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Estimation of Taiwan's CO₂ Emissions Related to Fossil Fuel Combustion – A Sectoral Approach

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1. Introduction

In terms of annual carbon dioxide (CO₂) emissions, Taiwan emitted 293.66 million metric tons of CO₂ in 2007 and the volume was down to 279.14 million metric tons in 2009. However, from 2007 to 2009, Taiwan's CO₂ emission ranking rose from the 22nd to the 21st largest emitter in the world. International comparisons of total CO₂ emissions are shown in Table 1. After the Kyoto Protocol entered into force in 2005, the Taiwanese government convened its second National Energy Conference.³ The Taiwan Environmental Protection Administration (EPA), designated as the leading government agency in greenhouse gas policy, submitted its Greenhouse Gas Reduction Bill to the legislature in 2006. Unfortunately, the Greenhouse Gas Reduction Bill was not passed.

After President Ma Ying-jeou took office in 2008, he announced his target of stabilizing Taiwan's GHG emissions at 2008 levels by 2020. Furthermore, the Committee of Carbon Reduction of the Executive Yuan has proposed a national target for reducing carbon dioxide in fuel emissions, dropping to 2005 levels by 2020 and to 2000 levels by 2025. The EPA resubmitted the Greenhouse Gas Reduction Bill to the legislature in 2008. It is still being considered, but if it passes, the bill would authorize the EPA to regulate GHGs with a cap-and-trade scheme and sectoral emission performance standards. That is, the government of Taiwan is considering setting up a carbon trading exchange.

Accordingly, the understanding of the historical allocation of the carbon dioxide emission across sectors and industries becomes very important. This information will allow the government to evaluate the potential trading volume of a future domestic carbon market. To get a grip on the issue of potential trading volume, we start from estimating Taiwan's CO₂ emission levels. Since the largest source of CO₂ emissions is from the oxidation of carbon

³ As a response to the Kyoto Protocol, the government convened the first National Energy Conference in 1998.

The top 10 high-emitting subsectors in Taiwan are presented in Table 10 and the time trend of the 10 high-emitting subsectors in Taiwan is shown in Figure 7.

Unit: metric tons

Ranking	Average CO2 Emissions
Residential	33,558,590.7
Road	33,438,841.7
Electrical and Electronic Machinery	21,521,104.3
Petrochemical Materials	16,731,562.8
Iron and Steel	14,881,871.4
Other Services	12,219,482.9
Petroleum Refineries	9,730,109.3
Artificial Fibers	7,720,797.0
Textile, Wearing Apparel and Accessories	6,993,901.0
Cement and Cement Products	6,917,039.71

Table 10. Top 10 High CO₂ Emitters in Taiwan, 2005-2010

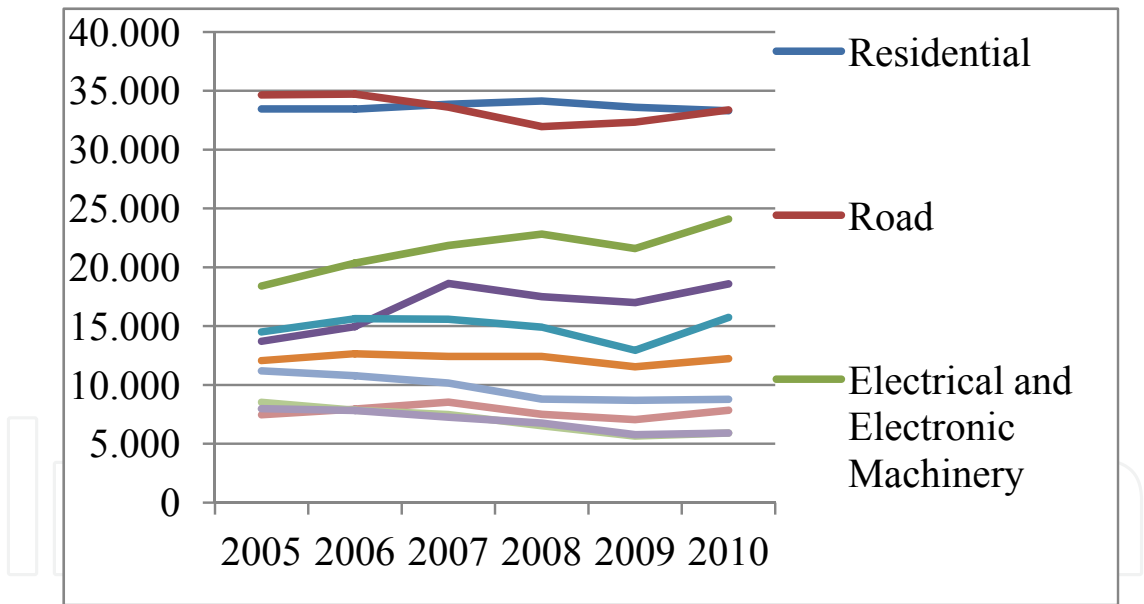


Figure 7. Top 10 High CO₂ Emitters in Taiwan, 2005-2010 Unit: 1000 metric tons CO₂ Emissions

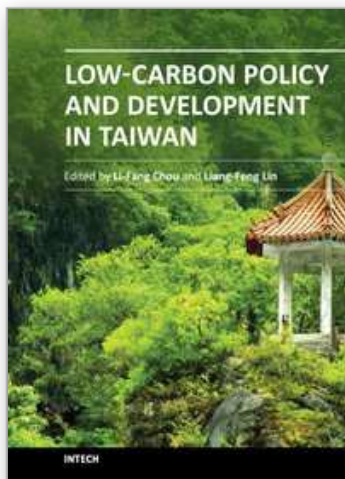
4. Conclusion and Future Research Direction

This paper is part of an ongoing research project designed to investigate the potential size of Taiwan’s carbon market. When tackling this big issue on the size of the carbon market, we first use IPCC’s sectoral approach to estimate CO₂ emissions from fuel combustion and examine the sectoral and subsectoral distribution of CO₂ emissions in Taiwan. Utilizing the Energy Balance Sheet compiled by the Bureau of Energy, this analysis is based on the fuel consumed in each subsector and the electricity used in the subsector.

With the results obtained in this paper, we are planning to examine the demand and supply structure of Taiwan's carbon market by projecting CO₂ emission data to year 2012 and 2013. Since the cap (emission rights) is given, the quantity of demand for emission rights and the quantity of supply for emission rights could thus be identified.

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Taiwan a typical small Asian country with few energy resources is well known for its high-tech industry in the last 20 years. However as a member of the global village Taiwan feels the responsibility to reduce carbon emissions. The book tells you how Taiwan transforms itself from a high-tech island to become a low carbon island. The book address Taiwan's low-carbon developmental policies of the past 10 years, applies an econometric approach to estimate Taiwan's sector department CO₂ emissions, shows how environmental change affects the economic growth of Taiwan, and provides two successful examples of low-carbon pilot regions in Taiwan. Stephen Shen, the Minister of the Environment Protection Agency of Taiwan, believes that the book arrives at the right time, because this is the time to educate the people of Taiwan, about the necessary action for achieving a low carbon society.

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