Are Electric Scooters Really Green?

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Bengaluru's Electric "Revolution"

Having been a resident of this city for over 16 years, I have seen this city gradually transform into a hub for electric scooters, with an exponentially incrementing rate of adoption in recent years. From Ather to Ola Electric, the quiet hums and wails of e-scooters weaving through traffic jams and metro stations is imminent in every nook and crevice of the city. For most urban commuters, it seems only pragmatic and logically sound to shift from petroleum to lithium: cheaper rides, significantly reduced noise levels, and an overall sense of fulfilment as being a fellow "saviour" of our planet. This sparks an intriguing question: are electric scooters truly as eco-friendly as they seem, or are we unknowingly just trading one form of pollution for another?

Myth vs Fact:

There has been a long-standing myth amongst commuters worldwide that electric scooters guarantee complete eco-friendliness and almost no emissions. However, as we continue to seek effective, sustainable management methods as a society, examining all pillars and implications behind such technologies throughout their lifecycle becomes a requirement. While electric scooters promise zero tailpipe emissions and minimal operational emissions, their environmental impact is far from negligible.

Extraction Footprint:

All electric-vehicle batteries are composed of a critical component called lithium, whose extraction can pose severe environmental challenges. Experts warn that lithium mining could lead to excessive freshwater use, deforestation, and contamination of water sources with mining byproducts due to the release of toxic gases while the ore is smelted. Furthermore, a report by MIT's Climate Lab indicates that mining one ton of lithium emits nearly 15 tons of carbon dioxide. This truly underscores the dire environmental ramifications posed by the pre-manufacturing phases of electric vehicles (EVs).

Manufacturing Footprint:

The energy-intensive nature of manufacturing lithium-ion batteries significantly aggravates the already jarring emission rates in the production of EVs. In India, the production phase accounts for approximately 46% of the total carbon emissions associated with electric vehicles, equating to about 8.8 tonnes of CO_2 emissions per vehicle. This is notably higher compared to internal combustion engine vehicles, where the production phase accounts for only 23% of all emissions.

Disposal Footprint:

Finally, we arrive at the phase of disposal, where improper lithium waste management not only presents severe environmental risks but can also induce health repercussions. In India, approximately 70% of retired batteries are handled by informal recyclers, who often employ unsafe methods like acid leaching

or open burning. This releases a myriad of toxic pollutants (metals, gases, etc.), posing serious risks to neighbouring communities and ecosystems. Additionally, only about 1–5% of lithium-ion batteries are formally recycled, leading to hazardous waste accumulations. In 2022, India generated nearly 700,000 metric tonnes of battery waste, a figure projected to exceed 2 million metric tonnes by 2040, bursting the delusional bubble of EVs being completely environmentally safe.

Comparative Data Analysis:

The data table below illustrates 3 different modes of transportation for commuters in Bengaluru: electric scooters, petrol scooters, and the Bengaluru Namma Metro network, and each of their respective carbon dioxide footprints per kilometre in the year 2022.

Mode of Transport	**CO_2 Emissions (gCO_2/km)**
Electric Scooter	14.5
Petrol Scooter	60 (mean)
Namma Metro	41.2 (per passenger)

This is direct evidence to demonstrate that although electric scooters significantly reduce carbon emissions while on the road, even when compared to the city's metro system, it is still not a null set. Here, the direct sources of electricity play a major role. In Bengaluru, a significant portion of the mains grid is still powered by coal and other fossil fuels. Charging an e-scooter with this electricity indirectly generates carbon dioxide, which diminishes the overall environmental benefit. This augments the strain on the already striking environmental repercussions through the extraction, manufacturing, and disposal stages of lithium batteries in EVs.

Conclusion:

Overall, the "zero tailpipe emissions" factor does not make electric scooters inherently green. Their true environmental impact spans the full lifecycle, from the carbon-intensive extraction of lithium, through energy-heavy battery manufacturing, to their often unsafe disposal. These collectively, if neglected, over time contribute to a compounding effect of hazardous greenhouse emissions and severe ecological risks. Ultimately, the "greenness" of electric scooters depends less on their moments of operation on the road and instead more on their underlying infrastructure, energy sources, and sustainable management practices. If the electricity through which these batteries are recharged comes from fossil fuels, or if disposal is improperly managed, the environmental benefits are practically nullified. Conversely, when e-scooters are charged using renewable energy, used consistently to offset their manufacturing footprint, and paired with responsible battery recycling programs, they can meaningfully reduce urban emissions compared to petrol scooters, acting as a major stepping stone towards achieving true transportational sustainability in the modern era.

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