

Key Low Carbon Transport
Financing Barriers and Challenges

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Outline :

Office of Transport and Traffic Policy and Planning

- Facing Transportation Problems in Thailand
- Driving a Policy to Low Carbon Transport
- Financing Barriers and Challenges



Outline :

Office of Transport and Traffic Policy and Planning

Facing Transportation Problems in Thailand

Driving a Policy to Low Carbon Transport

Financing Barriers and Challenges



Past

Present

Aim to Achieve the NDC Target

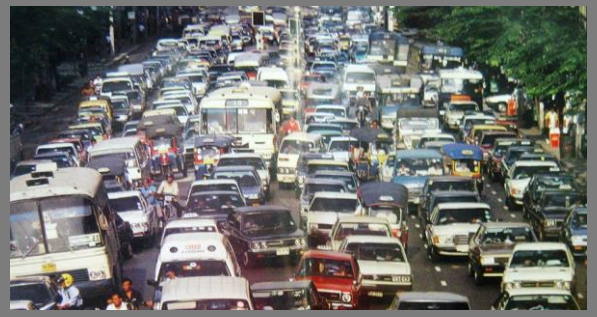
Future

Toward Sustainable Transport

Private

Public

Logistics



















Outline :

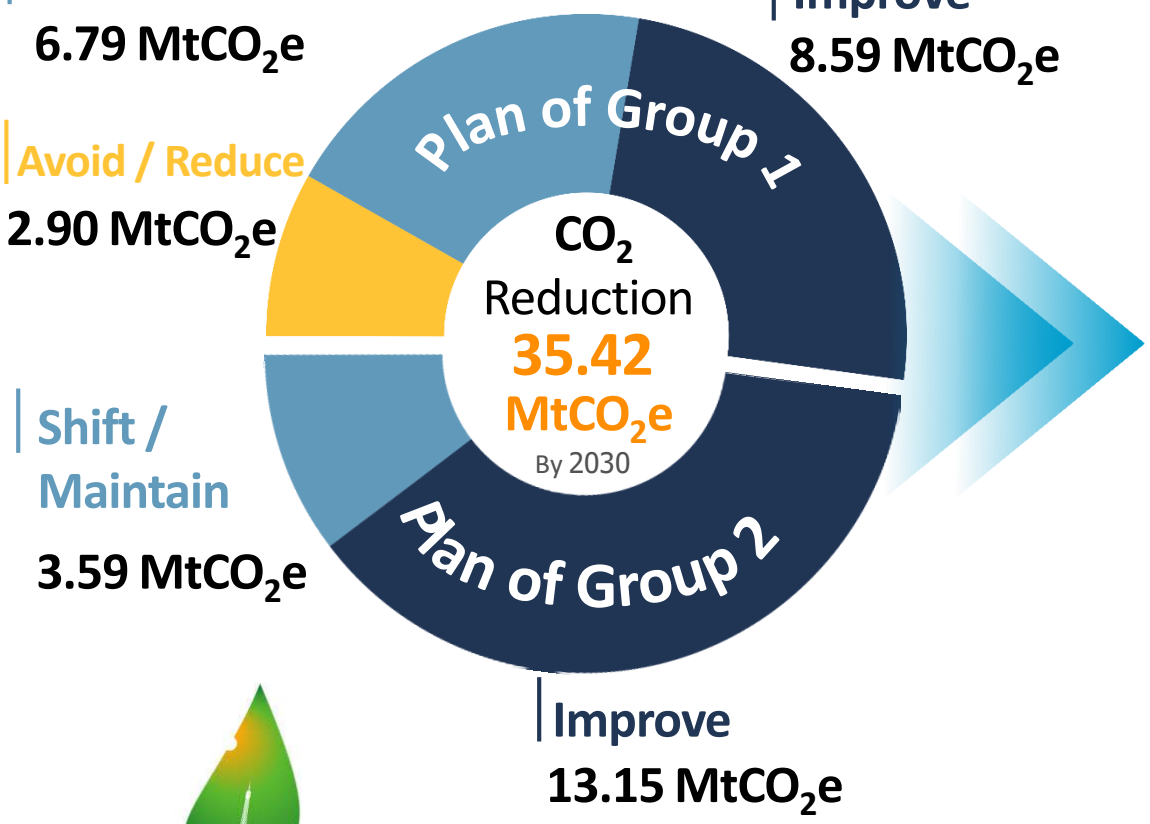
Facing Transportation Problems in Thailand

Driving a Policy to Low Carbon Transport

Financing Barriers and Challenges



NDC in Transport : COP 21



PARIS2015 UN CLIMATE CHANGE CONFERENCE COP21·CMP11

NDC #1 (2018)

NDC in Transport : COP 26

- Electrification of Transport — 28.29 $MtCO_2e$
- Energy Efficiency Improvement — 13.94 $MtCO_2e$
- Urban Mobility — 1.78 $MtCO_2e$
- Inter-urban Transport and Green Logistics — 1.60 $MtCO_2e$

Supportive Mitigation

- Future Energy for Transport
- Transport Infrastructure and Support

CO_2 Reduction **45.61 $MtCO_2e$** By 2030

COP 26 GLASGOW

NDC #2 (2023)

Mitigation Actions in the Transport Sector : NDC #2 (2023)

The mitigation measure that can assess greenhouse gas reduction.

Electrification of Transport

- Promotion of Electric Locomotives
- Promotion of Electric Vehicles (EVs)
- Promotion of Electric Boats
- Development of Supporting Infrastructure for Electric Vehicles

CO_2 Reduction
28.29 $MtCO_2e$

Energy Efficiency Improvement

- Tax System Improvement to Support the Use of Energy-Efficient Vehicles
- Setting Standards and Providing Information on Energy Efficiency and Greenhouse Gas Emissions of Vehicles

CO_2 Reduction
13.94 $MtCO_2e$

Urban Mobility

- Developing Public Transportation Infrastructure in Cities
- Promoting Shared Mobility and Multi-modal Transport
- Managing Urban Traffic Systems

CO_2 Reduction
1.78 $MtCO_2e$

Inter-urban Transport and Green Logistics

- Developing Rail Transportation Infrastructure
- Enhancing Efficiency of Water Transportation
- Promoting Logistics Management

CO_2 Reduction
1.60 $MtCO_2e$

Supportive Mitigation

Future Energy for Transport

- Promoting the Use of Hydrogen Fuel in Transportation
- Promoting Sustainable Aviation Fuel (SAF) in Aviation

Transport Infrastructure and Support

- Developing Environmentally Friendly Transport Infrastructure
- Developing Infrastructure to Improve Transportation Efficiency

The potential CO_2 reduction in the transport sector by 2030 is **45.61** $MtCO_2$

The Current Mitigation for Reduction CO2 in the Transport Sector

1 Electrification of Transport

E - Buses

Bangkok's E-Buses Program under Article 6.2

In Service : **2,017** E-buses → **3,100** E-buses by 2024





CO_2 reduction target : 500,000 tCO_2 (2021 – 2030)

Remark: This project does not include NDC.

Electrification of Intracity Buses

The BMTA is planning to replace ICE buses with EV buses.

- 1st Phase : 350 buses
- 2nd Phase : 1,520 buses
- 3rd Phase : 1,520 buses

Total : 3,390 buses





Source: The meeting resolution of the BMTA Board on March 13, 2024

Electrification of Intercity Buses and Green Terminals

The project currently under feasibility study aims to transition intercity buses to EV and develop green terminals.







Targeting the change to 381 EV buses in the first phase.

The Current Mitigation for Reduction CO2 in the Transport Sector

1 Electrification of Transport

E - Boat









Currently :

- There are 35 EV boats in service, accommodating 150 passengers each. They serve three routes : City Line, Metro Line, and Urban Line.

City Line : Phra Pinklao - Sathorn

Metro Line : Rama 7 - Sathorn

Urban Line : Phra Nang Klao - Sathorn



The Current Mitigation for Reduction CO2 in the Transport Sector

1 Electrification of Transport

EV on Locomotives









- Thailand has achieved success in developing EV for locomotives.
- First Phase, they will use EV locomotives for shunting at Krung Thep Aphiwat Central Terminal Station to reduce pollution in the second-floor station building from diesel-powered locomotives.
- The production target is 50 EV locomotives.
- It can travel 150-200 kilometers per charge.

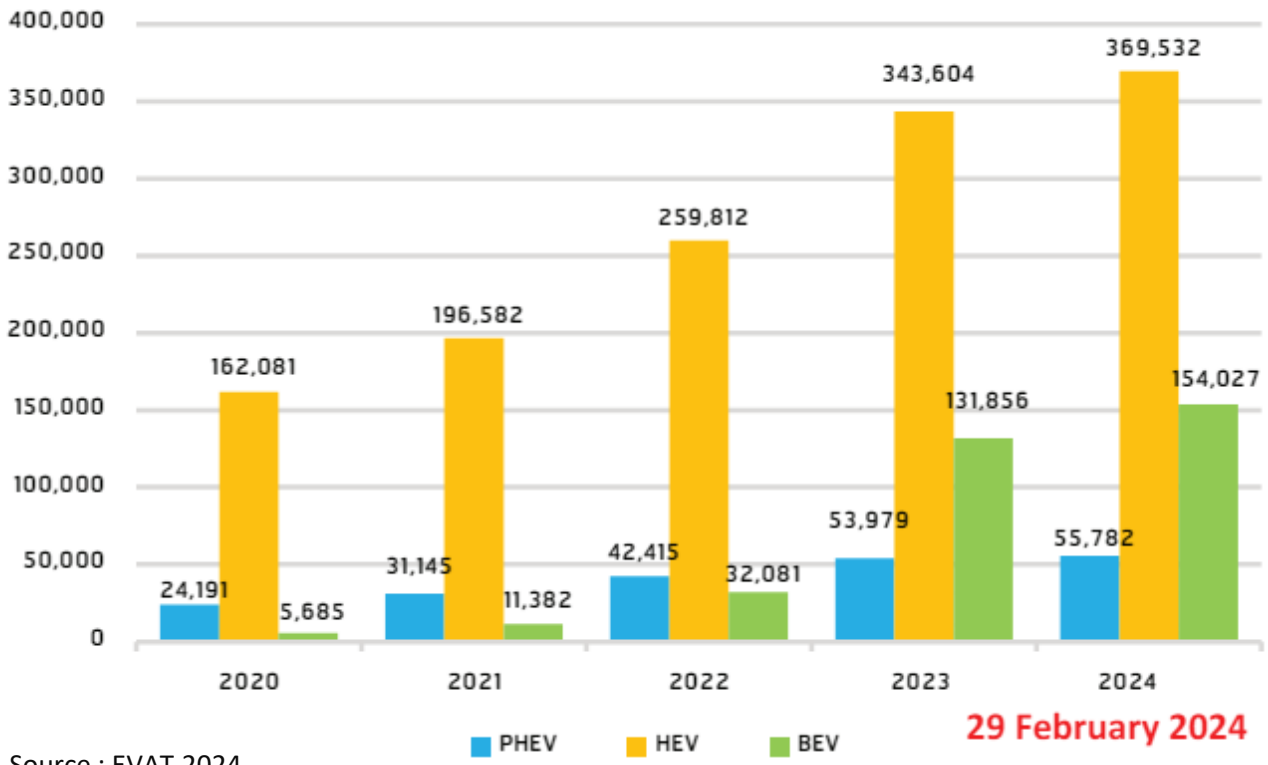
- **Ultra-fast charging in 1 hour**
- **10 minute battery swapping station**
- **40 – 60% energy saving**

The Current Mitigation for Reduction CO2 in the Transport Sector

1 Electrification of Transport

EV Car

The cumulative number of registered electric vehicles

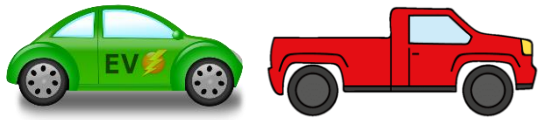


Source : EVAT,2024

30@30 EV Policy

The target is to promote the use of electric vehicles

- **Car & Light Duty Vehicle**



440,000 EVs

- **Motorcycle**



650,000 EVs

- **Bus and Truck**



33,000 EVs

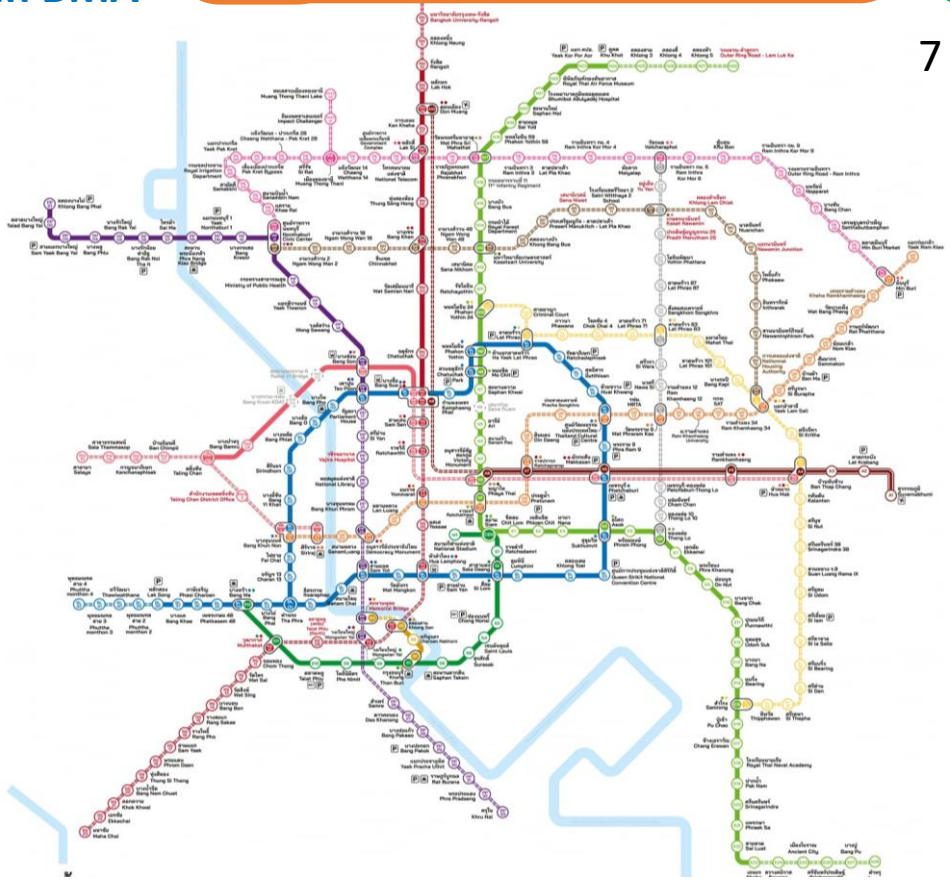
The Current Mitigation for Reduction CO2 in the Transport Sector

2 Urban Mobility

METRO in BMA

NEXT **Completed Network : 554 km**

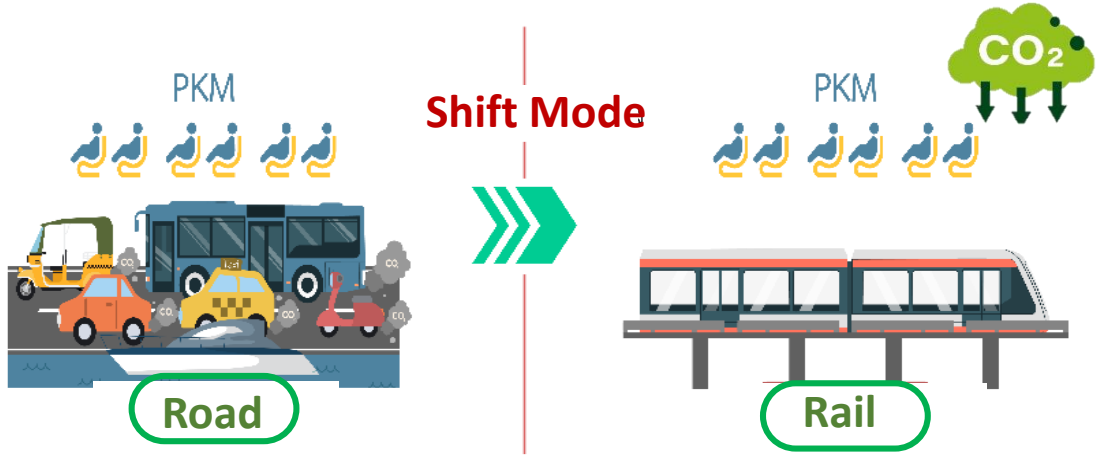
OPEN **In Services**



7 Lines, 276.84 km

- Green Line
- Blue Line
- Purple Line
- Red Line
- Golden Line
- Pink Line
- Yellow Line

Source : DRT,2024





Promote Green Feeder System



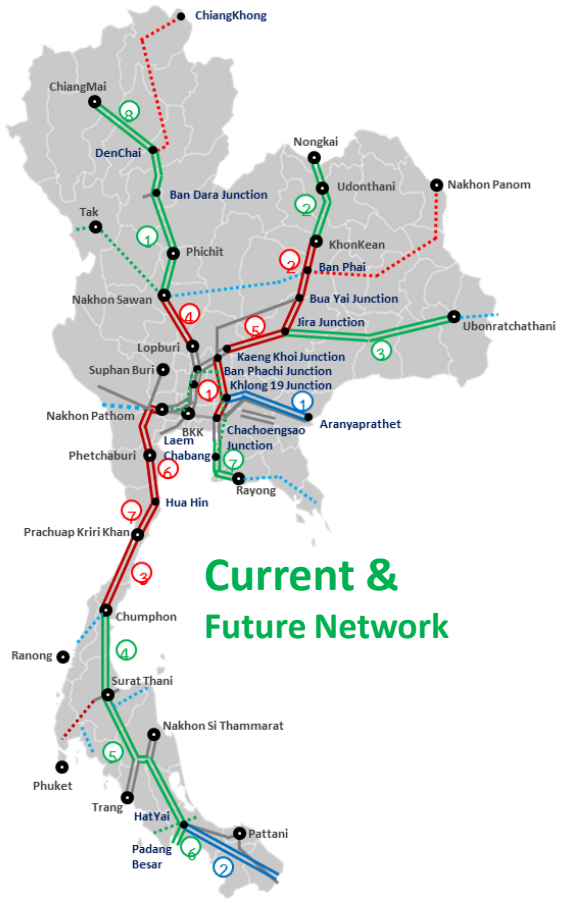


The Current Mitigation for Reduction CO2 in the Transport Sector

3 Inter-urban Transport and Green Logistics



Before



Current & Future Network

Passenger

Shift Mode



Road



Double Track
High Speed Train

Freight

Shift Mode



Road



Double Track

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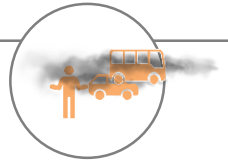




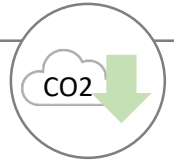
Example of Transport project: Electrified buses for intercity routes service

Rationale

Thailand's GHG in transport sector: contributed to 25% of all GHG in 2016



National transport sector target: reduce by 45.61 MtCO2e by 2030



This programme: reduce motorized travel need, promote public transport, & electrify intercity buses



Root causes and barriers

Social	Regulatory	Fiscal	Technological	Financial	Institutional
• changing travel preferences • Last-mile transportation gap • COVID-19 • Gender inclusivity	• licensing requirements for bus services • lack of specific legislation for EV battery management	• The availability of financial resources and fiscal incentives	• limited availability of charging infrastructure • Power security and energy source	• cost of purchasing and maintaining electric buses	• TCL holding the sole license limits competition and innovation

Electrified buses for intercity routes service: Overview

This output emphasizes the need to switch from using regular passenger vehicles operated by both the state-owned Transport Company Limited (TCL) and private operators on routes between Bangkok and other provinces, which still use internal combustion engines, to electric-powered mass transit systems, with at least 2,000 vehicles.



What's in the plan?



Electrifying 2,000 buses on routes of less than 400 km (Category 2)

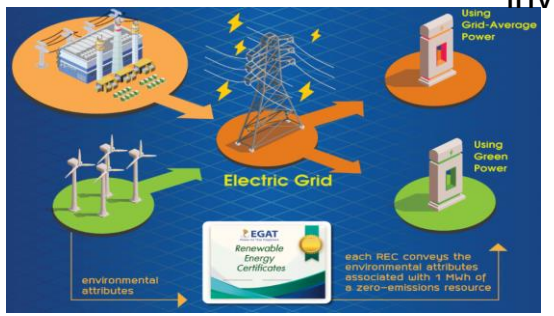
- Transport Co., Ltd. (TCL)'s buses
- Private sublicensed operators' buses

Measures to reduce Total Cost of Ownership (TCO)

- 40% and 50% reduction of EV vehicle and battery cost, respectively.
- 0% loan for EV vehicle and charging facilities investment by operators of electric buses



Investing in EV charging stations along electrified bus routes



Buying renewable energy credit (REC) from RE generators, with 0.5% of TCL's revenue.

(Pre-feasibility results) : The project will electrify a total of 2,027 buses, or around 47% of the ICE fleet. ; lower vehicle and battery cost, as well as a low-interest loan for vehicle purchases and charging station investment, will make it even more financially feasible.



	SC1 **60** EV buses	SC2 1,339 EV buses	SC3 **2,027** EV buses
Possible Scenarios	**60** EV minibuses	**60** EV minibuses **1,279** EV 12m buses	**60** EV minibuses + **688** EV minibuses (current ICE van fleet) **1,279** EV 12m buses
Net GHG reduction due to OP1 project* (Life-cycle estimation)	**2,959** Ton CO_2/year **2,036,286** THB/year	**156,473** Ton CO_2/year **107,687,039** THB/year	**267,318** Ton CO_2/year **183,971,644** THB/year
Financial Analysis** **w/o measures**	Investment : **468.05** million Baht NPV project : **67.10** million Baht B/C Ratio : **1.17** FIRR : **7.88%** payback period : year 10	Investment : **14,973.88** million Baht NPV project : **(4,083.91)** million Baht B/C Ratio : **0.67** FIRR : **1.94%** payback period : year 13	Investment : **20,348.64** million Baht NPV project : **(4,086.43)** million Baht B/C Ratio : **0.76** FIRR : **3.11 %** payback period : year 12
2-time battery replacement **0% loan for EV vehicle & charger investment** **40% reduction of EV vehicle price** **50% reduction of battery cost**	Investment : **390.05** million Baht NPV project : **167.44** million Baht B/C Ratio : **1.62** FIRR : **11.96%** payback period : year 8	Investment : **12,235.56** million Baht NPV project : **(591.34)** million Baht B/C Ratio : **0.93** FIRR : **5.23%** payback period : year 12	Investment : **16,714.62** million Baht NPV project : **501.71** million Baht B/C Ratio : **1.05** FIRR : **6.46 %** payback period : year 13

*By electrifying 12-meter passenger buses and minibuses, CO2 emissions can be reduced by 59% and 64%, respectively. Meanwhile, switching from passenger vans to electric minibuses can reduce CO2 emissions by up to 85%.

** Minibus and van service fares are 63% higher than actual.

Financial Barriers and Opportunities



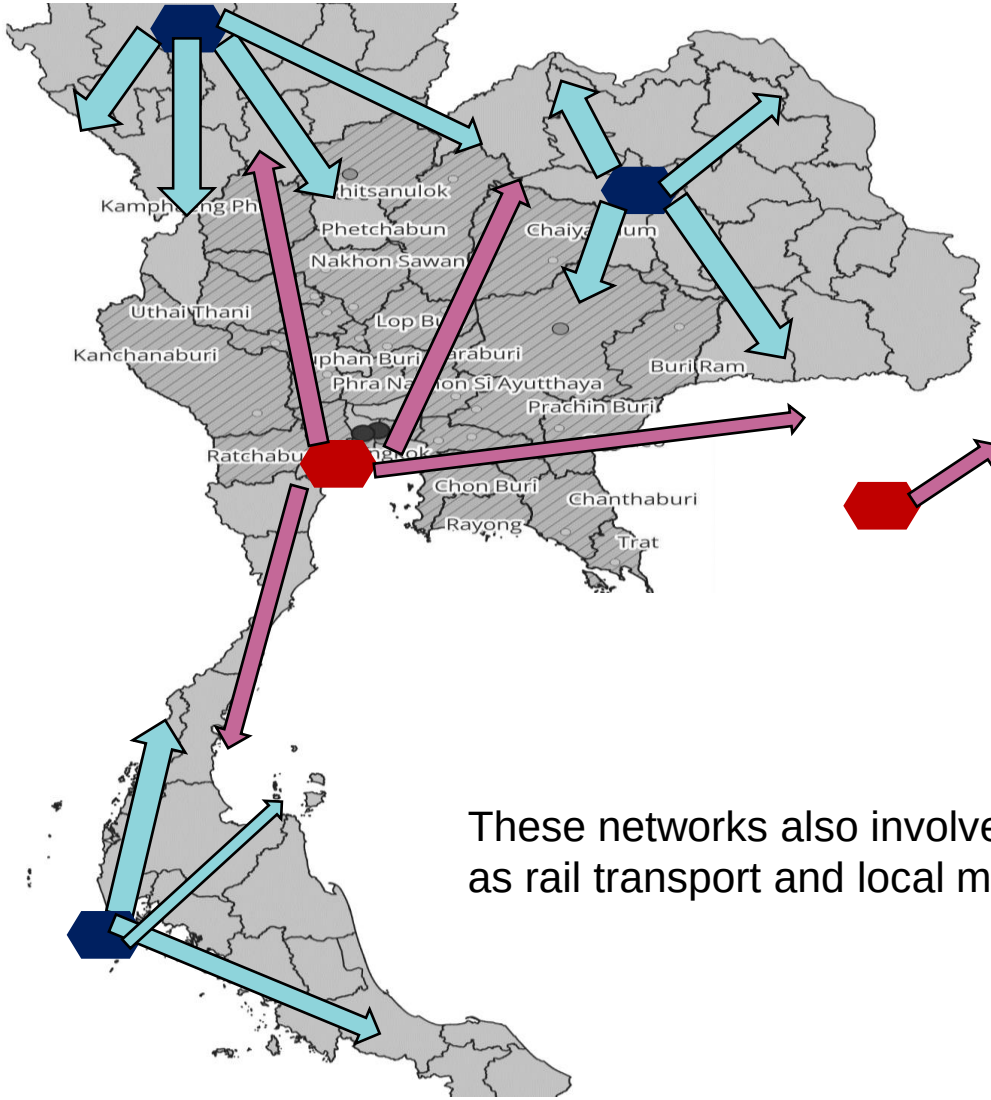


- High Initial Investment
- Cost of Charging Infrastructure
- Operational Costs
- Access to Financing
- Regulatory Uncertainty
- Revenue Uncertainty
- Range Anxiety and Infrastructure Availability
- Perception and Public Acceptance




- ✓ Growing Market Demand
- ✓ Policy Support and Incentives
- ✓ Cost Savings
- ✓ Technological Advancements
- ✓ Market Potential
- ✓ Brand Reputation and Social Impact
- ✓ Partnership Opportunities Long-Term Growth Potential

Scalability and sustainability of the project



Network of electric intercity bus routes and green terminals can be implemented in other regions.

Potential of Hydrogen fuel cell bus with service range over 400 km for both domestic and international routes can also be explored.

These networks also involve connectivity with other modes of transportation such as rail transport and local micro-transit (e.g. Tuk-tuk, Song-thaew).



THANK YOU

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