



The Electric Vehicle Accelerator Programme (EVA)



South Asia

Document Prepared by

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Report Title	Validation report of “The Electric Vehicle Accelerator Programme (EVA)”
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Summary:

TÜV SÜD South Asia Pvt. Ltd, commissioned by Climate Resources Exchange International Pte. Ltd. has performed the validation of The Electric Vehicle Accelerator Programme (EVA) (hereafter referred to as “the project”) on the basis of requirements of Verified Carbon Standard (VCS) Version 4.4.

The project activity consists of EV charging system installations, inclusive of their associated infrastructure, which charge EV applicable fleets whose GHG emission reductions are achieved through the displacement of conventional (and emissive) fossil fuel vehicles (e.g., petrol and diesel) used for passenger and freight transportation because of the electricity delivered by the project charging stations and electrified fleets. The first project activity will be developed in Singapore, with the plan to expand into regional countries.

The validation is an independent party assessment of the project’s baseline, estimated GHG emission reductions or net anthropogenic GHG removals, the monitoring plan and the crediting period using the applicable CDM and VCS requirements, Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of estimated Verified Carbon Units (VCUs). Verification is the periodic independent review and ex-post determination by a VVB of the monitored reductions in GHG emissions during defined verification period. In carrying out its verification work, the VVB shall ensure that the project complies the applicable CDM and VCS Standard Version 4.4 requirements.

A risk-based approach has been followed to perform this validation and verification activity. TUV SUD appointed a qualified team in accordance with internal procedures to perform the validation. During the validation, 03 Clarification Requests (CL), 09 Corrective Action Requests (CARs) and 01 forward action request (FAR) were raised.

In conclusion, it is TUV SUD opinion that the project “The Electric Vehicle Accelerator Programme (EVA)”, in the VCS PD (version 4.2 dated 17/07/2023) meets all relevant requirements for VCS activities and all relevant host Party criteria and correctly applies methodology AMS III.C Version 15 and VM0038 Version 1.

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1 INTRODUCTION

1.1 Objective

Climate Resources Exchange International Pte. Ltd. has commissioned TUV SUD to perform the validation of The Electric Vehicle Accelerator Programme (EVA) (hereafter referred to as “the project, on the basis of requirements of Verified Carbon Standard (VCS) Version 4.4.

In particular, the project's baseline, monitoring plan, and the project's compliance with relevant VCS requirements, GHG program requirements and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of Voluntary Carbon Units (VCUs).

1.2 Scope and Criteria

The validation was performed on the basis of VCS criteria. The information in these documents is reviewed against CDM Validation and Verification Standard, VCS standard version 4.4 and associated interpretations.

TUV SUD has, based on the instructions in the CDM VVS employed a risk-based and step-wise approach when conducting the validation, focusing on the identification of significant risks for project implementation and the generation of VCUs. The validation is not meant to provide any consulting towards the PPs. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design. The verification scope encompasses an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the TUV SUD. The verification scope covers the relevant documents (e.g. VCS PD, the monitoring plan, the emission reduction calculation spreadsheet, supporting documents available to the validator and information collected through performing interviews and during the remote site inspection, VERRA's requirements publicly available, relevant rules, including the host country legislation, etc.) to be independently reviewed, the project geographical locations to be visited remotely, the related project local stakeholders to be interviewed with, and processes that are necessary to acquire objective evidence for the evaluation of the project compliance to the VCS requirements and associated interpretations.

The validation activities are conducted according to the VERRA's requirements. In doing so, the principles of accuracy and completeness, relevance, reliability and credibility were followed. The

verification is not meant to provide any consulting service towards the PPs. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project.

1.3 Reasonableness of Assumptions

TUV SUD has undertaken a reasonable assurance engagement in accordance with VCS Standard (version 4.4). The validation conclusions are based on the VCS PD and supporting evidences made available to the VVB and information collected through performing interviews and during the on-site inspection.

1.4 Summary Description of the Project

The project activity consists of electric vehicles (EV) and its charging system, inclusive of the charging point or battery swap station, which charge EV applicable fleets whose GHG emission reductions are achieved through the displacement of conventional (and emissive) fossil fuel vehicles (e.g., petrol and diesel) used for passenger and freight transportation because of the electricity delivered by the project charging stations and electrified fleets. The first project activity will be developed in Singapore, with the plan to expand into regional countries.

Minimum Battery specification

Parameter	Depth of discharge (DOD)	Battery cycle	Distance Travelled per charge	Lifetime
Value	80% ¹	1200 cycles ²	132 km	2-6 years

The Grouped Project Activity (GPA) aims for charging of electric vehicles (EVs) through EV charging systems, including their associated infrastructure, whose 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 usage of electricity powered cars instead of fossil fuel powered ones leads to lower GHG emissions per distance driven. This is proven in the respective ER calculations. Under this GPA,

¹https://www.ntu.edu.sg/docs/librariesprovider60/publications/ess-technology-roadmap-singapore.pdf?sfvrsn/c91c9ae8_2

² <https://www.nccs.gov.sg/files/docs/default-source/default-document-library/e-mobility-technology-roadmap.pdf>

multiple Project Activity Instances (PAIs) will be included as more charging point owners join the program. Under the GPA, all carbon credits accrue under the contractual jurisdiction of CRX.

This project adopts the renewal crediting period of 7 years starting from 14/10/2021 to 13/10/2028 (the start and end dates included). The expected average annual emission reductions are 7801 tCO₂eq/y. Accordingly, the project is expected to generate 54606 tCO₂eq emissions reduction throughout its first crediting period. The starting date of the project activity and the start date of the crediting period is 14/10/2021. It has been verified by TÜV SÜD that the date of commercial operation/starting GHG emissions of the proposed project activity is considered as the start date of the project in line with VCS guidelines.

2 VALIDATION PROCESS

2.1 Method and Criteria

The overall validation, from Contract Review to Validation Report and opinion, was conducted using TUV SUD internal procedures.

The process includes three phases:

- 1) Desk review of documents;
- 2) On-site inspection and follow-up interviews;
- 3) final Validation Report and opinion.

TUV SUD validated the project against the requirements set in VCS requirements, and other relevant VCS requirements. No sampling was utilized during the on-site inspection as well as validation and verification for project activity. The following sections outline each step in more detail.

The audit team has created a validation plan that took the sampling plan into account, since there are only 4 charging points owners, who have the agreement with the CME, hence VVB has visited all the charging points and interviewed the personal involved in the project. This approach is justified as it has been designed in accordance with Section 4.4.3 of ISO 14064-3:2006.

The validation team and the technical reviewers consist of the following personnel:

Role/Qualification	Last Name	First Name	Country
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Team Leader, VCS Validator	Kewat	Shailendra	India
Technical Expert	Meesa	Srikanth	India
Technical Reviewer	Shruti	Kudtarkar	India
Technical Expert (TR)	Pankaj	Karn	India

2.2 Document Review

A desk review of the GPA PD and supporting documents was conducted by the assessment team. The aim of the desk review of the documentation was to verify correctness, credibility, interpretation and completeness of presented data and information, and to cross check between information provided in the updated GPA PD and information from sources other than that used, if available.

Review of the appropriateness of formulae and correctness of calculations was also carried out during this stage based on the approved methodology being applied. And particular attention was given to the quality of the metering equipment including calibration requirements, the monitored data and its evidence, and the emission reduction calculation. The evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions was also conducted.

The following table lists the documentation that was reviewed during the validation.

/1/	GPA DD for “The Electric Vehicle Accelerator Programme (EVA)” version 4.3 of 05/09/2023
/2/	Emission Reduction spread sheets version 4.2 of 17/07/2023
/3/	AMS III.C Ver. 15 methodology
/4/	NON-NEGOTIABLE COMMERCIAL TERMS FOR JOINING THE ELECTRIC VEHICLE ACCELERATOR (EVA) PROGRAMME TO GENERATE CARBON CREDITS- CRX dated 14/10/2021. Proof of start date.
/5/	Declaration of no double counting dated 25/10/2021
/6/	EVA Partner agreement dated 01/01/2021
/7/	THE ROLE OF PLUG-IN ELECTRIC VEHICLES TO IMPROVE FUEL ECONOMY- Working paper
/8/	Renewable and Sustainable energy reviews document
/9/	SEV charging point electricity utilizing Invoices 2021
/10/	IPCC 2006 Volume 2 Energy, table 1.4
/11/	Singapore Land & Transport Authority statistics data

/12/	https://think-asia.org/bitstream/handle/11540/12742/The-Influence-on-Energy-and-the-Economy-of-Electrified-Vehicle-Penetration-in-ASEAN.pdf?sequence=1
/13/	https://www.pnas.org/doi/epdf/10.1073/pnas.1406853111
/14/	https://seas.glueup.com/event/launch-of-the-electric-vehicle-accelerator-eva-52107/
/15/	https://www.lta.gov.sg/content/dam/ltagov/who_we_are/statistics_and_publications/statistics/pdf/M09-Vehs_by_Fuel_Type.pdf?fireglass_rsn=true
/16/	VM0038: Methodology for Electric Vehicle Charging Systems, Version: 1.0
/17/	EVA Singapore Project location file
/18/	First vehicle registration certificate 14/10/2021

2.3 Interviews

The objective of the interview process was to solicit important information from personnel related to project and relevant to the validation and verification process. Physical interviews and information discussions were conducted with PP. The key personnel interviewed are summarized in the table below:

	Date	Name and Role	Organization	Topic
1	05/10/2022	Vinod Kesava	CRX, Co-founder & CEO	Project technology, operation and maintenance, Project approval and implementation status, Investment Analysis, Baseline and Additionality, Monitoring plan and monitoring arrangements, roles and responsibilities, emergency procedures.
2	05/10/2022	Sanjana Somani	CRX, Head of Climate Market	Description of the project activity, Project technology, operation and maintenance, Project approval and implementation status, Investment Analysis, Baseline and Additionality, Monitoring plan and monitoring arrangements, roles and responsibilities, emergency procedures.

3	05/10/2022	Cherie Sim	CRX, Head of Carbon Commodities	Description of the project activity, Project technology, operation and maintenance, Project approval and implementation status, Investment Analysis, Baseline and Additionality, Monitoring plan and monitoring arrangements, roles and responsibilities, emergency procedures.
4	05/10/2022	Preeya Unadirekkul	CRX, Net-Zero Carbon Coordinator	Eligibility Criteria, Baseline and Additionality, Applicability Conditions, Emission reductions calculations, additionality and investment analysis, starting date and crediting period. Social & Environmental impacts
5	05/10/2022	Raymond Lim	Senior Manager, Singapore Electric Vehicles (SEV), Charging point owner.	Agreement with the CRX, awareness about the program, monitoring procedure
6	05/10/2022	Lai	Manager, MNL Asia, Charging point owner.	Agreement with the CRX, awareness about the program, monitoring procedure
7	05/10/2022	Angie Koh	Manager, EVFY, Charging point owner	Agreement with the CRX, awareness about the program, monitoring procedure
8	05/10/2022	Bernard Sim	Director, BlueSG, Charging point owner	Agreement with the CRX, awareness about the program, monitoring procedure

2.4 Site Visits

The validation site inspection was conducted on 05/10/2022. Site inspection included the inspection of charging points, metering arrangements and interview with PP and charging point owners. A ground inspection of the project plan was conducted during the site visit and the validation team interviewed project implementer representative, operation staff and charging point owners. During the site inspection, the accuracy of project description and the baseline scenario was evaluated, the technology implemented for the project activity was checked, and the supporting documents related to the project activity were examined.

2.5 Resolution of Findings

The objective of this phase of the validation is to resolve any outstanding issues, which need to be clarified for TÜV SÜD's positive conclusion on the project design.

To guarantee transparency a validation protocol has been customized for the project. The protocol shows in a transparent manner the requirements, means of validation and the results from validating the identified criteria. The validation protocol consists of three tables; the different columns in these tables are described in the figure below (see Figure 1). The completed validation protocol is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions.
- The VCS Version 4.1 requirements have not been met.
- There is a risk that the emission reductions cannot be monitored or calculated.

A clarification request (CR) is raised if information is insufficient or not clear enough to determine whether the applicable VCS Version 4.1 requirements have been met.

The final VCS PD Version 4.2 submitted by project owners on 17/07/2023 serves as the basis for the final assessment presented. Additional changes to the project during the validation process are not considered to be significant with respect to the main CDM/VCS objectives. The two VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

The list of findings and their resolution is presented in appendix 1 of this report

2.5.1 Forward Action Requests

No FAR is raised during the Validation.

3 VALIDATION FINDINGS

3.1 Project Details

The project entails the introduction of electric taxis which would replace the emission produced by the fossil fuel run taxis which would be used otherwise.

Project type: The project is a grouped project and has 1 project instance.

Technologies and measures implemented: EV charging and utilization technologies, will not cover the combination of two or more technologies, and also use any one methodology.

The technologies and measures were applied in the project description as in the same manner as the methodology.

Eligibility of the project:

This project is a grouped project. The set of activity instances (set of chargers) of the project constitutes the entire initial project that is being validated. The methodology does include:

- Eligibility criteria for the applicability conditions set out in the methodology applied to the project.
- The acceptable technologies (types of charges and vehicles)

Project design: PP has provided the required information on the applicable and valid version of the VCS PD. The project design includes 10 nos. of types of project instances based on the type of fuel and fleets/vehicle categories. The scenarios mentioned below represent the instances that would be included in the GPA.

Instance Type	Vehicle Category	Baseline Fuel	Remarks
Case 1: Diesel Car Fleets	Cars Only	Diesel	Baseline scenario will take into consideration the average Specific Fuel Consumption (SFC) of the top 5 diesel/petrol cars and compare them against the average Specific Energy Consumption (SEC) of the top 5 Electric Vehicle (EV) equivalents, using the selected methodology formulas as reference.
Case 2: Petrol Car Fleets		Petrol	
Case 3: Diesel Bus Fleets	Buses Only	Diesel	Baseline scenario will take into consideration the average SFC of the top 5 diesel buses and compare them against the average SEC of the top 53 EV

			equivalents, using the selected methodology formulas as reference.
Case 4: Truck and Van Fleets	Trucks and Vans Only	Diesel	Baseline scenario will take into consideration the average SFC of the top 10 diesel trucks/vans and compare them against the average SEC of the top 10 EV equivalents, using the selected methodology formulas as reference.
Case 5: Diesel Motorbike Fleets	Motorbikes Only	Diesel	Baseline scenario will take into consideration the average SFC of the top 10 diesel/petrol motorbikes and compare them against the average SEC of the top 10 EV equivalents, using the selected methodology formulas as reference.
Case 6: Petrol Motorbike Fleets		Petrol	
Case 7: Host Country National Fleet	Combination of National Host Country Natural Fleet Only	Diesel and Petrol Combined	Baseline scenario will take into consideration the average mandated SFC of the host country and compare them against the average SEC of the top 10 EV equivalents, using the selected methodology formulas as reference.
Case 8: Hovercraft Fleet	Hovercrafts Only	Petrol	Baseline scenario will take into consideration the average SFC of the top 5 petrol hovercrafts and compare them against the average SEC of the top 5 EV equivalents, using the selected methodology formulas as reference.
Case 9: Air-Taxis Fleet	Air-Taxis Only	Jet Fuel	Baseline scenario will take into consideration the average SFC of the top 5 Jet-fuel air taxis (or equivalent) and compare them against the average SEC of the top 5 EV equivalents, using the selected methodology formulas as reference.
Case 10: 3- Wheelers	3-Wheelers Only	Petrol	Baseline scenario will take into consideration the average SFC of the top 2 3-wheelers (or equivalent) and compare them against the average SEC of the EV equivalents, using the selected methodology formulas as reference.

Project proponent and other entities involved in the project: Based on the submitted documents, it is confirmed the CRX CarbonBank Pte Ltd. is the project proponent. Other entities are the Climate Resources Exchange International Pte Ltd. The same has been confirmed by checking the ownership documents (e.g. agreement with the charging point owners and fleet owners) during the site assessment.

Ownership: PP has provided the required information to confirm on the ownership of the Project Proponent “CRX CarbonBank Pte Ltd”. Based on the review of the lease agreement, it is confirmed that PP is owner of the carbon credits generated by the EV charging system installations, inclusive of their associated infrastructure,

Project start date: The start date of implementation date of EV vehicles under the first PAI included into this GPA is 14th October 2021. A registration certificate issued by the Accounting and Corporate Regulatory Authority (ACRA) has been verified by the VVB and found the first vehicle registered on 14th October 2021 under the PAI. Hence, it is considered as the project start as it is the date on which the project started generating emission reductions.

Project crediting period: 14/10/2021 -13/10/2028. (7 years)

Project scale and estimated GHG emission reductions or removals: Current project is under “Project” scale, and it is estimated to achieve average 7801 t CO₂/annum. This may vary in different project instances. However, PP will limit the ERs 60k tCO₂e on each project instances and ERs will not cross this threshold limit of the applicability criteria.

Project Representative: -

Organization name	CRX CarbonBank Pte Ltd
Contact person	Vinod Kesava
Title	MD & CEO
Address	20 Malacca Street #07-00 Malacca Centre Singapore 048979
Telephone	+65 9384 0166
Email	v.kesava@climate-resources.com

VVB confirms that both the client are PP for this project activity.

Project compliance with applicable laws and regulations:

The audit team has the following conclusions regarding the compliance of the project with all applicable laws, statutes and other regulatory frameworks:

- The project proponent installs EV chargers in areas where electric vehicles can be charged, e.g., parking lots. The project is in compliance with local siting regulations or other contracts with the landowner.

Leakage Management: -

The audit team has the following conclusions regarding the project's leakage management strategy:

- The methodology asserts there is no leakage and provides a reasonable explanation for the assumption of zero leakage. The PD confirmed the assertion for this project.

Commercially Sensitive Information

No information is commercially sensitive information in the project activity & all the information with stakeholders.

Project location: The group project is anticipated to spread across various countries such as Malaysia, Vietnam, Cambodia, the Philippines, Indonesia, Brunei, India, Nepal, Hong Kong, Taiwan South Korea and Japan. However, the first project instance is located in Singapore

The geographical boundary for project instance 1 located have been checked from the Google maps;

The project boundary for the proposed grouped project activity would be located within geographical boundaries of Singapore (if new countries are being added, a PD deviation shall be submitted).

Conditions prior to project initiation: Before EV charging was made easily available to the general community, EV owners had no ability to directly or indirectly impact the baseline emissions associated with their fossil fuel vehicles. As such, in the baseline scenario, EV owners would employ the use of diesel/petrol vehicles that utilize traditional ICE, in turn inducing higher GHG reductions.

Project compliance with applicable laws, statutes and other regulatory frameworks

In the project scenario, emission reductions will be generated when electricity kwh are supplied via the charger to an EV to result in EV-miles driven. This can be achieved when the EV-miles driven are converted to an equivalent set of fossil fuel vehicle miles driven by applying the comparable vehicle requirements laid out in the Applicability condition.

As a result, there is a neutralization of EV miles driven and fossil fuel miles driven, hard wired into the methodology's requirements. Artificially increasing this ratio to generate more fossil fuel miles driven is thus impossible.

Participation under other GHG programs: Projects registered (or seeking registration) under other GHG program(s) and other forms of credit:

PP has provided a declaration to the project VVBs that PP will not participate in any other GHG programs. This was also confirmed through the web-search. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows:

- <https://www.climateactionreserve.org/>
- <https://registry.goldstandard.org/projects?q=&page=1>
- <https://iceland.itmoregistry.net/Public/Project>
- <https://biocarbonregistry.com/en/projects/>
- https://projects.globalcarboncouncil.com/pages/submitted_projects

Rejection by other GHG programs: Not applicable. Refer the above.

Emissions trading programs and other binding limits: PP has confirmed that the project is not applied for any other emission trading programs.

Sustainable Development Program: -

PP is claiming 3 SDGs which is SDG 13, 9 & SDG 8:-

SDG 13: Project reduces GHG emission reduction due to implementation of EV cars and reducing fossil fuel-based cars.

Current project is under "Project" scale, and it is estimated to achieve average **7801 t CO₂/annum**.

SDG 8: Decent Work & Economic Growth

VVB confirms that reduction in DMC of fossil fuels will equal the reduction in DMC of Diesel and Petrol, less any increase in DMC of Natural Gas

SDG 9: CO₂ emission per unit of value added.

VVB confirms that project is estimated to decrease participants' total carbon emissions from driving from 2.79 tons CO₂e/year to 1.22 tons CO₂e/year, a total average reduction of 1.58 tons CO₂e/year/vehicle.

Scope 3: -

Not Applicable

VCS group project is briefed in section 1.4 above.

The project has applied the below stated two methodologies:

AMS.III.C: Emission reductions by electric and hybrid vehicles, Version 15

VM0038: Methodology for Electric Vehicle Charging Systems, Version: 1.0

The eligibility criteria for inclusion of new project activity instance under this grouped project has been assessed by the audit team as given below.

S.No.	Eligibility Criterion	Justification by PP	VVB Conclusion
1	Occur within one of the designated geographic areas specified in the project description.	Applicable. The first project instance is set to be developed within the boundary of Singapore but is envisioned to extend to the boundaries of Malaysia, Vietnam, Cambodia, the Philippines, Indonesia, Brunei, India, Nepal, Hong Kong, Taiwan South Korea and Japan.	VVB confirms that first location of the project activity within the geographical boundary of country Singapore. if new countries are being added, a PD deviation shall be submitted by Project Proponent & VVB will cross checked the same & asses.
2	Comply with at least one complete set of eligibility criteria for the inclusion of new project activity instances. Partial	Applicable. Complete set of eligibility criteria will be demonstrated.	This has to be checked by the VVB during inclusion of new instance.

	compliance with multiple sets of eligibility criteria is insufficient.		
3	Be included in the monitoring report with sufficient technical, financial, geographic and other relevant information to demonstrate compliance with the applicable set of eligibility criteria and enable sampling by the validation/verification body.	Applicable. All supporting data for validation/verification purposes will be made visible in the monitoring report.	PP will provide the all sets of documents to fulfil the eligibility criteria for the project activity to the VVB at the time of monitoring during future verification. PP has already provided the sufficient information with supporting evidence to the VVB & found ok.
4	Be validated at the time of verification against the applicable set of eligibility criteria.	Applicable. A certifying body will be engaged to validate new project instances that are introduced to the project.	For future addition to the project instances at the time of verification, PP fulfil the eligibility requirements of the instances in line with guidelines & VVB will cross verified during verification.
5	Have evidence of project ownership, in respect of each project	Applicable. CRX will be the project proponent and will have a clear title and ownership of	PP has clearly stated only the fleet and charging point owners that are included in the

	activity instance, held by the project proponent from the respective start date of each project activity instance (i.e., the date upon which the project activity instance began reducing or removing GHG emissions).	all VCU's generated from the EVA Programme as per the service agreement signed upon registration of fleet and charging point owners.	service agreement would be considered for carbon credits. PP has submitted the service agreement & found consistent.
6	Have a start date that is the same as or later than the grouped project start date.	Applicable. The grouped project start date is determined by the implementation date of EV vehicles under the first PAI included into this GPA which is 14/10/2021. Any new PAIs introduced will be later than 14/10/2021.	Project start date for the instance project is assessed in section 3.1 below.
7	Be eligible for crediting from the start date of the instance through to the end of the project crediting period (only). Note that where a new project activity	Applicable. Credits will be sought from the next verification period in this scenario	VVB confirms that at the time of new instances inclusion PP will only take credits during current crediting period or future crediting period. Project instances will not claim their credits for previous verification period.

	instance starts in a previous verification period, no credit may be sought for GHG emission reductions or removals generated during a previous verification period (as set out in Section 3.4.4) and new instances are eligible for crediting from the start of the next verification period.		Hence this is applicable to the project activity.
8	Not leave one VCS project and subsequently enroll in another VCS project.	Applicable. New PAIs will be enrolled under this VCS project with an exception to cases where the renewable energy source is connected to a charging station via national/regional grid. In such circumstances, project proponent will consider this as a separate project.	At the time of the verification/monitoring, PP will declare that project is not generating credits in any other GHG program or no double counting for the project activity. VVB will cross verify the same & provide assessment during very verification or monitoring.

3.2 Safeguards

3.2.1 No Net Harm

There are no significant environmental impacts due to the project implementation. PP has stated that the project is implementation of EV transport system which replaces fossil fuel-based transport system, project activity doesn't have any negative environmental and socio-economic impacts. The same was also confirmed during the physical audit interviews.

There are no potential negative environmental or socio-economic impacts identified by the project proponent. The Audit team concluded the project proponent's PD conforms with the requirements of the standard.

3.2.2 Local Stakeholder Consultation

The local stakeholder consultations were conducted by the PP in accordance with the requirements of VCS.

The stakeholder consultation meeting was conducted online on 12th April 2022. PP has provided the invitation email and the list of confirmations for the online meeting from various stakeholders, EV enthusiasts. Customers, Charging partner, carbon consultants and NGOs. PP has included the comments received during the local stakeholder consultation meeting. Further, PP has also stated that they have a dedicated customer helpline through which grievances / communications are received and addressed in a timely manner. Invitations were made public and published on the Sustainable Energy Association of Singapore (SEAS) website³, as well as sent out through a mailing letter to all members of the association on 11/04/2022.

The audit team has checked the stakeholder related documentation- invitations, summary provided to participants, attendance sheet and feedback by the local community.

By checking the feedback, the assessment team confirmed that the local stakeholder has no negative comments for the project activity.

Furthermore, a grievance book is put in the communication room at the project owner company. The local stakeholders can provide feedbacks through this way.

Thus, Validation team is of the opinion that the stakeholder meeting was adequate and appropriate. There were no negative comments raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region.

3.2.3 Environmental Impact

As per the local regulations, current group project VVBs not require environmental clearance. Urban Redevelopment Authority of Singapore (URA), where it was found that what was published was very

³ <https://seas.glueup.com/event/launch-of-the-electric-vehicle-accelerator-eva-52107/>

open ended and non-project specific. As such, the list of categories listed by URA was cross referenced with PMF IAS's Environmental Impact Assessment (EIA) Process & Procedures⁴.

During which it was concluded that the GPA did not fall within any project types that would require clearance from central government, and an EIA would not be needed.

3.2.4 Public Comments

During the period from 02/08/2022 to 01/09/2022, no public comments were received.

3.2.5 AFOLU-Specific Safeguards

NA

3.3 Application of Methodology

3.3.1 Title and Reference

The group project applies the below stated methodologies:

AMS.III.C: Emission reductions by electric and hybrid vehicles, Version 15, Sectoral scope 7.

VM0038: Methodology for Electric Vehicle Charging Systems, Version: 1.0

The tools used are

- Tool to calculate Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, Ver. 3
- Tool to calculate the emission factor for an electricity system, Ver. 07

3.3.2 Applicability

The applicability of the methodology has been assessed as given below

S r · N o ·	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
1	The methodology is not applicable for project activities that involve a switch from fossil fuels to biofuels in	No switch from fossil to biofuels is made by the project activity. The project activity is a	Not Applicable since the project activity does not involve any fuel switch from

⁴ <https://www.pmfias.com/eia-environmental-impact-assessment/>

S r · N o ·	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
	transportation; those project activities shall consider using another Type III methodology	switch from fossil fuels to electricity.	fossil fuels to biofuels, as assessed from the project design. Hence, this criterion is not applicable.
2	In cases where the project vehicles use a replaceable, chargeable battery there must be documented measures in place to ensure that vehicle owners have access to replacement batteries of comparable quality.	Project activity includes replaceable, chargeable battery. Project activity directly charge at charging stations. Therefore, this criterion is applicable. The project activity uses chargeable batteries that will be charged at charging stations. After completion of the lifetime of batteries, it will get replaced by batteries with similar specification. There are document measures that car-makers provide warranty on the EV batteries thus allowing vehicle owners to have access to replacement of batteries with comparable quality. (https://www.channelnewsasia.com/cna-insider/road-trips-battery-safety-and-competing-chargers-10-electric-car-queries-answered-2026871) Therefore, this criteria is applicable.	The project activity includes replaceable and chargeable battery. After completion of the lifetime of batteries, it will get replaced by batteries with similar specification, and the measures have been assessed by the audit team based on the project feasibility study reports and documents. Hence the criteria is applicable.
3	The project design document (PDD) shall explain the proposed approach for introducing/distributing the electric/hybrid vehicles, which	Electric vehicles included under this GPA will be introduced throughout the host country specified in the	PD has explained the proposed approach for introducing/distributing the electric/hybrid

S r . N o .	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
	shall allow for tracking of the project vehicles	individual PAI. Vehicle fleet owners operating these electric vehicles on lease and/or lease agreement clearly provide carbon ownership to CRX. Electric vehicles included under this GPA will be introduced throughout the host country specified in the individual PAI. Under the first PAI, the electric vehicles will be introduced throughout Singapore via direct procurement from the manufacturers. The vehicles will operate on lease and lease agreement. The tracking of the project vehicles will be done through using the EVA data monitoring system	vehicles, which shall allow for tracking of the project vehicles. The audit team has checked the relevant agreements/documents to validate the requirement. Hence the criterion is applicable.
4	Demonstrate that the baseline vehicles being displaced are those consuming fossil fuels. This can be done, for example, through documentation of the market share per fuel type per vehicle category in the project region (e.g. based on representative sample surveys or official data or peer reviewed literature);	Before EV charging was made easily available to the general community, EV owners had no ability to directly or indirectly impact the baseline emissions associated with their fossil fuel vehicles. As such, in the baseline scenario, EV owners would employ the use of diesel/petrol vehicles that utilize traditional ICE, in turn	Based on the review of the documentary evidence (Singapore Land & Transport Authority statistics data), it is assessed the justification and documentation provided by the PP that 50% of the baseline vehicles are Petrol, 30% of the baseline vehicles are CNG and 20% of the

S r . N o .	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
		inducing higher GHG reductions.	vehicles are diesel based is found acceptable. Hence the criterion is applicable. PP validated that baseline vehicles being displaced are those consuming fossil fuel. VVB through the documents sent by the PP could validate that in Singapore biofuel blends are less than 20% by volume.
5	Ensure compliance with prevailing regulations pertaining to battery use and disposal.	Project activity will ensure that regulations concerning battery disposal and recycling are followed where applicable. If no regulations are available, batteries will dispose of to authorized recyclers.	It has been assessed from the local regulations in Singapore that batteries will be disposed to authorized recyclers and was also confirmed during the audit. Hence the criterion is applicable. For electric vehicles with batteries that will be disposed of in Singapore, it will be done so in accordance with the regulated e-waste management system administered by Singapore's National Environment

S r . N o .	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
			Agency (NEA) which is based on the Extended Producer Responsibility (EPR) approach. This ensures that measures for proper collection, handling and treatment of e-waste are in place to safeguard against any negative environmental impacts associated with the batteries. The NEA has awarded licences to entities to operate as a Producer Responsibility Scheme (PSR) operators who will provide sufficient avenues for the collection of regulated electrical and electronic waste including electric vehicle batteries on behalf of producers and consumers to be transported to NEA-licensed e-waste recyclers for proper treatment and recycling.⁵ VVB through interviews and documental review could validate that

⁵ [https://www.nea.gov.sg/our-services/waste-management/3r-programmes-and-resources/e-waste-management/extended-producer-responsibility-\(epr\)-system-for-e-waste-management-system](https://www.nea.gov.sg/our-services/waste-management/3r-programmes-and-resources/e-waste-management/extended-producer-responsibility-(epr)-system-for-e-waste-management-system)

S r · N o ·	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
			the project complies with prevailing regulations pertaining to battery use and disposal, in accordance to the Singapore regulation (https://www.nea.gov.sg/media/readers-letters/index/nea-is-building-up-local-e-waste-recycling-capabilities). A FAR has been included for the compliance assessment
6	The PDD shall include minimum performance specifications for the batteries to be used such as: depth of discharge, battery cycles, distance travelled per charge, lifetime.	PP has included batteries performance details in section 1.11 of the PD.	The minimum performance specifications for the batteries to be used such as: depth of discharge, battery cycles, distance travelled per charge, life time have been included in the section 1.11 of the PD. assessment is provided in section 1.4 above. Hence the

S r · N o ·	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
			criterion is applicable.
7	The project proponent shall demonstrate that double counting of emission reductions will not occur e.g. via a contractual agreement with the end-user(s), maintenance of comprehensive inventory of project vehicles or unique identification of the vehicles owned by end-user(s). The steps undertaken to avoid double counting shall be documented in the PDD.	Vehicle fleet owners operating these electric vehicles on lease and/or lease agreement will clearly provide and sign carbon ownership over to CRX. Only vehicles are counted where such an agreement has been signed.	Based on the review of provided lease agreements, it is understood that the CRX has the ownership of the carbon emission reductions. Further, client has also provided a declaration on that there is no double counting of the emission reductions produced by the project. Hence the double counting has been assessed with respect to the project activity. The project proponent has provided a declaration, submitted by both the vendor and project owner, stating that there should be no occurrence of double counting.
8	In cases where renewable energy source is used for charging the electric vehicles through a dedicated transmission/distribution line, the methodology should be combined with “AMS-I.F.: Renewable electricity generation for captive use and mini-grid” to claim emission	In the project scenario, there has been no renewable energy involved for charging of electric vehicle and hence the condition is not applicable.	Not applicable The justification is accepted since there are no renewable energy source used for charging the EVs. Hence this criterion is not applicable.

S r · N o ·	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
	reductions for amount of electricity supplied from renewable electricity source to the charging station.		
9	In cases where this methodology is combined with “AMS-I.F.: Renewable electricity generation for captive use and mini-grid”, the project proponent shall separately demonstrate the additionality of each of the component (i.e supply of renewable energy to charging station (Type I) and use of electric vehicles (Type III)).	AMS I.F will be combined with AMS III C if electric vehicles will be charge through renewable energy source. If electric vehicles will be charge through grid power then amount of power withdrawn from the grid will consider as project emission.	Not applicable AMS 1.F would be used by PP in case electric vehicles will be charged through renewable energy sources. The criterion is not applicable.
10	Types of hybrid/electric vehicles to be introduced include but are not limited to cars, buses, trucks, jeepneys, commuter vans, taxis, motorcycles and tricycles.	Electric Vehicles introduced may include but are not limited to cars, buses, trucks, jeepneys, commuter vans, taxis, motorcycles and tricycles. This is evident in the list of scenarios shown in Section 1.4, as well as baseline scenario calculations submitted to the VVB. Vehicles referenced in both the project and baseline scenario will belong to the same vehicle category. Currently under the first PAI, the project vehicle introduced would belong to the same category as the baseline vehicle,	As stated in the PD, project may include for various scenarios of technologies/vehicle types, the project vehicle introduced would belong to the same category as the baseline vehicle, which covers 4 wheeler cars with comparable passenger capacity of 5 and will allow up to a maximum of 8. Hence the criterion is applicable.

S r . N o .	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
		which covers 4 wheeler cars with comparable passenger capacity of 5 and will allow up to a maximum of 8. The power rating of the current project vehicles are the BYD e6 with a power rating of of 90 kW (121hp) (https://sg.byd.com/wp-content/uploads/2019/11/e6_brochure_2018.pdf) which is comparable to the past similar models of BYD F3 (https://www.chinamobil.ru/eng/byd/f3/?view=props) with a power rating of 80 kW (109hp).	
1 1	Project participants shall demonstrate that the project and baseline vehicles are comparable,	Vehicles referenced in both the project and baseline scenario will belong to the same vehicle category, e.g. motorcycle, bus, taxi, truck, tricycle; So as to ensure that Project and baseline vehicle categories have comparable passenger/load capacity and	PP has adequately justified the comparability of the baseline and project vehicles with respect to the category, passenger capacity and the power rating. The same has been validated by the audit team by reviewing the data (Singapore Land & Transport Authority statistics data) and confirmed that the passenger capacity and power rating for the project vehicle is found with a variation of no more

S r . N o .	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
		power rating with a variation of no more than 20 per cent	than 20% of the baseline vehicles. VVB validated that baseline vehicles being displaced are those consuming fossil fuel. VVB verifies that, under the initial instances, the project vehicle introduced falls within the same category as the baseline vehicle, which includes four-wheeler cars with a similar passenger capacity of 4. The current project vehicles, such as the Bollure Bluecar, have a power rating of 30 kW⁶. Hence the criterion is applicable.
1 2	Measures are limited to those that result in emission reductions of less than or equal to 60 ktCO ₂ equivalent annually.	In no year are projected emission reductions over 60,000 tCO ₂ e. Refer section 1.10	As per the submitted estimated emission reduction sheet, it is evident that the projected annual emission reductions are less than 60,000 tCO ₂ e. Hence the criterion is applicable.
VM0038			

⁶ <https://autocatalogarchive.com/wp-content/uploads/2023/06/Bollure-Bluecar-2021-FR.pdf>

S r · N o ·	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
1	The applicable fleets of projects applying this methodology are limited to all LDV BEVs and PHEVs, and HDV EVs. For LDV projects, these applicable fleets comprise BEVs and PHEVs for L1 and L2 chargers, and BEVs for DCFCs. For HDV projects, these applicable fleets comprise MDV/HDV electric buses and trucks, both BEV and PHEV, eligible to charge at the project's set of EV charging systems.	Yes. The fleets are serviced by at least one of the following EV Charging Systems: • LDV BEV/PHEV (L1/1L2) • LDV BEV (DCFC) • HDV EV e-bus • HDV EV e-truck Therefore, this criterion is met.	The audit team has assessed that the fleets are serviced by one of charging systems, as verified from the technical specifications
2	Project proponents must demonstrate that the EV models comprising the applicable fleet of the project are comparable to their... .. conventional fossil fuel baseline vehicles using the following means⁷: • Project and baseline vehicles belong to the same vehicle category (e.g., car, motorcycle, bus, truck, LDV, MDV, HDV) • Project and baseline vehicles have comparable passenger/load capacities (comparing the baseline vehicle	Yes. The project partner will establish in section 1.1 the comparability between EV's in the applicable fleets and their comparable fossil fuel baseline vehicles.	The required comparability between EV's in the applicable fleets and their comparable fossil fuel baseline vehicles has been described in the PD.

⁷ Note that where project proponents apply the baseline emission default factors for MPG and AFEC determined for the US and Canada, this comparability requirement between applicable and comparable fleet models has already been completed and satisfied.

S r . N o .	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
	with the respective project vehicle).	Hence, this criterion is met.	
3	In order to demonstrate that double counting of emission reduction will not occur, the project proponent must maintain an inventory of EV chargers included in the project, including their L1/L2/DCFC classifications and unique identifiers; other measures may include disclosure of credit ownership to EV drivers. Double counting relative to any issued GHG credits from projects that introduce EV fleets will be addressed using the emission reduction discount adjustments in Section 8.4 below. Where associated infrastructure and/or renewable power (on-site and/or direct transmission) are included in an EV charging system, this must be referenced and described in the charging system's inventory. Project documentation must also include the following for each EV charger: • Classification using the performance voltage, AC/DC basis and kw power specifications given for L1, L2 and DCFC 50/100/150/320/500 definitions. • Unique identifiers, including the geo-spatial coordinates and one other unique reference.. ..such as NEMA codes, customer codes, equipment	The project partner will declare its inventory of EV chargers, whether it has already been supplied or not, and its respective type of EV charging system the inventory contains (L1/L2/DCFC/etc). After which, Geospatial coordinates or Unique identifiers such as NEMA codes, Customer codes, Equipment serial numbers, Charger ID codes will be supplied to the CME and VVB. Where associated infrastructure and/or renewable	Database maintained by the Project proponent has been checked. It maintains the inventory of EVs to avoid any double counting along with the unique ID and geo coordinates.

S r . N o .	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
	serial numbers, charger ID codes, or AFDC ID codes	power are included in an EV charging system, it will be referenced and described in the charging system's inventory. Hence, this criterion is met.	
4	This methodology is applicable to EV charging systems utilizing AI to provide electricity to and from EVs, on-site batteries and renewables under the condition that the AI must include adequate metering systems (e.g., meters/sub-meters and/or associated measurement systems). These metering systems must measure and accurately trace all electricity deliveries and receipts from all such interrelated associated infrastructure sources. This includes electricity sourced from/returned to the grid, dedicated renewable energy generated on-site (including RE sourced from direct transmission lines), on-site storage batteries, and/or the EV's on-board battery.	Yes. If the project partner's project activity utilizes AI to provide electricity to and from EVs, on-site batteries and renewables under the condition that the AI uses must include adequate metering systems. These metering systems will be elaborated upon and described briefly in an appendix, consistent with guidance found in VM0038.	During on-site visit metering system has been verified and PP follows the applicability condition of the metering system.

S r · N o ·	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
		Hence, this criterion is met.	
5	Projects with estimated annual emission reductions of over 60,000 tCO ₂ e (large-scale) are permitted where project proponents can demonstrate that the project is located in a country with credible national data sources for GHG emission calculations. Otherwise, projects are limited to annual emission reductions equal to or under 60,000 tCO ₂ e (small-scale). Projects located in Annex I and II countries, and countries referenced by EIA data sources, are automatically eligible to be of any scale. All regions listed in module VMD0049 Activity Method for Determining Additionality of Electric Vehicle Charging Systems meet these criteria and thus are not limited in scale.	Yes. The project activity is set to take place in Singapore, which isn't included as part of Annex I or II countries and regions listed in the module VMD0049 Activity Method for Determining Additionality of Electric Vehicle Charging Systems, therefore all projects will be limited to an annual emission reduction equal to or under 60,000 tCO₂e. Furthermore, since this project is to be registered as a GPA, If the annual emission reductions exceed 60,000tCO₂e, a new PAI will be submitted under the GPA.	The project activity is located in Singapore which is not part of Annex I or II countries and regions listed in the module VMD0049 Activity Method for Determining Additionality of Electric Vehicle Charging Systems, and the annual emission reductions equal to or under 60,000 tCO ₂ e. The same has been confirmed by the audit team.
6	Project proponents must demonstrate proof of ownership of emission reductions which	Yes.	The audit team has verified the ownership

S r . N o .	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
	may be achieved through the following..: • With the charging system owners through contractual agreements, terms of service, utility program participation rules, or other means, and/or • With EV drivers through disclosure of credit ownership (e.g., through dispenser notices, screen displays, terms of service, etc.).	The project proponent will demonstrate proof of ownership of emission reductions through one of the following methods/documents: With Charging System Owners: • Contractual agreements • Terms of Service contracts. • Utility program participation rules. With the EV drivers, disclosure of credit ownership via: • Dispenser notices • Screen displays • Terms of Service	documents with charging system owners.

S r · N o ·	Methodology Applicability criteria	Project applicability Criteria	Assessment by the Validation Team
		Therefore, this criterion is met.	

The project fulfils the applicability of the following TOOLS

S/N	Applicability conditions for TOOL05 “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”	Project applicability	Assessment by the Validation Team
1	If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer; b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power	Applicable Scenario A applies to the project activity as electricity consumption that is used to charge the electric vehicles is supplied from the grid, and there is no captive power plant installed at the site of electricity consumption.	VVB, during site audit has confirmed that there are no captive power plant connected to the project.

	plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.		
2	This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: a) Scenario I: Electricity is supplied to the grid; b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	Applicable Scenario II is applicable as the electricity consumed in the project activity will be supplied to consumers (electric vehicles)/electricity consuming facilities (charging points).	VVB, during site audit has confirmed that electricity is supplied to the consumers in the project scenario.
3	This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO2 emissions.	Applicable No captive renewable power generation technologies are installed in the project activity.	VVB, during site audit has confirmed that there are no captive renewable power plant connected to the project.

S/N	Applicability Conditions for TOOL07 “Tool to calculate the emission factor for an electricity system”	Project Applicability	Assessment by the Validation Team
1	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid	NA The project activity does not calculate for baseline emissions for electricity consumption as the project activity does supply electricity	This condition is not applicable for the project scenario.

	(e.g. demand-side energy efficiency projects).	nor substitute grid electricity.	
2	Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in “Appendix 1: Procedures related to off-grid power generation” should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Applicable The emission factor for the project electricity system under the first PAI is calculated from grid power plants only.	Grid connected power plants has been considered while calculating the emission factor. Same has been confirmed through the ER calculation sheet.
3	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	Applicable The project electricity system for the project activity is not located in an Annex I country	VVB confirms that the project is seeking registration only under only VERRA and located in the non Annex 1 country.
4	Under this tool, the value applied to the CO2 emission factor of biofuels is zero	NA Biofuels are not used in project	This condition is not applicable since no biofuel is used in the project.

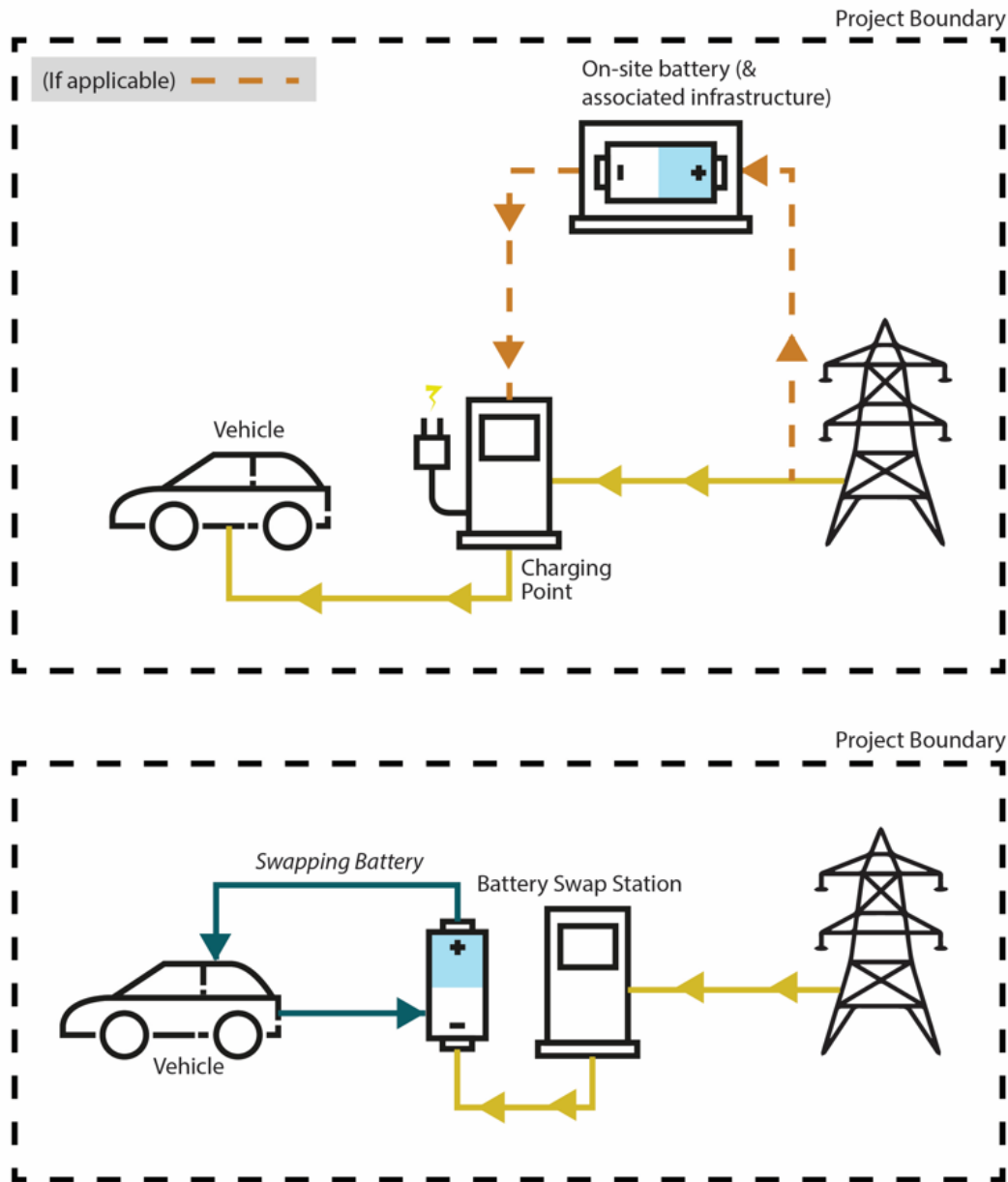
3.3.3 Project Boundary

The group project applies the guidelines provided in the applied methodologies “Emission reductions by electric and hybrid vehicles” AMS.III.C, version 15.

The project boundary comprises of a fleet for EV chargers and geographical location of the host country where the chargers are installed.

The relevant gases included in calculation of emissions are shown in the table below:

Source		Gas	Included?	Justification/Explanation
Baseline	Fossil fuel combustion of vehicles displaced by project activities	CO ₂	Yes	Included in the calculation of CO ₂ e associated with fuel combustion.
		CH ₄	N/A	N/A
		N ₂ O	N/A	N/A
		Other	N/A	N/A
Project	Electricity consumption via grid	CO ₂	Yes	Main emission source
		CH ₄	N/A	N/A
		N ₂ O	N/A	N/A
		Other	No	Not Applicable
	EV battery swap in vehicle	CO ₂	Yes	Main emission source
		CH ₄	N/A	N/A
		N ₂ O	N/A	N/A
		Other	No	Not Applicable



Based on the methodologies review and on-site visit, it was found that the PP has adequately provided the required information in section 3.3 of the VCS PD and it complies with requirements provided in para 18 of the applied methodology.

3.3.4 Baseline Scenario

The group project applies the guidelines provided in the applied methodologies "Emission reductions by electric and hybrid vehicles" AMS.III.C, version 15.

As per para 22, of the applied methodology, AMS.III.C, Version 15 and VM0038 Ver.1 para 6, "The baseline scenario in case of operation of electric vehicles is the operation of the comparable vehicles (the comparability of baseline and project vehicles to be demonstrated as per indicators

described below in (a) and (b)), that would have been used to provide the same transportation service in the absence of the project.

(a) Project and baseline vehicles belong to the same vehicle category, e.g. motorcycle, bus, taxi, truck, tricycle;

(b) Project and baseline vehicle categories have comparable passenger/load capacity and power rating with a variation of no more than 20 per cent (comparing the baseline vehicle with the respective project vehicle of same category).

Validation team has reviewed the provided justification for the applicability criteria 11 and it is confirmed that the baseline and project vehicles are comparable and same has been demonstrated by the PP in the PD and ER sheet.

Current project instance applies only the AMS.III.C, V.15 of the methodology. Based on the above, assessed that the project instance complies with the baseline criteria.

3.3.5 Additionality

The group project applies the guidelines provided in the applied methodologies “Emission reductions by electric and hybrid vehicles” AMS.III.C, version 15 to demonstrate additionality. CRX has used the Option 2 as per methodology.

According to data presented by Singapore Land Transport Authority⁸ (LTA), the table below depicts the numbers for different types of motor vehicles in Singapore as of 31st December 2021:

V e h i c l e T y p e	Fuel Type	Population
Cars	Petrol	568,391
	Diesel	23,087
	Petrol-Electric	64,437

⁸ https://www.lta.gov.sg/content/dam/ltagov/who_we_are/statistics_and_publications/statistics/pdf/M09-Vehs_by_Fuel_Type.pdf?fireglass_rsn=true

	Petrol-Electric (Plug in)	692
	Petrol-CNG	164
	Electric	3,246
	Diesel-Electric	20
	Total	678,037

The Validation team has checked that the percentage of Electric Vehicles on the road in Singapore can be calculated as 0.48% market penetration, which is lower than the 5% threshold. Therefore, as per methodology option 2, the justification could be accepted.

Validation team has reviewed the provided data with the publicly available sources and found the data is valid and acceptable. Hence, it is concluded that the current project instance is additional.

According to section 7 of VM0038, project proponents applying the methodology must determine additionality using the procedure described below.

Step 1: Regulatory Surplus

Regulatory surplus has been demonstrated by the absence of any systematically enforced law, statute, or other regulatory framework in Singapore which mandates the project activity consisting of installing EV charging systems and their associated infrastructure to charge applicable EV fleets, in order to displace the use of conventional fossil fuel-based vehicles used for passenger and freight transportation. The same has been assessed by the audit team based on existing regulations in Singapore.

Step 2: Positive List

The applicability conditions of the latest version of VCS module VMD0049 Activity Method for Determining Additionality of Electric Vehicle Charging Systems represent the positive list. The positive list was established using the activity penetration option (Option A in the VCS Standard). Projects that meet all applicability conditions of this methodology and VCS module VMD0049 Activity Method for Determining Additionality of Electric Vehicle Charging Systems are deemed additional.

The project activity is set to take place in Singapore which isn't included in the regions stated with the latest VCS module VMD0049 Activity Method for Determining Additionality of Electric Vehicle Charging Systems. Therefore, Step 2 is not applicable.

Step 3: Project Method

This project will use the CDM methodological tool 'Demonstration of additionality of small-scale project activities' and have chosen the Technological barrier approach to demonstrate additionality.

According to the 2021 data presented by Singapore's Land Transport Authority (LTA), only 0.48% (3,246 EVs) of Singapore's vehicles are fully electric. This number is significantly lower than the composition of conventional fossil fuel-based vehicles and the associated infrastructure which dominates the market share of passenger and freight transportation vehicles in Singapore.

Validation team has reviewed the provided data with the publicly available sources and found the data is valid and acceptable after Step 1 and 3. Hence the additionality has been demonstrated by the PP.

3.3.6 Quantification of GHG Emission Reductions and Removals

The group project applies the guidelines provided in the applied methodologies "Emission reductions by electric and hybrid vehicles" AMS.III.C, version 15

Baseline emissions calculated using VM0038 methodology Ver. 1 Section 8.1.

Baseline emissions are calculated by converting the electricity used to charge project applicable fleet vehicles at the EV chargers into distance travelled, and multiplying this by the emission factor for fossil fuels used by baseline comparable fleet vehicles to travel the same distance. Baseline emissions must be calculated as follows:

$$BE_y = \sum_{i,f} ED_{iy} * EF_{if,y} * 100 * IR_i^{y-1} / (AFEC_{iy} * MPG_{iy}) \quad (1)$$

Where:

BE_y = Baseline emissions in year y (tCO₂e)

$ED_{i,y}$ = Electricity delivered by project charging systems serving applicable fleet i in project year y (kwh)

$EF_{j,f,y}$ = Emission factor for the fossil fuel f used by comparable fleet vehicles j in year y (tCO₂e/gallon)

IR_i = Technology improvement rate factor for applicable fleet i

$AFEC_{i,y}$ = Weighted average electricity consumption per 100 miles rating for EVs in applicable fleet i in project year y (kwh/100 miles)

$MPG_{i,y}$ = Weighted average miles per gallon rating for the fossil fuel vehicles comparable to each EV in applicable fleet i , in project year y (miles per gallon)

Default values for $MPG_{i,y}$, $AFEC_{i,y}$, $EF_{j,f,y}$, and IR_i across both LDV and HDV applicable fleets can be found in the parameter tables in Section 9.1 below for the United States and Canada.

The weighted average electricity consumption per 100 miles rating for EVs in applicable fleet i , is calculated as follows:

$$AFEC_{i,y} = \sum_a (EV_{aiy} * EVR_{aiy}) / \sum_a EVR_{aiy} \quad (2)$$

Where:

$AFEC_{i,y}$ = Weighted average electricity consumption per 100 miles rating for EVs in applicable fleet i in project year y (kwh/100 miles)

$EV_{a,j,y}$ = Electricity consumption per 100 miles rating for model a EV in applicable fleet i in project year y (kwh/100 miles)

$EVR_{a,j,y}$ = Total number of model a EV in applicable fleet i on the road by project year y (cumulative number of EVs)

The weighted average miles per gallon rating for the comparable fleet associated with each applicable fleet i , is calculated as follows:

$$MPG_{i,y} = \sum_a (MPG_{aiy} * EVR_{aiy}) / \sum_a EVR_{aiy} \quad (3)$$

Where:

$MPG_{i,y}$ = Weighted average miles per gallon rating for fossil fuel vehicles comparable to each EV in applicable fleet i in project year y (miles per gallon)

$MPG_{a,j,y}$ = Mile per gallon rating for the fossil fuel vehicle model deemed comparable to each EV model a from applicable fleet i in project year y (miles/gallon)

$EVR_{a,i,y}$ = Total number of EV models within applicable fleet i on the road by project year y (cumulative number of EVs)

Guidance regarding the calculation procedures for $AFEC_{i,y}$ and $MPG_{i,y}$ and their associated parameters is given in the parameter tables in Section 9.2 and applicability condition #2.

Further details for the calculation of the default values for $MPG_{i,y}$, $AFEC_{i,y}$, can be found in Appendix 1 and the accompanying *Default MPG and AFEC Workbook* on the Verra website.

For the project instance, methodology AMS.III. C. V.15 is applicable.

Baseline Emissions:

Accordingly, as per para 25&26 of the applied methodology, PP has chosen the approach 2:

Using distance travelled by project vehicles.

The baseline emissions are calculated based on the unit of service provided by the project vehicles (travelled distance) times the emission factor for the baseline vehicle to provide the same unit of service as per the equation below:

$$BE_y = \sum_i EF_{BL,km,i} \times DD_{i,y} \times N_{i,y} \times 10^{-6}$$

BE_y = Total baseline emissions in year y (t CO₂)

$EF_{BL,km,i}$ = Emission factor for baseline vehicle category i (g CO₂/km)

$DD_{i,y}$ = Annual average distance travelled by project vehicle category i in the year y (km)

$N_{i,y}$ = Number of operational project vehicles in category i in year y

The Emission factor for baseline vehicle category ($EF_{BL,km,i}$) shall be determined as follows:

$$EF_{BL,km,i} = SFC_i \times NCV_{BL,i} \times EF_{BL,i} \times IR^t \quad \text{Equation (3)}$$

Where:

SFC_i = Specific fuel consumption of baseline vehicle category i (g/km)

$NCV_{BL,i}$ = Net calorific value of fossil fuel consumed by baseline vehicle category i (J/g)

$EF_{BL,i}$ = Emission factor of fossil fuel consumed by baseline vehicle category i (g CO₂/J)

IR^t = Technology improvement factor for baseline vehicle in year t . The improvement rate is applied to each calendar year. The default value of the technology improvement factor for all baseline vehicle categories is 0.99

T = Year counter for the annual improvement (dependent on age of data per vehicle category)

The specific fuel consumption for comparable vehicles is estimated by using the specific fuel consumption for highway driving obtained from manufacturer's specification of the top 20 per cent of vehicles operated/used for public/private transportation in the project region.

PP has provided the calculation example & found ok: -

Baseline Emissions – 6197 tCO₂e	
(Equation 1) $BE_y = \sum EF_{BL,km,j} \times (ECPJ,l,y/SECPJ,km,l,y) \times 10^{-6}$	
$EF_{BL,km,j}$	137.80
$ECPJ,l,y$	8994838
$SECPJ,km,l,y$	0.2
(Equation 2) $EF_{BL,km,j} = SFC_i \times NCV_{BL,i} \times EF_{BL,i} \times IR^t$	
SFC_i	44.47
$NCV_{BL,i}$	43650
$EF_{BL,i}$	0.0000717
IR^t	0.99

Project Emissions– 3799 tCO₂e	
(Equation 6) $PE_y = \sum EF_{PJ,km,i,y} \times (ECPJ,i,y/SECPJ,km,i,y)$	
$EF_{PJ,km,i,y}$	0.0001
$ECPJ,i,y$	8994838
$SECPJ,km,i,y$	0.2
(Equation 7) $EF_{PJ,km,i,y} = \sum SECPJ,km,i,y \times EF_{elect,y}/(1-TDL_y) \times 10^{-3} + \sum SFC_{PJ,km,i,y} \times NCV_{PJ,i} \times EF_{PJ,i} \times 10^{-6}$	
$SECPJ,km,i,y$	0.2
$EF_{elect,y}$	0.408
TDL_y	0.034
$SFC_{PJ,km,i,y}$	0
$NCV_{PJ,i}$	43650

$EF_{PJ,i}$	0.0000717
$ER_y = BE_y - PE_y - LE_y$	2399 tCO ₂ e

Below stated parameters that are used to determine the baseline emission calculations are found ex-ante:

S. No.	Parameter	Value	Assessment by Validation Team
1	Specific fuel consumption of baseline vehicle category (g/km)	Diesel cars- 0.035 l/km Diesel buses- 0.275 l/km Diesel rickshaws- 0.028 l/km	Validation team has assessed with all the credible sources which were verified and found acceptable.
2	Net calorific value of fossil fuel consumed by baseline vehicle category (J/g)	NCV of gasoline- 44.3 GJ/ton	These NCV values are taken from IPCC 2006 Volume 2 Energy, table 1.2. Hence, found valid acceptable.
3	Net calorific value of fossil fuel consumed by baseline vehicle category (J/g)	NCV of diesel- 43 GJ/ton	These NCV values are taken from IPCC 2006 Volume 2 Energy, table 1.2. Hence, found valid acceptable.
4	Net calorific value of jet fuel (J/g)	NCV of jet fuel- 443000 GJ/ton	These NCV values are taken from IPCC 2006 Volume 2

			Energy, table 1.2. Hence, found valid acceptable.
5	Specific fuel consumption of baseline Diesel Cars	43.5 g/km	IPCC 2006 Volume 2 Energy, table 1.2.
6	Specific fuel consumption of baseline petrol Cars	45.45 g/km	IPCC 2006 Volume 2 Energy, table 1.2
7	Specific fuel consumption of baseline Diesel buses	271.12 g/km	IPCC 2006 Volume 2 Energy, table 1.2.
8	Emission factor of fossil fuel consumed by baseline vehicle category <i>i</i> (g CO ₂ /J)	Diesel Vehicle - 0.0000741 Petrol Vehicle- 0.0000693 Jet fuel - 0.00007	These emission factors are taken from IPCC 2006 Volume 2 Energy. Hence, found acceptable.
9	Net calorific value of Diesel and Petrol (J/g)	43,650	These NCV values are taken from IPCC 2006 Volume 2 Energy, table 1.2. Hence, found valid acceptable.
10	Specific fuel consumption of baseline Diesel Trucks and Vans	69.97 g/km	IPCC 2006 Volume 2 Energy, table 1.2
11	Specific fuel consumption of baseline Petrol Trucks and Vans	132 g/km	IPCC 2006 Volume 2 Energy, table 1.2
12	Specific fuel consumption of baseline Diesel Trucks and Vans (HGV)	102.48 g/km	IPCC 2006 Volume 2 Energy, table 1.2

1 3	Specific fuel consumption of baseline Diesel Trucks and Vans (VHGV)	245.74 g/km	IPCC 2006 Volume 2 Energy, table 1.2
1 4	Specific fuel consumption of baseline petrol Motorbikes	19.26 g/km	IPCC 2006 Volume 2 Energy, table 1.2
1 5	Specific fuel consumption of baseline Petrol 3 wheelers	25.69 g/km	IPCC 2006 Volume 2 Energy, table 1.2
1 6	Specific fuel consumption of baseline Petrol and Diesel Vehicles in Singapore	44.47 g/km	Calculated by taking Average of diesel and petrol cars driven in Singapore. Hence, found valid acceptable
1 7	Specific fuel consumption of baseline Jet Fuel Air Taxis	134.64 g/km	IPCC 2006 Volume 2 Energy, table 1.2e
1 8	Technological improvement factor for baseline vehicle in year t.	0.99	Taken from the applied methodology AMS.III.C. Hence, found valid acceptable

Project emissions:

Project emissions include the electricity consumption associated with the operation of the applicable fleet and must be calculated as follows:

$$PE_y = \sum_{ij} EC_{ij,y} * EFkw_{ij,y} \quad (4)$$

Where:

PE_y = Project emissions in year y (tCO₂e)

$EC_{i,j,y}$ = Electricity consumed by project chargers sourced from region j serving applicable fleet i in project year y (kwh/year)

$EFkw_{i,j,y}$ = Emission factor (average) for the electricity sourced from region j consumed by project charging systems serving applicable fleet i in year y (tCO₂e/kwh)

Where projects include associated infrastructure within their charging systems, project emissions must be quantified for all such sources s following Equation 7, which must replace Equation 4, where the following applies:

- 1) The electricity emissions factor for the on-site battery must be calculated using the net weighted average of the grid and on-site renewable emission factors as provided in Equation 8 below.
- 2) The charging system's metering system must adequately and accurately measure and trace such net electricity kwh provided to the charging system (i.e., deliveries minus receipts) from all electricity sourced from/returned to the grid and the dedicated renewables. This includes, for example, electricity sourced from the grid, dedicated renewables (e.g., on site) and delivered to the EV directly and/or via on-site batteries, net of kwh returned back to such sources from the EV batteries¹⁸. See Appendix 2 for guidance on adequate metering systems.

$$PE_y = \sum_{ijs} NEC_{ijsy} * EFkwAl_{ijsy} - \sum_{ij} LEC_{ijy} * EFkwonsitebatt_{ijy} \quad (7)$$

Where:

PE_y = Total project emissions in year y (tCO₂e)

$NEC_{i,j,s,y}$ = Electricity consumed by EV charging systems supplied from associated infrastructure source s net of any kwh EV/charger returned to this same source within region j serving applicable fleet i in project year y (kwh/year)

$EFkwAl_{j,j,s,y}$ = Emission factor for the electricity from each associated infrastructure source s within region j consumed by project chargers serving applicable fleet i in year y (tCO₂e/kwh)

$LEC_{i,j,y}$ = Electricity provided to the grid and/or building from on-site storage battery within region j serving applicable fleet i in project year y (kwh/year)

$EFkwonsitebatt_{i,j,y}$ = Emission factor for the electricity from the on-site battery associated infrastructure source s within region j consumed by project charging systems serving applicable fleet i in year y (tCO₂e/kwh)

Where projects include associated infrastructure, the emission factor for electricity from on-site battery associated infrastructure must be calculated using the net weighted average of the grid and on-site renewable emission factors as follows:

$$EFkwonsitebatt_{ijy} = \sum_z ECB_{ijzy} * EFkwAlZ_{ijzy} \quad (8)$$

PP has selected approach 2 to determine the project emissions. As per that below stated formula is used to calculate the electricity used to charge the vehicles

$$PE_y = \sum_i EF_{PJ,km,i,y} \times \frac{EC_{PJ,i,y}}{SEC_{PJ,km,i,y}}$$

Where:

$EC_{PJ,i,y}$ = Electricity consumed by the project vehicles of type i in year y (kWh)

$SEC_{PJ,km,i,y}$ = Specific electricity consumption by project vehicle category i per km in year y in urban conditions (kWh/km)

I = Vehicle types of project activities

The emission factor of the project vehicles shall be established as follows:

$$EF_{PJ,km,i,y} = \sum_i SEC_{PJ,km,i,y} \times EF_{elect,y} / (1 - TDL_y) \times 10^{-3} + \sum_i SFC_{PJ,km,i,y} \times NCV_{PJ,i} \times EF_{PJ,i} \times 10^{-6}$$

Where:

- $SEC_{PJ,km,i,y}$ = Specific electricity consumption by project vehicle category i per km in year y in urban conditions (kWh/km)
- $EF_{elect,y}$ = CO₂ emission factor of electricity consumed by project vehicle category i in year y (kg CO₂/kWh)
- $SFC_{PJ,km,i,y}$ = Specific fossil fuel⁹ consumption by project vehicle category i per km in year y in urban conditions (g/km)
- $EF_{PJ,i}$ = CO₂ emission factor of fossil fuel consumed by project vehicle category i in year y (g CO₂/J)
- $NCV_{PJ,i}$ = Net calorific value of the fossil fuel consumed by project vehicle category i in year y (J/g)
- TDL_y = Average technical transmission and distribution losses for providing electricity in the year y

Below stated parameter used to determine the project emissions is found ex-ante:

S.No.	Parameter	Value	Assessment by Validation Team
1	Specific electricity consumption by project vehicle category i per km in year y in urban conditions (kWh/km)	Buses-50 Cars-26 Rickshaw-22	This is calculated using the maximum power and distance travelled per charge data provided by the manufacturer & same has been cross checked during site visit. Assessment team has reviewed the data found the applied value is conservative considering all models of electric

⁹ For electric vehicle the values is 0.00.

			cars implemented in the project instance.
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Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y	= Emission reductions in year y (t CO ₂ e)
BE_y	= Baseline emissions in year y (t CO ₂ e)
PE_y	= Project emissions in year y (t CO ₂ e)
LE_y	= Leakage emissions in year y (t CO ₂ e)

3.3.7 Methodology Deviations

Not Applicable

3.3.8 Monitoring Plan

The approved baseline and monitoring methodology “AMS-III.C”, version 15.0 has been applied.

The monitoring plan is in accordance with the monitoring methodology; the monitoring plan will give opportunity for real measurement of achieved emission reductions. TÜV SÜD’s team has checked all the parameters presented in the monitoring plan against the requirements of the methodology; no deviations relevant to the project activity have been found in the plan.

TÜV SÜD’s team confirms that the monitoring arrangements described in the monitoring plan are feasible within the project design, and the means of implementation of the monitoring plan are sufficient to ensure the emission reductions achieved by/resulting from the proposed VCS project activity can be reported ex post and verified.

Ex – ante parameters for the project activity: -

Parameters	VVB Assessment
NCV _{BL, Petrol} - Net calorific value of gasoline (GJ/ton)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent.

	Value – 44.3
NCV _{BL, Diesel} - Net calorific value of Diesel (GJ/ton)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 43
NCV _{BL, Combined} - Net calorific value of Diesel and Petrol (J/g)	PP has calculated this using IPCC value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 43.650
NCV _{BL, Aviation Gasoline} - Net calorific value of Jet Fuel (J/g)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value - 443000
SFC _{BL,Cars-Diesel} - Specific fuel consumption of baseline Diesel Cars (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 43.5
SFC _{BL,Cars-Petrol} - Specific fuel consumption of baseline Petrol Cars (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 45.45
SFC _{BL,Buses-Diesel} - Specific fuel consumption of baseline Diesel Buses (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 271.72
SFC _{BL,Vans(LGV)-Diesel} - Specific fuel consumption of baseline Diesel Trucks and Vans (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 69.97
SFC _{BL,Vans(LGV)-Petrol} - Specific fuel consumption of baseline Diesel Trucks and Vans (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent.

	Value – 132
SFC _{BL,HGV-Diesel} - Specific fuel consumption of baseline Diesel Trucks and Vans (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 102.48
SFC _{BL,VHGV-Diesel} - Specific fuel consumption of baseline Diesel Trucks and Vans (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 245.74
SFC _{BL,Motorbikes-Petrol} - Specific fuel consumption of baseline Diesel Motorbikes (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 19.26
SFC _{BL,3wheeler-Petrol} - Specific fuel consumption of baseline Petrol Motorbikes (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 25.69
SFC _{BL,SGNational-Combined} - Specific fuel consumption of baseline Petrol and Diesel Vehicles in Singapore (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 44.47
SFC _{BL,AirTaxi-AviationGasoline} - Specific fuel consumption of baseline Jet Fuel Air Taxis (g/km)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent. Value – 134.64
EF _{BL,Diesel} - CO ₂ emission factor of Diesel (gCO ₂ /J)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent Value - 0.0000741
EF _{BL,Petrol} - CO ₂ emission factor of Petrol (gCO ₂ /J)	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent

	Value - 0.0000693
EF _{BL,Combined} - CO2 emission factor of Petrol and Diesel	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent Value - Calculated
EF _{BL,AviationGasoline} - CO2 emission factor of Jet Fuel	PP has used IPCC 2006 value as a source of document & which has been cross verified by the assessment team & found consistent Value - 0.00007
IR _t - Technological improvement factor for baseline vehicle in year t	PP has applied methodology value for this parameter & found consistent. Value - 0.99
EF _{elect,CM} - Grid emission factor (kgCO2/kWh)	PP has applied value from this source as Energy Market Authority Singapore (EMA). EMA is publishing the grid emission factor on an annual basis. Value - 0.408

Ex – post parameters -

Data / Parameter:	SEC _{PJ,km,i}
Data unit:	kWh/km
Description:	Specific electricity consumption per km per project vehicle category i in year y i: Cars j: Buses k: LGV Van l: HGV m: VHGV n: Motorcycle o: 3-wheelers p: Marine Fleets

Source of data used:	Purchase orders, procurement documents
Means of verification/Comments:	PP will provide the purchase orders/procurement date during every monitoring period for cross-check mechanism to the VVB for the assessment. PP has also provided the sample data for the monitoring purpose to fulfil the requirement of cross-mechanism & found consistent.
Cross-check	Purchase order – every monitoring period

Data / Parameter:	SEC _(PJ,i,j,k,l,m,n,o,p)
Data unit:	g/km
Description:	Specific fuel consumption per km per EV category i in year y Specific electricity consumption per km per project vehicle category Type i per year y i: Cars j: Buses k: LGV Van l: HGV m: VHGV n: Motorcycle o: 3-wheelers p: Marine Fleets
Source of data used:	Purchase orders, procurement documents
Means of verification/Comments:	PP will provide the purchase orders/procurement date during every monitoring period for cross-check mechanism to the VVB for the assessment. PP has also provided the sample data for the monitoring purpose to fulfil the requirement of cross-mechanism & found consistent.
Cross-check	Purchase order – every monitoring period

Data / Parameter:	EC _{PJ,i,y}
Data unit:	kWh
Description:	Electricity consumed by the project vehicles of type i in year y
Source of data used:	Invoiced bills and/or EVA Data Monitoring System and Platform

Means of validation/Comments:	PP will provide the data sheet on monthly basis during the monitoring period to the VVB & VVB will cross check the relevant data with the invoices.
Cross-check	Excel Sheet will cross check with Invoices on Monthly Base.

Data / Parameter:	AFECiy
Data unit:	kwh/100 miles
Description:	Weighted electricity consumption per 100 miles rating for EVs of type i in project year y
Source of data used:	Calculated in ER Sheet (Applicable to project activities that involve only charging infrastructure)
Means of validation/Comments:	PP will provide the Company procurement records or purchased sales information during the monitoring period to the VVB & VVB will cross check the relevant data with the invoices.
Cross-check	Excel Sheet will cross check with Invoices

Data / Parameter:	MPGi _y
Data unit:	Miles per gallon
Description:	Weighted average miles per gallon rating for fossil fuel vehicles deemed comparable to each EV in applicable fleet i in project year y
Source of data used:	Calculated in ER Sheet
Means of validation/Comments:	PP will provide the Company procurement records or purchased sales information during the monitoring period to the VVB & VVB will cross check the relevant data with the invoices.
Cross-check	Excel Sheet will cross check with Invoices

Data / Parameter:	NECi,j,s,y
Data unit:	kWh/year
Description:	Electricity consumed by project chargers supplied from associated infrastructure source s net of any kwh EV/charger returned to this same source within region j serving applicable fleet i in project year y
Source of data used:	Calculated in ER Sheet (if project activity includes charging infrastructure)
Means of validation/Comments:	VVB will check the calibration records to confirm the same.
Cross-check	-

Data / Parameter:	EFkwAI-Zi,j,s,y
Data unit:	tCO2e/kwh
Description:	Emission factor for the net electricity from each associated infrastructure source s within region j consumed by project chargers serving applicable fleet i in year y
Source of data used:	Each of associated infrastructure source, s, must have a well-documented emissions factor for the electricity it supplies and/or dispatches as follows: – Grid-connected electricity from region j must follow the same procedures as for parameter EFkwi,j,y in Equation 4 (see above) – Dedicated renewable energy generated on-site, including renewable energy sourced via direct transmission lines, must set emission factors at zero – On-site storage batteries must assume the weighted average emission factor based upon the proportionate net consumption of grid and dedicated renewable energy at the charging system
Means of validation/Comments:	VVB will check the emission factor from the source.
Cross-check	-

Data / Parameter:	LECi,j,y
Data unit:	kWh/year
Description:	Electricity provided to the grid and/or building from on-site storage battery within region j serving applicable fleet i in project year y (kwh/year).
Source of data used:	From on-site battery/charging system's adequate measurement systems
Means of validation/Comments:	VVB will check the calibration records to confirm the same.
Cross-check	-

Data / Parameter:	EFkwonsitebatti,j,s,y
Data unit:	tCO2e/kwh
Description:	Emission factor for the electricity from the on-site batteries as associated infrastructure sources s within region j consumed by project chargers serving applicable fleet i in year y
Source of data used:	Calculated value
Means of validation/Comments:	VVB will check the emission factor from the source.
Cross-check	-

Data / Parameter:	ECBi,j,z,y
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Data unit:	kWh/year
Description:	Electricity consumed by on-site battery from associated infrastructure sources z, which comprise only the grid-connected and dedicated renewable sources, within region j serving applicable fleet i in project year y
Source of data used:	ER Sheet
Means of validation/Comments:	VVB will check the calibration records to confirm the same.
Cross-check	-

Data / Parameter:	EF _{kWAl-Zi,j,s,y}
Data unit:	tCO ₂ e/kwh
Description:	Emission factor for the net electricity from each associated infrastructure source s within region j consumed by project chargers serving applicable fleet i in year y
Source of data used:	ER Sheet
Means of validation/Comments:	VVB will check the emission factor from the source.
Cross-check	-

The monitoring plan as included in the VCS PD covers all the relevant monitoring parameter as required in the context of the project activity and as prescribed in the applied methodology and tools. The monitoring systems and responsibilities are clearly defined in the VCS PD and it gives impression to the validation team that the monitoring plan is feasible and implementable in the context of the project design. The monitoring parameters meet the minimum requirement of the applied methodology/tools in terms of measurement method, frequency and associated quality checks/ cross checks. The procedures for internal auditing and QA/QC are separately defined for each parameter, wherever applicable.

The monitoring plan has not applied sampling on any parameter and all of these are directly monitored or estimated based on monitoring methodology prescribed in applied methodology and tools, as appropriate. The organizational structure, responsibilities and competencies of the personnel that will be carrying out monitoring activities are adequately defined in the VCS PD including the policies for oversight and accountability of monitoring activities. Relevant internal procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation).

It has been included in the VCS PD that all monitored data required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of VCU, for this project activity, whichever occurs later.

3.4 Non-Permanence Risk Analysis

Not Applicable

4 VALIDATION OPINION

TÜV SÜD South Asia Pvt has performed a validation of the project activity “The Electric Vehicle Accelerator Programme (EVA)”. The validation was performed on the basis of VCS Version 4.4 requirements as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided TÜV SÜD with sufficient evidence to determine the fulfilment of stated criteria.

The project correctly applied the following baseline and monitoring methodologies

AMS III.C. Emission reductions by electric and hybrid vehicles, Ver. 15 and VM0038 Ver.1

The Electric Vehicle Accelerator Programme (EVA) is being implemented by CRX and is proposed to be implemented in Singapore and other countries such as Malaysia, Vietnam, Cambodia, the Philippines, Indonesia, Brunei, India, Nepal, Hong Kong, Taiwan South Korea and Japan.

This group project adopts the renewal crediting period of 7 years. The expected average annual emission reductions are 7801 tCO₂eq/y. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change. The monitoring plan provides for the monitoring of the project’s emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is TÜV SÜD opinion that the project participants are able to implement the monitoring plan.

In summary, it is TÜV SÜD opinion that the project activity “The Electric Vehicle Accelerator Programme (EVA)” as described in the PD version 4.2 dated 17/07/2023 meets all relevant VCS version 4.4 requirements and correctly applies the baseline and monitoring methodology.

Validated GHG emission reductions

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
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Year 1	2,399
Year 2	4,199
Year 3	6,000
Year 4	7,801
Year 5	9,602
Year 6	11,402
Year	13,203
Total estimated ERs	54,606
Total number of crediting years	7
Average annual ERs	7,801

APPENDIX 1: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS AND FORWARD ACTION REQUESTS

CL from this validation

CL ID	01	Section no.	PD	Date: 04/11/2022
Description of CL				
Following documents are need to be submitted: 1. Agreement signed with FOs and COs 2. Proof for start date 3. A declaration for no double counting 4. Reference for no impact on Environment due to project				
Project participant response				Date: 11/11/2022
Documents have been submitted to the VVB				
Documentation provided by project participant				
1. Signed HOTs with SEV 2. Invoices from SEV dated 01/01/2021 3. Declaration of No Double Counting 4. Reference of no impact on environment due to project.				
VVB assessment				Date: 28/11/2022
The requested documents have been provided by the PP. Hence the issue is closed.				
# CL 01 Closed				

CL ID	02	Section no.	PD	Date: 04/11/2022
Description of CL				
Document date is missing in the first page of the report				
Project participant response				Date: 14/11/2021
Start Date has been added.				
Documentation provided by project participant				
Revised GPA-DD				

VVB assessment	Date: 28/11/2022
The GPA-DD has been revised with respect to the start date. Hence the issue is closed. # CL 02 Closed	

CL ID	03	Section no.	3.1	Date: 04/11/2022
Description of CL				
PP has to elaborate further the implementing status of the project as VCS standard guidelines.				
Project participant response				Date: 14/11/2022
Implementing status has been updated in the GPA-DD				
Documentation provided by project participant				
Revised GPA-DD				
VVB assessment				Date: 28/11/2022
The project implementation status has been updated in the GPA-DD. Hence the issue is closed. # CL 03 Closed				

CARs from this validation

CAR ID	01	Section no.	1.4	Date: 04/11/2022
Description of CAR				
All criteria for each instance inclusion are missing in the section				
Project participant response				Date: 14/11/2022
Cases and Scenarios have been listed within the section.				
Documentation provided by project participant				
Revised GPA-DD				

VVB assessment	Date: 28/11/2022
The inclusion criteria has been included in the GPA-DD. Hence the issue is closed. # CAR 01 Closed	

CAR ID	02	Section no.	1.8, 1.9, 2.4 and 1.10	Date: 04/11/2022
Description of CAR				
Respective information in these sections is missing				
Project participant response				Date: 14/11/2022
All information has been included and updated				
Documentation provided by project participant				
Revised GPA-DD				
VVB assessment				Date: 28/11/2022
The GPA-DD has been revised for the missing information. Hence the issue is closed. # CAR 02 Closed				

CAR ID	03	Section no.	ER sheet	Date: 04/11/2022
Description of CAR				
How Energy consumption for each vehicle type is assumed or calculated? PP has to interlink all the values and calculation used in the sheet for the traceability.				
Project participant response				Date: 15/11/2022
Energy consumption had been put in as a place holder and will be updated upon submission of PAIs. All values and calculations used in the sheet has been linked for traceability.				
Documentation provided by project participant				
Compiled ER Spreadsheet				

VVB assessment	Date: 28/11/2022
The ER sheet has been revised with respect to the assumptions and traceability. Hence the issue is closed. # CAR 03 Closed	

CAR ID	04	Section no.	1.17	Date: 04/11/2022
Description of CAR				
Each and every SDG should be described with its monitoring procedure.				
Project participant response				Date: 15/11/2022
SDGs and their indicators have been included, supporting documentation has been sent over.				
Documentation provided by project participant				
Supporting documentation for SDG 13 and 8.				
VVB assessment				Date: 28/11/2022
The supporting documentation for SDGs have been assessed by the audit team and the monitoring procedure has been detailed in the GPA-DD. Hence the issue is closed. # CAR 04 Closed				

CAR ID	05	Section no.	2.2	Date: 04/11/2022
Description of CAR				
MoM and comments received during the LSC should be discussed under this section along with on going communication mechanism with the stakeholders.				
Project participant response				Date: 14/11/2022
Comments received during the LSC has been included into the section.				
Documentation provided by project participant				
Revised GPA-DD				
VVB assessment				Date: 28/11/2022
GPA-DD has been revised to include comments received during LSC. Hence the issue is closed. # CAR 05 Closed				

CAR ID	06	Section no.	3.2	Date: 04/11/2022
Description of CAR				
PP has to demonstrate each and every applicability criteria for methodologies and tool used in the project along with the justification.				
Project participant response				Date: 14/11/2022
Applicability criteria has been adjusted.				
Documentation provided by project participant				
Revised GPA-DD				
VVB assessment				Date: 28/11/2022
The applicability criteria has been justified by PP in the GPA-DD. Hence the issue is closed.				
# CAR 06 Closed				

CAR ID	07	Section no.	3.3	Date: 04/11/2022
Description of CAR				
Why grid is not a part of the project boundary?				
Project participant response				Date: 14/11/2022
Boundary has been updated				
Documentation provided by project participant				
Updated GPA-DD				
VVB assessment				Date: 28/11/2022
The boundary has been updated in the GPA-DD. Hence the issue is closed.				
# CAR 07 Closed				

CAR ID	08	Section no.	4.4 and 5.3	Date: 04/11/2022
Description of CAR				
Section 4.4 VVBs not have any information. PP has to elaborate section 5.3 with emergency preparedness, QA/QC procedure and organizational structure.				

Project participant response	Date: 15/11/2022
Information has been updated with the latest monitoring points and procedures. QA/QC procedures has also been included.	
Documentation provided by project participant	
Revised GPA-DD	
VVB assessment	Date: 28/11/2022
PP has updated the section 4.4 & 5.3 of the revised project description report in line with section guideline as per VCS template. PP has included the following information like emergency preparedness, QA/QC procedure and organizational structure & found consistent. # CAR 08 Closed	

CAR ID	09	Section no.	PD	Date: 04/11/2022
Description of CAR				
The report is not as per the VCS template, moreover latest VCS template should be used.				
Project participant response				Date: 15/11/2022
GPA-DD has been updated to the most recent template.				
Documentation provided by project participant				
Revised GPA-DD				
VVB assessment				Date: 28/11/2022
PP has updated the GPA-DD in line with VCS template guidelines & found ok. # CAR 09 Closed				

FARs from this validation

FAR ID	01	Section no.	PD	Date: 02/09/2023
Description of CAR				

PP has mentioned that the batteries will be disposed / recycled as per the regulated e-waste management system administered by Singapore's National Environment Agency (NEA). The verifying VVB must check whether battery handling method is followed as described in the section 3.2 of the PD.

Project participant response

Date:

Documentation provided by project participant

VVB assessment

Date: