Project Design Document

Grutter Consulting

Project Details	
Project title	Electric Mobility Program Thailand
Project participant	Grutter Consulting AG
Co-project participant	---
Project owners	Energytech Asia Co. Ltd. Haupcar Company Ltd. Mobilix Company Ltd. Kachasara Company Ltd.
Project location	Thailand (national level)
Coordinates of project location	no coordinates; vehicles operate all over Thailand
Project type	☐ Renewable energy of fossil fuel replacement ☐ Improvement of the efficiency of electricity and heat generation ☐ Use of public transportation system **X** Use of electric vehicle ☐ Improvement of the efficiency of engine ☐ Improvement of the efficiency of energy consumption in building and factory and in household ☐ Use of natural refrigerant ☐ Use of clinker substitute ☐ Solid waste management ☐ Domestic wastewater management ☐ Methane recovery and utilization ☐ Industrial wastewater management ☐ Reduction, absorption and removal of greenhouse gases from the forestry and agriculture sectors ☐ Capture, storage, and/or utilization of greenhouse gas ☐ Other .....
Project model	☐ Single project **X** Bundled project
Project size	☐ Micro scale **X** Small scale[1]

[1] Each individual project activity has the same crediting period. Each project activity has less than 60,000tCO2 per annum and is outlined in the PDD. The same type of GHG reduction activity is carried out by each project namely use of electric vehicles.

	☒ Large scale
T-VER methodology and tools	1. T-VER-P-METH-04-03 Ver 01 - Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle for Freight Transportation 2. T-VER-P-METH-04-01 Ver 03 - Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle
Project activity	The program includes battery electric trucks, light commercial vehicles LCVs/vans/pickups, and buses except buses used for public urban passenger transport. The Program is structured as a bundled project. Emission reductions are based on the difference between combustion emissions of fossil vehicles and grid-based emissions of electric vehicles (EVs).
Project investment cost	31,294 MTHB
Estimated Greenhouse Gas Emission Reductions/Removals	Total crediting period: 1,040,928 tCO_2eq Annual average 208,186 tCO_2eq/y (average 2026 to 2030 for 1st crediting period)
Crediting period	☒ 5 years ☐ 15 years

Details of report preparation		
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Version	05	
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Content

Part 1: Project Information

1.1 Project Information

Description of the Activity

The mitigation activity will promote electric mobility in different vehicle categories:

- Light commercial vehicles (LCVs): LCVs are defined as N1 vehicles based on EMEP/EEA guidebook 2023 updated 2024 Table 2.1 which can be used for carriage of goods or passengers;
- Trucks for cargo transport;
- Intercity, tourism, staff and company buses for passenger transport;

Only battery electric vehicles (BEVs[2]) are included. Hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs) and fuel-cell electric vehicles (FCEVs) are excluded. The definition used for EV is: EVs are vehicles powered by electricity and an electric motor rather than a conventional fossil fuel powered internal-combustion engine (see File 19). Whilst market penetration rates for e-mobility in Thailand outside urban buses and passenger cars are still low, the technology itself is not unknown and local technology providers are available.

Different vehicle categories are included - however, the measure itself and the technology are always the same: replacement of fossil internal combustion vehicles with BEVs. Ex-ante estimates have been made upfront for different vehicle categories included in the program.

The project type is electric vehicles. All project activities bundled in this program are in the same project type.

Structure

Grutter Consulting (GC) acts as Program Owner and aggregator of multiple project owners which implement individual project activities with all carbon credit rights transferred to GC.

The Program is structured as a Bundled Project. Individual Project Activities or Project Activity Instances (PAIs) all have the same crediting period (2026 to 2030) and crediting start (01/01/2026). All project activities have the same type of GHG reduction activities. Details of each project activity or PAI are:

PAI 1: The GHG activity is the leasing and operations of small/medium trucks under 6 tons by Mobilix.

PAI 2: The GHG activity is the leasing and operations of large trucks over 6 tons by Mobilix.

PAI 3: The GHG activity is the leasing and operations of LCVs by Mobilix.

PAI 4: The GHG activity is the leasing and operations of buses by Mobilix.

PAI 5: The GHG activity is the sale, leasing and operations of trucks by Energy Tech Asia.

PAI 6: The GHG activity is the leasing and operations of LCVs tons by Haupcar.

PAI 7: The GHG activity is the leasing and operations of trucks by Haupcar.

PAI 8: The GHG activity is the leasing and operations of buses by Haupcar.

PAI 9: The GHG activity is the sale, service structuring and operations of trucks by Kachasara.

[2] The term Electric Vehicles (EVs) is used in this document as equivalent to BEVs

PAI 10: The GHG activity is the sale, service structuring and operations of LCVs by Kachasara.

PAI 11: The GHG activity is the sale, service structuring and operations of buses by Kachasara.

The following table shows the projected annual emission reductions (ER) per PAI.

Table 1: Projected Annual ER per Project Activity

PAI	2026	2027	2028	2029	2030	Total
PAI 1	5,096	10,193	14,916	19,397	18,910	68,513
PAI 2	27,150	46,428	51,833	56,945	55,592	237,950
PAI 3	298	1,175	2,315	4,565	4,499	12,851
PAI 4	822	3,998	11,659	26,429	25,663	68,571
PAI 5	13,575	26,531	45,354	50,618	49,415	185,493
PAI 6	596	2,349	4,631	9,129	8,998	25,703
PAI 7	6,788	6,633	25,917	44,291	43,238	126,866
PAI 8	0	1,999	3,886	11,327	10,998	28,210
PAI 9	6,788	26,531	32,396	50,618	49,415	165,747
PAI 10	298	1,175	1,737	3,423	3,374	10,007
PAI 11	3,289	9,995	23,317	37,756	36,661	111,018
Total	**64,699**	**137,004**	**217,962**	**314,499**	**306,764**	**1,040,928**

Source: File 1

The PP is GC which works in carbon market transport projects in the last 30 years and has registered multiple methodologies for transport projects. GC is also the author of the revised Premium T-VER methodology for EVs[3] approved by TGO Board of Director at the end of 2024 and has developed multiple carbon market methodologies under different standards. Grutter Consulting has structured and developed over 50% of the world's registered carbon market transport projects including many EV projects and including multiple aggregator programs with numerous project investors. Carbon market transport projects have been registered by GC (being in the majority of cases the project owner) under the CDM, the VCS, the GS, and national standards in Switzerland, South Korea, Canada and Colombia. GC assists and trains project investors in monitoring, supervises and quality controls monitoring, formulates all reports and closes the purchase agreement with the buyer.

The project owners which have a signed contract with GC are: (i) Mobilix Company Ltd., which is part of WHA group and offers leasing vehicles (primarily trucks and vans) to operators, (ii) Energytech Asia Company Ltd., which realizes retrofit of diesel to electric trucks and (iii) Haupcar Company Ltd. which rents/leases vehicles; (iv) Kachasara Company Ltd. which realizes retrofits of buses and also sales EVs primarily to small operators.

[3] T-VER-P-METH-04-01 Version 3 Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle

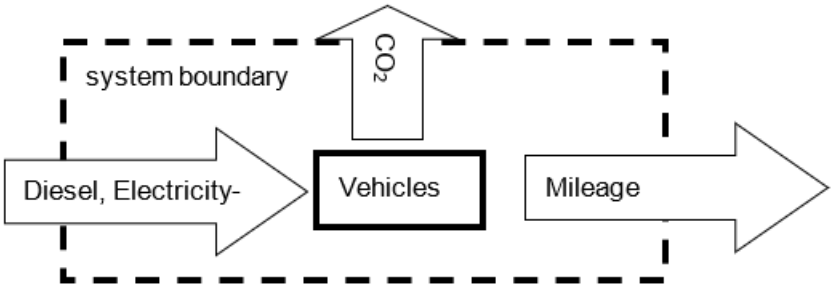
Figure 1: Geographic Project Area

The Program operates on a national scale with program vehicles operating all over Thailand.

Year	Expected ITMOs [t CO_2e]
2026	64,699
2027	137,004
2028	217,962
2029	314,499
2030	306,764
Total	**1,040,928**

1.2 Project Boundary

The geographic boundary is, in accordance with the TGO and CDM methodology the geographic area where the Program activity vehicles are operated. The Program boundary also includes the power plants connected physically to the electricity system that supplies power to the Program. This is reflected in the carbon emission factor of the grid. Only the mileage of vehicles within Thailand is accounted for.



1.3 Double Counting

The project activity in this project used to register or in the process of registering other carbon other international climate mitigation mechanisms such as Development Mechanism (CDM), Voluntary Carbon Standard (VCS), Gold Standard etc. or Renewable Energy Certificates (REC):

X No

☐ Yes

Project Title.....

Scheme.....

Crediting period that is issued.....

1.4 Additionality

EVs are listed under point 10.4 of the positive list of projects qualifying for carbon credits as included in the carbon credit management guideline and mechanism approved by the National Committee on Climate Change Policy on March 16th, 2022 (File 32)[4].

The additionality of the program is based on a representative vehicle unit and no individual proof per vehicle category. The financial additionality is checked each year per vehicle category and new vehicles can only enter the program if the respective vehicle category continues to be considered financially additional. At the Program start common practice test is made for each vehicle category at the threshold value of 5% of EV sales of the respective vehicle category (vans, trucks, intercity buses) as average of the last 3 years available.

Financial Additionality

The financial additionality is demonstrated per vehicle category, based on a total cost of ownership (TCO) calculation using a fossil vehicle of the same category and capacity and the most common fossil fuel used per vehicle category and using differential costs between EVs and fossil vehicles. This approach is in line with the UNFCCC methodological tool "investment analysis"[5]. Using the internal rate of returns is not an appropriate approach as it's not about the profitability of EVs but about the relative costs of an EV versus a fossil vehicle. Calculations have been made for all included vehicle categories (intercity buses, LCVs, and trucks). Tax incentives and subsidies have been included in the financial calculations, and all costs have been localised. Incentives are included through taking local sales prices of electricity at chargers and local vehicle prices. Latter include already any tax incentives and subsidies i.e. are based on final consumer prices. The electricity cost at public chargers which is currently 0.17 USD/kWh is for example based on a subsidy of electricity provision. The median price in European countries for AC charging is for example 0.46 USD/kWh and for DC charging 0.57 USD/kWh[6]. The price tag for example in the Philippines is 0.50-0.64 USD per kWh[7]. The Philippines operate without or with limited subsidies for chargers. Direct vehicle subsidies are for passenger cars, pick-ups and motorcycles which do not form part of this Program (see EV3.5 Incentive program policy 3). A temporary measure was introduced in the 1st National Electric Vehicle Policy Committee meeting in 2024: This measure allows businesses that switch to electric buses and trucks to deduct a portion of the vehicle cost from their corporate income tax (File 21). The Ministry of Finance has, however not yet announced an official measure which has prevented its implementation. This incentive is also only

[4] *https://www.dcce.go.th/news/project_file.aspx?p=2382*

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v1.pdf

[6] *Electric vehicle recharging prices | European Alternative Fuels Observatory (europa.eu)*

[7] File 39

applicable until the end of 2025, highlighting its limited-time nature. With the program starting date being mid-2025, even if the measure will be put in place, it will not affect the large share of vehicle purchases in this program.

The following table summarises the TCO calculations. All data parameters are referenced in File 8, and support files are available to the validator. TCO costs include only differential costs between a fossil fuel and an EV of the same category. Cost parameters included are the investment in the vehicle, energy costs, insurance costs, and maintenance costs. The Net Present Value approach is used to determine the TCO. Calculations are made over the vehicle's commercial lifespan mileage. All costs are expressed in real constant USD, with no cost changes assumed over time.

Table 2: TCO Calculations for EV Categories Thailand 2024

Vehicle Category	TCO EV relative to ICE
Intercity bus	9% higher
Truck	14% higher
Van (LCV)	39-48% higher

Source: File 8

TCOs are significantly higher for EVs compared to Internal Combustion Engines (ICEs). This is basically due to the higher upfront investment cost for EVs. This result remains robust for all vehicle categories with a sensitivity analysis across main parameters, including changes in the investment cost, energy costs, maintenance costs, and vehicle mileage. CAPEX of electric intercity buses LCVs and trucks would need to drop by 20-40% to achieve TCO equivalence (see File 8). The sensitivity analysis was performed per vehicle category with a variation of the core parameters CAPEX, energy costs, maintenance costs, and vehicle mileage by ±10%. With all variations, results are robust.

LCVs are frequently operated by individuals or are taken home, where level 1 chargers can be used (also when parked at company premises). Without intermediate charging LCVs however have difficulties to comply with the daily mileage level, especially during peak times. This results potentially in loss of revenues. Including this potential loss of revenues for LCVs the TCO of EVs is 48% higher than of ICEs.

Resources from the sale of ITMOs are used to improve the EV profitability and reduce the TCO gap. On average, 80% of gross revenues from sales goes to the project investors, with the other part used to cover transaction costs such as fees for validation, verification, registration, document preparation and credit issuance fees. The share received by GC is contractually fixed and can be revised during the verification of the monitoring reports by the external designated operational entity. The investor is the entity which enables the mitigation activity. This can be directly the operator of the vehicle, or it can be the leasing company (with financial leasing the owner of the vehicle is the leasing company) which contractually ensures the ownership of emission reductions. As calculations show EVs are non-competitive without carbon finance.

Resources from the sale of ITMOs can, on average, cover between 30% and 100% of the incremental costs of the electric vehicle. Thus, the resources received from the sale of ITMOs are critical for EV deployment and can overcome to a large extent the financial barrier and the financial risks associated with EV investments (File 8).

Additionality is determined annually for the vehicle categories included. This is documented in the monitoring reports using as a base the File 8 and updating financial data, including primarily energy cost and the CAPEX of vehicles (for EVs based on the actual purchase cost of EVs within the Program).

Common Practice

The market deployment rate is a sign of the overall attractiveness or common practice of a new technology. It encompasses financial criteria as well as barriers under the assumption that markets will pick up a new technology once the new technology proves to be more attractive than the existing or current technology i.e. in this case EVs against fossil vehicles[8]. It encompasses, therefore, also the "common practice" component of the guidelines for additionality of FOE (2024, File 29, chapter 6.4).

The following table shows the market sales share in Thailand of included vehicle categories.

Table 3: Market Share of EVs in Thailand as Percentage of Total Vehicles

Vehicle category	EV share of vehicle sales (average 2022 to 2024)	EV share of vehicle stock (2024)
Multipurpose vehicle (MPV) including vans	0.0%	n.a[9]
All buses	13%	0.5%
Buses excl. urban buses Bangkok	1.3%	0.0%
Trucks	0.4%	0.1%

Source: Grutter Consulting based on data of Transport Statistics Sub-Division, Planning Division, Department of Land Transport) for all vehicle types and for EVs *https://data.thaiauto.or.th/auto/auto-stat/auto-registration/stat-auto-registration-energy-menu.html* (see File 5, sheet "total fuel type")

The share of EVs in trucks, vans and buses outside urban buses in Bangkok is as a share of registered vehicles less than 1% and as a share of average sales in the last three years between 0.0% and 1.3%, i.e. significantly below what is considered as common practice and a tipping point (estimated by Bloomberg NEV at 5% of sales of the respective vehicle category; see File 26).

Barriers

The main barriers to the deployment of electric mobility are related to financial, information/know-how and infrastructure barriers. Financial barriers have been assessed under the financial additionality showing that EVs have incremental total costs of ownership relative to fossil vehicles of the same vehicle category.

Information and know-how Barriers

The barriers to information and know-how are related to local mechanics and maintenance staff not having the required skills and training to maintain and repair EVs. This lack of know-how results in not being able to resolve relatively simple problems with the resultant standstill time of vehicles. This is typical of new technologies entering a market. The lack of information is also prevalent in vehicle users including private persons as well as commercial users, not being aware of the technology development and options of electric mobility. Many prejudices towards electric vehicles, such as limited range and lifespan of batteries, lack of power on gradients or no available models, are existent. As long as electric vehicles are not used commonly, they will not be considered a viable alternative by the majority of companies. This is the case, especially for trucks and intercity buses.

[8] See also chapter 2.4.7. transformational change on typical adoption curve of EVs

[9] In total registered numbers vans and pickups are put in the same category whilst for separation of fuel type pickups and cars are in one category and MPVs in a 2nd category.

Infrastructure Barrier

Infrastructure barriers refer to the lack of a charging infrastructure for EVs in Thailand. This refers especially to high-powered chargers as required by intercity buses and trucks. Intercity buses in Thailand operate on long routes and typically only make short breaks of 15-30 minutes every 4-6 hours (operations are done on long-haul routes with 2 drivers), which would require on these stops very high-powered chargers as well as battery sets allowing with high C-rates. Such chargers are currently not available in Thailand, which strongly limits the adoption of e-buses for intercity routes or requires companies to change schedules, which might make services less attractive to clients. For long-haul trucks, the same is true: in the absence of high-powered on-route chargers, e-trucks have significant range and usage limitations compared to fossil trucks. For commercial vehicles such as vans and delivery vehicles, access to urban fast chargers or battery swap facilities is critical to ensure that all duties can be performed. Urban chargers are, however, typically slow chargers of 22kW or less. This creates a barrier to the deployment of EVs in this segment. This barrier was also identified in a recent EV policy analysis performed by ADB (see table 10, File 20). With the higher demand and the higher number of EVs there is a better business case for putting up public charging infrastructure thus reducing this barrier. The financial barrier of lack of charging infrastructure was monetized for LCVs.

1.5 Crediting Period

Start of 1st crediting period: 01/01/2026 or in accordance with the TGO Guidelines for Premium T-VER projects (Version 5.0) chapter 3 “Characteristics and eligibility criteria for participating activities” point 9 the next day after the project registration date.

End of 1st crediting period: 31.12.2030

Duration of the 1st crediting period:

X 5 years

☐ 15 years

The **project start date** is set as in the applied TGO-methodologies and refers to the date in which the first leasing contract for an EV which is part of the Program has been signed and which is part of this Program.

Project start date: 19/06/2025

1.6 Document or Certificate of Land Use Rights (For Reduction, absorption and removal of greenhouse gases from the forestry and agriculture sectors)

- Not applicable as the Program is not for reduction, absorption and removal of greenhouse gases from the forestry and agriculture sectors.

Part 2 T-VER Methodology

2.1 T-VER Methodology and Tools

No.	Methodology Code	Version	Title of methodology/tool
1	T-VER-P-METH-04-03	01	Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle for Freight Transportation
2	T-VER-P-METH-04-01	03	Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle

2.2 Project Conditions

T-VER-P-METH-04-01 used for buses (excludes urban public transport buses)

Code: T-VER-P-METH-04-01	
Version: 03	
Methodology/tool: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle	
Project Conditions	**Justification/Explanation**
1. Internal combustion engine vehicles (Baseline vehicle) and battery electric vehicles (Project activity) must be of the same type	1. Baseline and project vehicle are the same type (same size, same vehicle category) and used for the same purpose
2. Battery electric vehicles must have a maximum load (for bus or truck) or engine power (for 4 wheels vehicles, motorcycle, and motor tricycle) difference of not more than 20 percent compared to baseline vehicle.	2. Electric buses used have the same passenger capacity as ICE units. This is shown with the monitoring report.
3. Electric vehicle conversion (a modification of internal combustion engines vehicle with battery electric vehicles) must comply with the law (Motor Vehicle Act / Land Transport Act)	3. Any conversion which takes place will be in-line with the law. This is shown with the monitoring report.
4. Battery electric vehicle must be able to monitor the electricity consumption for charging and the travel distance.	4. BEVs can monitor the distance driven and the electricity consumed. This is shown with the monitoring report.
5. The project owner or the project developer which uses a battery electric vehicle must demonstrate guidelines for managing damaged or end-of-life batteries.	5. Contracts between GC and the vehicle investor include the clause: “The Project Investor ensures that batteries of electric vehicles deployed under this contract are tracked and properly recycled or disposed of in line with national EV battery regulations (once in effect) or in absence of latter in line with best practices and guidelines such as adopted e.g. in the EU, the USA, India or PR China”.
6. Types of motor vehicles must comply with the law (Motor Vehicle Act/Land Transport Act) by the types that fall within the scope of: • 4-wheel vehicles such as sedans, pickup trucks, taxis, vans, etc. • Motorcycle • Motor tricycle (Tuk Tuk) • Bus • Truck	6. Program vehicles are buses, LCVs and trucks. For this methodology only buses.

Code: T-VER-P-METH-04-01	
Version: 03	
Methodology/tool: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle	
Project Conditions	**Justification/Explanation**
7. Bus is not included in project activity.	7. The program vehicles are not urban public transport buses for which another methodology would need to be used.
8. The electricity supplied to the charging station under the project boundary must not be generated using renewable source.	8. Charging stations used by program EVs are grid connected.
9. Internal combustion engine vehicles (Baseline vehicle) must not be used as the vehicle outside project boundary, which the project developer will have to have the evidence to prove. This is not included the electric vehicle conversion	9. Companies purchase a new EV instead of purchasing a new fossil vehicle. The Program changes this purchase decision. In the project as well as in the baseline case, an existing fossil vehicle is being replaced – this is, however, not the baseline vehicle: the baseline vehicles are the new fossil vehicles which would have been purchased in the absence of the EV. In the baseline case, as in the project case, we thus have a used fossil vehicle which might either be scrapped, kept by the owner or re-sold. Important is that in the baseline, as in the project case, we have the exact same case – a vehicle is sold, scrapped or continues to be used. The emissions of this used vehicle are the same in the baseline and the project case (see graph below). Re-sale of a vehicle will also have a potentially positive downstream effect as an even older and less efficient vehicle is being replaced until coming to the last user. In mathematical terms: Baseline situation: Emissions of new fossil vehicle + emissions of previously owned vehicle Project situation: Emissions of new EV + emissions of previously owned vehicle

Code: T-VER-P-METH-04-01

Version: 03

Methodology/tool: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle

Project Conditions	Justification/Explanation
	Figure 2: Baseline and Project Case of Replacing a Vehicle

Blue: situation independent of the project (this is NOT the baseline but the situation before the project and the situation after project implementation relative to the vehicle available prior to project start)

Yellow: Date 0: the investor decides to purchase a new vehicle and compares different options, including ICEs and EVs

Orange: The baseline case, i.e. in the absence of the project activity, the investor would have bought a new fossil vehicle

Green: The project situation, i.e., the purchase of an EV

Source: Grutter Consulting

Thailand replaces old vehicles and also the vehicle fleet grows due to increasing population and GDP. New EVs are purchased instead of purchasing a new ICE. In absence of the Program a new ICE is purchased. This is the vehicle the program replaces. As such it will not operate once the EV is purchased.

T-VER-P-METH-04-03 used for LCVs and trucks

Code: T-VER-P-METH-04-03	
Version: 01	
Methodology/tool: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle for Freight Transport	
Project Conditions	**Justification/Explanation**
1. Freight transportation under project activity is domestic transportation only.	1. Only domestic transport is included in the Program.
2. ICE vehicles (Baseline vehicle) and BEVs (Project activity) must be the same type.	2. Baseline and program vehicles are of the same vehicle category/type.
3. BEVs must have a maximum load difference of not more than 20 percent compared to baseline vehicle.	3. The same load category is taken for both baseline and ICE vehicles.
4. EV conversion must comply with the law (Motor Vehicle Act / Rule of Land Transport Department: Criteria for requesting permission and permission to use vehicles that have been modified or converted in accordance with the Motor Vehicle Act and other related laws). In case of EV conversion for other purposes without regulation, the EV conversion must be certified by engineer with license for professional practice in Thailand	4. For conversions these regulations are followed. This is shown with the monitoring report.
5. BEV must be able to monitor the electricity consumption for charging and the travel distance.	5. BEVs can monitor the distance driven and the electricity consumed. This is shown with the monitoring report.
6. The project owner or the project developer which uses a BEV must demonstrate guidelines for managing damaged or end-of-life batteries.	6. Contracts between GC and the investor include the clause: “The Project Investor ensures that batteries of electric vehicles deployed under this contract are tracked and properly recycled or disposed of in line with national EV battery regulations (once in effect) or in absence of latter in line with best practices and guidelines such as adopted e.g. in the EU, the USA, India or PR China”.
7. Types of motor vehicles must comply with the law (Motor Vehicle Act/Land Transport Act) or be registered as machines and equipment under relevant laws such as Department of Primary Industries and Mines Announcement: Criteria and Reporting for Mining etc.	7. Program vehicles are buses, LCVs and trucks. For this methodology only LCVs and trucks compliant with the law are used.
8. ICE vehicles (Baseline vehicle) must not be used as the vehicle outside project boundary, which the project developer	8. Companies purchase a new EV instead of purchasing a new fossil vehicle. The Program changes this purchase decision. In the project as well as in the

Code: T-VER-P-METH-04-03	
Version: 01	
Methodology/tool: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle for Freight Transport	
Project Conditions	**Justification/Explanation**
will have to have the evidence to prove. This is not included the EV conversion.	baseline case, an existing fossil vehicle is being replaced – this is, however, not the baseline vehicle: the baseline vehicles are the new fossil vehicles which would have been purchased in the absence of the EV. In the baseline case, as in the project case, we thus have a used fossil vehicle which might either be scrapped, kept by the owner or re-sold. Important is that in the baseline, as in the project case, we have the exact same case – a vehicle is sold, scrapped or continues to be used. The emissions of this used vehicle are the same in the baseline and the project case (see graph below). Re-sale of a vehicle will also have a potentially positive downstream effect as an even older and less efficient vehicle is being replaced until coming to the last user. See for details explanation given in former table.
9. ICE vehicles (Baseline vehicle) are able to replace the vehicles outside project boundary which are the longest service life in the vehicle registration system of the Department of Land Transport. Project developer must demonstrate information or documents to verify the deregistration for ICE vehicles with the longest service life from the system, such as engine deregistration, etc.	9. At time of monitoring reports and verification, publicly accessible statistics are provided demonstrating that old diesel trucks are not plying anymore the streets. These are not necessarily related to the program. They give however a general indication that some trucks have been retired.

2.3 Relevant information for calculating greenhouse gas emissions

Relevant greenhouse gas sources for calculation

Emission Source	Type of Greenhouse Gas	Detail of activity
Baseline Emission		
Fossil fuel combustion of baseline vehicles displaced by the program vehicles	CO_2	Included in the calculation of CO2 emissions associated with fossil fuel consumption
Project Emission		
Electricity consumption from	CO_2	Included based on electricity consumption and the associated carbon grid factor of Thailand

program vehicles and the related emissions from the power grid of Thailand	CO_2	N/A
	CH_4	N/A
Leakage Emission		
Not included		

Part 3 Calculation of greenhouse gas reduction

3.1 Calculation of baseline sequestration/emission

a). Buses

For buses the methodology T-VER-P-METH-04-01 is used. Option II Approach 1 as well as approach 2 might be used during the monitoring period depending on the data produced by the individual project investors. For upfront projections of baseline emissions approach 1 was used. Data referred to as measured is thereby subject to changes based on monitored results.

Code: T-VER-P-METH-04-01

Version: 03

Methodology/tools: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle Approach 1 Using distance travelled by project vehicles

Equation: $BE_y = \sum_i EF_{BL,km,i} \times DD_{i,y} \times N_{i,y} \times 10^{-6}$ (equation 3 of TGO methodology)

Parameter	Meaning	Ref	Value	Unit
BE_y	Baseline emissions in year y	Calculated	See table below	tCO_2
$EF_{BL,km,i}$	Emission factor for baseline vehicle category i	Calculated	See table below	gCO_2/km
$DD_{i,y}$	Annual average distance travelled by project vehicle category i in the year y	Measured	See table below	Km
$N_{i,y}$	Number of operational project vehicles in category i in year y	Measured	See table below	No unit
i	Vehicle category		Buses	No unit

Table 4: Projected baseline emissions from buses for the crediting period 2026 to 2030 (sum of all PAIs with buses)

Year (y)	$N_{Buses,y}$	$DD_{Buses,y}$ (million km)	$EF_{BL,km,Buses}$ (gCO_2/km)	BE_y (tCO_2)
2026	100	16.3	692	11,283
2027	400	65.2	685	44,680
2028	1,000	163.0	678	110,582
2029	2,000	326.0	672	218,952
2030	2,000	326.0	665	216,763

Source: File 1; File 1 includes per PAI the projected number of buses, distance driven and BE

Approach 2 of the methodology is not used for upfront projections of baseline emissions.

Code: T-VER-P-METH-04-01				
Version: 03				
Methodology/tools: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle				
Equation: $EF_{BL,km,i} = SFC_i \times NCV_{BL,i} \times EFCO2_{CNG,i} \times IR^t \times 10^3$ *(equation 5 of the methodology)*				
Parameter	**Meaning**	**Ref**	**Value**	**Unit**
$EF_{BL,km,i}$	Emission factor for baseline vehicle category i	Calculated	See table below	gCO_2/km
SFC_i	Specific fuel consumption of baseline vehicle category *i; based on the methodology this is determined for CNG vehicles*	OTP (2021), File 4	Minibus: 89 Large bus: 270	g/km
$NCV_{BL,i}$	Net calorific value of CNG consumed by baseline vehicle category *i*	Default IPCC	48	MJ/kg
$EFCO2_{CNG,i}$	CO2 emission factor of CNG consumed by baseline vehicle category *i*	Default IPCC	56.1	gCO_2/MJ
IR^t	Technology improvement factor for baseline vehicle in year *t.* The improvement rate is applied to each calendar year.	Default TGO methodology	0.99	No unit
t	Year counter for the annual improvement (dependent on age of data per vehicle category)		2026 to 2030	No unit

Note: this is based on CNG vehicles in accordance with the methodology

Table 5: Baseline Emission Factors of Buses per Year (gCO2/km)

Bus size	2026	2027	2028	2029	2030
Minibus	229	227	224	222	220
Large bus	692	685	678	672	665

Source: File 1

Option 3 of the methodology (existing statistics) for determining the fuel efficiency of the vehicle categories included has been used due to lack of sample data or data from a control group. The default data used is a host country statistic from the transportation department. For other bus sizes which might eventually be used by the project in the future (e.g. medium sized buses) existing statistics will also be used and reported in the respective monitoring report once this bus size is actually used. The

preference will be on host country statistics if by then available for other bus sizes or then data from EEA/EMEC based on the latest version of the COPERT model.

b). Trucks and LCVs

For trucks and LCVs the methodology T-VER-P-METH-04-03 is used. Option II based on the traveled distance is used. Approach 1 or 2 might be used during the monitoring period depending on the data produced by the individual project investors. For upfront projections of baseline emissions approach 1 was used. Data referred to as measured is thereby subject to changes based on monitored results.

Code: T-VER-P-METH-04-03				
Version: 01				
Methodology/tools: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle for Freight Transportation: Option II approach 1: Calculation based on travelled distance				
Equation: $BE_y = \sum_i EF_{BL,km,i} \times DD_{i,y} \times N_{i,y} \times ADJ \times 10^{-6}$ (equation 3 of the methodology)				
Parameter	**Meaning**	**Ref**	**Value**	**Unit**
BE_y	Baseline emissions in year y	Calculated	See table below	tCO_2
$EF_{BL,km,i}$	Emission factor for baseline vehicle category i	Calculated	See table below	gCO_2/km
$DD_{i,y}$	Annual average distance travelled by project vehicle category i in the year y	Measured	See table below	Km
$N_{i,y}$	Number of operational project vehicles in category i in year y	Measured	See table below	No unit
I	Vehicle category		Trucks and LCVs	No unit
ADJ	Adjustment factor	TGO Methodology	0.9	No unit

Table 6: Projected baseline emissions from trucks for the crediting period 2026 to 2030 (sum of all trucks and all sizes of all PAIs with trucks)

Year (y)	**$N_{Trucks,y}$**	**$DD_{Trucks,y}$ (million km)**	**$EF_{BL,km,trucks}$ (gCO_2/km) Small/Large**	**BE_y (tCO_2)**
2026	1,000	132	522 / 1,305	136,411
2027	2,000	264	517 / 1,292	270,343
2028	3,000	396	512 / 1,279	401,459
2029	4,000	528	507 / 1,266	529,926
2030	4,000	528	502 / 1,253	524,627

Source: File 1; File 1 includes per PAI the projected number of trucks, distance driven and BE

Table 7: Projected baseline emissions from LCVs for the crediting period 2026 to 2030 (all PAIs)

Year (y)	$N_{LCVs,y}$	$DD_{CVs,y}$ (million km)	$EF_{BL,km,LCVs}$ (gCO_2/km)	BE_y (tCO_2)
2026	200	6	314	1,693
2027	800	24	310	6,704
2028	1,500	45	307	12,445
2029	3,000	90	304	24,641
2030	3,000	90	301	24,395

Source: File 1; File 1 includes per PAI the projected number of LCVs, distance driven and BE

Approach 2 of the methodology is not used for upfront projections of baseline emissions.

Code: T-VER-P-METH-04-03

Version: 01

Methodology/tools: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle for Freight Transportation

Equation: $EF_{BL,km,i} = SFC_i \times NCV_{BL,i} \times EFCO2_{BL,i} \times IR^t \times 10^3$ (equation 5 of the methodology)

Parameter	Meaning	Ref	Value	Unit
$EF_{BL,km,i}$	Emission factor for baseline vehicle category i	Calculated	See table below	gCO_2/km
SFC_i	Specific fuel consumption of baseline vehicle category *i*	Defaults: LCV EMEP/EEA (2024) File 8 Trucks MOT (2023) File 18	LCV: 101 Truck 3-4.5t: 169 Truck 4.5-6t: 194 Truck > 6t: 422	g/km
$NCV_{BL,i}$	Net calorific value of fossil fuel consumed by baseline vehicle category *i* (diesel)	Default IPCC	43	MJ/kg
$EFCO2BL_{,i}$	CO2 emission factor of fossil fuel consumed by baseline vehicle category *I* (diesel)	Default IPCC	74.1	gCO_2/MJ
IR^t	Technology improvement factor for baseline vehicle in year *t*. The improvement rate is applied to each calendar year.	Default TGO methodology	0.99	No unit
t	Year counter for the annual improvement (dependent on age of data per vehicle category)		2026 to 2030	No unit

Table 8: Baseline Emission Factors of LCVs and Trucks per Year (gCO2/km)

Vehicle type	2026	2027	2028	2029	2030
LCV diesel	314	310	307	304	301
Truck 3-4.5t	522	517	512	507	502
Truck 4.5-6t	600	594	588	582	576
Truck > 6t	1,305	1,292	1,279	1,266	1,253

Source: File 1

Option 3 of the methodology (existing statistics) for determining the fuel efficiency of the vehicle categories included has been used due to lack of sample data or data from a control group. The default data used is a host country statistic from the transportation department for trucks and the European international publication EEA/EMEC based on the latest version of the COPERT model.

3.2 Calculation of project sequestration/emission

a). Buses

For buses the methodology T-VER-P-METH-04-01 is used. Option 1 used.

Code: T-VER-P-METH-04-01				
Version: 03				
Methodology/tools: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle				
Equation: $PE_y = \sum_i EC_{i,y} \times EF_{Elec,y} \times 10^{-3}$ (equation 6 of the methodology)				
Parameter	**Meaning**	**Ref.**	**Value**	**Unit**
PE_y	Project emissions in year y	Calculated	See table below	tCO_2
$EC_{i,y}$	Electricity consumed by project vehicle category *i* in year *y*	Measured	See table below	MWh
$EF_{Elec,y}$	Emission factor for electricity generation/consumption in year y	TGO value monitored (file 2)	See table below	gCO_2/kWh

Table 9: Projected project emissions from buses for the crediting period 2026 to 2030 (sum of all PAIs)

Parameter	2026	2027	2028	2029	2030
EC in MWh	16,300	65,200	163,000	326,000	326,000
EF_{elec} in gCO_2/kWh	440	440	440	440	440
PE in tCO_2	7,172	28,688	71,720	143,440	143,440

Note: the same EF_{elec} is assumed for projections for all years

Source: File 1; File 1 includes per PAI the projected EC and PE

b). Trucks and LCVs

For trucks and LCVs the TGO methodology T-VER-P-METH-04-03 Version 01 is used. Option 1 used.

Code: T-VER-P-METH-04-03				
Version: 01				
Methodology/tools: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle for Freight Transportation				
Equation: $PE_y = \sum_i EC_{i,y} \times EF_{Elec,y} \times 10^{-3}$ (equation 3 of the methodology)				
Parameter	**Meaning**	**Ref.**	**Value**	**Unit**
PE_y	Project emissions in year y	Calculated	See table below	tCO_2
$EC_{i,y}$	Electricity consumed by project vehicle category *i* in year *y*	Measured	See table below	MWh
$EF_{Elec,y}$	Emission factor for electricity generation/consumption in year y	TGO value monitored (file 2)	See table below	gCO_2/kWh

Table 10: Projected project emissions from trucks for the crediting period 2026 to 2030 (sum of all PAIs)

Parameter	2026	2027	2028	2029	2030
EC trucks in MWh	175,032	350,064	525,096	700,128	700,128
EF_{elec} in gCO_2/kWh	440	440	440	440	440
PE in tCO_2	77,014	154,028	231,042	308,056	308,056

Note: the same EF_{elec} is assumed for projections for all years

Source: File 1; File 1 includes per PAI the projected EC and PE

Table 11: Projected project emissions from LCVs for the crediting period 2026 to 2030 (sum of all PAIs)

Parameter	2026	2027	2028	2029	2030
EC LCVs in MWh	1,140	4,560	8,550	17,100	17,100
EF_{elec} in gCO_2/kWh	440	440	440	440	440
PE in tCO_2	502	2,006	3,762	7,524	7,524

Note: the same EF_{elec} is assumed for projections for all years

Source: File 1; File 1 includes per PAI the projected EC and PE

3.3 Calculation of Leakage Emission

Based on the methodology (valid for both methodologies used) no leakage calculations are required.

3.4 Summary of greenhouse gas emissions

a). Buses

For buses the methodology T-VER-P-METH-04-01 is used.

Code: T-VER-P-METH-04-01				
Version: 03				
Methodology/tools: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle				
Equation: $ER_y = BE_y - PE_y - LE_y$ (equation 9 of the methodology)				
Parameter	**Meaning**	**Ref.**	**Value**	**Unit**
ER_y	Project emissions in year y	Calculated	See table below	tCO_2
BE_y	Baseline emissions in year *y*	Calculated	See table below	tCO_2
PE_y	Project emissions in year y	Calculated	See table below	tCO_2
LE_y	Leakage emissions in year y	Default	0	tCO_2

Table 12: Projected emission reductions from buses for the crediting period 2026 to 2030 (sum of all PAIs)

Parameter	2026	2027	2028	2029	2030
ER in tCO2	4,111	15,992	38,862	75,512	73,323
BE in tCO2	11,283	44,680	110,582	218,952	216,763
PE in tCO2	7,172	28,688	71,720	143,440	143,440
LE in tCO2	0	0	0	0	0

Source: File 1. This includes various PAIs

Table 13: Projected emission reductions from buses for the crediting period 2026 to 2030 per PAIs (tCO2)

Project activity	2026	2027	2028	2029	2030
PAI 4	822	3,998	11,659	26,429	25,663
PAI 8	0	1,999	3,886	11,327	10,998
PAI 11	3,289	9,995	23,317	37,756	36,661

Source: File 1

a). Trucks and LCVs

For trucks and LCVs the methodology T-VER-P-METH-04-03 is used.

Code: T-VER-P-METH-04-03				
Version: 01				
Methodology/tools: Switching from Internal Combustion Engine Vehicles to Battery Electric Vehicle for Freight Transportation				
Equation: $ER_y = BE_y - PE_y - LE_y$ (equation 9 of the methodology)				
Parameter	**Meaning**	**Ref.**	**Value**	**Unit**
ER_y	Project emissions in year y	Calculated	See table below	tCO_2
BE_y	Baseline emissions in year *y*	Calculated	See table below	tCO_2
PE_y	Project emissions in year y	Calculated	See table below	tCO_2
LE_y	Leakage emissions in year y	Default	0	tCO_2

Table 14: Projected emission reductions from trucks for the crediting period 2026 to 2030 (all PAIs)

Parameter	2026	2027	2028	2029	2030
ER in tCO2	59,397	116,315	170,417	221,870	216,570
BE in tCO2	136,411	270,343	401,459	529,926	524,627
PE in tCO2	77,014	154,028	231,042	308,056	308,056
LE in tCO2	0	0	0	0	0

Source: File 1. This includes various PAIs

Table 15: Projected emission reductions from trucks for the crediting period 2026 to 2030 per PAIs (tCO2)

Project activity	2026	2027	2028	2029	2030
PAI 1	5,096	10,193	14,916	19,397	18,910
PAI 2	27,150	46,428	51,833	56,945	55,592
PAI 5	13,575	26,531	45,354	50,618	49,415
PAI 7	6,788	6,633	25,917	44,291	43,238
PAI 9	6,788	26,531	32,396	50,618	49,415

Source: File 1

Table 16: Projected emission reductions from LCVs for the crediting period 2026 to 2030 (all PAIs)

Parameter	2026	2027	2028	2029	2030
ER in tCO2	1,191	4,698	8,683	17,117	16,871
BE in tCO2	1,693	6,704	12,445	24,641	24,395
PE in tCO2	502	2,006	3,762	7,524	7,524
LE in tCO2	0	0	0	0	0

Source: File 1. This includes various PAIs

Table 17: Projected emission reductions from LCVs for the crediting period 2026 to 2030 per PAIs (tCO2)

Project activity	2026	2027	2028	2029	2030
PAI 3	298	1,175	2,315	4,565	4,499
PAI 6	596	2,349	4,631	9,129	8,998
PAI 10	298	1,175	1,737	3,423	3,374

Source: File 1

3.5 Summary of greenhouse gas emissions

Year	d/m/y – d/m/y	Baseline Emission	Project Emission	Leakage Emission	Emission Reduction
2026	01/01/2026-31/12/2026	149,387	84,688	0	64,699
2027	01/01/2027-31/12/2027	321,727	184,723	0	137,004
2028	01/01/2028-31/12/2028	524,486	306,524	0	217,962
2029	01/01/2029-31/12/2029	773,519	459,020	0	314,499
2030	01/01/2030-31/12/2030	765,784	459,020	0	306,764
Total (tCO_2eq)		2,534,904	1,493,975	0	1,040,928
Average (tCO_2e/y)		506,981	298,795	0	208,186

In the NDC Action Plan adopted in December 2024 by the cabinet, it is stated that for Article 6 projects, 10% of the total amount of ITMOs will be deduced and be kept by Thailand. DCCE confirmed the following by email dated 28.5.2025:

a) In the years 2026 to 2029 100% of expected ITMOs will be transferred
b) In the year 2030 10% of the total cumulative number of ITMO volume will be retained by Thailand i.e. 10% of 1,040,928 or 104,093.

Total ERs projected to be generated are therefore 1,040,928 and total ITMOs to be transferred to Switzerland 936,836 and total kept in Thailand 104,093.

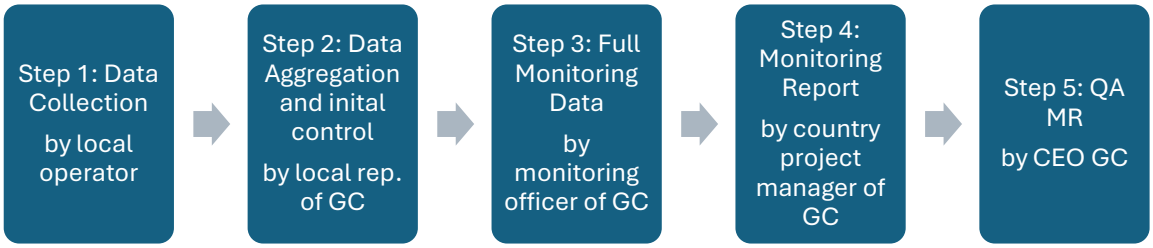
Part 4 Monitoring of project

4.1 Monitoring Plan

Annual reporting by Grutter Consulting of the total Program with separate emission reduction calculations per project investor and vehicle category and PAI. QA is made within the company.

Data collection is made for most parts by the individual project owners. GC instructs and trains the individual project owners in monitoring and quality controls data provided. Other data required for the monitoring report is directly collected by GC. The figure below shows the procedure for reporting as adopted by Grutter Consulting.

Figure 3: Production of Monitoring Reports



Each operator of vehicles receives a training on data collection and management with an on-site visit realized by the monitoring officer of GC together with the local representative of GC. A guideline is given as well as the formats (e.g. excel based) on data collection and the frequency.

Once the process is established under Step 1 the local operator collects all data required in the form as agreed upon and submits this data to the local representative of GC who makes an initial data control and check for completeness and for submitting in accordance with the agreed upon form. The local rep. also collects additional data required such as the latest version of the electric grid factor. The local rep. then forwards the data electronically to the Monitoring Officer at GC. The Monitoring Officer reviews worldwide for GC all e-mobility programs concerning monitoring and trains all clients. The check performed by the Monitoring officer is on completeness of all information and accordance with prescribed system. The country project manager receives from the monitoring officer the complete dataset and performs all quality controls relative to plausibility and conformity with the PDD. The country project manager (in GC normally a country project manager is responsible of various countries) writes the MR. The final review and quality control of all MRs is made by the CEO of GC.

All data is stored electronically on a cloud data and with 2 copies in separate hard disks stored physically in Switzerland and in Colombia.

4.2 Parameters not monitored

Parameter	$NCV_{BL,i}$
Value applied	Diesel: 43 CNG: 48
Unit	MJ/kg
Meaning	Net calorific value of fossil fuel consumed by baseline vehicle category *i*
Source of data	IPCC, 2006, table 1.2; File 31

Parameter	$EFCO2_{BL,i}$
Value applied	Diesel: 74.1 CNG: 56.1
Unit	gCO_2/MJ
Meaning	CO2 emission factor of fossil fuel consumed by baseline vehicle category *i*
Source of data	IPCC, 2006, table 1.2; File 31

Parameter	IR^t
Value applied	0.99
Unit	No unit
Meaning	Technology improvement factor for baseline vehicle in year
Source of data	TGO methodology default value

Parameter	SFC_i
Value applied	See Table 3
Unit	g/km
Meaning	Specific fuel consumption of baseline vehicle category *i* ; default value fixed ex-ante are listed in the PDD
Source of data	OTP, MOT and EMEP/EEA listed in File 8

Parameter	ADJ
Value applied	0.9
Unit	No unit
Meaning	Adjustment factor used for freight vehicles
Source of data	TGO methodology for T-VER-P-METH-04-03

4.3 Monitored Parameters

Parameter	$SEC_{PJ,i,y}$
Unit	kWh/km
Meaning	Specific electricity consumption factor for project vehicle category i in year y
Source of data	Vehicle operator / 3rd party survey or survey managed by GC
Description of measurement methods and procedures to be applied	Options are listed in order of preference, i.e. option 2 is chosen if option 1 is not available. The MR needs to give a clear explanation why option 1 is not possible. Option 1: Records of all vehicles Option 2: Sample measurement per vehicle category i. The sample measurement will be based on a representative sample (simple random sampling) of similar vehicles operated in comparable conditions as the Program vehicles. Simple random sampling is suitable as there is little heterogeneity amongst the units being sampled. The procedure used will be in accordance with the General Guidelines for sampling and surveys for CDM Program activities and programmes of activities version 4 (File 34) with a check for the reliability or relative precision level, which must be 10% or lower

	based on a 95% confidence interval (see section "comment" for approach). The sample vehicles are statistically randomly selected using for the determination of the sample size Taro Yamane's table with a 95% confidence level and a 10% error, detailed in Annex 1 of the TGO methodology (File 28).
Frequency of monitoring/recording	Annual

Parameter	$EC_{i,y}$
Unit	MWh
Meaning	Electricity consumed by project vehicle category i in year y
Source of data	Direct measurement
Description of measurement methods and procedures to be applied	Measurement of total electricity consumed by the fleet e.g., based on charger reading
Frequency of monitoring/recording	Annual

Parameter	$DD_{i,y}$
Unit	km
Meaning	Annual average distance travelled by project vehicle category *i* in the year y
Source of data	Odometer, GPS or other device recording distance driven
Description of measurement methods and procedures to be applied	Options are listed in order of preference i.e. option 2 is chosen if option 1 is not available. The MR needs to give a clear explanation why option 1 is not possible. Option 1: Records of all vehicles Option 2: Sample measurement per vehicle category i. The sample measurement will be based on a representative sample (simple random sampling) of similar vehicles operated in comparable conditions as the Program vehicles. Simple random sampling is suitable as there is little heterogeneity amongst the units being sampled. The procedure used will be in accordance with the General Guidelines for sampling and surveys for CDM Program activities and programmes of activities version 4 (File 34) with a check for the reliability or relative precision level, which must be 10% or lower based on a 95% confidence interval (see section "comment" for approach). The sample vehicles are statistically randomly selected using for the determination of the sample size Taro Yamane's table with a 95% confidence level and a 10% error, detailed in Annex 1 of the TGO methodology (File 28).

	For vehicles operating also outside the territory of Thailand the vehicle operator records or makes an estimate of the share of km operated outside Thailand. Only service units operated within Thailand will be counted for determination of DD. For intercity bus and long-haul truck operators, the PI must identify vehicles which are also used outside Thailand. For such vehicles the international routes are defined and the mileage is then split based on the route distance into mileage within Thailand and outside Thailand. The following steps are taken with intercity and long-haul truck operators: 1. Confirm with operators that vehicles are only used within Thailand 2. In case vehicles are also used for international operations perform the following steps: a). Identify international routes used by the vehicles operating internationally b). Calculate share of distance of international routes within and outside Thailand based on google map distance origin-destination c). If various international routes are driven take the one with the longest share outside Thailand (conservative approach) d). Determine distance driven in Thailand for these units by multiplying share within Thailand * total mileage.
Frequency of monitoring/recording	Annual

Parameter	$N_{i,y}$
Unit	Vehicles
Meaning	Number of operational project vehicles in category i in year y
Source of data	Direct measurement
Description of measurement methods and procedures to be applied	Vehicle database maintained by PP or operator of vehicles and sales or leasing invoice and eventually a third party survey company. In case of sample procedures used for determination of distance driven and/or electricity consumption the number of the project vehicles in operation is established through: Option (A): a representative sample survey vehicles to determine the percentage of vehicles in use or Option (B): the annual sales records or official data for registered project vehicles, multiplied by the default factor 0.9^t, where t is year counter for the number of years since the vehicle was introduced (for example: if n vehicles are sold in year 1, in year 2 the number of vehicles still in operation are assumed to be equal to n*0.9, and in year 3, $n*0.9^2$, etc.)
Frequency of monitoring/recording	annual

Parameter	$EF_{Elec,y}$
Unit	gCO2/kWh
Meaning	Emission factor for electricity consumption in year *y*
Source of data	Report on greenhouse gas emissions (Emission Factor) from electricity generation/consumption for projects and activities of greenhouse gas reduction published by TGO: For 2024: 0.440 (value for 2021 based on 2022 publication of TGO (last available year) see File 2
Description of measurement methods and procedures to be applied	TGO default value based on latest published TGO data for T-VER Premium
Frequency of monitoring/recording	annual

Parameter	SFC_i
Unit	g/km
Meaning	Specific fuel consumption of baseline vehicle category i
Source of data	Default values based on official statistics by OTP/MOT or international publications by EMEP/EEA (Copert model)
Description of measurement methods and procedures to be applied	See PDD.
Frequency of monitoring/recording	Annual

Parameter	Policies
Unit	---
Meaning	Policies, laws and regulations mandating EVs
Source of data	Official reports, regulations, policies
Description of measurement methods and procedures to be applied	New publications on policies, regulations and laws relative to electric mobility
Frequency of monitoring/recording	annual

Parameter	FA
Unit	USD/km
Meaning	Financial additionality per vehicle category i included in the monitoring report for the year y

Source of data	Grutter Consulting
Description of measurement methods and procedures to be applied	File 8 (financial additionality file of the MADD) is used as base and updated annually for the vehicle categories included in the MR. The primary updates are for energy prices and for vehicle CAPEX. For the CAPEX of EVs the prices paid by the project operators are taken as base using the lowest available price per vehicle category. The TCO is calculated for the fossil and for the EV of the same vehicle category. If the fossil TCO is lower including monetized barriers as included in the File 8 the respective vehicle category is considered in the future as non-additional and no new vehicles of this category can be included the calendar year after the MR has been approved by the Swiss and the Thai government. Previously included vehicles continue to generate ERs.
Frequency of monitoring/recording	Annual

Part 5 Local Stakeholder Consultation

5.1 Participation in the process of stakeholders consultation

A virtual meeting was organized on 6th February 2025 on Zoom to present the E-Mobility Programme. As per the guidelines of Thailand Greenhouse Gas Management Organization (TGO, File 25), the meeting invitation was sent via email 10 days prior to the meeting to more than 115 stakeholders in public, private, universities, and NGOs (File 24).

The meeting announcement was posted twice on Grütter Consulting LinkedIn Account (24th January[10] and 3rd February 2025[11]). A total of 29 participants registered to this virtual meeting[12] (File 24). During this meeting the E-mobility Program was presented by Grütter Consulting Staff indicating its scope, the mitigation activities that can be included, the structure of the program, and the program cycle that must be completed before registration (File 24).

5.2 Summary of comments

At the end of the meeting, there were two questions from TGO on the list of invited participants to ensure inclusive participation from relevant stakeholders and the submission of modality of communication to TGO. Grütter Consulting staff explained that the list of invitees included a wide range of stakeholders and conducted per guidance of TGO handbook. On the submission of Modality of Communication[13], the Grütter Consulting team clarified that this will be done accordingly.

5.3 Suggest solutions to problems for issues in 5.2

[10] *https://www.linkedin.com/posts/grutter-consulting_emobility-sustainability-climateaction-activity-7288195821269856256-UBVr?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAnq7M8BmciGT7ZF3e9jsbWV6Ahk4BG61V4*

[11] *https://www.linkedin.com/posts/grutter-consulting_emobility-sustainability-climateaction-activity-7292819672712818689-7CeR?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAnq7M8BmciGT7ZF3e9jsbWV6Ahk4BG61V4*

[12] *The registered list excluded 2 Grütter Consulting Staffs and 1 representative from Klik Foundation*

[13] *Expression of interest about doing Carbon Project under Thai's standard*

No issues raised during the stakeholder meeting. Additionally, regarding grievance mechanism, Grütter Consulting has on its website the option to for any stakeholders to register concerns, either real or perceived, with the aim of resolving challenges before they escalate. The page for registering concerns is in Thai and English languages[14].

[14] *https://grutterconsulting.com/special-projects/accelerating-e-mobility-in-thailand-through-the-market-mechanism-of-article-6-of-the-paris-agreement-itmos-e-mobility-program-for-thailand/*

Appendix 1

1. Grutter Consulting, Emission Reduction Sheets e-Mobility Program Thailand
2. TGO (2022), Emission Factor for projects and activities to reduce greenhouse gas emissions
3. CEVA logistics (2023), presentation on CMA CGM & CEVA Electric Vehicle Project
4. OTP, energy usage of vehicle
5. DLT, vehicle registration fleet
6. Government of Thailand (2024) Thailand's 2nd Updated Nationally Determined Contribution
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Appendix 2

Stakeholder Consultation Summary Report for the Project

The virtual meeting was organized on 6th February 2025 on Zoom to present the E-Mobility Programme. As per guideline of Thailand Greenhouse Gas Management Organization (TGO), the meeting invitation was sent 10 days prior to the meeting via email to more than 115 stakeholders in public, private, universities, and NGOs. The meeting announcement was posted twice on Grutter Consulting LinkedIn Account (24th January[15] and 3rd February 2025[16]). A total of 29 participants registered to this virtual meeting[17]. During this meeting the E-mobility Program was presented by Grutter Consulting Staff indicating its scope, the mitigation activities that can be included, the structure of the program, and the program cycle that must be completed before registration. At the end of the meeting, there were two questions from TGO on the list of invited participants to ensure inclusive participation from relevant stakeholders and the submission of modality of communication to TGO. Grutter Consulting staff explained that the list of invitees included a wide range of stakeholders and conducted per guidance of TGO handbook. On the submission of Modality of Communication, the team clarified that this will be done accordingly.

Additionally, regarding grievance mechanism, Grutter Consulting has on its website the option to for any stakeholders to register concerns, either real or perceived, with the aim of resolving challenges before they escalate. The page for registering concerns is in Thai and English languages[18].
Additionally, the website offers the presentation of the programme.

Appendix 3

Evidence of organizing local stakeholder consultation is available at *https://we.tl/t-8UR1xAws2F*

[15] *https://www.linkedin.com/posts/grutter-consulting_emobility-sustainability-climateaction-activity-7288195821269856256-UBVr?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAnq7M8BmciGT7ZF3e9jsbWV6Ahk4BG61V4*

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[17] The registered list excluded 2 Grutter Consulting Staffs and 1 representative from Klik Foundation

[18] *https://grutterconsulting.com/special-projects/accelerating-e-mobility-in-thailand-through-the-market-mechanism-of-article-6-of-the-paris-agreement-itmos-e-mobility-program-for-thailand/*