Carbon Credits for Buses

Unlocking Revenue for a Cleaner Tomorrow

Summary Brief

Acknowledgement

We would like to express our sincere gratitude to Mr. V. Baranedharan, Managing Director, RCG-EECC and GHG Consultant at The World Bank; Mr. Alagappan Ramanathan, Sustainable Transport Specialist at UNDP; and Mr. Premkumar Elangovan, Consultant at The World Bank, for their invaluable inputs and guidance throughout the development of this report. Their expertise has been instrumental in shaping this comprehensive guide, aimed at assisting State Transport Undertakings (STUs) Special Purpose Vehicles (SPVs) and Urban Local Bodies (ULBs) operating electric buses in India to successfully register their electric bus projects on the voluntary carbon credit market.

We hope this report serves as a valuable resource for STUs/SPVs/ULBs, enabling them to leverage the benefits of carbon credits and contribute to a greener, more sustainable future.

Disclaimer

This guide and the various steps outlined herein regarding the registration process have been drafted in consultation with carbon credit experts and through a comprehensive literature review of established frameworks such as the Clean Development Mechanism (CDM), VERRA, and Gold Standard. The information provided is intended for guidance purposes only, and while every effort has been made to ensure accuracy and comprehensiveness, readers are advised to seek professional advice before registering the Electric Bus Project in the Voluntary Carbon Credit Market. Utmost care has been taken while type setting and printing, however the publisher, however the publisher and printer do not own any responsibility for any mistakes, that may have occurred inadvertently and unintentionally. No resultant claim of any kind will be entertained.

Edited and Published by:

Association of State Road Transport Undertakings
Plot No. 4A, PSP Block, Pocket 14,
Sector 8, Dwarka, New Delhi 110077
Email: asrtu.info@ gmail.com **Web:** www.asrtu.org

With support from:

Institute of Transportation & Development Policy (ITDP)
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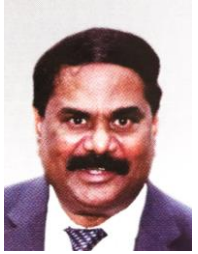

Dr. T. Surya Kiran
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ASRTU is an apex coordinating body of all State Road Transport Undertakings (SRTUs). The Secretary, (RT&H) Ministry of Road Transport & Highways, (MoRTH) Govt of India is the ex-officio President of ASRTU. ASRTU has expertise of more than 50 years in promoting public transport in the country. At present 90 SRTUs/SPVs are the backbone of mobility for the urban rural and hilly region population across the country, and collectively operate about 1,50,000 buses and provide gainful employment to 10 lakh people. ASRTU's motto is to promote public transport at par with the international standards.

VISION

Thriving on challenges, moving on the wheels of innovations and facilitating seamless integration of India's State Road Transport Undertakings, to ensure a world-class passenger road transport system reaching all corners of India, thus making a mark in the global map of public road transport.

MISSION

- Strengthening the public transport system in the country by facilitating improvement of transport infrastructure with enhanced safety standards and assured service levels, efficient governance, sustainable mobility with environmental sensitivity and last mile connectivity.
- Formulation of policies and facilitating their implementation, advocacy with Ministry and Government agencies, addressing issues of common interest in various interactive forums for the benefit of member undertakings.
- Enhancing the competency of Transport Managers of STUs/SPVs by participation in national and international conferences and seminars, workshops and training.
- Providing a common procurement service of quality automobile components at reasonable prices meeting the standard specifications to its members.

The Institute for Transportation & Development Policy (ITDP) is a global non-for-profit organisation that works with cities worldwide to promote transport solutions that reduce traffic congestion, air pollution, and greenhouse emissions while improving urban liveability and economic opportunity. ITDP is represented in India by ITDP Pvt. Ltd. and works with governments, multilateral agencies, and civil society to make visible, on-the-ground improvements by providing technical expertise, policy solutions, research publications, and training programmes.

Introduction

India has been operating e-buses since 2016. As of 2024, there are 8,634 e-buses in operation, with more than 20,000 additional buses in the pipeline. The Government of India is emphasising the electrification of public bus transport through various schemes like PM E-Bus Sewa Scheme, highlighting the growing importance and expansion of e-bus fleets across the country.

For STUs/SPVs/ULBs, the carbon credit system represents a significant opportunity to monetise the emissions savings from their e-bus operations. Given the high capital expenditure (capex) of e-buses, carbon financing can play a crucial role in sustaining their operations by providing a viable financial mechanism to support deployment and maintenance. This approach ensures that the environmental benefits of e-buses translate into financial gains, supporting the long-term sustainability of e-bus projects.

The carbon credit system can be viewed as a strategic tool to support the influx of new e-buses. By strategically planning and monetising emission savings through carbon credits, STUs/SPVs/ULBs can financially sustain e-bus operations, reducing the need for viability gap funding. This system should be included in contracts signed under the PPP model of ownership to ensure consistent control over the credits generated by e-bus projects.

ASRTU and ITDP India are actively working to impart knowledge and provide guidance on leveraging carbon credits. This summary document outlines the mechanisms of carbon trading, highlighting distinctions between mandatory and voluntary carbon markets, and offers a comprehensive process for registering an e-bus project for carbon credits. For more in-depth reading, please refer to ITDP India and ASRTU's guidebook "CARBON CREDITS-Unlocking Revenue for a Cleaner Tomorrow".

What is Carbon Credits & Carbon Markets?

1. Carbon markets reduce Green House Gas (GHG) emissions by setting a cap and allowing trading of emission permits.

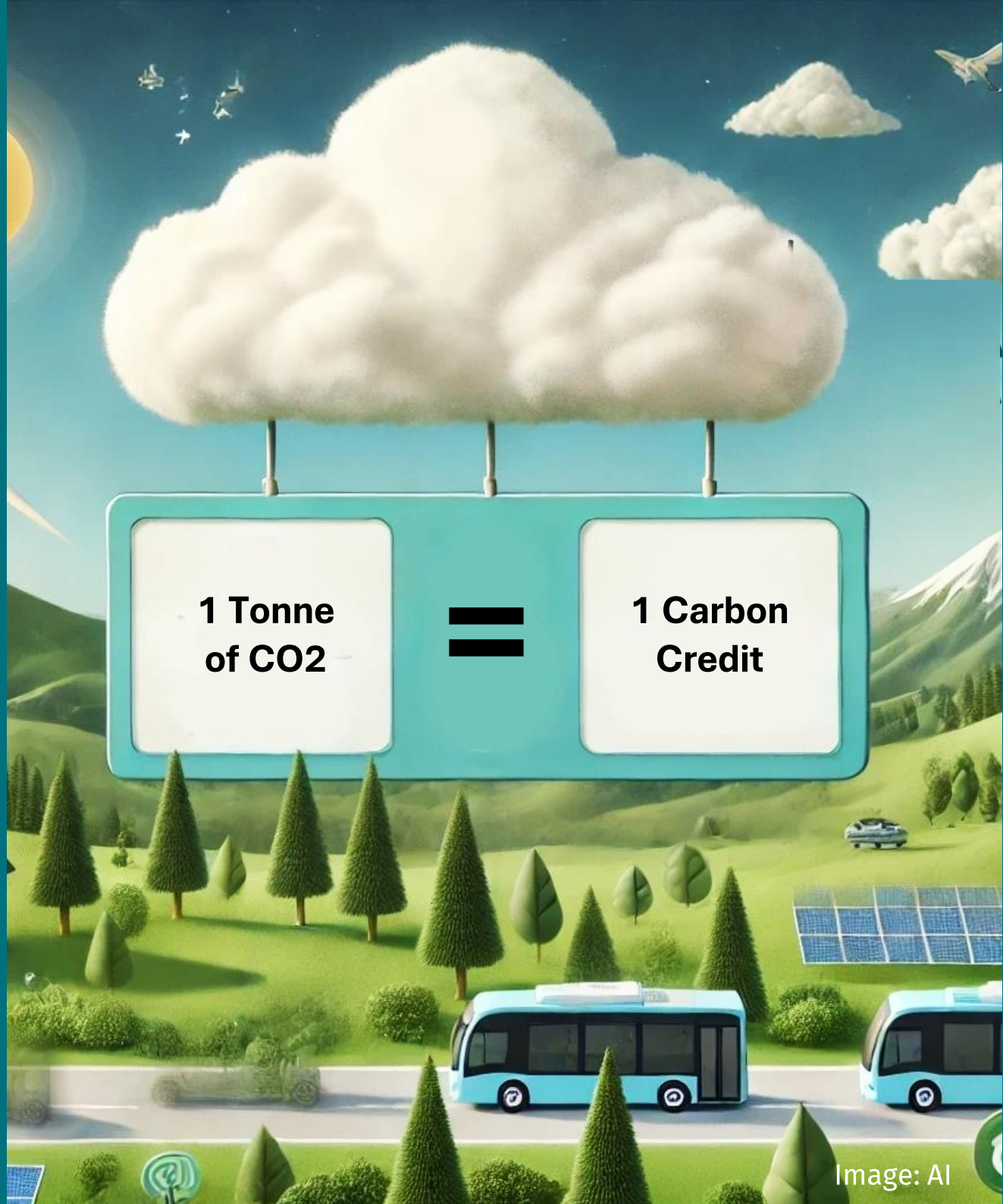
2. Crucial for climate change mitigation by providing economic incentives for reducing emissions.

3. Carbon credits represent the reduction of one tonne of CO2 or its equivalent.

4. Essential for offsetting emissions and achieving carbon neutrality.

5. STUs/SPVs/ULBs operating electric buses can earn carbon credits for reducing emissions.

6. Additional revenue can be generated by selling these credits in carbon markets.



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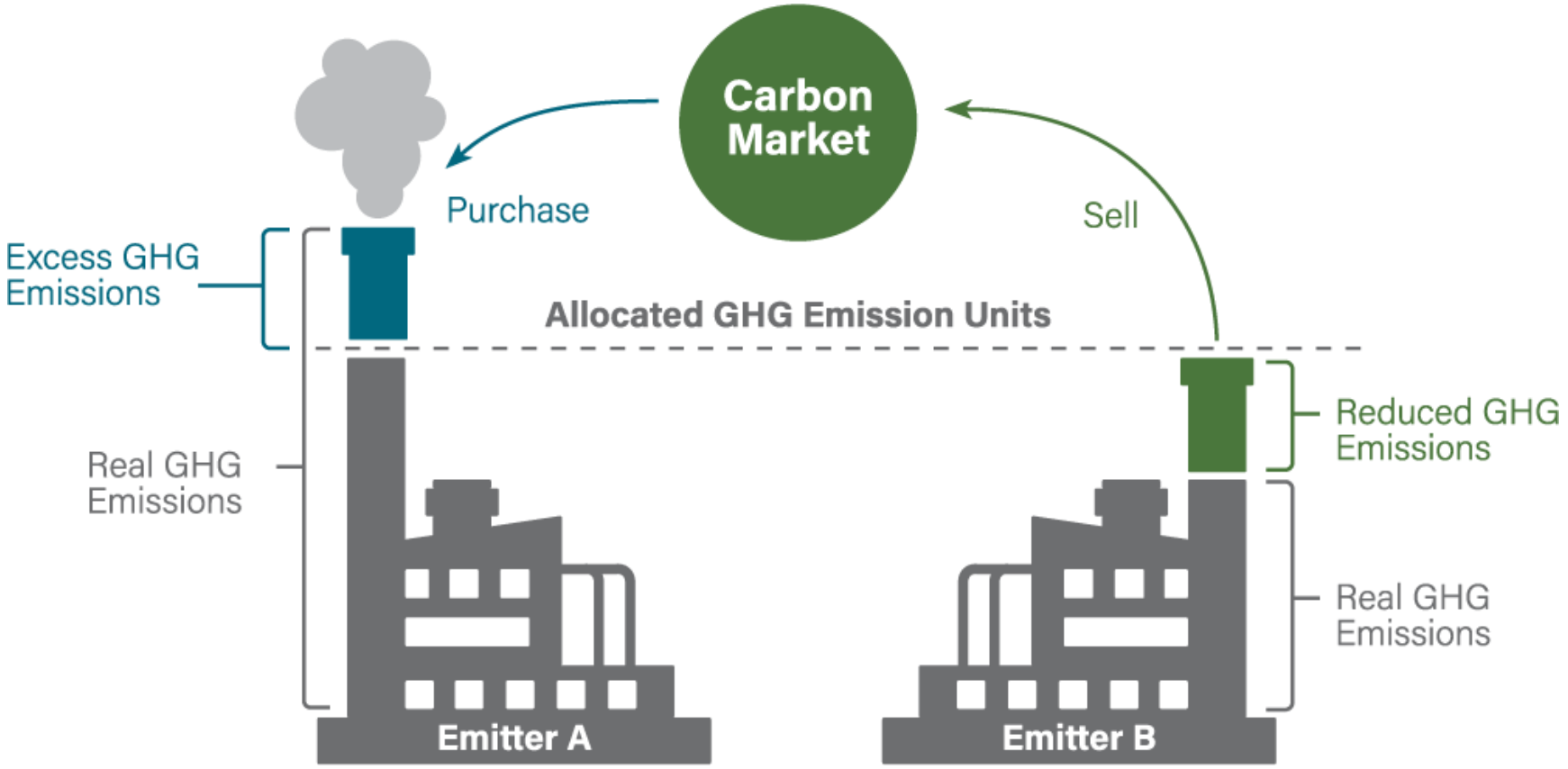
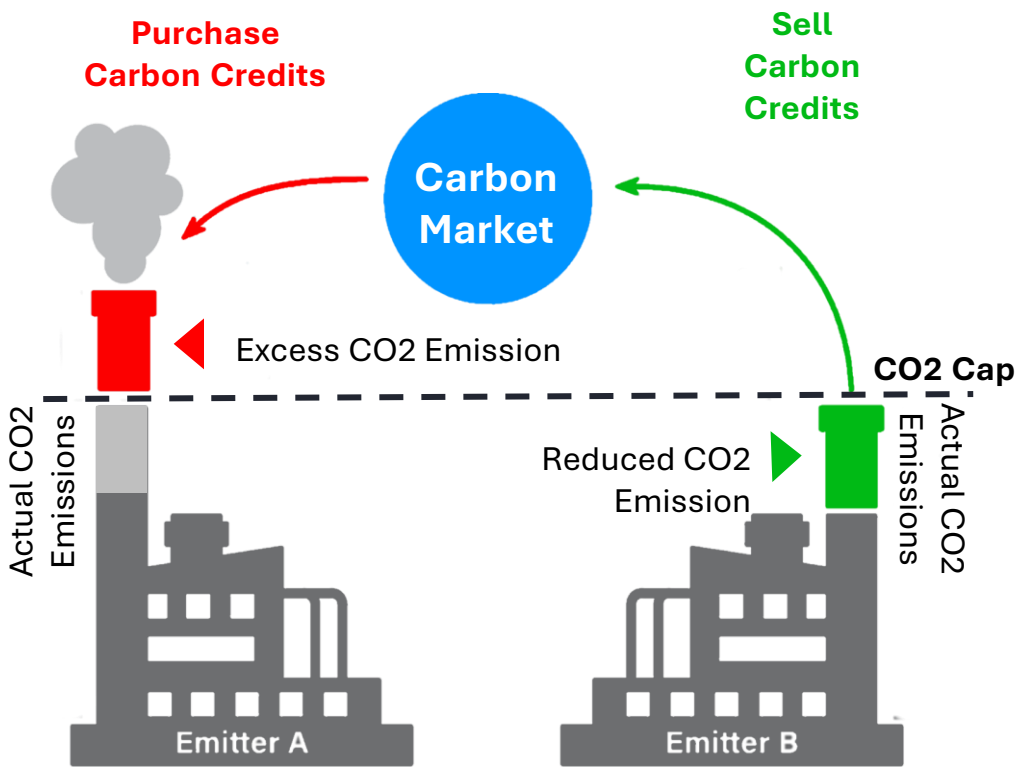
How Carbon Trading Works?



- Carbon markets function by capping emissions and allowing entities to buy and sell emission allowances.
- Provides economic incentives for entities to reduce designated pollutants.
- Companies trade carbon credits and offsets to drive emissions reduction.
- Companies exceeding their emission limits can purchase credits from those who have reduced their emissions below their cap.

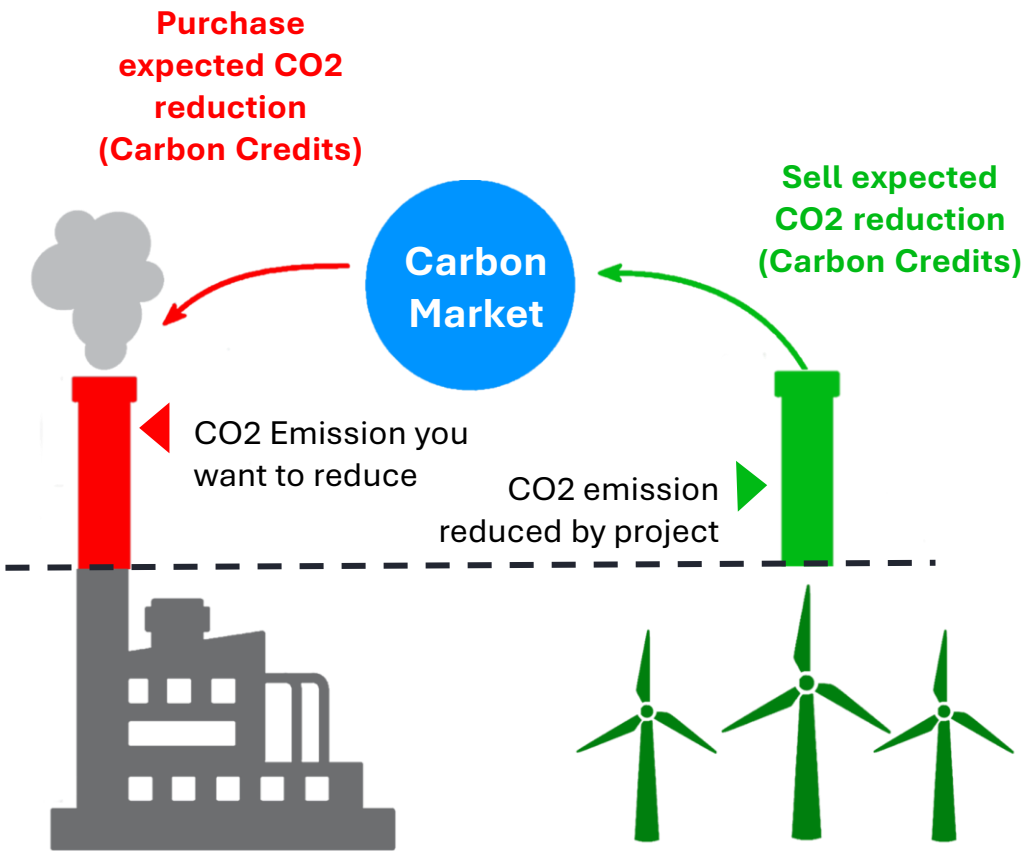
Types of Carbon Markets

Mandatory Market



Mandatory markets such as EU ETS and RGGI, are established by policies such as the Kyoto Protocol and Paris Agreement, requiring entities to meet emission reduction targets using Compliance Emission Reduction (CER) credits.

Voluntary Market



Voluntary carbon markets, driven by corporate social responsibility and sustainability, allow companies to purchase credits to offset emissions without regulatory mandates.

These markets, smaller than mandatory markets, offer flexibility and potential for significant future growth.

International Transfers of Carbon Credits under Paris Agreement

Article 6.4 Voluntary Markets

- Article 6.4 enables voluntary emissions reductions and voluntary carbon markets.
- Facilitates use of internationally transferred mitigation outcomes (ITMOs) for national targets.
- Allows cross-border collaboration, reducing climate goal costs.
- Paris Agreement parties can engage in ITMO transfers.

Article 6.2 International Transfers

- Article 6.2 establishes a framework for cooperative approaches between countries.
- Allows international transfers of emission reductions, removals, or avoided emissions.
- Transfers are recorded and tracked for transparency and environmental integrity.

Mechanisms for International Cooperation:

- Facilitate the transfer of carbon credits between countries.
- Encourage global collaboration to achieve emission reduction targets.

Opportunities for STUs/SPVs/ULBs:

- Participation in international carbon markets.
- Collaboration with international partners to enhance carbon credit value.

International Carbon Credits Standards

Clean Development Mechanism

- Under the Kyoto Protocol, the CDM allows developing countries to earn certified credits for emission reductions.
- Promotes sustainable development with UNFCCC ensuring transparency.
- Provides access to international funding and carbon markets.
- CDM's Kyoto Protocol linkage offers a recognised and structured approach.

Verified Carbon Standard

A VERRA STANDARD

- VERRA framework verifies and quantifies GHG reductions.
- Projects generate tradable Verified Carbon Units (VCUs).
- VCS standards apply to various project types.
- Guidelines include renewable energy and transportation projects.

Gold Standard for the Global Goals

- Gold Standard certifies projects for sustainable development and integrity.
- Provides guidelines for measurable benefits and emission reductions.
- Electric bus projects can qualify if criteria are met.
- Ensures tangible and measurable benefits beyond emission reductions.

Carbon credit landscape for transport in India

Transportation accounts for 25% of global emissions. Within India the transport sector is responsible for 14% emissions, mainly from road transport.

While carbon credits from renewable energy projects are widespread in India, the credits from the clean transport sector are notably scarce. The transition to electric mobility presents a **promising solution**, transitioning from fossil fuels to clean fuel, and optimising renewable energy sources.

India's renewable projects aid in the Voluntary Credit Market; e-bus credit registration needs international market knowledge and precise data.

Due to the absence of a domestic carbon market in India, navigating e-bus programmes' carbon credit registration process demands a deep understanding of international voluntary markets. Furthermore, emphasis on additionality, and meticulous surveys for accurate data collection is also needed.

Monetising emission reduction in mobility sector efforts requires understanding Article 6.4 (Voluntary Markets) and Article 6.2 (International Transfer) of the Paris Agreement.

Image: Rohit Dhende

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Opportunities for Carbon Revenue from E-bus Projects

Even after providing upfront capex subsidy, e-bus projects are facing cost-revenue deficit to support the operation. Carbon/Climate financing can help **reduce funding gap while making project financially sustainable** and attract other climate funds across the globe.

As EV markets transition, the e-bus projects can easily **demonstrate additionality** under carbon standards.

Emission reduction at vehicle level will be lower. But at fleet level emission reduction volume will be significantly high.

Carbon credits buyers are looking for good quality credits, and registration of e-bus project in carbon credits standards provides tangible recognition of the project's contribution to mitigating climate change and reducing greenhouse gas emissions.

Overview of Carbon Credit Registration for E-bus Projects in India

Since 2016, India has operated e-buses, and as of 2024, 8,634 e-buses are in service. However, the emissions savings have not been monetised for financing. Given the high capex of e-buses, carbon financing is crucial. E-buses produce significantly lower emissions than diesel buses, and carbon credits can further support their deployment and maintenance. By monetising these emission savings through carbon credits, STUs/SPVs/ULBs can sustain e-bus operations financially, reducing the need for viability gap funding and ensuring long-term project sustainability.

How emission reduction is estimated?

- **Baseline Emission Calculation =** Total Diesel Consumed x Emission Factor

- **Project Emission Calculation =** Total Electricity Consumed x Emission Factor

- **Emission Reduction Calculation =** Baseline Emissions – Project Emissions

Opportunities	Challenges
• **Higher Carbon Credits Volume:** Large fleet volumes can generate higher carbon credits, which can be traded for additional revenue. • **Central Implementation:** A central implementing agency can improve the monitoring, reporting, and verification (MRV) processes. • **Socio-Economic Benefits:** Additional socio-economic benefits from improved air quality and reduced noise pollution can enhance the market value of carbon credits.	• **Increased Fleet Requirements:** Because electric vehicles (EVs) require charging, more e-buses may be needed than diesel buses to maintain the same level of service. • **Route Adaptations:** Extended routes for e-buses may alter the distance traveled by buses, impacting operational efficiency. • **Seasonal Variability:** Seasonal HVAC load affects e-buses' mileage, impacting their operational costs and efficiency.

Step-by-step Registration Process for E-bus Project

1 Preparation and Background Work

Successful project development requires thorough preparation, comprehensive surveys, detailed documentation, compliance with carbon credit standards, and transparent data collection.

2-3 months

2 Project Development Document

Hire a consultant to prepare project documents as per standards like CDM, Gold Standard, Global Carbon Council, and VERRA, with the STU receiving carbon credits upon successful verification.

3 Choosing Carbon Standard & Methodology

Selecting an appropriate carbon standard and methodology is critical as it determines the framework, rules, and procedures for the project's carbon credit registration.

4 Validation by Designated Operational Entities (DOE)

Validation by Designated Operational Entities (DOEs) ensures project integrity by independently assessing compliance with carbon standards and verifying eligibility for carbon credits.

5 Internal check by Carbon Standard Technical Committee

After DOE validation, the carbon credit registration process involves an internal review by the carbon standard's committees to ensure guideline adherence, followed by a registration fee.

6 Project Registration

Upon completing internal checks, the project is formally registered in the carbon credit standard, signifying its eligibility to earn carbon credits and its public listing on the standard's official website.

9 to 16 months from step 01

7 Monitoring, Reporting, and Verification (MRV)

After registration, the e-bus carbon credits project enters the MRV stage, involving data tracking, report compilation, third-party verification, and the issuance of carbon credits for trading.

Continuous process for 12 to 24 months

8 Issuance of Carbon Credits

Once compliant with carbon standards, the STU receives carbon credits for verified emissions reductions, which can be traded or transferred for financial benefits.

24 to 36 months from step 01

9 Monetisation of Credits

Monetising carbon credits in the open market involves various steps and methodologies, ensuring transparency, liquidity, and maximum returns for project developers.

Various Ways of Monetising Carbon Credits

1

Internationally Transferred Mitigation Outcomes (ITMO):

ITMO allows countries to meet part of their climate targets under the Paris Agreement by purchasing emission reductions from other countries. Projects generating carbon credits can participate in this international market, selling their credits to countries needing to offset their emissions.

2

Pre-Registration Agreement through Bidding:

This involves securing agreements with buyers before the credits are officially registered. Project developers (STU) can auction their future carbon credits at a fixed cost per credit, providing upfront capital and ensuring a market for their credits once they are verified.

3

'As-a-Service' Revenue Model:

Specialised carbon trading agencies can offer carbon credit monetisation services without any risk or cost to e-mobility asset owners and operators i.e. STUs/SPVs/ULBs. These agencies handle the entire process from verification to sale, in exchange for a portion of the revenue generated after the credits are traded. By leveraging this model STUs/SPVs/ULBs can avoid the upfront fees and get their e-bus project registered at 'no cost' from market expertise.

4

Utilising Trading Platforms:

- IHS Markit: This platform provides a transparent market for trading environmental commodities, allowing project developers to list and sell carbon credits, including those from e-bus projects in India.

- Voluntary Carbon Markets: Platforms like the Gold Standard, VERRA (formerly VCS), and Climate Action Reserve enable entities to voluntarily offset their emissions. These platforms offer opportunities for trading credits from sustainable transportation projects in India.

- Power Exchanges in India: Power Exchange India Ltd (PXIL) aims to launch a carbon-credit trading platform by the second quarter of FY25. This platform will cater to the Indian market, providing an additional avenue for trading carbon credits.

**Trading Platforms typically charge a fee per credit traded, which can vary depending on the platform and market conditions.*

Appropriate Methodology for E-bus Projects

Methodology	Applicable to	Approving Carbon Standard
UNFCCC **CDM AMS III.C**	Operation and/or charging of electric and hybrid vehicles for providing passenger and/or freight transportation services.	UNFCCC; Verified Carbon Standard A VERRA STANDARD; Gold Standard for the Global Goals
UNFCCC **CDM AMS III.S**	Introducing and operating new, less-greenhouse-gas-emitting vehicles (e.g., CNG, LPG, electric, or hybrid) for commercial passengers and freight transport on routes with comparable conditions. Retrofitting existing vehicles is also applicable.	UNFCCC; Verified Carbon Standard A VERRA STANDARD; Gold Standard for the Global Goals
Verified Carbon Standard A VERRA STANDARD **VM0038**	Applies to the charging of electric vehicles (EVs) through EV charging systems. GHG emission reductions are achieved through the displacement of emissions from conventional fossil fuel vehicles used for passenger and freight transportation as a result of the electricity delivered by the project chargers. The methodology is globally applicable.	Verified Carbon Standard A VERRA STANDARD

AMS-III.C. - Emission reductions by electric and hybrid vehicles

Typical project(s)	Operating and/or charging electric and hybrid vehicles for providing passenger and/or freight transportation services
Type of GHG emission mitigation action	• Fuel switch • Displacement of more GHG-intensive vehicles
Important conditions under which the methodology is applicable	• Project and baseline vehicles should belong to the same vehicle category. Vehicles under the category have comparable/load capacity and power rating with variation of no more than 20%. • The prevailing regulations pertaining to battery use and disposal shall be complied with; • The procedure for avoiding double counting of emission reductions should be documented in the PDD (Project Development Document).
Important parameters	**At Validation** • If applicable: Grid emission factor (can also be monitored ex-post)
	Monitored: • Number of electric/hybrid vehicles operated under the project; • Quantity of fossil fuel used e.g. for hybrid vehicles and electricity consumption for all-electric and hybrid vehicles, to determine specific electricity/fossil fuel consumption per km; • Annual average distance driven by project vehicles; • Electricity consumption by the project vehicles.

Baseline Scenario

Operation of more GHG-emitting vehicles for providing passenger and/or freight transportation services

Fossil Fuel — Diesel Buses — Emission

Project Scenario

Operation of less/zero GHG emitting vehicles for providing passenger and/or freight transportation services

Electricity — Electric Buses — Emission reduction

AMS-III.S. - Introduction of low-emission vehicles/technologies to commercial vehicle fleets

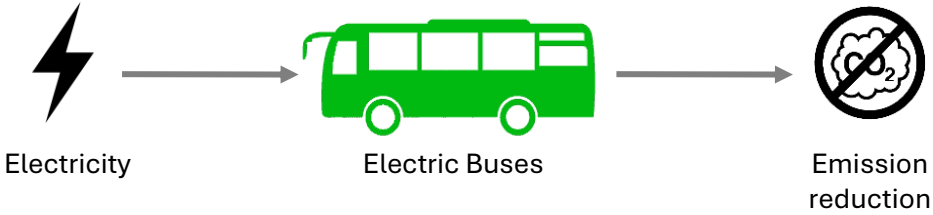
Typical project(s)	Introduction and operation of new less-greenhouse-emitting vehicles (eg. CNG, LPG, Electric or hybrid) for commercial passengers and freight transport, operating on routes with comparable conditions. Retrofitting of existing vehicles is also applicable.
Type of GHG emission mitigation action	• Fuel switch • Displacement of more GHG-intensive vehicles
Important conditions under which the methodology is applicable	• The overall level of service on comparable routes before the project implementation shall remain the same, and modal shift in transport is not eligible; • There is no significant change in tariff discernible from their natural trend, which could lead to a change in the pattern of vehicle use; • The frequency of operation of the vehicles is not decreased; • The characteristics of the travel route- distance, start and end points and the route itself and/or the capacity introduced by the project is sufficient to service the level of passenger/freight transportation previously provided.
Important parameters	**At Validation** • The efficiency of baseline vehicles (can also be monitored ex-post)
	Monitored: • Total annual distance travelled, and passengers or goods transported by project and baseline vehicles on the route; • Annual average distance of transportation per person or tonne of freight per baseline and project vehicle; • Service level in terms of total passengers or volume of goods transported on route before and after project implementation.

Baseline Scenario

Passengers and freight are transported using more GHG-intensive transportation modes.

Project Scenario

Passengers and freight are transported using vehicles with less GHG emissions or retrofitted existing vehicles on routes.



Case Studies From Mobility Sector

Case Study: 01 Bangkok E-Bus Programme

The Bangkok E-Bus Programme, owned by Energy Absolute Public Company Limited, aims to replace Bangkok's internal combustion engine buses with electric buses under the ITMOs provision of Article 6.2 of the Paris Agreement. The project spans from 2022 to 2030, with the crediting period from 2022 to 2029. The KliK Foundation supports the project by acquiring at least 5,00,000 ITMOs until 2030, ensuring financial viability and promoting electric mobility in Bangkok.

Case Study 02: Delhi Metro Rail Corporation's Carbon Credit Programme

The Delhi Metro Rail Corporation (DMRC) generated ₹19.5 crore by selling 35.5 lakh carbon credits from 2012 to 2018 and ₹9.55 from 2007 to 2011 through CDM and Gold Standard projects. Registered under CDM in 2007, DMRC's initiatives include regenerative braking, modal shift, MRTS Programme of Activities, and solar projects, collectively earning ₹ 29.05 crore in total revenue from trading carbon credits.

Case Study 03: BluSmart's Carbon Credit Registration

BluSmart, India's first all-electric cab service, operates in Delhi-NCR and Bengaluru with a fleet of around 5,000 electric cars. The company has provided over 95 lakh fully electric trips, completing over 30 crore kilometers. BluSmart has successfully registered their e-cabs project under the VERRA standard, which will create substantial additional revenue stream if traded in the carbon markets.

Successfully Registered Projects in the E-mobility Sector in India

Project	Proponent	Project Type	Methodology	Status	Estimated Annual Emission Reduction (tCO2 + Credits)	Amount received from selling Credits
Grouped Commercial Vehicles EV Projects India	Multiple Proponents	Transport	AMS-I.F; AMS-III.C.	Registered	**7,052**	
BluSmart EV Project in India	BluSmart Mobility Private Limited	Energy Industries (Renewable/non-renewable sources); Transport	AMS-I.F; AMS-III.C.	Registered	**26,251**	
Convergence Energy Services Ltd. (CESL) EV Charging Infrastructure Project	Convergence Energy Services Ltd. (CESL)	Energy Industries (Renewable/non-renewable sources); Transport	VM0038	Registered	**12,334**	
EV Charging Infrastructure by a project by ENKING International	EKI Engergy Sevrices Ltd.	Energy Industries (Renewable/non-renewable sources); Transport	VM0038	Registered	**20,174**	
Installation of low greenhouses (GHG) emitting rolling stock cars, regenerative braking, modal Shift, MRTS programme of activities and solar project	Delhi Metro Rail Corporation	Transport	Multiple CDM Methodologies	Registered & traded the credits	**5,88,000**	**₹9.55 crore** (2007 – 2011) **₹19.5 crore** (2012 – 2018)

Consideration of Cost-benefit Analysis to Assess Project Feasibility

Key Considerations	Analysis
Potential Benefits for Electric Bus Programmes	• E-bus programmes in India's voluntary carbon market are in high demand due to their scarcity, offering significant revenue potential over 10-12 years. • Converting carbon credit revenue to INR offsets costs, supports expansion, and ensures sustainability
Variability in Carbon Credit Prices	• Carbon credit prices depend on project type, perceived impact, and location, influenced by local policies and market maturity. • Market demand, driven by regulatory changes and corporate goals, causes significant price volatility in carbon credit markets.
Market-Dependent Profitability	• Carbon credit project profitability is influenced by market dynamics, including supply-demand changes, regulations, economic conditions, and geopolitical events, causing price volatility. • Project developers must assess market conditions, trends, and employ risk management strategies to ensure financial viability and profitability.
Impact of Sustainable Development Goals (SDGs) Labelling	• **Social Focus in E-buses:** E-bus projects emphasise environmentally friendly battery disposal and community benefits. • **Battery Disposal:** Ensuring sustainable battery disposal enhances environmental benefits, project credibility, and carbon credit eligibility. • **Quality Carbon Credits:** High-quality carbon credits require adherence to strict environmental and social standards, incurring additional costs for developers.

Following are the Sustainable Development Goals, which are typically applicable to e-bus projects

Transitioning to e-buses will reduce CO_2 emissions and save barrels of oil annually.

The widespread adoption of e-buses will deliver clean energy solutions.

By adopting electric buses, the city/state can reduce CO2 emission annually and thereby improve air quality.

The shift to e-buses will boost clean employment opportunities, particularly in the operation and maintenance sector of e-buses and their components.

Image: Rohit Dhende

Understanding Benefits from E-bus Project

Following is the hypothetical e-bus project of 100 fleet size to understand the benefits from e-bus project

	Annual savings emission reduction	Tentative annual revenue from Carbon Credits	New job opportunities
Emission Reduction	5741 tones	$ 28,000 (₹24 lakh)	450 Jobs
Fuel Savings	20.86 lakhs litres		
Fuel Cost Savings	₹10 Cr.		

Disclaimer:
This example calculation and its outcomes serve as a illustration of tentative carbon credit revenue only. They are based on assumptions concerning average technical and operational characteristics of different vehicles, energy systems, macroeconomic environments, currency exchange rates, and carbon market circumstances. ASRTU and ITDP India assumes no responsibility or liability for any error or omission therein and actual parameters and outcomes may differ from case to case. As such no rights, claims or liabilities can be derived from this example. No representations to third parties should be made based on this example. Consult with Carbon Credit expert for a further assessment of your potential.

Assumptions:
Total e-buses: 100 | Daily assured km: 200 | Total life: 12 years | Diesel cost: ₹90/litre | Fuel Efficiency of diesel bus: 4 km/litres | Trading/Bid value of 1 carbon credit: $ 5 | Staff ratio under GCC model for new jobs: 4.5 | USD to INR exchange rate: ₹83.76

Recommendations for STUs/SPVs/ULBs

1. **Understanding Market Dynamics:** STUs/SPVs/ULBs must understand carbon credit price variability, project costs, and market dynamics to make informed decisions about participating in the voluntary carbon market.

2. **Consultation with Relevant Experts:** Comprehensive planning and expert consultation are crucial for STUs/SPVs/ULBs to navigate the carbon credit market and maximise the benefits of their e-bus projects.

3. **Cost-benefit Analysis:** Before applying for carbon credits, STUs/SPVs/ULBs should conduct a cost-benefit analysis of carbon credit prices, project development, verification, and validation costs, market dynamics, SDG labeling, and estimated revenue, considering potential benefits and revenue conversion rates from USD to INR for project sustainability.

4. **Risk Free Approach for Monetising Carbon Credits:** STUs/SPVs/ULBs should explore the voluntary carbon market for monetising e-bus carbon credits using the "As-a-Service" model, where specialised agencies handle the process at no cost or risk in exchange for revenue share, minimising investment risks and leveraging market expertise.

5. **Rights and Ownership of Carbon Credits:** STUs/SPVs/ULBs must ensure that tender conditions explicitly state their ownership and trading rights of carbon credits from e-bus projects, regardless of bus ownership or operation by private entities or third parties.

Recommendations for STUs/SPVs/ULBs

6 **Alignment with Sustainable Development Goals:** Emphasising SDG alignment can enhance carbon credits' market value; STUs/SPVs/ULBs should ensure projects adhere to high environmental and social standards, contributing to local communities and social welfare.

7 **Consideration of energy source:** The source of electricity in e-bus programmes impacts carbon credit generation; STUs/SPVs/ULBs should ensure a significant percentage comes from clean energy to maximise emission reductions and carbon credit values.

8 **Renewable Source of Energy:** E-bus programmes yield higher carbon credits when using dedicated renewable energy sources for charging, resulting in zero emissions, maximised reductions, and higher carbon credit prices.

9 **Battery Disposal:** Achieving carbon credits in e-bus projects requires eco-friendly battery disposal through stringent guidelines, certified recyclers, tracking systems, second-life applications, training, public awareness, financial incentives, regular audits, and tender conditions for compliant disposal processes.

10 **Strategic Planning for Regulatory Compliance:** As India transitions to a domestic regulatory carbon market, STUs/SPVs/ULBs must strategically plan their carbon credit strategies by assessing timelines and regulatory certainty to decide on voluntary market participation or waiting for a regulated market.

11 **Capacity Building on Data Tracking and Monitoring:** STUs/SPVs/ULBs should implement precise daily monitoring of energy consumption, emissions, and efficiency, develop detailed plans, ensure accurate data collection, engage accredited verification agencies, and train personnel on compliance to maintain data integrity and efficiency.

References

Sr. No.	Reference
1	Carboncredits.com, 2024 https://carboncredits.com/the-ultimate-guide-to-understanding-carbon-credits/
2	4irelabs, 2023: https://4irelabs.com/articles/carbon-credit-market-overview/
3	Carboncredits.com, 2020: https://carboncredits.com/
4	The World Bank: https://carbonpricingdashboard.worldbank.org/credits/issuance
5	Katusa Research: https://katusaresearch.com/carbonomics/
6	Bureau of Energy Efficiency, 2024: Detailed Procedure for Compliance Mechanism under CCTS
7	United Nations Environment Programme (UNEP)
8	Niti Aayog: https://www.niti.gov.in/decarbonising-transport-redefining-mobility-policies-india
9	ICCT: https://theicct.org/wp-content/uploads/2022/05/Meta-study-India-transport_final.pdf
10	Shell Foundation: https://shellfoundation.org/app/uploads/2021/11/SouthPole-report.pdf
11	Renewable Cogen Globe: https://www.rcg-eecc.com/
12	Paia: https://paiaconsulting.com.sg/carbon-offsets-and-credits-explained/
13	Clean Development Mechanism: Methodology Booklet
14	Clean Development Mechanism: Methodology Booklet, Verra: VCS Methodology
15	Carboncredits.com, 2024: https://carboncredits.com/the-swiss-thai-carbon-credit-deal-ignites-ev-revolution-in-bangkok/
16	Klik, 2024: https://www.klik.ch/en/international/activities/bangkok-e-bus
17	Hindustan Times, 2021: https://www.hindustantimes.com/cities/delhi-news/delhi-metro-earns-19-5-crore-by-selling-3-55-million-carbon-credits-101632679060521.html
18	planet.outlookindia.com, 2023: https://planet.outlookindia.com/news/blusmart-becomes-first-indian-mobility-firm-to-earn-carbon-credit-accreditation-news-416305
19	Economic Times, 2023: https://energy.economictimes.indiatimes.com/news/power/blusmart-attains-carbon-credit-certification/105096899
20	PManifold: https://www.pmanifold.com/blogs/carbon-markets-types-and-leading-initiatives-in-clean-transport/
21	DMRC: https://www.delhimetrorail.com/pages/en/corporate/clean-development-mechanism
22	Clean Development Mechanims: https://cdm.unfccc.int/Projects/DB/SQS1297089762.41/view?cp=1
23	Detailed Procedure for Compliance Mechanism under Carbon Credit Trading Scheme (CCTS) by Bureau of Energy Efficiency

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