



**Verified Carbon
Standard**

THE ELECTRIC VEHICLE ACCELERATOR (EVA) GROUPED PROJECT



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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Electric Vehicle Acceleration Grouped Project (“**EVA**”) is an initiative undertaken by Climate Resources Exchange International Pte Ltd (“**CRX**”) that focuses on Electric & Hybrid Vehicle Technologies, so as to replace traditional internal combustion engines (ICE) which use emissive diesel and petrol fuel sources.

The Grouped Project Activity (GPA) intends to generate Verified Carbon Units (VCUs) through the 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, 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.

To avoid double counting, the following steps will be applied:

- Carbon credits will only accrue to CRX from a charging point that is registered under the EVA GPA.
- The Terms and Conditions at the point of sale at the charging point will clearly indicate that carbon credits generated from the charging point accrue to the account of CRX.
- Based on the methodology AMS III.C Ver 15.0, Section 5.1.18.c), Charging point owners will be briefed on the project boundaries.

The GPA will be submitted following CDM Methodology AMS-III.C, Emission reductions by electric and hybrid vehicles Ver. 15, which describes the requirements for EV charging systems to issue credits across a range of potential charging systems and their applicable fleets¹. Based on emission reduction calculation of applicable CDM

¹ Fleet is defined to be as a vehicle or a group of vehicles that are being charged at any charging point(s) registered under the GPA.

methodology AMS III.C “Emission reductions by electric and hybrid vehicles”, overall emission reduction of project activity will not increase from 60,000 tCO₂e/year.

Before the implementation of this GPA, the typical mode of transport within the boundary of the host countries would be petrol and diesel combustion vehicles, with the market penetration of EVs to be well below 5%².

Geographic location of vehicles and charging systems, and confirmation of eligibility from Methodology AMS III.C:

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 and Brunei.

1.2 Sectoral Scope and Project Type

Sectoral scope: 1&7, Energy industries (renewable/non-renewable sources) and Transport respectively

Category: AMS III.C: Emission reductions by electric and hybrid vehicles

Version: 15.0

Project Type: Grouped Project

1.3 Project Eligibility

This project activities undertaken are supported by the approved CDM methodology – AMS III C, Emission reductions by electric and hybrid vehicles version 15. VCS standard accepted all active CDM methodology therefore project activity is eligible for registration under VCS standard version 4.1.

1.4 Project Design

This project description is designed to be a Grouped Project and is structured to allow the expansion of multiple project activities after project validation.

Framework for the implementation of the proposed GPA

The (GPA) intends to generate VCUs through the charging of electric vehicles (EVs) through EV charging systems, including their associated infrastructure, whose GHG

² The Influence on Energy and the Economy of Electrified Vehicles Penetration in ASEAN, <https://think-asia.org/bitstream/handle/11540/12742/The-Influence-on-Energy-and-the-Economy-of-Electrified-Vehicle-Penetration-in-ASEAN.pdf?sequence=1>

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.

All Project Activity Instances (PAIs) will consist of only EV charging and utilization technologies, will not cover the combination of two or more technologies, and also use any one methodology.

To cater to both the publicly available and captive controlled charging points and their associated fleets within the host country, the following cases may be represented in the subsequent PAIs.

Table 1: Possible Scenarios for this GPA with respect to the selected methodology: AMS-III.C

PAI 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 diesel buses purchased, and compare against the average SEC of the top EV equivalent; using the selected methodology formulas as reference.
Case 4: Diesel Van Fleets	Commercial Light Good Vehicles Only (Vans/Lorry)	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: Petrol Van Fleets		Petrol	
Case 6: Diesel Truck Fleets	Commercial Heavy Good Vehicles & Very Heavy Good Vehicles Only (Trucks)	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 7: Diesel	Motorbikes Only	Diesel	Baseline scenario will take into consideration the average SFC of the top 10 diesel/petrol motorbikes and compare

Motorbike Fleets			them against the average SEC of the top 10 EV equivalents, using the selected methodology formulas as reference.
Case 8: Petrol Motorbike Fleets		Petrol	
Case 9: 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 10: Harbour Craft Fleet	Harbour Craft Only	Petrol	Baseline scenario will take into consideration the average SFC of the top 5 petrol Harbour Craft and compare them against the average SEC of the top 5 EV equivalents, using the selected methodology formulas as reference.
Case 11: 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.

These scenarios from the table above will be included and referenced to throughout this GPA document.

1. Eligibility Criteria

The eligibility criteria for new project instances to be introduced in project year to grouped projects will comprise:

- Applicability conditions as set out in methodology AMS III.C
- New project locations must be within the country referenced in section 3.5 (if new countries are being added, a PD deviation shall be submitted)

1.5 Project Proponent

Organization name	CRX CarbonBank Pte Ltd
Contact person	Vinod Kesava
Title	MD&CEO
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**Organization
name**

CRX CarbonBank Pte Ltd

1.6 Other Entities Involved in the Project

Not Applicable.

1.7 Ownership

In accordance with VCS Standard version 4.1, section 3.6, the project vehicles are not owned by CRX, instead are owned by different entities that join the program through individual PAIs. But as per lease agreement carbon rights are with CRX.

The lease agreement will include and resent the legal right of the vehicle fleet owner to own, operate and maintain the EV cars across the locations where they have been implemented, only signing over the carbon rights to CRX and in turn the GPA.

1.8 Project Start Date

The project start date is determined by the implementation date of EV vehicles under the first PAI included into this GPA which is **13/04/2022**.

1.9 Project Crediting Period

The project crediting period for this project shall be 7 years, twice renewable for a total of 21 years.

Project crediting period start date: 13/04/2022

Project crediting period end date: 13/04/2029

Project Scale	
Project	x
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1 (e.g., 2019)	

Year 2	
Year 3	
Year 4	
Year 5	
Year 6	
Year 7	
Total estimated ERs	
Total number of crediting years	7
Average annual ERs	

1.10 Description of the Project Activity

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 chargers.

The GPA will be submitted following CDM Methodology AMS-III.C, Emission reductions by electric and hybrid vehicles Ver. 15, which describes the requirements for EV charging systems to issue credits across a range of potential charging systems and their applicable fleets. Based on emission reduction calculation of applicable CDM methodology AMS III.C “Emission reductions by electric and hybrid vehicles”, overall emission reduction of project activity will not increase from 60,000 tCO₂e/year.

1.11 Project Location

EVA would like to replicate similar activities across the host countries as stated in Section 1.1.

The first project activity will be developed in Singapore.



1.12 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. In order to do so, EV owners would have to artificially inflate GHG emissions (through the use of diesel/petrol vehicles that utilize traditional ICE), before inducing higher GHG reductions through the use of other project technologies.

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.

1.13 Compliance with Laws, Statutes and Other Regulatory Frameworks

Given that, the VCS Standard defines regulatory surplus as: "The project shall not be mandated by any law, statute or other regulatory framework" And that for additionality purposes, a carbon credit project must not have been undertaken due to such regulatory surplus mandates, whilst nonetheless comprising measures which are still in compliance

with applicable laws, permits, etc., as such each PAI that will be included into the GPA must adhere to the following eligibility criteria stated below:

Eligibility Criteria	Yes	No
Were the project's GHG reductions mandated or required by VCS Standard regulatory surplus measures?		X
Are the EV implementations nonetheless broadly in compliance with prevailing local, regional and national laws?	X	

1.14 Participation under Other GHG Programs

1.14.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has not been registered or is seeking registration under any other GHG programs.

1.14.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs.

1.15 Other Forms of Credit

1.15.1 Emissions Trading Programs and Other Binding Limits

The project is not involved in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.15.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit.

1.16 Additional Information Relevant to the Project

2. Leakage Management
3. As per methodology para 43 no leakage calculation required.
4. Commercially Sensitive Information

None of the project documents will be considered commercially sensitive information, and all the documentation is available to any stakeholders.

If certain information is deemed sensitive and confidential for public viewing, it will be supplied to the VVBs separately for reviewing.

5. Sustainable Development

6. The sustainable development of the project will contribute positively to its respective host country's Sustainable Development Goals, which is a set of 17 universal goals covering the thematic areas of environmental, economic and social development.

Additionally, the project will contribute to achieving sustainable development as follows:

- Supports the expansion and adoption of EV's across the project region.
- Pioneers even faster EV charging infrastructure which is critical to the expansion of long-range BEVs which incorporate larger battery capacities.
- Empowers smaller scale EV charging owners to access the carbon capital markets for EV chargers through aggregation services – to accelerate their EV charging investments.
- Lower noise pollution, EV based transport systems generate lower noise as compared to fossil fuel-based transport systems.

Demonstrates that charging systems servicing HDV, LDV service vehicle and LDV customer EV segments can all issue carbon credits in ways that advance in an integrated and holistic fashion, a utility's leadership towards its transportation electrification goals.

7. Further Information

Technological aspects:

Introduction of new technologies for environmentally friendly vehicles as the prevailing practice within the host country is to use fossil fuel-based transport systems.

Social aspects:

Less respiratory diseases caused through air pollution basically by particulate matter. Fossil fuel powered transport systems, are a major source of particulate matter which again is a cause of respiratory diseases affecting especially children, elderly and people with a poor health

Economic aspects:

Savings of fossil fuel reduce the dependence of the economy on liquid fossil fuel imports and reduce the exposure to external price shocks of fossil fuels thus improving the conditions for continuous growth.

2 SAFEGUARDS

2.1 No Net Harm

As project activity is implementation of EV transport system and replacing fossil fuel-based transport system, project activity doesn't have any negative environmental and socio-economic impacts.

2.2 Local Stakeholder Consultation

A national level online stakeholder consultation was executed on **12/04/2022** between EV users and owners to ensure diverse stakeholder opinions are gathered throughout the deployment process.

Apart from the above, CRX will periodically engage with stakeholders through its EV fleet owners through a bi-annual reporting of EV use and uptake. In addition, CRX through its EV Fleet owners, will also have a dedicated customer helpline through which grievances / communications are received and addressed in a timely manner.

2.3 Environmental Impact

There were no environmental impact assessments required by the methodology.

2.4 Public Comments

The following comments (if any) were received during the VCS project public comment period.

2.5 AFOLU-Specific Safeguards

Not applicable to non-AFOLU projects.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The following Methodology and Tools have been applied:

- AMS-III.C: Emission reductions by electric and hybrid vehicles, Ver. 15
- AMS-I.F.: Renewable electricity generation for captive use and mini-grid, Ver. 3
- 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

3.2 Applicability of Methodology

As mentioned in Section 1.2, the methodology applied in this project is AMS III.C Ver. 15 which is applicable under the following conditions:

S/N	Methodology Applicability criteria Project applicability Criteria	Methodology Applicability criteria Project applicability Criteria
1.	The methodology is not applicable for project activities that involve a switch from fossil fuels to biofuels in transportation; those project activities shall consider using another Type III methodology (e.g. “AMS-III.T.: Plant oil production and use for transport applications” and “AMS-III.AK.: Biodiesel production and use for transport applications”).	Not Applicable No switch from fossil to biofuels are made by the project activity. The project activity is a switch from fossil fuels to electricity.
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.	Applicable In cases where the project activity includes replaceable, chargeable battery. There will be documented measures in place to ensure that vehicle owners have access to replacement batteries of comparable quality. Therefore, this criterion is applicable.
3.	The project design document (PDD) shall explain the proposed approach for introducing/distributing the electric/hybrid vehicles, which shall allow for tracking of the project vehicles	Applicable Electric vehicles included under this GPA will be introduced throughout the host country specified in the individual PAI. Vehicle fleet owners operating these electric vehicles on

		lease and/or lease agreement clearly provide carbon ownership to CRX.
4.	a) 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.	Applicable 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. In order to do so, EV owners would have to artificially inflate GHG emissions (through the use of diesel/petrol vehicles that utilize traditional ICE), before inducing higher GHG reductions through the use of other project technologies.
5.	b) Ensure compliance with prevailing regulations pertaining to battery use and disposal.	Applicable Project activity will ensure that regulations concerning battery disposal and recycling are followed where applicable. If no regulations are available, batteries will be disposed of to authorized recyclers.
6.	The PDD shall include minimum performance specifications for the batteries to be used such as: depth of discharge, battery cycles, distance traveled per charge, lifetime.	Applicable PP has included batteries performance details in section 1.11 of Joint PD.
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.	Applicable 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.
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	Applicable AMS I.F will be combined with AMS III C if electric vehicles will be charge through renewable energy source. If electric vehicles

	claim emission reductions for the amount of electricity supplied from renewable electricity source to the charging station ³ .	will be charge through grid power then amount of power withdrawn from the grid will consider as project emission.
9.	Types of hybrid/electric vehicles to be introduced include but are not limited to cars, buses, trucks, jeepneys, commuter vans, taxis, motorcycles and tricycles.	Applicable Electric Vehicles introduced may include but are not limited to cars, buses, trucks, jeepneys, commuter vans, taxis, motorcycles and tricycles.
10.	Project participants shall demonstrate that the project and baseline vehicles are comparable, using the following means: 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 the same category).	Applicable 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 power rating with a variation of no more than 20 per cent.
11.	Measures are limited to those that result in emission reductions of less than or equal to 60ktCO ₂ equivalent annually.	Applicable In no year are projected emission reductions over 60,000tCO ₂ e.

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 reductions for the amount of electricity supplied from renewable electricity source to the charging station.

3.3 Project Boundary

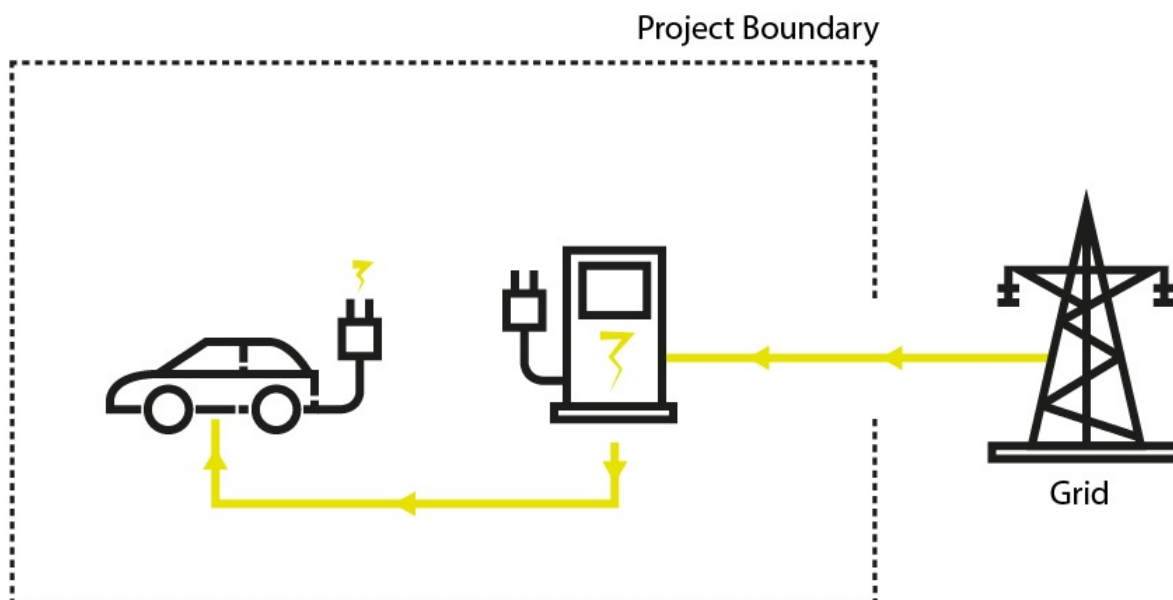
The project boundary comprises of LDV fleet for EV chargers and geographical location of the host country where the chargers are installed.

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

³ In case where renewable energy source is connected to charging station via national/regional grid, project proponent should consider this as a separate project and may explore using “AMS-I.D.: Grid connected renewable electricity generation”.

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	Optional	May be excluded for simplification. Where included in the baseline, source must also be accounted for in project emissions.
	N ₂ O	Optional	May be excluded for simplification. Where included in the baseline, source must also be accounted for in project emissions.
	Other	No	Not Applicable

The project boundary includes the electric vehicles that are part of the project activity and the electricity supply source.



3.4 Baseline Scenario

The project's baseline scenario is the operation of comparable vehicles (the comparability of baseline and project applicable fleet vehicles which has been demonstrated as per indicators set out in applicability conditions as described in Section 3.2 above), that would have been used to provide the same transportation service in the absence of the project.

3.5 Additionality

Methodology provides an option to demonstrate additionality with following 2 options:

Option 1:

Demonstrate that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in the “Methodological tool: Demonstration of additionality of small-scale project activities”. The barrier(s) can be demonstrated for buyers/users and/or charging service providers of the electric vehicles even if the manufacturer or retailer of the electric vehicles is implementing the project.

Option 2:

Demonstrate ex ante that the market share of project electric/hybrid vehicles is equal to or smaller than 5 per cent of the vehicles of the same category (e.g. if project vehicles are electric scooters, market share of electric two wheelers is equal to or smaller than 5 per cent of all motorized two wheelers, irrespective of the manufacturer) in the region.

PP has opted option 2 to demonstrate additionality.

Singapore:

According to data presented by Singapore Land Transport Authority⁴ (LTA), the table below depicts the numbers for different types of motor vehicles in Singapore as of 31st December 2021:

<i>Vehicle Type</i>	<i>Fuel Type</i>	<i>Population</i>
<i>Cars</i>	<i>Petrol</i>	568,391
	<i>Diesel</i>	23,087
	<i>Petrol-Electric</i>	64,437
	<i>Petrol-Electric (Plug in)</i>	692

⁴ 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-CNG	164
	Electric	3,246
	Diesel-Electric	20
	Total	678,037

Taking into consideration the fully electric EV population in Singapore, 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 project is additional.

3.6 Methodology Deviations

There are no deviations from the methodology.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions calculated using Approach 2 as described in AMS-III.C methodology Ver. 15 section 5.4.

Approach 2: Using the electricity used to charge the vehicles

The baseline emissions are calculated as per the equation below by transforming the electricity charged to the vehicles at the charging stations/points into travelled distance and the emission factor for fossil fuels used by the baseline vehicles to travel the same distance.

$$BE_y = \sum_i EF_{BL,km,i} \times \frac{EC_{PJ,i,y}}{SEC_{PJ,km,i,y}} \times 10^{-6} \quad \text{Equation (2)}$$

Where:

- BE_y = Total baseline emissions in year y (t CO₂)
- $EC_{PJ,i,y}$ = The electricity consumed for charging project vehicles category i at the charging stations/points in year y (kWh)
- $EF_{BL,km,i}$ = Emission factor for baseline vehicle category i (g CO₂/km)
- $SEC_{PJ,km,i,y}$ = Specific electricity consumption per km per project vehicle category i in year y (kWh/km)

In which,

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

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)

Option 2 (Top 20 percent of the comparable vehicles used for public/private transportation) will be taken to determine the specific fuel consumption for vehicle category i (SFC_i).

4.2 Project Emissions

Project emissions include the electricity and fossil fuel consumption associated with the operation of project vehicles and shall be calculated as follows:

Approach 1: Using distance travelled by project vehicles

$$PE_y = \sum_i EF_{PJ,km,i,y} \times DD_{i,y} \times N_{i,y} \quad \text{Equation (4)}$$

Where:

- PE_y = Total project emissions in year y (t CO₂)
- $EF_{PJ,km,i,y}$ = Emission factor per kilometre travelled by the project vehicle type i (t CO₂/km)
- $N_{i,y}$ = Number of operational project vehicles in category i in year y
- $DD_{i,y}$ = Annual average distance travelled by the project vehicle category i in the year y (km)

Approach 2: Using the electricity used to charge the vehicles

Approach 2: Using the electricity used to charge the vehicles

$$PE_y = \sum_i EF_{PJ,km,i,y} \times \frac{EC_{PJ,i,y}}{SEC_{PJ,km,i,y}} \quad \text{Equation (5)}$$

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:

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

$$+ \sum_i SFC_{PJ,km,i,y} \times NCV_{PJ,i} \times EF_{PJ,i} \times 10^{-6}$$

Where:

$SEC_{PJ,km,i,y}$	=	Specific electricity consumption by project vehicle category i per km in year y in urban conditions (kWh/km)
$EF_{elect,y}$	=	CO ₂ emission factor of electricity consumed by project vehicle category i in year y (kg CO ₂ /kWh)
$SFC_{PJ,km,i,y}$	=	Specific fossil fuel ³ consumption by project vehicle category i per km in year y in urban conditions (g/km)
$EF_{PJ,i}$	=	CO ₂ emission factor of fossil fuel consumed by project vehicle category i in year y (g CO ₂ /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

4.3 Leakage

As per methodology para 43, no leakage calculation is required.

4.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (7)}$$

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)

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 1			0	
Year 2			0	
Year 3			0	
Year 4			0	
Year 5			0	
Year 6			0	
Year 7			0	
Total			0	

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	NCV _{BL, Petrol}
Data unit	GJ/Ton
Description	Net calorific value of gasoline
Source of data	IPCC 2006 Volume 2 Energy, table 1.2
Value applied	44.3
Justification of choice of data or description of measurement methods and procedures applied	IPCC 2006 Volume 2 Energy https://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Purpose of Data	Calculation of baseline emissions

Comments	<i>NCV is only used for the baseline and is thus not an annually monitored value but one which is known at the time of validation.</i>
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Data / Parameter	NCV _{,BL, Diesel}
Data unit	GJ/Ton
Description	Net calorific value of Diesel
Source of data	IPCC 2006 Volume 2 Energy, table 1.2 https://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied	43
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value.
Purpose of Data	Calculation of baseline emissions
Comments	<i>NCV is only used for the baseline and is thus not an annually monitored value but one which is known at the time of validation.</i>

Data / Parameter	NCV _{,BL, Combined}
Data unit	J/g
Description	Net calorific value of Diesel and Petrol
Source of data	Calculated; See ER Spreadsheet provided to Validator
Value applied	44,061.78
Justification of choice of data or description of measurement	Calculated value taking into consideration IPCC data.

methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>NCV is only used for the baseline and is thus not an annually monitored value but one which is known at the time of validation.</i>

Data / Parameter	NCV _{,BL, Jet Fuel}
Data unit	GJ/Ton
Description	<i>Net calorific value of Jet Fuel</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>NCV is only used for the baseline and is thus not an annually monitored value but one which is known at the time of validation.</i>

Data / Parameter	SFC _{,BL,Cars-Diesel}
Data unit	g/km
Description	<i>Specific fuel consumption of baseline Diesel Cars</i>
Source of data	<i>Calculated; See ER Spreadsheet provided to Validator</i>
Value applied	200.5
Justification of choice of data or description of	<i>Calculated value taking into consideration top 4 Diesel Cars in Singapore</i>

measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>N/A</i>

Data / Parameter	<i>SFC_{BL,Cars-Petrol}</i>
Data unit	<i>g/km</i>
Description	<i>Specific fuel consumption of baseline Petrol Cars</i>
Source of data	<i>Calculated; See ER Spreadsheet provided to Validator</i>
Value applied	<i>164.6</i>
Justification of choice of data or description of measurement methods and procedures applied	<i>Calculated value taking into consideration top 10 Petrol Cars in Singapore</i>
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>N/A</i>

Data / Parameter	<i>SFC_{BL,Buses-Diesel}</i>
Data unit	<i>g/km</i>
Description	<i>Specific fuel consumption of baseline Diesel Buses</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and	

procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>N/A</i>

Data / Parameter	$SFC_{BL,Vans-Diesel}$
Data unit	<i>g/km</i>
Description	<i>Specific fuel consumption of baseline Diesel Vans</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>N/A</i>

Data / Parameter	$SFC_{BLVans-Petrol}$
Data unit	<i>g/km</i>
Description	<i>Specific fuel consumption of baseline Petrol Vans</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>

Comments	N/A
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Data / Parameter	SFC _{BL, Lorry&Trucks-Diesel}
Data unit	g/km
Description	<i>Specific fuel consumption of baseline Diesel Lorries and Trucks</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	SFC _{BL, Motorbikes-Diesel}
Data unit	g/km
Description	<i>Specific fuel consumption of baseline Diesel Motorbikes</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	SFC _{BL, Motorbikes-Petrol}
Data unit	g/km
Description	<i>Specific fuel consumption of baseline Petrol Motorbikes</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	SFC _{BL, SGNational-Combined}
Data unit	g/km
Description	<i>Specific fuel consumption of baseline Petrol and Diesel Vehicles in Singapore</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	SFC _{BL,Hovercraft-Petrol}
Data unit	g/km
Description	<i>Specific fuel consumption of baseline Petrol Hovercrafts</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	SFC _{BLAirTaxis-JetFuel}
Data unit	g/km
Description	<i>Specific fuel consumption of baseline Jet Fuel Air Taxis</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	EF _{BL,Diesel}
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Data unit	<i>gCO₂/J</i>
Description	<i>CO₂ emission factor of Diesel</i>
Source of data	<i>IPCC 2006 Volume 2 Energy, table 1.4 https://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf</i>
Value applied	<i>0.0000741</i>
Justification of choice of data or description of measurement methods and procedures applied	<i>IPCC default value</i>
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>EF_{CO₂} is only used for the baseline and is thus not an annually monitored value but one which is known at the time of validation</i>

Data / Parameter	<i>EF_{BL,Petrol}</i>
Data unit	<i>gCO₂/J</i>
Description	<i>CO₂ emission factor of Petrol</i>
Source of data	<i>IPCC 2006 Volume 2 Energy, table 1.4 https://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf</i>
Value applied	<i>0.0000693</i>
Justification of choice of data or description of measurement methods and procedures applied	<i>IPCC default value</i>

Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>EFCO₂ is only used for the baseline and is thus not an annually monitored value but one which is known at the time of validation</i>

Data / Parameter	$EF_{BL,Combined}$
Data unit	<i>gCO₂/J</i>
Description	<i>CO₂ emission factor of Petrol and Diesel</i>
Source of data	<i>Calculated; See ER Spreadsheet provided to Validator</i>
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	<i>Calculated value taking into consideration IPCC data.</i>
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>EFCO₂ is only used for the baseline and is thus not an annually monitored value but one which is known at the time of validation</i>

Data / Parameter	$EF_{BL,JetFuel}$
Data unit	<i>gCO₂/J</i>
Description	<i>CO₂ emission factor of Jet Fuel</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and	

procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	<i>EFCO₂ is only used for the baseline and is thus not an annually monitored value but one which is known at the time of validation</i>

Data / Parameter	IR ^t
Data unit	-
Description	<i>Technological improvement factor for baseline vehicle in year t.</i>
Source of data	As per the methodology AMS III.C Ver 15.0
Value applied	0.99
Justification of choice of data or description of measurement methods and procedures applied	As per the methodology AMS III.C Ver 15.0
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	SEC _(PJ,Cars)
Data unit	kWh/km
Description	<i>Specific electricity consumption per km per EV Car</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and	

procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	$SEC_{(PJ,Buses)}$
Data unit	<i>kWh/km</i>
Description	<i>Specific electricity consumption per km per EV Bus</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	$SEC_{(PJ,Vans)}$
Data unit	<i>kWh/km</i>
Description	<i>Specific electricity consumption per km per EV Vans</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	

Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	$SEC_{(PJ, Trucks)}$
Data unit	<i>kWh/km</i>
Description	<i>Specific electricity consumption per km per EV Truck</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	$SEC_{(PJ, Motorbike)}$
Data unit	<i>kWh/km</i>
Description	<i>Specific electricity consumption per km per EV Motorbike</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	SEC _(PJ,SGNational-Combined)
Data unit	kWh/km
Description	<i>Specific electricity consumption per km per EV Vehicle in Singapore</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	SEC _(PJ,Hovercraft)
Data unit	kWh/km
Description	<i>Specific electricity consumption per km per EV Hovercraft</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

Data / Parameter	$SEC_{(PJ,AirTaxi)}$
Data unit	<i>kWh/km</i>
Description	<i>Specific electricity consumption per km per EV Air Taxi</i>
Source of data	
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of Data	<i>Calculation of baseline emissions</i>
Comments	N/A

5.2 Data and Parameters Monitored

Data / Parameter	$EC_{(PJ,l,y)}$
Data unit	<i>kWh</i>
Description	<i>Electricity consumed for charging point vehicles category i</i>
Source of data	<i>CPO Data Monitoring System</i>
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	<i>Continuously and daily recording</i>
Value applied	<i>Provide an estimated value for the data/parameter</i>
Monitoring equipment	<i>Electricity supplier metering, CPO Data Monitoring receipts</i>
QA/QC procedures to be applied	<i>Electricity supplier metering, crosschecked against CPO Data Monitoring receipts</i>

Purpose of data	<i>Baseline emission calculation</i>
Calculation method	<i>N/A</i>
Comments	<i>N/A</i>

Data / Parameter	$EF_{\text{elect,CM}}$
Data unit	<i>kgCO₂/kWh</i>
Description	<i>Grid emission factor</i>
Source of data	<i>Energy Market Authority Singapore (EMA)</i>
Description of measurement methods and procedures to be applied	<i>EMA is publishing the grid emission factor on an annual basis. Therefore, EMA data will be updated on an annual basis based on published data by EMA or any other relevant literature or source.</i>
Frequency of monitoring/recording	<i>Annually</i>
Value applied	<i>Provide an estimated value for the data/parameter</i>
Monitoring equipment	<i>N/A</i>
QA/QC procedures to be applied	<i>N/A</i>
Purpose of data	<i>Calculation of project emissions</i>
Calculation method	<i>N/A</i>
Comments	<i>N/A</i>

5.3 Monitoring Plan

The responsibilities of the CPO Monitoring Platform are to:

1. Collect the required frequency all data for the monitoring of the project from the CPO database.
2. Perform data and information quality control.
3. Maintain data on the CPO Monitoring Platform.

The CME is responsible for the monitoring reports for the entire crediting period. Core responsibilities of CME include:

1. Check data quality and collect, if required, additional data;
2. File all documents in the manner and timing that these demands;
3. Realize an annual monitoring report;
4. Answer all inquiries and additional information requests by the VVBs and registry.

All data must be filed electronically.

QA/QC includes basically following parts for all data collected:

- Control of data collected by the CPO Platform through the CME;
- Comparison of data collected with data of previous years.

2. APPENDIX

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.