

EV BATTERY SUPPLY CHAIN SUSTAINABILITY: KEY FIGURES AND INSIGHTS

Data source: IEA (2025) EV Battery Supply Chain Sustainability

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BATTERY DEMAND AND PRODUCTION



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The demand for EV batteries has seen rapid expansion, reaching 850 GWh in 2023, a 40% increase from 2022. Electric vehicles (EVs) remain the dominant force, accounting for 750 GWh, or 90% of total battery demand, with electric cars alone making up 80%. This trend is expected to continue, with battery demand projected to increase 4.5 times by 2030 and 7 times by 2035 under current policies.

China remains the largest market, representing 55% of global demand in 2023, while the European Union and the United States each hold a 15% share. Emerging markets and developing economies (EMDEs) outside China currently account for 3% of global battery demand, but this is expected to grow to 10% by 2030.



Battery production is also diversifying, with significant investments in North America, Europe, and developing economies such as India, Indonesia, and Morocco. Despite this diversification, China continues to lead in battery cell manufacturing, controlling over 75% of global production, along with more than 80% of cathode and 90% of anode material manufacturing.



EMISSIONS REDUCTION POTENTIAL OF EVs



Electric vehicles (EVs) cut life cycle emissions by 50% compared to ICEVs, with regional variations. The UK and Chile see >60% reductions, while China and India achieve 40% and 20%, respectively, due to grid composition. As renewable energy adoption increases, EVs will become cleaner, offering greater sustainability benefits and further reducing emissions from battery production and electricity usage.





By 2035, EVs will emit 2.5 to 3 times less than ICEVs due to higher battery energy density (+30%), cleaner grids, and more recycled materials. NMC batteries offer higher energy density but require more mining, while LFP batteries are cheaper, more sustainable, and cobalt-free. Reducing emissions will require low-carbon mining, electrified production, and expanded battery recycling, ensuring cleaner battery supply chains while maintaining affordable and efficient EV technology.

Vehicle size impacts emissions, but EV SUVs still outperform ICE counterparts, emitting 40% less than mid-sized ICE cars and 60% less than ICE SUVs. Lightweight materials, better aerodynamics, and advanced battery technology will further improve efficiency. As global emissions standards tighten, automakers will continue optimizing EVs, making them a vital component of decarbonized transport.



RECYCLING AND CRITICAL MINERALS 税

Battery recycling is emerging as a key strategy to reduce reliance on newly mined critical minerals. By 2050, recycling could reduce lithium and nickel demand by 25% and cobalt demand by 40%. However, recycling infrastructure remains heavily concentrated in China, which holds 80% of the world's pretreatment capacity and 85% of material recovery capacity.

If all announced recycling projects are implemented, global recycling capacity will be six times larger than demand by 2030. However, end-of-life EV batteries will not become the main feedstock for recycling until after 2035, as most of the current recycling capacity is designed for manufacturing scrap.

Key investment regions are emerging, with Morocco securing \$15 billion in battery and component production investments and Indonesia attracting more than \$15 billion for EV and battery manufacturing, including its first operational battery cell plant.





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SECOND-HAND EV MARKET AND CIRCULARITY

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The second-hand EV market is rapidly expanding, with 1.5 million used EVs sold in 2023, a figure roughly equal to new EV sales in the United States that year. China accounted for 50% of global second-hand EV sales, while the remaining sales were primarily concentrated in the United States and Europe.



One major sustainability challenge is ensuring efficient battery recycling and second-life applications for these vehicles. If second-hand EV trade patterns follow those of internal combustion vehicles, the availability of battery recycling feedstock in EMDEs could increase by 50% by 2050. Strengthening policies for managing second-hand EVs and battery disposal will be essential for maximizing sustainability benefits.





POLICY AND CIRCULAR ECONOMY STRATEGIES



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The Global Battery Passport, introduced in 2024, aims to enhance supply chain transparency by tracking the environmental, social, and governance (ESG) performance of batteries throughout their lifecycle. This initiative is expected to encourage sustainable sourcing and recycling while reducing the carbon footprint of battery production.



Looking ahead, global cooperation will be essential in addressing challenges such as the export of second-hand EVs, battery waste management, and the development of local recycling facilities in emerging markets. Stronger trade policies, investment in local battery production, and the enforcement of strict recycling regulations will be necessary to ensure a sustainable and resilient battery supply chain.

