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## Ethical and Social Responsibility in Procurement for Electric Vehicle Components

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### Abstract

Electric Vehicle (EV) industry growth proceeds rapidly, with associated ethical and social challenges in obtaining key components, both batteries and rare earth metals. This study investigates how they can combine corporate social responsibility (CSR) goals into their procurement practices to confront these problems. It emphasizes the need to build quality jobs, source responsibly, and minimize the environmental impact of EV production by recycling second-life batteries for them. The study shows how blockchain technology could help with supply chain transparency and verifying the legal sourcing of raw materials in supply chains. Adopting a sustainable and transparent strategy is the best way for EV OEMs to keep their brand image intact, disregard regulations, and damage sustainability in the long term. Social aspects of procurement are also considered, including material procurement from countries with weak labor laws. Auditing and checking ethical standards that prevent workers' rights from being violated and fair labor practices is necessary. This study also suggests that a more sustainable and ethical future for the EV industry lies in developing CSR practices that will help create a cleaner, more equitable transition towards electric mobility. The study lays down the responsibility of the industry to carry out astute collaboration and innovation in technological areas to support responsible sourcing, promote environmental outlay, and uphold human rights.

**Keywords:** *Corporate Social Responsibility (CSR), Supply Chain Transparency, Ethical Sourcing, Recycling, Blockchain, Fair Labor Practices*

### 1. Introduction

Among the most important climate change mitigation and greenhouse gas emissions mitigation challenges the world is taking up is the transition toward electric vehicles (EVs). Recognizing the crucial role EVs play in arranging a more sustainable future, EVs are seen as being major in the transition to reducing reliance on fossil fuels, enhancing air quality,

and increasing energy efficiency. That is because EVs are seen as a promising alternative to traditional gasoline and diesel-powered vehicles due to growing concerns regarding the environmental impact of these vehicles. As a means to decarbonize various sectors, from transportation to commercial buildings, clean energy, and clean cars, they are regarded as a key player. Given nations' efforts to achieve targets of the Paris Agreement and other related climate protocols, the adoption of EVs has become a critical part of the global strategy for climate change. Most governments around the world have introduced policies, incentives, and regulatory frameworks to encourage the adoption of EVs. Businesses increasingly understand the relevance of the evolution of electric vehicles as part of environmental sustainability objectives and growth strategies in the long run. Consumers are also becoming more environmentally conscious, and they prefer products that can encompass green initiatives. The growing collective momentum propelling the market for electric vehicles into high gear is providing backers to established automotive manufacturers and new entrants with robust cash to pump into EV production. This puts EVs in a position of importance. It is the fundamental shift in how society perceives and utilizes transport technologies.

EVs promise a more sustainable future, but items needed to produce EVs, such as lithium-ion batteries, rare earth metals, and other materials for production, are raising ethical and social responsibility issues. The extraction and production of these important components for the operation of electric vehicles present many concerns. Raw materials from which EV batteries are manufactured, such as lithium, cobalt, and nickel, are mined for EV batteries, often associated with terrible environmental degradation, such as deforestation, habitat destruction, and water pollution. These activities often lead to adverse social outcomes, especially when labor regulations are not too strong. Lack of position on labor rights adds matter to a discussion about the mining sector, especially concerning labor rights, such as reports of children being used for mining, hazards of mining, and the exploitation of workers in specific regions, especially those of the Democratic Republic of Congo, which does a big portion of cobalt. These problems question the whole sustainability of the production of EVs, as the industry depends on materials from sources that are ethically questionable overall. Therefore, in the case of critical components for EVs, the manufacturers of these goods are subjected to growing demands for transparency in the supply chain and more responsible sourcing practices to minimize the negative impacts of procuring these components.

This paper looks at the ability of an electric vehicle original equipment manufacturer (OEM) to coordinate their procurement practices to work towards corporate social responsibility (CSR) goals. The study's particular objectives cover investigating different ways ethical labor practices, environmental impact concerns, and supply chain transparency can be introduced into the EV procurement process to better fit in with the more justifiable and sustainable efforts of building an EV industry. The paper seeks to establish the role of responsible sourcing processes that the industry needs to pay attention to to ensure that EVs are a futurist promise of a greener future. This paper will discuss

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about how blockchain as an innovative technology can be leveraged to improve transparency and traceability of the EV supply chain. Immutable records of the sourcing and movement of raw materials that intensely matter to guarantee material sourcing ethically and environmentally are exactly what blockchain technology is capable of. They will consider how emerging technologies can assist the electric vehicle business in being socially and environmentally responsible in operations so that the transition to EVs affects the environment and the communities from which the EV components must be produced or extracted.

## **2. Aligning Procurement Practices with CSR Goals**

### **2.1 Corporate Social Responsibility in Procurement**

Corporate Social Responsibility (CSR) is a critical term in today's corporate world in industries where the impact on the environment and society is high, among them is the electric vehicle (EV) sector (White, 2022). It refers to the company's commitment to running its operations in good ways for society, the economy, and the environment. For EV OEMs, CSR is not limited to mere vehicle production but extends to the whole supply chain, such as sourcing critical components like lithium batteries and rare earth metals. The importance of CSR in procurement is to avoid situations where anything sourced is through practices that contribute to human rights violations, environmental degradation, and other unethical activity procedures. This means scrutinizing their suppliers and ensuring that the supply chain meets the highest social and environmental responsibility standards for EV OEMs.

CSR also applies to procurement, including issues arising from conflict zones, child labor, unsafe working conditions, and bad environmental practices sourced from there. EVs play a big part in the development of a cleaner, greener future, and manufacturers have to be sure that the materials they use in EVs themselves are supplied in a way that matches their sustainability goals. As consumers and regulators hold businesses in the EV space accountable more and more for procurement, the time has come to take a responsible approach across the board in the industry. Conscientiousness is on the compliance side of a strategic business decision because failing to meet CSR expectations will, first and foremost, negatively impact your reputation, put you at risk of legal challenges by civil society, and make you guilty of tarnishing consumer trust.



*Figure 1: Corporate social responsibility (CSR)*

## 2.2 Integrating CSR into Procurement Strategies

The concrete steps that EV OEMs must take to align procurement practices with the company's CSR goals are to integrate ethical considerations into their procurement strategy. An effective way to do this is by setting and enforcing supplier codes of conduct. A supplier code of conduct is a set of rules that checks the ethics, environmental, and social practices a supplier is expected to conduct. These codes focus on critical issues such as fair labor practices, health and safety standards, measures to prevent corruption, and environmental sustainability issues. EV OEMs must set such codes to ensure their suppliers adhere to the company's ethical standards. They are a means to communicate expectations to suppliers and can be used to monitor and review compliance. Supplier audits are a crucial additional element in procurement strategies when integrating CSR. Regular and thorough audits of suppliers are often conducted to ensure that suppliers meet the required CSR standards; regular audits can include on-site inspections, interviews with workers, and reviewing records regarding environmental practices and practices, labor conditions, and international and local law compliance.

A proper audit will help OEMs identify some risks in their supply chains and try to solve them before they become severe. Audits create a mechanism for periodic dialog between the OEMs and their suppliers to work, communicate, and address the shortcomings (Villena, 2019). Another critical strategy to ensure procurement practice supports CSR goals is stakeholder engagement. EV OEMs engage with diverse stakeholders, such as non-governmental organizations (NGOs), local communities, industry groups, and regulatory bodies, by identifying and addressing ethical risks in their supply chains. OEMs can work with NGOs focused on labor rights or the environment, giving OEMs an idea of what to expect and what to do. Collaboration with these stakeholders will also help improve transparency and build trust within the supply chain toward meeting and communicating

CSR commitments to the public (Brun et al., 2020).

**Table 1: Examples of Supplier Code of Conduct Components**

Code of Conduct Component	Purpose
Fair Labor Practices	Ensure suppliers uphold ethical labor standards
Environmental Protection	Suppliers must follow sustainable and environmentally responsible practices
Safety Standards	Adhere to health and safety protocols for workers
Anti-Corruption	Prevent bribery, fraud, and corruption in the supply chain
Compliance with Local and International Laws	Ensure adherence to both local and international legal frameworks

### 2.3 Measuring the Impact of CSR Initiatives

As far as EV OEMs, they must evaluate and measure the results of their CSR efforts and ensure the impact their procurement practices exert on the social, environmental, and economic results they aim for. Increasingly, OEMs are measuring the impact of CSR initiatives on the vehicles they produce. Such measures enable tracking their progress toward achieving their sustainability goals, evaluating their suppliers, and pinpointing improvement opportunities. One of the most effective ways to do this is with Key Performance Indicators (KPIs) that monitor particular sustainability metrics like carbon footprint, reduction in waste, water use, and labor conditions in the supply chain.

External reporting is also important in CSR measurement. In measuring and reporting on ESG factors, many EV OEMs are engaged in global reporting initiatives like the Global Reporting Initiative (GRI) or the Carbon Disclosure Project (CDP), which are standardized frameworks. These frameworks help companies measure their performance against the existing industry standards and show their commitment to CSR to stakeholders, including investors, consumers, and regulators. Transparency in how CSR is reported is inevitable to build credibility and show that a company's CSR efforts are real and effective (Liu et al., 2023).

**Table 2: CSR Metrics for EV OEMs**

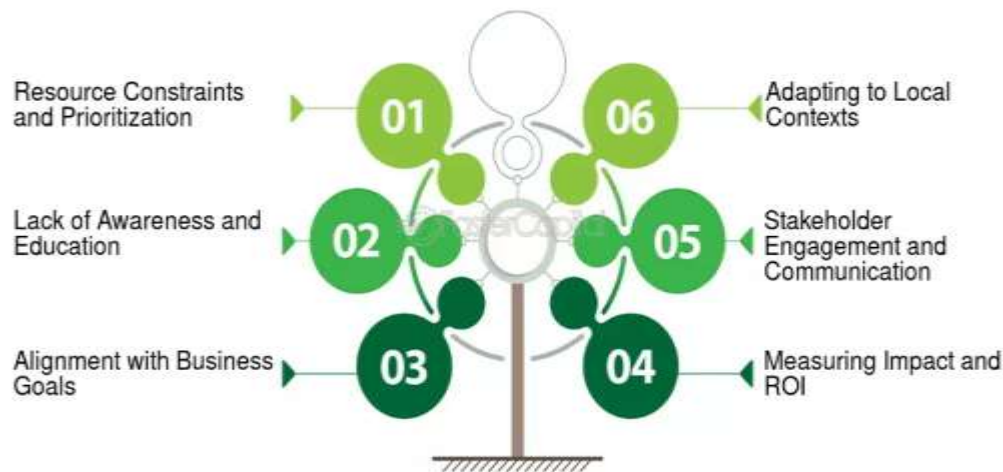
KPI (Key Performance Indicator)	Purpose
Carbon Footprint Reduction	Track progress in reducing emissions from supply chain and manufacturing

KPI (Key Performance Indicator)	Purpose
Waste Reduction in Manufacturing	Monitor and improve efficiency in reducing waste from production processes
Water Use Efficiency	Measure the reduction in water consumption during production
Labor Conditions in Supply Chain	Assess and monitor the ethical treatment of workers across the supply chain

## 2.4 Continuous Improvement in CSR Practices

CSR is a changing field; consequently, EV OEMs are always being asked to build on what has been done and improve their procurement practices. Then, continuous improvement constantly engages with international standards, legislations, and best business practices for labor rights, environmental protection, and supply chain management. In this case, regular training or education of the procurement team and the Director's willingness to adjust procurement strategy to new technologies and innovations are needed. OEMs could find new opportunities in their further advancements in sustainability practices, for example, in recyclable reduction of battery and renewable energy technologies. Feedback mechanisms are also important for continuous improvement in CSR practices. CSR efforts should engage with stakeholders, such as employees, suppliers, and local communities, to gain beneficial insights into the areas they can strengthen. Feedback from audits, supplier evaluations, and customer feedback is used to identify procurement process gaps and areas that need further development. EV OEMs must understand that CSR is not a one-off gesture but something that will continuously be brought to the fore to help improve their social and environmental impact (Hira, 2023).

Procurement practices should be aligned to achieve CSR goals to realize the promise of an electric vehicle industry committed to a sustainable future (Gebhardt et al., 2022). EV OEMs can integrate supplier codes of conduct and other component levels, regularly audit, engage stakeholders, and robust measurement systems to help manage their supply chains from an ethical perspective and in an environmentally responsible direction. There is little meaning that CSR standards will evolve, except continuing improvement will help keep the credibility and success of CSR initiatives and drive positive change within the industry.



*Figure 2: Overcoming Challenges in Implementing CSR Capacity Building*

### 3. Fair Labor Practices and Ethical Sourcing

#### 3.1 The Importance of Fair Labor Practices

As the raw materials used in many EV manufacturing processes are procured worldwide, setting fair labor practices is especially important to building a sustainable and ethical brand image (Althaqafi, 2023). One of the biggest threats to the reputation of original equipment manufacturers of EVs is the risk of labor rights violations, which include child labor, forced labor, and unsafe working conditions off fair wages. Failure to comply with any of these can cause legal and consumer backlash and long-term damage to the brand's trust. Therefore, EV manufacturers must ensure their suppliers abide by internationally recognized labor standards stipulated by the International Labour Organization (ILO) (International Labour Organization, 2020). These standards protect workers' rights, guarantee fair wages, and ensure that workers are protected from exploitation or harm by creating safety and health rules. Not only are EV OEMs compelled to create these labor standards at the end of the supply chain (for legal reasons), but they must also, in order for the sourcing of materials to be ethical, incorporate them into their supply chain.

More importantly, fair labor practices must also be adored and respected to ensure that competitive advantage can be achieved sustainably. With an increasing emphasis on being socially responsible, socially conscious consumers prefer brands that can show commitment in the same direction. Companies that emphasize fair labor treatment take a stand against it legally and in terms of their public image (Andrias, 2019). It encourages the marketing of an increasingly lucrative sector of eco-friendly consumers who expect ethical criteria regarding the production processes involved.

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### 3.2 Ethical Sourcing and Brand Image

Ethical sourcing means procuring materials in accordance with fairness, human rights, and environmental sustainability in the supply chain. It is, therefore, crucial to building EV OEM brand image. By committing to ethical sourcing practices, OEMs can differentiate themselves and create a reputation as a socially conscious company (Lechler et al., 2020). This is extremely vital, especially in the EV business, where consumers are interested in the end-of-life impact of their purchases. Participation in certification programs that certify packaging materials as being responsibly sourced is one of the main aspects of ethical sourcing. For instance, the Responsible Cobalt Initiative (RCI) is a program that helps improve the sourcing of materials like cobalt, which is one of the key constituents of many EV batteries (Responsible Cobalt Initiative, 2021). The certifications ensure that the products being bought were sourced ethically and sustainably. Participation in such initiatives is not only a requirement to comply with best practices but also helps the brand to project credibility by showing that they are actively taking the issue of workers and the environment in EV OEMs seriously.

Ethical sourcing also comes with a positive brand image; transparency is another critical element. Customers are given confidence by dealing with consistent, lucid details regarding sourcing conduct, the origins of raw substances, and how they were mined. Publishing detailed reports regarding supply chain practices on the part of OEMs can lead to the transparency of the supply chain, which in turn can be achieved by OEMs through third-party auditing or disclosing information regarding what their suppliers do to adhere to ethical standards. Transparency can only help foster trust and allow consumers to decide which brands to support (Morey et al., 2015).

### 3.3 Addressing Labor Rights Violations in the Supply Chain

To address the supply chain labor rights violations, EV OEMs must develop strong mechanisms to identify and correct violations in the supply chain. To ensure that suppliers and the sub suppliers have a good condition of providing their services, they do a comprehensive due diligence process. That goes deeper into verifying supplier compliance with international labor standards for exposing potential risks in labor exploitation such as unsafe working conditions or human rights abuses. Due diligence can be done by local workers or through site visits (to which independent audits can be used) regarding the working conditions. EV OEMs must quickly, and emphatically, act on violations that they detect. This may include working with suppliers to make necessary changes e.g. work conditions, fair wages, and worker's training, protective equipment.

If the supplier does not meet a minimum labor standard or it is egregious in the violation, severing the relationship with the supplier could be necessary in more severe cases. At the same time, OEMs should work with communities affected by violations of labor standards to identify the root causes of labor violations and work jointly with communities up and down the supply chain to improve workers' lives and conditions. Steps should then be taken to sustain improvements over time after corrective actions. What's needed are regular

audits and inspections and workers and other stakeholders' feedback to track whether the interventions are working and whether labor rights violations will recur. EV OEMs can show that they are proactively addressing labor rights violations, demonstrating their commitment to ethical sourcing, fair labor practices, and mitigating the risks in supply chain management (Farooki et al., 2023).



*Figure 3: Navigating Labor Standards and Ethics in Supply Chain Management:*

### 3.4 Collaborative Efforts for Ethical Sourcing

Promoting ethical sourcing in the EV sector requires constant collaboration with industry peers, nongovernmental organizations (NGOs), and governments. Most of the problems in achieving labor and environmental sustainability in the supply chain are systemic in nature and need to be addressed collectively. OEMs can work together to develop common industry solutions to these challenges, establish industry standards, and ultimately reduce sustainability issues in the supply chain. The forum includes the formation of industry coalitions (of course, one example of such success is the Responsible Cobalt Initiative (RCI), whereby stakeholders from all along the supply chain collaborate to promote ethical sourcing of cobalt). The coalitions could also assist in building common standards and sharing best practices and can be used to raise systemic issues like child labor, unsafe working conditions, and environmental degradation. These collaborations are supported by NGOs, which provide expertise, raise awareness, and hold companies responsible for their actions.

They also raise the regulations, and the government should do its part by empowering ethical sourcing practices as they protect workers and the environment's rights. EV OEMs must argue for strict regulations protecting worker's rights and the environment in the supply chain. It can help the government and other stakeholders to formulate responsible sourcing policies and create a level playing course for all business companies in the

industry. While this is still a fairly new industry, it is crucial to be a fair labor practice type of industry with ethical sourcing. OEMS can implement these practices to emphasize the brand image, build consumer trust, and solve the underlying labor violations and environmental harm risks (Hofmann et al., 2018). The EV OEMs can verify whether their supply chains align with the most ethical practices for the industry as a whole and contribute to the evolution of the EV industry towards sustainability and social responsibility.

#### 4. Ethical and Sustainable Sourcing of Lithium-Ion Batteries

##### 4.1 The Environmental Impact of Lithium-Ion Batteries

Lithium-ion (Li-ion) batteries are key in electric vehicles (EVs) powering on demand. Such production has several environmental problems. Typically, it involves extracting raw materials such as lithium, cobalt, or nickel from the ground and either selling them or using them in the production of battery cells (McKinsey & Company, 2021). Inevitably, there is a common side effect of resource depletion, habitat disturbance, and pollution. The extraction also contributes to deforestation, soil degradation, and polluting local water sources with toxic chemicals.

Since the manufacturing process for these batteries is energy-intensive, emissions that enhance the planet's warming are released. Since the need to move from a system of transportation whose emissions contribute to greenhouse gas emissions is gaining importance, such environmental concerns must be discussed. The demand for these minerals, particularly from countries with weaker environmental regulations, exacerbates these issues. Ethical and sustainable sourcing practices in the battery supply chain can mitigate these negative impacts. Ethical sourcing can help legitimize more responsible extraction and processing methods (Mancini et al., 2020).

**Table 3: Key Materials in EV Manufacturing and Their Environmental and Ethical Challenges**

Material	Environmental Impact	Ethical Concerns
Lithium	Habitat destruction, water pollution, soil erosion	Poor working conditions, low wages
Cobalt	Deforestation, water contamination	Child labor, unsafe working conditions
Nickel	Habitat disturbance, water usage issues	Labor exploitation, health risks for workers
Rare Earth	Land destruction, pollution of water	Forced labor, unsafe working

Material	Environmental Impact	Ethical Concerns
Metals	sources	environments

## 4.2 Recycling and Second-Life Applications

Recycling is a promising strategy to reduce lithium-ion batteries' environmental footprint. Battery recycling fetches valuable materials like lithium, cobalt, nickel, and on, thus reducing virgin material requirements. Not only does this save the environment, but it also saves energy that goes into the mining process (Initiative for Responsible Mining Assurance, 2022). The advanced recycling technologies achieve higher recovery rates, enabling manufacturers to reintroduce these materials into the production cycle. Indeed, battery sustainability is largely concerned with second-life applications. With the end of vehicle life for EV batteries comes an opportunity to repurpose used EV batteries for other energy storage uses. The performance requirements of these second-life batteries are less demanding than would be required for use in vehicles or other applications that necessitate higher energy storage density. In addition to extending the battery life, it reduces the pressure on the recycling infrastructure by decreasing the number of batteries to be processed. In combination, battery recycling and second-life applications contribute to developing a battery circular economy, which aims to reduce the necessity of continuously extracting resources and, thereby, waste (Ferrara et al., 2021).

## 4.3 Sustainable Sourcing Practices

In adopting several sustainable sourcing practices, sourcing lithium-ion batteries by electric vehicle original equipment manufacturers (EV OEMs) is likely ethical. One such activity is bringing recyclers into closed-loop supply chain arrangements. It allows critical materials to be recovered from the end-of-life batteries to reduce dependence on new mining operations. Closing the loop on material sourcing represents a good opportunity for EV OEMs to cut the environmental and social impacts of raw materials sourcing (Baars et al., 2021). Another is to invest in research and development (R&D) of battery recycling technology and alternative battery chemistries. Significant progress has been made in the development of more sustainable alternatives to traditional lithium-ion batteries. Take, for example, solid-state batteries. Their energy density is closer, if not higher, than that of liquid ones, and their safety (in case of accidents) is less reliant on rare or conflict-prone materials. OEMs can support R&D in this space, which will help develop more sustainable battery technologies to reduce their environmental footprint further. EV OEMs can also follow responsible procurement procedures for new suppliers, which can include criteria related to sustainability. By applying these criteria, the suppliers' operations will follow international environmental standards, reducing the ecological impact of the battery manufacturing process.



*Figure 4: End-of-life strategies for traction batteries*

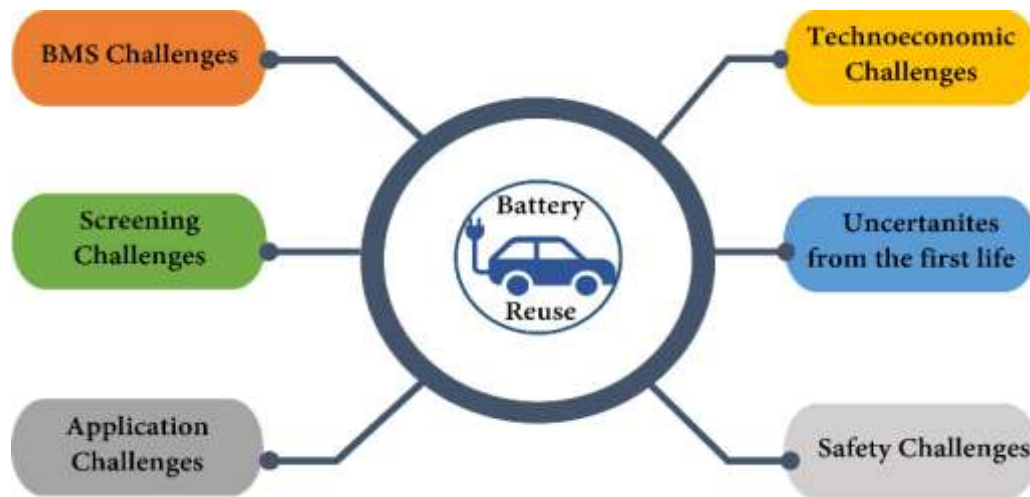
#### 4.4 The Role of Consumer Education in Battery Sustainability

It is the educator between the consumers on the environmental impacts of lithium-ion batteries and the need for responsible recycling practices within the EV industry. The mere understanding by the consumer of the issues related to battery production likely leads to their support of companies that focus on sustainable sourcing, recycling, and second-life applications. The growing customer demand for environmentally friendly products encourages manufacturers to make similar use of environmentally friendly facilities. Education campaigns are important to inform people about the necessity of battery recycling and the benefits of the second-life battery application in a positive environmental regard. More awareness among consumers allows them to actively engage in the recycling process by either bringing used batteries to specific recycling centers or supporting brands that source from their products with greater consideration. The EV OEMs can implement bolder policies, such as promoting a well-informed consumer base, accelerating the transition to more sustainable battery sourcing, and creating market demand for products with lower environmental impact (Dirgahayani et al., 2020).

#### 4.5 Innovations in Battery Technology

So, there is an ongoing drive in battery technology to develop the future of sustainable lithium-ion batteries. One example of such advancement is solid-state batteries. The technical aim is to develop these batteries with a solid electrolyte instead of the liquid electrolyte in traditional lithium-ion batteries, resulting in safety, energy density, and longevity improvement. They could further decrease the dependence on cobalt, a material with poor ethical sourcing. Other strategies are also being developed for alternate battery chemistries, including sodium ions and lithium sulfur. These batteries are less environmentally and ethically risky in that they rely on less scarce materials like cobalt and nickel. Although these technologies are still in development, they promise to decrease the total environmental impact of EV battery production.

Natural innovations that can be undertaken relate to new chemistry in batteries and manufacturing processes to enable sustainability (Larcher & Tarascon, 2015). Some techniques, such as 3D printing and advanced automation, could reduce production energy and enhance battery efficiency and life. Upgrading battery technology will become the key to solving the environmental problems caused by lithium-ion batteries. Suppose EV OEMs want to reduce the electric vehicle's environmental impact significantly. Therefore, they must develop more sustainable methods, improve material recycling, and advance battery technology.



*Figure 5: Empowering Electric Vehicles Batteries*

## 5. Environmental and Social Impact of Mining Rare Earth Metals

### 5.1 The Challenges of Rare Earth Metal Mining

Electric vehicles (EVs) demand rare earth metals to produce motors, batteries, and electronic systems, steering the need to source and use those metals. Lithium, cobalt, nickel, and other rare earth elements like neodymium and dysprosium are essential for EVs to perform efficiently. The extraction of these materials during mining creates huge environmental and social problems, which must also be dealt with. Habitat destruction is one of the main environmental problems caused by rare earth metal mining. Land mining often causes deforestation and the destruction of ecosystems upon large-scale land excavation for mining operations. To illustrate, the extraction of lithium from brine pools in South America and the mining of cobalt in the Democratic Republic of Congo (DRC) have each been associated with habitat destruction and biodiversity loss. Land clearing to mine is an environmental disrupter to the local wildlife and the soils it also erodes.

Apart from that, mining activities most often result in water pollution. The heavy water demand used in extracting and processing rare earth metals means the chemicals are used to dirty up nearby water sources. The effects of this pollution on local communities that rely on these water sources as drinking water or for farming are detrimental. As an example, the chemicals used to extract cobalt and lithium used in the extraction are toxic; if they are

not carefully dealt with, they seep into the groundwater, posing health risks for a long time and affecting humans and wildlife. The social fact behind mining rare earth metals is not overlooked. Local communities are exploited in mining, especially when the country lacks labor and environmental regulations. Child labor, unsafe working conditions, and failure to pay satisfactory wages are standard for cobalt mining in the DRC. Usually, local communities living near the mining sites are destroyed with their homes and livelihoods. Mining operations are usually carried out in areas where governance is poor, so workers usually fail to press for their rights or demand damages caused by the operations (Lauwo et al., 2016). The lack of these campaigns and regulatory oversight in these places contributes to continuing these dirty practices.

## 5.2 Adopting Greener Alternatives

EV original equipment manufacturers (OEMs) can employ several mitigating strategies to address rare earth metal mining's environmental and social issues and avoid relying on destructive methods of extraction. Another means is sourcing from responsible mines. OEMs should use environmental and labor standards and rigorous compliance, such as those certified by the Initiative for Responsible Mining Assurance (IRMA); this should be the highest priority. The certification indicates that mines follow best practices in terms of community engagement, environmental management, and workplace safety. By indulging in sourcing materials from certified mines, EV manufacturers can, to a great extent, diminish the side effects related to improper mining practices that include diversion of habitats, contamination of water and exploitation of the workforce. Responsible mines tend to put efforts like land reclamation and waste management, adopting approaches to mitigate how their operations harm the environment.

Another important strategy is investing in research and development to investigate other materials that are not based on rare earth metals. The invention of new chemistries of more sustainable batteries or motors that do not require rare earth elements currently used in EV production could be a matter of material science. For example, researchers are looking to find replacements for cobalt and nickel, such as iron-based batteries or nonrare earth metals. This would decrease demand for rare earth metals and lessen extraction's environmental and social risks. Adopting new battery recycling technology could help avoid the need for new mining. By developing more recycling efficiency, cobalt and nickel can be recovered from used batteries and reused in new battery production, improving the sustainability of these vital materials (Tan et al., 2020). This closed-loop system would also reduce demand for virgin raw materials and help curtail the environmental degradation caused by mining operations.

**Table 4: Challenges of Mining Rare Earth Metals and Mitigation Strategies**

Challenge	Mitigation Strategy
Habitat destruction	Sourcing from responsible mines, land reclamation

Challenge	Mitigation Strategy
Water pollution	Implement better water management practices in mining
Child and forced labor	Adopt strict ethical sourcing standards and conduct regular audits
Unsafe working conditions	Establish fair labor practices and ensure compliance with health and safety standards

### 5.3 Government Regulations and Standards

Alongside stronger government regulations and international agreements, responsible mining practices and mining that do not put demands on the environment or local communities must be promoted. The government can get stricter regarding the environmental standards set for mining operations, which means that companies must follow best practices in environmental matters, including water management, waste disposal, and land reclamation. The laws should ensure that local water sources are not contaminated and that diversity in mining areas is protected. International agreements, such as the Paris Agreement on climate change, can influence mining practices by pushing for the use of cleaner, more sustainable technology in other sectors. Global organizations can also assist in changing the policy, as this international shift moves towards sustainability, to encourage EV OEMs and mining companies to adopt greener practices to reduce their carbon emissions and make the extraction operations less ecological.

Governments should also enforce labor regulations that guarantee the employees' right to work in mining and to access safe working conditions. The International Labor Organization (ILO) has already created internationally recognized labor standards that should be incorporated into mining operations worldwide (Tapiola, 2021). Such regulations can also address the problem of child labor, forced labor, and unsafe working conditions in some of the biggest mining areas in the world, such as the DRC. Site-specific mitigation of mining operations' impacts on the local community should happen. It must be done without compensating the local community or providing alternative livelihoods to the community.

### 5.4 The Role of Consumers in Promoting Responsible Mining

Consumers have a big role in promoting responsible mining through their behavior, including consuming goods that do not promote unsafely mined commodities or lowering their purchasing decisions. With craper sources and consumers gravitating towards brands using ethical sourcing practices and having transparency into how rare earth metal minerals are mined, the demand for refining this metal is on an uptick. Support from consumers can create demand for more sustainable products by opting to purchase only from companies with whom they are supporting sourcing from responsible mines or investing in the development of alternative materials.

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If consumer pressure is high enough, EV OEMs will be prompted to adopt more transparent sourcing practices and prioritize sustainability over cost savings. If a company does not satisfy consumers' sustainable expectations at face value, there can be consequent reputational damage, loss of market share, and regulatory pressure (Ioannou et al., 2023). Many companies are now beginning to realize the need to show their commitment to responsible sourcing using public reporting, certifications, and third-party audits. People can also gain a voice by endorsing policies that promote responsible mining, and brands can be called out to garner similar, if not better, impacts! Consumers can help a whole industry switch to more sustainable and socially responsible mining practices by advocating for stronger regulations and much greater transparency in the supply chain.

## **6. The Role of Blockchain in Ensuring Supply Chain Transparency**

### **6.1 The Need for Supply Chain Transparency**

Transparency in the supply chain is an important aspect to be achieved in order for the procurement to match Corporate Social Responsibility (CSR) goals. For industries like the electric vehicle (EV) manufacturing arena, raw materials such as lithium, cobalt, or rare earth metals are mined from all corners of the world, and in order for full transparency, this component of the process needs to be accounted for. These materials often originate in regions with barriers to entry, including weak labor laws, inadequate environmental protections, and so on. Transparency is important to mitigate the risk of human rights, environmental violations, degradation, and corruption in the supply chain. Supply chains are notoriously hard to achieve transparency within. In a global supply chain, the number of layers of suppliers and intermediates is usually complex, and most of the time, the flow of the materials is not transparent. This opacity means that EV manufacturers cannot see where the materials they are using are sourced, making it difficult to confirm that they are ethically sourced and that suppliers meet environmental and labor standards. Furthermore, enforcing compliance and addressing the problems in real-time is difficult because reliable data is lacking (Avula, 2021). This is a context where the need for transparency has never been greater. Companies in so-called 'sustainable' industries such as EV manufacturing are increasingly being asked to prove what people have long suspected that they are not very sustainable or are deriving unsustainable practices from other parts of their systems. In alignment with CSR principles, as companies worldwide become accountable to stakeholders to ensure that their supply chain is transparent, it is crucial that they achieve transparency in their entire supply chain (Gold & Heikkurinen, 2018).



*Figure 6: How to Increase Supply Chain Transparency*

## 6.2 Blockchain as a Solution

At the same time, supply chain transparency is turning out to be one of the hottest trends in tech today, and there is blockchain technology to solve this. Consequently, blockchain is a decentralized and immutable ledger system that records transactions securely and transparently. The information chain is verifiable in that each transaction, or 'block,' links to the previous block, creating a never-ending, continuous, and verifiable Blockchain's provenance tracking feature that is particularly valuable for tracking materials and ensuring data integrity in the whole supply chain. Blockchain can be useful for verifying bullet trails from source to production for electric vehicle OEMs. Blockchain allows for transparent and tamper-proof recording of how much of the supply chain has progressed. That is why manufacturers can check if the materials they use come from ethically and sustainably managed sources. It also can enable verification that suppliers follow social and environmental standards with an immutable record of compliance audits and certifications, as well as other vital information.

Blockchain can increase trust by providing real-time access to supply chain data and through a secure channel between consumers, regulators, and other stakeholders (Panda & Satapathy, 2021). In addition, it can assist consumers in identifying the source of the products they purchase so they may be more well-informed when making ethically informed purchase decisions. As with sourcing decisions for EV manufacturing, where they can have significant environmental and social impacts, Blockchain's ability to increase transparency in such a way is valuable.

**Table 5: Blockchain Technology Applications in the EV Supply Chain**

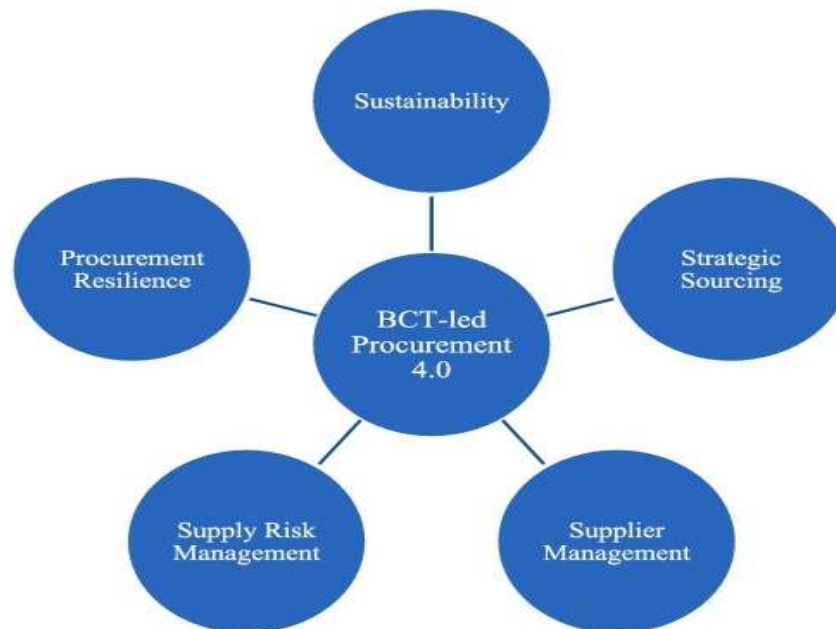
<b>Blockchain Application</b>	<b>Benefit</b>
Tracking Material Origins	Ensures raw materials are ethically sourced
Compliance Verification	Provides an immutable record of supplier audits and certifications
Real-Time Data Access	Increases supply chain transparency and builds trust with consumers
Preventing Fraud	Secures transactions and reduces the risk of fraud in the supply chain

### 6.3 Implementing Blockchain in Procurement

The key steps to implement blockchain in procurement processes for an electric vehicle OEM are as follows. The first step OEMs should take in adopting blockchain solutions in collaboration with technology providers that offer such solutions. OEM works with blockchain technology providers to use this Blockchain technology to realize systems that complement OEM's own supply chain needs (Banerjee, 2018). Following these customized solutions can help solve the specific challenges that EV manufacturers have, such as tracing rare minerals from one border to the other or checking an EV manufacturer's environmental impact when it comes to mining. After a blockchain solution has been created, the next step is to include suppliers in integrating it. To make blockchain effective in guaranteeing supply chain transparency, all stakeholders in the supply chain need to be involved. This includes miners, manufacturers, logistics providers, and other intermediaries. In order to encourage suppliers to adopt blockchain technology, a business effort will need to be made to demonstrate the benefits of Blockchain beyond transparency and accountability to enhance efficiency and reduce the risk of fraud or supply chain disruption (Nyati, 2018).

Assuming it will be successful, another important part would be training (and onboarding?) the suppliers to the blockchain system. Blockchain integration with suppliers' operations may be difficult without the necessary infrastructure and technical expertise, especially in the developing region. Trusted third party like EV OEMs can support their suppliers by initiating training programs, technical support, and all the resources to switch to a blockchain-based system. All the stakeholders must know the significance of the data entry, and if there is an error or omission, it might break the whole blockchain system. EV OEMs must rely on auditors and certification bodies' third-party audits on their blockchain data to further bolster credibility and trustworthiness. The auditors can audit the

information on the blockchain to verify that the supply chain remains in good ethical sourcing practices. The third-party validation offers additional credibility to the blockchain system, which gives consumers and other stakeholder's confidence that the information is correct and reliable.



*Figure 7: Blockchain technology as a strategic weapon to bring procurement 4.0 truly alive*

## 6.4 Overcoming Challenges in Blockchain Implementation

Compared to other applications, blockchain presents more challenges when it comes to integrating it into procurement processes. One of the first hurdles is the high implementation cost of blockchain technology. Creating and deploying such a blockchain can also be expensive, especially for smaller companies with complex or global supply chains. It is also quite expensive to integrate blockchain with existing supply chain management systems, or the cost of maintaining the system may be even higher. The issue is another complexity of integrating blockchain with the existing infrastructure of suppliers and partners. Structurally, many suppliers lack the technical capacity to adopt blockchain. They are not open to making the change as they perceive it as unacceptably disruptive to their operation. This is particularly difficult if the suppliers do not see immediate benefits from the new system and are convinced to do so. Data privacy and security issues can arise because the information needs to be shared with other network nodes.

Education and training of suppliers on the benefits of operating on the blockchain and incentives to adopt the technology can mitigate suppliers' resistance. Cooperating with all supply chain partners is necessary to avoid inconveniences in blockchain implementation and maximize benefits to all (Kumar et al., 2020). Similarly, OEMs of EV industries can approach industry consortia and standard-setting organizations to develop a common framework or standard for blockchain implementation that will make the system

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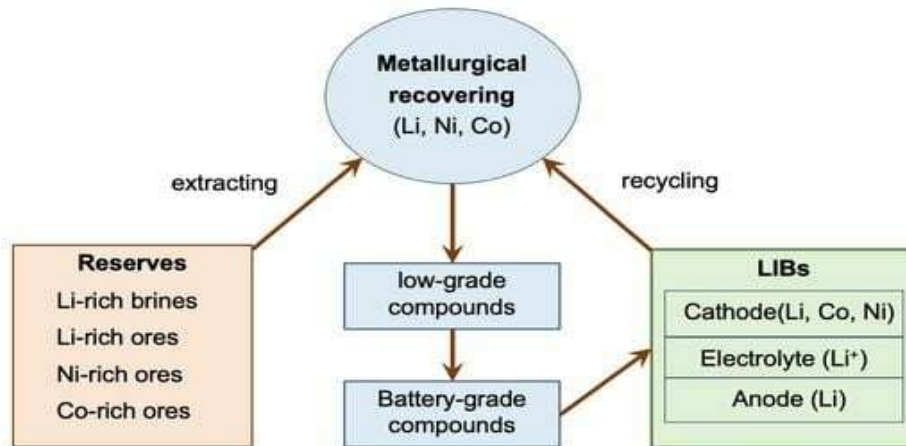
interoperable and scalable across diverse regions and industries. Though blockchain technology offers several hurdles, the long-term benefits of supply chain transparency provided by blockchain technology are clear. However, order no longer needs to be a marathon, as addressing these hurdles and working with suppliers can lead to more transparency, accountability, and a more sustainable supply chain for EV OEMs. Blockchain adoption may intensively contribute to achieving CSR goals and increasing the EV industry's sustainability (Upadhyay et al., 2021).

## **7. Ethical and Legal Concerns**

### **7.1 Ethical Implications of Sourcing Critical Materials**

There are considerable ethical issues related to sourcing critical materials like lithium, cobalt, and rare earth metals. Electric vehicle battery components (and other materials) associated with the production of electric vehicle (EV) batteries are essential here, and they are subject to high labor rights abuses, such as child labor, forced labor, and dangerous working conditions in extraction areas. The mining of such materials is linked to human rights violations, which is especially true in countries with weak governance structures. Lithium is used by most electric vehicles, laptops, and other digital devices and is especially important for cobalt, a central component of lithium-ion batteries, which is extracted mostly in the Democratic Republic of Congo (DRC), where child labor and unsafe working conditions are rampant. There are reports that children as young as seven are working in artisanal mines without protective equipment, their hands exposed to toxic chemicals, and their lives in danger in a work environment that should cry for legitimate concerns. Other than the exploitation of labor, mining practices lack proper regulation, which leads to environmental degradation, such as deforestation, water contamination, and soil erosion. EV original equipment manufacturers (OEMs) must consider whether these ethical concerns may be incurred through their supply chain.

To take one possible example, the extraction of lithium and rare earth metals from the earth may have child labor practices even if they are not as closely linked. To the working people in lithium mines, such as in South America, there are low wages, inadequate safety measures, and longer working hours. These issues exasperate the ethical challenges of sourcing materials for EVs, which are a move to reduce carbon emissions. This should be looked at as a way to mitigate the ethical implications that affect the sustainability of the supply chain, in which case EV OEMs must adopt strict monitoring of ethics sourcing. To mitigate these ethical risks, EV OEMs have to establish and enforce firm codes of conduct with their suppliers that demand 'fair treatment' at work and adherence to internationally recognized labor standards. These standards should include the prohibition of child labor, forced labor, and unsafe work conditions. Furthermore, OEMs need to motivate their suppliers to comply with transparency and accountability requirements, and thereby, materials are to be procured from suppliers that meet ethical labor standards (Sainio, 2017).



*Figure 8: Aspects of Nickel, Cobalt and Lithium, the Three Key Elements for Li-Ion Batteries*

## 7.2 Legal Frameworks and Compliance

Evangelical legal frameworks have an integral role in ensuring that EV OEMs meet ethical sourcing guidelines and the possibility of legal trouble in the case of human rights violations and environmental damage (Sten, 2023). In many locales, companies are required by law to show that their equipment is purchased and produced so as not to support conflict minerals or human rights abuses financially. One regulation that the Dodd-Frank Act passed in the United States targeted conflict minerals like cobalt from the DRC and surrounding areas. Publicly traded companies must disclose the sources of these minerals in their supply chains and do due diligence to determine whether the company's materials are coming from conflict zone areas where such armed groups profit from the mining operations. Dodd-Frank Act is not directly linked to combating armed conflict, although it is a tool that aims to make companies responsible for their sourcing practice so that they do not violate human rights.

The EU Conflict Minerals Regulation came into force in 2021, demanding that EU companies operating without engagement with material mined in a way that promotes human rights violations ought to have all their supply chains. That includes cobalt, lithium, lithium, tin, tungsten, end, and tantalum, all common elements in EV production. They must conduct thorough due diligence on their supply chain, looking for risks associated with conflict minerals and mitigating them. In addition to avoiding legal penalties, these regulations are needed to ensure a company has a positive reputation or risks losing customers. Legal consequences and loss of consumer trust are the likely factors that EV OEMs will suffer if they fail to adhere to legal standards. OEMs must be updated on legislative changes and ensure these regulations are incorporated into procurement practice. This has to do with regular audits with legal experts and informing staff in charge of such things (Farrington & Lysons, 2020).

**Table 6: Major International Regulations for Conflict Minerals**

Regulation	Key Requirement	Affected Materials
Dodd-Frank Act (US)	Disclose sources of conflict minerals in supply chain	Cobalt, Tin, Tungsten, Tantalum
EU Conflict Minerals Regulation	Conduct due diligence and source from conflict-free zones	Cobalt, Lithium, Tin, Tungsten
Initiative for Responsible Mining Assurance (IRMA)	Certify mining operations for environmental and labor standards	All minerals used in EV production

### 7.3 Risk Mitigation Strategies

EV OEMs depend on sourcing critical materials from other regions and must address numerous ethical, legal, and supply concerns through an integrated risk mitigation approach. Simultaneous efforts should be made to create strong compliance programs with full due Diligence and pressure for stronger legal standards in sourcing the materials in the first place. The most effective methods of minimizing the risks are compliance programs, such as supplier audits, whistleblowing mechanisms, and good employee training. They (supplier audits) are necessary to ensure supplier compliance with the OEM's ethical sourcing criteria downstream. These audits and surprise inspections would be scheduled to obtain continuous compliance. The key is for them to know what labor conditions, environmental practices, and total supply chain transparency are doing. OEMs might have access to third parties like the Responsible Cobalt Initiative (RCI) or the Initiative for Responsible Mining Assurance (IRMA) to certify that their supplier is certified and complies with universal labor and environmental standards.

Due Diligence is another crucial component. EV OEMs must ensure background checks on suppliers to learn their sourcing process and possible risks with the operation (Kasselia & Somi, 2023). It is a process of collecting information about the conditions of the mines, labor protection, the integrity of environmental effects of suppliers, and materials traceability. An OEM can develop a fully functioning risk management framework to identify red flags in the supply chain and execute remedial steps before the problem becomes serious. What product companies need to do is that, as a matter of course, experts have to lobby to get stricter legal standards so that our supply chain is more responsible and transparent.

EV OEMS should discuss with policymakers, industry groups, and nongovernment organizations (NGOs) to influence tighter regulations regarding sourcing critical materials. Through OEMs sharing their advocacy for regulations that mandate transparency, accountability, and fair working conditions in mining, they can assist in enabling systemic change in the mining sector. Education and training help mitigate risks. This means that OEM procurement teams and their supply chains must be provided with specific knowledge regarding ethical sourcing standards, legal compliance requirements, and the

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identified risks of non-compliance. It is possible to create regular training programs that enable employees to grow awareness and prepare them with knowledge and tools to make ethical sourcing decisions. If these risk mitigation strategies are implemented, EV OEMs can reduce their susceptibility to legal and ethical problems related to their supply chains, improve their corporate reputation, and help create a more sustainable and responsible electric vehicle industry.

## **8. Future Considerations**

### **8.1 Advancements in Sustainable Technologies**

Technological advancement is the key to lowering the environmental footprint of the EV industry and moving towards a sustainable future of electric vehicle (EV) component sourcing (Un-Noor et al., 2017). An area of focus is the further development of battery recycling technologies that are more efficient—currently, recycling only a small fraction of the valuable materials, like cobalt, nickel, or lithium, from lithium-ion batteries. The efficiency of these processes is slowly being improved with the coming of new technologies. Possibilities such as hydrometallurgical processes, direct recycling, and closed-loop recycling systems could obtain much higher recovery rates, therefore decreasing the obligation to set up new mining sites and preventing the negative ecological effects of the extraction itself. Alternate battery chemistries also have a great potential to reduce dependence on common conflict-prone minerals. The Lithium-Ion battery is the current leader in the game for batteries within the EV space. However, research into other chemistries, such as solid-state, Sodium ion, or lithium-sulfur, could rapidly change the EV space's sustainability. One example is solid-state batteries, which use a solid electrolyte rather than a liquid electrolyte to improve energy density and safety benefits and, in both cases, avoid vandalism. This mineral has major ethical sourcing issues. Still, sodium-ion batteries are made using available materials and have a lower environmental impact than lithium-ion batteries. These technologies will continue to evolve and could be cleaner, more sustainable batteries.

For example, developing substitutes for rare earth metals is also important. Production of EV batteries requires materials such as cobalt, nickel, and rare earth elements, but also at a high cost from both environmental and ethical points of view. New materials and combinations are under development to reduce the use of rare and possibly harmful substances (Kharissova et al., 2019). For example, studying manganese and iron-based battery chemistries would open paths to more sustainable and less resource-intensity alternatives. Other than developing battery technology, possible improvements in EV manufacturing include automation, energy management, and material efficiency innovations. Additive manufacturing, or 3D printing, can lower waste and improve the accuracy of battery and vehicle components. These technologies can also decrease raw materials and energy use in manufacturing processes.



*Figure 9: Progress, challenges, and prospects of spent lithium-ion batteries recycling*

## 8.2 Long-Term Sustainability Goals

While the EV industry is developing, original equipment manufacturers (OEMs) should establish long-term sustainability goals beyond ethical procurement procedures. It is important to bring sustainability into the EV sector as a broader life cycle issue, including getting the material, producing the vehicle, using it, and recovering it. Adopting the circular economy principles is one of the key aspects of long-term sustainability (European Commission, 2020). It is how materials and services are consumed or produced for a circular economy, which means that they are subjected to be reused, refurbished, or recycled so that raw material requirements are reduced, and waste is minimized. By design, batteries and other vehicle components can be easily disassembled and recycled, and EV OEMs can adopt circular economy practices (Glöser-Chahoud et al., 2021). This would ensure that his material is recovered and reintroduced into the supply chain where it is valuable. An example at the end of the life of this would be to make batteries easier to disassemble, allowing recycling to be better and reducing the environmental impact of disposal of a battery.

Another long-term goal, which is very important but very hard to reach, is carbon-neutral production. The EV industry will have to address the carbon footprint of the manufacturing processes as it is expanding. To cut greenhouse gas emissions from producing batteries and vehicles, EV OEMs must invest in renewable energy sources for their production facilities, solar and wind power. Manufacturing processes should also be optimized to lower energy consumption and waste generation, which would help reach the carbon-neutral status. It can be done with energy-efficient technologies, smarter resource management, and low-emission practices throughout the supply chain. In addition to using water and waste and reducing emissions in our production process, further efforts should be made to continue improving water, waste, and emissions impact throughout our production. Because they have set ambitious sustainability goals and are measuring progress towards these targets, EV OEMs can signal to the world that they are doing their part to reduce their environmental footprint and serve as an example for other OEMs in the industry. To this

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shift toward long-term sustainability in the EV sector, the EV sector needs to be committed to continuing innovation and taking a proactive approach towards solving the environmental challenges posed by the production of batteries, manufacturing vehicles, and disposal. Sustainability, therefore, should not be considered a corporate responsibility for EV OEMs. It is a key component that needs to be integrated into their brand identity and the success of the future.

### **8.3 Collaboration with Policymakers and Industry Groups**

To achieve a sustainable future for EVs, industry groups, governments, nongovernmental organizations (NGOs), and other stakeholders must take a collaborative approach. It is the regulatory landscape of the EV sector and policymakers in the picture. Rather, they will set the stage for this by setting clear and ambitious environmental standards for the industry to drive toward more sustainable practices. Subsidies, tax credits, support for R&D in hydrogen, and other alternative clean technologies like electric vehicles offer incentives for governments to encourage their adoption. Environmental regulations can also be very strong; materials are sourced ethically, and EV OEMs comply with high labor and environmental standards throughout their supply chain.

Industry groups, including trade associations and coalitions, serve as an equally important powerhouse for systemic change in the EV sector (Ryghaug et al., 2023). Industry-wide standards and best practices for sustainable sourcing, manufacturing, and handling can be set up through collaborative efforts between manufacturing, suppliers, and other stakeholders. For instance, the Responsible Cobalt Initiative (RCI) encourages the responsible sourcing of cobalt and other minerals needed for EVs. Working together, industry participants can find ways to share knowledge, set common sustainability goals, and try to solve the industry's most pressing issues: resource scarcity and ethical labor practices.

The supply of EVs also has a role for NGOs so that the EV industry remains transparent and is accountable for its sustainability efforts. NGOs can help encourage stronger environmental and labor laws to compel governments and corporations to act in the case at hand or inaction. Also, they can increase public awareness about the social and environmental impacts of the EV supply chain, forcing manufacturers to be more ethical and sustainable. All the stakeholders must collaborate to ensure the long-term transition of the EV industry towards sustainability. Policymakers, industry groups, and NGOs must craft some great, unified, green, ethical vision for the future of the EV sector. The aim is that the systemic changes required to deal with the complex challenges of sourcing, manufacturing, and disposal of EV components in a way compatible with future sustainability will be made in a collaborative move.

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## 9. Stakeholder Engagement and Communication

### 9.1 Engaging with Local Communities

Electric vehicle (EV) original equipment manufacturers (OEMs) are engaged with local communities. They will continue to play a role in making their corporate social responsibility (CSR) more pervasive and robust in areas such as where mining or production facilities are located in regions with vulnerable populations. The impact of operations goes beyond environmental outcomes and involves these communities' social and economic aspects (World Economic Forum, 2021). To avoid harm to local populations, EV OEMs must include activities they conduct instead of activities that will be more conducive to local development and address people's concerns. EV OEMs should engage in open dialogues with local communities to understand the needs, worries, and desires of those affected by its operations. It often involves meetings with community leaders, local government officials, and other stakeholders to discuss problems following mining or manufacturing. Companies should pay the communities affected by displacement, depletion of the environment, or disturbance of the local ecosystem in mining.

EV OEMs could partner with local development campaigns to boost education, healthcare, infrastructure, and other important factors that will contribute to the community in the long term (Kishore & Johnvieira, 2021). This approach shares the benefits of the company's operations with the local population, which makes one feel that the OEM is partnering with the local population. OEMs can show that they invest in sustainable community development, demonstrating that they are practicing ethical business practices and their responsibility to the community, which helps them operate their business (Kumar, 2019). In addition, companies also have a chance to offer employment opportunities to local citizens through training programs to equip them with skills needed in the emerging EV industry. Improving local economies, promoting goodwill, and enhancing the social license to operate are other reasons for the project's long-term sustainability investment. Finally, engaging with local communities entails much more than working on the solution to an immediate problem; it involves identifying a process of social responsibility made possible through mutual development between the OEM and the community.

### 9.2 Transparency with Consumers

Transparency is key for securing consumers' trust and loyalty in those industries with great ethical and environmental implications and operating in the EV industry. EV OEMs need to give consumers accurate and user-friendly information about the sourcing of materials, labor conditions, and environmental impacts on their products as consumers increasingly become more focused on sustainability and ethical business practices. Transparent communication goes hand in hand with building a company's reputation and giving beneficial advice to the consumers, whose purchasing intention is based on their values. EV OEMs can build transparency through multiple channels, such as marketing campaigns, product labeling, and corporate reports. When battery manufacturers provide detailed

information about the source of raw battery materials such as lithium, cobalt, and nickel, consumers can decide whether these were sourced responsibly and ethically (Mancini et al., 2020).

Manufacturers can use certifications and third-party audits to prove their claims to consumers; they will confirm that the company implements the most stringent environmental and social standards. It has also been shown that manufacturing processes should be communicated about environmental impacts. Regarding EV OEM efforts to reduce their operations' carbon footprint, for example, they should celebrate the use of renewable energy in production facilities or energy-efficient technologies (Nyati, 2018). By doing this, OEMs represent their engagement with the sustainability topic and offer ideas to eco-conscious consumers. Communication of labor conditions within the supply chain is equally important. People are more aware of the human rights issues that are a factor in the industries supported by complicated global supply chains, including child labor and unsafe working premises. Publicly sharing supplier codes of conduct EV OEMs serve can help address this issue. It lets EV OEMs share with their suppliers what labor standards are expected of them and what measures have been implemented to get them on board. In addition, insights into worker safety and compensation programs can proudly put the company on the map of firms committed to improving the welfare of workers from across its supply chain and winning the trust of consumers. Transparency is not limited to marketing materials.

It should also manifest in annual CSR reports (sustainability reports), to which OEMs can disclose their actions regarding environmental goals, supply chain audits, and community engagement. These reports offer a formal channel of accountability, which can strengthen the company's claims about its sustainability. EV OEMs later become involved by maintaining transparency; thus, it builds trust in consumers and puts them forward to have a great lead in corporate responsibility in the automotive industry.



***Figure 10: Transparency Matters***

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### 9.3 Collaborating with NGOs and Advocacy Groups

The subsequent role played by collaboration with nongovernment organizations and advocacy groups to ensure that EV OEMs remain informed and updated on emerging ethical and sustainability issues within their supply chains is critical (Bonsu, 2020). Expertise and insights are supplied by NGOs dedicated to matters of human rights, environmental protection, and sustainable development, as well as companies seeking to pursue best practices for their operations. These collaborations are good for OEMs because they give access to independent assessments, expert knowledge, and the networks of stakeholders out in the market.

A major advantage for OEMs when engaging with NGOs is that the same organizations can not only provide guidance to improve labor and environmental conditions in OEMs' supply chains but can also assist in raising awareness among the general public regarding such conditions. NGOs may help document labor rights violations occurring as mining operations occur, such as child labor, or when resource extraction occurs in sensitive regions affecting the environment. With these partnerships, OEMs can implement corrective actions and increase their CSR initiatives. OEMs keep themselves updated about global trends and practices to lessen their negative environmental impact, and having advocacy groups focusing on green and environmental sustainability also helps OEMs to be involved with them. They frequently assert their innovative approach to making production, research, and policy frameworks that can influence decisions. Engagement with these organizations allows EV OEMs to understand environmental risks and opportunities better and meet industry sustainability norms in terms of risk and opportunities.

This combination can also enhance the company's reputation by increasing the number of people who appreciate working with those who espouse trust within and are consistent advocates for social and environmental change. They can also tell OEMs what they need to understand how to bring complete autonomy to sustainability strategies like circular economy schemes, ethically aware mining processes, and energy-efficient manufacturing processes. Collaborating with NGOs and advocacy groups, OEMs may also volunteer to participate in industry-wide activities to solve the system issues of the supply chain. The Responsibility Cobalt Initiative (RCI) joins different cobalt supply chain roles to solve the social and environmental risks of cobalt mining. This is a chance for EV OEMs to align their sourcing practices with international efforts to promote ethical and sustainable supply of resources.

A final piece of advice released below is that EV OEMs should collaborate with NGOs and advocacy groups to listen, adapt to new best practices, and continue to be socially responsible. As indicated in the partnerships mentioned above, they said the company in building and providing a more sustainable, more equitable global supply chain through its CSR delivery. For the success of the EV OEM global marketplaces marketplace, effective stakeholder engagement and communication are required. Interacting with local communities, maintaining consumer transparency, and cooperating with NGOs or

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advocacy groups enable companies to build trust, improve their CSR performance, and create long-term value (Moshtari & Vanpoucke, 2021). Their outcomes further contribute to the broader systemic goal of a sustainable, morally upright EV industry.

## **10. Conclusion**

Reaching the electric vehicles (EVs) will help to decrease our dependence on fossil fuels and climate change. The higher the demand for EVs, the fewer lithium-ion batteries will be needed, as there will only be raw materials that go into manufacturing these batteries, e.g., lithium, cobalt, and nickel. These materials are produced and extracted with many ethical and environmental ramifications, such as the exploitation of labor and the destruction of the environment. Holistic ethical procurement and corporate social responsibility (CSR) for the EV industry measures how to address these challenges. The necessity of integrating CSR in the procurement practice of EV original equipment manufacturers (OEMs) is due to this. In order to get fit, get materials ethically sourced, and live up to labor and environmental standards, a multi-faceted strategy is required. The main route is to develop supplier codes of conduct that furnish clear ethical, environmental, and social boundaries. These codes are used to ensure that the workers are treated well, that suppliers play along with the goals of CSR, and that less damage is done to the environment. Monitoring and auditing are continuous and help promote compliance and correct them at the right time.

Integrating blockchain technology into the supply chain will enhance supply chain transparency. It does not rest on the blockchain, like one that relies on another authority. It has a decentralized ledger that allows OEMs to trace material provenance, check supplier compliance, and create an immutable record of transactions. Transparency can help companies learn what is happening within their supply chain and verify their materials' ethical sourcing. Introducing blockchain into our supply chain is not easy, but the simplicity is nothing a simple lack of transparency and unaccountability brings. Concerning CSR practices, EV OEMs must also consider community engagement after procurement. Local communities, especially in mining areas or near production facilities, must have good relations and address the environmental and social impacts. OEMs can contribute to these regions' long-term welfare by investing in local development initiatives, creating employment opportunities, and paying fair compensation to compensated communities. It eases securing the place to operate a social license and develops trust with the local stakeholders.

Consumer education is another necessary component of promoting ethical and sustainable practices within the EV industry. Consumers are becoming more environmentally conscious and increasingly concerned with the sourcing of the products and the environmental impact involved. This demand from consumer's claims that OEMs could respond by clearly communicating their products' environmental and social implications. Raising awareness about the need for battery recycling, battery applications for a second life, and sustainable sourcing of raw materials can stimulate demand for more ethically

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sourced products and encourage consumers to make educated decisions. Such developmental technologies, such as battery recycling and alternative chemistries, also reduce the industry's environmental footprint beyond consumer education.

Investment in research and development can continue, creating more sustainable battery technologies based on less harmful materials with less environmental impact. Solid-state batteries could reduce dependence on conflict-prone minerals such as cobalt and nickel and are safer and more energy-dense. Investment in these technologies by OEMs would further diminish the product ecological of the EV industry's shift toward making the world's future sustainable rests on the handshakes of several stakeholders, including OEMs, consumers, NGS (NGOs), and policymakers. The OEMs' CSR practices must evolve and ensure that their procurement process aligns with social and environmental ethical values. EV manufacturers locating themselves in China have the opportunity to not only elevate their brand reputation but also to support the broader and greatly needed aspiration for a more sustainable, equitable economy.

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