

# Research Trends and Results

## Improving methods of predicting change of emissions of carbon dioxide from automobiles as roads open for service

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### 1. Introduction

The development of methods of predicting change of greenhouse effect gas emissions accompanying road projects has, until now, been done by various administrative bodies and research institutes inside and outside of Japan, but, a standard method which a road builder can practically apply at the road plan study stage has not been established.

So studies have been carried out to complete knowledge concerning the range of the impact of changes of traffic flow and of the emissions of carbon dioxide (below, "CO<sub>2</sub>") when a new road opens to traffic, and to overcome challenges to improving methods of predicting the range of such impacts.

### 2. Study method

Fifteen actual road plans (5 cases each of bypass, expressway, and ring road projects) were used to trial calculate change of traffic volume, traveling speed, and CO<sub>2</sub> emissions caused by the opening of a new road to service and to analyze the state of these changes, based on the CO<sub>2</sub> emission coefficient by estimated traffic volume and by travel speed.

Figure 1. Distribution of Change of CO<sub>2</sub> on the New Road and Surrounding Roads (Example of a bypass road, yellow shows the project location)

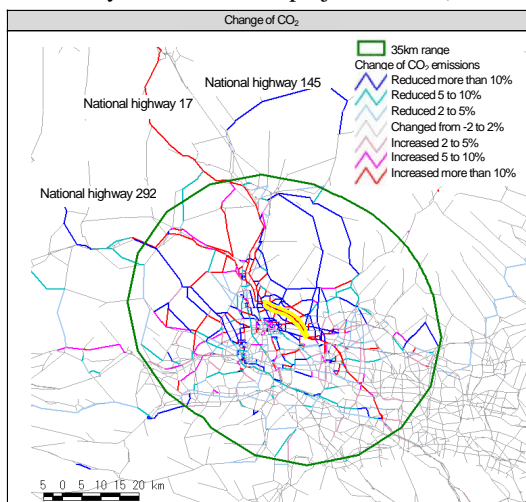
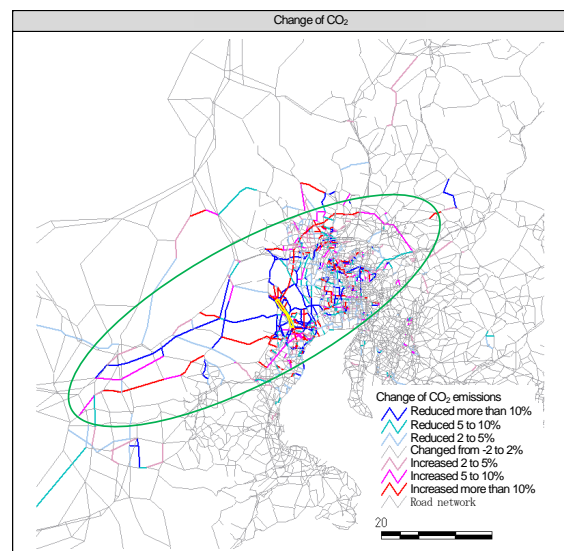


Figure 2. Distribution of Change of CO<sub>2</sub> on the New Road and Surrounding Roads (Example of a ring road, yellow shows the project location)



### 3. Results of the study

Figure 1 and Figure 2 show examples of the change of CO<sub>2</sub> emissions accompanying the change of traffic volume on the new road and on surrounding roads.

They show that while the traffic volume increases on the new road and sections at each end, on multiple roads parallel to the new road, the traffic volume falls accompanied by a decline of CO<sub>2</sub> emissions. As a result of analyzing such changes in traffic volume and CO<sub>2</sub> emission in detail, the following were obtained as criteria for the range of the evaluation of the new roads.

- |             |   |
|-------------|---|
| Bypass:     | for 10km of improved road, areal range of about 30 to 40km  |
| Expressway: | areal range on the inside of a distance of 50km or more. It is also effective to narrow the focus to expressways and national highways. |
| Ring road:  | wide areal area such as an entire regional block.   |

But in the future, the criteria must be verified by comparison with actual changes caused by the opening of a new road.

#### **4. Summary**

The successful results and knowledge provided by the study will be further verified in the future, and will contribute to the building of a method of predicting CO<sub>2</sub> emissions of road projects.