UNFCCC Workshop for Asia-Pacific region
Nationally Appropriate Mitigation Action,
NAMA on 22 April 2014, Don Chan Palace

Feasibility study for transportation NAMA in Vientiane – *Laos*

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Outline of the presentation

1. Background of NAMA feasibility study
2. Key activities from the NAMAs Capacity Building Cooperation
3. MRV Demonstration Study using Model Project
4. Challenges and opportunities for the future

Background of the NAMA feasibility study

❖Laos has not yet submitted a list of Nationally Appropriate Mitigation Actions (NAMAs) to the UNFCCC (United Nations Framework of Convention for Climate Change) Secretariat in response to the invitation by the COP decisions.

❖Lao's Second National Communication states that its NAMAs would include mitigation efforts in several areas, and that Mitigation is one of the priorities of the national climate change strategy and Climate Change Action Plan 2013-2020. It has also been integrated into the 5-year national development plans, including the current 7th National Socio-economic Development Plan.

(1) Source: Lao PDR (2013): Second National Communication

❖In order to realize those issues, MOEJ proposed a Capacity-Building Cooperation for the Development of NAMAs in a MRV Manner in Laos.

❖In 2012 Laos and Japan have Signed MOU for Capacity-building Cooperation and Joint Study Project in NAMA in a MRV manner in the transport sector between the Ministry of Natural Resources and Environment, Lao PDR (MONRE) and the Ministry of the Environment, Japan (MOEJ),

❖The feasibility study NAMA Project in Transportation sector is base on:

- The National Strategy and Action Plan on Environmentally Sustainable Transport
- The Vientiane Urban Master Plan
  - Road Network Development
  - Public Transport Development
  - Traffic development and Traffic safety
- The potential Mitigation activities in Transportation

Key Activities from the NAMAs Capacity Building Cooperation with OECC, Japan

NAMAs Capacity Building Cooperation: List of activities in FY2012

Activity1:Proposal for the institutional arrangement for NAMA implementation

Activity 2: List of the mitigation options in the transport sector in Laos

Activity 3: List of environmental technologies in relation to NAMAs options

Activity 4: Model Emission reduction calculation for NAMAs option: Introduction of electric vehicles

Selected NAMAs options

Selected as a model case in FY2012

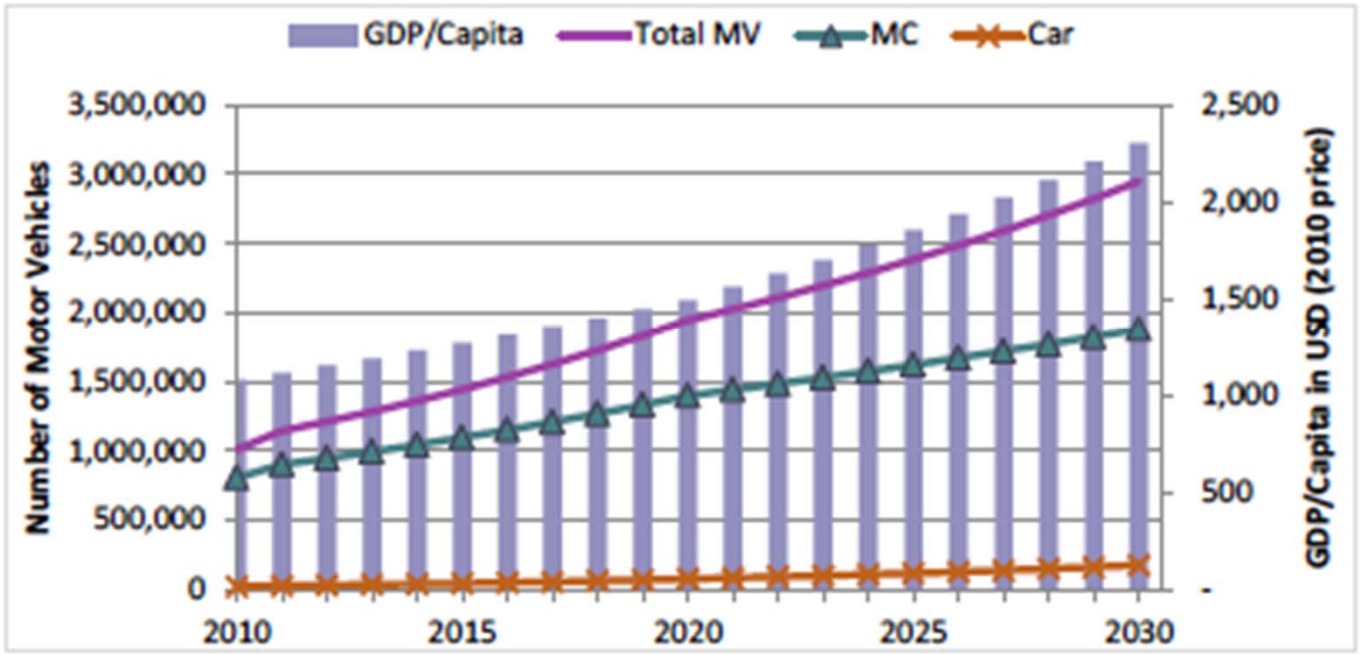
No.	Category	NAMAs Options
1	Fuel switching / Improvement of fuel efficiency per vehicle	Introduction of electric vehicle
2		Promotion of operation of electric vehicle
3		Promotion of operation of four stroke tricycles
4		Alternative fuel introduction (bio-ethanol, biodiesel)
5		Regulation on fuel quality
6		Regulation on fuel economy
7		Regulation on exhaust gas
8		Promotion of eco-driving
9	Improvement of traffic efficiency	Development and promotion of public bus
10		Development and promotion of BRT
11		Bicycle lanes
12		Car parking project
13		Truck ban
14		Signalization of major intersections
15		Ring road project
16		Introduction of ITS
17		Traffic Control Management Center
18		Establishment of a truck terminal and physical distribution centers
19	Others	Installation of LED Signals

Data Collection for NAMA Study in Transportation

Basic Data: Study on Low-emission Public Transport System in Lao PDR, by JICA

❖ Estimation of Vehicle Ownership in future Laos:

Estimated accordingly with GDP Growth estimation, and its relations between vehicle ownership Number of Car and Motor Cycle will increase



Source: Basic Data Collection Study on Low-emission Public Transport System in Lao PDR, JICA

Basic Data: Study on Low-emission Public Transport System in Lao PDR, by JICA

Diffusion Target of Electric Vehicle in Lao PDR:

❖**Estimate Electric Vehicle will increase**
-7% year 2015,
- 40% year 2020 and
- 80% year 2030

❖ **Estimate Conventional Vehicles will Decrease 83% year 2015, 60% year 2020 and 20% year 2030**

Source: Basic Data Collection Study on Low-emission Public Transport System in Lao PDR, JICA

Basic Data: Study on Low-emission Public Transport System in Lao PDR, by JICA

Diffusion Target of Electric Vehicle by type in Lao PDR:

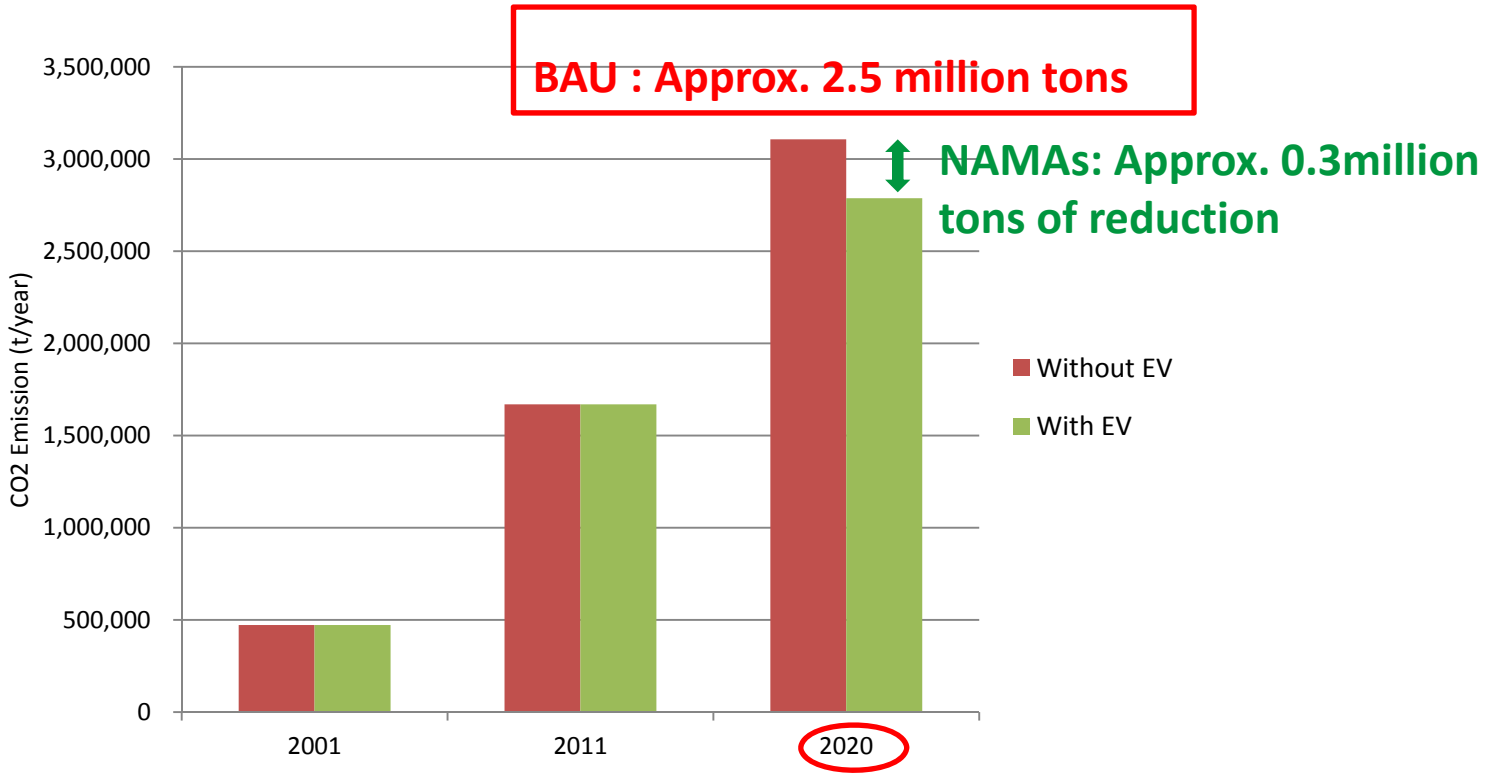
- ✓ **Motor Cycle will increase 10% year 2015 and 50% year 2020**
- ✓ **Passenger Car will increase 10 % year 2020**
- ✓ **Tuktuk/Mini bus will increase 20% year 2015 and 100% year 2020**
- ✓ **Meduim Bus /Large Bus will increase 10% year 2020**

This is target year for NAMAs year 2020

Source: Basic Data Collection Study on Low-emission Public Transport System in Lao PDR, JICA

NAMAs Project Emission Calculation

NAMA Project Emission Reduction in 2020



Source: Basic Data Collection Study on Low-emission Public Transport System in Lao PDR, JICA

Calculation for emission reduction in transport sector

Emission Reduction = BaU (without EV) – Project emission (with EV)

BaU = Driving Distances (Km) X CO_2 emission factor (tCO_2/liter) / Fuel Economy (Km/liter)

Monitoring parameter

National value or IPCC data

Should be set for each types of motor vehicles

Driving distance/ Amount of fuel

- Project emission = [Driving Distances (km)] x [CO_2 emission factor of grid electricity (tCO_2/kWh)] / [Electricity Economy (km/kWh)]

Survey for fuel economy in Vientiane

Applicable reference vehicle
- Motorbike
- Passengers car
- Tuk tuk

Method

<u>Fill-up method</u>

- Motorbike and Passengers car
  - Record amount of fuel
  - Read odometer
- Tuk tuk
  - Record amount of fuel
  - Measurement of driving distance with the GPS system

Fuel Economy in Vientiane

Subject of Survey

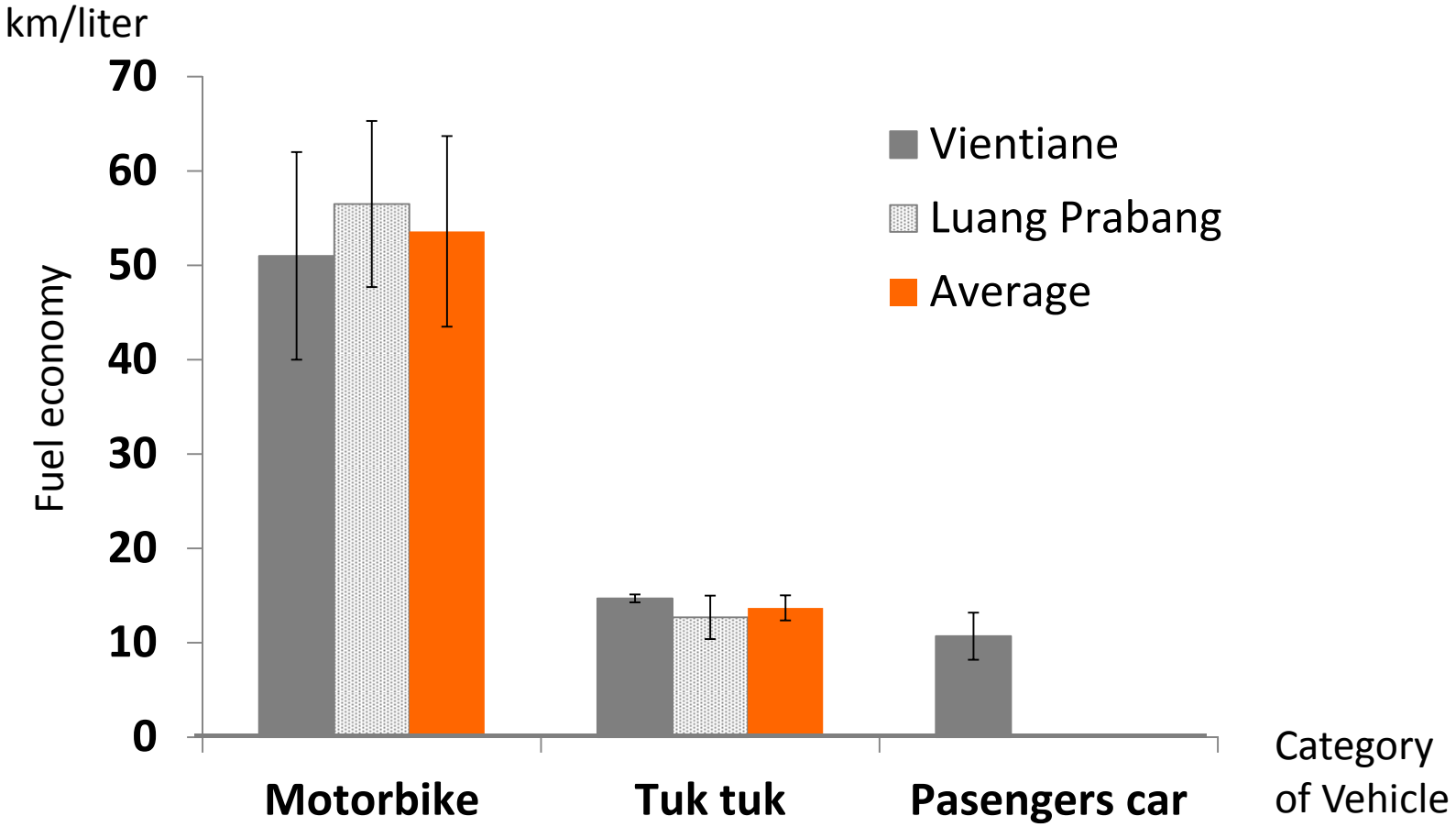
Motorbike: 100 cc x3, 125 cc x 6

Passengers Car : Gasoline: 1400 cc x 1, 1800 cc x 1, 2000 cc x 1
Diesel : 2500 cc x 4, 3000 cc x 1

Tuk tuk: Gasoline: 1000 cc x 4

	Number of Motor vehicle	Average of Fuel Economy (km/liter)	Standard Deviation
Motorbike	9	51	11.0
Passengers car	8	10.7	2.5
Tuk Tuk	4	13.4	1.8

Fuel Economy in Lao PDR



Fuel economy

Motorbike: 53.6 km/liter (n=17≥10)

Tuk tuk: 13.0 km/liter (n = 10≥8)

Passengers car: 10.7 km/liter (n=8<15)

Fuel economy data in Luang Prabang is provided by Almec VPI (JCM MRV Demonstration study)

MRV Demonstration Study using Model Project

➢Transportation Improvement through Introduction of Efficient Buses and Provision of Good Services

November/2012

Source: Katahira & Engineers International Mitsubishi UFJ Morgan Stanley Securities

FUKKEN CO,. LTD.

➢ A History of the Study

Phase1 (Mitsubishi UFJ Morgan Stanley Securities(MUMSS), 2010)

Feasibility Study for Transportation NAMA in Vientiane, Lao PDR

Phase2 (Katahira & Engineers International(KEI), MUMSS, 2011)

New Mechanism Feasibility Study for Urban Transport Management in Vientiane, Lao PDR

Phase3 (KEI, MUMSS, Fukken, 2012)

Transportation Improvement through Introduction of Efficient Buses and Provision of Good Services

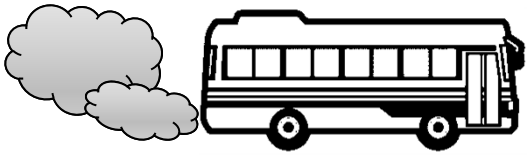
- **Source:** Katahira&Engineers International Mitsubishi UFJ Morgan Stanley Securities
- FUKKEN CO,. LTD.

➢ GHG Reduction Mechanism by the Projects/Activities

(1) Introduction and Operation of New Bus Vehicles

✓ New bus vehicles will improve fuel consumption.

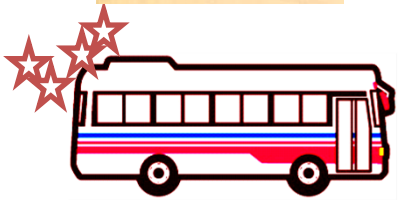
Existing bus vehicle



Existing bus is aging and deteriorating.

New bus vehicles

Fuel efficiency **per vehicle** will be improved.

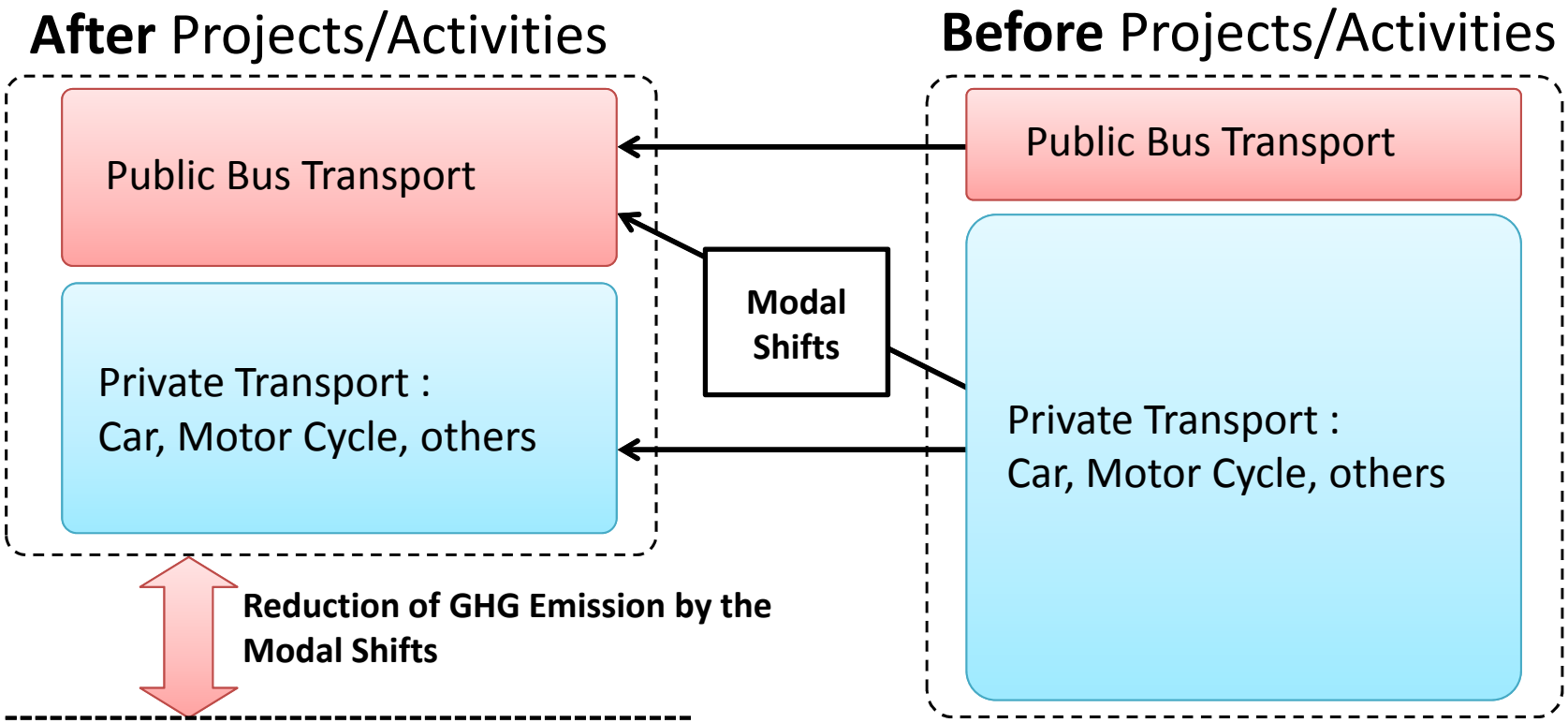


✓ Reduction of fuel consumption will directly reduce GHG emission.

Source: Katahira&Engineers International Mitsubishi UFJ Morgan Stanley Securities

➢ HG Reduction Mechanism by the Projects/Activities

(2) Improvements in Operation and Service - Modal Shifts



Comparison of GHG Emission before/after the Projects/Activities

- ✓ Increase of public bus transport will increase GHG emission.
- ✓ However decrease of private transport will decrease more GHG emission.

Source: *Katahira* Katahira&Engineers International Mitsubishi UFJ Morgan Stanley Securities

Proposed Methodologies for the Project Activity

Measure1: Introduction of new bus vehicles

Energy Efficiency Improvement

(MRV1)

Energy Efficiency Improvement of Public Buses in the Lao PDR

Measure2: Improvement in bus operation

Modal Shifts (Passenger)

(MRV2)

Improving Transport Efficiency of Public Buses by Operational Improvements in the Lao PDR

Source: *Katahira* Katahira&Engineers International Mitsubishi UFJ Morgan Stanley Securities

First Survey
- Monitoring on the Improvement of Fuel Efficiency

before the Projects/Activities

after the Projects/Activities

Survey **bus operation / operation logs** of the project owner (VCSBE)

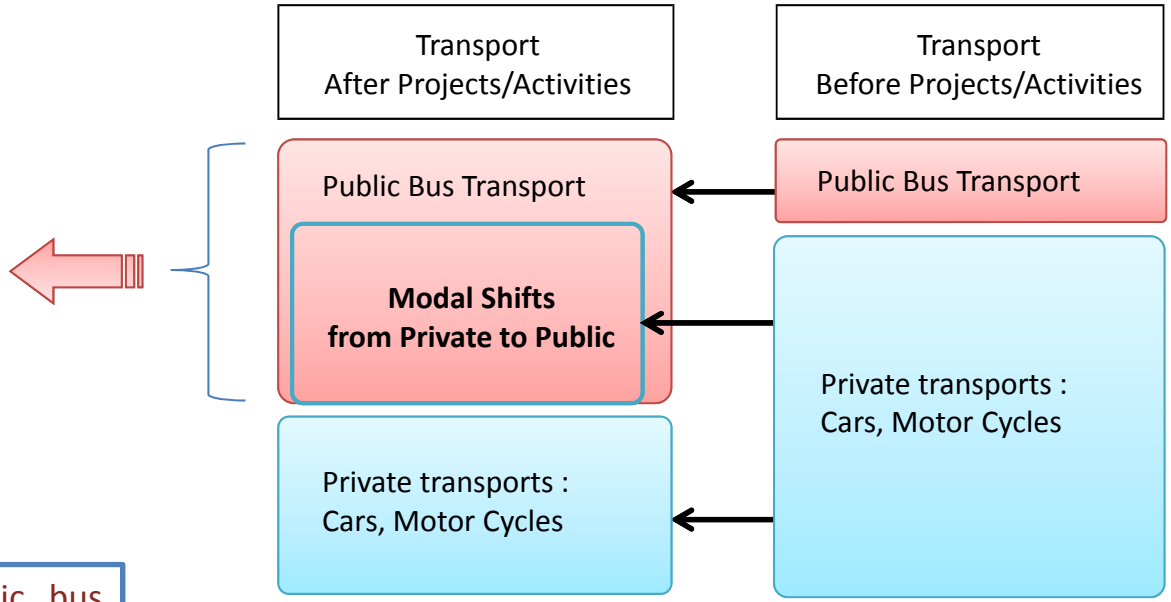
Fuel consumption
Vehicle – km of travel
others

- ✓ Calculate **difference** of before/after **fuel consumption** per VKT
- ✓ *Calculate **GHG reduction** from the difference of the fuel consumption*
- ✓ Apply the Method1-1 of MRV1 in this Study

Second Survey
- Monitoring on the Modal Shifts (for Method2 of MRV2)

- ✓ Ridership Survey for the bus passengers
- ✓ Survey for records of the bus operation

Ridership Survey (Interview)



- ✓ Conduct Ridership Survey for public bus passengers after the introduction of the new buses
- ✓ Find evidence of the modal shifts from private transport to mass public transport

Calculate GHG reduction from

- ✓ volume of the modal shifts (person kilometer)
- ✓ former means of transport

Source: *Katahira* Katahira&Engineers International Mitsubishi UFJ Morgan Stanley Securities

➢ Results of the Monitoring on the Improvement of Fuel Efficiency

Comparison of Fuel efficiency of Reference Bus and Project Bus

Categories	Manufacturer	Capacity (person)	Raw data		Adjusted by capacity	
			Travel distance per liter (km/L)	Fuel consumption per travel distance (L/km)	Travel distance per a liter (km/L)	Fuel consumption per travel distance (L/km)
Reference Bus	Hyundai	45	2.950	0.339	2.660	0.376
Project Bus	Isuzu (without air conditioner operating)	50	3.702	0.270	3.702	0.270
	Isuzu (with air conditioner operating)	50	2.974	0.336	2.974	0.336

20% of Reduction on same condition

✓ Comparison on the Dongdok line

Source: *Katahira* Katahira&Engineers International Mitsubishi UFJ Morgan Stanley Securities

Challenges and opportunities for the future

Challenges and opportunities for the next step:

1. Possibility of reviewing current vehicle registration system (i.e. subdividing its vehicle categories into power sources (gasoline, diesel, hybrid, LPG, electricity etc) at the initial registration or annual vehicle inspection).

2. Country specific default value for fuel efficiency by vehicle types need to be develop for calculation of NAMAs options in the transport sector;

3. Capacity building on transport data collection may be required;

4. Other listed NAMA options in the transport sector need to be study.
5. Need finance for NAMAs implementation.

Challenges and opportunities for the future:

Possible NAMAs projects in Laos

Category	Mitigation Option
Fuel Switching / Improve Fuel Efficiency per vehicle	**Promote use of Electric Vehicle**
	Promote operation of Electric Vehicle
	Promote Operation of four stroke tricycles
	Alternative Fuel Introduction (Bioethanol, Biodiesel)
	Regulation on Fuel quality
	Regulation on Fuel economy
	Regulation on exhaust gas
	Promotion of Eco-driving
Improve Traffic Efficiency	**Development and Promotion of Public bus**
	Development and Promotion of BRT
	Bicycle Lane
	Car Parking Project
	Truck Ban
	Signalization of major intersections
	Ring Road Project
	Introduction of ITS
	Traffic Control Management Center
	Establishment of Truck Terminal and Physical Distribution Centers
Others	Installation of LED Signals (Energy Efficiency)

Thank you very much!