

Comparison and Analysis of CO₂ Emissions Data for China

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Abstract

This paper reviews the CO₂ emissions data for China provided by various international organizations and databases (namely IEA, BP, EDGAR/PBL/JRC, CDIAC, EIA and CAIT) and compares them with China's official data and estimation. The difference among these data is due to different scopes, methods and underlying data, and particularly the difference in fossil fuel consumption. Compared with data from other databases, IEA and CAIT data have the best comparability with China's official data. The paper recommends that China enhance its coal statistics, raise the frequency of official data publication and improve the inventory completeness.

Keywords: CO₂; emissions data; comparability

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1 Introduction

Second National Communication (SNC) on Climate Change of the People's Republic of China was submitted to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC, hereinafter referred to as the Convention) in November 2012 [NDRC, 2012] and was released to the international communities. The second part of the communication was about China's GHG inventory in 2005. This was the third time China officially released its GHG data after the release of GHG data of 1994 in Initial National Communication on Climate Change of the People's Republic of China (INC) in 2004 [NCCC and NDRC, 2004] and data of 2004 in National Climate Change Programme (NCCP) in 2007 [NDRC, 2007]. And this was also the first time China officially

released the base year data after its 2020 CO₂ mitigation target was announced in 2009 before the Copenhagen Conference, attracting wide attention from the international communities.

However, there are some differences between the data released by China and those by the internationally renowned research agencies or databases. These agencies are far surpassing China in terms of the frequency and timeliness of their data release, often resulting in the international community's preconceived impression on China's GHG emissions. This paper analyzes and compares the major international CO₂ emissions data with China's official data from the perspective of original data source, calculation scope and methodology^①. The purpose of the study is, on the one hand, to clarify the causes of differences through comparative analysis; and on the other hand, to iden-

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^① Since there are few research agencies estimating full-range GHG emissions and China's autonomous target focuses on CO₂ mitigation, this paper chooses CO₂ as the object for comparison

tify the weaknesses in China’s energy statistics.

2 A comparison between CO₂ emissions data officially released by China and data from other sources

2.1 China’s official CO₂ emissions data and estimated data in 2006–2011

Table 1 lists China’s official CO₂ emissions data. Both INC and SNC adopt TIER2 method provided by Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as IPCC 1996) for inventory development, and the reference

approach is also used for comparison [NDRC, 2012; NCCC and NDRC, 2004]. The main sources of CO₂ emissions covered by SNC are fossil fuel combustion, industrial processes (the production of cement, steel, lime, and calcium carbide and utilization of limestone and dolomite) as well as the combustion of a very small amount of non-botanic waste. CO₂ emissions from fossil fuel combustion do not cover international bunker (listed separately) or non-energy use [NDRC, 2012]. Other energy activities may also produce significant CO₂ emissions, such as coal mining, venting and flaring in oil and gas system, but they are not estimated in SNC.

The paper estimates CO₂ emissions from energy

Table 1 Summary of China’s official CO₂ emissions data

Emission category	INC (1994)	NCCP (2004)	SNC (2005)
Energy-related CO ₂ emissions (Mt)	2,795		5,404
CO ₂ emissions from industrial processes (Mt)	278 (including 160 Mt from cement production)	5,070	569 (including 410 Mt from cement production)
Total GHG emissions (Mt CO ₂ -eq, excluding LULUCF)	4,058	6,100	7,467
Share of CO ₂ in overall GHG emissions (%)	75.7	83.1	80.0

Note: The data of 2004 were rough estimates, less comparable with those of 1994 and 2005; the scope adopted to calculate the inventory data of 2005 was slightly wider than that of 1994, but it has limited impacts

combustion in China in 2006–2011 based on the implied emission factors of primary fossil fuels in 2005, namely, CO₂ emissions per unit of coal, oil and gas (t CO₂ (TJ)⁻¹). Meanwhile, according to CO₂ emission factor of clinker production and proportion of clinker in cement, CO₂ emissions from China’s cement production in 2006–2011 are also estimated^②, as shown in Figure 1.

It should be noted that the above estimations are all based on China’s official energy consumption and industrial production statistic data. China has gradually established its energy statistics system since the early 1980s, and a relatively complete system of statistical indicators and statistical agencies has been set up on both national and local levels to meet the needs in that time. Nevertheless, China’s energy statistics still has certain limitations, such as a shortage of high quality data, unsound energy statistical scopes and statis-

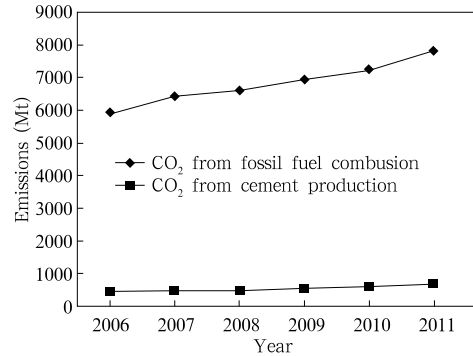


Figure 1 Trends of China’s CO₂ emissions from fossil fuel combustion and cement production in 2006–2011

tical indicators, and weak energy statistics foundations, etc. [Di, 2011]. The marketization of energy industries has further weakened the original energy statistic system [Li et al., 2010]. Therefore, there are certain deviations in the official energy data released

^② In most international researches, the calculation of production process emissions only covers cement production emissions generally, so this paper just makes a rough estimate of CO₂ emissions from China’s cement production to facilitate the comparison with the data from other sources

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