

# Policy framework for sustainable freight transport

---

Masahiko NAITO

Director-General,  
Engineering and Safety Department  
Road Transport Bureau

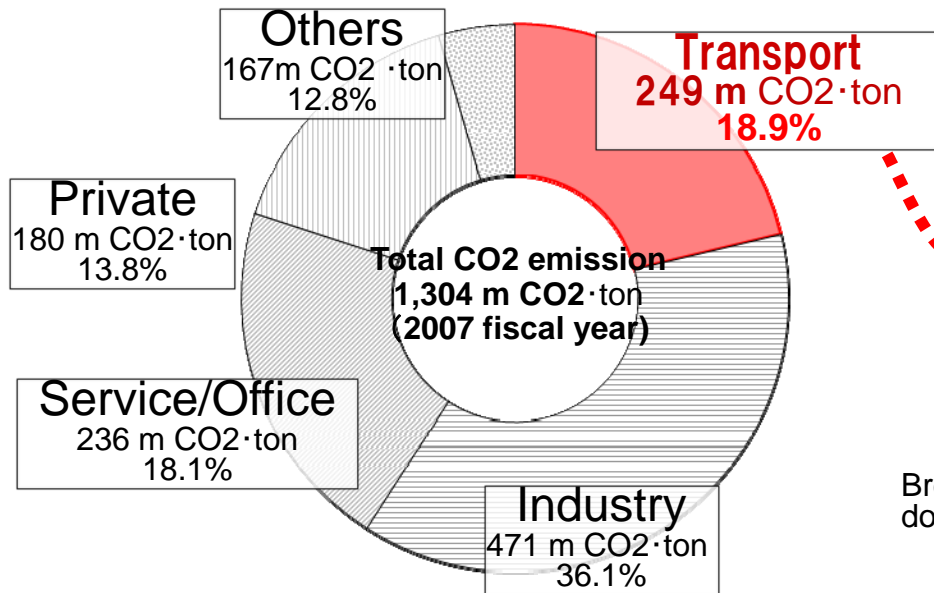
Ministry of Land, Infrastructure, Transport and Tourism(MLIT)  
Japan

- CO2 emission in transport sector in Japan
- Advanced technologies and regulations: Fuel Efficiency regulation, simulation method and R&D program
- Fiscal Incentives and Labeling
- Behavior and efficient logistics
- City Planning and EFVs
- Conclusion

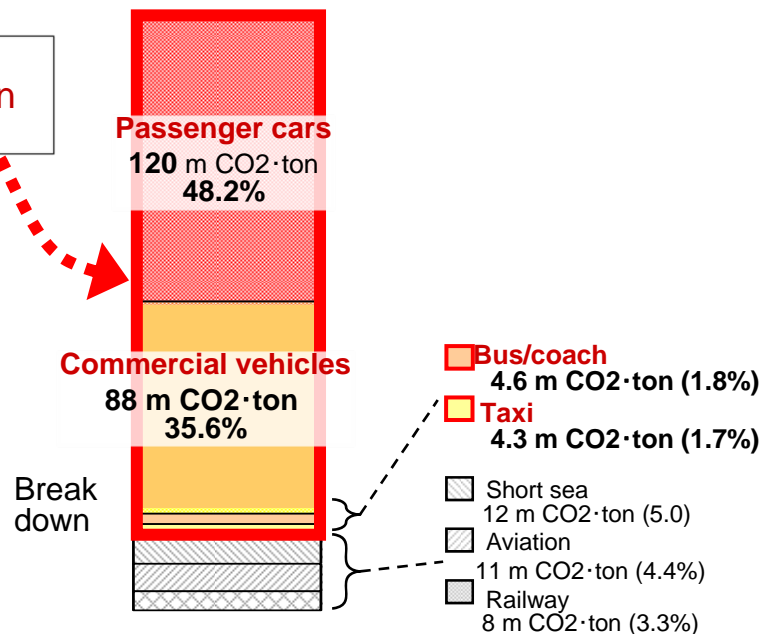
# CO2 Emission from transport sector in Japan

CO2 Emission from transport sector is 19% of total emission in Japan.  
Road transport emits 87% of transport emission.

CO2 Emission in Japan



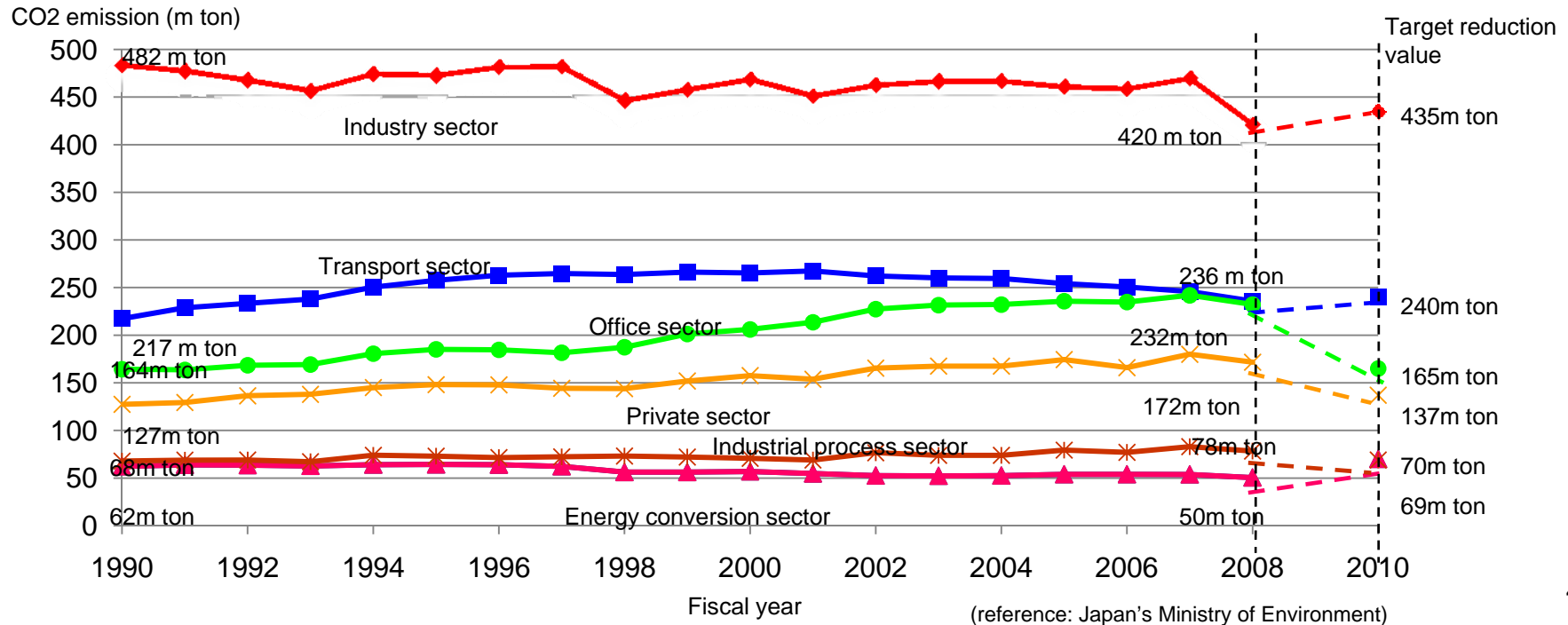
Breakdown in Transport sector



※ Emission from electric generation and thermal generation are distributed to final demand sectors according to amount of consumption of each sector.

※ Developed by MLIT referring to “Japanese GHG Inventory report “

Total CO2 emission increases by 13.3% compared to 1990 level.  
 Transport sector has turned into decrease.



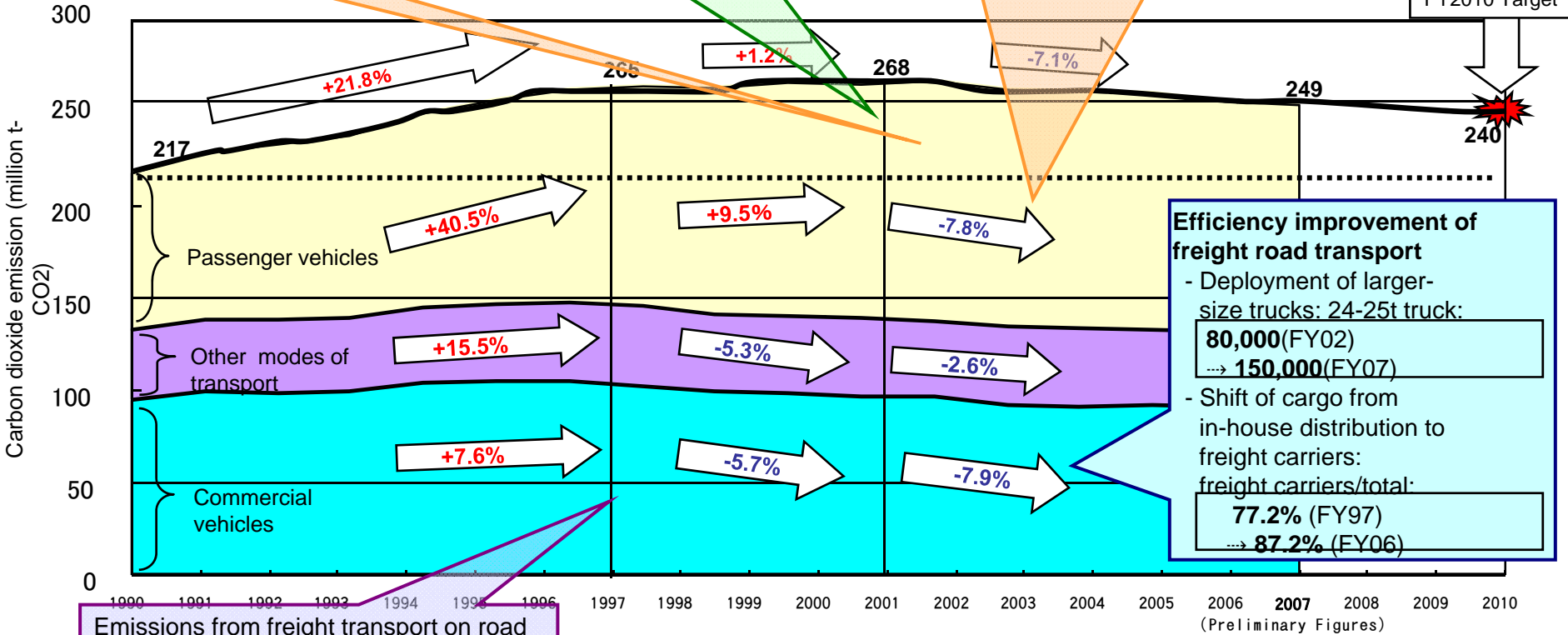
# CO2 emission in Transport sector

Emissions from passenger transport on road peaked in FY2001.

Since FY2001, emissions from the transportation sector have been on a downward trend.

## Improvement of mileage of passenger vehicles

- Fuel Efficiency regulation
- Green Tax (Since FY2001)
- 14.4mil./57.5mil. registered vehicles are GREEN



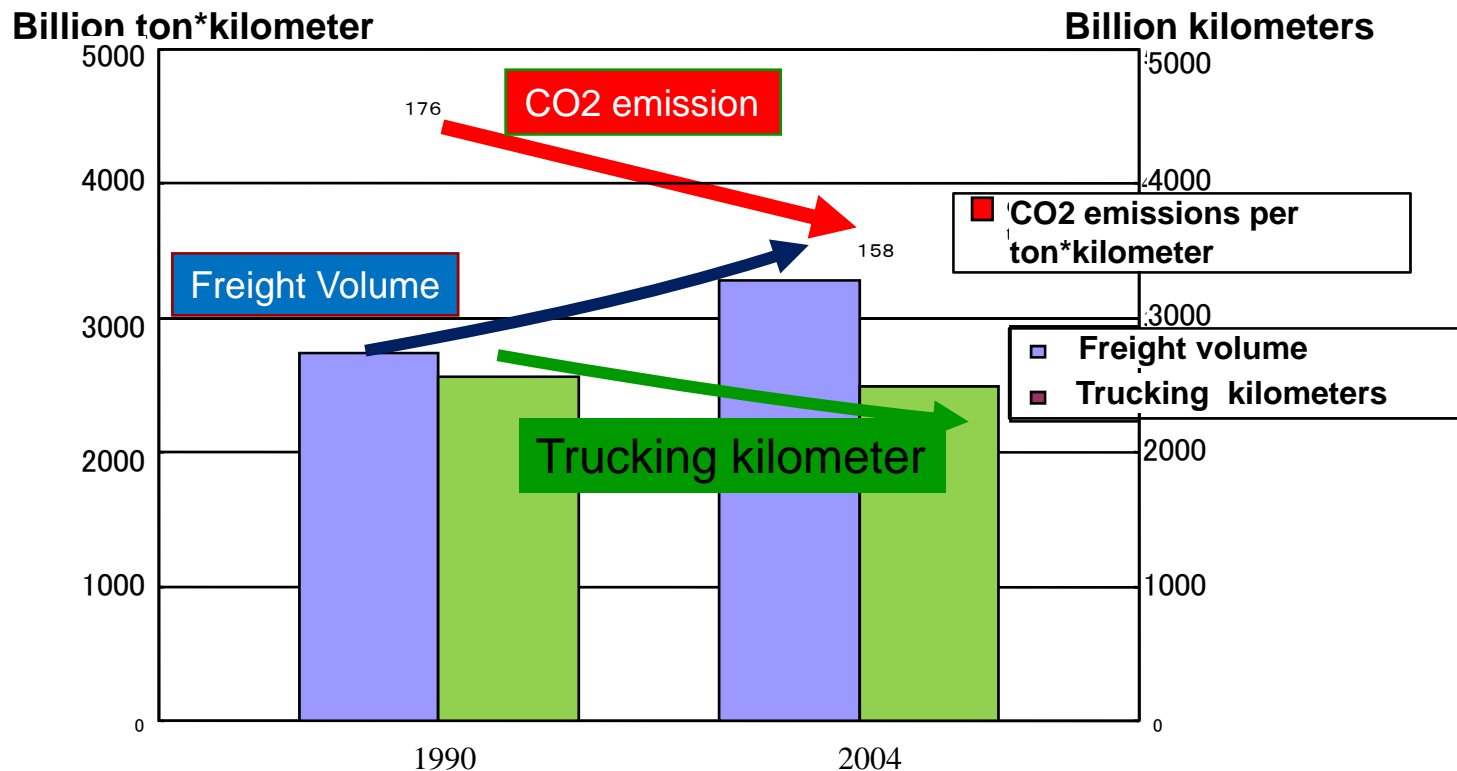
Emissions from freight transport on road peaked out in FY1996

### Efficiency improvement of freight road transport

- Deployment of larger-size trucks: 24-25t truck:
  - 80,000 (FY02)
  - 150,000 (FY07)
- Shift of cargo from in-house distribution to freight carriers:
  - freight carriers/total: 77.2% (FY97)
  - 87.2% (FY06)

# Decoupling of CO2 reduction and growth

This graph shows symbolic result of decoupling in freight transport sector. CO2 emission and trucking kilometers had been decreased, while freight volume(ton-kilometer) increased.



# Key for success; Integrated approach

The key for success in decoupling growth of transport demand and CO2 emission is an approach to integrate all the relevant measures in coordinated way.

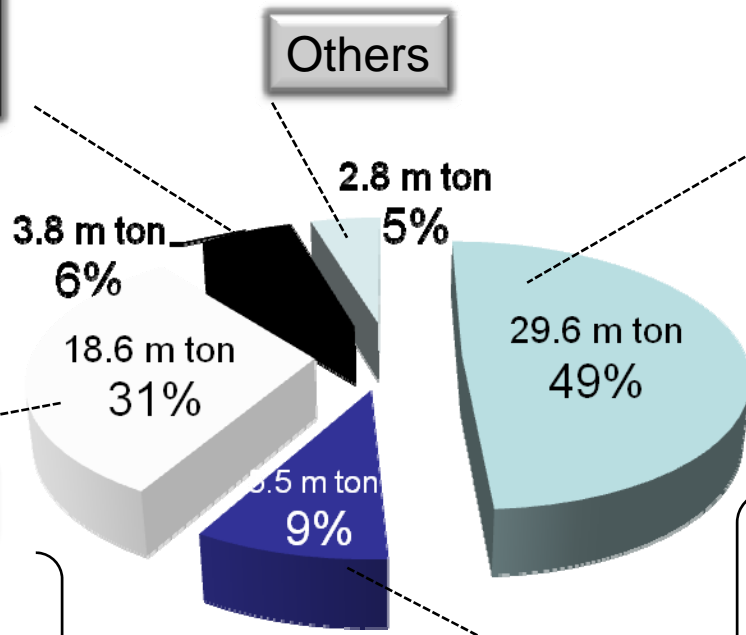
Breakdown of reduction potential In transport sector  
(National action plan for achievement of Kyoto protocol)

## Mobility management/ Public transport

- Mobility shift to Public transport
- New transport infrastructure for railways

## Efficient logistics

- Deployment of larger trucks
- Shift of cargo from in-house distribution to freight carriers:



## Vehicle technology and Driving behavior

- Fuel Efficiency regulations (LDV/HDV)
- Fiscal incentives for EFVs
- Labeling
- Eco-driving

- Elimination of bottlenecks, such as railroad crossing
- ITS, Electric Toll gate system
- Flexible toll for highway

## Better flow of traffic

- CO2 emission in transport sector
- **Advanced technologies and regulations: Fuel Efficiency regulation, simulation method and R&D program**
- Fiscal Incentives and Labeling
- Behavior and efficient logistics
- City Planning and EFVs
- Conclusion

# Fuel efficiency regulation for N1: Light Duty Trucks

By 2015, the average performance will be improved by 12.6% compared to 2004.  
 - Categories are ramified using multiple parameters, fuel/vehicle structure/transmission/ and weight, to reflect varied specifications of N1 vehicles

Average Fuel Efficiency in 2004(base year)	Average Fuel Efficiency in 2015(target year)	Improvement
13.5 km/L	15.2km/L	12.6%

\* JC08 mode.

	Fuel		Structure			Trans-mission		Weight Category
Mini(-660cc)	-		Van	Cab-over Van/Truck		AT	MT	2-4 categories
- GVW1.7t	-		-			AT	MT	2-3 categories
GVW 1.7t-3.5t	Gas	Diesel	Van	Cab-over van	Cab-over Truck	AT	MT	1-8 categories

# Fuel efficiency regulation for Heavy Duty Trucks

The first fuel efficiency regulation for HDVs in the world. By 2015, the average performance will be improved by 12.2% compared to 2002.

Average Fuel Efficiency in 2002(base year)	Average Fuel Efficiency in 2015(target year)	Improvement
6.32 km/L (415g-CO2/km)	7.09 km/L (370g-CO2/km)	12.2%

\* JE05 mode.

GVW (t)	3.5 -7.5				7.5 -8	8 -10	10 -12	12 -14	14 -16	16 -20	20-
Payload (t)	-1.5	1.5-2	2-3	3-							
Fuel efficiency (km/L)	10.83	10.35	9.51	8.12	7.24	6.52	6.00	5.69	4.97	4.15	4.04

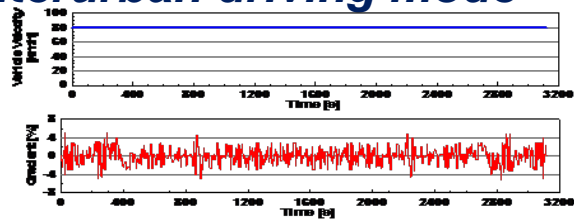
# Simulation Method for fuel efficiency testing for HDV

Japan adopted “simulation method” for the fuel efficiency testing. It is an effective way to avoid time and money consuming testing for HDVs which have lots of varieties with types for a single engine.

<Weighting factor: 0.9 (GVW-20t)/ 0.7 (GVW 20t)->

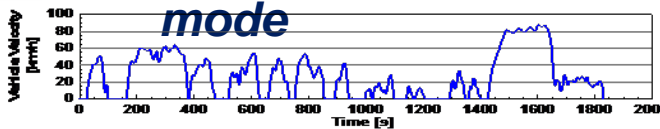
<Weighting factor: 0.1(GVW-20t) / 0.3 (GVW 20t)->

**Interurban driving mode** →



**Driving mode**

← **Urban driving mode**



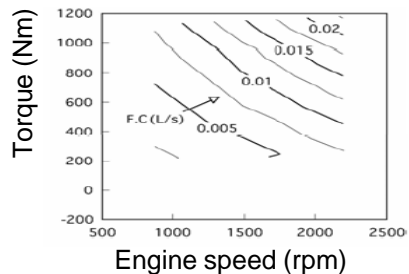
- Determine gear-shift positions.
- Calculate engine speed and torque.

Vehicle specifications

Engine speed/torque data vs. time

**Fuel efficiency map** →

**Computing**



**Fuel consumption**

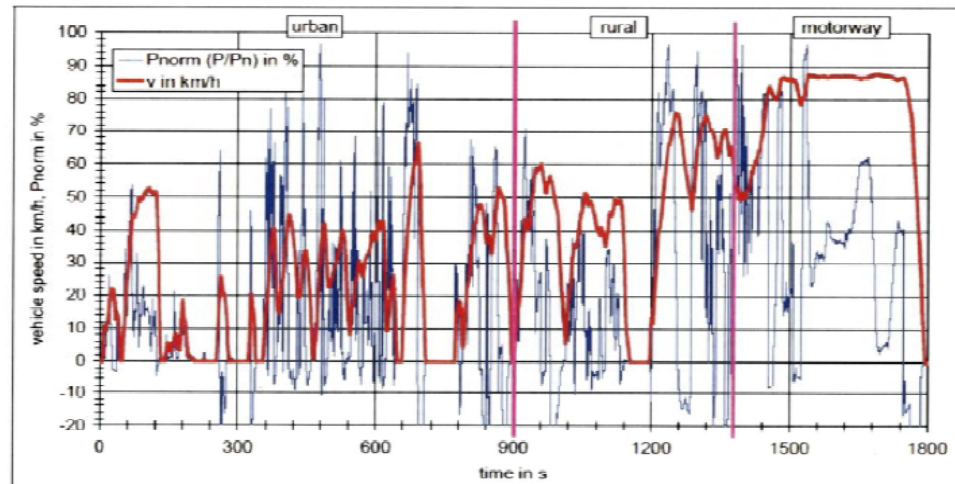
$$= \sum_{i=start}^{end} F.C.(i)$$

**Phase of conversion**

**Phase of calculation of fuel efficiency**

\*Before simulation, perform operation tests to create a fuel efficiency map

- WHDC; in a process of world wide application
- Next step; Development of internationally harmonized test cycle for fuel efficiency /CO2 regulation incorporated with a simulation method.



WHTC mode in gtr.4 (WHDC)

A national project "Next generation EFV(HDV) project" has been implemented to develop next-generation low-pollution trucks and buses in cooperation with research institute, academics, manufactures. Verification running tests for improving their practicability are being conducted.

## <Vehicle types under development>



<DME\* Vehicle>



<Inductive power transferred hybrid vehicles>



<Large CNG\* Vehicles >



<LNG\* Vehicles>



<FTD\* Vehicles>



<Super Clean Diesel Engine>



<Hydrogen Engine>

\* DME: dimethyl ether

\* CNG: Compressed Natural Gas

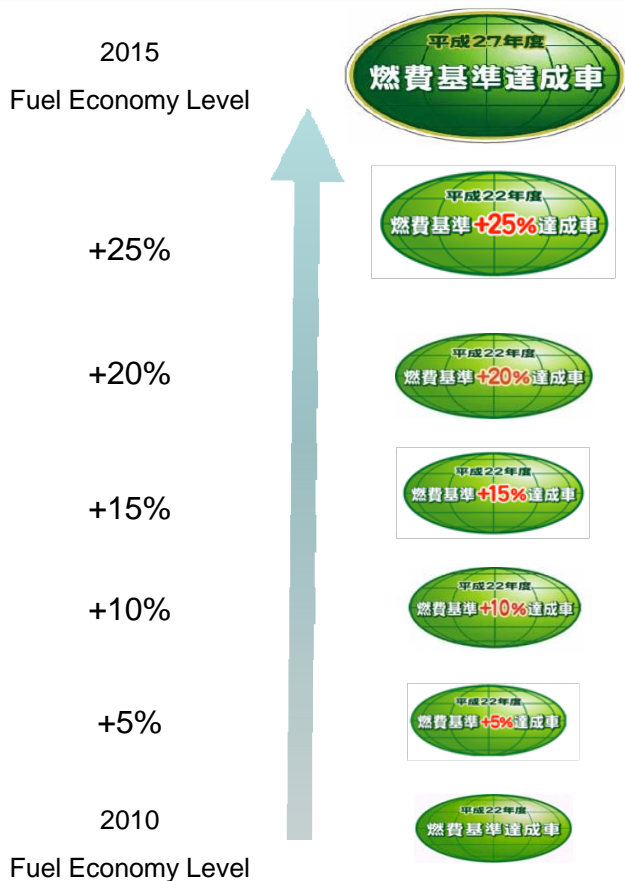
\* LNG: Liquefied Natural Gas

\* FTD (Fischer-Tropsch Diesel): New type of fuel that is diesel like, made from Natural Gas, Biomass, etc.

- CO2 emission in transport sector in Japan
- Advanced technologies and regulations: Fuel Efficiency regulation, simulation method and R&D program
- **Fiscal Incentives and Labeling**
- Behavior and efficient logistics
- City Planning and EFVs
- Conclusion

# Labeling and Fiscal incentives

Labeling and fiscal incentives are significantly essential to accelerate dissemination of EFVs.



<div style="background-color: yellow; padding: 5px; border: 1px solid black; text-align: center;"> <b>Tax incentive Apr. 2008 - Mar. 2011</b> </div>	<b>Initial tax (Acquisition tax)</b>	<b>Annual tax (Engine capacity based tax/ Weight based tax)</b>
EV, PHEV, HV, CNG, Clean Diesels	<b>Exempted</b>	<b>Exempted (weight based) / -50% (capacity based)</b>
Normal ICEs (Gasoline) <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">                           燃費基準+25%達成車                          +25% 2010 FE reg                     </div> <div style="text-align: center;">                         and                     </div> <div style="text-align: center;">                           低排出ガス車                          +75% JP05                     </div> </div> <hr style="border-top: 1px dashed black;"/> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">                           燃費基準+15%達成車                          +15% 2010 FE reg                     </div> <div style="text-align: center;">                         and                     </div> <div style="text-align: center;">                           低排出ガス車                          +75% JP05                     </div> </div>	<b>-75%</b>	<b>-75%(weight based) / -50% (Capacity based)</b>
Normal ICEs (Diesel) <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">                           燃費基準達成車                          2015 FE reg                     </div> <div style="text-align: center;">                         and                     </div> <div style="text-align: center;">                           JP09 level                     </div> </div> <hr style="border-top: 1px dashed black;"/> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">                           燃費基準達成車                          2015 FE reg                     </div> <div style="text-align: center;">                         and                     </div> <div style="text-align: center;">                           低排出ガス車                          +10% JP05                     </div> </div>	<b>-75%</b>	<b>-75%(weight based)</b>

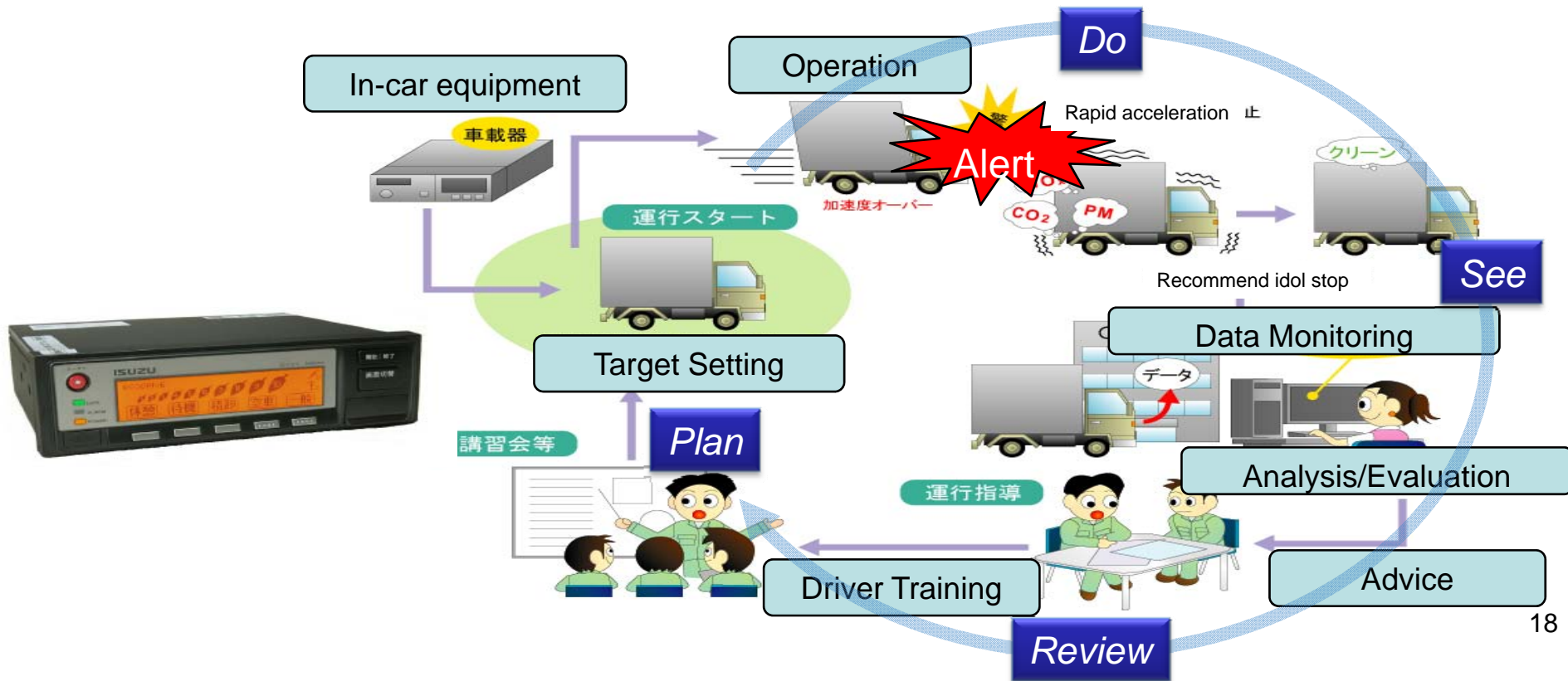
\* In addition to Tax incentive, we have subsidy scheme for EFV

- CO2 emission in transport sector in Japan
- Advanced technologies and regulations: Fuel Efficiency regulation, simulation method and R&D program
- Fiscal Incentives and Labeling
- **Behavior and efficient logistics**
- City Planning and EFVs
- Conclusion



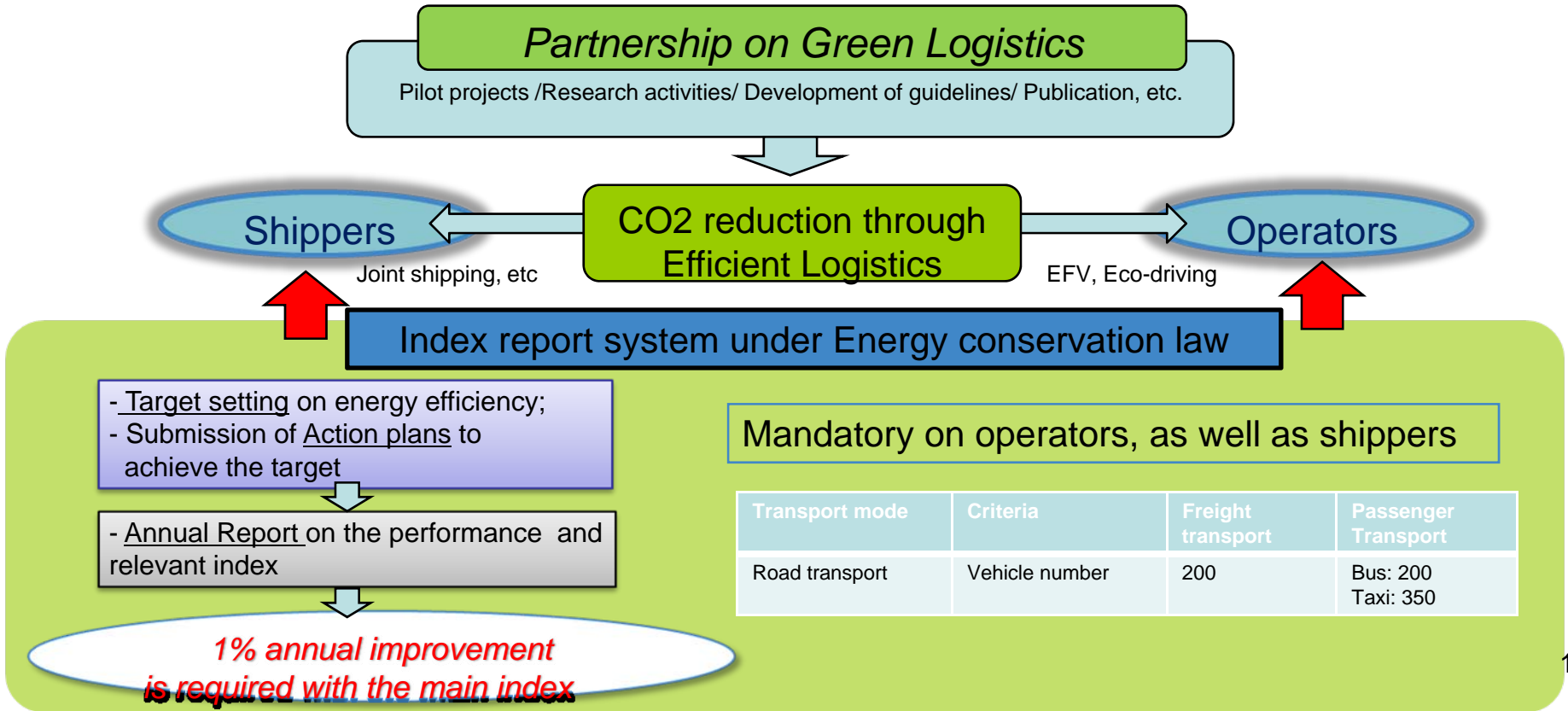
# EMS: Eco-driving in road freight sector

For freight operator, we have subsidy program on EMS(Eco-driving Management System). It assures long term effect of Eco-driving through continuous monitoring and control in operation.



# Legal instrument and voluntary initiatives for efficient operation

To enhance efficiency of operation, cooperative Initiative among shippers and operators is significantly essential. Legal instruments, like index report system, also plays an important role to facilitate their actions.



- CO2 emission in transport sector in Japan
- Advanced technologies and regulations: Fuel Efficiency regulation, simulation method and R&D program
- Fiscal Incentives and Labeling
- Behavior and efficient logistics
- **City Planning and EFVs**
- Conclusion

# For the future of transport

Future of road transport should be realized through harmonized and simultaneous evolution of “vehicle technologies”, “people’s behavior” and “city planning/Infrastructure”.

## Vehicle technologies

Electric vehicles will be popularly used thanks to technology innovation

Electric vehicles and plug-in hybrid vehicles will be disseminated in urban area.

Electric buses will prevail mainly around urban area.

Super-clean diesel will be introduced to trucks for long range.

Electric vehicles and plug-in hybrid vehicles are partly on sale.

## Behavior change

Optimized combination between public transportations and personal mobility will be achieved.

Style of using or possessing vehicles will be changed.

Eco-drive will be widely practiced.

Transport companies try to use “eco-drive”.

Changes in the usage of vehicles are implied by the appearance of car-sharing or low-cost rental cars.

## City planning, Infrastructure

Best transportation system will be developed in compact cities

Environment for electric vehicles will be completely established in all area.

Advanced infrastructure will be developed by municipalities one after another.

Environment for electric vehicles will be established in big cities.

Diffusive structure of cities remains.

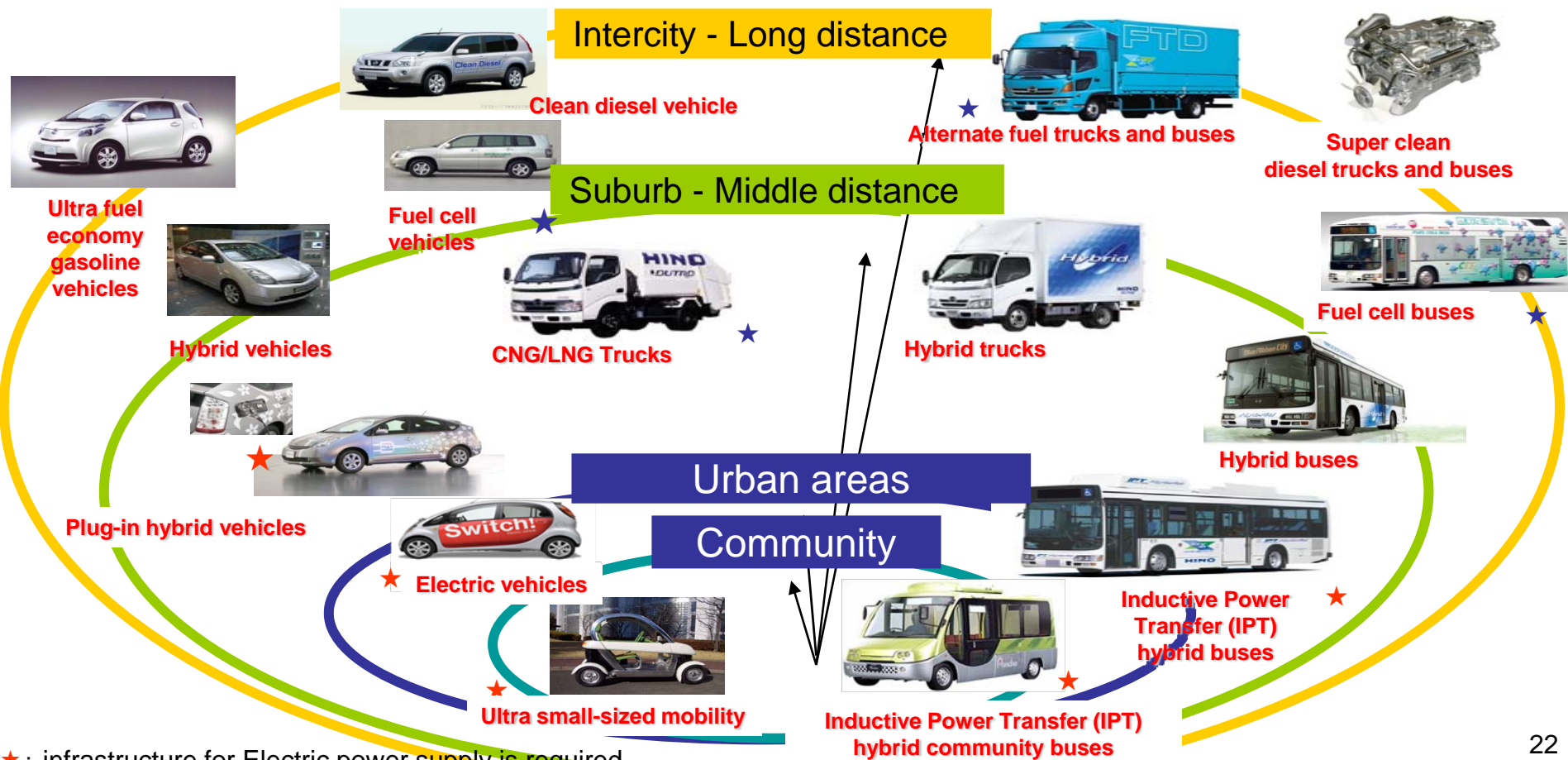
Environments for electric vehicles are not established.

## Road transport in 2050

## Road transport in 2020

## Road transport today<sub>21</sub>

# Best use of new propulsion system and conventional vehicles



- CO2 emission in transport sector in Japan
- Advanced technologies and regulations: Fuel Efficiency regulation, simulation method and R&D program
- Fiscal Incentives and Labeling
- Behavior and efficient logistics
- City Planning and EFVs
- **Conclusion**

- CO2 reduction in road transport sector;
  - challenging, but feasible by the best mix of effective policy tools,
- Fuel Efficiency regulation and vehicle technologies;
  - significantly contributes, especially in combination with well designed fiscal incentive and labeling;
  - Simulation method and International harmonization
- Behavior and efficient logistics;
  - immediate action, sustainable and cost effective,
- Efficient logistics;
  - also crucial in freight transport sector,
- City planning and EFVs;
  - Harmonized evolution of “vehicle technologies”, “people’s behavior “and “city planning/Infrastructure “ for the sustainable future of transport.
  - R&D activities for better ICE technologies encouraged.

*Thank you for your listening attentively*