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மின்சார வாகனங்கள் பயன்பாடு, பயன்பாட்டிற்குப் பிந்திய
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தாக்கம் தொடர்பான மதிப்பீடு - இலங்கை

Electric Vehicle Usage, Post – Usage
Management and Environmental Impact Assessment in Sri Lanka

ජාතික විගණන කාර්යාලය
தேசிய கணக்காய்வு அலுவலகம்
NATIONAL AUDIT OFFICE



Report No: ENV/2025/03

ENVIRONMENTAL AUDIT REPORT ON ELECTRIC VEHICLE



USAGE, POST-USAGE MANAGEMENT
AND ENVIRONMENTAL IMPACT
ASSESSMENT IN SRI LANKA



CLEANER
ENVIRONMENT



SUSTAINABLE
FUTURE



RESPONSIBLE
POST-USAGE
MANAGEMENT



EVIDENCE BASED
AUDIT FOR
BETTER OUTCOMES



Driving Towards a
Greener Sri Lanka



AUDIT PERIOD
2020 – 2025



National Audit Office of Sri Lanka
Performance Audit Division



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1. Executive Summary

Electric mobility is increasingly recognized as an important component of Sri Lanka's climate change mitigation strategy, particularly given that the transport sector accounts for nearly one-third of the country's energy-related carbon dioxide (CO₂) emissions. As of September 2025, approximately 30,000 electric vehicles (EVs) had been registered in Sri Lanka, of which electric motorcycles accounted for nearly 80 per cent. Although EV registrations had gradually increased since 2020, their overall penetration remained relatively low compared with the total national vehicle fleet. However, a significant increase in EV registrations was observed in 2025 and thereafter.

By June 2026, the number of registered EVs had increased to over 100,000 within a relatively short period. Nevertheless, EVs continued to represent only a small proportion of the national vehicle fleet, which exceeded nine million vehicles as of June 2026. The rapid increase in EV registrations highlights the growing transition towards electric mobility and underscores the need for adequate regulatory, institutional, charging infrastructure, and post-usage management arrangements to support the sustainable expansion of electric mobility in Sri Lanka.

This Environmental Audit on “Electric Vehicle Usage, Post Usage, and its Environmental Impact in Sri Lanka” was undertaken to assess whether the country's transition towards electric mobility is being governed, implemented, and managed in a manner that is environmentally sustainable, institutionally effective, and aligned with national development priorities and international commitments. The audit was conducted under the authority vested in the Auditor General by Article 154(1) of the Constitution of the Democratic Socialist Republic of Sri Lanka and the National Audit Act No. 19 of 2018, and covered the period from 2020 to 2025.

The audit examined the legal, policy, institutional, and operational framework governing electric vehicle (EV) usage and post usage management, evaluated the effectiveness and environmental outcomes of projects promoting EV adoption, assessed the contribution of EV to greenhouse gas (GHG) emission reductions, and identified challenges faced by EV users and the battery disposal industry.

The audit identified significant gaps in the national legal and regulatory framework governing EV usage and post usage management. While several laws, regulations, and policy instruments exist: including the National Environmental Act, National Environmental Action Plan (NEAP) 2022–2030, National Policy on Waste Management (2020), and sector specific legislation, these

instruments have not been fully operationalized to address the full lifecycle of electric vehicles. In particular, the absence of an approved and updated National Transport Policy has resulted in fragmented and uncoordinated EV initiatives, overlapping institutional mandates, inconsistent charging infrastructure planning, and unclear responsibilities for EV battery disposal and recycling.

The audit further observed that the institutional coordination is not in satisfactory level among key agencies responsible for EV regulation, including the Ministry of Transport and Highways, Ministry of Environment, Central Environmental Authority (CEA), Public Utilities Commission of Sri Lanka (PUCSL), Sri Lanka Sustainable Energy Authority (SLSEA), Sri Lanka Standards Institution (SLSI), Department of Import and Export Control, and Department of Motor Traffic. Although used EV batteries are categorized as scheduled waste under existing environmental regulations, enforcement mechanisms remain limited.

In evaluating projects initiated during the period from 2020 to 2025 to promote electric vehicle (EV) adoption, the audit observed that several government-led and donor-funded initiatives had not achieved their intended outcomes within the expected timeframes. The Global Environment Facility (GEF) funded “Sustainable and Efficient Electric Mobility System in Sri Lanka” project, despite its strategic importance and climate mitigation potential, has experienced prolonged delays due to administrative transfers, weak institutional coordination, and the absence of a functional monitoring framework. Similarly, the electric bus deployment initiative was approved by Cabinet in the year 2023/24. However, it has not progressed beyond the procurement stage, owing to weak procurement governance, inadequate due diligence, and lack of contingency planning. These implementation shortcomings have delayed the realization of anticipated environmental and economic benefits, including reductions in fuel imports and urban air pollution.

The assessment of EV contributions to Greenhouse Gas (GHG) emission reductions indicates that electric vehicles offer significant mitigation potential, particularly in high impact segments such as two wheelers and three wheelers. National and international research reviewed by the audit demonstrates that electrification of these segments can reduce per vehicle emissions by over 60 per cent compared to Internal Combustion Engine Vehicles (ICEVs). However, the audit noted that Sri Lanka has not prioritized these segments through targeted fiscal incentives or structured transition programs. Moreover, the overall climate benefits of EV adoption are constrained by the current carbon intensity of the national electricity grid. Although renewable energy generation has increased in recent years, thermal power remains a substantial component of the energy mix, limiting the net GHG reductions achievable through EV expansion.

The audit also identified the absence of a robust national Measurement, Reporting, and Verification (MRV) framework for EV related emission reductions. Fragmented data systems across transport, energy, and environmental institutions hinder accurate quantification of emission reductions for national and international reporting purposes, including Sri Lanka's Nationally Determined Contributions under the Paris Agreement.

From the perspective of users and industry stakeholders, the audit highlighted several operational challenges. Survey results indicate that EV usage in Sri Lanka is largely confined to short and medium distance travel and is concentrated among middle aged and older consumers. While users generally appreciate lower operating costs and driving comfort, inadequate charging infrastructure, unreliable public charging stations, limited specialized maintenance facilities, and low awareness of government policies and battery disposal requirements have constrained broader adoption. The battery disposal and recycling sector remains at an early stage of development, operating largely on ad hoc arrangements without a formal national take back or Absence of an implemented Extended Producer Responsibility (EPR) mechanism at present.

Overall, the audit observed that while Sri Lanka has taken initial steps toward promoting electric mobility, the current EV ecosystem is constrained by policy gaps, weak institutional coordination, delayed project implementation, insufficient charging infrastructure, and the absence of comprehensive battery lifecycle management and emissions accounting systems. Without timely corrective action, these shortcomings may undermine the environmental sustainability of the EV transition and limit its contribution to national climate and development goals.

Accordingly, the audit is made recommendations for strengthening governance and effectiveness across the EV sector. These include expediting the approval of a comprehensive National Transport Policy incorporating electric mobility and environmental safeguards; establishing a formal multi agency coordination mechanism for EV governance; operationalizing enforceable regulations and tracking systems for EV battery disposal and recycling; strengthening regulatory oversight of charging infrastructure; aligning EV deployment with renewable energy expansion; prioritizing high impact vehicle segments for electrification; and developing an integrated Measurement Reporting Verification (MRV) framework for EV related GHG reductions. Implementation of these measures is essential to ensure that Sri Lanka's transition to electric mobility is environmentally sound, economically efficient, and aligned with national and international sustainability commitments.

2. Introduction and Background of the Report

2.1 Background of the Report

2.1.1 Growth of Electric Vehicles (EVs) Globally and in Sri Lanka

The global transition toward electric mobility represents one of the most transformative technological shifts in modern history. As concerns about climate change, air pollution, and fossil fuel dependency intensify, the adoption of Electric Vehicles (EVs) has gained unprecedented momentum worldwide. Although the first electric vehicle appeared around 1800, modern developments have been led by countries such as China and the United States.

According to the International Energy Agency's Global EV Outlook 2026, global electric-car production reached nearly 22 million units in 2025, representing an increase of more than 25 per cent over 2024. Approximately 16 million electric cars were produced in China, accounting for nearly 75 per cent of global production, while the European Union produced approximately 3.2 million units. Global electric-car sales exceeded 20 million units, equivalent to approximately one-quarter of all new cars sold worldwide. China recorded sales exceeding 13 million units, representing six out of every ten electric cars sold globally, while Europe recorded sales of 4.2 million units and the United States approximately 1.5 million units. Chinese manufacturers supplied around 60 per cent of global electric-car sales in 2025. Major economies such as China, the United States, Japan, and the European Union have incorporated electric mobility into their long-term national strategies for achieving net-zero emissions and reducing urban pollution. This rapid expansion reflects a collective global effort to decarbonize the transport sector and align with the objectives of the Paris Agreement* on 21st of September 2016.

In the South Asian context, countries like India and Sri Lanka are progressively embracing the transition toward cleaner transport modes. Sri Lanka's own history with electric mobility dates back to the 1970s, when the University of Moratuwa developed the 'Viduliya 1' an electric-powered van prototype. Sri Lanka's introduction of EVs dates back to around 2015 facilitated primarily by tax incentives and heightened consumer interest in sustainable alternatives. Initially concentrated in urban centers, the adoption of EVs in Sri Lanka has gradually expanded across provinces, reflecting increasing awareness of environmental protection and energy efficiency. Despite these advancements, the overall proportion of EVs remains relatively small compared to Internal Combustion Engine (ICE) vehicles, representing less than 2 per cent of total registrations as of 2024 (Department of Motor Traffic, 2024). Challenges persist in ensuring adequate charging

infrastructure, affordable financing options, standardized safety protocols, and most critically the sustainable management of used EV batteries.

**The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 195 parties at the UN climate change conference (COP21) in France, on 12 December 2015*

2.1.2. Registered Electric Vehicles in Sri Lanka (as of September 2025)

According to the Department of Motor Traffic, a total of 30,426 electric vehicles had been registered in Sri Lanka as of September 2025. Among these, electric motorcycles accounted for the highest share with 25,718 registrations, representing 84 percent of the total. Electric cars numbered 4,476, while only 205 electric three-wheelers were registered. Other categories such as dual-purpose vehicles, motor tricycle vans, single cabs, and special purpose vehicles collectively represented fewer than 30 units. This indicates that electric mobility adoption in Sri Lanka is concentrated within the two-wheeler segment, primarily driven by affordability and urban travel needs.

Table No. 01

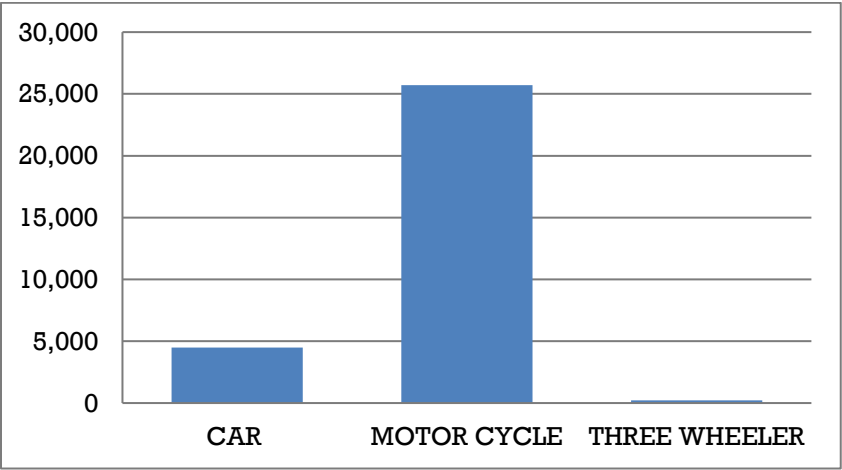
Annual Electric Vehicle Registrations

Vehicle Type	No: of vehicles
Car	4,476
Motor cycle	25,718
Three wheeler	205
Other (Dual purpose (commercial), Motor tricycle van, Single cab & Special purpose vehicle)	27
Total	30,426

Source: Department of Motor Traffic

Figure 01

Annual Electric Vehicle Registrations



Source: Department of Motor Traffic, Sri Lanka (2025)

2.1.3 Electric Vehicle Registration Trends (2020–2024)

- (a) Electric vehicle registrations in Sri Lanka have grown consistently over the past five years. Data from the Department of Motor Traffic reveal an increase from 340 registered EVs in 2020 to 12,519 in 2024. The following table summarizes the data by category and year.

Table No 02

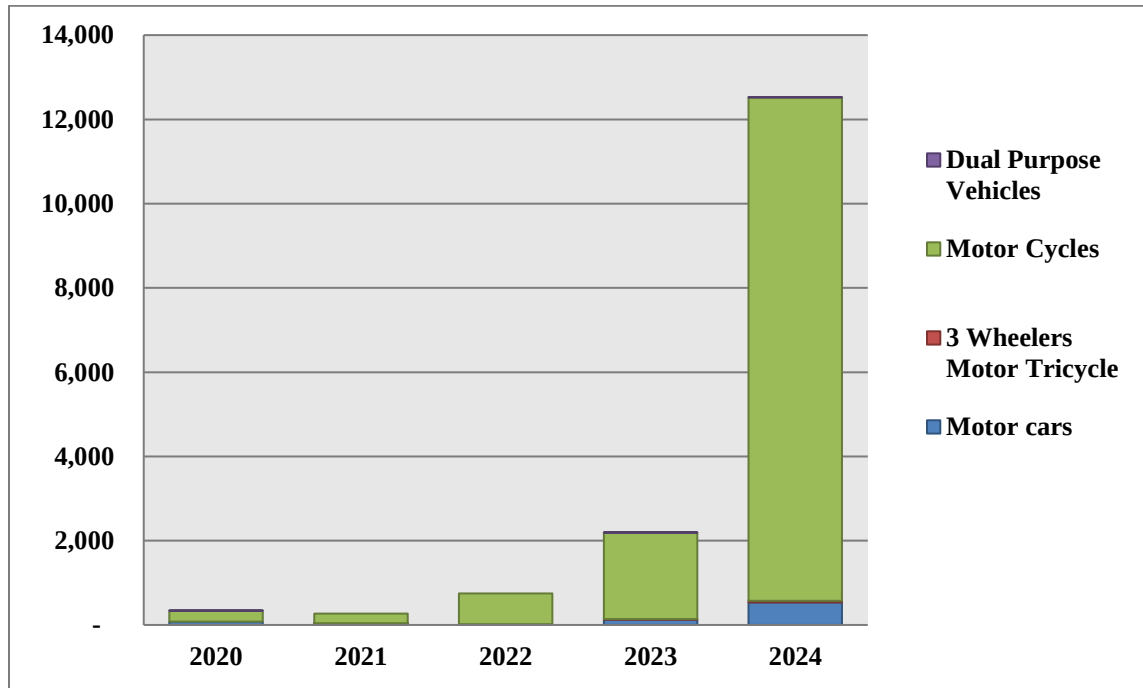
Electric Vehicle Registration annually (2020-2024)

Year	Motor Cars	Three-wheelers	Motorcycles	Dual-purpose Vehicles	Total
2020	77	-	261	2	340
2021	41	3	229	-	273
2022	17	-	728	-	745
2023	124	14	2,054	3	2,195
2024	538	32	11,948	1	12,519

Source: Department of Motor Traffic

Figure 02

Annual Electric Vehicle Registrations (2020-2024)



Source: Department of Motor Traffic, Sri Lanka (2025)

(b). The most significant growth was observed in the Western, Central, and Southern Provinces, where charging infrastructure and consumer purchasing power are comparatively higher. However, despite this upward trend, the total number of EVs remains marginal relative to the existing fleet of Internal Combustion Engine Vehicles (ICE) vehicles exceeding 4 million nationwide. This imbalance underscores the importance of continued fiscal incentives, technological innovation, and public education to foster large-scale adoption.

(c). However, according to information provided by the Department of Motor Traffic, EV registrations increased significantly in 2025 and 2026 compared with the audited period. A total of 41,443 EVs were registered in 2025, while 39,700 EVs were registered in 2026. Although these registrations fall outside the audited period, the figures have been included in this report solely to reflect the prevailing trend in EV adoption and were not subjected to detailed audit examination or verification.

2.1.4 Types of Electric Vehicles

Electric vehicles can be categorized into three main types: Battery Electric Vehicles (BEVs), Hybrid Electric Vehicles (HEVs), and Fuel Cell Electric Vehicles (FCEVs). These vehicles utilize power sources such as Lead–Acid, Nickel–Hydrogen, and Lithium-ion batteries.

- **Battery Electric Vehicles**

Battery Electric Vehicles (BEVs) are powered entirely by rechargeable batteries. These batteries include types such as lead–acid, nickel–cadmium, nickel–hydrogen, and lithium-ion batteries. BEVs are fully electric and do not rely on Internal Combustion Engines.

Example Nissan leaf, Tesla model 3, BYD Atto 3

- **Hybrid Electric Vehicles/Non Plug in hybrid**

Hybrid Electric Vehicles (HEVs) combine an Internal Combustion Engine (ICE) with an electric motor and battery system but do not require an external charging facility, as the battery is charged through the vehicle’s internal systems, including regenerative braking and the combustion engine. Toyota introduced the Prius in Japan in 1997 as the world’s first mass-produced hybrid passenger vehicle. Subsequently, other major automobile manufacturers, including Honda, Ford, General Motors, and several European manufacturers, introduced various hybrid vehicle models, contributing to the wider adoption of hybrid technology in the global automotive market.

- **Plug-in Hybrid Vehicles**

Plug-in Hybrid Electric Vehicles (PHEVs) have externally chargeable batteries that can power the vehicle for a limited distance before switching to the engine. They can also recharge the battery using electricity generated by the engine.

Examples of PHEVs include the Toyota Prius Plug-in Hybrid, Mitsubishi Outlander

- **Fuel Cell Electric Vehicles**

Fuel Cell Electric Vehicles (FCEVs) generate electricity through chemical reactions between hydrogen or methanol fuel and oxygen in the air. They produce no harmful emissions and have higher energy conversion efficiency than traditional combustion engines. FCEV technology remains under research and development globally.

Examples of FCEVs include the **Toyota Mirai** and **Hyundai NEXO**.

This environmental audit report is focused only on the Battery Electric Vehicles (BEVs/EVs)

2.1.5. National and International Policy Commitments

Sri Lanka's policy commitments toward clean energy and sustainable transport are framed within both national strategies and international environmental obligations. The country's Nationally Determined Contributions (NDCs) under the Paris Agreement outline measurable targets for reducing Greenhouse Gas (GHG) emissions by transitioning toward renewable energy and energy-efficient transport systems. In addition, the National Environmental Policy of Sri Lanka provides the overarching framework for environmental management and sustainable development. It emphasizes pollution prevention, waste minimization, conservation of natural resources, and the integration of environmental considerations into national planning and sectorial policies, including the transport and energy sectors. The National environmental Action Plan (NEAP) 2022-2030 strengthens the foundation for implementing sustainable EV adoption and responsible end-of-life battery management, reinforcing Sri Lanka's commitment to green growth and environmental protection.

At the international level, Sri Lanka became a signatory country to the Basel Convention in 1989 on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, which regulates the import, export, and recycling of hazardous materials such as used EV batteries. Additionally, under the Paris Agreement and the United Nations Sustainable Development Goals (SDGs), the country is obliged to implement climate-resilient development strategies and ensure that clean technology transitions do not compromise environmental integrity. These frameworks collectively serve as guiding principles for the audit in assessing compliance, governance, and policy effectiveness.

In October 2021, the 14th Regional Environmentally Sustainable Transport (EST) Forum in Asia adopted the Aichi 2030 Declaration on Environmentally Sustainable Transport (2021-2030), which sets out a common vision and six strategic goals for achieving universally accessible, safe, clean, low-carbon, efficient and resilient passenger and freight transport across Asia. These goals are supported by 25 operational strategies and are monitored via the Asian Transport Outlook (ATO). Although the Declaration is non-binding and open to voluntary participation by all Asian countries, it provides an important regional policy framework which Sri Lanka has formally aligned with

through its national profile in the ATO “Aichi Profiles” series — thereby situating the country’s transport-environment agenda within a broader regional commitment to sustainable mobility.

2.1.6 Institutional Framework and Key Stakeholders

The governance of Sri Lanka’s EV ecosystem involves multiple public and private institutions. Currently, the Ministry of Transport, Highways and Urban Development leads policy formulation and coordination across the transport sector. The Ministry of Environment and the Central Environmental Authority (CEA) are responsible for enforcing environmental laws and managing hazardous waste, including end-of-life batteries. The Sri Lanka Sustainable Energy Authority (SLSEA) supports policy development for renewable energy integration and energy efficiency, while the Public Utilities Commission of Sri Lanka (PUCSL) oversees electricity regulation and tariff structures for EV charging infrastructure.

The Sri Lanka Standards Institution (SLSI) is tasked with establishing national standards for EVs components, battery safety, and charging equipment. Meanwhile, private stakeholders including EV importers, dealers, recyclers, and charging network operators play critical roles in operational execution. Collaboration between these entities is vital to creating a robust and sustainable EV sector capable of balancing economic development with environmental protection.

2.1.7 Importance of Green Transport and EV Promotion

The transport sector is the second-largest contributor to Sri Lanka’s GHG emissions, accounting for nearly 30 percent of total energy-related carbon dioxide emissions (Sri Lanka Sustainable Energy Authority [SLSEA], 2023). The transition to electric mobility therefore represents a crucial pillar in national strategies for emission reduction, energy diversification, and climate change mitigation.

Electric mobility also complements the government’s renewable energy objectives. The Ceylon Electricity Board (2023) has outlined plans to achieve a 70 percent renewable electricity generation share by 2030, supported by solar, hydro, and wind energy. Integrating EVs into this renewable power system could establish a virtuous cycle: clean electricity powering clean vehicles.

2.1.8 Electricity Generation and Renewable Energy Contribution (2020–2024)

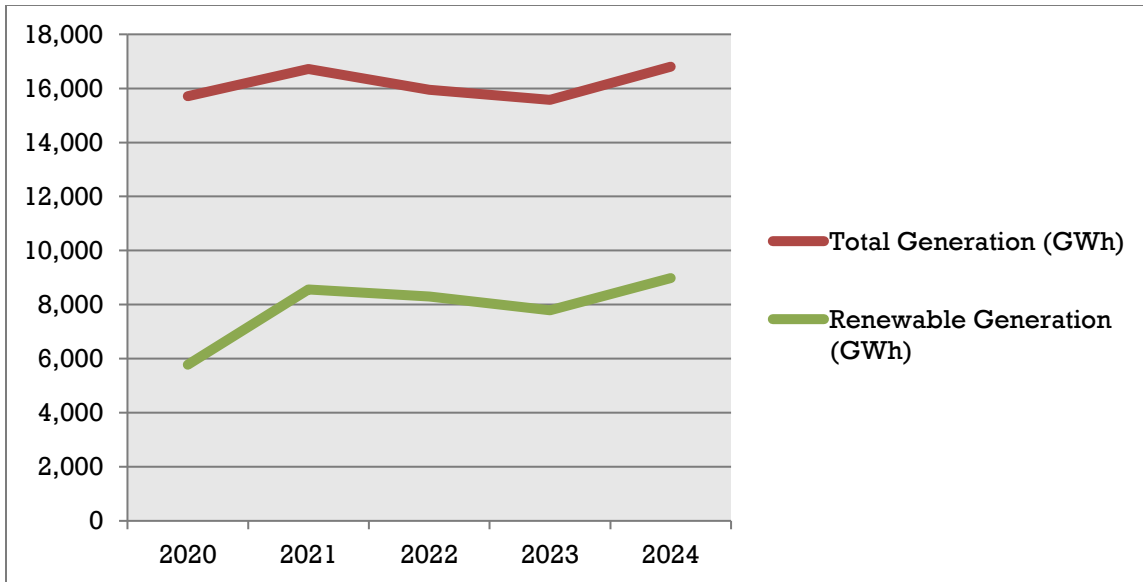
Sri Lanka’s energy mix continues to evolve toward renewable generation. Between 2020 and 2024, Sri Lanka’s electricity generation mix has shown a steady increase in renewable energy contribution, underscoring Sri Lanka’s commitment to decarbonizing its power sector. Between 2020 and 2024, total electricity generation averaged around 16,000 GWh annually, while the share of renewable sources comprising major hydro, wind, solar, biomass, and municipal waste rose from 36.8 percent in 2020 to 53.5 percent in 2024, marking a notable expansion in sustainable power supply.

Table 03
Electricity Generation and Renewable Energy Contribution (2020–2024)

Year	Total Generation (GWh)	Renewable Generation (GWh)	Renewable Share (%)
2020	15,714	5,777	36.8
2021	16,716	8,562	51.2
2022	15,942	8,301	52.1
2023	15,576	7,795	50.0
2024	16,802	8,982	53.5

Source: Ceylon Electricity Board

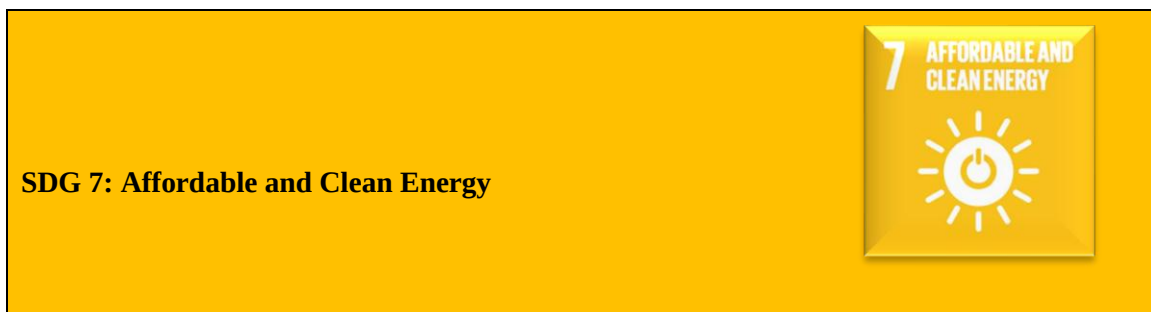
Figure 2:
Sri Lanka Electricity Generation and Renewable Contribution (2020–2024)



Source: Ceylon Electricity Board

Still hydropower continued to dominate, while solar and wind projects showed gradual expansion under government and private-sector initiatives. Despite this progress, thermal power generation remains a major component of the national energy mix, largely dependent on imported fossil fuels. The government’s long-term objective of achieving a 70 percent renewable electricity share by 2030 underscores the need for enhanced investment in renewable infrastructure, energy storage systems, and smart grid modernization to support sustainable energy transitions. Nonetheless, thermal power remains a substantial component of the grid, posing challenges for achieving full carbon neutrality in the transport sector. The environmental benefits of EV adoption are closely linked to the cleanliness of the electricity grid hence; the integration of EVs into renewable-based power systems remains a key national priority.

2.1.9 Sustainable Development Goals (SDGs) Related to Electric Vehicle (EV) Usage and Post-Usage



Relevance to EVs: Clean electricity is essential for low-emission EV charging. Energy efficiency in generation, grids, and end-use lowers lifecycle emissions of transport.

Relevant Targets:

- 7.2 : By 2030, increase substantially the share of renewable energy in the global energy mix.
- 7.3 By 2030, double the global rate of improvement in energy efficiency.
- 7.a Enhance international cooperation to facilitate access to clean energy research and technology.
- 7.b Expand infrastructure and upgrade technology for modern, sustainable energy services in developing countries.

SDG 9: Industry, Innovation and Infrastructure



Relevance to EVs: EV rollout depends on resilient, low-carbon charging and grid infrastructure. Industrial de-carbonization and clean technologies reduce upstream emissions from vehicle and battery manufacturing.

Relevant Targets:

- 9.1 Develop quality, reliable, sustainable and resilient infrastructure to support economic development and human well-being.
- 9.4 Upgrade infrastructure and retrofit industries to make them sustainable with increased resource-use efficiency and clean technologies.

SDG 11: Sustainable Cities and Communities



Relevance to EVs: Mode-shift and electrified public/urban transport reduce local air pollution and GHGs. Municipal air-quality and waste systems intersect with EV uptake and battery/waste handling.

Relevant Targets:

-  11.2 Provide access to safe, affordable, accessible and sustainable transport systems for all by 2030.
-  11.6 Reduce the adverse per capita environmental impact of cities by improving air quality and waste management.

SDG 12: Responsible Consumption and Production



Relevance to EVs: Directly relevant to EV battery supply chains, end-of-life (EoL) collection, recycling, and hazardous waste control. Public procurement and consumer information can accelerate responsible EV and battery markets.

Relevant Targets:

-  12.4 Achieve environmentally sound management of chemicals and all wastes throughout their life cycle.
-  12.5 Substantially reduce waste generation through prevention, reduction, recycling, and reuse.
-  12.6 Encourage companies to adopt sustainable practices and integrate sustainability information into reporting.

- ✚ 12.7 Promote sustainable public procurement practices in line with national priorities.
- ✚ 12.8 Ensure people have information and awareness for sustainable development and lifestyles in harmony with nature.

SDG 13: Climate Action



Relevance to EVs: Transport electrification is a core national mitigation pathway; integration into policies and NDCs is critical. Awareness and capacity help align EV strategies with mitigation and adaptation measures.

Relevant Targets:

- ✚ 13.2 Integrate climate change measures into national policies, strategies, and planning.
- ✚ 13.3 Improve education and capacity on climate change mitigation, adaptation, and early warning.
- ✚ 13.a Implement commitments for mobilizing \$100 billion annually to address developing country needs.
- ✚ 13.b Promote mechanisms for building capacity in least developed countries and small island developing States.

In addition to the SDGs directly associated with electric mobility, SDGs 3, 8 and 15 are indirectly related to electric vehicle (EV) usage and post-usage management.

SDG	Goal	Relevance to EV Usage and Post-Usage
SDG 3	GOOD HEALTH AND WELL-BEING	EV adoption can contribute to improved air quality by reducing tailpipe emissions and associated air pollutants. Accordingly, the transition to cleaner transport can support efforts

		to reduce adverse health impacts associated with transport-related air pollution.
SDG 8	DECENT WORK AND ECONOMIC GROWTH	The expansion of electric mobility can support green economic activities and employment opportunities in areas such as EV technology, charging infrastructure, vehicle maintenance, and battery services and recycling.
SDG 15	LIFE ON LAND	Environmentally sound management of used EV batteries and other hazardous components is important for preventing soil contamination and protecting terrestrial ecosystems from the adverse impacts of improper handling, storage and disposal.

2.1.10 Audit Rationale and Linkage with National Sustainability Priorities

The environmental audit on “Electric Vehicle Usage, Post-Usage, and Its Environmental Impact in Sri Lanka” is directly aligned with the nation’s long-term sustainability vision and international commitments. The rationale for the audit stems from the need to ensure that the country’s EV transition remains environmentally sound and socially equitable. The audit supports national efforts to achieve SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). It also contributes to Sri Lanka’s Vision 2040 objectives by evaluating whether current practices align with green growth principles and circular economy strategies.

2.2 Authority for Audit

The audit was carried out under my direction in pursuance of provisions in Article 154(1) of the Constitution of the Democratic Socialist Republic of Sri Lanka and provisions of the National Audit Act No.19 of 2018.

2.3 Audit Objective and Sub Objectives

The main objective of this environmental audit is to assess the overall effectiveness, adequacy of the regulatory framework, and environmental sustainability of electric vehicle (EV) usage and post-usage management in Sri Lanka, with reference to national development priorities, environmental policies and strategies, and relevant international commitments.

The sub objectives of this audit are:

- To review the current legal and regulatory framework for the usage and end-of-life management of EVs.
- To evaluate the effectiveness and environmental outcomes of projects promoting EV adoption.
- To assess the contribution of EVs to GHG emission reductions.
- To identify challenges faced by stakeholders and users in the EV industry.

2.4 Audit Approach

The topic was selected based on the following key concerns:

- **Policy and Regulatory Gaps:** There are currently no comprehensive laws and regulations governing the full lifecycle of electric vehicles, especially post-usage aspects such as battery disposal and recycling.
- **Limited Infrastructure:** EV adoption remains low due to insufficient charging stations and supporting facilities.
- **Environmental Impact of Fossil Fuels:** Greenhouse gases (GHGs) from fossil fuel usage are a major contributor to Sri Lanka's climate-related challenges. EVs are identified as a key mitigation measure.
- **Battery Waste Management Issues:** The disposal and recycling of EV batteries lack standard procedures and monitoring, posing potential environmental and health risks.
- **Government Prioritization of Green Transport:** Projects have been initiated to promote electric and hybrid vehicles, making it timely to assess their implementation and sustainability outcomes.

2.5 Scope and Limitations of the Audit

The audit covered the period from 2020 to 2025 and examined the legal, institutional, regulatory, and operational aspects of electric vehicle (EV) usage and post-usage management in Sri Lanka. The audit included a review of relevant government policies and programmes, institutional arrangements, private-sector initiatives, and the environmental implications associated with the post-usage management and disposal of EV batteries.

The audit was subject to certain limitations, including incomplete and fragmented data relating to EV battery imports, reuse, recycling, and disposal; the absence of a formal and integrated collection and tracking system for used EV batteries; and the lack of comprehensive mechanisms for monitoring hazardous waste flows. Furthermore, due to the limited availability of the required technology, technical data, and infrastructure facilities for audit assessment, the audit was unable to independently quantify the exact environmental impact and net emission benefits arising from the use of EVs compared with conventional internal combustion engine vehicles. In particular, a comprehensive lifecycle assessment covering electricity generation, vehicle operation, battery production, and end-of-life management could not be undertaken.

To mitigate this limitation to the extent possible, the audit reviewed and utilized relevant local and international research studies to assess the comparative environmental implications of EVs and conventional fuel-powered vehicles and to support the audit analysis and conclusions.

2.6 Audit Criteria

The audit has been conducted in accordance with the International Standards of Supreme Audit Institutions (ISSAIs) and the INTOSAI Working Group on Environmental Auditing (WGEA) guidelines and following sources were used.

2.6.1 Sources of Audit Criteria

- i. National Environmental Act, No. 47 of 1980
- ii. National Environmental (Protection and Quality) Regulations No. 1 of 2008
- iii. Guideline on Importation and Disposal of Used Lithium-Ion Batteries (CEA, 2020)
- iv. Technical Guidelines on Management of Used Lead Acid Batteries (CEA, 2005)
- v. National Environmental Action Plan (NEAP) 2022–2030
- vi. National Policy on Waste Management (2020)
- vii. Sri Lanka Electricity Act No. 20 of 2009

- viii. Sri Lanka Sustainable Energy Authority Act No. 35 of 2007
- ix. Motor traffic (amendment) Act, no. 8 of 2009

2.6.2 International benchmarks include;

- Basel Convention

The Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and Their Disposal was adopted in 1989. Its main purpose is to protect human health and the environment from the harmful effects of hazardous waste. It controls the movement of hazardous waste between countries and promotes its environmentally sound management. The Convention is especially relevant to the collection, transport, recycling, export and final disposal of used electric-vehicle batteries and other electronic waste.

- Paris Agreement

The Paris Agreement is an international climate agreement adopted in 2015 under the United Nations Framework Convention on Climate Change. It aims to hold the increase in the global average temperature well below 2°C above pre-industrial levels and to pursue efforts to limit the increase to 1.5°C. Expanding electric mobility, improving energy efficiency and using renewable electricity for vehicle charging can help countries reduce transport-sector emissions and achieve their national climate commitments.

- Sustainable Development Goals (SDGs)

The environmental protection, sustainable electric mobility and sound battery management contribute particularly to SDG 3 (Good Health and Well-being), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

2.6.3. National Research Papers;

- i. *Gajanayake, S., Thilakshan, T., Sugathapala, T., & Bandara, S. J. (2020). Study of the impact of electric vehicles on fuel consumption and carbon dioxide emission scenarios in Sri Lanka. In MERCon 2020: Moratuwa Engineering Research Conference*
- ii. *Saranjan, P., Thilakshan, T., & Bandara, J. M. S. J. (2023). Analyzing key determinants affecting electric vehicle adoption in Sri Lanka: A comprehensive evaluation. In MERCon 2023: Moratuwa Engineering Research Conference*

2.6.4. International Research Papers

- i. Nikzad et al. (2024) – *Well-to-Wheel Energy Consumption and CO₂ Emission Comparison of Electric and Fossil Fuel Buses*
- ii. Shen & Han (2013) – *Well-to-Wheel Analyses for Energy Consumption and GHG Emissions of Electric Vehicles*

2.7 Audit Methodology

The audit was conducted comprising qualitative and quantitative procedures to obtain sufficient and appropriate audit evidence.

No.	Audit Methodology	Application to the EV Audit
1	Document Review	Review of legislation, regulations, national policies, strategic plans, institutional records, standards, guidelines and other relevant documents relating to EV usage, charging infrastructure, renewable energy and battery disposal.
2	International Commitments and Good Practices Review	Review of relevant international frameworks, including the Paris Agreement, Basel Convention and Sustainable Development Goals.
3	Data Analysis	Analysis of available data relating to EV registrations and imports, charging infrastructure, electricity and energy aspects, battery imports and vehicle registrations.
4	Stakeholder Interviews and Discussions	Interviews and discussions with responsible institutions and officials to understand regulatory responsibilities, implementation progress, operational issues and constraints.
5	EV User Survey through structured Questionnaires	Survey of 190 battery electric vehicle (BEV) users to obtain primary evidence on charging facilities, maintenance difficulties, user experience, policy awareness and related practical issues.
6	Physical Inspections / Site Visits	Physical inspection of selected EV charging stations to assess operational status, accessibility, safety arrangements, signage, user guidance and infrastructure conditions.

Review of relevant local and international studies on EV adoption, energy consumption, fuel displacement, greenhouse-gas emissions and environmental impacts.

3 Audit Observations

3.1 Objective 1: To Review the Legal and Regulatory Framework on Electric Vehicle Usage, Post Usage and Its Environmental Impact

3.1.1 National Environmental Act No. 47 of 1980

The Central Environmental Authority (CEA), established under the National Environmental Act No. 47 of 1980, is responsible for regulating the environmentally sound management of hazardous waste, including post-usage electric vehicle (EV) batteries. The audit observed that used or off-specification batteries have been classified as scheduled waste under the National Environmental (Protection and Quality) Regulations, No. 1 of 2008 (Waste Codes S261 and S262), and that hazardous waste is currently managed through 14 number of CEA-licensed e-waste collectors.

However, the audit observed that the existing arrangements have not yet been supported by a comprehensive regulatory and monitoring framework specifically designed for the anticipated increase in end-of-life EV batteries. In particular, the guideline prepared on the importation, handling, transportation, storage, recycling and disposal of used lithium-ion batteries had not yet been gazetted and implemented, while a centralized system for tracking EV batteries throughout their life cycle had not been established. In the absence of such mechanisms, effective monitoring of battery collection, movement, recovery and final disposal cannot be adequately ensured as EV adoption increases. These gaps may increase the risk of informal handling and environmentally unsound disposal practices in the future, potentially leading to soil and water contamination and undermining the long-term environmental sustainability objectives of the country's electric mobility programme.

3.1.2 National Environmental Action Plan (NEAP)

a) Policy and Strategic Framework

The NEAP 2022–2030 establishes an overarching framework for achieving sustainable environmental management in Sri Lanka, with Theme 1, focusing on Air Quality Management and Strategy 6 emphasizing the promotion of electric mobility. The audit observed that while the NEAP recognizes the importance of electric mobility in reducing air pollution and greenhouse gas emissions, implementation progress remains slow. Although, the NEAP outlines specific actions under Theme 1 – Strategy 6.1 to 6.4, such as developing an Electric Mobility Action Plan, introducing emission-free transport modes, and integrating renewable energy sources, these initiatives are yet to be fully operationalized. The lack of a defined implementation roadmap and measurable performance indicators has limited progress toward achieving the NEAP’s transport-sector environmental targets.

b) Implementation of E-Mobility Action Plan

The audit examined the implementation of Theme 1 - Strategy 6.2 which aims to promote local manufacturing capabilities. It was observed that the Global Environment Facility (GEF) funded Electric Mobility Project, which intended to serve as a pilot initiative, faced prolonged administrative delays and coordination challenges between the Ministry of Environment and the Ministry of Transport. Additionally, there has been limited development of energy efficiency labeling or regulatory frameworks to assess the environmental performance of imported EVs, contrary to the NEAP’s expectations under Strategy 6.4. These weaknesses indicate a lack of inter-ministerial coordination for achieving NEAP objectives.

c) Institutional Coordination and Responsibility Gaps

The audit identified persistent institutional gaps between the Central Environmental Authority (CEA), Sustainable Energy Authority (SEA), and Public Utilities Commission of Sri Lanka (PUCSL) regarding their respective mandates in EV waste regulation, charging infrastructure, and renewable integration.

The Cabinet Decision No. 24/1175/608/054 of 2024 July 10 directed the formation of a coordination committee, implementation of this decision remains pending. This has resulted in duplication of functions, inconsistent policy enforcement, and weak accountability structures. However, as of the audit date, no inter-agency mechanism has been formalized to oversee EV battery lifecycle management.

d) Environmental and Operational Risks

The audit observed that the absence of a national system for EV battery collection, storage, and recycling poses significant environmental risks. As defined in the National Environmental (Protection and Quality) Regulations No. 1 of 2008, used EV batteries fall under scheduled waste categories S261 and S262. However, due to the lack of domestic recycling facilities, used batteries are either stored informally or exported to foreign facilities at high cost. This practice contradicts the NEAP's call for resource recovery and circular economy integration (NEAP 2022–2030, Theme 1 – Strategy 6.4). If unaddressed, this dependency on foreign recycling could undermine long-term sustainability, increase environmental hazards, and constrain the achievement of SDG 12.4 on responsible waste management.

3.1.3 National Transport Policy

A coherent National Transport Policy (NTP) is essential for ensuring the sustainable, safe, and efficient movement of people and goods within Sri Lanka. It forms the guiding framework for strategic decisions relating to land transport, public transport systems, multimodal mobility, transport emissions, the adoption of electric vehicles (EVs), infrastructure development, and long-term sectorial investments. As the line Ministry responsible for the transport sector, the Ministry of Transport (MOT) bears the primary mandate to formulate, update, and implement national-level transport policies in accordance with national development priorities.

Due to evolving transport technologies including EV penetration, smart mobility, charging networks, energy storage, and AI-enabled transport systems, the Ministry is expected to periodically review and revise the National Transport Policy to ensure relevance and responsiveness. Following observations are made in this regard.

(a) Absence of an Updated National Transport Policy

Audit revealed that Sri Lanka does not currently have an approved, updated National Transport Policy that comprehensively addresses the present transport challenges, including:

- Integration of electric vehicle usage
- Regulation of post-usage EV waste and battery recycling
- Modernization of public transport
- Long-term infrastructure requirements for sustainable mobility
- Mapping of emission reduction pathways within the transport sector

Although draft policy documents have been prepared at different times (e.g., draft National Transport Policy 2009, later revisions), none have been approved by Cabinet or published for implementation during the period under review.

The absence of an approved national transport policy has resulted in: fragmented and uncoordinated EV introduction efforts, overlapping mandates between ministries and agencies, inconsistent charging infrastructure planning and delays in establishing technical standards for EV safety and grid integration.

This has limited the effectiveness of projects promoting electric mobility, including donor-funded initiatives such as GEF-supported e-mobility pilots.

b) Weak Inter-Agency Coordination

Without a formal policy framework, coordination between transport, power, energy, and environment sector institutions remains ad hoc. Key areas affected include:

- Planning of nationwide charging infrastructure
- Integration of renewable energy into transport electrification
- Monitoring of transport-sector emissions
- Ensuring safety and regulatory compliance of EV imports

3.1.4 National Policy on Waste Management (2020)

Following observations are made.

Ineffective Implementation of the National Policy on Waste Management in Regulating Post-Usage Electric Vehicle Batteries

The National Policy on Waste Management (2020) establishes a comprehensive framework for the environmentally sound management of waste, including electronic and hazardous waste, with the objective of developing integrated systems for collection, recycling, and disposal by 2030. However, the audit observed that, during the period under review, the policy had not been effectively operationalized with respect to the management of post-usage electric vehicle (EV) batteries. Specifically, measurable performance targets, operational mechanisms, and an integrated institutional framework for the collection, recycling, tracking, and environmentally sound disposal of used EV batteries had not been established, while coordination among the responsible agencies remained limited. Although the newly enacted **National Environment (Amendment) Act No. 15**

of 2026 provides the legal framework for implementing an **Extended Producer Responsibility (EPR)** system, with regulations being developed to cover used EV batteries, establish a national life-cycle tracking system, and impose legal obligations on producers and importers for environmentally sound battery management, these measures were still at the implementation stage during the audit period. Consequently, the absence of an operational regulatory and monitoring framework continued to expose the country to the risk of improper handling and environmental contamination arising from future lithium-ion battery waste.

3.1.5 Regulatory Framework for Electric Vehicle Charge Point Operators (CPOs)

Following observations are made in this regard.

a) Incomplete Implementation of PUCSL Mandate:

The audit observed that, although the Public Utilities Commission of Sri Lanka (PUCSL), under the Sri Lanka Electricity Act, No. 20 of 2009, has established a regulatory framework requiring Electric Vehicle Charge Point Operators (CPOs) to obtain Certificates of Exemption and comply with the Code of Practice and other regulatory directions issued by the Commission, several key regulatory measures required for effective oversight remained incomplete during the audit period. While Codes of Practice for Charge Point Operators and Charging Station Operations had been introduced, a national register of charging stations, end-user tariff framework, and a regular data collection and monitoring system had not yet been established. As a result, the expanding EV charging sector continued to operate without comprehensive regulatory oversight, standardized pricing mechanisms, and an effective monitoring framework, limiting the Commission's ability to ensure consistent service quality, consumer protection, and safety standards.

b) Delay in Licensing and Exemption Procedures for EV Operators:

The PUCSL's enforcement of licensing and exemption provisions for Charge Point Operators (CPOs), as authorized under Section 10(i) of the Electricity Act, was significantly delayed. Although the law has been in effect since 2009, formal certification procedures were introduced only in March 2025, resulting in minimal compliance only two certified operators by August 2025. The delay stemmed from inadequate administrative follow-up, unclear processes, and weak stakeholder communication. This regulatory gap allowed unlicensed charging stations to proliferate, exposing consumers to unregulated pricing and safety risks.

3.1.6 Corporate Plan (2021–2025) of Sri Lanka Sustainable Energy Authority

Following observations are made in this regard.

The audit observed that, although the Sri Lanka Sustainable Energy Authority (SLSEA), established under the Sustainable Energy Authority Act, No. 35 of 2007, had recognized electric mobility as a strategic priority in its Corporate Plan (2021–2025) and initiated measures such as inviting private sector Expressions of Interest (EOI) for solar-assisted EV charging stations and engaging with development partners to implement pilot projects, these initiatives had not progressed to implementation during the audit period. The Authority attributed the delay to the absence of a comprehensive regulatory framework, funding constraints, evolving institutional responsibilities, and the limited readiness of the national electricity system to support renewable energy-based EV charging. Consequently, the integration of renewable energy with EV charging infrastructure remained limited, delaying the realization of the long-term environmental and energy security benefits envisaged under the national sustainable energy objectives.

3.1.7 Industrial Policy of Sri Lanka

Following observations are made in this regard.

The audit observed that, although the Ministry of Industry and Entrepreneurship Development, as the lead agency responsible for industrial policy, had taken initiatives to promote the domestic electric vehicle (EV) industry, including the introduction of Standard Operating Procedures (SOPs) for vehicle assembly and component manufacturing since 2021, the preparation of national specifications for electric vehicles, and collaboration with relevant agencies on EV manufacturing, charging infrastructure, and battery disposal, these measures had not been fully operationalized during the audit period. In particular, a comprehensive regulatory and incentive framework to promote EV component manufacturing, battery recycling, and circular economy practices had not yet been established. Consequently, industrial participation in the EV value chain remained limited, constraining the country's ability to attract sustainable investment and develop a competitive green manufacturing ecosystem.

3.1.8 Regulation of the Import and Export of Vehicles, Batteries and Related Components

Following observations are made in this regard.

The Department of Import and Export Control, governed by the Import and Export Control Act No. 1 of 1969, is responsible for regulating the importation and exportation of vehicles, batteries, and

related components. The audit found that while the Department exercises control over the import of conventional vehicles and hazardous substances, no distinct licensing category or Harmonized System (HS) code exists for new or used electric vehicle batteries. This regulatory gap undermines the ability to monitor the importation of used EV batteries, which pose environmental risks if not properly managed. The absence of specific licensing requirements for EV batteries and components also limits coordination with the Central Environmental Authority and Customs Department, resulting in weak traceability of hazardous waste imports and exports. If the Department of Import and Export Control, in collaboration with the Ministry of Environment and the Department of Customs has established a separate HS classification for EV batteries and implement mandatory licensing requirements to ensure environmentally sound importation and exportation practices, traceability could have been improved.

3.1.9 National Standards of Sri Lanka Standard Institution

Following observations are made in this regard.

The audit observed that, although the Sri Lanka Standards Institution (SLSI), established under the Sri Lanka Standards Institution Act, No. 6 of 1984, had adopted and published **37 national standards** covering key aspects of electric vehicle (EV) charging systems, including conductive charging, charging connectors, wireless power transfer, battery swapping systems, information exchange, and vehicle-to-grid (V2G) communication, comprehensive national standards for EV batteries, charging infrastructure quality, end-of-life battery management, and recycling processes had not yet been fully established during the audit period.

3.1.10 Integrated Data Management System of Department of Motor Traffic

Following observations are made in this regard.

The Department of Motor Traffic (DMT), established under the Motor Traffic Act No. 14 of 1951, oversees vehicle registration, licensing, and roadworthiness certification in Sri Lanka. The audit observed that while the DMT maintains separate registration categories for hybrid and electric vehicles, it does not have an integrated data management system to track the operational life cycle, de-registration, or post-usage phase of EVs. The lack of a vehicle life-cycle database prevents the systematic monitoring of battery replacement, reuse, and end-of-life disposal. Furthermore, the absence of linkages between DMT records and environmental regulatory agencies has created an information gap that undermines national efforts to manage EV waste sustainably.

3.2 Objective 2: Evaluation of the Effectiveness and Environmental Outcomes of Projects Promoting Electric Vehicle Adoption

3.2.1 “Sustainable and Efficient Electric Mobility System in Sri Lanka” (GEF–07)

The Sustainable and Efficient Electric Mobility System in Sri Lanka project is a collaboration between the United Nations Environment Programme (UNEP) and the Global Environment Facility (GEF) (Project ID: GEF-10651). The project, approved on 16 September 2022, seeks to reduce greenhouse gas (GHG) emissions, air pollutants, and fossil fuel dependency by accelerating electric mobility in Sri Lanka. The total project cost amounts to USD 9.65 million, with GEF funding of USD 1.096 million and co-financing of USD 8.4 million from the Ministries of Transport, Power and Energy, and Petroleum. Following initial implementation under the Ministry of Environment, administrative control was transferred to the Ministry of Transport and Highways in January 2024, after Cabinet approval (Cabinet Memorandum No. 24/1175/608/054 of 13 June 2024).

The project comprises three key components:

- i) Establishing an Integrated Policy and Institutional Framework for electric mobility, including a national strategy, fiscal policy consolidation, and monitoring system;
- ii) Deployment of Electric Mobility Infrastructure and Demonstration Activities, including policy formulation for charging infrastructure, battery management, and an electric bus pilot in Colombo; and
- iii) Capacity Building and Public Awareness, focusing on training programs, public campaigns, and knowledge dissemination on e-mobility benefits.

The project targets an estimated reduction of over 2.3 million metric tons of CO₂ (direct and indirect) and aims to benefit 990 individuals (590 women and 400 men) through direct participation.

Following observations are made in this regard.

Delayed Implementation and Weak Institutional Coordination

- i. The audit observed that although the Sustainable and Efficient Electric Mobility System project has significant potential to support national climate change goals, its implementation progress has been slow and fragmented. Despite project approval in September 2022 and subsequent

administrative arrangements through 2023, the project activities have yet to transition to the operational phase.

- ii. The transfer of project responsibility between ministries, absence of a functional coordination mechanism, and delayed finalization of the Project Cooperation Agreement (PCA) contributed to the postponement of key activities, including the electric bus demonstration and establishment of the intersectoral coordination body.
- iii. Further, the lack of clear accountability among implementing partners, insufficient technical staffing within the line ministries, and absence of a defined monitoring framework have constrained timely progress. As a result, the anticipated GHG mitigation outcomes, fiscal policy reforms, and infrastructure development remain unrealized, thereby undermining the project's effectiveness in supporting Sri Lanka's Nationally Determined Contributions (NDCs) and Sustainable Development Goals (SDGs 7, 11, and 13).

3.2.2 Electric Bus Deployment Project

According to the Cabinet Memorandum on the Introduction of Electric Buses (2023) and the Government's Vision for Sustainable Transport Modernization, the Ministry of Transport was required to procure 200 electric buses for the Sri Lanka Transport Board (SLTB), Centralizing operations in the Colombo Metropolitan Region and Gampaha District. The project sought to reduce fuel imports, mitigate air pollution, and enhance the sustainability of the national public transport fleet.

Following observations are made in this regard.

- a) The audit revealed that despite cabinet approval and the publication of a Request for Proposals (RFP), the Ministry of Transport and SLTB failed to implement the project within the expected timeframe. Out of the ten bidders who purchased RFP documents, only one bidder submitted a proposal; this was later disqualified due to a fraudulent performance bond. Consequently, the procurement process was terminated on 20 July 2024, and as of 27 October 2025, no action had been taken to re-initiate or finalize the purchase and deployment of electric buses.
- b) Weak procurement governance and inadequate due diligence during the evaluation of bidders resulted in non-compliance with procurement regulations. The absence of contingency procurement strategy, coupled with poor inter-agency coordination between the Ministry of Transport, Treasury, and SLTB, further delayed implementation.

3.3. Objective 3: To assess the contribution of EVs to GHG emission reductions

3.3.1. Sri Lankan Research Studies

Following are the observation tables derived from two main research studies examining the contribution of electric vehicles to greenhouse gas (GHG) emission reductions.

I Gajanayake et al. (2020)

Observation	Criteria	Condition	Cause	Effect	Recommendation
Quantified potential from two-wheeler electrification	Sri Lanka's climate commitments under the Paris Agreement and National Climate Change Policy (NCCP). Determined by the contribution of two-wheelers (NDCs).	Electrification of two-wheelers can reduce per-vehicle CO ₂ emissions by approximately 65.7% relative to ICE two-wheelers; estimated 207.5 kg CO ₂ /year for E2W vs. ~605 kg CO ₂ /year for ICE using 0.83 kg	Low EV penetration and limited policy instruments targeting mass two-wheeler segments.	Delayed carbonization in the dominant vehicle category and missed opportunity for high-impact, low-cost GHG abatement.	Accelerate E2W adoption through fiscal incentives, concessional finance, and renewable-linked charging programs with annual GHG reduction targets.

		CO ₂ /kWh grid factor.			
Three-wheeler transition yields material national benefits	Alignment with NDC transport-sector mitigation and SDG 13.	Electrifying three-wheelers can reduce CO ₂ by ~63.7% per vehicle; 10–30% penetration provides substantial national emission reductions.	Absence of an E3W conversion/retirement roadmap, limited charging access, and inadequate financing tools for fleet turnover.	Continued high emissions from a vital public transport mode and sustained fuel expenditure.	Implement an E3W transition plan with concessional loans, scrappage/retrofit incentives, depot fast-charging, and GHG data monitoring.
Grid-emission factor determines net EV climate benefits	Coherence with the National Energy Policy and power-sector decarbonization pathways.	Sri Lanka's grid emission factor (~0.83 kg CO ₂ /kWh) limits net EV climate gains though EVs outperform ICE vehicles in efficiency.	Slow renewable energy integration and grid constraints in transmission and distribution systems.	Sub-optimal well-to-wheel GHG outcomes and uncertainty in national emission-reduction trajectories.	Link EV roll-out to renewable integration via time-of-use tariffs, rooftop solar charging, and annual grid-EF updates for verified accounting.

Reference (APA):

Gajanayake, S., Thilakshan, T., Sugathapala, T., & Bandara, S. J. (2020). Study of the impact of electric vehicles on fuel consumption and carbon dioxide emission scenarios in Sri Lanka. In MERCon 2020: Moratuwa Engineering Research Conference IEEE. <https://doi.org/10.1109/MERCon50084.2020.9185248>

II Saranjan et al. (2023)

Observation	Criteria	Condition	Cause	Effect	Recommendation
Adoption constraints slow GHG abatement progress	EV promotion objectives under national transport and energy policies.	Survey results (2023) show key adoption factors as performance, charging infrastructure, and cost of ownership over subsidies.	Insufficient fast-charging coverage, limited home-charging facilities, and user knowledge gaps on safety and battery health.	Slower EV adoption and deferred realization of projected emission reductions.	Focus policy measures on infrastructure readiness, performance-based incentives, and user awareness on charging safety and maintenance.
	Measurement, reporting, and verification (MRV) framework gaps	Good governance and NDC tracking requirements .	No standardized national MRV protocol exists linking EV registration, mileage, grid-EF data, and battery lifecycle tracking.	Fragmented institutional responsibilities across power, transport, and environment agencies.	Weak accountability for emission reduction claims and limited policy evidence base.
					Establish an inter-agency MRV framework integrating fleet, mileage, grid EF, and lifecycle data, with annual audited EV GHG accounts.

Reference (APA):

Saranjan, P., Thilakshan, T., & Bandara, J. M. S. J. (2023). Analyzing key determinants affecting electric vehicle adoption in Sri Lanka: A comprehensive evaluation. In MERCon 2023: Moratuwa Engineering Research Conference (pp. 788–792). IEEE. <https://doi.org/10.1109/MERCon60487.2023.10355410>

Following observations are made in this regard.

a) Low Penetration of High-Impact EV Segments Delays National Emission Reductions

According to the research findings, audit noted that Sri Lanka continues to experience low penetration of electric two-wheelers and three-wheelers despite these segments representing the highest potential for cost-effective carbon mitigation. Nationally Determined Contributions (NDCs) and related national transport-sector decarbonisation policies emphasise the need for rapid transition in these vehicle categories.

However, evidence shows that electrifying two-wheelers can reduce per-vehicle CO₂ emissions by approximately 65.7 percent, while electrifying three-wheelers yields emission reductions of around 63.7 percent. Although the environmental benefits are substantial, adoption remains minimal, primarily due to the absence of targeted fiscal incentives, a lack of a well-structured national conversion or retirement programme for three-wheelers, and inadequate charging facilities suitable for low-income and taxi-sector users.

As a result, Sri Lanka is missing a highly impactful mitigation opportunity in its dominant vehicle categories, delaying national GHG reductions and prolonging dependence on imported fossil fuel.

b) Grid Emission Factor Limits the Full GHG Benefits of EV Expansion

According to the research findings, audit observed that Sri Lanka's grid emission factor, estimated at approximately 0.83 kg CO₂ per kWh, significantly limits the overall climate benefits of transitioning to electric vehicles. While EVs remain more energy-efficient than internal combustion engine vehicles, their net carbon advantage is restricted by the carbon intensity of the national electricity grid.

This condition arises from delays in renewable energy integration, grid modernization constraints, and insufficient transmission infrastructure to support large-scale renewable deployment. Consequently, the national decarbonization trajectory remains uncertain, and EV adoption does not yield the full mitigation benefits achievable under a cleaner grid.

c) Lack of a Robust Measurement, Reporting and Verification (MRV) Framework for EV-related Emission Reductions

According to the research findings, audit found that Sri Lanka lacks a comprehensive MRV system capable of tracking real-world emission reductions attributable to the uptake of electric vehicles. Although responsibilities for EV-related data collection are distributed among various institutions including the Department of Motor Traffic, the Ceylon Electricity Board, the Sustainable Energy Authority, and the Ministry of Environment; there is no integrated platform that consolidates vehicle registration, mileage, energy consumption, charging patterns, and battery lifecycle data.

This fragmentation results in inconsistent or incomplete datasets, making it difficult for the Government to accurately quantify emission reductions for NDC reporting. It also poses a risk of under- or over-estimating national EV-related climate benefits.

d) Inadequate Charging Infrastructure Slows EV Adoption and GHG Realization

According to the research findings, audit observed that charging-infrastructure limitations remain one of the most significant barriers impeding the growth of EV adoption in Sri Lanka. Survey findings highlight that users place strong emphasis on performance reliability, availability of convenient charging facilities, and predictable lifetime operating costs. Yet, the existing network of fast-charging stations is sparse, unevenly distributed, and insufficient to meet growing demand.

Additionally, the lack of clear regulatory guidance for home-charging installation and limited public awareness on battery health and safe charging practices further discourage potential EV buyers. These conditions collectively slow the transition towards EVs, delay the realisation of national emission-reduction benefits, and create potential safety risks.

3.3.2. International Research Studies

Following are the observation tables derived from two main international research studies examining the contribution of electric vehicles to greenhouse gas (GHG) emission reductions intentionally.

I. Shen & Han (2013)

Observation	Criteria	Condition	Cause	Effect	Recommendation
Well-to-wheel performance of EVs depends primarily on power-sector efficiency.	Alignment with Paris Agreement, National Energy Policy, and global WTW emission accounting practices.	Study finds that common BEVs in coal-dominated grids can have 11–77% higher WTW GHG emissions than gasoline cars; only high-efficiency BEVs using advanced coal technologies (USC/IGCC + CCS) achieve significant	Electricity generation is predominantly coal-based older, low-efficiency plants, high transmission losses, and limited CCS deployment.	EVs may not deliver net emission reductions under fossil-dependent grids, creating sub-optimal national GHG outcomes.	Link EV roll-out to clean electricity expansion, enforce grid-emission-factor baselines, and prioritize high-efficiency EV models with mandatory WTW assessments.

	reductions (up to 83% lower).
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Source: Shen & Han (2013) – Well-to-Wheel Analyses for Energy Consumption and GHG Emissions of Electric Vehicles

II. Nikzad et al. (2024)

Observation	Criteria	Condition	Cause	Effect	Recommendation
Electric buses provide low TTW emissions but limited WTW climate gains under fossil-heavy grids.	Consistency with SDG 11, SDG 13, and national low-carbon mobility frameworks.	Electric buses show low TTW energy use (7.1 MJ/km) and zero tailpipe CO ₂ , but WTW CO ₂ reaches ~1,367 g/km under Iran’s 92% fossil electricity mix—comparable to diesel and CNG buses.	Highly fossil-dependent power generation, minimal renewable share (<1%), and high transmission losses (13.2%).	Electric buses do not yield meaningful national GHG reductions without renewable expansion, potentially undermining climate commitments.	Increase renewable electricity supply, promote solar-linked depot charging, and use WTW-based fleet planning benchmarks.

Source: Nikzad et al. (2024) – Well-to-Wheel Energy Consumption and CO₂ Emission Comparison of Electric and Fossil Fuel Buses

Following observations are made in this regard.

- a) The audit highlights that international research consistently demonstrates the dependency of electric vehicle (EV) climate benefits on the carbon intensity and efficiency of national power systems. Evidence from Shen & Han (2013) shows that well-to-wheel (WTW) GHG emissions from battery electric vehicles can exceed those of gasoline vehicles by 11–77 percent in coal-dependent grids, due to outdated generation technologies, high transmission losses, and the absence of carbon-capture systems. Only in scenarios where advanced technologies such as ultra-supercritical plants, integrated gasification combined cycle systems, or carbon-capture and storage are deployed do EVs achieve substantial reductions up to 83 percent lower than internal combustion vehicles. Similarly, research by Nikzad et al. (2024) finds that although electric buses achieve zero tailpipe emissions and lower tank-to-wheel energy use, their well-to-wheel emissions remain high approximately 1,367 gCO₂/km under fossil-heavy electricity systems such as Iran’s 92-percent thermal grid.
- b) These findings underscore that EV deployment alone does not guarantee meaningful GHG reductions unless supported by parallel reforms in electricity generation. The combined international evidence suggests that Sri Lanka’s EV strategy must be directly aligned with renewable-energy expansion, adoption of grid emission-factor baselines, and enforcement of well-to-wheel assessment standards for all future EV fleets, including public transport. Strengthening the power sector’s renewable share, reducing transmission losses, and integrating solar-based charging particularly for depots and high-utilization fleets are essential to ensure that EV roll-out contributes effectively to national climate commitments and avoids sub-optimal environmental outcomes.

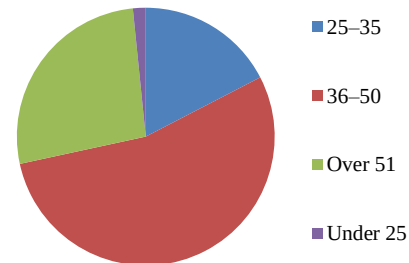
3.4 Objective 4: Challenges Faced by EV Users and Battery Disposal Industry

3.4.1 Challenges Faced by Electric Vehicle Users in Sri Lanka

This section summarises the key challenges faced by electric vehicle (EV) users in Sri Lanka, based on the survey of 190 BEV users. Both quantitative and qualitative user feedback were analysed using Statistical Package for the Social Sciences (SPSS) to understand demographic patterns, usage behavior, charging difficulties, maintenance challenges, policy awareness, and user satisfaction. Analysis of the results in SPSS are shown below.

(a) Demographic Profile of Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 25–35	33	17.4	17.4	17.4
36–50	103	54.2	54.2	71.6
Over 51	51	26.8	26.8	98.4
Under 25	3	1.6	1.6	100.0
Total	190	100.0	100.0	

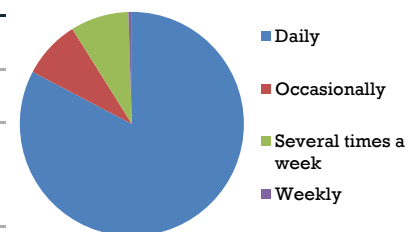


The data indicate that the majority of EV users fall within the 36–50 age group (54.2%), followed by those over 51 years (26.8%). Users under 35 represent only 19%, showing that EV adoption is concentrated among middle-aged and senior consumers.

(b) Vehicle Usage Patterns

i. Frequency of EV Use:

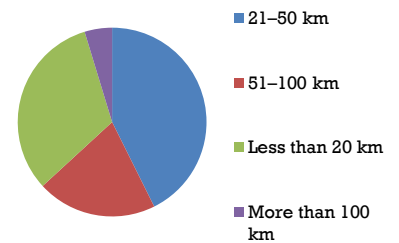
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Daily	157	82.6	82.6	82.6
Occasionally	16	8.4	8.4	91.1
Several times a week	16	8.4	8.4	99.5
Weekly	1	.5	.5	100.0
Total	190	100.0	100.0	



A large majority (82.6%) use their EVs daily, indicating that BEVs serve as the primary mode of transport for most respondents.

ii. Average Daily Driving Distance in Kilometers(Km):

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21–50 km	81	42.6	42.6	42.6
	51–100 km	39	20.5	20.5	63.2
	Less than 20 km	61	32.1	32.1	95.3
	More than 100 km	9	4.7	4.7	100.0
	Total	190	100.0	100.0	

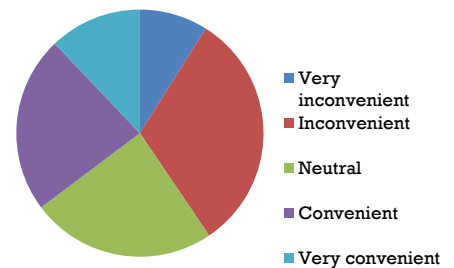


Most users (74.7%) drive 50 km or less per day, showing that EV usage in Sri Lanka mainly supports short to medium-distance travel.

(c) Charging Experience and Infrastructure Challenges

i. Charging Convenience

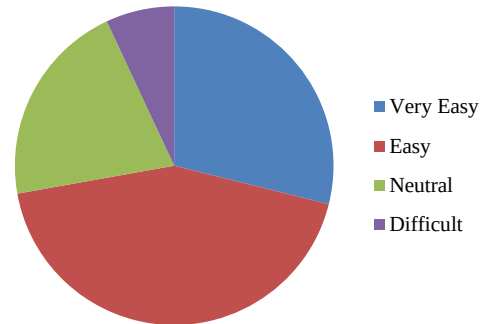
Charging Convenience Rating	Frequency	Percent	Valid Percent	Cumulative Percent
Very inconvenient	17	8.9	8.9	8.9
Inconvenient	60	31.6	31.6	40.5
Neutral	46	24.2	24.2	64.7
Convenient	44	23.2	23.2	87.9
Very convenient	23	12.1	12.1	100.0
	190	100.0	100.0	



Although, 87% find overall EV use convenient, charging convenience scores were significantly lower. Qualitative feedback revealed long queues, unreliable chargers, grid outages, and limited fast-charging options.

ii. Maintenance and Service Challenges

Maintenance Difficulty	Frequency	Percent
Very Easy	54	28.4%
Easy	81	42.6%
Neutral	39	20.7%
Difficult	13	7.9%



Users generally find EV maintenance easy (71%). However, access to specialised EV repair centres remains a major issue, with qualitative comments highlighting long wait times, lack of trained technicians, and unavailability of parts.

(d) Low Awareness of EV Policies and Incentives

Only 27% of respondents were aware of government policies, tax concessions, or environmental initiatives supporting EV adoption. Many users expressed uncertainty about future regulations, battery disposal rules, or warranty obligations.

(e) Overall User Satisfaction

While driving comfort and running cost savings were appreciated, concerns were expressed regarding battery degradation, charging time, and service network limitations. The average satisfaction score was 3.2 out of 5.

Following observations are made from the above results.

- (i) The audit noted that electric vehicle (EV) adoption in Sri Lanka is concentrated mainly among middle-aged and older users, with limited penetration among younger consumers, reflecting constraints arising from high upfront costs, limited financing options, and low awareness of long-term benefits.

- (ii) Although EVs serve as the primary mode of daily transport for most respondents, usage remains largely confined to short and medium-distance travel due to range anxiety, limited inter-city charging infrastructure, and concerns surrounding battery degradation.
- (iii) User experience is further hindered by inadequate charging infrastructure, where many reported long queues, unreliable stations, and power interruptions, resulting in reduced confidence and slower progress toward national EV mobility goals.
- (iv) Maintenance was generally perceived as easy; however, the absence of specialized service centers, trained technicians, and reliable parts supply chains poses operational risks and extends vehicle downtime.
- (v) Awareness of government policies, incentives, and regulatory requirements including battery disposal and warranty obligations was found to be significantly low, increasing the likelihood of misuse, misinformation, and under-utilization of available benefits.

3.4.2 Challenges Faced by Battery Disposal Industry

- (a) The audit observed that Sri Lanka's industry for managing post-usage electric vehicle (EV) batteries remains at an early stage of development. Field discussions and inspection at a private owned company a licensed e-waste collector confirmed that only a limited number of EV batteries have been received to date, primarily from corporate agreements with vehicle manufacturers such as Toyota and Mercedes-Benz.
- (b) Most EV users retain their used batteries due to their residual market and functional value, repurposing them for secondary applications such as solar power storage or home energy systems. Consequently, the country has not yet entered a large-scale disposal phase for EV batteries.
- (c) Although approximately 60 tons of hybrid and lead-acid batteries were exported to Europe before the COVID-19 pandemic and about 40 tons to India recently, the export of lithium-ion EV batteries remains minimal owing to limited volumes and high logistical costs. Current practices, including the open-air storage of used batteries before dismantling and packaging in jumbo bags, highlight occupational and environmental risks that require enhanced oversight. Some photos of collected EV Batteries are shown below.

Figure 04:
Collected EV Batteries



In the absence of a dedicated national take-back scheme, comprehensive tracking system, and standardized storage and transport protocols specific to EV batteries during the audit period, the sector continued to operate largely on ad hoc commercial arrangements, which may not ensure consistent environmental safeguards as the volume of end-of-life batteries increases. Although the **National Environmental (Amendment) Act, No. 15 of 2026** introduced provisions to establish an **Extended Producer Responsibility (EPR)** framework for the environmentally sound management of post-usage EV batteries, the supporting regulations, operational procedures, and implementation mechanism need to be expedited.

3.4.3 Physical Inspection of Electric Vehicle Charging Stations

The audit conducted field inspections of selected electric vehicle (EV) charging stations in the Colombo District and held discussions with sector regulators and operators. The objective was to assess operational compliance with Public Utilities Commission of Sri Lanka (PUCSL) guidelines and identify gaps related to infrastructure, maintenance and renewable-energy integration.

Following observations are made.

a) Inconsistent Operational Status of Public Charging Stations

The audit assessed compliance with the Public Utilities Commission of Sri Lanka (PUCSL) Codes of Practice and operational requirements applicable to public electric vehicle (EV) charging stations, including service availability, operational functionality, and the provision of customer information. Physical inspections revealed that, while several charging stations located in

Maradana, Kollupitiya, and Wellawatta were fully operational, some charging stations remained non-operational due to incomplete infrastructure, including the absence of protective roofing, and prolonged periods of inactivity.

The audit further observed inadequate follow-up by the responsible parties to ensure the timely commissioning of charging stations, as well as insufficient monitoring of the operational performance of licensed operators. Consequently, these deficiencies reduced the reliability and accessibility of public EV charging services, resulted in the underutilization of existing infrastructure, and impeded the expansion and public adoption of electric vehicles, particularly in high-demand urban areas.



b) Limited Compliance with Technical and Safety Standards

The audit assessed compliance with the technical and safety requirements prescribed under the Public Utilities Commission of Sri Lanka (PUCSL) Codes of Practice, the Sri Lanka Standards Institution (SLSI) requirements relating to safety labeling and signage, and the basic accessibility requirements applicable to public electric vehicle (EV) charging stations. Physical inspections revealed that certain charging stations lacked clearly visible safety signage, user operating instructions, and certification labels, while charging bays at some locations were not consistently demarcated. The audit further observed the absence of systematic technical inspections, limited operator training, and inconsistent practices adopted by contractors. Consequently, these deficiencies increased operational and safety risks, adversely affected the user experience, and heightened the potential for safety-related incidents.

c) Weak Integration of Renewable Energy into Public Charging Infrastructure

Although national policies promote increase the renewable electricity share and promote sustainable charging infrastructure (SDG 7; national targets), most inspected stations relied solely on grid electricity, while limited solar-assisted initiatives exist (e.g., by private operators); There was no consistent approach to renewable integration at public sites. Limited fiscal/technical incentives and weak coordination on grid interconnection for distributed solar at charging sites. Constrained well-to-wheel GHG benefits from EVs and higher exposure to grid-emission variability.

4. Recommendations

- 4.1** The Central Environmental Authority (CEA) should expedite the gazette of technical guidelines, establish a National Tracking System for post-usage EV batteries, and strengthen coordination with relevant agencies to ensure environmentally sound battery disposal.
- 4.2** The Ministry of Environment (MOE) should operationalize the national e-waste policy through enforceable regulations, measurable targets, and an effective monitoring mechanism for the safe collection, recycling, and disposal of post-usage EV batteries.
- 4.3** The Public Utilities Commission of Sri Lanka (PUCSL) should establish a centralized EV charging station register, implement a transparent tariff framework, and introduce a national monitoring programme to ensure safe, equitable, and efficient service delivery.
- 4.4** The PUCSL should strengthen regulatory enforcement, streamline certification procedures, and enhance public awareness in collaboration with provincial authorities to ensure full compliance and effective consumer protection.
- 4.5** The Sri Lanka Sustainable Energy Authority (SLSEA) should enhance its institutional focus on electric mobility through dedicated budgetary allocations, improved inter-agency coordination, and the integration of renewable energy into EV infrastructure planning.
- 4.6** The Ministry of Transport and Highways (MOTH) should establish a dedicated project steering committee, operationalize the Project Cooperation Agreement, and implement a robust monitoring and reporting framework to ensure timely achievement of low-carbon transport objectives.
- 4.7** The Ministry of Transport and Highways in collaboration with the Ministry of Environment, Ministry of Energy and other relevant institutions should develop and implement a structured electrification program for two- and three-wheelers and integrate EV deployment with renewable energy development.
- 4.8** The Ministry of Transport and Highways in collaboration with the Ministry of Energy, Ministry of Finance and other relevant institutions, should strengthen policy communication, expand fast-charging infrastructure and other relevant institutions establish national service standards, and introduce targeted financial and educational interventions to support a sustainable EV transition.

- 4.9** A centralized national database should establish to record EV batteries entering the country and track their movement throughout their lifecycle, including importation, installation, replacement, second-life use, collection, recycling, export, and final disposal. Relevant agencies, including Customs, the Department of Import and Export Control, CEA and Department of Motor Traffic, should establish appropriate data-sharing arrangements to ensure traceability and regulatory oversight.
- 4.10** The Ministry of Environment in collaboration with the Ministry of Transport and Highways, Ministry of Energy, CEA and other relevant institutions, should establish a nationally accepted methodology for assessing the environmental benefits of EVs on a lifecycle and/or well-to-wheel basis. This should incorporate the national grid emission factor, vehicle category, energy consumption, battery characteristics, electricity generation mix, and relevant lifecycle impacts to enable reliable assessment of actual GHG reductions attributable to EV adoption.
- 4.11** The Ministry of Environment in collaboration with the Ministry of Transport and Highways, Ministry of Energy, CEA and other relevant institutes, should establish and operationalize a unified Monitoring, Reporting and Verification (MRV) framework for the EV sector, with measurable indicators and GHG reduction targets covering EV registrations, vehicle categories, electricity consumption, charging infrastructure, renewable-energy contribution, fossil-fuel displacement, battery retirement, recycling, and estimated emission reductions.
- 4.12** The Ministry of Environment in collaboration with the Ministry of Environment, Ministry of Energy, Ministry of Finance, Ministry of Industry and other relevant institutions, should establish and implement integrated national e-mobility implementation framework clearly defining the roles and responsibilities of all key institutions, implementation timelines, financing arrangements, measurable targets, coordination mechanisms, and monitoring responsibilities. The framework should integrate vehicle electrification, charging infrastructure, renewable energy, battery lifecycle management, environmental protection, and public transport electrification.

- 4.13 The Ministry of Transport and Highways in collaboration with the Ministry of Environment, Ministry of Energy, CEA and other relevant institutions should conduct periodic evaluations of the national EV transition against established targets and report progress on EV penetration, infrastructure development, renewable-energy integration, fossil-fuel savings, GHG reductions, battery lifecycle management, fiscal impacts, and implementation constraints. Corrective actions should be initiated where progress deviates materially from established targets.

Sgd./L.S.I. Jayaratna
Auditor General

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September 2026