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## Policy design of the Hubei ETS pilot in China

Shaozhou Qi<sup>a</sup>, Banban Wang<sup>b,\*</sup>, Jihong Zhang<sup>c</sup><sup>a</sup> Economics and Management School, Wuhan University, Wuhan, China<sup>b</sup> School of Economics, Huazhong University of Science and Technology, Wuhan, China<sup>c</sup> Institute of Quality Development Strategy, Wuhan University, Wuhan, China

## HIGHLIGHTS

- The Hubei ETS covers only small numbers of entities but considerable emissions.
- The Hubei ETS applies several mechanisms to deal with the rapid economic growth.
- The Hubei ETS has the greatest proportion of reserve for capacity extension.
- Hubei sets more flexible ex-post adjustment of firms' allowances.
- The Hubei ETS emphasizes liquidity.

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## ABSTRACT

Of seven pilot emissions trading schemes (ETS) being run in China, the ETS in Hubei province is the only provincial pilot in the central and western regions of the country with a high GDP growth rate and heavy industrial structure. As such, it is quite representative of China as a whole and its ETS will therefore be reasonably characteristic of a future nationwide market. This paper describes the policy design of the Hubei ETS, including aspects of coverage, cap, allowance allocation, transactions, compliance and penalties. Then, after making a comparison with the other Chinese pilots and emissions trading schemes in the European Union (EU) and California, the paper offers a summary of several distinct features of the Hubei ETS. First, the small numbers of entities that are covered by the scheme produce a considerable proportion of the emissions. This makes Hubei the world's third largest carbon market. Second, the Hubei ETS applies several mechanisms to deal with the province's rapid growth rate. Third, the scheme's policy design emphasizes liquidity. In addition to these unique features, the Hubei ETS also shares some common features with all the pilots in China.

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## 1. Introduction

In order to control the growth of greenhouse gas (GHG) emissions, the Chinese government stated clearly in its 12th Five-Year Plan that market instruments such as emissions trading would be applied. Soon afterwards, Emissions Trading Scheme (ETS) pilots in two provinces (Guangdong and Hubei) and five cities (Beijing, Shanghai, Shenzhen, Tianjin and Chongqing) were formally announced. Transactions within the pilots commenced in 2013–2014, and a nationwide ETS will probably be established in the near future.<sup>1</sup>

Compared to other pilots, Hubei's social economic and energy contexts differ to other pilot ETS. And in many aspects, Hubei is very similar to China (Table 1). First, Hubei is the only provincial pilot in the central area, which is a “developing region” in China. Its stage of development, indicated by GDP per capita, is quite representative of China's own development (42,539 Yuan in Hubei and 41,805 Yuan in China). Second, like China as a whole, Hubei is still heavily reliant on secondary industry and coal consumption. The proportion of the primary, secondary and tertiary industries is 12.6; 49.3; and 38.1, respectively, in Hubei, which is the most similar of the pilots to the national industrial structure of 10.0; 43.9; and 46.1. Hubei is also the only pilot whose coal consumption makes up more than 70% of its primary energy consumption, which is consistent with the national energy structure. Third, as a province, unlike the five city pilots, Hubei faces more severe problems in terms of income gap and an urban–rural dual structure: the urbanization rate (urban/total population) of 54.5% is almost the same as the national level of 53.7%. Fourth, under the above stated conditions, Hubei is experiencing a faster growth rate

\* Correspondence to: Room A322, Economics and Management School, Wuhan University, Luojia Hill, Wuhan, 430072, China. Tel.: +86 13971210462; fax: +86 27 68754377.

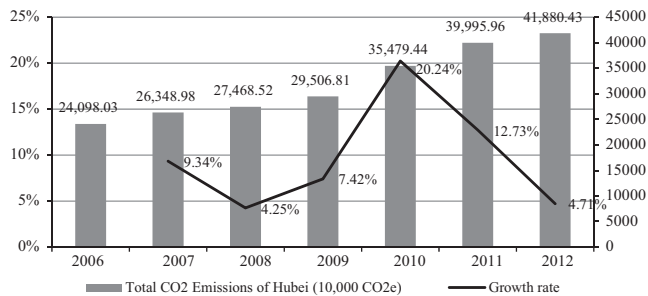
E-mail addresses: [cneuus@126.com](mailto:cneuus@126.com) (S. Qi), [wang\\_banban@126.com](mailto:wang_banban@126.com) (B. Wang), [whu\\_jhzhang@whu.edu.cn](mailto:whu_jhzhang@whu.edu.cn) (J. Zhang).

<sup>1</sup> The National Development and Reform Committee (NDRC) announced to launch a nationwide ETS in 2015, but the detailed timetable is still unclear.

**Table 1**  
Social-economic contexts of China and the seven ETS pilot regions.

	China	Hubei	Guangdong	Beijing	Shanghai	Shenzhen	Tianjin	Chongqing
Administration level	Nation	Province	Province	Municipality	Municipality	Municipality	Municipality	Municipality
GDP (billion Yuan)	568,845	24,669	62,164	19,501	21,602	14,500	14,370	12,657
GDP growth rate (%)	7.7	10.1	8.5	7.7	7.7	10.5	12.5	12.3
GDP per capita (Yuan/Person)	4,1805	42,539	58,403	92,210	89,444	5,889.05	97,609	42,795
Industrial Structure (primary: secondary: tertiary)	10.0: 43.9: 46.1	12.6: 49.3: 38.1	4.9: 47.3: 47.8	0.8: 22.3: 76.9	0.6: 37.2: 62.2	0.04: 43.4: 56.6	1.3: 50.6: 48.1	7.9: 50.5: 41.6
Industrial value added (billion Yuan)	210,689	11,160	27,426	3,537	7,237	5,695	6,679	5,250
Industrial value added growth rate (%)	7.6	11.8	8.0	7.8	6.3	9.6	12.8	13.1
Fixed-asset investment (billion Yuan)	447,074	20,178	22,859	7,032	5,648	2,501	10,121	11,205
Fixed-asset investment growth rate (%)	19.3	25.8	18.3	8.8	7.5	14.0	14.1	19.5
Urbanization rate (urban/total population)	53.7	54.5	67.8	86.3	/	/	/	58.3
Energy consumption (10,000 tce)	341,094*	17,675*	29,144*	7,178*	11,362*	6,525*	8,208*	9,278*
Energy structure (proportion of coal in primary energy, %)	70.6*	75.0*	48.0*	29.5*	41.8*	/	51.4*	67.4*

Notes: 1. Most numbers in the table are 2013 data; "\*" indicates 2012 data. 2. "/" indicates that the data of the indicator could not be accessed in any official statistic publication. 3. "China Statistics Yearbook 2014", which will include data in 2013, has not yet been published. All data comes from the "Statistical Bulletin for National Economic and Social Development in 2013" and other official bulletins from the Statistics Bureau of China and the seven pilots, such as the "China Energy Statistics Yearbook 2013". 4. GDP per capita and energy structure have been calculated by the authors.



**Fig. 1.** CO<sub>2</sub> emissions and change rate in Hubei (2006–2011).  
Note: Numbers in the table have been calculated by the authors.

than both the other pilots and the nation as a whole. Its rate of growth in terms of GDP, industrial value added and fixed-asset investments is 10.1%, 11.8% and 25.8% respectively; higher than the national level by 2.4, 4.2 and 6.5 percentage points, respectively. Rapid growth creates greater challenges for Hubei's ETS in terms of cap prediction and allowance allocation, since CO<sub>2</sub> emissions are also growing quickly, with an average growth rate of 9.65% (Fig. 1). On the positive side, the structural adjustment and energy intensity control that the province experienced during the 11th Five-Year Period meant that the growth rate peaked in 2010 and has been decreasing since.

Hubei's distinct characteristics make it representative of the seven pilots for a future nationwide market. Therefore, the experience of designing the Hubei ETS pilot may have strong implications for China. In section two of this paper, we introduce in detail the policy design of the Hubei ETS, including the coverage, cap, allowance allocation, transactions, compliance and penalties. In section three, we conduct a comparison of Hubei, other Chinese pilots and emission trading schemes in the European Union (EU) and California, and then summarize the features of the Hubei ETS. In section four we outline our main conclusions.

## 2. Policy design of the Hubei ETS

### 2.1. Coverage

An ETS that covers all GHGs in all sectors does not exist (Newell et al., 2012). In reality, coverage includes regulated emissions,

regulated sectors and the emission boundary issues of firms. Determining the coverage of the Hubei ETS involves a balance between feasibility and data analysis.

#### 2.1.1. Regulated emissions

Although GHGs commonly referring to six gases, during its pilot phase the Hubei ETS will start with CO<sub>2</sub> emissions only, which is the same as the EU ETS Phase I, the Regional Greenhouse Gas Initiative (RGGI) in the United States and the Tokyo-ETS (Perdan and Azapagic, 2011). Feasibility here is the main consideration because in the early stages of an ETS it is comparatively easier to collect data if CO<sub>2</sub>, the main GHG, is the only regulated GHG. Three kinds of CO<sub>2</sub> emissions are calculated: direct emissions from energy use, indirect emissions from energy use (electricity) and process emissions. The method of double counting both the direct and the indirect emissions was suggested by China's National Development and Reform Committee (NDRC) in order to motivate a reduction in electricity use because China's electricity price is regulated and therefore inflexible in terms of passing through to downstream sectors.

#### 2.1.2. Regulated sectors

Hubei determined the coverage of sectors by using a sole criterion (other than that of sectors): the threshold of an enterprise's energy consumption. During the pilot phase, any industrial enterprise whose energy consumption was equal to or above 60,000 tce in either 2010 or 2011 would be covered. The reason for using the energy consumption criteria is that before the ETS commenced Hubei had no official CO<sub>2</sub> emissions inventory at the firm-level, though the energy statistic system was comparatively sound. According to the official energy consumption statistics, calculations have been conducted of the number of firms covered and the proportion of emissions covered corresponding to different thresholds (Table 2). If the threshold is lower than 60,000 tce, it would increase the number of firms dramatically, compared with only a steady increase in the covered emissions proportion. That is, a much higher administration cost driven by a larger number of firms covered would only result in very little marginal emissions being regulated by the system. Therefore, Hubei has chosen 60,000 tce as its ETS coverage threshold.

The final number of firms and emissions covered was acquired by conducting a first round verification before the launch of the ETS.

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