

CUE2015-Applied Energy Symposium and Summit 2015: Low carbon cities and urban energy systems

Evolution of China's urban energy consumption structure—a case study in Beijing

Jiahong Liu^{a,b*}, Silan Chen^a, Hao Wang^{a,b}, Pietro Elia Campana^c, Jinyue Yan^{c,d}

a State Key Laboratory of Simulation and Regulation of Water Cycle in River Basin, China Institute of Water Resources and Hydropower Research, Beijing 100038, China

b Engineering and Technology Research Center for Water resources and Hydroecology of the Ministry of Water Resources, Beijing 100038, China

c School of Business, Society & Engineering, Mälardalen University, SE-72123 Västerås, Sweden

d School of Chemical Science, KTH Royal Institute of Technology, SE-10044 Stockholm, Sweden

Abstract

China is a coal-based energy consuming country. The proportion of coal is up to 70% in the energy consumption structure in 1990s. In the past 20 years, driven by energy saving policy, China's energy consumption structure has undergone great changes, especially in urban areas. This paper explores the evolution of energy-use structure at the national level and the level of Beijing City in China. Four major energy sources were considered, including coal, oil, natural gas and electricity. The dataset was collected from 1990 to 2012. The results show that the proportion of coal consumption decreased by approximately 20% from 1990 to 2012 at the national level in compare with nearly 50% at the level of Beijing City. Furthermore, the proportion of natural gas consumption and other clean energies rose. In Beijing the natural gas and other clean energies account for over 60% of the total energy in 2012, which played an important role in improving the local environment.

© 2016 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of CUE 2015

Keyword: Energy consumption structure, urban area, evolution analysis, Beijing

1. Introduction

* Corresponding author. Tel.: +86 10 68781936.
E-mail address: liujh@iwhr.com (J. H. Liu).

Energy is an important component of a country's economic growth and social development [1-2]. However, global climate change caused by excessive carbon emissions is a widespread concern in the international community. Developing countries, rely on industrial, production-based economic growth, with high energy consumption rates and carbon emissions. In this context, optimizing energy consumption structure is an important component of economic development.

researchers have studied on a wide scope of urban energy consumption and urban carbon emissions [3-6]. There is a rapid increase in urban energy consumption, and many researchers explored the method to reduce urban energy consumption [7-8]. Other researchers tried to figure out the factors that influence the urban energy consumption [9-12]. Also, researches on effect of energy consumption on urban heat islands have been carried out [13]. As for urban carbon emissions, researchers have done some great researches in urban scale[14-19]. And they also tried to find some methods to reduce carbon emissions [20].

China, the world's largest developing country, is undergoing rapid economic development and annual increases in energy consumption. The pressure from environment and demand from industry development and others on energy supply, energy efficiency, industrial structure and other aspects of energy consumption make optimizing the country's energy consumption structure an important issue in China's energy strategy [21].

Over all, urban energy consumption is a primary driver in total energy consumption and continues to increase in response to the expansion of urbanization. However, recent trends in urban development indicate that the proportion of energy consumed by the industry sector is declining. In addition, CO₂ emissions have been mitigated to such an extent that the release of SO₂ from coal consumption has become the main source of pollution in many areas. Urban environmental management measures have also helped decrease the proportion of coal consumption in the city. With the development of urbanization and improvement of living standards, petroleum, natural gas and electricity will gradually replace coal. There are apparent regional differences in Chinese urban energy consumption [22].

China's energy consumption and energy consumption structure have been studied from different angles, different scales, and over time [9][22]. Weihua Guan et al. established a dynamic model of China's energy consumption to help predict future changes to its structure[14]. The model suggests that the proportion of coal consumption will gradually decline, while consumption of oil, natural gas, and water as energy sources will rise. Of the latter, oil consumption will increase at a greater rate than other sources. Researchers have also analyzed and forecasted future carbon emissions from energy consumption [15-16]. However, the influence of the evolution of urban energy structure on carbon emissions has not been thoroughly reviewed. This case study provides insight on the role of Beijing's energy consumption in carbon emissions as a model of China's overall urban energy structure.

2. Analysis of the evolution of energy consumption in China

2.1. China energy consumption structure

Changes in China's energy consumption structure from 1990 to 2012 are shown in Figure. 1.

In the 1980s, coal was the main source of energy in China. The proportion of coal-powered energy consumption increased to 75% in the 1990's. After the 21st century, however, the proportion of petroleum, natural gas, and other energy sources, such as wind power, hydropower, and nuclear power, began to rise. Coal was still the main source of energy, but its share in energy consumption structure fell. In fact, the proportion of coal consumption decreased to 68% in 2010.

Recent changes to China's energy structure reflect the country's efforts to adopt an eco-friendly approach to development, including advancement of new, clean energy industries such as nuclear power, wind power, and solar energy. These kinds of structural adjustments and power conversions associated with

Download English Version:

<https://daneshyari.com/en/article/1508788>

Download Persian Version:

<https://daneshyari.com/article/1508788>

[Daneshyari.com](https://daneshyari.com)