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From state monopoly to renewable portfolio: Restructuring China's electric utility

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Abstract

Deregulation and decentralization in the electricity sector have thrived worldwide since the early 1980s. China also started restructuring its electricity industry since the mid-1980s. The reform shares many common features with restructuring practices in other countries and exhibits some unique characteristics as well. To some extent, two features, namely governmental administrative departments' dual role of government and business inherited from a highly centralized planned economy, and the coal-intensive nature of power generation, has determined many aspects of the evolution of China's electric power sector. This paper aims to provide a comprehensive account of the process with some emphasis on recent developments. We also identify some of the features that are similar to electricity market reforms in other countries and, most importantly, those that characterize the uniqueness of the restructuring practices in China's electricity industry through investigating the administrative framework, price and investment mechanisms, and associated legislation and policy settings at each of the five stages in the evolution of the electric utility sector. The paper concludes with a discussion and summary of some generic characteristics and remaining challenges.

Keywords: Electric power; Renewable portfolio; China

1. Introduction

Since the early 1980s, utility restructuring has become an international trend. Chile was the first to reorganize its electricity market in 1982. The Chile practice has influenced following reforms in other Latin American countries. In 1989, the British government launched the restructuring and privatization of the state-owned Central Electricity Generating Board to separate the ownership and operation of generation, transmission and distribution (T&D). The British practice was then used as a model or a catalyst for the deregulation in other Commonwealth countries such as Australia and New Zealand. Norway introduced similar innovations in 1991. In US, early important restructuring efforts include the creation of non-utility generators in the *Public Utilities Regulatory Policies Act of 1978* (PURPA) and the introduction of transmission open access in the break-through legislation—*Energy Policy Act of 1992*; however, comprehensive utility restructuring and competition initiatives only began to be taken seriously by policy makers in the mid-1990s, marked by Federal Energy Regulatory Commission (FERC) *Order 888* and *889* (Hogan, 2002; Joskow, 2006).

Experiences and lessons on utility restructuring and deregulation have been studied widely. Despite the differences in the models adopted in various countries, some common features and steps are identified. Newbery (2001) and Jamasb (2002) compared the practices in developed and developing countries and summarized some of the generic reform aspects: clear legal framework, incentive regulation (IR), separation of competitive segment from monopolistic segment, open network access, wholesale market construction, and appropriate privatization. However, the primary aims of utility reforms in developing countries are basically different from those in

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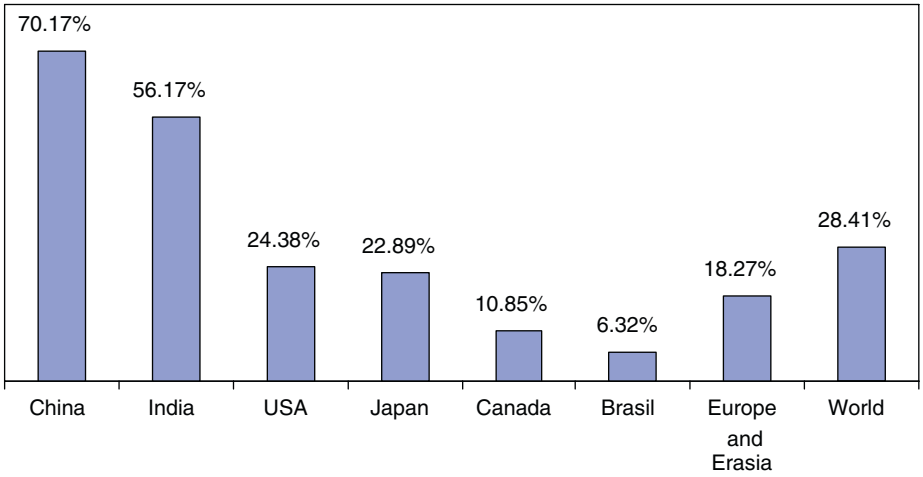
developed countries. In developed countries, the focus has been to improve efficiency while in developing countries the attraction of investment for generation capacity expansion is a main concern resulting from the chronic supply shortage which in turn results from a mix of weak infrastructure and high demand growth (OFFER, 1998; Rajan, 2000). The practices in many Latin American and Asian countries have generally followed this path (International Energy Agency (IEA), 1997; Lalor and Garcia, 1996; Mendonca and Dahl, 1999). Later in 2000 and 2001, the California electricity crisis led many to suggest that further electricity reforms be carried out prudently. The crisis had repercussions in both developed and developing countries (Brennan et al., 2002; Joskow, 2006; Rudnick and Montero, 2002; Yeh and Lewis, 2004). China has also launched electric utility reforms since the mid-1980s. The experiences in China have exhibited both uniqueness and common features compared with those in other countries. This paper conducts a policy analysis of China's electric utility reforms over the past two decades. The paper is organized as follows. The second section provides an overview of China's electricity industry and related studies. The third section investigates the utility restructuring in each of the five stages. Policy discussions and conclusions are provided in the last section.

2. Overview

China's electricity industry has developed rapidly in the past two decades. China is currently the world's second largest electricity generation market only after the United States. By 2006, electricity generation had reached 2834.4 TWh, which accounts for 14.9% of global total and is nearly five times the amount that the entire Africa generated (British Petroleum (BP), 2007). What makes China's power situation particularly compelling, however, is the coal-intensive nature. While coal contributes 28.4% of primary energy consumption (commercial energy only) worldwide in 2006, it accounts for 70.2% in China (Fig. 1). Thermal power accounts for 77.82% of China's total power generation while hydro, nuclear, wind, and other renewable energy contributing only 20.67%, 1.1%, 0.3%, and 0.11%, respectively (SERC, 2006b). China's heavy dependence on coal, combined with its large population, and explosive economic growth have taken a heavy toll on the environment and pollution-related human health issues. On the one hand, the country has experienced cycles of under and over-capacity in generation due to inefficient resource allocation. This caused grid reliability problems and led to frequent blackouts in many provinces. On the other hand, electricity supply and demand are extremely unbalanced geographically. There is a substantial mismatch between the geographic distribution of energy resources such as coal and hydro which are major sources of electricity, and centers of economic and population growth where electricity demand is highest. While the northern and western China is abundant in coal and hydro resources, most of the economic and population centers are located in the East and South.

The electric utility reform in China has been launched for over two decades since 1985. The sector has experienced fundamental changes. A series of reform policies aimed to cultivate a market-oriented electricity sector have been consistently implemented. They are successful in some aspects while have not fared as well as expected in others (Andrews-Speed and Dow, 2000; Blackman and Wu, 1999; Li and Dorian, 1995; Wirtshafter and Shih, 1990; Xu and Chen, 2006; Xu, 2006). Earlier reform policies have been well in line with the international trend of utility restructuring in developing countries. As in other developing countries, capital constraint has been a major concern in China's electricity industry, which has constrained the expansion of generation capacity (Blackman and Wu, 1999; Li and Dorian, 1995). However, focus changed as the



Data Source: BP, 2007, million tones of oil equivalent (mtoe).

Fig. 1. Coal dependence of primary energy consumption 2007.