

# Consideration of the Method for Determining and Evaluating the Amount of Carbon Dioxide Emissions in the Road Field (Research Period: FY 2013–2016)

Ryuji Inoue, Head  
Masamichi Takimoto, Researcher

Yosuke Nagahama, Researcher  
Road Environment Division, Road Traffic Department

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## 1. Introduction

The Intended Nationally Determined Contributions, which Japan submitted toward COP21, specifies the goal of reducing the emissions of greenhouse gases, such as carbon dioxide, in FY 2030 as a 26.0% reduction compared with the FY 2013 levels. Based on this, the Global Warming Control Plan was approved by the Cabinet, and greenhouse gas reduction measures are required to be implemented in various sectors in Japan.<sup>1</sup> NILIM is working on the establishment of a method for determining the amount of carbon dioxide emissions at the stage of placing roads in service and maintaining them.

## 2. Determination of the Amount of Carbon Dioxide Emissions at the Stage of Placing Roads in Service

Since an increase in the speed of automobiles due to reduced traffic congestion leads to a reduction in fuel consumption, the construction of arterial roads and appropriate route selection are considered to contribute to a reduction in the amount of carbon dioxide emissions. Therefore, the amount of carbon dioxide emitted from automobiles was estimated using automobile driving data (private probe data, ETC 2.0 probe data, and traffic counter data, etc.) and emission factor,<sup>2</sup> then visualized as shown in Figure 1.

In this way, determining the amount of carbon dioxide emitted from automobiles visually and quantitatively helps to easily identify the extent of the amount of carbon dioxide emissions and the fluctuations in the emission amount before and after taking measures for traffic flow, which are expected to be utilized in evaluating the effect of such measures.

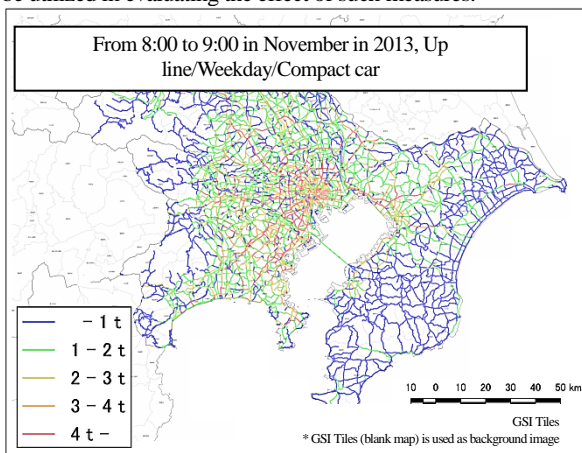


Figure 1 The amount of carbon dioxide emissions per unit road length

(Configured to enable the visualization of the amount of carbon dioxide emissions, the amount of traffic, and average travel speed, and numerical extraction.)

## 3. Determination of the Amount of Carbon Dioxide Emissions of the Road Construction Stage

Since it is necessary to understand direct emissions on-site and indirect emissions, such as the collection of the raw

materials for the material used, in the manufacture of material and transportation in order to determine the amount of carbon dioxide emissions associated with social capital improvement, it is effective to base the process on the concept of Life Cycle Assessment (LCA).

So far, we have considered not only the method for calculating the amount of carbon dioxide emissions (social capital LCA) based on the information (the scale, work type, and material of the structure) that can be gained in the decision-making stages, such as planning, design, and construction, but also that the carbon dioxide emission intensities by structure, by work type, and by material and equipment on the basis of the concept of LCA.

Figure 2 shows the result of preliminarily calculating the amount of carbon dioxide emissions using intensity based on the information obtained when comparing investigations of interchanges, etc., as was carried out during preliminary design stage. This method helps to determine quantitatively the total amount and the work type-based breakdown of carbon dioxide emissions associated with the construction, which is expected to be utilized in the appropriate evaluation of carbon dioxide emission reduction technologies in social capital improvement.

## Amount of CO<sub>2</sub> emissions

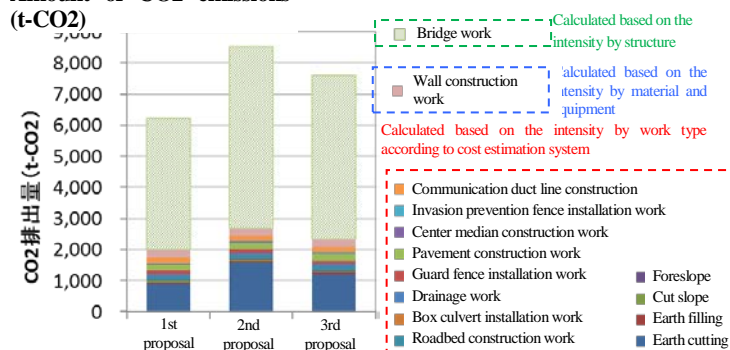


Figure 2 The result of preliminarily calculating the amount of carbon dioxide emissions based on social capital LCA (The carbon dioxide emissions were calculated based on the information obtained when comparing investigations of interchanges, etc., as was carried out during the preliminary design stage.)

## [References]

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