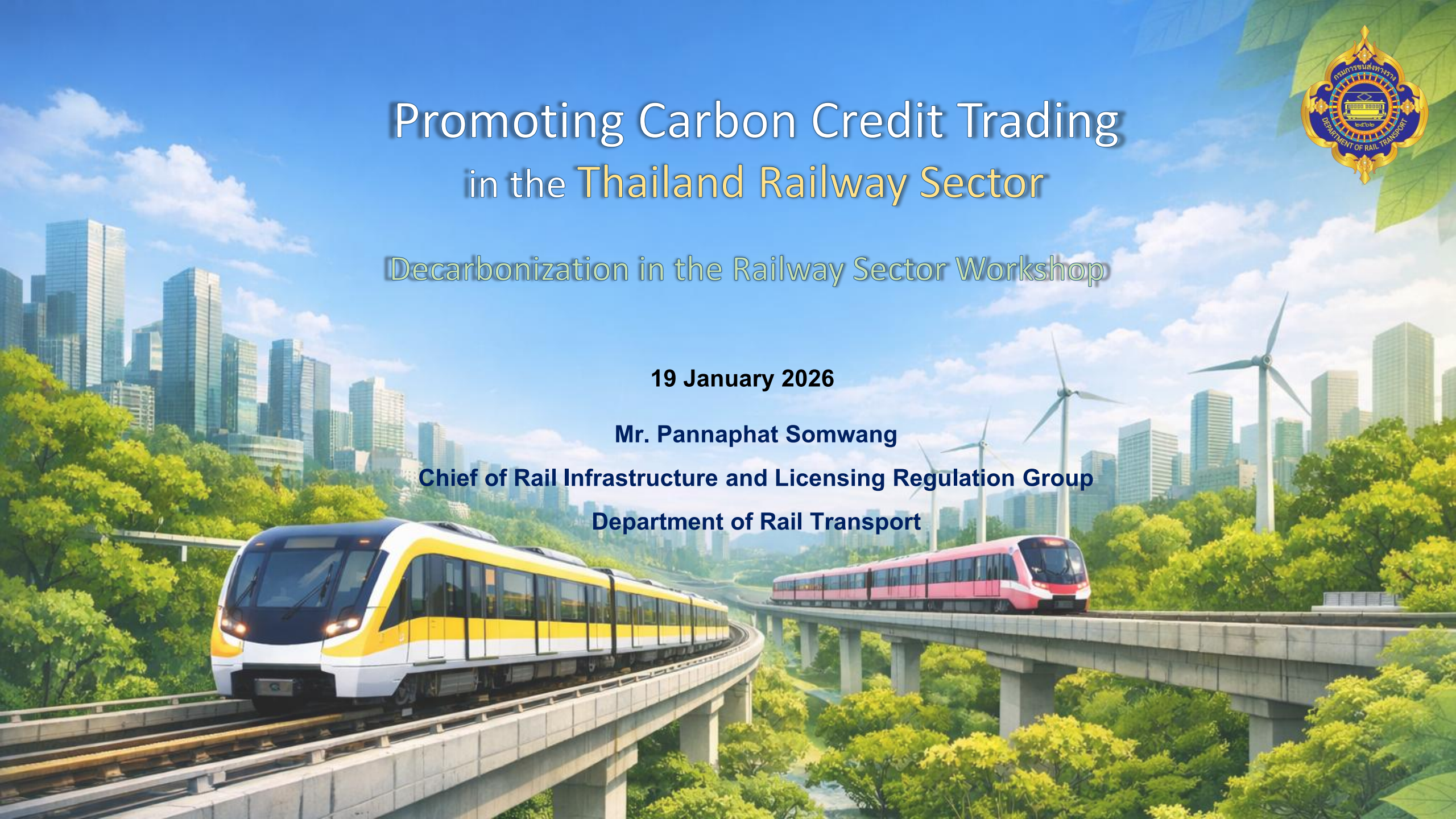

Promoting Carbon Credit Trading in the Thailand Railway Sector

Decarbonization in the Railway Sector Workshop

19 January 2026

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Department of Rail Transport

Thailand Carbon Market Context

1 National Framework

Thailand uses the **Thailand Voluntary Emission Reduction Program (T-VER)** as the primary voluntary mechanism for domestic GHG mitigation.

2 T-VER & Premium T-VER Mechanisms

T-VER Standard

Focuses on domestic emission reductions with a **7-year** crediting period for railway projects.

Premium T-VER

A higher-tier standard designed for international market alignment, requiring more rigorous validation and verification (V&V) processes.

3 Where Railway Fits in the Voluntary Market

Modal Shift: Rail projects generate verified carbon credits by shifting passengers and freight from higher-emission road transport to lower-emission rail systems.

Standards and T-VER Project Framework for the Railway Sector

1 Calculation Standards and National Accreditation

GHG emissions are calculated in accordance with methodologies and guidelines approved by the **Thailand Greenhouse Gas Management Organization (TGO).**

Electric Rail (Mass Transit): Follows the T-VER-S-METH-03-01 (Modal Shift Methodology)

2 T-VER Project Participation Conditions

- **Eligible Projects:** Rail-based mass transit system or railway infrastructure located within Thailand (Bangkok, vicinity, or provincial areas).
- **Project Scope:** Focuses on new developments or significant system expansions that demonstrate measurable emission reductions compared to the baseline.
- **Operational Timeline:** The project must have commenced operation no more than three years prior to the date of Project Design Document (PDD) validation.
- **Additionality:** The project must demonstrate additionality, meaning it represents a voluntary action beyond existing legal or regulatory requirements.

Carbon Credit Ownership & Governance

1 Infrastructure & Project Owner (MRTA)

As the owner of the railway infrastructure, the Mass Rapid Transit Authority of Thailand (MRTA) is designated as the **Project Owner** for the purposes of **T-VER project registration.**

2 System Operators & Project Developers

Private railway operators—Northern Bangkok Monorail Co., Ltd. (NBM) and Eastern Bangkok Monorail Co., Ltd. (EBM)—act as Project Developers, responsible for project implementation and monitoring under T-VER.

3 Authorization Mechanism for Credit Rights

- **Entitlement Framework:** Ownership of carbon credits is determined in accordance with the provisions of the joint investment agreements.
- **Assignment of Rights:** The MRTA authorizes and assigns carbon credit rights to the project developers through a formal written authorization.
- **Legal Approval:** This written authorization serves two primary functions:
  (i) approving the implementation of the project under the T-VER scheme; and
  (ii) explicitly granting the rights to the resulting carbon credits to the project operators (NBM / EBM).

T-VER-S-METH-03-01: Modal Shift in Passenger Transportation by Rail - based Mass Rapid Transit

$$ERy = BEy - PEy - LEy$$

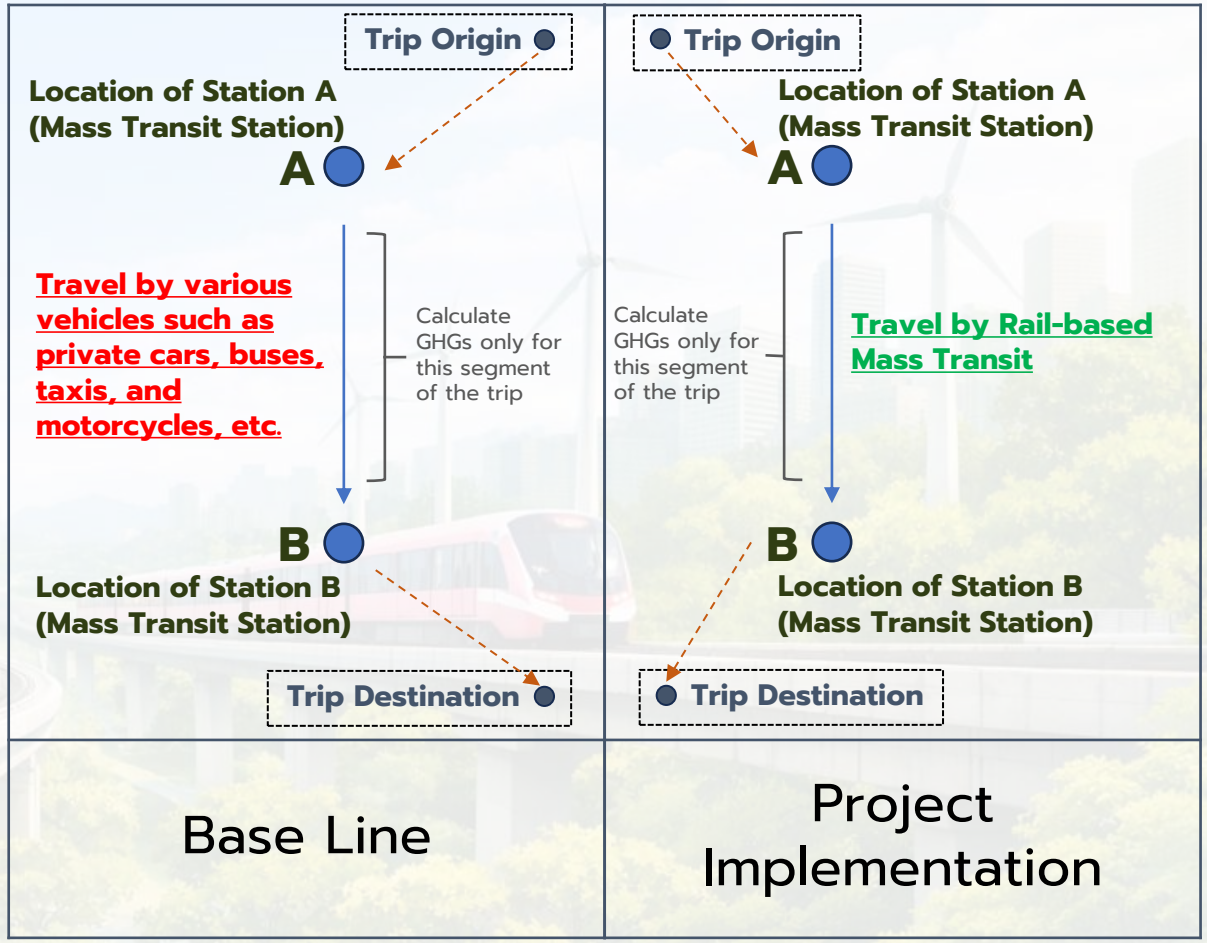
Where ;

ERy = **Greenhouse Gas Emission Reduction in Year y (tCO_2eq/year)**

BEy = **Baseline Greenhouse Gas Emissions in Year y (tCO_2eq/year)**

PEy = **Greenhouse Gas Emissions from Project Implementation in Year y (tCO_2eq/year)**

LEy = **Greenhouse Gas Emissions from Leakage in Year y (tCO_2eq/year)**



Case Studies – Real Railway Projects

1. Pink line Project

Project Owner :

Mass Rapid Transit Authority of Thailand (MRTA)

Concessionaire (Operator) :

Northern Bangkok Monorail Co., Ltd. (NBM)

2. Yellow line Project

Project Owner :

Mass Rapid Transit Authority of Thailand (MRTA)

Concessionaire (Operator) :

Eastern Bangkok Monorail Co., Ltd. (EBM)

On-site Questionnaire Survey

Yellow line Project	
Average Daily Passengers	42,577 trips/day
Required Sampling Rate	5.0% (as per T-VER guidelines)
Minimum Required Samples	2,129
Actual Collected Samples	2,154
Survey Dates	29 May – 1 June 2025

Pink line Project	
Average Daily Passengers	55,625 trips/day
Required Sampling Rate	5.0% (as per T-VER guidelines)
Minimum Required Samples	2,782
Actual Collected Samples	2,816
Survey Dates	5 – 8 June 2025

Yellow Line Project Baseline Scenario

GHG Emissions Without the Project

Baseline Scenario: Estimated GHG emissions from passengers' alternative modes of transport, assuming the Yellow Line was not available.

Travel Mode Share

The survey identified the primary transport modes replaced by the Yellow Line


Public Bus: 32.23% (Highest shift)


Taxi: 23.36%


Private Car: 19.92%


Song w (Shared Pickup): 9.45%


Moto le Taxi: 8.53%


Priva otorcycle: 6.50%

Baseline Emission Factor ($CT_{BL,y}$): 73.97 gCO_2 per passenger-kilometer (pkm)

Annual Number of Passengers: 90,721,884 (Source: Data from the Feasibility Study)

Annual Passenger Activity ($PKM_{PJ,y}$): 675,878,035.80 pkm/year

Total Baseline Emissions (BE_y): 49,993.03 tCO_{2eq}/year

Yellow Line Project Scenario & ER Results

Project Scenario: Emissions from Project Implementation GHG emissions arising directly from electric railway operations, mainly from electricity consumption.

Annual Electricity Consumption ($EC_{PJ,y}$): 30,967,316.47 kWh/year

Grid Emission Factor ($EF_{EC,PJ,y}$): 0.468 tCO_2/MWh

Total Project Emissions (PE_y): 14,498.90 tCO_2/year

Net GHG Emission Reductions (ER_y):

Emission reductions are calculated by subtracting Project Emissions (PE_y) from Baseline Emissions (BE_y).

Net GHG Reductions (ER_y): 35,494.14 tCO_{2eq}/year

Crediting Period: 7 Years

Cumulative GHG Reductions: 248,458 tCO_{2eq}

Pink Line Project Baseline Scenario

GHG Emissions Without the Project

Baseline Scenario: Estimated GHG emissions from passengers' alternative modes of transport, assuming the Pink Line was not available.

Travel Mode Share

The survey identified the primary transport modes replaced by the Pink Line


Public Bus: 52.72% (Highest shift)


Private Car: 20.39%


Taxi: 16.59%


Motorcycle Taxi: 4.01%


Private Motorcycle: 3.51%


Songthaew (Shared Pickup): 2.76%

Baseline Emission Factor ($CT_{BL,y}$): 61.57 gCO_2 per passenger-kilometer (pkm)

Annual Number of Passengers: 96,723,552 (Source: Data from the Feasibility Study)

Annual Passenger Activity ($PKM_{PJ,y}$): 727,361,111 pkm/year

Total Baseline Emissions (BE_y): 44,782 tCO_{2eq}/year

Pink Line Project Project Scenario & ER Results

Project Scenario: Emissions from Project Implementation GHG emissions arising directly from electric railway operations, mainly from electricity consumption.

Annual Electricity Consumption ($EC_{PJ,y}$): 48,317,171.59 kWh/year

Grid Emission Factor ($EF_{EC,PJ,y}$): 0.468 tCO_2/MWh

Total Project Emissions (PE_y): 22,622 tCO_2/year

Net GHG Emission Reductions (ER_y):

Emission reductions are calculated by subtracting Project Emissions (PE_y) from Baseline Emissions (BE_y).

Net GHG Reductions (ER_y): 22,160 tCO_{2eq}/year

Crediting Period: 7 Years

Cumulative GHG Reductions: 155,120 tCO_{2eq}

DRT Digital Toolkit: Rail GHG & Air Pollutant Calculator

Multi-Platform Access & Connectivity

1. Web-Based Interface
2. Mobile Optimization

Targeted Stakeholder Groups

Rail Passengers: Urban and intercity travelers seeking to track their personal carbon footprint.

Freight Transport Operators: Businesses assessing the environmental benefits of shifting freight from road to rail.

Project Planners: Organizations engaged in the strategic planning and development of new rail infrastructure.

Urban & Intercity Rail Passengers

Front End

Calculation Method Options ;

- **Urban rail and Rail passengers**
- **Rail freight transport operators**
- **Organizations involved in the planning and development of rail projects**

Click to Pick
Intercity rail passengers
or
Urban rail passengers

Route and travel mode

เดินทางด้วยรถไฟ / รถไฟฟ้า

Origin Line (Starting line)

Origin station

ต้นทาง เลือกสาย สถานี สถานี

ปลายทาง เลือกสาย สถานี สถานี

destination station

กรุณาเลือกสถานีต้นทางและปลายทาง

Destination Line (Ending line)

เปรียบเทียบกับการเดินทางรูปแบบ ประเภทรถ

Compared with which mode of travel? (Car, motorcycle, public bus)

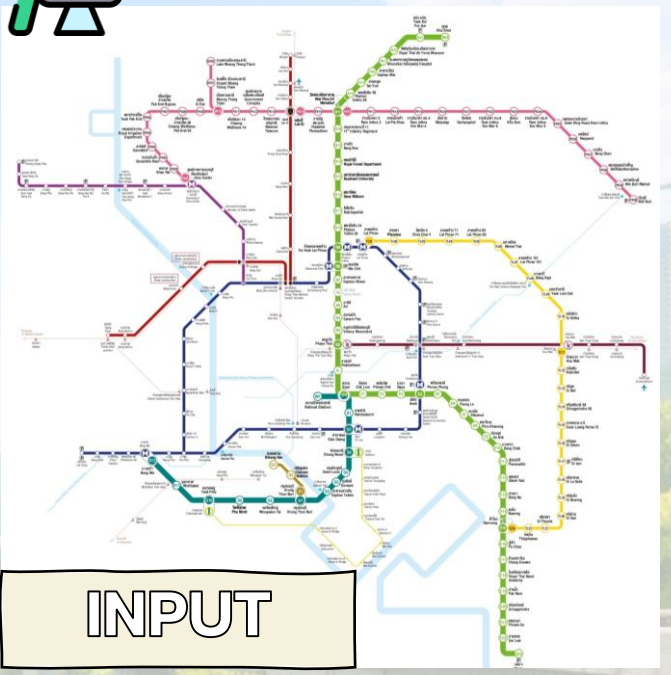
หมายเหตุ: *กำหนดให้เชื้อเพลิงที่ใช้เป็นดีเซล

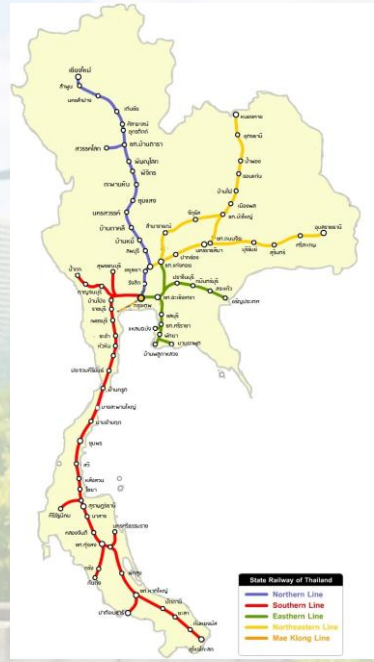
Reduced greenhouse gas emissions and air pollution

	CO_2	$PM_{2.5}$	NO_x	CO
กรณีขนส่งทางถนน	0	0	0	0
กรณีขนส่งทางราง	0	0	0	0
ปริมาณก๊าซเรือนกระจกและมลภาวะทางอากาศที่ลดลงเมื่อขนส่งสินค้าทางราง	0	0	0	0

หมายเหตุ: หน่วย CO_2 คือ g หน่วย PM_{25} NO_x CO คือ mg

1. Urban rail and Rail passengers





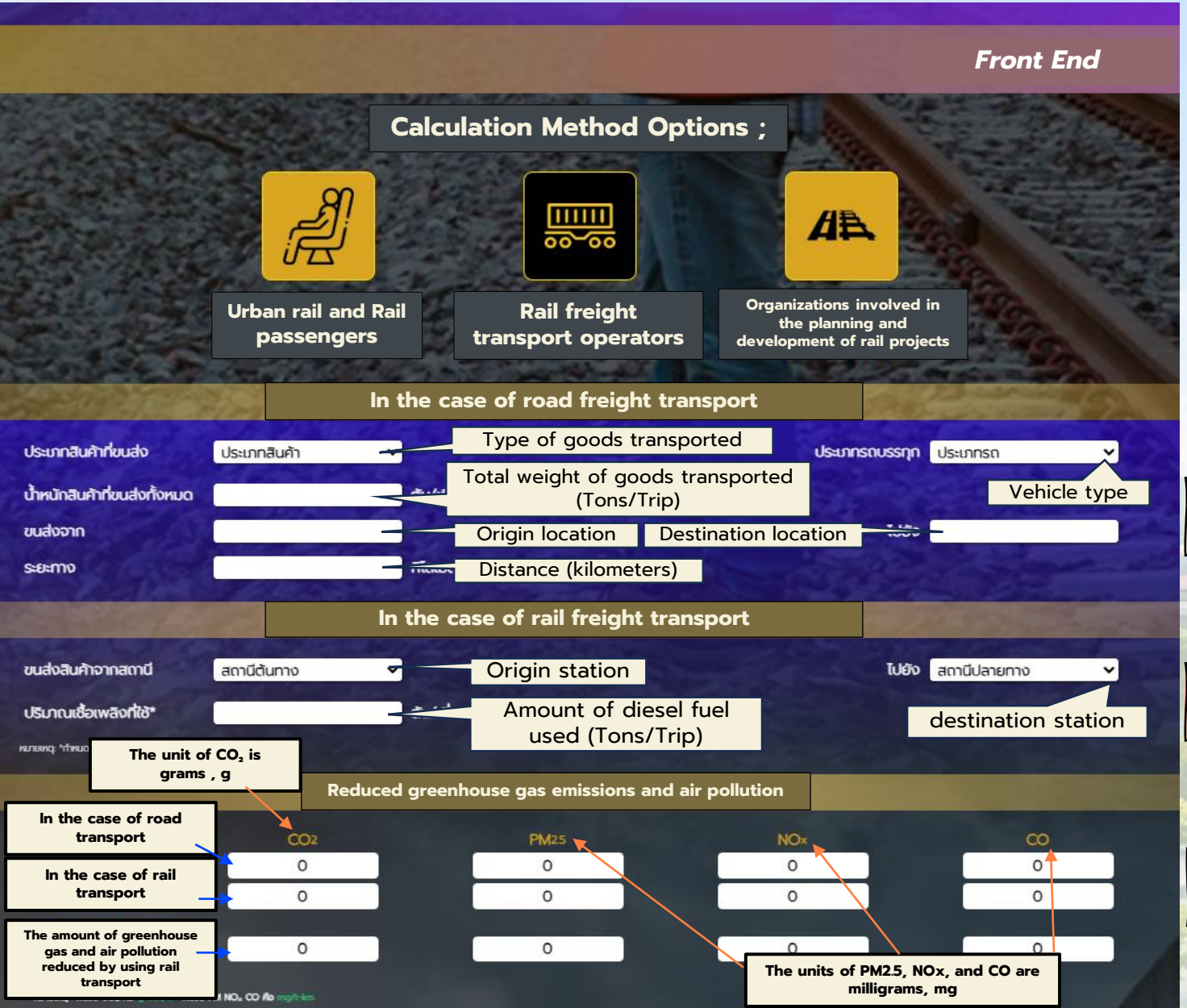
INPUT

OUTPUT

Source :

- Greenhouse gas (GHG) emissions are calculated using emission factors EIA ,Thailand Greenhouse Gas Management Organization (TGO)
- Air pollutants are calculated using the relevant emission factors EMEP/EEA EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019

Rail freight transport operators



2. Rail freight transport operators

INPUT for Road

INPUT for Rail

OUTPUT

Source :

- GHG is calculated in accordance with the relevant CDM regulations : AM0090 Clean Development Mechanism
- Air pollutants are calculated using emission factors in accordance with EMEP/EEA EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019

Organizations involved in the planning and development of rail projects

Front End

Calculation Method Options ;

- Urban rail and Rail passengers
- Rail freight transport operators
- Organizations involved in the planning and development of rail projects

Route and travel mode

ปริมาณผู้โดยสารที่ใช้บริการรถไฟฟ้าขนส่งมวลชนต่อปี

Annual number of passengers using the mass transit system (people/year)

สัดส่วนการเดินทางรูปแบบ

Mode share of : (%)

Motorcycle	0-100
Private car	0-100
Taxi	0-100
Motorized three-wheeler (tuk-tuk)	0-100
Songthaew (shared pickup taxi)	0-100
Van	0-100
Public bus	0-100

Average travel distance per passenger (kilometers, km)

ปริมาณการใช้ไฟฟ้าของรถไฟฟ้าต่อปี

Annual electricity consumption of the electric train system (Megawatt - hour, MWh/year)

ระยะทางเฉลี่ยที่ผู้โดยสารเดินทาง — km

Reduced greenhouse gas emissions

Baseline Emission	Baseline Emission (Tons of CO_2 equivalent, t CO_2e)	0	t CO_2e
Project Emission	Project Emission (Tons of CO_2 equivalent, t CO_2e)	0	t CO_2e
ปริมาณก๊าซเรือนกระจกที่ลดลง	Amount of greenhouse gas emissions reduced (Tons of CO_2 equivalent, t CO_2e)	0	t CO_2e

3. Organizations involved in the planning and development of rail projects

INPUT

OUTPUT

Source :
T-VER-S-METH-03-01 Methodology, Thailand Greenhouse Gas Management Organization (TGO)

Recommendations for Carbon Credit Implementation in Thailand's Railway Sector

Inclusion in Terms of Reference (TOR): Carbon credit requirements should be formally incorporated into bidding documents and concession renewal conditions.

Mandatory Operator Compliance: Concessionaires shall be contractually required to establish data collection plans and undertake T-VER project registration, where applicable.

Addressing Early-Stage Efficiency: During initial operations, lower ridership levels may result in CO_2 reductions that do not yet offset electricity consumption. Extending the crediting start date would allow for a more representative assessment of the project's environmental impact.

Annual Mode Share Surveys: Support operators in conducting annual passenger behavior surveys to maintain a precise and up-to-date Baseline Scenario.

Driving Modal Shift & Passenger Volume: Increasing rail ridership through modal shift is essential to enhancing both project viability and carbon credit outcomes.

Expanding Methodological Coverage: Expanding T-VER methodologies to comprehensively cover passenger and freight rail will strengthen modal shift incentives and market credibility.

Thank You