Results of JAMA-Commissioned CO_2 Reduction Trial Study
-Estimating the Impact of Road Traffic Measures-

1. Trial Study Overview

The target for this study was the Oji section of the Tokyo Metropolitan Expressway's inner ring road—a 7.1 km segment from Adachi to Itabashi wards which was opened for service in December 2002. Based on road traffic data, CO_2 emissions were estimated for the months of October 2002 and October 2003, before and after the opening of this new route (and for local roads as well), which in turn permitted the calculation of the impact of this route's operation on CO_2 reduction.

Fig. Location of the Oji section (Tokyo inner ring road)

2. Methodology

(1) Data Sources

- Sectional traffic volume by route and time*1, average vehicle speed data: Survey data spanned the 23 wards of central Tokyo. Data for the Tokyo Metropolitan Expressway was obtained from the Metropolitan Expressway Company, Ltd., while information for major local roads was supplied courtesy of the Metropolitan Police Department (MPD). Traffic volume and average vehicle speed data for other roads was estimated on the basis of data provided in the *Fiscal 1999 Road Traffic Survey*.*2

For traffic volume and average vehicle speed, data for the one-month periods of October 2002 and October 2003 was expanded for use as annual estimates.

*1: Sectional traffic volume: Number of vehicles passing by a certain point within a fixed period of time.

*2: *Road Traffic Survey:* Fact-finding survey on nationwide road network improvements, motor vehicle traffic volume and other trends (conducted every 3 to 5 years by the Ministry of Land, Infrastructure and Transport and individual prefectures).

- Vehicle mix:
  Vehicle mix (passenger cars, trucks, buses, etc.) for the October 2002 and October 2003 data was assumed to be the same as that recorded (on the basis of direct observation from roadway observation points) for the *Fiscal 1999 Road Traffic Survey*.

(2) Calculation Methods
Estimates were developed on the basis of the mathematical relationship* between average vehicle speed and CO_2 emissions (fuel consumption). For that relationship, three models were used—those of the Ministry of Land, Infrastructure and Transport's National Institute for Land and Infrastructure Management, the Tokyo Metropolitan Research Institute for Environmental Protection, and the Japan Automobile Research Institute.

(*): In terms of volume, automotive CO_2 emissions are lowest at average speeds of 60-70 km/h, with increases in CO_2 emissions triggered by reductions in average speed linked to congestion and other factors.

3. Results (Estimated)

(1) As a result of the opening of the Tokyo Metropolitan Expressway inner ring road's Oji section, CO_2 emissions were calculated to have been reduced by roughly 20,000 to 30,000 tons annually.
In fuel-conversion terms, this is equivalent to the conservation of between 9,550 to 13,300 kiloliters of gasoline (in other words, the annual gasoline consumption of approximately 10,000 passenger cars).

Tokyo Metropolitan Expressway:	
	Increase of 39,000 to 51,000 tons (+2.4 to +2.5%)
Local roads:	Decrease of 68,000 to 73,000 tons (-1.8 to -2.1%)
Total:	Decrease of 22,000 to 31,000 tons (-0.4 to -0.6%)

(2) Average speed on the Tokyo Metropolitan Expressway improved by 0.2 km/h, and on local roads by 0.3 km/h.

(3) Vehicle distance travelled annually on the Tokyo Metropolitan Expressway rose by 180 million kilometers (+2.8%), while on local roads, that distance dropped by 160 million kilometers (-1.4%). This translates to an overall increase of 19 million kilometers in annual distance travelled (+0.1%).

4. Conclusions

(1) Confirmation that road traffic measures can be effective in reducing CO_2.

(2) Confirmation that existing road traffic data can be used for quantitative evaluations of CO_2 reduction resulting from the implementation of road traffic measures to alleviate congestion.

Note:
Tabulation of the number of road accidents (as per fiscal 2001 and fiscal 2003 *MPD Traffic Yearbook* data) occurring in the vicinity of the Oji section of the Tokyo Metropolitan Expressway's inner ring road before and after that section's operational launch revealed a decline in accidents on local roads of approximately 30%.
Source: Metropolitan Expressway Company, Ltd. Web site