

Feasibility Study for Transportation NAMA in Vientiane, Lao PDR

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Mitsubishi UFJ Morgan Stanley Securities
Clean Energy Finance Committee

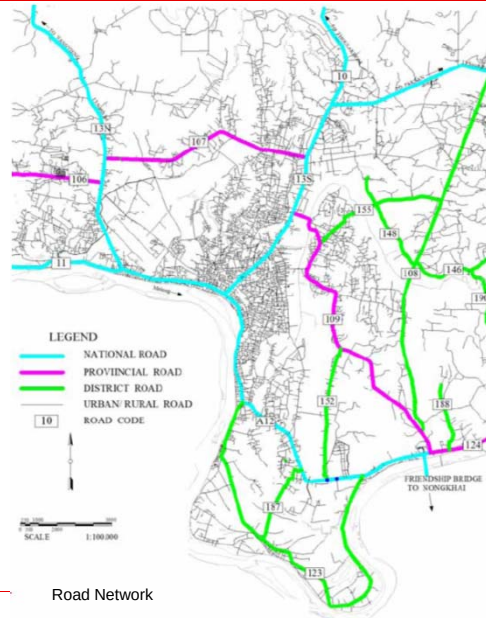
Study Objectives

- Study Feasibility of NAMA/New Mechanism through the case study of Vientiane Urban Transportation Master Plan by examining followings:
 - Boundary
 - Reference
 - Estimation of GHG emission reduction
 - Monitoring Method
 - MRV (Measurement, Reporting and Verification)
 - Financial Condition
 - Co-benefit

Boundary of the Case Study



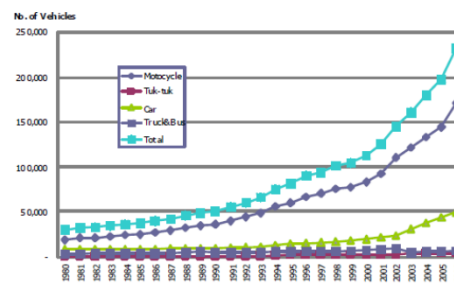
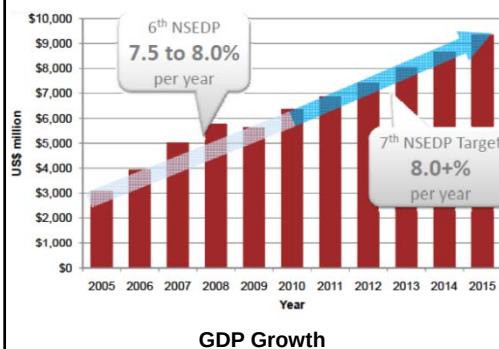
Chant habuly, Hadxayfong, Sikhottabong, Sisattanak, and Xaysetha Districts (38,190ha, 9.7% of Vientiane)



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Reference Scenario-1

- "Agrees that developing country Parties will take nationally appropriate mitigation actions in the context of sustainable development, supported and enabled by technology, financing and capacity-building, aimed at achieving a deviation in emission relative to "business as usual" emissions in 2020" (COP16 AWG-LCA).
- Increase of GHG emission due to increasing number of vehicles caused by population and GDP growth is expected in Vientiane.

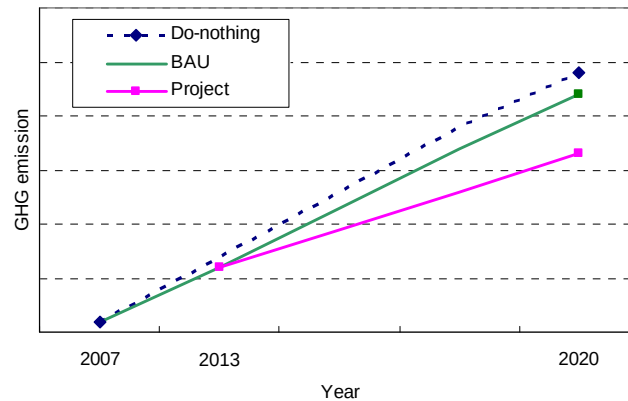


Source: Source: The Study of Master Plan on Comprehensive Urban Transport in Vientiane in Lao PDR (JICA, MPWT Lao PDR, Katahira Engineers)

Source: The National Socio-Economic Development Plan, 2011-2015

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- Without any measure, GHG emission will increase with increasing number of vehicles (Do-nothing)
- Continuation of current measures by Lao government (BAU)
- Reference scenario is BAU



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Vientiane Urban Transport Master PlanGHG Emission
ReductionMonitoring
FeasibilityCDM
Feasibility**Road Network Development**

- Support Sound Urban Development
- Establish Functionally Balanced Road Network
- Construction of Missing Links
- Secure Space for Public Transport
- Secure Future ROW and Widen as Traffic Volume Increases

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Public Transport Development

- Upgrade both quantity and quality of bus service system (Include BRT)
- Incorporate existing para-transit into urban transport system
- Connect to railroad stations and other transport modes
- Consider future introduction of Light Rail Transit (LRT) (After 2020)

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Traffic Management & Traffic Safety

- Parking regulation & other traffic enforcement
- Traffic Safety Education (Drivers and Pedestrians)
- Traffic Accident Data Accumulation & Analysis
- Traffic signals
- Traffic signs & pavement markings
- Traffic safety devices (guard rail etc)
- Road section and intersection improvement
- Traffic Demand Management (TDM)

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- Estimate emission reductions by reducing the number of vehicles and distance traveled by vehicles in Vientiane compared to BAU scenario by implementing planned activities under the master plan.
- CO₂ emissions can be estimated with a bottom-up approach based on vehicle activity and emission factors.

$$ER = BE - PE$$

$$BE = \sum_{m=n}^{m=l} A_{BL,m} * I_{BL,m}$$

$$PE = \sum_{m=n}^{m=l} A_{PJ,m} * I_{PJ,m}$$

- Vehicle Activity in reference scenario is estimated via simulation.
- Emission factor of vehicle type by speed is deemed desirable to be applied.

ER : CO₂ emissions from transportation (tonCO₂)

BE : Baseline Emission/ Reference Emission (tonCO₂)

PE : Project Emission(tonCO₂)

A_m : Transport Activity by vehicle m in the boundary (Vehicle-km)

I_m : GHG emission factor of vehicle m (tonCO₂/km)

m : Type of vehicle

Estimated Transport Activity in 2025^{*1}

Unit: Vehicle-km/day

Scenario	Motor Cycle	Car	Tuk Tuk	Bus	Track
BAU	8,901,243	3,331,593	43,452	148,244	466,455
With Road Network Development	8,570,579	3,192,499	41,073	139,685	428,601
With Public Transportation	3,427,334	2,422,417	67,480	203,327	413,425

EF (Tentatively EF of Thailand or Japan at average speed was used for rough estimation) ^{*2}

Vehicle Type	EF (g/km)	Source
Car	166.2	Average EF for passenger car (gasoline) in Bangkok at 23.4km/h
Bus	1,125	Average EF for bus (Diesel, without AC) in Bangkok at 22.8km/h
Track	1,010	Average EF for Heavy duty tracks in Bangkok at 20km/h
Motor Cycle	54.5	Average EF for four-stroke bike in Bangkok at 22km/h
Tuk Tuk	300	Average EF for diesel car in Japan at 20km/h

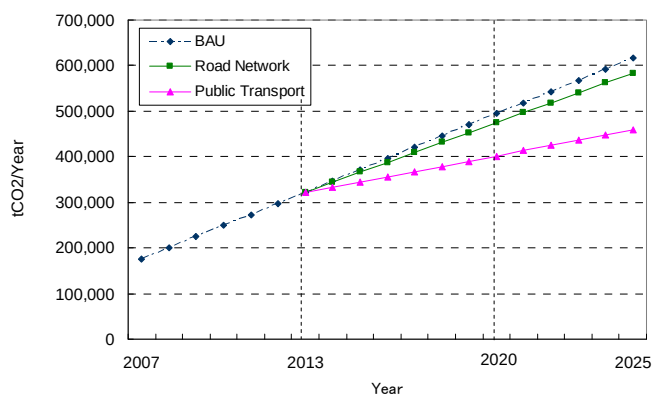
^{*1}: Based on The Study of Master Plan on Comprehensive Urban Transport in Vientiane in Lao PDR (JICA, MPWT Lao PDR, Katahira Engineers)

^{*2}:Source: Passenger car, Bus: MIT Japan Study

Track: Developing Integrated Emissions Strategies for Existing Land-transport (DIESEL), Joint UNDP/World Bank Energy Sector Management Assistance Programme, 2008, Motor Cycle: PCD (Pollution Control Department), MONRE, Thailand

Estimated CO₂ emissions in 2025Unit: (tonCO₂/year)

Scenario	Motor Cycle	Car	Tuk Tuk	Bus	Track	Total	Reductions
BAU	177,068	202,104	4,758	60,873	171,959	616,762	0
With Road Network	170,490	193,667	4,497	57,358	158,004	584,016	32,746
With Public Transportation	68,178	146,951	7,389	83,491	152,409	458,419	158,343

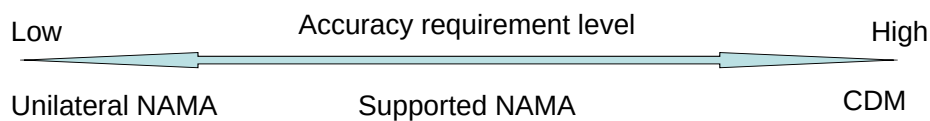


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Decisions related MRV in COP16

- Internationally supported mitigation actions will be measured, reported and verified domestically and will be subject to international measurement, reporting and verification in accordance with guidelines to be developed under the Convention.
- Domestically supported mitigation actions will be measured, reported and verified domestically in accordance with general guidelines to be developed under the Convention.

- Still unclear definition of MRV
- Guideline has not been developed
- However, different accuracy requirement is expected depending on the type of NAMA



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- Monitoring mainly consists of monitoring input values for simulation of reference scenario and monitoring vehicle activity of project scenario.
- Parameters to be monitored, frequency and size of traffic survey should be considered depending on the accuracy requirement for MRV.
- Financial and Technical support to develop a structured monitoring system and organization is important.

Monitoring Parameter	Potential method to collect/ data source
Progress of Activities	Progress of planned activities, any new project, timeline from Ministry
Population	Census
Individual Attribution	Census
Number of Vehicles	Record from Ministry
GRP	National Statistics
Road Network	Road Network at the monitoring
Distance Traveled (Vehicle-km)	O-D Survey
Type of Vehicles	O-D Survey
Velocity of Vehicles	Traffic Survey
Number of Passengers on Buses	Record of bus company
Fuel sales data	Ministry (cross-check purpose)
Emission Factors (tonCO ₂ /km)	Possibly measured

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- Comprehensive approach to reflect the synergy effect of each planned activity is desired for Urban Transportation Projects
- Implementation of Urban Transport Master Plan in Vientiane has a potential to reduce CO₂ emissions
- NAMA has a potential to support the implementation of mitigation activities in transportation sector
- Financial and technical support for the development of monitoring system and organization to collect traffic data is an important part of NAMA
- Continue further study to elaborate the findings, such as emission reduction calculation, and MRV is important

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