, the lithium-ion cells that power most electric vehicles rely on raw materials — like cobalt, lithium and rare earth elements — that have been linked to grave environmental and human rights concerns. Cobalt has been especially problematic.

Mining cobalt produces hazardous tailings and slags that can [leach into the environment](https://www.sciencedirect.com/science/article/abs/pii/S0959652618335340), and studies have found high [exposure in nearby communities](https://pubmed.ncbi.nlm.nih.gov/19486963/), especially among children, to cobalt and other metals. Extracting the metals from their ores also requires a process called smelting, which can emit sulfur oxide and other harmful air pollution.

And as much as 70 percent of the world’s cobalt supply is mined in the Democratic Republic of Congo, a substantial proportion in unregulated “artisanal” mines where workers — including many children — dig the metal from the earth using only hand tools at great risk to their health and safety, human rights groups warn.

The world’s lithium is either mined in Australia or from salt flats in the Andean regions of Argentina, Bolivia and Chile, operations that [use large amounts of groundwater](https://iopscience.iop.org/article/10.1088/1748-9326/aae9b1) to pump out the brines, drawing down the water available to Indigenous farmers and herders. The water required for producing batteries has meant that manufacturing electric vehicles is [about 50 percent more water intensive](https://fas.org/sgp/crs/misc/R46420.pdf) than traditional internal combustion engines. Deposits of rare earths, concentrated in China, often [contain radioactive substances](https://www.epa.gov/radiation/tenorm-rare-earths-mining-wastes) that can emit radioactive water and dust.

Focusing first on cobalt, automakers and other manufacturers have committed to eliminating “artisanal” cobalt from their supply chains, and have also said they will develop batteries that decrease, or do away with, cobalt altogether. But that technology is still in development, and the prevalence of these mines means these commitments “aren’t realistic,” said Mickaël Daudin of Pact, a nonprofit organization that works with mining communities in Africa.

Instead, Mr. Daudin said, manufacturers need to work with these mines to lessen their environmental footprint and make sure miners are working in safe conditions. If companies acted responsibly, the rise of electric vehicles would be a great opportunity for countries like Congo, he said. But if they don’t, “they will put the environment, and many, many miners’ lives at risk.”

**Recycling could be better**

As earlier generations of electric vehicles start to reach the end of their lives, preventing a pileup of spent batteries looms as a challenge.

<https://magazine.northeast.aaa.com/daily/life/cars-trucks/electric-vehicles/are-electric-car-batteries-bad-for-the-environment/>

The environmental toll of electric car batteries begins before the product is even assembled, most notably in the mining of its active material, lithium. To extract lithium from the Earth, an immense amount of water (as much as [**2 million gallons**](https://unctad.org/news/developing-countries-pay-environmental-cost-electric-car-batteries) per metric ton of lithium by some estimates), is pumped down into salt flats, bringing mineral-rich saltwater to the surface. Lithium is filtered out of the mixture left behind after the water evaporates.

This water-intensiveness is problematic for several reasons, including its potential to contaminate the water supply. Further complicating the issue is the location of these mines, many of which are found in desert regions of Australia and China. More than half of the Earth’s lithium supply, however, is in the Lithium Triangle, spanning Andean Mountain sections of Argentina, Bolivia and Chile. The area is one of the driest places on the globe and lithium mining consumes as much as 65% of the region’s water, according to the [**United Nations**](https://unctad.org/news/developing-countries-pay-environmental-cost-electric-car-batteries).

Lithium isn’t the only potentially hazardous electric vehicle battery material. The process of mining for cobalt, nearly 70%  of which is done in the Democratic Republic of Congo, produces hazardous byproducts that can [**toxify the environment**](https://www.sciencedirect.com/science/article/abs/pii/S0959652618335340). Cobalt mine sites often contain sulphur, which generate sulfuric acid when exposed to air and water. This process wreaks havoc on rivers, streams and aquatic life, creating damage that can last for hundreds of years, according to the [**United Nations**](https://unctad.org/news/developing-countries-pay-environmental-cost-electric-car-batteries).

Because of methods required to mine for its raw materials, and their subsequent environmental effects, battery production is likely the most environmentally damaging stage in the manufacturing of electric vehicles. Research by the European Environment Agency found batteries alone account for 10% to 75% of the energy and 10% to 70% of the greenhouse gas emissions resulting from the entire production of the vehicle.

If you remove the lithium battery from the equation, production of electric and gas-powered vehicles is very similar and thus, have nearly identical effects on the environment. Its inclusion, however, puts electric vehicle manufacturing’s environmental impact over the top. The same EEA study found production of electric cars emits between 1.3 and 2 times the amount of greenhouse gases than that of internal-combustion vehicles.

Critics of electric vehicles are often quick to point out that green vehicles aren’t, in fact, green. They are charged by an electrical grid likely powered by fossil fuels. This is true. Unless the electricity utilized to power an electric car battery is derived entirely from renewable energy, there are emissions associated with it.

But electric grids across the country are shifting to a mix of natural gas, wind and solar power. Currently, 17% of the electricity in the United States is powered by renewable energy, according to the [**EPA**](https://www.epa.gov/egrid/power-profiler#/). (Power is even greener closer to home. Nearly 20% of New England’s electrical grid and more than 40% of upstate New York’s is fueled by renewable sources.) Regardless of where you live, you’re likely getting at least some of your power from green energy.

The dearth of recycled lithium batteries has significant economic repercussions, but it also takes a dire toll on the environment. Most lithium batteries end up in landfills, where their hazardous components can leak into the soil and groundwater. Landfills are also a major contributor of greenhouse gas emissions, the [**EPA**](https://www.epa.gov/lmop/basic-information-about-landfill-gas) reports. Recycling would also limit the need for mining raw materials, an environmentally destructive stage in an electric car battery’s lifespan.

These negative effects, however, are offset by the absence of tailpipe emissions throughout the vehicle’s lifetime. A recent study by the [**International Council on Clean Transportation**](https://theicct.org/publications/global-LCA-passenger-cars-jul2021) found electric vehicles in the U.S. produce 60%–68% fewer emissions over their lifetime than gas-powered cars.

<https://www.motorbiscuit.com/ev-car-batteries-destroy-environment-violate-human-rights/>

Automotive companies and environmentalists herald electric vehicles as one of the solutions to addressing environmental problems such as the climate change crisis and air pollution. With their electric powertrains, [EVs](https://motorbiscuit.com/tag/EV) produce zero carbon emissions. However, [electric vehicles](https://www.motorbiscuit.com/guide-new-upcoming-electric-pickup-trucks/) have a dirty secret: the lithium and cobalt that are in EV car batteries destroy the environment and violate human rights.

Electric vehicles hold much promise for addressing environmental problems. However, as currently built, EVs contribute to environmental problems in ways that many people might not even realize. As detailed by the [Institute for Energy Research](https://www.instituteforenergyresearch.org/renewable/the-environmental-impact-of-lithium-batteries/), lithium-ion batteries in electric vehicles have a considerable negative impact on the environment.

Lithium mining requires a massive amount of water, which is increasingly in short supply in many regions of the [world](https://www.motorbiscuit.com/7-best-coastal-drives-7-seas/). Approximately 500,000 gallons of water get used for every ton of lithium mined. To extract lithium, “miners drill a hole in salt flats and pump salty, mineral-rich brine to the surface.” The water then evaporates after several months, which leaves lithium and other minerals.

The Lithium Triangle in South America, which includes portions of Bolivia, Chile, and Argentina, contains more than half of the world’s supply of lithium. The region is also very dry. In Chile’s Salar de Atacama, lithium mining consumes 65% of the region’s water. The problem is so bad that farmers and other people in the local communities have to get water elsewhere.

In addition to using a great deal of water, lithium mining causes water, soil, and air pollution. Toxic chemicals like hydrochloric acid used in the mining process can leak from evaporation pools and contaminate the surrounding area.

Another problem regarding lithium-ion EV car batteries is the high amount of lithium-ion waste. For example, in [Australia](https://www.motorbiscuit.com/millions-red-crabs-cause-traffic-jams-christmas-island/), “only two percent of the country’s 3,300 metric tons” of lithium-ion batteries get recycled. The lithium-ion waste typically ends up in landfills, where it can potentially leak into the environment.

In addition to lithium, another mineral used in EV car batteries is cobalt. Unfortunately, cobalt mining has many of the same negative environmental impacts as lithium. This includes water, soil, and air pollution.

One of the human rights, as defined by the United Nations, is “access to safe, sufficient and affordable water, sanitation, and hygiene facilities.” With this in mind, lithium mining for EV car batteries violates human rights. This is because it wastes a considerable amount of water in dry areas — and causes water contamination.

<https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars>

[Electric cars](https://en.wikipedia.org/wiki/Electric_car) (or electric vehicles, EVs) have a smaller [environmental footprint](https://en.wikipedia.org/wiki/Environmental_footprint) than conventional [internal combustion engine](https://en.wikipedia.org/wiki/Internal_combustion_engine) vehicles (ICEVs). While aspects of their production can induce similar, less or alternative environmental impacts, they produce little or no tailpipe emissions, and reduce dependence on [petroleum](https://en.wikipedia.org/wiki/Petroleum) and [greenhouse gas emissions](https://en.wikipedia.org/wiki/Greenhouse_gas_emissions), and health effects from [air pollution](https://en.wikipedia.org/wiki/Air_pollution).[[2]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-EVCostBenefit-2)[[3]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-Holland2016-3)[[4]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-Yuksel2016-4)[[5]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-Weis2016-5) [Electric motors](https://en.wikipedia.org/wiki/Electric_motor) are significantly more efficient than [internal combustion engines](https://en.wikipedia.org/wiki/Internal_combustion_engine) and thus, even accounting for typical power plan efficiencies and distribution losses,[[6]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-6) less energy is required to operate an EV. Manufacturing batteries for electric cars requires additional resources and energy, so they may have a larger [environmental footprint](https://en.wikipedia.org/wiki/Environmental_footprint) from the production phase.[[7]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-7)[[8]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-8) EVs also generate different impacts in their operation and maintenance. EVs are typically heavier and could produce more [tire, brake, and road dust](https://en.wikipedia.org/wiki/Non-exhaust_emissions) air pollution, but their [regenerative braking](https://en.wikipedia.org/wiki/Regenerative_braking) could reduce such [particulate pollution](https://en.wikipedia.org/wiki/Particulate_pollution) from brakes.[[9]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-two-thirds-9) EVs are mechanically simpler, which reduces the use and disposal of engine oil.

[Electric cars](https://en.wikipedia.org/wiki/Electric_car) have some disadvantages, such as:

* Possible increased [particulate matter](https://en.wikipedia.org/wiki/Particulates) emissions from tires. This is sometimes caused by the fact that most electric cars have a heavy battery, which means the car's tires are subjected to more wear. The brake pads, however, can be used less frequently than in non-electric cars, if [regenerative braking](https://en.wikipedia.org/wiki/Regenerative_braking) is available and may thus sometimes produce less particulate pollution than brakes in non-electric cars.[[13]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-13)[[14]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-worse-than-diesel-14) Also, some electric cars may have a combination of [drum brakes](https://en.wikipedia.org/wiki/Drum_brake) and disc brakes, and drum brakes are known to cause less particulate emissions than [disc brakes](https://en.wikipedia.org/wiki/Disc_brake).
* [Pollution emitted in manufacturing](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#Impacts_due_to_Manufacturing), especially the increased amounts from producing batteries.
* Reliance on rare-earth elements such as [neodymium](https://en.wikipedia.org/wiki/Neodymium), [lanthanum](https://en.wikipedia.org/wiki/Lanthanum), [terbium](https://en.wikipedia.org/wiki/Terbium), and [dysprosium](https://en.wikipedia.org/wiki/Dysprosium), and other critical metals such as [lithium](https://en.wikipedia.org/wiki/Lithium) and [cobalt](https://en.wikipedia.org/wiki/Cobalt),[[15]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-15)[[16]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-16) though the quantity of rare metals used differs per car. Though rare earth metals are plentiful in the earth's crust, only a few miners hold exclusivity to access those elements.[[17]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-17)

Most EVs use permanent magnet motors as they have better performance than [induction motors](https://en.wikipedia.org/wiki/Induction_motor), which don't use [rare-earth elements](https://en.wikipedia.org/wiki/Rare-earth_element).[[28]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-:1-28) These [neodymium magnets](https://en.wikipedia.org/wiki/Neodymium_magnet) use [neodymium](https://en.wikipedia.org/wiki/Neodymium) and [praseodymium](https://en.wikipedia.org/wiki/Praseodymium). Although not actually rare these elements can be dirty and difficult to produce.[[28]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-:1-28)[[29]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-29)

China has 48% of the world's reserves of rare-earth elements, the United States has 13%, and Russia, Australia, and Canada have significant deposits. Until the 1980s, the U.S. led the world in rare-earth production, but since the mid-1990s China has controlled the world market for these elements. The mines in [Bayan Obo](https://en.wikipedia.org/wiki/Bayan_Obo) near [Baotou](https://en.wikipedia.org/wiki/Baotou), [Inner Mongolia](https://en.wikipedia.org/wiki/Inner_Mongolia), are currently the largest source of rare-earth metals and are 80% of China's production.[[30]](https://en.wikipedia.org/wiki/Environmental_footprint_of_electric_cars#cite_note-NatGeo0611-30)

<https://electrek.co/2019/07/08/study-electric-bicycles-better-than-electric-cars/>

New UK study shows e-bikes beat electric cars

A new study released by the [Center for Research into Energy Demand Solutions (CREDS)](https://www.creds.ac.uk/creds-launches-first-major-report-shifting-the-focus-energy-demand-in-a-net-zero-carbon-uk/) in the UK has found that [electric cars](https://electrek.co/2019/07/08/tesla-women-electric/) aren’t actually the best transportation option when it comes to urban traffic or environmental impact.

The study found that over time, electric cars will likely increase the number of cars on the road due to their lower cost to operate than gas vehicles. This will result in further congestion in cities, an increase in urban sprawl and potentially negative societal health impacts in the form of obesity.

The CREDS study found that active forms of transportation, such as [electric bicycles](https://electrek.co/2019/04/26/review-ride1up-roadster-ghost-electric-bicycle/), were better solutions for reducing traffic and alleviating health concerns related to sedentary lifestyles that are increasingly common in urban residents, according to [Forbes](https://www.forbes.com/sites/carltonreid/2019/07/05/electric-cars-dont-reduce-congestion-but-bicycles-can-argues-uk-government-funded-report/#371f65ec323e).

<https://www.nwebikes.com/post/environmental-benefits-of-an-e-bike-vs-a-car>