Department of Rail Transport

Decarbonization Strategies in the Railway Sector

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2nd DRT – AIRO Railway Workshop

19th January 2026 at 14.05 – 14.20 hrs.

Department of Rail Transport

Thailand's Nationally Determined Contribution Roadmap on Mitigation (2021–2030)

COP26 OUTCOMES (2021)

COP26

Thailand pledges to reduce GHG emissions
40% from the Business-as-Usual (BAU) by **2030**

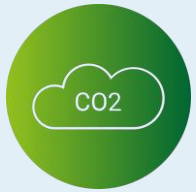
2030

Reduce GHG emissions
by **30–40%** from the 2005 level

2050

Carbon Neutrality

2065



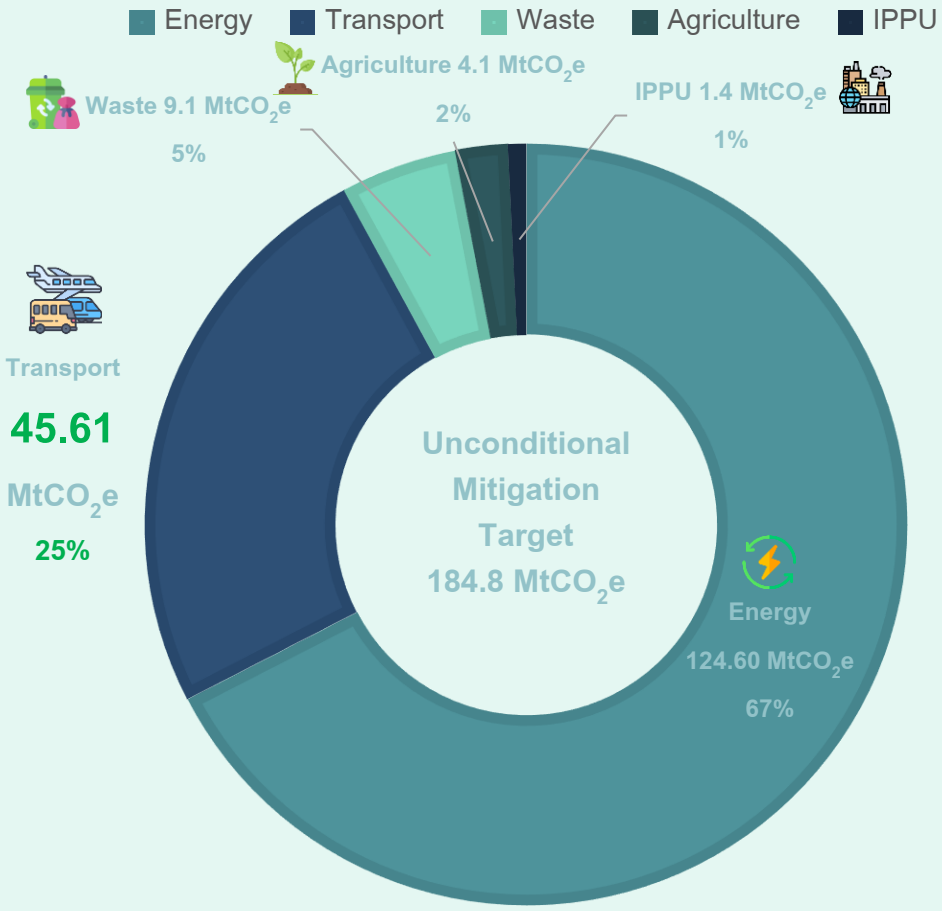
Net Zero Greenhouse Gas Emissions

TRANSPORT SECTOR TARGET

Target GHG emission reduction by **2030**:
45.61 Mt CO_2e

Source: NDC Action Plan on Mitigation 2021 – 2030, Department of Climate Change and Environment

Thailand's Nationally Determined Contribution Roadmap on Mitigation (2021–2030)



NDC in transport : COP 26

- Electrification of Transport 28.29 $MtCO_2e$
- Energy Efficiency Improvement 13.91 $MtCO_2e$
- Urban Mobility 1.78 $MtCO_2e$
  - Expand the rail transport network
- Inter-urban Transport and Green Logistics 1.60 $MtCO_2e$
  - Promoting the use of the "Green Rail Mark" certification

Source: NDC Action Plan on Mitigation 2021 – 2030, Department of Climate Change and Environment

Existing > Future

Railway Network

4,044 km.	Total	4,722 km.
2,868 km. (70.92%)	Single track	1,215 km. (25.73%)
1,069 km. (26.43%)	Double track	3,400 km. (72%)
107 km. (2.65%)	Triple track	107 km. (2.27%)

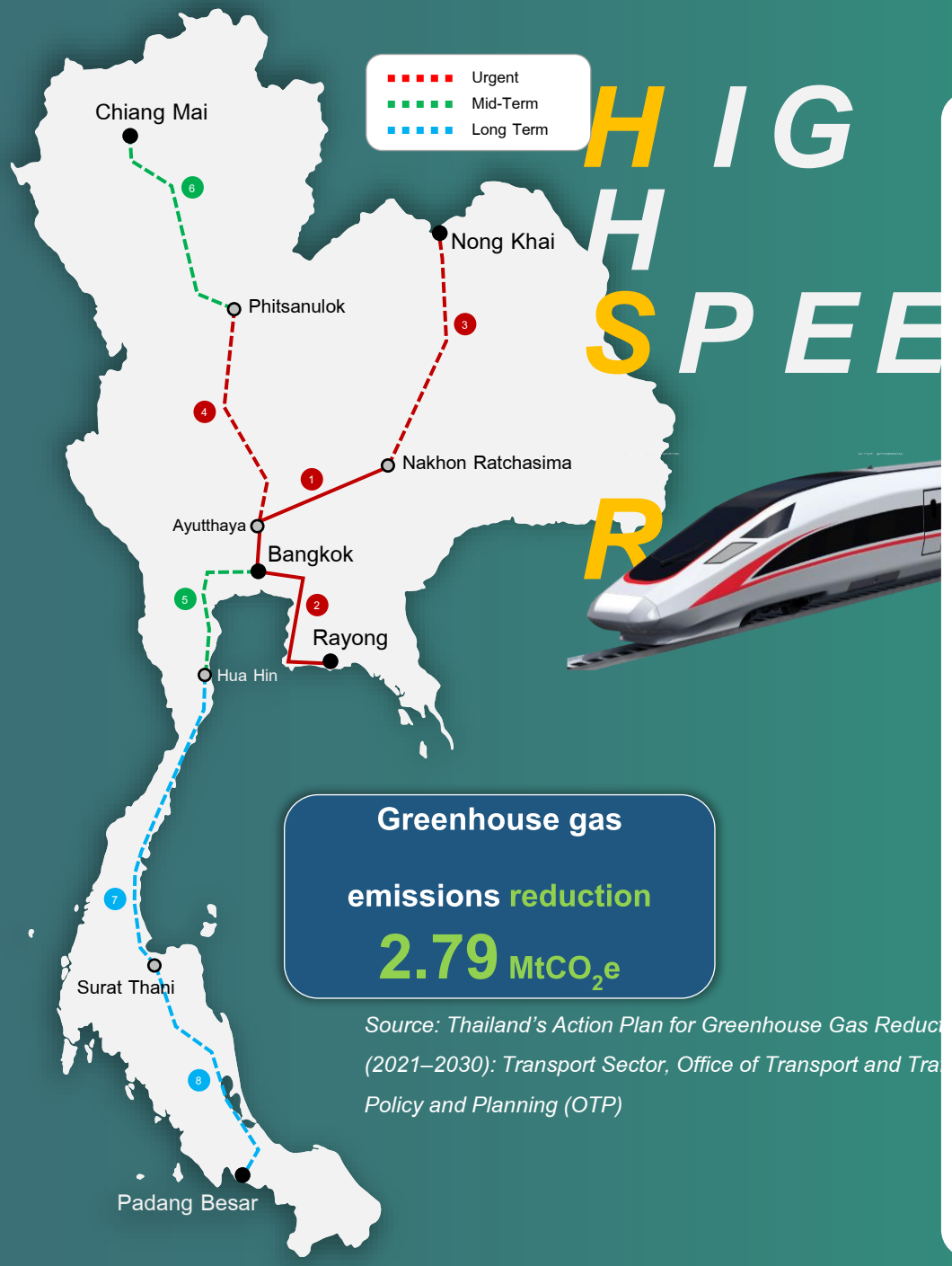
Greenhouse gas emissions

reduction

1.56 $MtCO_2e$

Source: Thailand's Action Plan for Greenhouse Gas Reduction (2021–2030): Transport Sector, Office of Transport and Traffic Policy and Planning (OTP)

HIGH SPEED RAIL



Greenhouse gas emissions reduction

2.79 $MtCO_2e$

Source: Thailand's Action Plan for Greenhouse Gas Reduct (2021–2030): Transport Sector, Office of Transport and Tra Policy and Planning (OTP)

4 Routes 8 Projects

UNDER CONSTRUCTION

2 PROJECTS 473 KM.

1. Bangkok - Nakhon Ratchasima (253 km.)
   - Open 2029
2. HSR Connecting 3 airports (Donmuang - Suvarnabhumi – Utapao) (220 km.)
   - Open 2030

UNDER PREPARATION

6 PROJECTS 1,994 KM.

Urgent

3. Nakhon Ratchasima – Nong Khai (356 km.)
   - Construction is expected to start in 2026 and Open in 2030
4. Bangkok – Phitsanulok (380 km.)
   - Detailed Design Completed and EIA approved
   - Open in 2032

Mid-Term

5. Bangkok – Hua Hin (211 km.)
   - Feasibility Study Under Revision
6. Phitsanulok – Chiang Mai (288 km.)
   - EIA approved

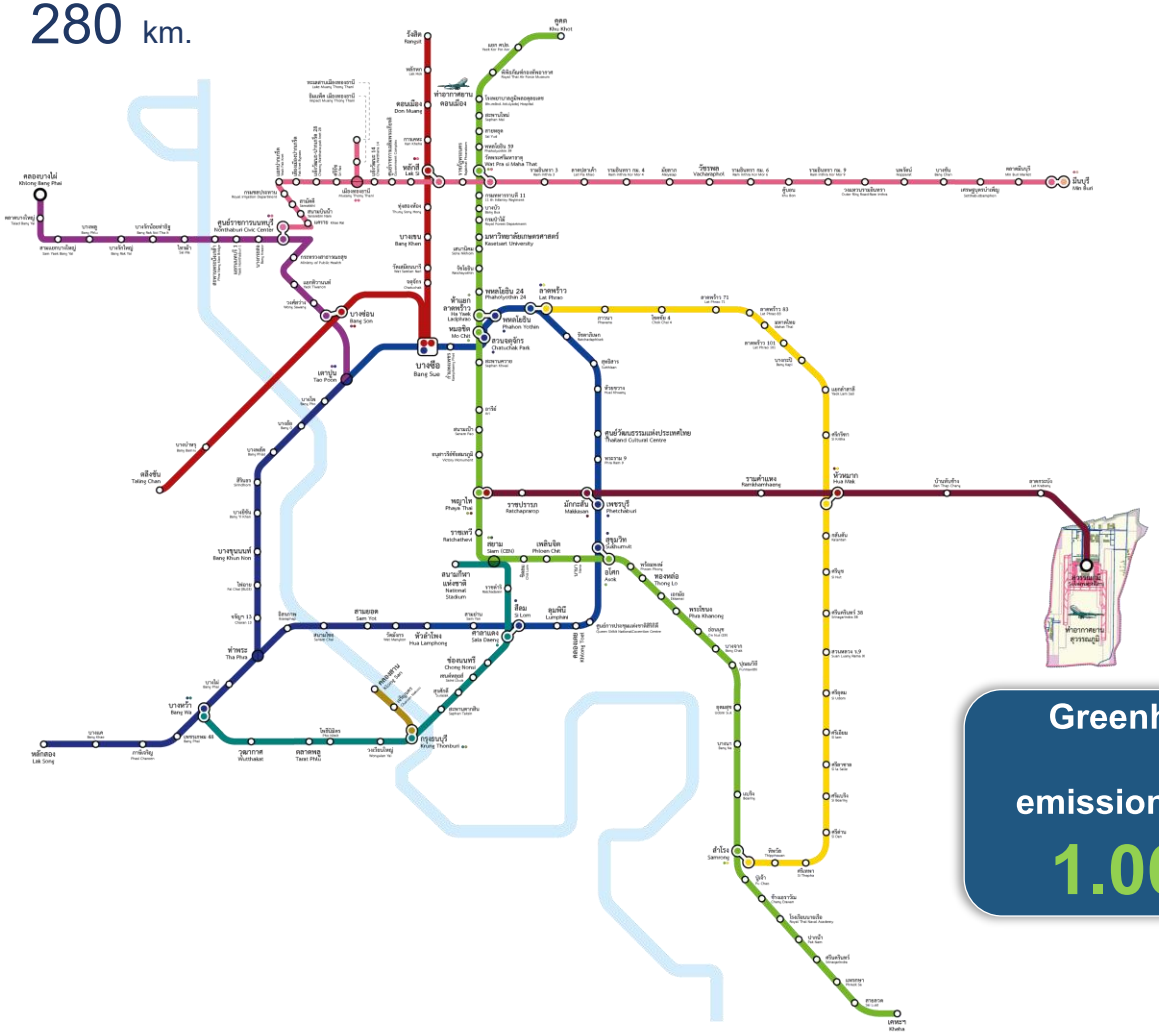
Long Term

7. Hua Hin – Surat Thani (424 km.)
   - Request the FY2027 budget for reviewing the feasibility study results.
8. Surat Thani – Padang Besar (335 km.)
   - Pre-Feasibility Study Completed
   - Request the FY2031 budget for the feasibility study.

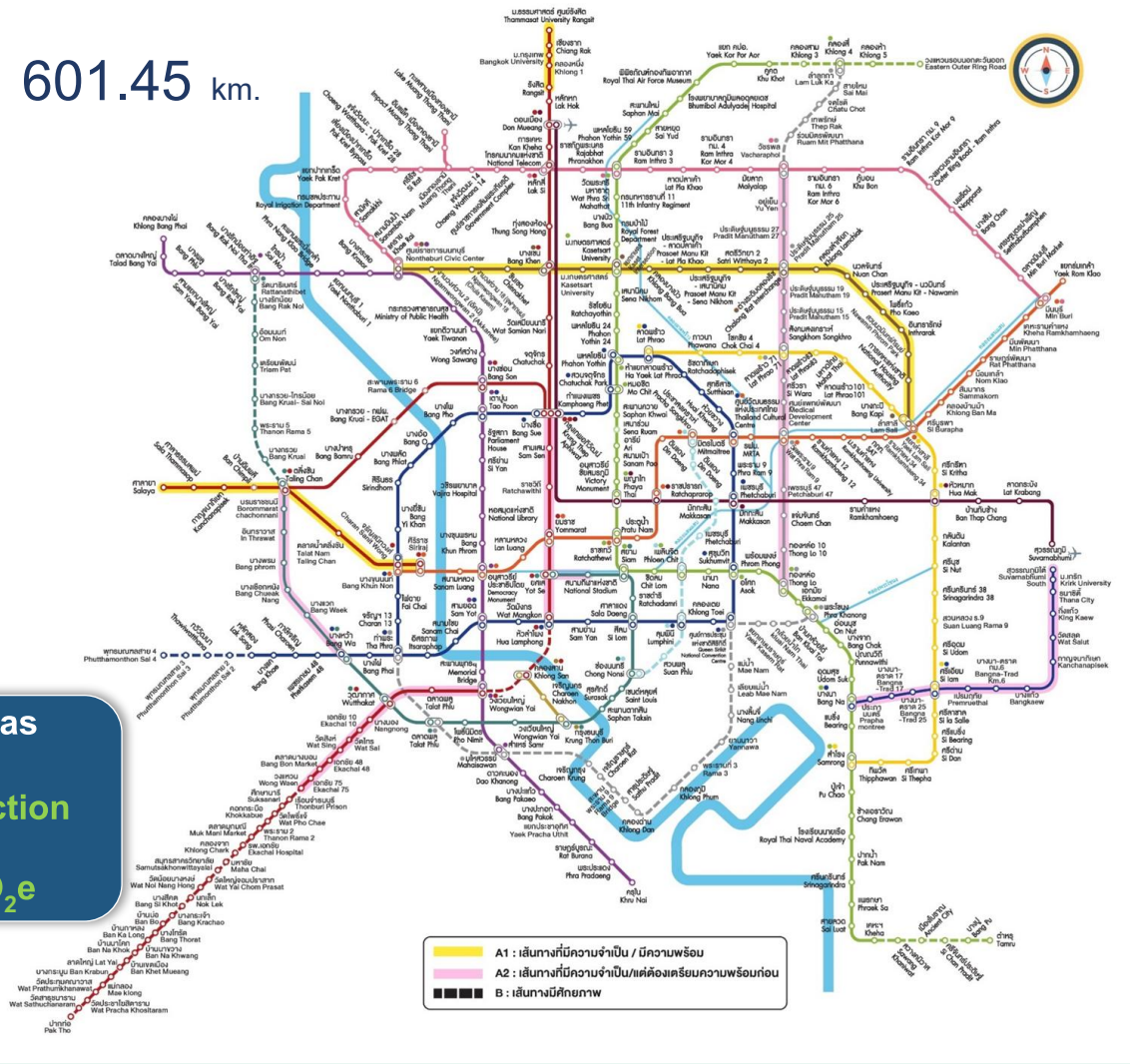
Existing > Future

Urban Railway Network

280 km.



601.45 km.



Greenhouse gas emissions reduction

1.06 $MtCO_2e$

Source: Thailand's Action Plan for Greenhouse Gas Reduction (2021–2030): Transport Sector, Office of Transport and Traffic Policy and Planning (OTP)

Action Plan for Reducing GHG Emissions and Air Pollution in the Rail Transport Sector

Summary of Action Plan **(2023–2037)**

Thailand reaffirms its commitment to the Paris Agreement and aims to achieve Carbon Neutrality by 2065.Under **the National Strategy (2023–2037),** the plan emphasizes the development of logistics infrastructure, with a target to **increase the share of rail freight transport to at least 7%** during 2023–2027

Objective

To reduce greenhouse gas emissions in the rail transport sector

KPI

Reduction in greenhouse gas emissions from the rail transport sector

Measures

- Support the rail transport sector in contributing to the **Net Zero Greenhouse Gas Emissions by 2065**
- **Establish an implementation framework** for reducing greenhouse gas emissions in the rail transport sector, including indicators for monitoring and evaluation
- Propose appropriate mitigation measures for relevant agencies in the rail transport sector to effectively reduce greenhouse gas emissions

Long-Term Vision

Adopt policies and incentives to create a sustainable, low-emission, and modern rail transport system.

Measures to Reduce GHG Emissions and Air Pollution in the Transport Sector

Proposed Measures

Rolling stock

1. Switching from diesel fuel to bio-diesel (**HVO – Hydrotreated Vegetable Oil**) — IN PROGRESS
2. Establishing **standards to control greenhouse gas emissions** and air pollution in the rail transport sector — START 2026

Infrastructure for Rail Systems and Stations

1. Developing low-carbon rail infrastructure using materials and processes with lower emissions from production **(Hydraulic cement)** — IN PROGRESS
2. Replacing SF6-based switchgear with **SF6-free switchgear** in electric power substations — START 2026

Support and Maintenance

1. **Replacing air-conditioning refrigerants (R-22 to R407C)** in BTS and SRT's trains sets with more environmentally friendly alternatives — IN PROGRESS

Other Measures

1. Promoting the use of renewable energy, such as installing **solar rooftop systems** — IN PROGRESS
2. Encouraging travel by rail, for example through **fare incentives policy** — DONE
3. Promoting rail freight transport, such as through **carbon pricing** or **carbon tax measures*** 
4. Promoting the use of the **"Green Rail Mark"** certification — START 2026

*(Draft) Climate Change Act B.E. …. (Department of Climate Change and Environment)

Transition to HVO fuel

Fuel type	CO_2 emissions reduction (tCO_2e/year)
1. Diesel B7	168,435
2. Diesel B7 + HVO 10%	151,591
Greenhouse gas emissions reduction	16,844

Locomotives and Railcar Data (2025): 4,723 units

- Freight cars: 2,929 units
- Passenger cars: 1,285 units
- Locomotives: 266 units
- DMU: 243 units

Greenhouse gas emissions reduction

16,844 tCO_2e/year

In 2024, SRT consumed **82,931,630 liters** of diesel per year. If HVO is used at a blending **ratio of 10% for 75%** of total fuel consumption, CO_2 emissions would be reduced by approximately **16,844 tCO_2e**.

Source: Estimated by the consultant, based on fuel price data from PTT.

Note: The figures represent preliminary price trends only and cannot be used as a reference for actual purchase prices.

2 Rolling Stock

Emission Control Standards for Greenhouse Gases and Air Pollutants in Rail Transport

2026

Based on EU Stage III A

(Emission Standard Limits:

- Carbon Monoxide (CO): Not exceeding 3.5 g/kWh
- Hydrocarbons + Nitrogen Oxides ($HC + NO_x$): Not exceeding 4 g/kWh
- Particulate Matter (PM): Not exceeding 0.2 g/kWh)

2035

Based on EU Stage III B

(Emission Standard Limits:

- Carbon Monoxide (CO): Not exceeding 3.5 g/kWh
- Hydrocarbons (HC): Not exceeding 0.19 g/kWh
- Nitrogen Oxides (NO_x): Not exceeding 2.0 g/kWh
- Particulate Matter (PM): Not exceeding 0.025 g/kWh)

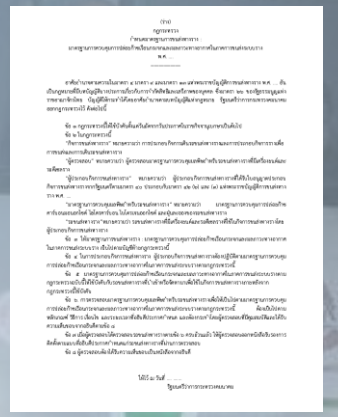
2045

Based on EU Stage V

(Emission Standard Limits:

- Carbon Monoxide (CO): Not exceeding 3.5 g/kWh
- Hydrocarbons (HC): Not exceeding 0.19 g/kWh
- Nitrogen Oxides (NO_x): Not exceeding 2.0 g/kWh
- Particulate Matter (PM): Not exceeding 0.015 g/kWh)

Rail Transport Act B.E. 2568 (2025)
Article 13 (3)



- Applicable to locomotives and diesel multiple units (DMUs)
- Required as a criterion for the registration of rail operators and rolling stock

Source: Regulation EU 2016/1628 of European Parliament and of the Council of 14 September 2016

1 Infrastructure for Rail Systems and Stations

Using Low-Carbon Cement for Rail Infrastructure Construction

Future Rail Transit Projects	Total Projects	Total Distances (KM)	Greenhouse Gas Emissions Reduction (tCO2e)
M - MAP 2	19	245	476,107
R - MAP	18	2,961	6,252,737
Total	**37**	**3,206**	**6,728,844**

Greenhouse gas emissions reduction

6,728,844 tCO_2e

Pilot project

for testing prototype cement-free low-carbon concrete

Example

MRT Purple Line

- In 2024, MRTA used 1,300,000 m3 (approx. 560,000 tons) of hydraulic cement
- Replacing conventional Portland cement in MRT Purple Line construction
- Expected to reduce CO2 emissions by approximately 29,000 tCO2e

2 Infrastructure for Rail Systems and Stations

Replacing SF6-based switchgear with SF6-free switchgear in electric power substations

Future Rail Transit Projects	Total Projects	SF6-free switchgear per project	Greenhouse Gas Emissions Reduction (tCO2e)
M - MAP 2	19	495	8,727
High-speed rail	4	840	14,810
Total	**23**	**1,335**	**23,537**

Greenhouse gas emissions reduction

23,537 tCO_2e

Schneider Electric SIEMENS ABB EATON HITACHI

1 Infrastructure for Rail Systems and Stations

Replacing air-conditioning refrigerants in trains with more environmentally friendly alternatives

105 Cars — Green Line (Sukhumvit)

R-22: 5,557 tCO2e/year	R-407C: 5,409 tCO2e/year

148 tCO2e

302 Cars — Long distance railway

R-22: 8,697 tCO2e/year	R-407C: 8,466 tCO2e/year

231 tCO2e

Greenhouse gas emissions reduction

379 tCO_2e

All rolling stock managed by MRTA SRTET and Asia Era One have transitioned from R-22 to R-407C.

1 Other Measures

Promoting the use of renewable energy, such as installing solar rooftop systems

Project	Total projects	Capacity (MW)	Baseline, (tCO2e/year)	After Project, (tCO2e/year)	Greenhouse Gas Emissions Reduction (tCO2e/year)
Installed project	4*	8.564	5,628.70	356.94	**5,271.77**
On process project	8**	15.772	11,019.47	698.81	**10,321.16**
Total	**12**	**24.34**	**16,648.67**	**1,055.75**	**15,592.93**

*MRT Blue line's depot, Green line, Purple line and Orange line (East Section)

**Krungthep Aphiwat station, Yellow line, Pink line, Chachoengsao Junction station, Kaeng Khoi Junction station, Phisanulok station, Salaya station and Thung Song Junction station

Solar Rooftop Installation

Greenhouse gas emissions reduction

15,592.93 tCO_2e/year

5 Other Measures

Promoting the use of the “Green Rail Mark” certification

Green Rail Mark

Company Mark

1. Must transport **at least 7%** of total annual freight volume via rail.
2. Annual rail transport distance must exceed **1,500 ton-kilometers**.
3. Demonstrate a continuous commitment to utilizing rail transport.
4. Submit annual reports on rail transport volumes.

Product Mark

1. The specific product must utilize rail transport for **at least 7%** of its total distribution volume (ton-kilometers).
2. Transport distance must exceed **500 ton-kilometers per year.**
3. Consistent monitoring and reporting of transport data are required.

当社は、環境にやさしい鉄道貨物輸送を推進している企業です。
エコレールマーク

Eco Rail Mark (Japan)

to promote the use of environmentally friendly rail transport systems

- **Company Mark**
  Must transport **at least 15%** of total annual freight volume via rail.
- **Product Mark**
  must utilize rail transport **at least 30%** of its total distribution volume (ton-kilometers).

Action Plan for Reducing GHG Emissions and Air Pollution in the Rail Transport Sector

Rolling stock

Greenhouse gas emissions reduction

16,844 tCO_2e/year

Infrastructure for Rail Systems and Stations

Greenhouse gas emissions reduction

6,752,381 tCO_2e

Support and Maintenance

Greenhouse gas emissions reduction

379 tCO_2e

Other Measures*

Greenhouse gas emissions reduction

15,593 tCO_2e/year

HVO Implementation Year

Greenhouse gas emissions reduction

16,844 tCO_2e/year

During 2023 - 2037

Greenhouse gas emissions

Cumulative reduction

6,785,197 tCO_2e

Post-Completion of Solar Rooftop Installation

Greenhouse gas emissions reduction

15,593 tCO_2e/year

Next

* 2 more highlight measures to support greenhouse gas emissions in Thailand's Railway Sector are Fare Incentives Policy and Carbon Credit

Thank you