Japan International Cooperation Agency
Ulaanbaatar City Government
Ministry of Environment and Tourism

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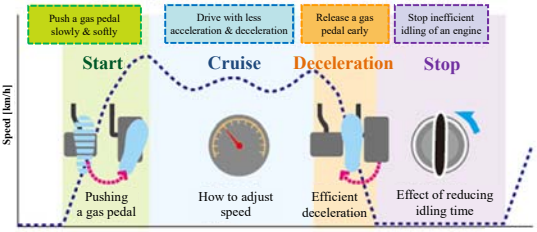
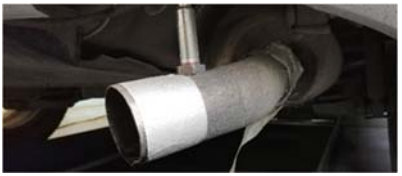
The Initiatives for Improving Various Problems in Automobile Society by Eco-Driving

The eco-driving support device installation example



The eco-driving image diagram
(Environmental Restoration and Conservation Agency of Japan)



Example of measurement vehicle for impact of reducing exhaust gas before and after the introduction of the eco-driving

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Outline of pilot projects of the eco-driving

(1) Background

The eco-driving is one of the measures for improving various problems in the automobile society that any driver can easily take. The eco-driving can be done by being aware of the 13 driving methods shown in Table 1. By practicing the eco-driving, you can obtain mainly four effects: reducing environmental problems such as air pollution and global warming, improving the comfort of passengers and drivers, reducing traffic accidents, saving fuel costs, etc. By decision No.19/03 of National Committee for Environment Pollution Reduction in 2019, the Mayor of Ulaanbaatar city, Deputy Minister of Road Transport Development, and Commissioner of National Traffic Police Agency have been ordered to carry out regular inspections to control the traffic of diesel buses and diesel trucks in Ulaanbaatar with excessive pollutant emissions and without exhaust gas filters. Against the background of such implementation of environment pollution reduction measures for diesel buses and diesel trucks, this JICA project are providing activities on the following items related to the eco-driving.

① In order to understand the impact of reducing exhaust gas before and after the introduction of the eco-driving in Ulaanbaatar city, exhaust gas measurement by an on-board emission measurement system was done and vehicle operation data with the eco-driving support devices are collecting.
② The eco-driving support devices will be installed in some vehicles running in Ulaanbaatar, and the eco-driving seminar will be held for drivers and operation managers.
③ In order to reduce the emission of air pollutants by the eco-driving, awareness-raising activities to spread the eco-driving widely among Ulaanbaatar citizens will be provided.

Table 1 : Driving methods for the eco-driving

No.	**Driving details**
1	Avoid sudden starts and try to start gently (push a gas pedal slowly and softly)
2	Try to shift up early when starting and accelerating
3	Use high gears as much as possible
4	Try to drive with less acceleration and deceleration
5	When decelerating, release the gas pedal early and use engine braking
6	When driving the automobile, allow plenty of time and be careful not to drive too fast
7	Use the air conditioner moderately
8	Turn off the engine when stopping the vehicle for a while (stop idling)
9	Check traffic information and try to leave with plenty of time to avoid traffic jams
10	Check tire pressure regularly
11	Don’t put unnecessary luggage in the automobile
12	Don’t park in a way that obstructs traffic
13	Make it a habit to keep track of fuel consumption

(2) Utilization of the eco-driving technology

The effect of reducing exhaust gas through the eco-driving and the content of the eco-driving seminar, which will be confirmed and implemented in this project, will be expected widely recognized by Ulaanbaatar citizens. In addition, this project hope that many drivers in Ulaanbaatar city will practice the eco-driving, and that this will lead to an increase in Ulaanbaatar citizens' awareness of the need to improve the various problems of the automobile society.

The impact of reducing exhaust gas before and after the introduction of the eco-driving in Ulaanbaatar

This newsletter shows the emission measurement results by the on-board emission measurement system conducted in Ulaanbaatar city on 2021 and 2022. By comparing these results during normal driving and the eco-driving, this newsletter shows the expected effect of reducing exhaust gas per vehicle by implementing the eco-driving.

（1）Test route and test vehicle

Three routes were tested: a round-trip route on Peace Avenue, a round-trip route around Ulaanbaatar city, and a round-trip route in the high-speed section toward the airport. And three vehicles were tested: a gasoline passenger car, a gasoline hybrid passenger car, and a diesel light duty truck.

（2）Effects of reducing air pollutants through the eco-driving

As a result of implementing the eco-driving, the effect of reducing air pollutants in a gasoline passenger car was 12% for NOx, and 3% for fuel consumption, in a gasoline hybrid passenger car was 31% for NOx, and 2% for fuel consumption, and in a light duty truck was 33% for PM, and 13% for fuel consumption. About a diesel light duty truck, NOx increased by 13% due to improved combustion due to less fuel being put into the engine.

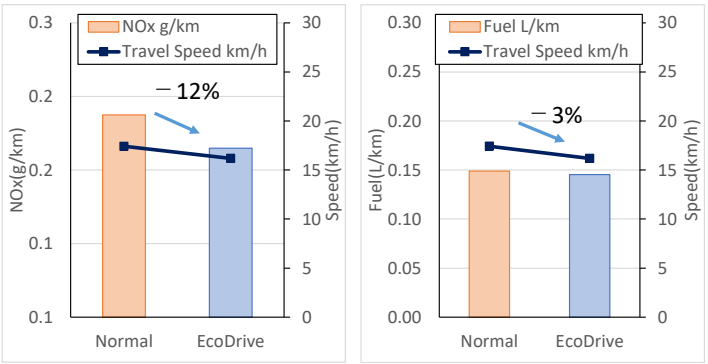

Fig. 1（1）: The effect of reducing air pollutants by the eco-driving（a gasoline passenger car）

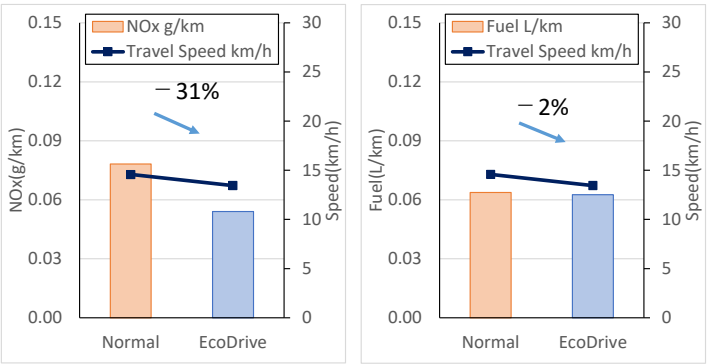

Fig. 1（2）: The effect of reducing air pollutants by the eco-driving（a gasoline hybrid passenger car）

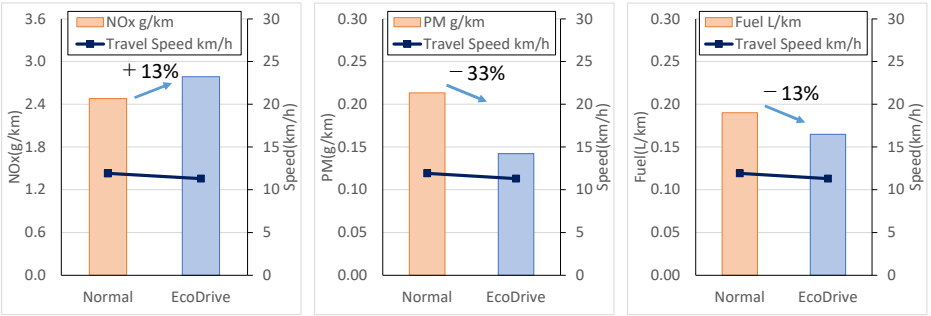

Fig. 1 (3) : The effect of reducing air pollutants by the eco-driving (a diesel light duty truck)

Future plans for the eco-driving pilot project

In this emission measurement results showed that the eco-driving had the effect of reducing air pollutant emissions and improving fuel efficiency compared to normal driving.

Currently, the eco-driving pilot project is proceeding installation of the eco-driving support devices to the vehicles of affiliated organizations of Ulaanbaatar and private companies. In the future, this project will implement the eco-driving seminar for drivers and operation managers of vehicles equipped with the eco-driving support devices.

In addition, this project will collect operation data during normal driving and the eco-driving using the eco-driving support devices, and specifically estimate the effect of reducing air pollutant emissions by implementing the eco-driving, which is expected in Ulaanbaatar city. This project hope that these data will be used as materials for consideration the introduction of laws and incentives to promote the eco-driving, and that many Ulaanbaatar citizens will recognize the benefits of the eco-driving, which will lead to drivers active improving to the eco-driving.

Technology transfer by this project

- Measure and evaluate the exhaust gas reduction effect of introducing the eco-driving in Ulaanbaatar city by the on-board emission measurement system.
- The introduction of the eco-driving support devices to the vehicles of affiliated organizations of Ulaanbaatar city and private companies, and implement the eco-driving seminar for drivers and operation managers of vehicles equipped with the eco-driving support devices.

Utilizing the output of this project

- This project hope to many Ulaanbaatar citizens understand the effects of the eco-driving, and that drivers' eco-driving efforts will not only reduce exhaust gas but also raise Ulaanbaatar citizens' awareness towards of various problems in the automobile society.

Figure 2 Flow of future utility of the eco-driving pilot project