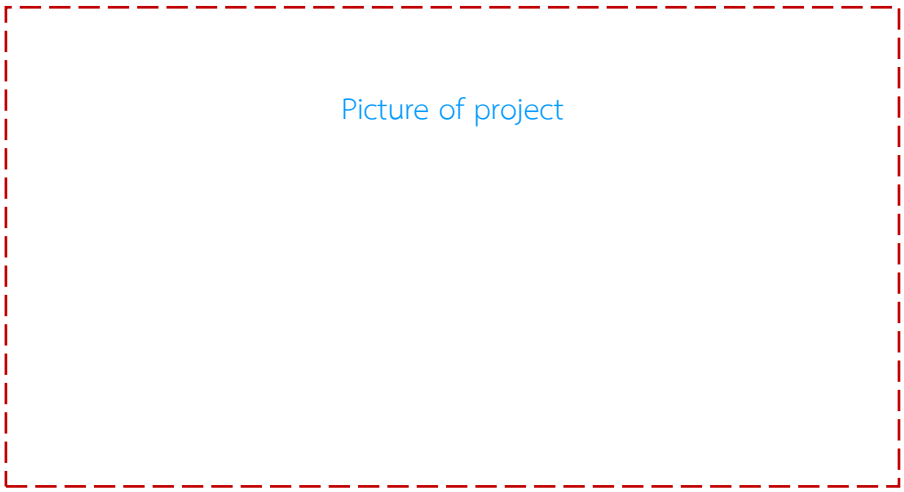
T-VER Programme of Activities Design Document



Thailand Electric Logistic Programme

Programme of Activities Details	
Title of PoA	Thailand Electric Logistic Programme PoA04
Project participant	-
Co-project participant	-
Project owner	Thai EV Company Ltd
Project type	☐ Renewable energy of fossil fuel replacement ☐ Improvement of the efficiency of electricity and heat generation ☐ Use of public transportation system ✔ 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 .....
Programme of Activities	The Mitigation Activity aims to replace common diesel trucks with introducing new battery electric trucks, excluding HEVs and PHEVs. It will cover up to 1,688 fleet vehicles from various channels, including direct purchase and open platforms, with an anticipated ITMO authorization of approximately 191,729 tCO2e by 2030.
Crediting Period	✔ 20 years <18 September 2025 – 18 September 2045>

T-VER Methodology	T-VER-P-METH-04-03
	Switching from internal combustion engine vehicles to battery electric vehicle for freight transport
	Version 01
T-VER Tools *(if any)*	<tool code>
	<title>
	<version>

Details of report preparation		
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Content

Part 1: Programme of Activities Information

1.1 Objectives and details of programme activities

The transportation sector substantially contributes to the greenhouse gas emissions from the use of fossil fuel in internal combustion engine (ICE) vehicles, of which diesel consumption in ICE trucks account for a substantial proportion in Thailand. Consumption of diesel fuel account for nearly 43% of all petroleum fuel products in Thailand in 2024 , mostly consumed by commercial vehicles. These vehicles are used to carry large capacity of cargo, leading to high fuel combustion and emissions generation compared to other vehicle categories, e.g, passenger vehicles, motorcycles, etc.

To tackle the emissions from trucks in Thailand's transport sector, the Thailand Electric Logistics Programme, developed by Thai EV Co., Ltd., implements mitigation activities to promote the adoption of electric vehicles (EVs) in Thailand, with a focus on battery electric vehicle (BEV) trucks and renewable energy-based charging stations. This initiative aims to transition the logistics industry from a business-as-usual path of reliance on conventional diesel-powered vehicles to a lower-carbon fleet. To achieve this, the programme seeks to introduce the new BEV trucks with technologies detailed in **Section** Error! Reference source not found.. While BEV trucks promise various advantages as compared to ICE trucks, their higher capital costs and other practical limitations have kept their penetration into the commercial truck market below 1% for the past three consecutive years. The programme demonstrates its additionality to the NDC, a mandatory requirement for Article 6.2 programme implementation. The demonstration ensures that the Mitigation Activity does not overlap with existing policies, incentives and other promotion measures of the Thai government, but is complementary and additional to the country's overall strategy to promote electric vehicles.

The programme of activity 01 (PoA04) aims to replace ICE trucks with various BEV truck types, including 4-wheel, 6-wheel, 10-wheel, tractor unit, and other types of trucks such as non-road trucks. This Mitigation Activity expects 1,688 vehicles to participate from 2025 to 2029 and generate GHG emission reduction units until the end of 2030. By switching from ICE to BEV, all participating vehicles are expected to reduce emissions by 191,729 tCO_2e throughout the crediting period.

Emission reductions will be calculated using the Premium T-VER methodology (T-VER-P-METH-04-03 Version 01 – Switching from internal combustion engine vehicles to battery electric vehicle for freight transport) – and converted into Internationally Transferred Mitigation Outcomes (ITMOs) for transfer to Switzerland.

The programme allows both Thai EV's customers and other fleet operators, e.g. those who will purchase/lease EV trucks from other suppliers to join. During the implementation of the Mitigation Activity, all participating vehicles will be tracked and monitored for emissions reduction performance using a digital device operated by the project proponent. This includes monitoring of travelled distance and energy consumption for BEVs. The programme ensures the avoidance of double claiming through contractual agreement with truck owners. Once the quantified mitigation outcomes from the vehicles' emission reductions performance are verified and issued for transfer, the monetary benefits generated from the ITMO revenues will be monetized and allocated to participants.

1.2 Physical/geographical boundary of T-VER-PoA

The Thailand Electric Logistics Programme (PoA04) covers nationwide operations across Thailand, targeting key logistics and industrial regions where freight transport activities are concentrated.

Each Component Project Activity (CPA) under PoA04 will be implemented within the operational boundaries of participating fleet operators and logistics companies, where BEV trucks are deployed for freight transport and logistics operations. The locations of all CPAs collectively represent the national-level boundary of the PoA, consistent with the programme's objective to decarbonize Thailand's logistics sector.

A geographical map illustrating the distribution of participating CPAs and their corresponding operational sites is provided below to show the spatial boundary of implementation across the country.

Figure 1 Project Area

1.3 Measure and technology

The Mitigation Activity involves the deployment of Battery Electric Trucks (BEVs) with advanced electric drive technologies designed to reduce greenhouse gas emissions during vehicle operation. The eligible BEV trucks include 4-wheel, 6-wheel, and 10-wheel trucks, as well as other truck configurations as presented in **Table 1**.

Each BEV truck is equipped with a high-efficiency electric motor and lithium-ion battery system, replacing conventional internal combustion engines and eliminating direct tailpipe emissions. The installed battery capacity typically ranges from 61 to greater than 423 kWh, depending on the vehicle size and operational requirements.

The BEVs are supplied by Thai EV and comply with energy efficiency and safety standards set by the Department of Land Transport (DLT). The deployment of these trucks under each CPA contributes to measurable emission reductions through the replacement of fossil fuel combustion, ensuring consistency with the emission reduction mechanism defined under the PoA04.

Table 1 Emission Mitigation Technology

Technology Information	Mitigation Technology
	

Item	Detail
Model Name	EVO – P5
Size (mm)	1,760 x 5,620 x 2,680
Payload (ton)	1.8
Battery capacity (kWh)	61
Wheel	4
Power rating (kW)	55
Peak power (kW)	112

Item	Detail
Model Name	JAC P7
Size (mm)	1,885 x 5,300 x 1,990
Loading (ton)	2.3
Battery capacity (kWh)	63.75
Wheel	4
Power rating (kW)	50
Peak power (kW)	105

Item	Detail
Model Name	JAC P7R
Size (mm)	1,885 x 5,300 x 1,990
Loading (ton)	2.3
Battery capacity (kWh)	63.75
Wheel	4
Power rating (kW)	50
Peak power (kW)	105

Item	Detail
Model Name	JAC G7
Size (mm)	2,160 x 7,025 x 2,323
Pay Load (ton)	5.68
Battery capacity (kWh)	107
Wheel	6
Power rating (kW)	90
Peak power (kW)	171

Item	Detail
Model Name	EVO G9
Size (mm)	2,495 x 9,845 x 3,680
Pay Load (ton)	8.7
Battery capacity (kWh)	210
Wheel	6
Power rating (kW)	110
Peak power (kW)	180

Item	Detail
Model Name	EVO X1
Size (mm)	2,550 x 7,520 x 3,090
Pay Load (ton)	39.5
Battery capacity (kWh)	423.9
Wheel	10
Power rating (kW)	250
Peak power (kW)	360

Item	Detail
Model Name	EVO L1
Size (mm)	2,500 x 11,560 x 3,740
Payload (ton)	14
Battery capacity (kWh)	423.9
Wheel	10
Power rating (kW)	150

Peak power (kW)	250

Item	Detail
Model Name	NJL5900K424BEV2
Size (mm)	9,870 x 3,500 x 3,970
Payload (ton)	55
Battery capacity (kWh)	423
Wheel	Equal greater than 10
Power rating (kW)	420
Peak power (kW)	640

Item	Detail
Model Name	Telemetric Box
Size (mm)	130 x 65.5 x 25.5 (W × D × H)
Data Acquisition	1. Location 2. Milage from odometer 3. Travelled distance 4. Electricity charged 5. Electricity consumption 6. Vehicle speed 7. Motor temperature 8. Record date and time 9. Driving time/ duration 10. Stop driving time/ duration

Note: The telemetric box is used as part of data tracking, monitoring, and acquisition as detailed in **Section 3.1.**	

1.4 Project Boundary

Figure 2 the concept of introducing new BEV trucks into the programme's system boundary. The use of BEV trucks instead of ICE trucks is decided at the decision-making stage by fleet operators and can result in reduced emissions at the operational stage compared to the baseline scenario, where fossil fuels are consumed by ICE vehicles. The programme encourages fleet operators to acquire the new BEV trucks (through purchase or leasing) by leveraging incentives from the carbon finance mechanism. GHG emissions from the use of BEV trucks at the operational stage can be minimised to zero when the vehicles are powered entirely by renewable electricity produced by renewable energy generating units

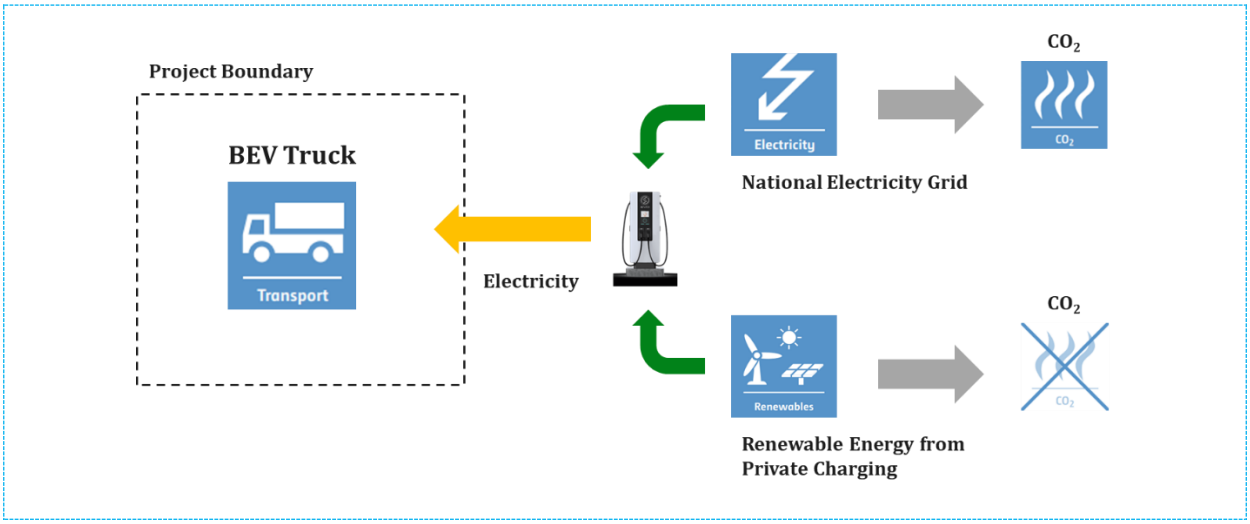

Figure 2 System Boundary of Mitigation Activity

1.5 PoA T-VER project management structure

Parties involved in the Mitigation Activity include Department of Climate Change and Environment (DCCE), National Designated Authority for bilateral agreements under Article 6 of the Paris Agreement. To ensure project viability, Thai EV works closely with ERM-Siam Co., Ltd., project consultant, on developing required documents, emission quantification, and stakeholder

engagement. These processes are critical for the registration procedure under Premium T-VER registry, managed by Thailand Greenhouse Gas Management Organization.

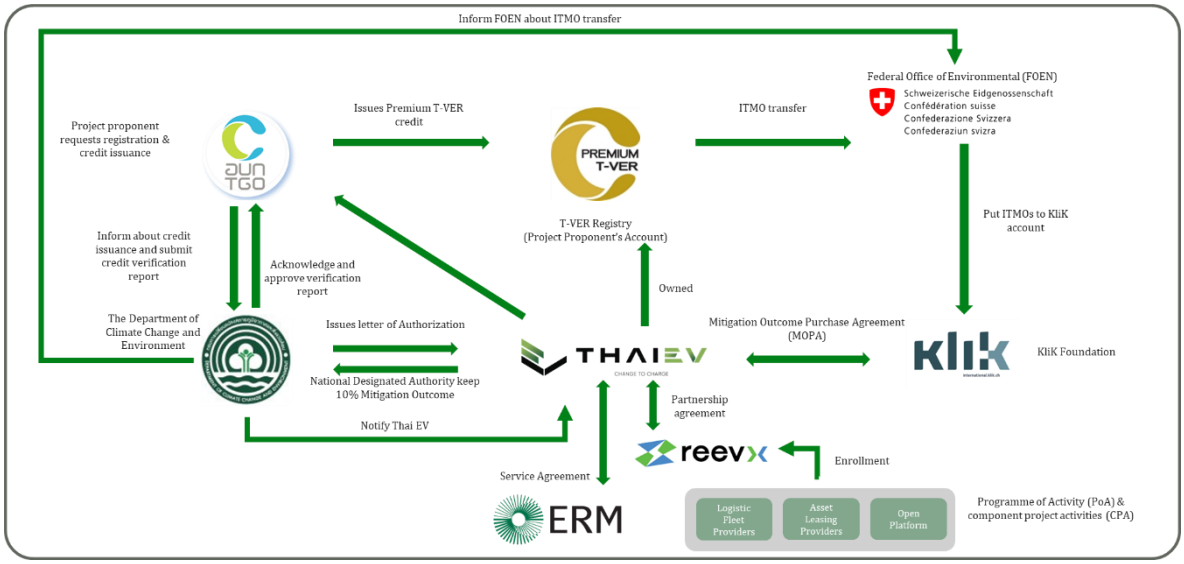

Figure 3 Business Structure of Mitigation Activity

1.6 Crediting Period of PoA in Premium T-VER project

Crediting period: ✓ 5 years

Start date of PoA: 18 September 2025

Part 2 Component Project Activity (CPA)

2.1 Component Project Activities (CPA) Details

The Mitigation Activity was designed to be a group of PoA, separating into CPA. In this respect, the criteria in designing the PoA and CPA are detailed in Error! Reference source not found.. The design of CPA was scoped by BEV truck operated in Thailand as basis criteria for participating in the programme. This includes the emissions reduction performance of PoA and CPA with limiting the reduction capacity in line with the Premium T-VER guideline

2.2 Compliance with T-VER PoA project development criteria

Criteria	Explanation
CPA applies the same T-VER methodology as the proposed Programme of Activities.	Each CPA under PoA04 applies an identical applicable methodology, referring to T-VER-P-METH-04-03 Version 01 and its conditions as outlined in **Section 2.3**
CPA is the same project type as the proposed Programme of Activities.	Each CPA is designed for introducing new BEV trucks by replacing ICE truck in the geographical boundary of Thailand
The total amount of expected GHG emission reductions/removals of all CPA shall not be 60,000 tCO_2eq/year.	The GHG emission reductions of PoA04 are expected to be not over 60,000 tCO_2eq/year, after combining all CPAs
The size of each CPA shall be a micro-scale project.	Each CPA is designed with limiting the emission reduction no more 20,000 tCO_2eq/year
The addition of CPA have to occur within the timeframe of the registered PoA.	Each CPA shall be added and implemented within the crediting period and validity timeframe of the registered PoA

2.3 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 transport

2.3.1 Project Conditions of CPA

The Thailand Electric Logistics Program under PoA04/CPAs is designed to introduce the use of new BEV trucks, targeting over 1,688 vehicles nationwide. Participating vehicles can include those supplied by Thai EV, as well as vehicles from other suppliers joining Thai EV's open platform these fleets, the PoA04 of MA expects to achieve 191,729 tCO_2e emission reductions by end of 2030. Eligible participants in this programme encompass all logistics businesses, including those who directly purchase vehicles from Thai EV and who join Thai EV's open platform. These consist of individuals, SMEs, enterprises – operating licensed EV trucks and open platform (a mixed representative group of other logistic service providers and asset leasing operators).

To quantify emissions reduction performance, Article 6.2 mechanism allows parties to select the registry and methodology for the programme based on mutual agreement. In this context, Thailand has introduced a domestic methodology developed by TGO as the protocol for quantifying emissions reductions until 2030. The methodology was analysed to ensure compatibility with the most suitable criteria and conditions of the programme.

The programme relates to a technological shift from ICE to BEV, while the objective in both scenarios remain the same, serving load transportation and logistics purposes. The applicable methodology for the programme must be associated with travelled distance and energy consumption tracking, as outlined in **Section 3.4.3**. This approach captures the difference in emissions generation resulting from the vehicle technology switch. As a result, T-VER-P-METH-04-03 Version 01 – Switching from internal combustion engine vehicles to battery electric vehicle for freight transport has been adopted for use in the Mitigation Activity.

The compatibility between Mitigation Activity and methodology is required to be demonstrated in ensuring the Mitigation Activity is eligible. In this case, all conditions are analysed to demonstrate the project eligibility of Mitigation Activity as detailed below.

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
Internal combustion engine vehicles (Baseline vehicle) and battery electric vehicles (Project activity) must be of the same type	The project has set the baseline and project vehicle to ensure the type of vehicle are the same. The use of baseline and project vehicles under the implementation is considered based on the vehicle category as defined by the Department of Land Transportation (DLT).
BEVs must have a maximum load difference of not more than 20 percent compared to baseline vehicle	The comparable vehicles between baseline and project are the same vehicle category which are categorized as a truck under Land Transport Act B.E. 2522[1] of Department of Land Transportation. Moreover, the technical specification will not differ by ±20% of maximum load difference of each comparable fleet. That ensures that both vehicles are reasonably comparable.
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)	Not relevant (Mitigation Activity fully allows only brand-new EV trucks as the project vehicles.)
Battery electric vehicle must be able to monitor the electricity consumption for charging and the travel distance	BEV truck operated with installed device (telemetric box) to track monitoring data, including the electricity consumption from the charging station and travelled distance of each vehicle.
The project owner or the project developer which uses a battery electric vehicle must demonstrate guidelines for managing damaged or end-of-life batteries	The end-of-life management of batteries is addressed through a guideline that outlines procedures for handling damaged or end-of-life batteries
Types of motor vehicles must comply with the law (Motor Vehicle Act/Land Transport Act/ Mineral 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 Mining truck	• Participating vehicles are classified as “Trucks” under the Land Transport Act B.E. 2522 (1979). • Special-purpose trucks, such as those used in mining operations, must adhere to the requirements of the Mineral Act B.E. 2560 (2017). • Other BEV trucks operating within closed-service areas (i.e. non-public roads), are subject to applicable Thai laws and regulations relevant to their specific use.

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**
The electricity supplied using RE to charging stations under the project boundary must be tracked and separated from the electricity grid.	This Mitigation Activity offers two charging options that impact emissions quantification: electricity from the national grid (public and private charging stations) and electricity from renewable sources (private charging station). For renewable sources, a telematics box is installed to monitor RE consumption by tracking relevant devices during vehicle charging, to accurately record its usage.
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.	The MA considers ICE trucks that are being retired (deregistered) from the database of DLT as the baseline scenario. It applied to the MA in replacing ICE trucks with new BEV trucks.

2.3.2 Relevant information for calculating greenhouse gas emissions

The project's boundary, as depicted in **Figure 2**, illustrates the concept of introducing new BEV trucks into the system boundary. The program encourages fleet operators to acquire the new BEV trucks (through purchase or leasing) by leveraging incentives from the carbon finance mechanism. This concept is applied to all component project activities (CPAs) under PoA04.

The use of BEV trucks instead of ICE trucks is decided at the decision-making stage by fleet operators. The use of BEV trucks results in reducing emissions at the operational stage compared to the baseline scenario, where fossil fuels are consumed by ICE vehicles. GHG emissions from the use of BEV trucks during operational phase can be minimized to zero when the vehicles are powered entirely by renewable electricity produced by renewable energy generating units.

Emission Source	**Type of Greenhouse Gas**	**Detail of activity**

Baseline Emission		
Fossil fuel use	CO_2	Fossil fuel used for internal combustion vehicle at use phase
Project Emission		
Electricity consumption	CO_2	Electricity consumed by battery electric vehicles in the use phase using national electricity grid generated from fossil fuel
Leakage Emission		
The project has no leakage emission outside the project boundary		

2.4 Calculation of emission reductions of CPA

In quantifying the emissions reduction arising from baseline and project emissions, the applicable methodology, as mentioned in **Section 2.3**, is selected for the calculation. The methodology includes the calculations detailed in Equations (1) – (7) or calculating emissions reductions resulting from both the baseline and project scenarios.

The emissions of baseline scenario under PoA04 are calculated using equations in **Section 2.4.1** Similarly, the project scenario emissions are calculated using equations in **Section 2.4.2**. The parameters required for these calculations include specific fuel consumption (SFC_i) of each vehicle, net calorific value ($NCV_{BL,I}$) of each specific energy type, emission factor ($EF_{CO2,fossil\ fuel}$) of fuel consumption, constant value of technology improvement (IR), electricity consumption ($EC_{PJ,y}$) of project vehicle, specific electricity consumption ($SEC_{PJ,km,i,y}$), percentage of transmission and distribution loss (TDL_y), and emissions factor of national electricity grid mixed (EF_{elec}).

2.4.1 Calculation of baseline emission

Baseline Emissions for Fuel Use

Approach 1: $BE_{Total} = \sum EF_{BL,km,i} \times DD_{i,y} \times N_{i,y} \times 10^{-6} \times ADJ$ Equation [1]

Approach 2: $BE_{Total} = \sum EF_{BL,km,i} \times EC_{PJ,y} / SEC_{PJ,km,i,y} \times ADJ$ Equation [2]

Emissions Factor for Baseline Emissions

$EF_{BL,km} = SFC_i \times NCV_{BL,l} \times EF_{CO2,Diesel} \times IR^t$ Equation [3]

Where:

SFC_i = Specific fuel consumption (km/l)

$NCV_{BL,l}$ = Net calorific value (j/g)

$EF_{CO2,fossil\ fuel}$ = Emission factor of fossil fuel (gCO_2/j)

$EF_{BL,km}$ = Emission factor of baseline emission (gCO2/km)

$EC_{PJ,y}$ = Electricity consumption (kWh)

$SEC_{PJ,km,i,y}$ = Specific electricity consumption (kWh/km)

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

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

ADJ = Constant value for adjustment downward (default 0.9)

IR = 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)

Methodology: Switching from internal combustion engine vehicles to battery electric vehicle for freight transport			
Code: T-VER-P-METH-04-03			
Parameter	**Meaning**	**Reference**	**Unit**
BE_y	Baseline emission in year y	Calculation	Based on calculation Eq.2
$EF_{BL,km,l}$	Emission factor for baseline vehicle category	TGO announcement	Based on calculation Eq.2
$EF_{grid,y}$	Grid emission factor in year y	TGO announcement	0.4371
SFC_i	Specific fuel consumption	Available public data	Based on vehicle type
$SEC_{PJ,km,i,y}$	Specific electricity consumption	Monitoring data	Monitoring data
$NCV_{BL,l}$	Net calorific value	Intergovernmental Panel on Cli-mate Change (IPCC), table 1.4 Chapter 1 of Vol. 2 (Energy) of the	43,000

Methodology: Switching from internal combustion engine vehicles to battery electric vehicle for freight transport			
Code: T-VER-P-METH-04-03			
Parameter	**Meaning**	**Reference**	**Unit**
		2006 IPCC Guide-lines on National GHG Inventories National GHG Inventories	
$EC_{PJ,y}$	Electricity consumption	Monitoring data	Based on monitoring data
$DD_{i,y}$	Annual average distance travelled by project vehicle category i in the year y	Monitoring data	Based on monitoring data
$N_{i,y}$	Number of operational project vehicles in category i in year y	Monitoring data	Based on monitoring data
ADJ	Constant value for adjustment downward	T-VER-P-METH-04-03	0.9
IR	Technology improvement factor for baseline vehicle in year t	T-VER-P-METH-04-03	0.99
t	Year counter for the annual improvement	Year counter	1-5

2.4.2 Calculation of project sequestration/emission

Project Emissions for Electricity use

Approach 1: $PE_{Total} = \sum EC_{i,y} \times EF_{Elec,y}$ Equation [4]

Approach 2: $PE_{Total} = \sum EF_{PJ,km,I,y} \times EC_{PJ,I,y} / SEC_{PJ,km,i,y}$ Equation [5]

Emissions Factor for Project Emissions

$EF_{PJ,km,i,y} = SEC_{PJ,km,I,y} \times EF_{Elec,y} / (1\text{-}TDL_y) \times 10^{-3}$ Equation [6]

Where:

$EF_{PJ,km,i,y}$ = Emission factor of project emission (tCO_2/km)

$EC_{PJ,y}$ = Electricity consumption (kWh)

$SEC_{PJ,km,i,y}$ = Specific electricity consumption (kWh/km)

TDL_y = Percentage of transmission and distribution loss (%)

EF_{elec} = National electricity grid mixed ($kgCO_2e$/kWh)

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

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

Methodology: Switching from internal combustion engine vehicles to battery electric vehicle for freight transport			
Code: T-VER-P-METH-04-03			
Parameter	**Meaning**	**Reference**	**Unit**
PE_y	Project emission in year y	Calculation	Based on calculation Eq.4 or 5
$EF_{PJ,km,i,y}$	Emission factor of project emission	Calculation	Based on calculation Eq.6
$EF_{grid,y}$	Grid emission factor in year y	TGO announcement	0.4758
SFC_i	Specific fuel consumption	Available Public Data	Based on vehicle type
$SEC_{PJ,km,i,y}$	Specific electricity consumption	Monitoring data	Monitoring data
$EC_{PJ,y}$	Electricity consumption	Monitoring	Based on monitoring data
$DD_{i,y}$	Annual average distance travelled by project vehicle category i in the year y	Monitoring Data	Based on monitoring data
$N_{i,y}$	Number of operational project vehicles in category i in year y	Monitoring Data	Based on monitoring data

2.4.3 Calculation of leakage emission

The retirement of Baseline Vehicles (ICE vehicles) is required as a measure to prevent carbon emissions leakage outside the project boundary. This is to prevent ICE trucks that are replaced by BEV trucks to be used elsewhere. Given the small number of participating vehicles, estimated at 1,688 in proportion to the overall truck fleet within Thailand of approximately 1.25[2] million as of 2023[Error! Bookmark not defined.], this impact is negligible, hence, the replacement of ICE trucks within the programme will not lead to their increased use beyond market conditions. In this regard, the leakage emissions from Baseline Vehicles will be addressed through the same number of units of ICE trucks retired in Thailand. This demonstration will be based on vehicle deregistration statistics from the database of Thailand's DLT. This approach allows for the same amount (or a

higher number) of ICE trucks being retired (deregistered) and taken off the road than the ones being introduced by the programme.

2.4.4 Calculation of emission reductions

Emissions Reduction

$ER_{Total} = BE_{Total} - PE_{Total}$ Equation [7]

Parameter	Meaning	Unit
ER_y	Emission reductions in year y	tCO_2e/year
BE_y	Baseline emissions in year y	tCO_2e/year
PE_y	Project emissions in year y	tCO_2e/year
LE_y	Leakage emissions in year y	tCO_2e/year

Part 3 Monitoring of Component Project Activity (CPA)

3.1 Monitoring plan

Thai EV has assigned REEV X to be responsible for acquiring data related to the monitoring parameters specified in **Section 3.3** and the monitoring flow outlined in **Figure 4**. The monitoring data will be delivered to Thai EV for the development of the monitoring report. This data will be tracked and collected through MRV devices – the Telemetric Box and an external MRV device – before being transferred to REEV X for consolidation. The external MRV device will be examined by REEV X, as detailed in **Figure 7** to ensure its capability to monitor the parameters required for emission reduction quantification.

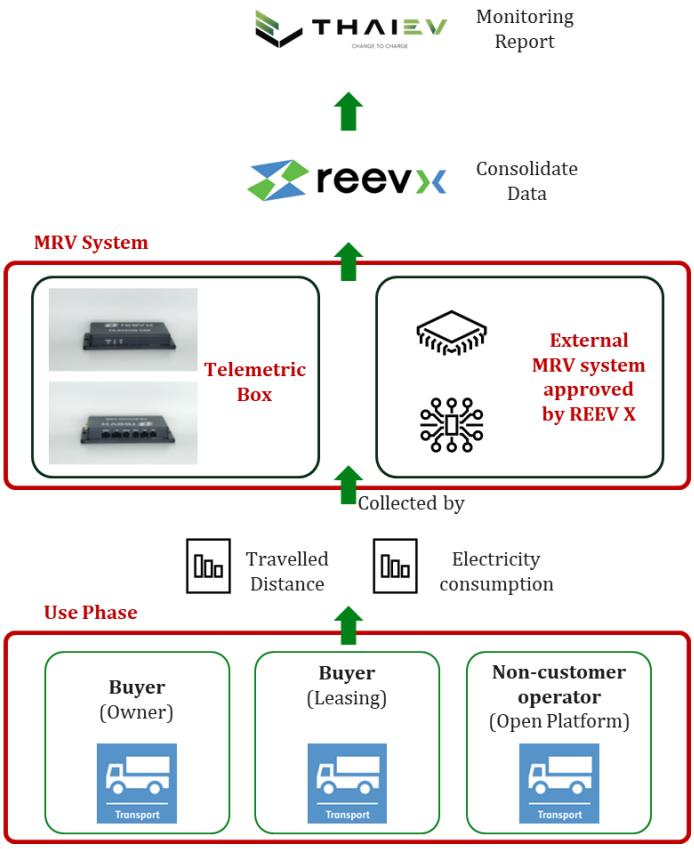

Figure 4 Structure of MRV System and Data Flow for Monitoring BEV Truck

The technology used for tracking and monitoring of Mitigation Activity is the telemetric box, developed by REEV X Co., Ltd. This digital device facilitates data acquisition, particularly for monitoring parameters as listed in **Section 3.3**. Travelled distance and electricity consumption are two crucial monitoring parameters tracked and collected from all participating vehicles under the programme for GHG emissions reduction quantification.

The digital MRV used in the programme has been developed based on a 15-minute monitoring interval to measure electricity consumption as shown in **Figure 5**. The use of 15-minute monitoring interval is standard practice by the major Thai electricity retail authorities (Metropolitan Electricity Authority and Provincial Electricity Authority). It enhances the granularity of energy usage throughout the monitoring period. The system tracks the electricity generated by the solar system for every 15-minute period, aligning with the 15-minute tracking period of electricity charged by the vehicles. This implies all generated electricity amount that is tracked will be accounted for as electricity consumption

As for RE consumed by the programme vehicles, the energy output is monitored through the inverter that is connected to the solar power system. To ensure accurate tracking, energy consumed by the fleet is further recorded at the charging station and charger to verify that solar-generated electricity is used at a specific time. Additionally, the telemetric box communicates with the charging station to log the electricity charged.

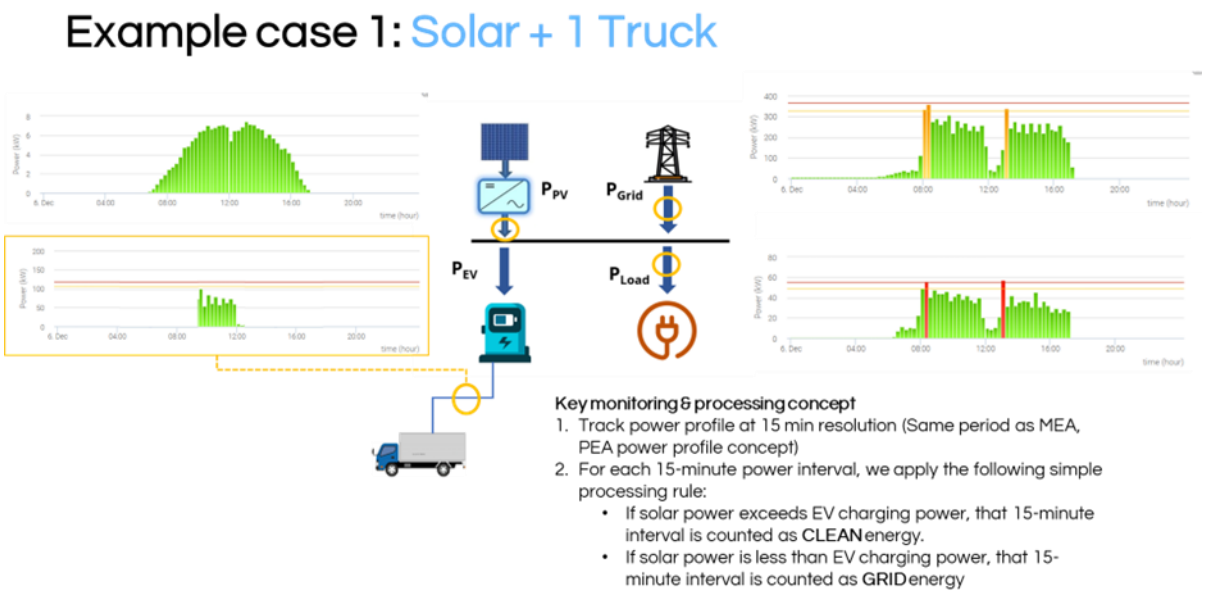

Figure 5 Key Monitoring and Processing Concept

The same concept also applies in the case where multiple BEVs are at the charging station (as depicted in **Figure 6**), based on the conservative principle, if the energy consumption during certain time is higher than the electricity generated from solar, the system is designed to not calculate the emissions reduction using the electricity from renewable sources. It will instead classify this entire amount being charged to the vehicle as grid electricity, applying the regular grid emission factor.

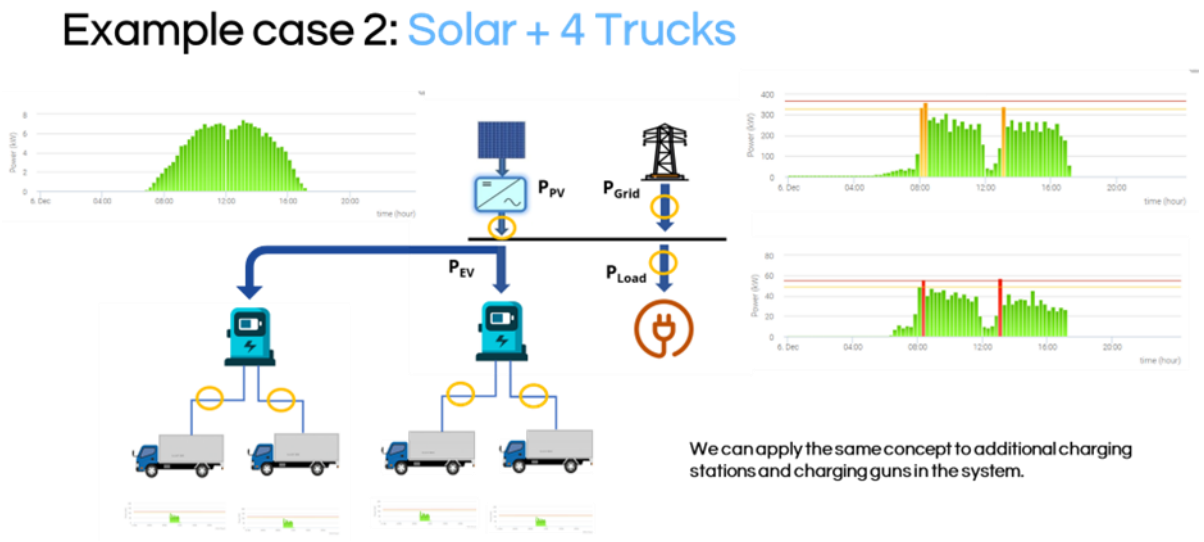

Figure 6 Key Monitoring and Processing Concept for Multiple Chargers

Another potential leakage concerns the charging of EV trucks with solar electricity that could be considered removing some clean electricity from other potential users, and thus increasing their reliance on grid electricity. The programme will consider solar-equipped charging stations that sell excess generated electricity back to the national grid as completely relying on the national grid and apply the regular grid emission factor. This approach prevents double claiming and ensures the environmental integrity of the MO. Note that as of publication, selling solar-electricity back into the grid is still very uncommon in Thailand and requires special permissions.

Additionally, as the program allows participants beyond Thai EV customers to join, the MRV system for those open channels is imperative for examination and demonstration to ensure that all monitoring parameters can be tracked and reported to REEV X (**Figure 7**).

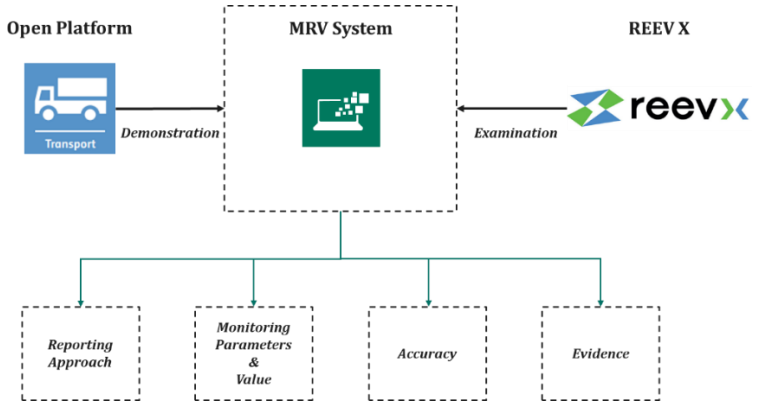

Figure 7 MRV System Approach of Open Platform

3.2 Parameters not monitored

Parameter	$NCV_{BL,I}$
Value applied	43,000
Unit	j/g
Meaning	Net calorific value (NCV) of fossil fuel in baseline scenario from applied methodology.
Source of data	The NCV of diesel specified in methodology that is originally derived from Thailand Greenhouse Gas Management Organization (TGO), Greenhouse Gas Reduction Calculation Document. The NCV is calculated with the conversion factor of biodiesel from Department of Energy Business.

Parameter	$EF_{CO2,Diesel}$
Value applied	0.0000741
Unit	gCO_2/j
Meaning	Emission factor of diesel consumed by baseline vehicle category i
Source of data	The emission factor of diesel B7 based on emission factor of diesel that is originally derived from the Intergovernmental Panel on Climate Change (IPCC), table 1.4 Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories National GHG Inventories.

3.3 Monitored Parameters

Parameter	$EC_{PJ,I,y}$
Unit	kWh

Meaning	Electricity consumed by the Project Vehicle of type i in year y (kWh)
Source of data	Direct measurement, via an installed digital device, i.e. telemetric box, in each vehicle
Description of measurement methods and procedures to be applied	To measure the electricity consumption of each vehicle, the data is tracked from the travelled distance in kWh/km. As per data/parameter table 2 in T-VER-P-METH-04-03 version 01, the data under the Mitigation Activity uses the telemetric box to monitor the electricity consumption. This is outlined in **Section 3.1**
Frequency of monitoring/recording	Measured continuously

Parameter	$SEC_{PJ,km,i,y}$
Unit	kWh/km
Meaning	Specific electricity consumption by Project Vehicle category i per km in year y in urban conditions (kWh/km)
Source of data	Direct measurement
Description of measurement methods and procedures to be applied	The data used to determine each vehicle's specific fuel consumption is based on electricity consumption per distance travelled, tracked by the telemetric box

Frequency of monitoring/recording	Measured continuously

Parameter	$EF_{Elec,y}$
Unit	$kgCO_2/kWh$
Meaning	Emission factor for electricity generation/consumption in year y
Source of data	Thailand Greenhouse Gas Management Organization (TGO) Source: https://ghgreduction.tgo.or.th/th/download-tver/120-tver-gwp-emission-factor/3377-emission-factor-30-2565.html
Description of measurement methods and procedures to be applied	As per data/parameter table 3 in T-VER-P-METH-04-01 version 01, the emission factor of electricity grid is derived from the latest TGO' s emission factor value. *TGO is Thailand's official organisation directly responsible for driving Thailand to low carbon economy through promotion of low carbon projects. TGO publishes Thailand grid emission factor periodically for GHGs accounting purposes. The value of 0.4371 $kgCO_2/kWh$ will apply and be monitored annually.* In the case of electricity consumption from a RE source, the PE is equal to zero. This infers that the emission factor from RE is equal to zero (Annex 3: Monitoring Approach).
Frequency of monitoring/recording	Annually or use the latest data regularly that is updated by TGO

Parameter	TDL_y
Unit	Percentage (%)
Meaning	Average technical transmission and distribution losses for providing electricity in the year y
Source of data	Electricity Generating Authority of Thailand (EGAT) https://www.egat.co.th/home/en/wp-content/uploads/2022/07/EGAT_SR2021_EN-20220718.pdf
Description of measurement methods and procedures to be applied	As per data/parameter table 9 in T-VER-P-METH-04-03 version 01, option 1 (use measurement report in the case of information on the amount of electricity released from the producer and the amount of electricity received by the consumer) is applied. In the grouped project context implemented in Thailand, EGAT provides the value annually.
Frequency of monitoring/recording	Annually update by Electricity Generating Authority of Thailand (EGAT)

Parameter	$N_{i,y}$
Unit	-
Meaning	Number of Project Vehicles in operation in year y
Source of data	The registered number of participating vehicles in the programme recorded by project proponent

Description of measurement methods and procedures to be applied	Annual sales records or official data on registered project vehicles cross-checked against the results from a representative sample survey vehicles to determine the percentage of vehicles in use
Frequency of monitoring/recording	-

Parameter	$DD_{i,y}$
Unit	km
Meaning	Annual average distance driven by Project Vehicle i in year y (km/yr)
Source of data	Monitored data of participating vehicles in the programme recorded by project proponent
Description of measurement methods and procedures to be applied	Measure the annual average distance driven by the Project Vehicles through monitoring of all vehicles
Frequency of monitoring/recording	-

Appendix

Supporting documents/evidence

Revision record			
Version	**Revision number**	**Effective date**	**List of revision**
02	1	15 November 2024	- Revised the logo. - Added additional sections to Part 1, including the PoA project location, the PoA project management structure, and the PoA programme period. - Revised and expanded Part 2 to include the section on the calculation of greenhouse gas emission reductions for the Component Project Activities (CPA). - Added additional sections to Part 3, including the parameters not subject to monitoring and the parameters subject to monitoring.
01	-	10 January 2023 – 14 May 2025	-

[1] https://www.dlt-inspection.info/dlt/index.php?ref=inspection-work-truck&ref2=truck

[2] https://web.dlt.go.th/statistics/plugins/UploadiFive/uploads/53126fb05a3183e4a1cc110d8e79cfad7802cb8409dff48c74cfec728c8c9535.xls