

Informal document GRB-57-22  
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agenda item 3(b))

# Japanese proposal on R51 limit values ~Rationality of Thresholds for N2 and M3~

JASIC



## **Basic concept of Japanese proposal on limit values with sub-categories in GRB/2012/7 (Formal Document)**

At GRB 56, based on the Monitoring database (856 vehicles) and the Japanese database (184 vehicles) and in consideration of Inf. Doc. GRB-54-03, proposed by the expert from Germany, Japan has proposed subcategories, limit values and tolerances in WP29./GRB/2012/7.

Basic concepts of the revised proposal are as follows;

- Stage 1 limit values are chosen from around 10% cut-off levels of the frequency distributions of Monitoring+ Japanese database. Owing to the introduction of the new test method with Stage 1 limit values and ASEP, the reduction of the road traffic noise is expected.
- Moreover, Stage 1 of ECE R51-03 could be involved in IWVTA.

- Stage 2 limit values are chosen from about 30% or more cut-off levels of the frequency distributions of Monitoring+ Japanese database in order to reduce the road traffic noise further.
- The application date of Stage 1 should be 2 years after the entry into force of R51-03, while the application dates of Stage 2 should be basically 4 years after Stage 1 for Non-heavy duty vehicles (M1, M2(GVW $\leq$ 3.5t) and N1) except Small Low Power trucks, and 6 years after Stage 1 for heavy duty vehicles (M2(3.5t<GVW), M3, N2 and N3). As the development cycle of Small Low Power trucks is similar to Heavy duty vehicles, the application date of Stage 2 of Small Low Power trucks is 6 years after Stage 1.

- “3 stage” approach is very ambitious but has clear message for enforcing the vehicle noise level. Because of the uncertainty of noise reduction technology advance and other regulations that might influence on noise reduction measures (ex. CO2 and pollutant emission regulation) , Japan proposes the temporary limit values and entry-into-force dates of Stage 3, which shall be reviewed and fixed until the entry-into-force date of Stage 2. The limit values are reviewed to be about 70% or more cut-off level, which might be more practical.

# Proposal on new limit values

Unit: dB(A)

		Stage 1	Stage 2		Stage 3 <sup>3</sup>	
		2 years after entry into force of ECE R51.03	4 years after stage 1	6 years after stage 1	[4] years after stage 2	[6] years after stage 2
M1	PMR ≤ 120 kW/t	72	70	-	[68]	-
	120 < PMR ≤ 160 kW/t	73	-	71	[70]	-
	PMR > 160 kW/t	75	73	-	[72]	-
M2	GVW ≤ 2.5 ton	72	70	-	[69]	-
	2.5 ton < GVW ≤ 3.5 ton	74	72	-	[71]	-
	3.5 ton < GVW	75	-	73	-	[71]
M3	P ≤ 135 kW	76	-	74	-	[73]
	135 < P ≤ 250 kW	79	-	78	-	[76]
	P > 250 kW	80	-	78	-	[76]
N1	GVW ≤ 2.5 ton and PMR(GVW) <sup>1</sup> ≤ 35kW/t	74	-	72	-	[70]
	GVW ≤ 2.5 ton and 35kW/t < PMR(GVW) <sup>1</sup>	72	70	-	[68]	-
	2.5 ton < GVW ≤ 3.5 ton	74	72	-	[71]	-
N2	P ≤ 135 kW	77	-	76	-	[73]
	P > 135 kW	78	-	77	-	[75]
N3	P ≤ 250 kW	80	-	78	-	[76]
	P > 250 kW	82	-	80 <sup>2</sup>	-	[78]

1 “PMR(GVW)” means PMR calculated by using the maximum authorized vehicle mass.

2 Entry-into-force date of N3 with an engine power exceeding 250 kW for stage 2 is 8 years after stage 1.

3 Limit values and entry-into-force dates of “Stage 3” shall be reviewed and fixed until the entry-into-force date of “Stage 2”.  
[Tolerance]

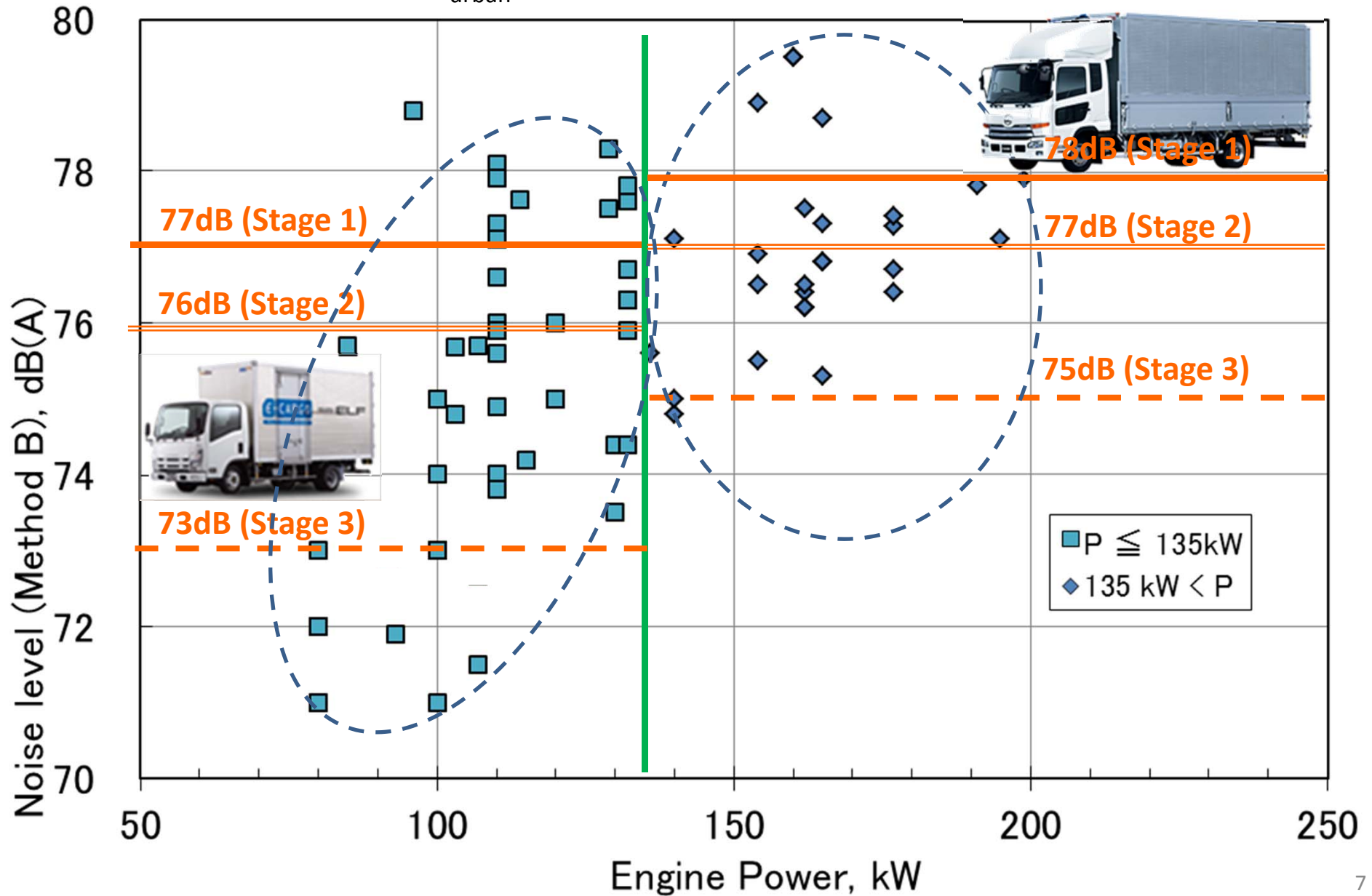
- 1dB for Off-road Vehicles (M1 is restricted to those with wading depth 500 mm (See Annex 13) and having the ability to climb 30 percent gradient)
- 2dB for M3 equipped with an engine having rated engine speed exceeding 4000 rpm

## Analysis of the proposed Sub-categories of N2 and M3

- At the last GRB session, GRB agreed to verify data and provide a basis for analysis for a power reference value of 160 kW in vehicle category M3 and for the reference value of 140 kW in vehicle category N2. And finally, GRB agreed to resume consideration on this subject at its February 2013 session on the basis of the above test data, if available, and on those existing provided by the experts from China, Japan and EC.
- Japan is the opinion that the threshold should be 135 kW especially for N2 and M3.
- Using Monitoring and Japanese database, the subcategories of N2 and M3 are analyzed as the following slides.

# Analysis of N2

$L_{urban}$  Distribution of N2 category



## ➤ Line-ups of the Japanese N2s

- Japanese N2s are divided into two groups, one is “Small Type Truck” equipped with a small heavy duty engine (HDE) for urban driving, and the other is “Medium Type Truck” equipped with a medium HDE for inter-city driving mainly.

“Small Type Trucks” ( $85 \leq P \leq 132$  [kW])



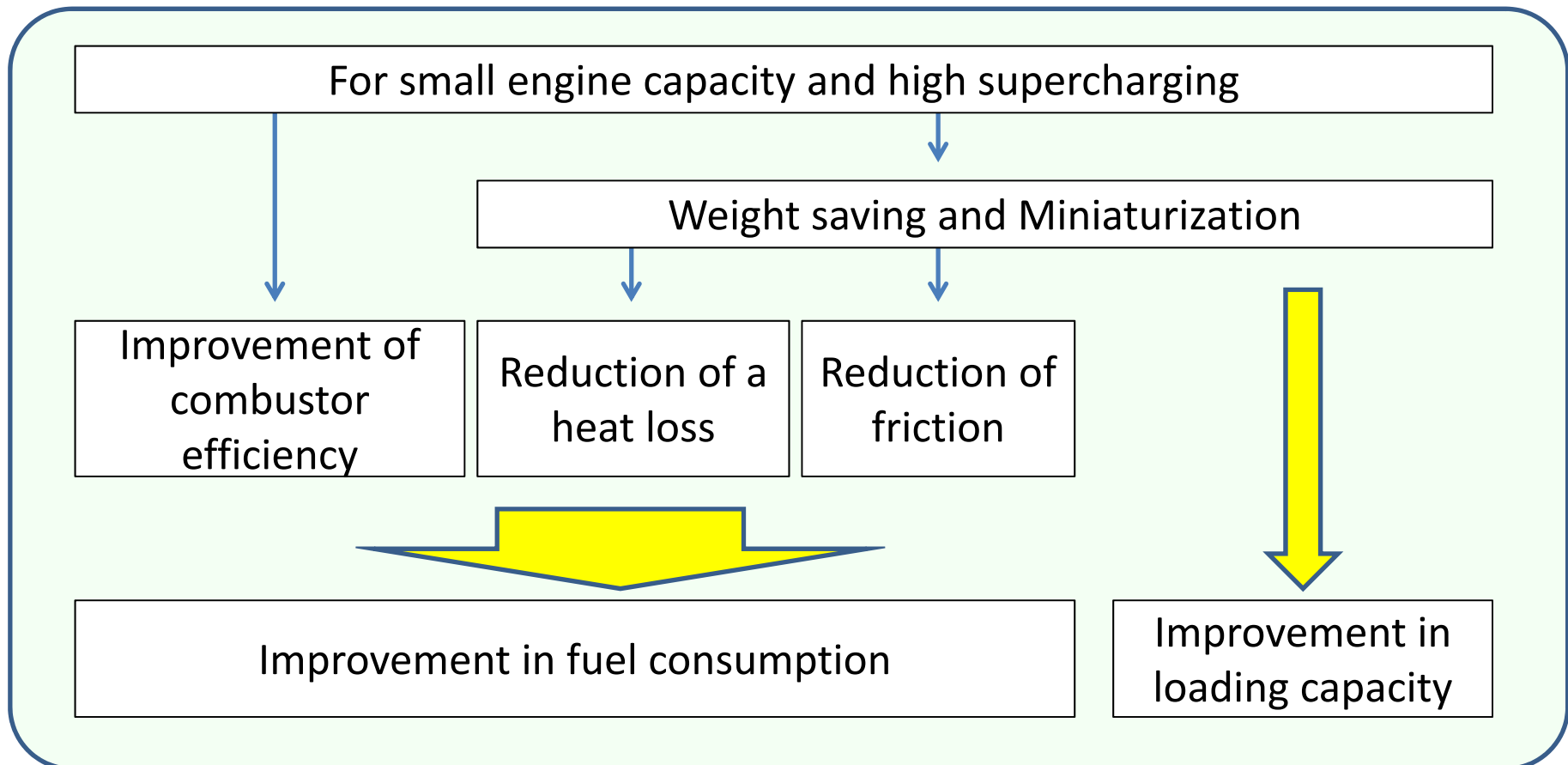
“Medium Type Trucks” ( $132 \leq P \leq 199$  [kW])<sup>1)</sup>



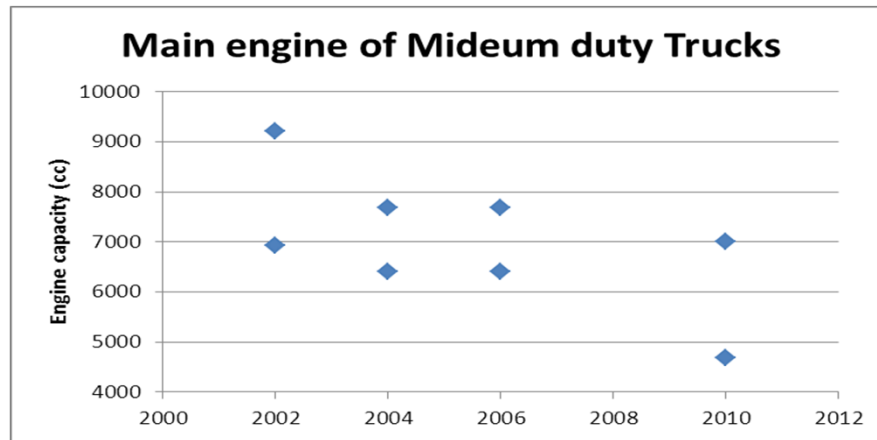
1) Among “Medium Type Trucks”, there are those equipped with small power engines, such as 110 and 129 kW. Those engines are originally designed for “Small Type Trucks” but a few 8 ton GVW trucks equip with them.



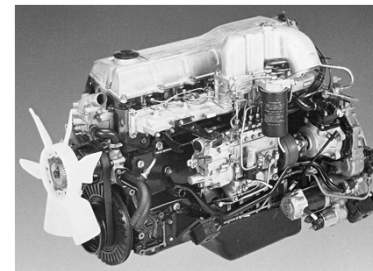
- The heavy duty and medium duty engines tend to be downsizing, which means reducing the engine power and improving fuel efficiency, in Japan. The threshold for noise regulation should not be the restriction of engine downsizing of Medium Type Trucks.



The main engine of medium-duty truck has also changed to 4 to 7 liter and 4 or 6 cylinder engine from the around 8 liter 6 cylinder engine. And especially adoption of a 4-cylinder engine of small capacity is increasing.



2001~2



FE6E (6cyl / 7.0l)

2010

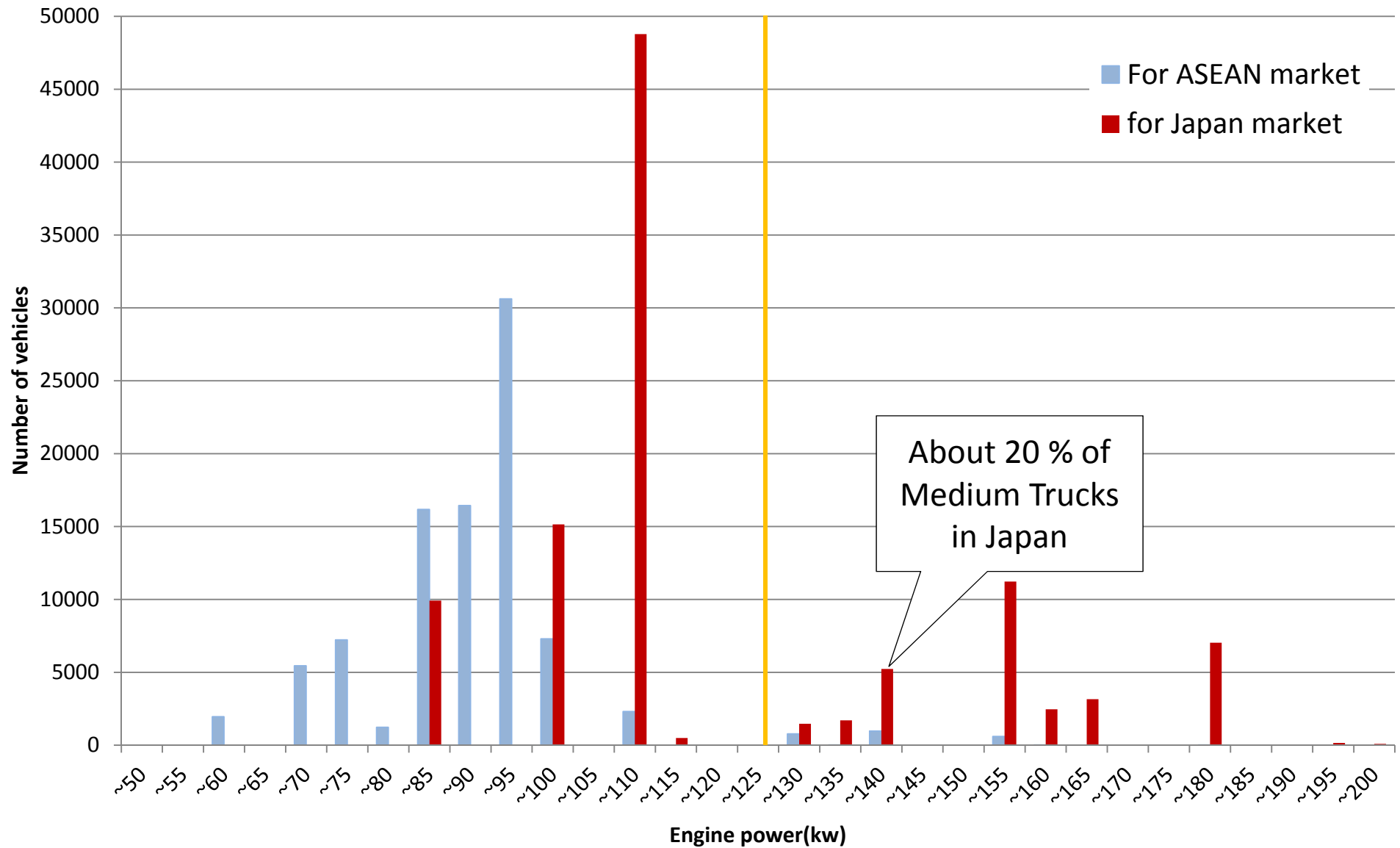


GH5 (4cyl / 4.7l)

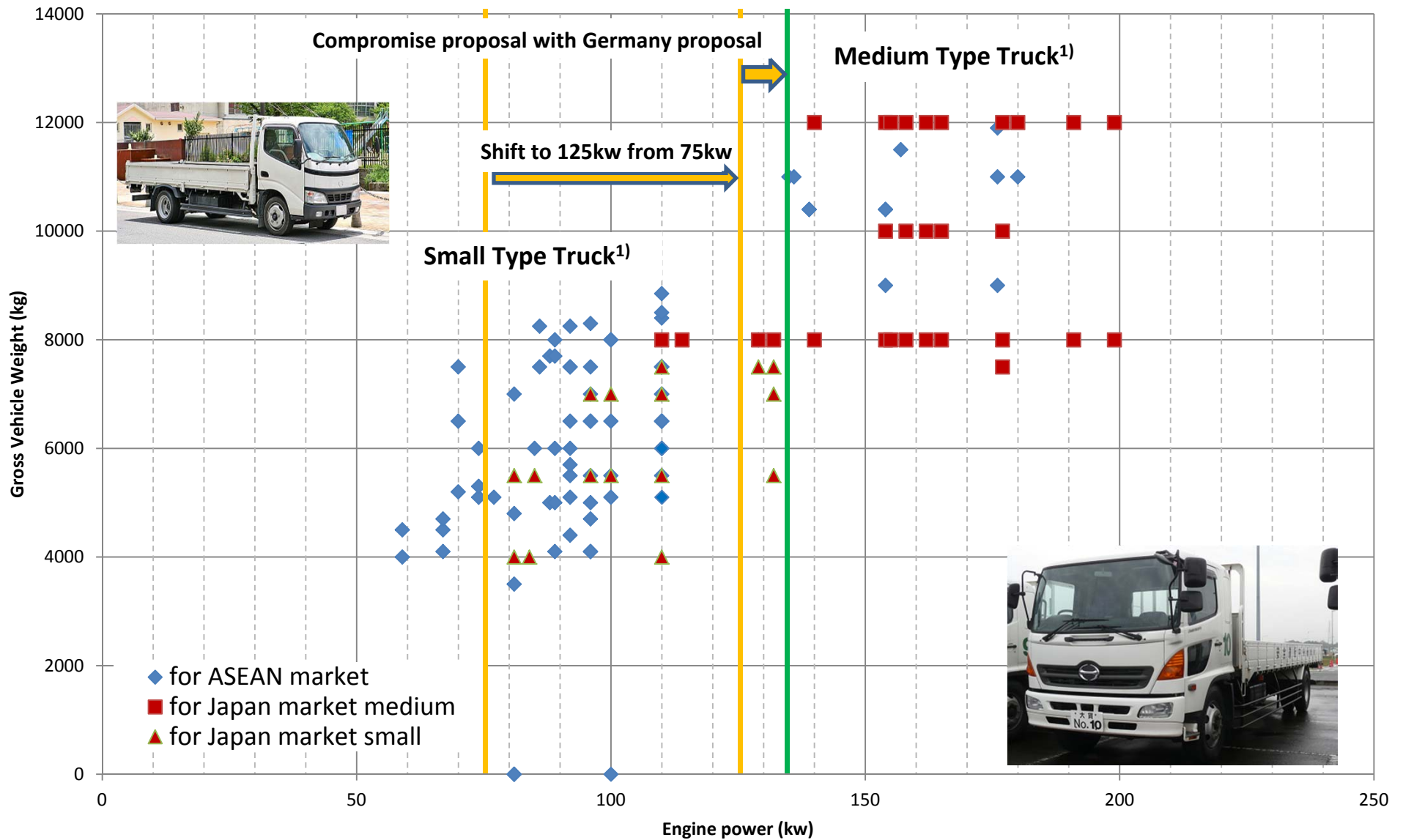


# ➤ Sales Trends of the Japanese N2s in ASEAN Market

## Number of Sales for ASEAN market (N2) in 2011



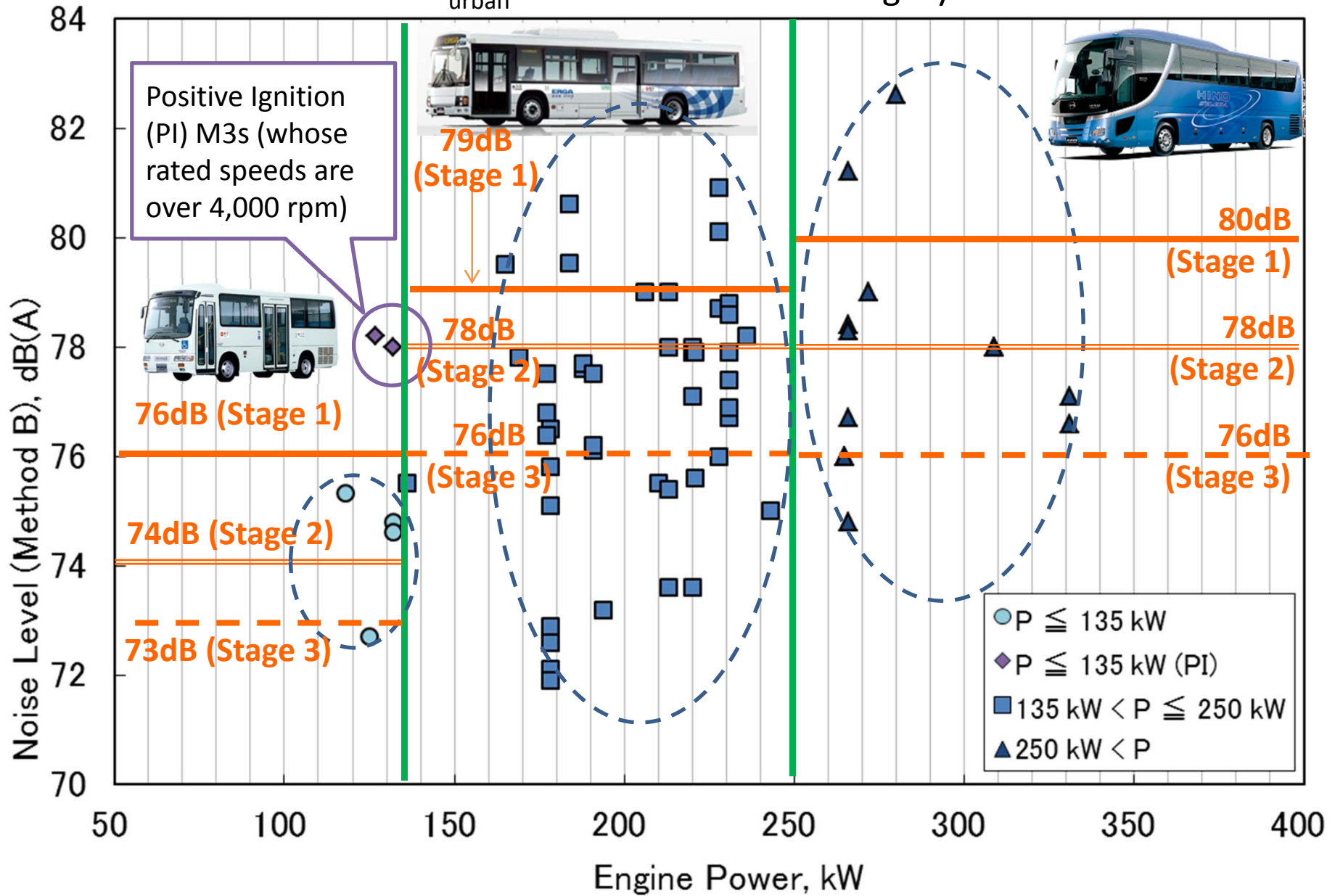
# Engine power Distribution of N2 category for Japan & ASEAN market in 2011



1) "Medium" and "Small" type are divided in accordance with engine power and GVW. 110kW , 114 kW or 129kW "Medium" type trucks equips with the same engine as those of "Small" type trucks.

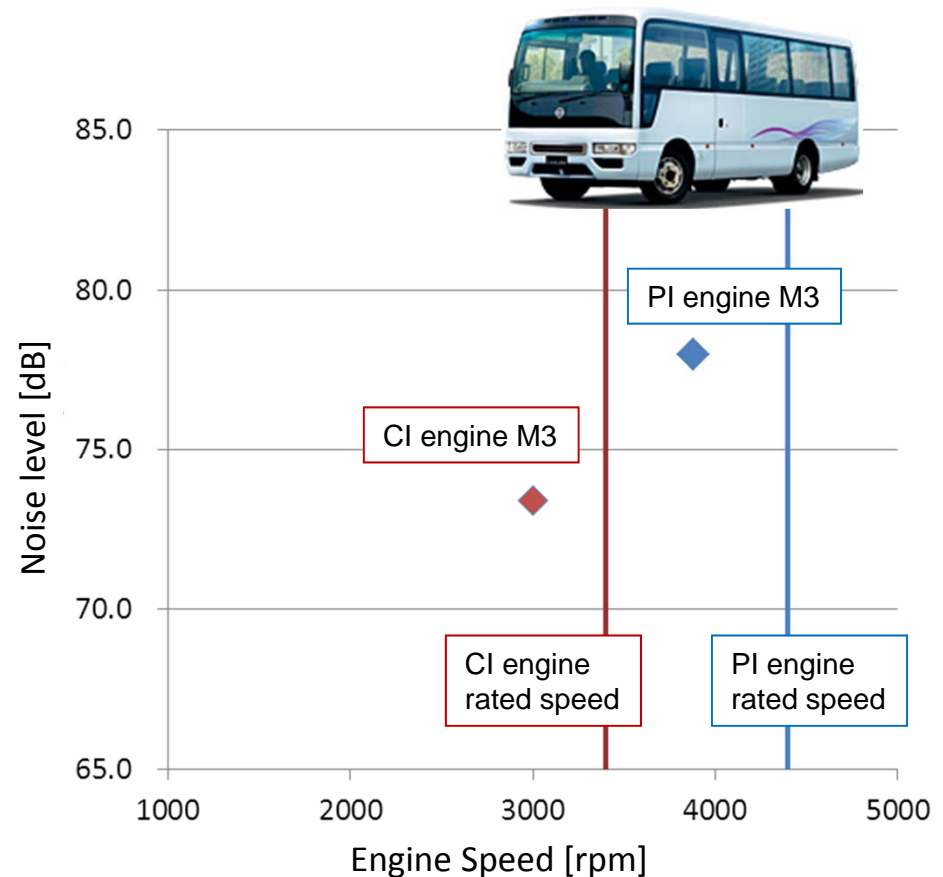
# Analysis of M3

$L_{urban}$  Distribution of M3 category



- Difference between PI and CI engines in M3  
 Difference between PI and CI engines are due to the difference of engine rotating speeds.

	PI	CI
Engine Type	TB45E	ZD30DDTi
Cylinder layout	Linear 6	Linear 4
Cylinder Capacity	4.478 L	2.953 L
Rated Power kW(PS)/rpm	127(173)/4400	110(150)/3400
Transmission	5MT	5MT
Driving type	2WD	2WD
GVW	5315 kg	5405k g
Passenger	29名	29名
Max engine speed in R51 test	<b>3880rpm</b>	<b>3000rpm</b>
Noise level(dBA)	78.0	73.4



➤ Line-ups of the Japanese M3s

- Japanese M3s are divided into two groups, one is “City Bus”, which has not exceeding 250 kW engine, and the other is “Inter-city and Tourist Coach Bus”, which has exceeding 250 kW engine. City Buses are divided into two subgroups.
- Small city buses equip the same engines as small N2, while large city buses equip the same engines as large N2.

“Small City Buses” ( $118 \leq P \leq 132$  [kW])



Same Engine



“Small Type Trucks”



“Large City Buses” ( $165 \leq P \leq 221$  [kW])



Same Engine

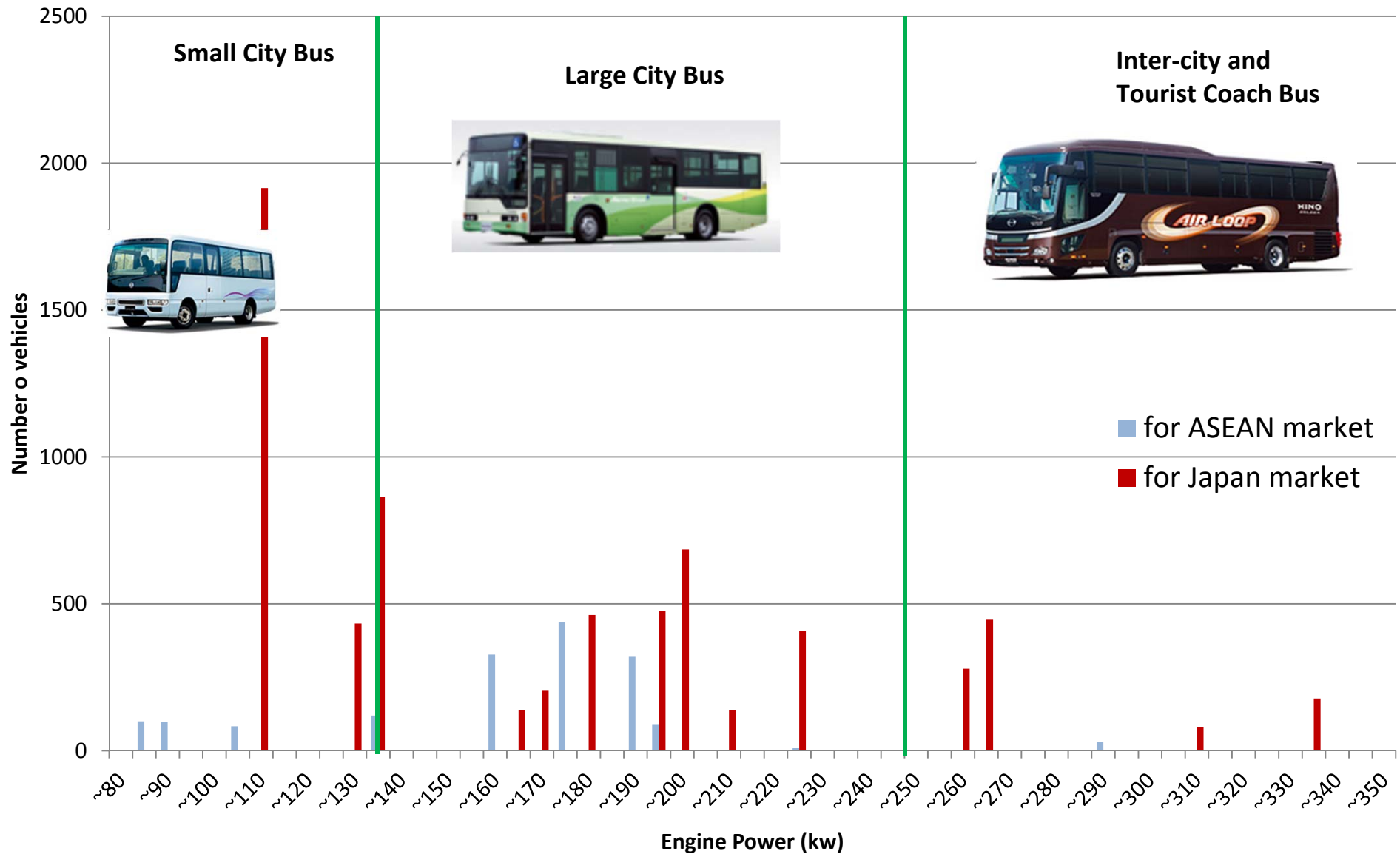


“Medium Type Trucks”



# ➤ Sales Trends of the Japanese M3s in ASEAN Market

Number of Sales for ASEAN market (M3) in 2011





**Thank you !**

