SUSTAINABLE FUTURE

Are electric cars 'green'? The answer is yes, but it's complicated

PUBLISHED MON, JUL 26 2021•12:00 AM EDT UPDATED MON, JUL 26 2021•7:12 AM EDT

Saheli Roy Choudhury
@SAHELIRC

KEY POINTS

As electric cars become more popular, some question if they are as environmentally friendly as advertised — with some saying that greenhouse emissions during the manufacturing process and battery-charging have to be considered.

The number of electric cars, buses, vans and heavy trucks on roads is expected to hit 145 million by 2030, the International Energy Agency predicts.

Experts broadly agree that electric vehicles create a lower carbon footprint over the course of their lifetime than do cars and trucks that use traditional, internal combustion engines.

The number of electric vehicles on the world's roads is surging, hitting a record number last year.

That would seem to be good news, as the world tries to wean itself off fossil fuels that are wrecking the global climate. But as electric cars become more popular, some question just how environmentally friendly they are.

The batteries in electric vehicles, for example, charge on power that is coming straight off the electric grid — which is itself often powered by fossil fuels. And there are questions about how energy-intensive it is to build an EV or an EV battery, versus building a comparable traditional vehicle.

Are electric vehicles greener?

The short answer is yes — but their full green potential is still many years away.

Experts broadly agree that electric vehicles create a lower carbon footprint over the course of their lifetime than do cars and trucks that use traditional, internal combustion engines.

Last year, researchers from the universities of Cambridge, Exeter and Nijmegen in The Netherlands found that in 95% of the world, driving an electric car is better for the environment than driving a gasoline-powered car.

that energy to get charged. Separately, EV battery production remains an energy-intensive process.

> **“Producing electric vehicles leads to significantly more emissions than producing petrol cars … which is mostly from the battery production.**
>
> —Florian Knobloch
>
> CAMBRIDGE CENTRE FOR ENVIRONMENT, ENERGY AND NATURAL RESOURCE GOVERNANCE

A study from the Massachusetts Institute of Technology Energy Initiative found that the battery and fuel production for an EV generates higher emissions than the manufacturing of an automobile. But those higher environmental costs are offset by EVs’ superior energy efficiency over time.

In short, the total emissions per mile for battery-powered cars are lower than comparable cars with internal combustion engines.

“If we are going to take a look at the current situation, in some countries, electric vehicles are better even with the current grid,” Sergey Paltsev, a senior research scientist at the MIT Energy Initiative and one of the study’s authors, told CNBC.

Paltsev explained that the full benefits of EVs will be realized only after the electricity sources become renewable, and it might take several decades for that to happen.

Read more about electric vehicles from CNBC Pro

It’s time to buy Nio shares after the Chinese electric vehicle maker’s 44% drop, UBS says

Electric, hybrid vehicles will account for nearly 50% of cars on the road by 2040, Goldman predicts

Wall Street banks pick their top semiconductor stocks as electric vehicle production soars

“Currently, the electric vehicle in the U.S., on average, would emit about 200 grams of CO2 per mile,” he said. “We are projecting that with cleaning up the grid, we can reduce emissions from electric vehicles by 75%, from about 200 (grams) today to about 50 grams of CO2 per mile in 2050.”

currently emit about 275 grams of CO2 per mile. In 2050, their projected emissions are expected to be between 160 to 205 grams of CO2 per mile — the range is wider than EVs, because fuel standards vary from place to place.

Decarbonization is the process of reducing greenhouse gas emission produced by the burning fossil fuels. Efforts to cut down pollution across various industries are expected to further reduce the environmental impact of EV production and charging over time.

"When you look forward to the rest of the decade, where we will see massive amounts of decarbonization in power generation and massive amount of decarbonization in the industrial sector, EVs will benefit from all of that decarbonization," Eric Hannon, a Frankfurt-based partner at McKinsey & Company, told CNBC.

Batteries are the biggest emitter

EVs rely on rechargeable lithium-ion batteries to run. The process of making those batteries — from using mining raw materials like cobalt and lithium, to production in gigafactories and transportation — is energy-intensive, and one of the biggest sources of carbon emissions from EVs today, experts said.

Gigafactories are facilities that produce EV batteries on a large scale.

"Producing electric vehicles leads to significantly more emissions than producing petrol cars. Depending on the country of production, that's between 30% to 40% extra in production emissions, which is mostly from the battery production," said Florian Knobloch, a fellow at the Cambridge Centre for Environment, Energy and Natural Resource Governance.

Those higher production emission numbers are seen as "an initial investment, which pays off rather quickly due to the reduced lifetime emissions."

VIDEO 16:54

Why China is beating the U.S. in electric vehicles

China currently dominates battery production, with 93 gigafactories producing lithium-ion battery cells versus only four in the U.S., the Washington Post reported this year.

"I think the battery is the most complicated component in the EV, and has the most complex supply chain," George Crabtree, director of the U.S. Department of Energy's Joint Center for Energy Storage Research, told CNBC, adding that the energy source used in battery production makes a huge difference on the carbon footprint for EVs.

Batteries made in older gigafactories in China are usually powered by fossil fuels, because that was the trend five to 10 years ago, he explained. So, EVs that are built with batteries from existing factories are going to have large carbon footprints.

But that's changing, he said, as "people have realized that's a huge carbon footprint."

Experts pointed to other considerations around battery production.

They include unethical and environmentally unsustainable mining practices, as well as a complex geopolitical nature of the supply chain, where countries do not want to rely on other nations for raw materials like cobalt and lithium, or the finished batteries.

Mining raw materials needed for battery production will likely be the last to get decarbonized, according to Crabtree.

Recycling and decarbonizing the grid

Today, very few of the spent battery cells are recycled.

Experts said that can change over time as raw materials needed for battery production are in limited supply, leaving firms with no choice but to recycle.

McKinsey's Hannon outlined other reasons for companies to step by their recycling efforts. They include a regulatory environment where producers, by law, would have to deal with spent batteries — and disposing them could be more expensive.

extensive recycling infrastructure yet because the cars are so new, we're not needing many back," he said.

Most auto companies are already working to ensure they have significant recycling capacity in place before EVs start reaching the end of life over the next decade, he added.

Knobloch from Cambridge University said a lot of research is going into improving battery technology, to make them more environmentally sustainable and less reliant on scarce raw materials. More efforts are also needed in decarbonizing the electricity grid, he added.

"It's very important that more renewable electricity generation capacity is added to the grid each year, than coal generation capacity," Knobloch said.

"Nowadays, it's much easier to build large scale solar or offshore wind compared to building new fossil fuel power plant. What we see is more renewable electricity coming into the grid all over the world."

Still, he pointed out that generating electricity by using renewable sources will still emit greenhouse gases as there are emissions from producing the solar panels and wind turbines. "What we look at is how long will it take until the electricity grid is sufficiently decarbonized so that you see large benefit from electric vehicles," Knobloch added.

Policies needed for societal change

Experts agree that a transition from gasoline-powered cars to EVs is not a panacea for the global fight against climate change.

It needs to go hand-in-hand with societal change that promotes greater use of public transportation and alternative modes of travel, including bicycles and walking.

Reducing the use of private vehicles requires plenty of funding and policy planning.

MIT's Paltsev, who is also deputy director at the university's joint program on the science and policy of global change, explained that there are currently about 1.2 billion fuel-powered cars on the road globally –

In comparison, there are only about 10 million electric vehicles currently.

VIDEO 31:19
The electric vehicle boom is real — but the road won't be easy

People underestimate how many new cars have to be produced and how much materials will be needed to produce those electric vehicles, Paltsev said.

The International Energy Agency predicts that the number of electric cars, buses, vans and heavy trucks on roads is expected to hit 145 million by 2030.

Even if everyone drove EVs instead of gasoline-powered cars, there would still be plenty of emissions from the plug-in vehicles due to their sheer volume, according to Knobloch.

"So, it's not silver bullet for climate change mitigation. Ideally, you also try to reduce the number of cars massively, and try to push things such as public transport," he said. "Getting people away from individual car transport is as important."

RELATED

‘It’s now or never’: World’s top climate scientists issue ultimatum on critical temperature limit

Elon Musk has strong views on hydrogen. Not everyone agrees

Are electric cars ‘green’? The answer is yes, but it’s complicated

Coal’s a ‘stupid investment’ and we’re ‘sleepwalking to climate catastrophe’: UN chief Guterres

Wall Street banks love these energy stocks — and two are on Goldman's conviction buy list

MORE IN SUSTAINABLE FUTURE

'It's now or never': World's top climate scientists issue ultimatum on critical temperature limit

Sam Meredith

The enabler of Russia's war? Ukraine's top climate scientist lays the blame on fossil fuels

Sam Meredith

VIDEO 03:10

Swiss Re: Flood losses to keep rising with climate change, urbanisation

READ MORE

News Tips

Got a confidential news tip? We want to hear from you.