

The reality of electric vehicles

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"Mirage," "illusion," "false solution": For some time now, there has been no shortage of terms used to criticize the move towards electric vehicles. Some mention the environmental impact, mining or child labour. But what is the reality?

In the race to achieve the energy transition, demand for certain critical minerals has risen sharply, posing ecological and humanitarian challenges. That's why researchers have developed batteries with little or no nickel or cobalt, given concerns about child labour in Congo's cobalt mines.

Cobalt is also used in the oil refining process for gas-powered vehicles, computers and mobile phones.¹ These new battery chemistries offer a number of advantages: a significant reduction in the ecological and humanitarian impact of mining, an abundance of resources (iron, phosphate, manganese and later sodium² are abundant and inexpensive), lower battery prices and energy security. This is particularly true of lithium-iron-phosphate (LFP) batteries. By 2022, around 50 per cent of Tesla cars sold will be equipped with LFP batteries.³ These have demonstrated a number of charge-discharge cycles in excess of 10,000, which translates into several million kilometres covered over the life of the battery, which exceeds 20 years.⁴

Lithium-ion batteries are now recycled using hydro-metallurgical processes with recovery rates of 95 per cent, soon to rise to 99 per cent. What's more, governments (including Quebec's) are currently working

¹ <https://www.cobaltinstitute.org/essential-cobalt-2/powering-the-green-economy/catalytic-converters/#:~:text=Cobalt%20plays%20a%20vital%20role,catalysts%20in%20this%20desulphurisation%20process.>

² https://www.technologyreview.com/2023/05/09/1072738/this-abundant-material-could-unlock-cheaper-batteries-for-evs/?utm_source=the_spark&utm_medium=email&utm_campaign=the_spark.unpaid.engagement&utm_content=%7Cdate:m-d-y%7C*

³ <https://electrek.co/2022/04/22/tesla-using-cobalt-free-lfp-batteries-in-half-new-cars-produced/>

⁴ <https://www.sciencedirect.com/science/article/abs/pii/B9780323960229000608?via%3Dihub>

on regulations that will require electric vehicle batteries to be recycled. Remember that zero per cent of the oil burned by gas and diesel vehicles can be recycled.⁵

500 to 1000 times less oil extracted

The International Energy Agency⁶ estimates demand for the critical minerals needed for electric vehicles and energy storage at 12.7 million tonnes in 2040. In comparison, 4 billion tonnes of minerals were extracted for transport oil⁷ in 2018. At its fastest rate of deployment, the quantities of minerals extracted for the entire low-carbon economy (power grids and electric vehicles, renewable energy, energy storage) will be 500 to 1,000 times less than current fossil fuel production.⁸

Environment and life cycle

A vehicle's ecological footprint should always be calculated on the basis of its entire life cycle, rather than just the manufacturing stage. This includes the extraction of raw materials, the manufacture of the battery and the vehicle, and its use, disposal and recycling.

While the impact of battery manufacture is real, it is falling year over year. Greenhouse gas emissions from its manufacture fell by around 60 per cent per kWh between 2013 and 2019.⁹ According to McKinsey,¹⁰ "Ambitious players have the capacity to reduce the carbon footprint of battery production by up to 75 per cent on average over the next five to seven years." For gas-powered vehicles, such ecological improvements are not possible.

Electricity vs oil in Canada

Between 1990 and 2021, GHG emissions from the Canadian electricity sector fell by 45 per cent,¹¹ making electric vehicles increasingly greener. During the same period, GHG emissions from the oil sands rose by 463 per cent. By 2023, more than 70 per cent of Canada's oil production will come from the tar sands,¹² which account for 97 per cent of the country's proven oil reserves.¹³ According to the Pembina

⁵ <https://www.reuters.com/sustainability/eu-lawmakers-approve-legislation-make-batteries-greener-2023-06-14/>

⁶ <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/mineral-requirements-for-clean-energy-transitions>

⁷ <https://www.iea.org/reports/key-world-energy-statistics-2020/final-consumption#abstract>

⁸ <https://www.sustainabilitybynumbers.com/p/mining-low-carbon-vs-fossil>

⁹ https://blog.evsmart.net/wp-content/uploads/2020/11/englisch_Studie-EAuto-versus-Verbrenner_CO2.pdf

¹⁰ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-race-to-decarbonize-electric-vehicle-batteries>

¹¹ <https://www.canada.ca/fr/environnement-changement-climatique/services/indicateurs-environnementaux/emissions-gaz-effet-serre.html#electricite>

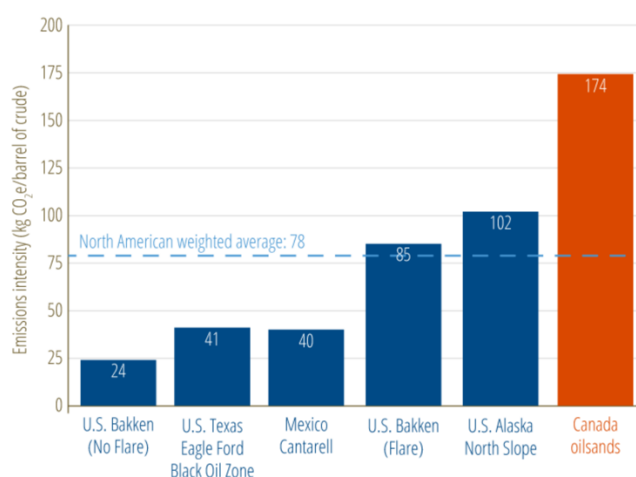
¹² <https://www.cer-rec.gc.ca/fr/donnees-analyse/produits-base-energetiques/petrole-brut-produits-petroliers/index.html>

¹³ <https://ressources-naturelles.canada.ca/nos-ressources-naturelles/sources-denergie-reseau-distribution/combustibles-fossils/petrole-brut/que-sont-sables-bitumineux/18152>

Institute,¹⁴ oil sands extraction and processing generated 2.2 times more emissions per barrel than the average crude oil extracted in North America. The more oil consumed by diesel and gas vehicles, the greater their overall environmental impact.

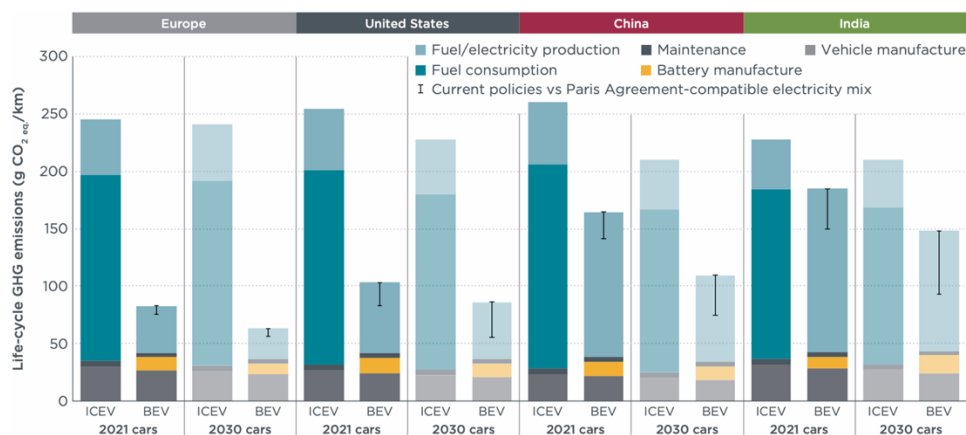
(Source: Pembina Institute)

Figure 2. Emissions associated with the extraction and processing for a selection of crudes produced in North America



According to a report published by the International Council on Clean Transportation (ICCT) in 2021,¹⁵ the full lifecycle GHG emissions of electric vehicles in Europe, the United States, China and India are still lower than those of a comparable gas vehicle: 66 to 69 per cent lower in Europe, 60 to 68 per cent lower in the United States, 37 to 45 per cent lower in China and 19 to 34 per cent lower in India.

(Source: ICCT)



¹⁴ <https://www.pembina.org/blog/real-ghg-trend-oilsands>

¹⁵ <https://theicct.org/wp-content/uploads/2021/07/Global-Vehicle-LCA-White-Paper-A4-revised-v2.pdf>

According to a report published in 2022 by the National Research Council of Canada,¹⁶ partially and fully electric vehicles still have lower GHG emissions than gas vehicles in Canada. In Quebec, the impact is around 60 per cent less over 150,000 km. As the vehicles have a life expectancy of around 250,000 to 300,000 km, the difference is even greater in favour of electric vehicles.

By no means are we saying that light- and heavy-duty electric vehicles are perfect, or that they represent THE solution to ecological problems. If individuals and businesses can do without cars and trucks, so much the better. We need to start by encouraging electric public transport, active transport, car pooling and electric car sharing, while discouraging solo driving to reduce pollution and greenhouse gas emissions and traffic congestion.

That said, far from being a mirage or an illusion, electric light- and heavy-duty vehicles are superior to gas and diesel vehicles from an ecological and health point of view. They simply have to be used intelligently.

That's the reality of electric vehicles.

¹⁶ <https://www.sciencedirect.com/science/article/abs/pii/S095965262102607X?via%3Dihub>