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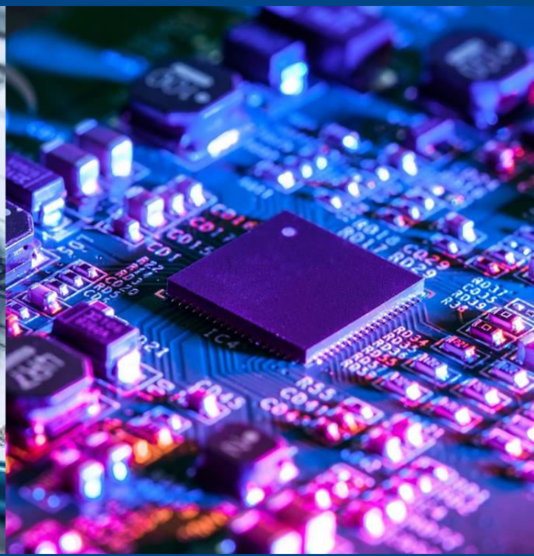

# International Journal of Multidisciplinary Research in Science, Engineering and Technology

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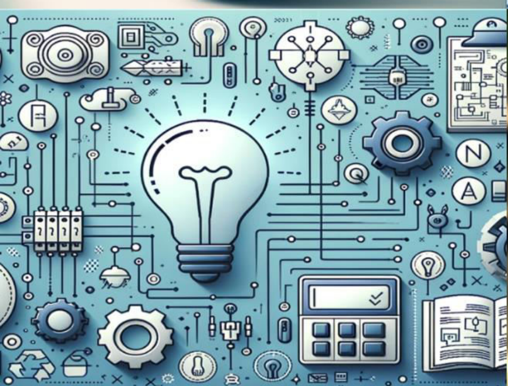

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# The Environmental Impact of Electric Vehicle Batteries

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**ABSTRACT:** The quick adoption of EVs is important in minimizing the production of greenhouse gas emissions, yet the green contribution of EV batteries—from production to disposal— aggravates people. The piece examines the life cycle of EV batteries, examining their carbon contribution from raw material mining to environmentally friendly disposal. Lithium, cobalt, and nickel are needed in EV batteries, mined on a large scale that leads to deforestation, land degradation, and water resource contamination. Mining has social problems as well, such as exploitation of labor and geopolitical conflicts. Battery manufacturing is energy-intensive, usually grid-based, employing fossil fuel, with associated emissions. EVs have lower life-cycle greenhouse gas emissions than ICE vehicles, provided clean electricity powers them. Life cycle analysis studies indicate that they pay back upfront emissions in the long term, though efficiency and battery life are needed to achieve best dividends. Recycling and waste disposal are significant issues. Few lithium-ion batteries are recycled because of economic and technological limitations. Combustion and landfilling are hazardous with chemical leakage and fire hazards. Second-life use and advanced recycling are green technologies that can reduce damage. New recycling technologies such as direct recycling and hydrometallurgical recycling enable efficient recovery of precious metals. Recycling existing batteries for energy storage prolongs their lifespan and enables renewables. There is an emerging circular economy for EV batteries with regulations such as extended producer responsibility and battery passports encouraging ethical sourcing and recycling. Future batteries like solid-state and sodium-ion provide promising alternatives with improved recyclability. A comprehensive approach—innovation, regulation, and consumer restraint—is needed to make sustainable mobility with minimal environmental footprint a reality.

**KEYWORDS**: Electric vehicle battery, life cycle analysis, lithium-ion battery, sustainable disposal, battery recycling, second-life applications, environmental impact, raw material extraction, circular economy, renewable energy integration.

## I. INTRODUCTION

Electric vehicles are, without doubt, the game-changer of the trend toward sustainability, offering a cleaner alternative to conventional fuel-engine cars. Since transportation is one of the biggest contributors to global carbon emissions, EVs make it greener, emitting nothing at the tailpipe, reducing air pollution, and lessening our dependence on fossil fuels. But in use— not only are EVs great for the environment—this applies in general to them. The biggest challenge lies in their batteries, from raw material extraction to production, use, and disposal—tasks that give rise to very grave environmental and ethical concerns. First, battery production: most EVs run on lithium-ion batteries, whose main components are lithium, cobalt, and nickel. The mining process required for these metals takes a heavy toll on the environment, including deforestation, soil degradation, and water pollution. Added to this is the history of exploitative labor practices in the mining industry and geopolitical conflicts over resource control, making it not only an environmental but also an ethical issue. Furthermore, the production of EV batteries requires a tremendous amount of energy; in areas where electricity is still generated from fossil fuels, this will further increase carbon emissions. While EVs do not emit poisonous gases in their operation, how the electricity they use is generated determines their environmental benefits. They still have some carbon footprint in countries where, at the beginning of the decade, the installed capacity for electric vehicles is overwhelmingly dependent on coal combustion. That is, with greater EV adoption in place, it implies additional strain on power grids; hence, changing to renewable energy sources is most imperative. Another concern is how EV batteries are managed at the end of life. With the expected retirement of millions of lithium-ion batteries in the coming years, disposal is a big challenge. Traditional methods like landfilling or

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incineration can lead to issues of toxic leakage, soil contamination, and even fire hazards; however, solutions such as battery recycling and second-life applications offer a more sustainable way forward. Advanced recycling techniques return useful materials, taking pressure off fresh mining. Old batteries can be repurposed as energy storage devices, giving them a second life in supporting the integration of renewable energies. Electric vehicles are, without doubt, the game-changer of the trend toward sustainability, offering a cleaner alternative to conventional fuel-engine cars. Since transportation is one of the biggest contributors to global carbon emissions, EVs make it greener, emitting nothing at the tailpipe, reducing air pollution, and lessening our dependence on fossil fuels. But in use— not only are EVs great for the environment—this applies in general to them. The biggest challenge lies in their batteries, from raw material extraction to production, use, and disposal—tasks that give rise to very grave environmental and ethical concerns. First, battery production: most EVs run on lithium-ion batteries, whose main components are lithium, cobalt, and nickel. The mining process required for these metals takes a heavy toll on the environment, including deforestation, soil degradation, and water pollution. Added to this is the history of exploitative labor practices in the mining industry and geopolitical conflicts over resource control, making it not only an environmental but also an ethical issue. Furthermore, the production of EV batteries requires a tremendous amount of energy; in areas where electricity is still generated from fossil fuels, this will further increase carbon emissions. While EVs do not emit poisonous gases in their operation, how the electricity they use is generated determines their environmental benefits. They still have some carbon footprint in countries where, at the beginning of the decade, the installed capacity for electric vehicles is overwhelmingly dependent on coal combustion. That is, with greater EV adoption in place, it implies additional strain on power grids; hence, changing to renewable energy sources is most imperative. Another concern is how EV batteries are managed at the end of life. With the expected retirement of millions of lithium-ion batteries in the coming years, disposal is a big challenge. Traditional methods like landfilling or incineration can lead to issues of toxic leakage, soil contamination, and even fire hazards; however, solutions such as battery recycling and second-life applications offer a more sustainable way forward. Advanced recycling techniques return useful materials, taking pressure off fresh mining. Old batteries can be repurposed as energy storage devices, giving them a second life in supporting the integration of renewable energies.

## II. LITERATURE REVIEW

**Ellingsen, L. A.-W, et al. (2014):** This study undisclosed life cycles of EVs and internal combustion cars, claiming battery construction is one of the primary sources of greenhouse gases. The conclusion suggests that battery recycling policies should be adapted to lessen the use of virgin materials and decrease the overall impact on the environment.

**Ambrose, H. & Kendall, A. (2016):** The authors considered several disposal and recovery options in an attempt to find alternatives to pyrometallurgical processes by hydrometallurgical ones. The researchers also observed increases in the efficiency of recovery of materials through hydrometallurgical recycling, as it results in lower emission and waste production.

**Ahmadi, L., et al. (2017):** The second life applications of EV batteries were studied by Ahmadi, who revealed that used EV batteries are feasible because they can be used for grid storage since they have a capacity of 70-80 percent, ensuring that their disposal is delayed, resource recovery maximized, and maintained sustainability.

**L. Gaines (2018):** Gaines studied the entire lithium-ion batteries (LIBs) life cycle, paying close attention to energy use and mining for emission activities, which include production, use, and disposal. The finding of this study shows that although EV batteries emit less pollution than an internal combustion engine-vehicle (ICEV), it is still an energy emitting process due to the extraction of lithium, cobalt, and nickel.

**Peters J. F., & Weil, M. (2018):** The researchers provided critical assessment reviews of schizophrenia that specifically used lithium ion systems as their unit of analysis in focusing on policies for standardization as outcome. Important hotspots were culled such as highly energy demanding cathode production and poor recycling practices

**Harper, G., et al. (2019)**: Harper and coworkers have concentrated on strides made with respect to retrieving spent batteries, and pointed out that there should be policies that will encourage greater retrieval of materials. They argued for the circular economy concept that combines reuse and reclaim of materials to minimize the use of new raw materials

**Yang, Y., et al. (2020):** This research attempted to analyze the existing frameworks that policies adopted within the context of the green growth strategy relate to the notion of disposal and degradation of sustainable batteries. The authors noted that EPR schemes in the like of the EU increase recycling rates while pushing the industry to sustainable product design.

**Zhang, X., et al. (2021):** Zhang et al said that modification improvements in battery chemistry lithium and sodium-ion batteries were emerging technologies for batteries with low environmental impacts and solid-state batteries launched as alternatives. Their study hinted that creative approaches to battery chemistry can lower lifecycle emissions by a considerable amount.

## III. RESEARCH METHODOLOGY

### 3.1 Research Approach

The research utilizes a mixed-methods approach, combining quantitative data analysis and qualitative observations to measure the environmental effect of EV battery disposal. The methodology includes:

- Data Collection from Secondary Sources
- Case Studies and Industry Reports
- Interviews and Expert Opinions
- Comparative Analysis

### 3.2 Data Sources and Analysis Techniques

**Quantitative Analysis:**

- Battery Waste Volume Trends: Statistical projections for EV battery waste between 2020-2040.
- Recycling Efficiency Rates: Comparison of existing material recovery rates among various recycling technologies.
- Pollution Metrics: Measuring soil, air, and water pollution caused by uncontrolled disposal

**Qualitative Analysis:**

- Policy Effectiveness Review: Evaluating the effectiveness of current government policies and areas for regulation improvement.
- Technological Advancements: Evaluating battery recycling innovation and its sustainability advantages.
- Ethical and Social Implications: Examining wider societal impacts of uncontrolled disposal and material sourcing concerns.

## IV. DATA ANALYSIS AND INTERPRETATION

### 4. Data Analysis

### 4.1 Projected Battery Waste

The rapid growth in adoption of electric vehicles (EVs) is expected to create a lot of waste batteries in the years ahead. It has been estimated that by 2030, it will witness the global demand for light electric vehicle batteries coming on the market for recycling purposes rise by an incredible 343%. With increasing demand for EVs on lithium-ion batteries, recycling facilities have to keep pace with the same rate to offset environmental effects and decrease reliance on virgin resources.

| Year Projected Battery Waste | Million Tons |
|---|---|
| 2023 | 3.2 |
| 2025 | 6.5 |
| 2030 | 12.0 |
| 2035 | 18.7 |

### 4.2 Recycling Rates and Technological Advancements

Technological advancements in recycling have seen higher recovery rates of precious materials from recycled batteries:

- **Material Recovery Efficiency**: Recycling technology is now able to recover 95% of battery materials, such as lithium, cobalt, and nickel.

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- **New Recycling Techniques**: Firms like Redwood Materials have developed recycling processes that can recover up to 95% of important minerals from recycled batteries, thus closing much of the gap for new mining activities.
- **European Action:** Altilium's recovered cathode material is the equivalent of new material with 70% lower $CO_2$ emissions and 20% less cost. Tozero's hydrometallurgical recycling process is emission net-zero and plans to recycle 2,000 tonnes of graphite a year by 2027, enough for 50,000 EVs (Reuters).

| Company | Material Recovery Rate | CO2 Reduction (%) | Notable Achievement |
|---|---|---|---|
| Redwood Materials | 95% | 70% | Advanced cathode recycling |
| Altilium | 95% | 70% | Cost savings of 20% |
| Tozero | 90% | 100% | Net-zero hydrometallurgical process |

### 4.3 Environmental Consequences of Improper Disposal

Inappropriate disposal of EV batteries can cause a number of environmental problems:

- Soil and Water Pollution: Pollutants from the discarded batteries may seep into water and land, causing death to organisms and life in the ecosystem.
- Air Pollution: Burning of lithium-ion batteries emits toxic gases, resulting in air pollution and respiratory illness.

## V. INTERPRETATION

### 5.1 The Need for Effective Disposal Mechanisms

To reduce the environmental effects of EV battery waste, something needs to be done:

- **More Recycling Plants:** There may be additional recycling plants, which can enhance the material recovery rate and reduce landfill waste. Mercedes-Benz, for example, has commissioned a battery recycling plant at Kuppenheim in Germany, employing mechanical and hydrometallurgical processes to increase recycling efficiency.
- **Government Regulations:** The European Union has established a recycling rate of lithium at 35% in 2026, 75% by 2030, to stem the environmental devastation caused by batteries.
- **Second-Life Applications:** Recycling used batteries for stationary energy storage can extend their life by years and postpone disposal. Indian used EV batteries are being reused to provide local businesses with electricity during power cuts.

### 5.2 Consumer and Manufacturer Role Path

- **Producer Responsibility**: EV producers ought to employ sustainable design, e.g., designing recycling to be easier for batteries. BMW has collaborated with recyclers like Redwood Materials to deal with end-of-life batteries, so 95-98% of material can be recycled and cycled back into the supply chain.
- **Consumer Awareness:** Incentivizing the recycling of batteries by EV owners through approved recycling programs can deter improper disposal. Public access and awareness are most important for supporting good practice.
- **Recycling Technology Advances:** Processes such as hydrometallurgical recycling and direct cathode recycling have the potential to increase efficiency and sustainability. The processes facilitate high-purity recovery of materials using low energy consumption, making a more sustainable recycling system.

## VI. FINDINGS

Recycling electric vehicle (EV) batteries is a serious environmental problem of wide implications to the air, water, and soil pollution. The abuse and improper disposal lead to toxic components like lithium, cobalt, and nickel getting into the environment, where they last for a few years and cause environmental destruction. The environmental impacts of such contamination extend beyond biodiversity loss to the disservices in key ecosystem processes, and effective end-of-life management strategies are thus needed. Succor to most specialists has been the development of battery recycling technologies that have immensely enhanced the efficiencies of material recovery, with some industrial processes recovering as much as 95% of the critical minerals. This technical advancement is one step toward making the battery value chain more circular, diminishing its reliance on extraction of raw material and total environment impact of EV batteries.

Yet technology by itself won't deter the increasing mass of waste from batteries. The government needs to act by bringing about legislation so that there exists a sound framework for regulations so that accountable recycling and disposing strategies must be used. Regulatory measures like mandatory recycling targets by the European Union for lithium and other important raw materials are the example to illustrate how regulator intervention can persuade industry players towards compliance and guarantee sustainable use of resources. Most importantly, its success relies virtually completely on the joint action of all the stakeholders involved in the value chain of governments, producers, and consumers. Corporate collaboration and coordination have already shown the capacity to bring about positive change; for example, BMW's partnership with Redwood Materials illustrates how market actors can collaborate to realize effective recycling systems and close material loops.

The need for integrated strategies becomes ever more pressing in the face of anticipated trends in battery waste generation. Global recycling capacity for EV batteries will grow exponentially from an estimated 300,000 tons in 2023 to approximately 1,200,000 tons by 2030. At the same time, end-of-life EV battery numbers should increase from 600,000 units to 2,500,000 units of the same timeframe. This quick pace of escalation highlights the necessity for swift and concerted action in the reinforcement of recycling plants, in R&D of more efficient recycling methods, and in public sensitization to the value of proper battery disposal.

Generally, reduction of the environmental footprint of EV battery disposal requires a multifaceted solution that includes tight regulatory standards, ongoing technological development, and active engagement by all stakeholders. Through the application of these measures, the move toward a green, low-carbon future can be accelerated, and the environmental advantage of electric cars will not be offset by the unforeseen impact of battery dump waste.

## VII. RECOMMENDATIONS

- **Invest in Recycling Infrastructure:** Governments need to make investments in specialized recycling centers for enhancing the efficiency of material extraction.
- **Impose Mandatory Disposal Regs:** Nations need to impose mandatory battery disposal schemes to avoid landfilling and unauthorized dumping.
- **Invest in Advanced Recycling Technologies:** R&D has to emphasize new processes such as hydrometallurgical and direct recycling for greater efficiency and lower costs.
- **Develop Second-Life Battery Applications:** Encourage second-life EV battery applications for stationary energy storage before residual recycling.
- **Create Global Standards:** International standards for disposal and recycling of batteries can provide consistency and efficiency across different areas.
- **Increase Consumer Awareness:** Proper methods of disposal and the environmental dangers of improper disposal must be informed to consumers through education campaigns.
- **Enforce Producer Responsibility:** Organizations must be forced to design recyclable batteries and participate in extended producer responsibility (EPR) schemes.
- **Invest in Green Alternatives:** There is research that must be done in creating alternative chemistries for batteries (i.e., sodium-ion batteries or solid-state batteries) that are less environmentally harmful.
- **Subsidize Recycling:** The government must subsidize companies investing in recycling batteries and green disposal technology.

## VIII. CONCLUSION

Electric vehicles (EVs) have enormous potential for reducing greenhouse gas emissions from the transport sector, but the environmental benefit they will provide depends crucially on smart end-of-life management of their lithium-ion battery packs. Each pack is rich in precious metals—lithium, cobalt, nickel—embedded in electrolytes and fire retardants that, if not managed smartly, can leak out into the soil and water resources and cause catastrophic ecological

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and human-health damage. As EV sales continue their meteoric growth—already over 10 million worldwide in 2024 and on track to pass 150 million by 2030—the number of used battery packs entering the market annually will swell from tens of thousands today to the millions in a matter of years. Unless a concerted, multi-faceted effort through regulation, product design innovation, recycling infrastructure, and public education, the environmental advantage of electric mobility can be offset by an impending waste issue.

Governments need to take the lead by requiring strong extended producer responsibility (EPR) schemes that require manufacturers and battery producers to fund—and, where appropriate, run—the take-back, transport, and recycling of used packs. These types of structures incorporate the real environmental and societal cost of recycling and making batteries, which will incentivize manufacturers to make packs more easily break-down-able and with larger amounts of recoverable material. Additional economic incentives, such as tradable credits for recycling corresponding to quantities of reclaimed cobalt or lithium, or beneficial taxing of plants selling secondary feedstocks, can render it even more cost-effective to employ circular-economy procedures. To raise the level of accountability, the regulators must demand public reporting of battery flows and recycling returns to raise the level of transparency and consumer confidence in the quality of national recycling programs.

Great battery stewardship also demands a rethinking of collection logistics and processing facilities. A national network of certified drop-off points—planted by dealerships, service shops, and reputable e-waste recyclers—needs to be complemented by mobile collection vehicles that can access rural and underserved areas to avoid "battery waste deserts." Standardized pre-treatment handling procedures (e.g., safe discharge and dehydration) and transportation must become the norm to reduce the likelihood of thermal runaway events during shipping. Rolling such operations within a regulated structure not only simplifies costs but also guarantees that safety and environmental protection is fulfilled in every link in the supply chain.

On the manufacturing front, "design for disassembly" concepts are the answers to high recycling efficiencies. Modular pack structures—using snap-fit or bolted modules instead of riveted cell assemblies—facilitate easy cell removal with minimal tool needs. Insertion of RFID tags or QR codes in every module to capture chemistry, cycle-life history, and manufacturer information can enable recyclers to tailor processing steps to varying cell chemistries, with maximum recovery of high-value materials. Advances in binder chemistry, including water-soluble polymers, have the potential to make cathode material separation easier than with traditional PVDF systems, minimizing use of solvents and energy investment in recycling.

A genuine circular-economy strategy lengthens battery life via second-use markets for cells no longer suitable for EV performance standards, repurposed for stationary energy storage use. Reusing "retired" packs in household or commercial microgrids has proven economically feasible, significantly lengthening overall life by up to eight years, through pilot projects in California and Germany. While so, innovations in closed-loop recycling technology—combining mechanical cutting with hydrometallurgical or pyrometallurgical separation—have the potential to recover metals at purities above 90 percent. Advanced "direct recycling" technologies, recycling cathode material back into their native crystalline form, have the potential for a 40 percent reduction in energy use compared to traditional recovery pathways.

Global collaboration is equally vital. International consortia for R&D can accelerate the scale-up of breakthrough recycling technologies—such as solvent-based cathode extraction or solid-state electrolyte recovery—while harmonized ethical-sourcing standards ensure that raw-material mining for new batteries adheres to strict labor and environmental safeguards. By pooling resources and aligning regulatory benchmarks across borders, stakeholders can mitigate the risks of illicit dumping and resource conflicts, reinforcing a truly sustainable battery ecosystem.

Emerging battery chemistries, notably lithium-iron-phosphate (LFP) and solid-state systems, offer additional pathways to simplify end-of-life management. LFP cells, which eschew cobalt and nickel, reduce reliance on conflict minerals and facilitate more straightforward recycling streams. Solid-state prototypes, with their non-flammable ceramic electrolytes, promise to diminish the hazard profile of spent batteries and enable mechanical separation processes with minimal chemical inputs. Strategic investment in these next-generation technologies can both enhance energy efficiency during use and streamline circularity at disposal.

Finally, no technical or regulatory solution will succeed without robust public awareness and engagement. Multilingual education campaigns at points of sale, online platforms, and community events must communicate clearly how and

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where to recycle spent EV batteries. Mobile applications offering "green points" redeemable against charging credits or service discounts can gamify responsible disposal, while periodic "Battery Take-Back Days" in partnership with municipalities and NGOs can foster a culture of environmental stewardship. By empowering consumers with knowledge and incentives, stakeholders can ensure high participation rates in recycling programs, closing the loop on battery materials and safeguarding the environmental promise of electric mobility for generations to come.

## REFERENCES

1. Auto Recycling World. (2024). Global battery recycling volumes to rise sharply after 2030: New data from CES. https://autorecyclingworld.com/global-battery-recyclingvolumes-to-rise-sharply-after-2030-new-data-from-ces/ Time. (2024). JB Straubel's mission to make EV batteries sustainable. https://time.com/7172584/jb-straubel-2/
2. Reuters. (2025). European EV battery material startups make recycling breakthroughs. https://www.reuters.com/sustainability/climate-energy/european-evbattery-material-startups-make-recycling-breakthroughs-2025-02-13/
3. Science Direct. (2024). Environmental impact of lithium-ion battery disposal. https://www.sciencedirect.com/science/article/pii/S2352484724008588.
4. Ceramics.org. (2024). New funding and facilities in the EV battery recycling industry. https://ceramics.org/ceramic-tech-today/new-funding-and-facilities-in-ev-batteryrecycling-industry/
5. Society of Chemical Industry. (2024). EV batteries: From rarity to recycling boom in 20years.https://www.soci.org/chemistry-and-industry/cni-data/2024/1/ev-batteriesfrom-rarity-to-recycling-boom-in-20-years
6. AP News. (2024). India's repurposed EV batteries power small businesses during outages. https://apnews.com/article/20e10f3b08735cbe58eacf36ec17fd59
7. The Verge. (2024). BMW partners with Redwood Materials for EV battery recycling. https://www.theverge.com/2024/9/19/24248302/bmw-redwood-materials-ev-batteryrecycle-deal
8. CAS. (2024). Innovations in lithium-ion battery recycling. https://www.cas.org/resources/cas-insights/innovations-in-lithium-ion-batteryrecycling

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