Development of HDV Fuel Economy in Korea

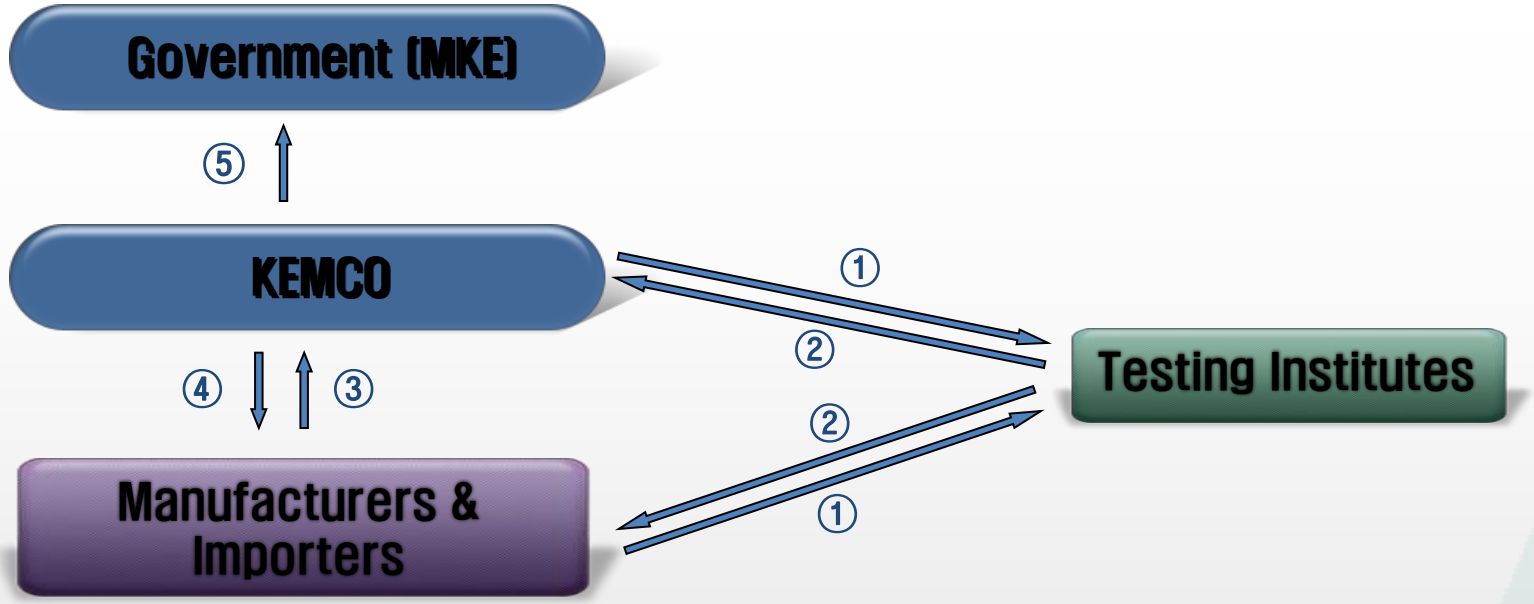
2015. 4. 29

Hwanjung JUNG

Contents

MRV* Operating System

* MRV : Measuring, Reporting, Verifying



① Requesting tests (include following-up control)
② Issuing test results report
③ Reporting test results
④ Responding the approval and verifying results
⑤ Reporting registration status

Development of HDV Fuel Economy

Chassis Dynamometer

- Base Vehicle
- Experimental Data

- **Base Vehicle Selection**

  (discuss with vehicle maker)

- **Collection experimental data**

If it is necessary, additional test can be proceed

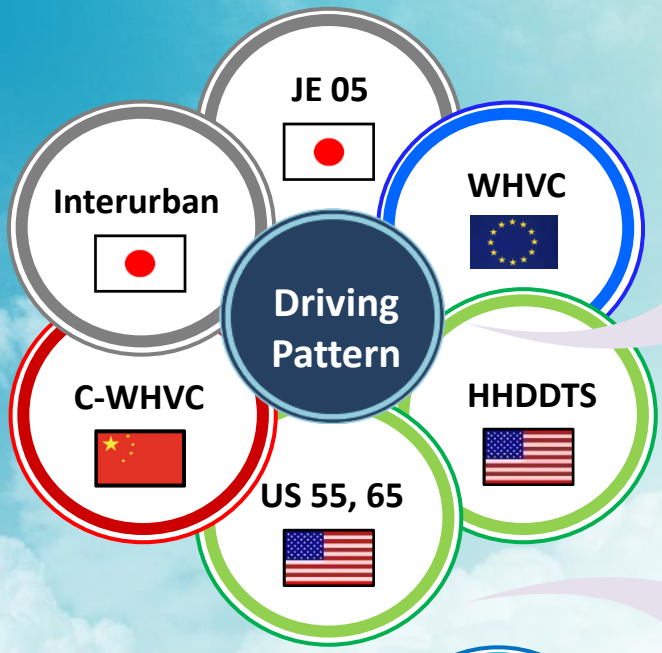
Simulation

- Base Vehicle
- Variant Vehicle

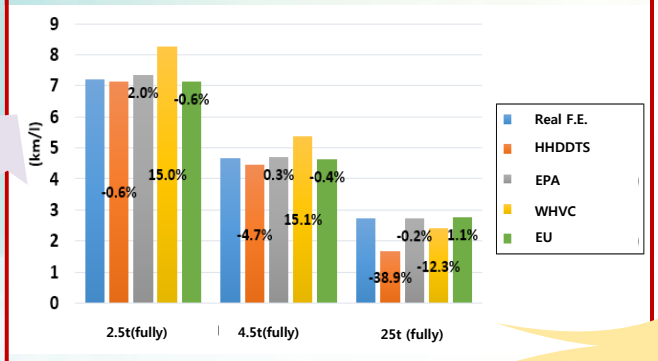
- **Verification of Base Vehicle**
- **Evaluation of Variant Vehicle**

Development of HDV Fuel Economy

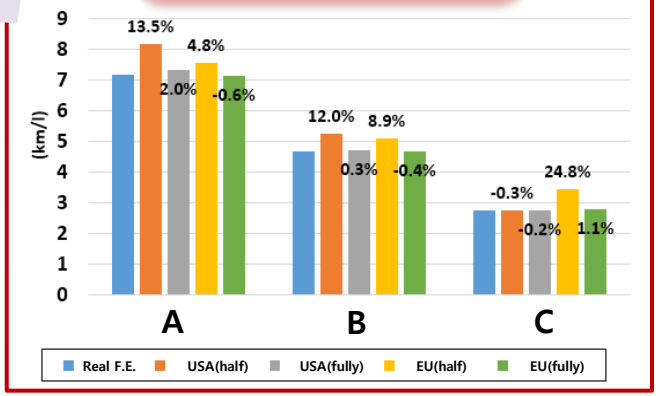
Driving Schedule & Loading capacity



Compare to Real Road



Chi square analysis



WHVC

GVW

Development of HDV Fuel Economy

Test Procedure

Vehicle Classification

F.E. Scenario

Development of HDV Fuel Economy

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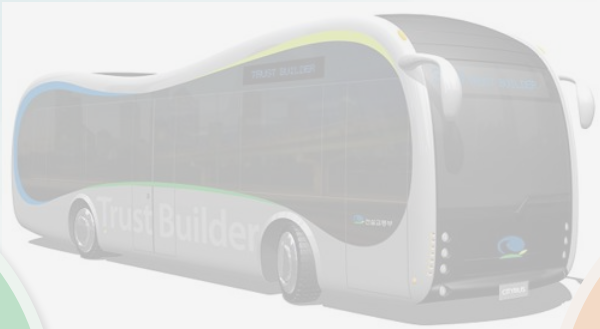
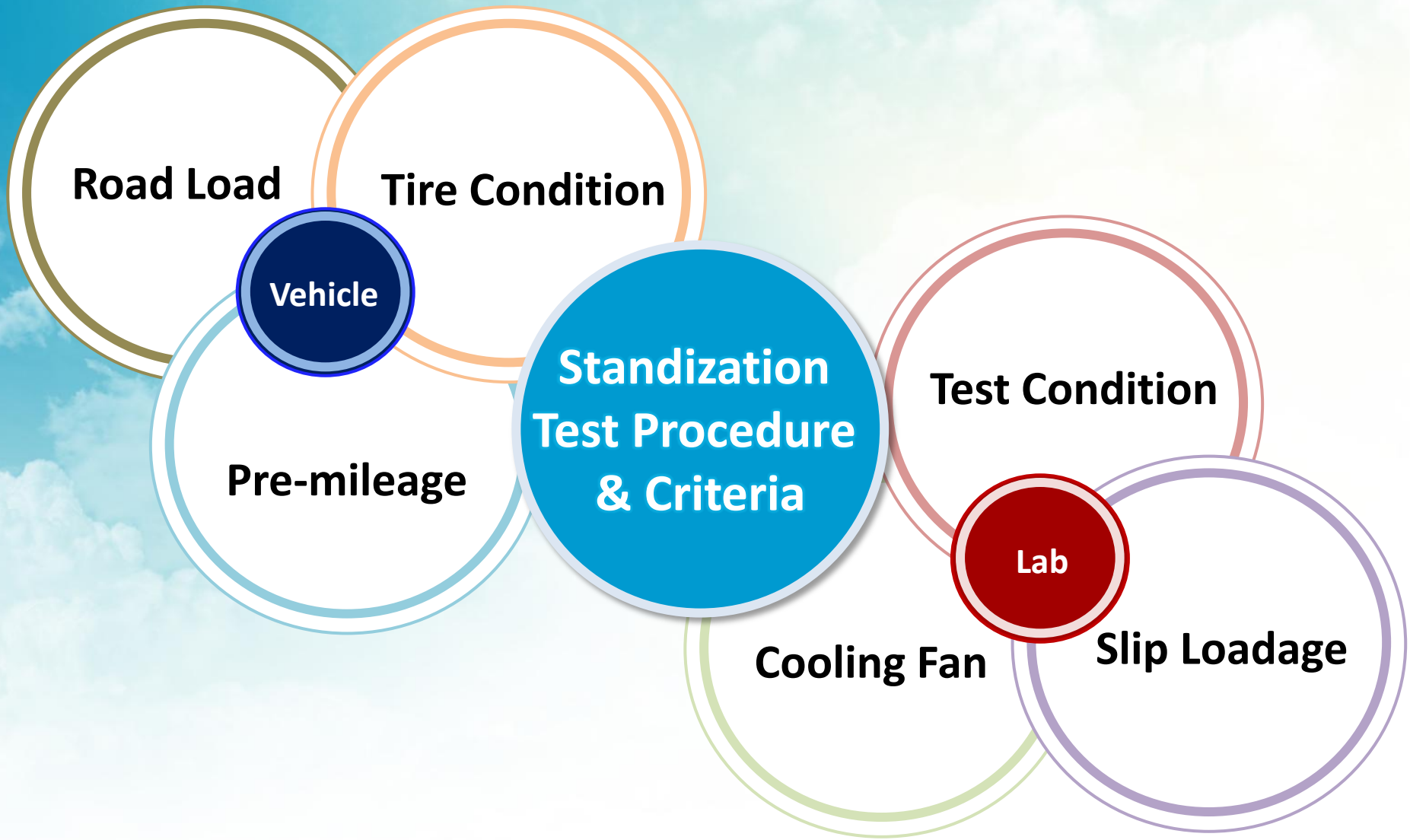
Test Procedure



Vehicle Classification

F.E. Scenario

Standization Test Procedure & Criteria



Standization Test Procedure & Criteria

Load Road

	Passenger Vehicle
mileage	$6,500\text{km} \pm 1{,}000\text{km}$
procedure	Total 9section, average 90kph
	Repeating accel/decelation without cruise mode

Tire Condition

	Passenger Vehicle
Size	Manufactor's specifications
Pressure	Standard air pressure
Tread depth	Over 50 %

Cooling Fan

	Passenger Vehicle
Cooling fan (fixed speed)	Opened Hood
	2.5 $m^3/s\leq$
Cooling fan	Closed hood
	About 30.5cm from front of Vehicle

Lab. Condition

	Passenger Vehicle
Temperature	20 ~ 30 °C
Attached	As be released
Fuel requirment	Over 40 %
Warm up	Pre-driving with same mode

Standization Test Procedure & Criteria

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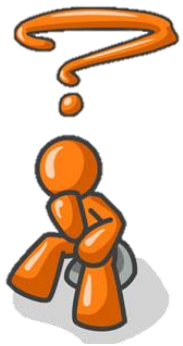
Load Road

Tire Condition

Even if Passenger vehicle's F.E. test procedure shall apply to HDV, Many component still have to discuss.

- Mileage
- Cooling Fan(fixed or not, position, Fan capacity)
- Attached device
- Fuel requirement
- etc



Passenger Vehicle		Passenger Vehicle	
mil			ifications
proc			ssure
Cooli (fixed s			cle
			ased
Cooling fan	Closed hood	Fuel requirement	Over 40 %
	About 30.5cm from front of Vehicle	Warm up	Pre-driving with same mode

Chassis Dynamometer Test

Chassis Dynamometer for HDV

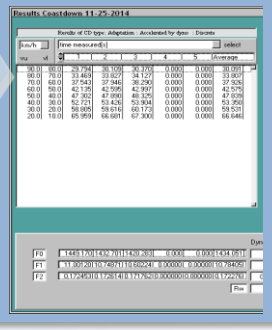
Specification	KATECH	JIAT
Picture		
Type	MIM (Motor in the Middle)	AC IGBT Vector
Max test speed	160 km/h	150 km/h
Inertia simulation range	3,500~30,000 kg	1,000~40,000 kg
Max permissible axle load	20,000 kg	25,000 kg
Vehicle cooling fan (Main)	64,000 m^3/h	144,000 m^3/h

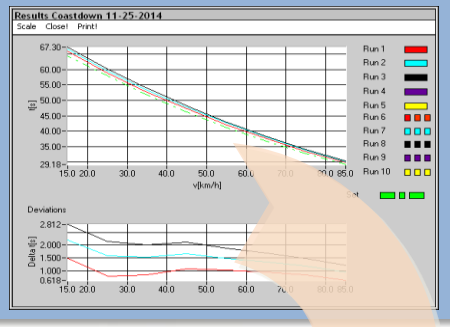
Chassis Dynamometer Test

Test condition & Procedure

Pay Loadage considered slip

Coast-down test & Pre-run





WHVC Driving & Data analysis

Measuring CO_2 , 2~3 times repeated

(L/100KM)
62.143

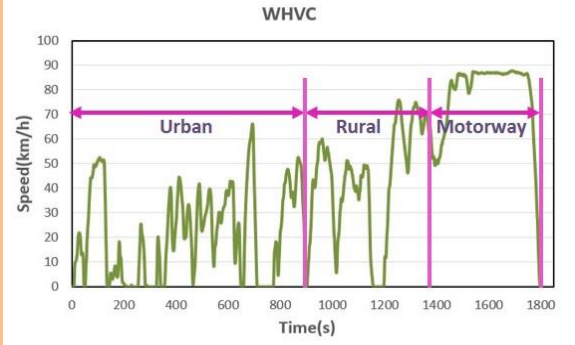
(KM/L)
1.6092002E+00

(L/100KM)
44.947

(KM/L)
2.2248427E+00

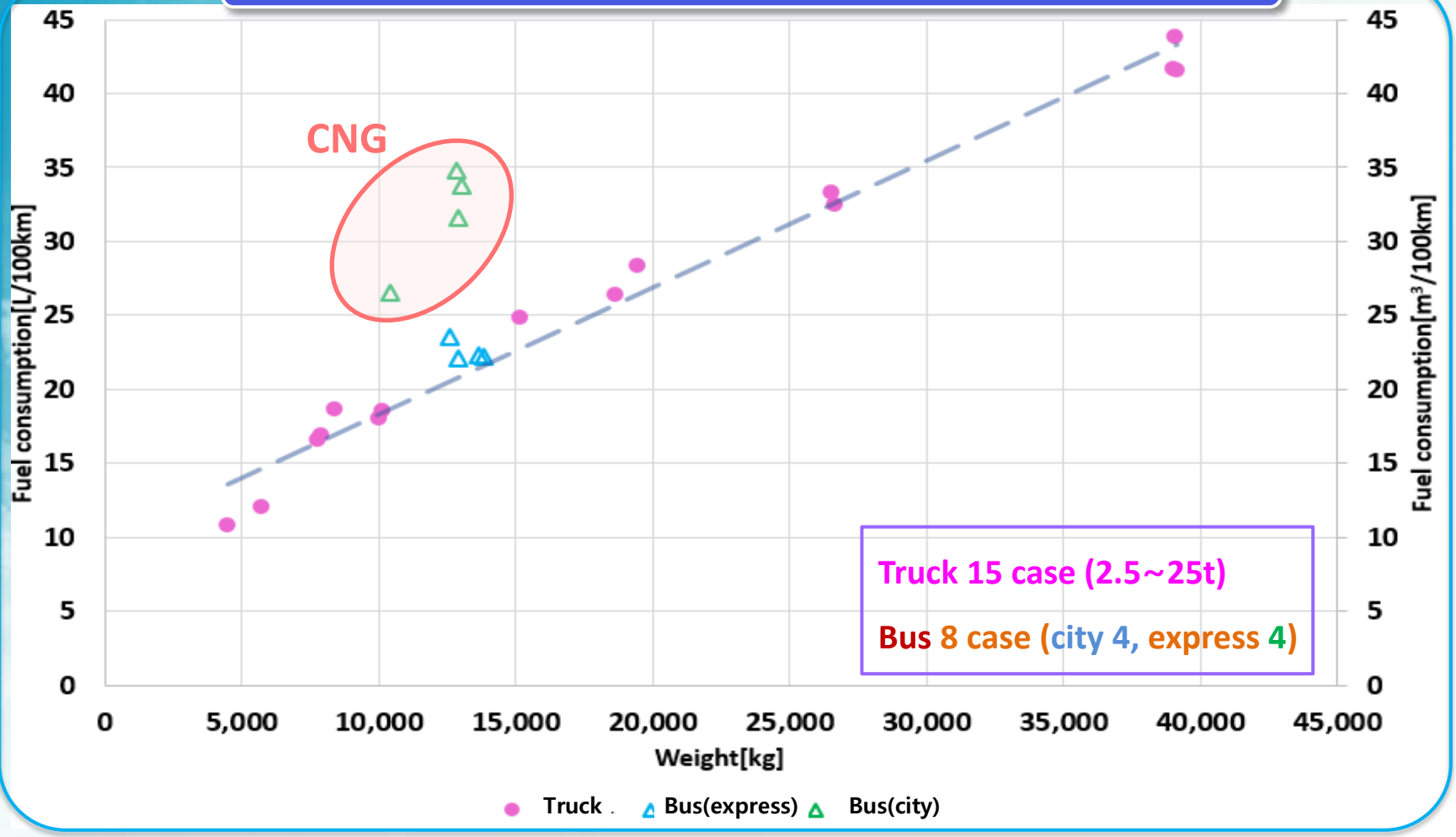
(L/100KM)
27.518

(KM/L)
3.6339873E+00



Chassis Dynamometer Test(WHVC)

Fuel Consumption by GVW



Most of all vehicles Fuel economy show linearity.

Development of HDV Fuel Economy

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Test Procedure

Vehicle Classification

F.E. Scenario

HDV Classification in Korea

	Medium - Heavy	Heavy - Heavy
Bus	16 ≤ passenger ≤ 35, 	36 ≤ passenger, 9m ≤ L, W, H  
Truck	1t < Load Capacity(Max) < 5t, 3.5t < GVW < 10t  	5t ≤ Load Capacity(Max), 10t ≤ GVW 

HDV Classification in Korea

	type	GVW	variant	Classification
	Combined Tractor	Day Cab Class 8	Low Roof	12
			Mid Roof	
			High Roof	
		Day Cab Class7	…	
		Sleeper Cab Class8	…	
	Vocational Vehicle	Light Heavy		
		Medium Heavy		
		Heavy Heavy		
	Truck	T1 ~ 11		25
	Tractor	TT1 ~ 2		
	Bus(city)	BR1 ~ 5		
	Bus(express)	B1 ~ 7		
	Tractor	8		54
	Bus(Intra)	11		
	Cargo Truck	12		
	Bus(city)	12		
	Dump Truck	11		

Development of HDV Fuel Economy

Test Procedure

Vehicle Classification

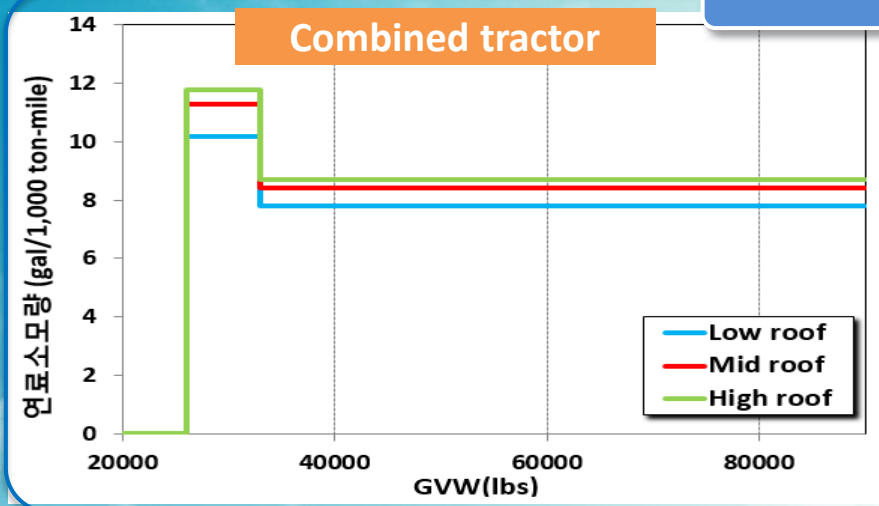
F.E. Scenario

Fuel Economy Scenario

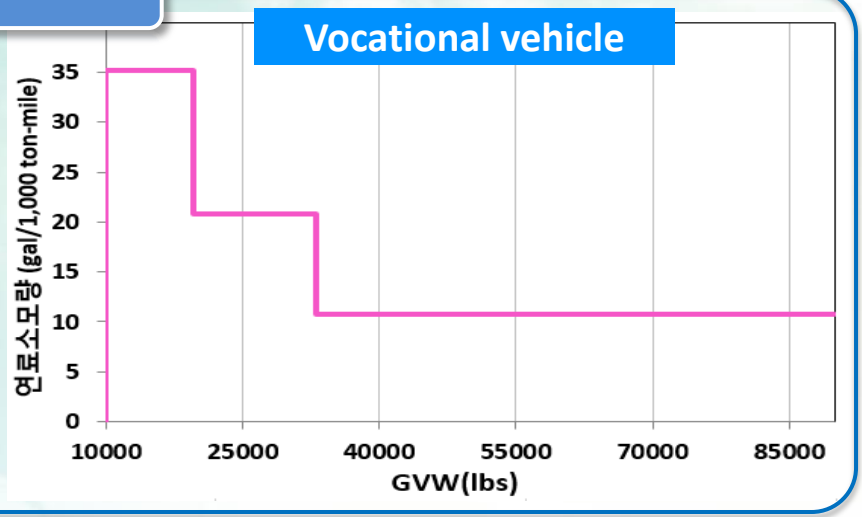
source: EPA, NHTSA]

US

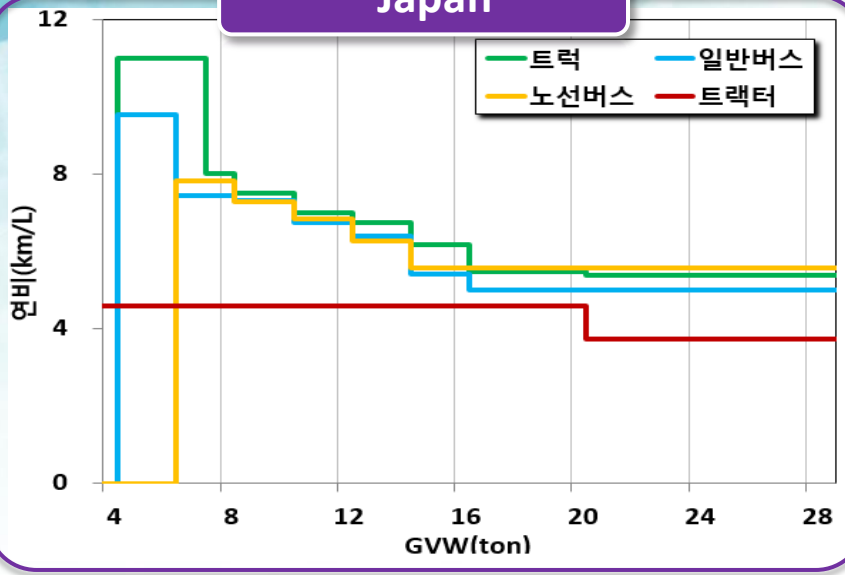
Combined tractor



Vocational vehicle

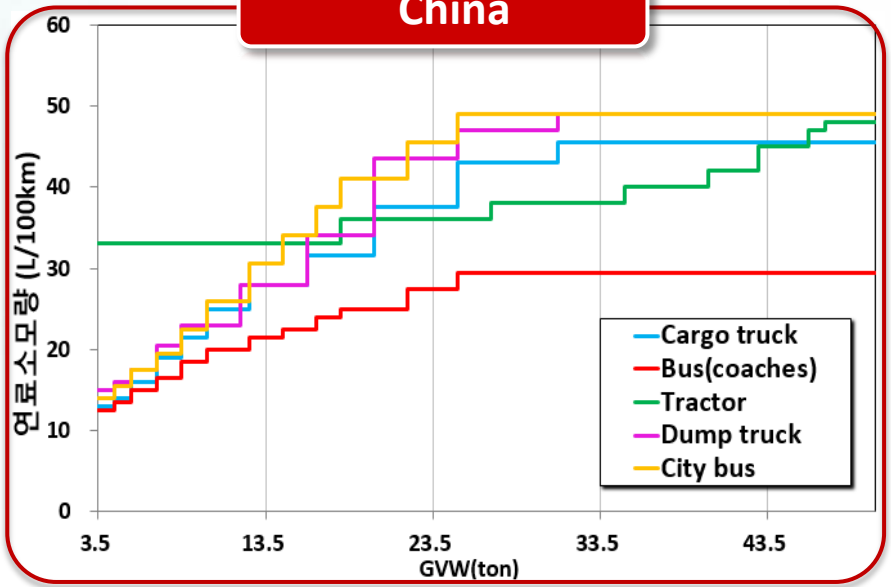


Japan



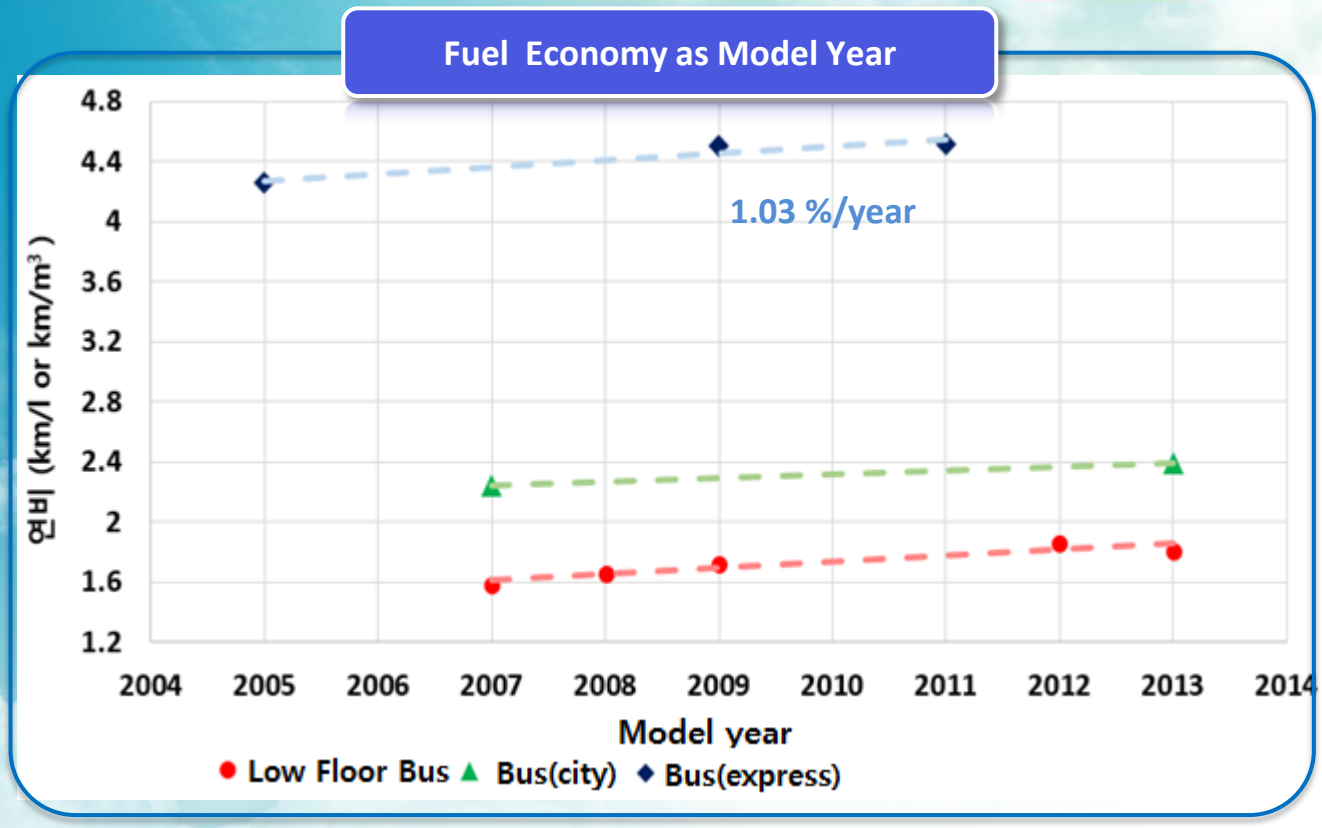
source: MLIT(국토교통성)]

China



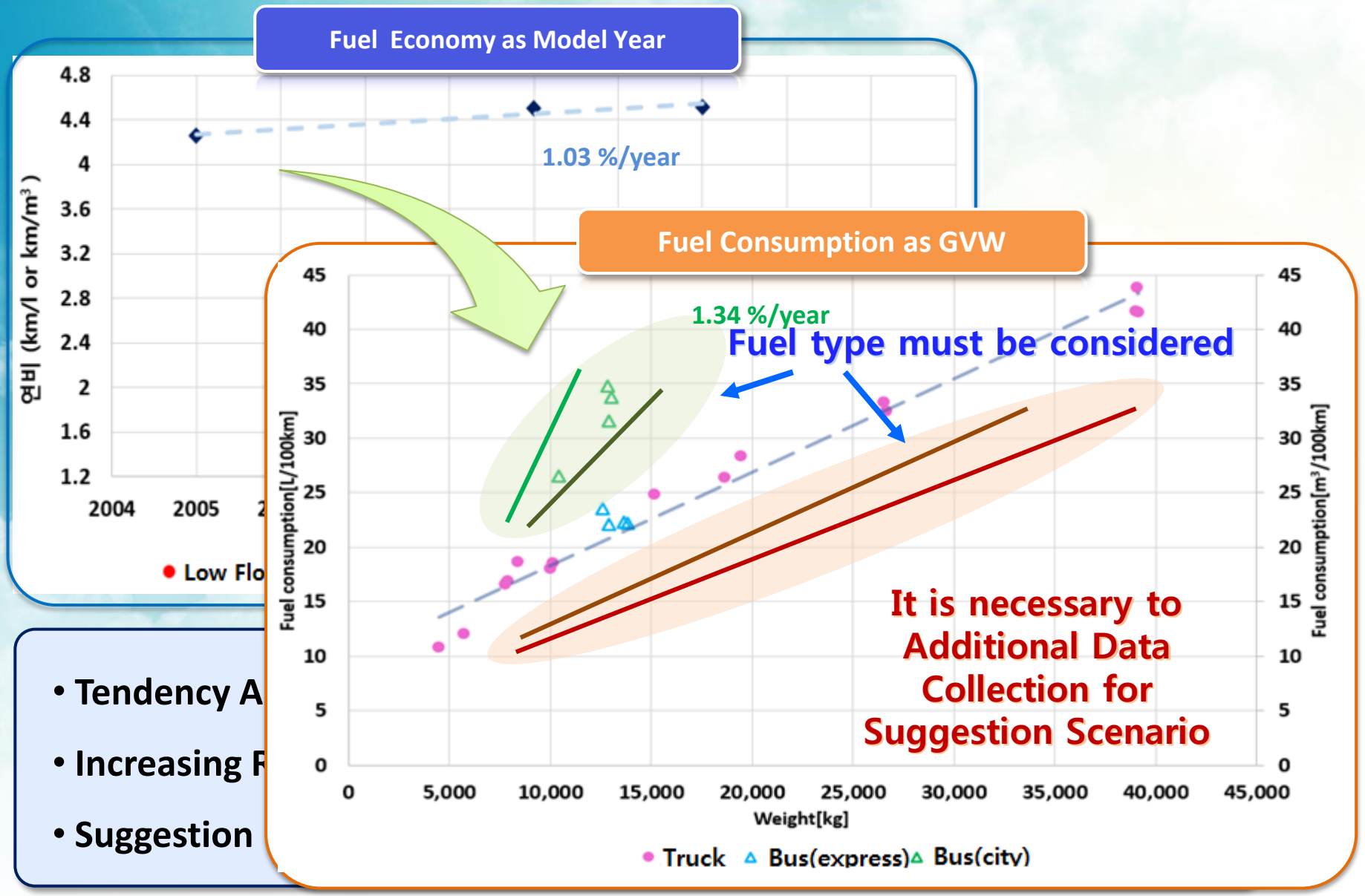
source: ICCT]

Fuel Economy Scenario



- Tendency Analysis of Bus with different type
- Increasing Rate is about 6 ~ 14% as model year
- Suggestion Fuel Economy Scenario considered Increasing Rate

Fuel Economy Scenario



- Tendency A
- Increasing F
- Suggestion

Issues

- Standization of Test Procedure for HDV
- Selection of HDV segmentation Criteria
- Collection Experimental Data (type, fuel, model)
- Suggestion Fuel Economy Scenario from Big Data

Thank you

for your attention