Comparative Synthesis of Electricity Supply in Britain and China

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Abstract: This paper illustrates the case of Britain and China and compare power supply companies' ownership, efficiency level, cooperation with non-governmental organizations, and supervision methods. We could conclude that privatization and centralization had various benefits and challenges, and the government plays different roles in electricity supply. For example, the centralization could have relatively unified quality, but privatization may suffer different quality levels that need to have supervision. Also, the privatized market is highly competitive compared with the centralized market, which means the government plays a relatively weak role in the electricity market, and the privatized market could reflect the consumers' needs with high efficiency. Also, we mention the importance of NGOs in the electricity supply for all cases. To sum up, having a healthy electricity supply industry requires the cooperation of the government, power suppliers, and consumers to obtain a healthy development of the industry.

Keywords: Electricity Market; Britain; China; NGOs; Ownership

Introduction

This paper focuses on comparative synthesis for cases from two countries (China and UK) to discuss government challenges in the electricity supply. This paper regards the case in the UK and China as essential examples for public policy in electricity supply. Because many scholars found the electricity industry in the UK was the most important and the most radical case in transforming from state ownership to private ownership (Green, 1998; Domah, 2001) and it is valuable to analyze changes. And China is the most populous country globally and the country with the most extensive public power grid in the world. Research on China can reveal the pros and cons of public power grids and compare with the UK, which is a privatization case.

Case1: UK

Historical Background

From 1948 to 1990, the government in Britain chosen public ownership, and the Central Electricity Generating Board (OEGB) oversaw the electricity supply. However, based on White Paper Privatizing Electricity (Secretary of State for Energy, 1988) and Electricity Consumers' Council (1982), the government privatized the electricity industry. The British electricity reform consisted of four sectors, restructuring, privatization, regulation, and competition. The twelve area boards (Regional Electricity Companies, or RECs) and two major conventional generators (National Power and PowerGen) were privatized in 1990 and 1991 (Appendix 1). On the other hand, the British government separated the different electricity supply stages, which aimed to promote transmission investment and competition in generation and retail sales (Goto et al., 2013). For the electricity prices, they are regulated at the Office of Gas and Electricity Markets, an independent regulatory institution and protecting consumers' interests. The British government aimed to use a list of reforms to have a fully competitive wholesale electricity market (Hammond and Waldron, 2008). It is widely believed that the privatization of the UK's electricity industry earned signify ant efficiency (Armstrong et al., 1994).

Energy Sources

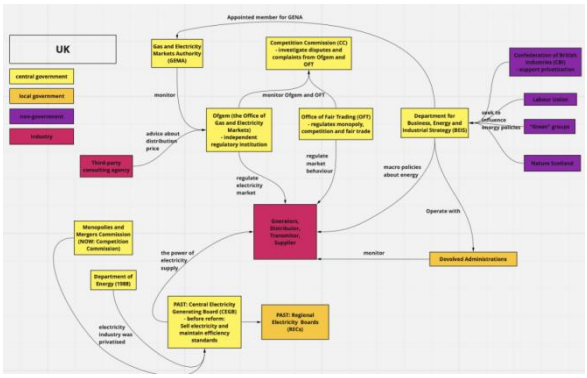
Britain has four primary energy sources for electricity supply: fossil fuels, nuclear, renewables, and imported electricity. The total electricity supply has reduced by 10% since 2010, with a fourfold increase in renewables and a 51% decrease in fossil fuels. These trends could be a positive change for electricity supply, which suited the New Electricity Trading Arrangements (NETA, 2001) and

achieved the government's target with 37.1% electricity generated by renewables.

Actors and Actor Map

Electricity generation and supply are always regarded as potentially competitive activities, while electricity transmission and distribution are natural monologies that need to have regulations in the market (Jamasb and Pollitt, 2007). For electricity generation, there are many generators in the British electricity market because of privatization, and EDF occupied the largest one in 2020. For electricity transmission, National Grid holds the operation power, while the three companies (National Grind Electricity Transmission, Scottish Hydro Electric Transmission Ltd., SP Energy Networks) holds the transmission infrastructures and ownership of assets. Electricity distribution is separated from transmission, independent distribution operators (IDNO), and dependent distribution operator (DNO). Another active actor is NGOs, who monitor and build collaborative solutions for market. For example, the Confederation of British Industry (CBI) rejects the Labor Party's nationalization in the government. The "green" groups also impact the sustainable related policies by promoting, selling, and labeling green electricity.

Figure 1. The actor map of British electricity industry



Case 2: China

Historical background

Power system planning in China has historically been limited to single-utility balancing areas that have been developed. Oil continued to increase its share of total Chinese energy production even after coal recovered. Although initial hopes of large oil supplies and associated growth have been tempered, oil has become a significant energy source and today accounts for almost 20% of China's overall commercial energy supply (Shen et al., 2019). A nation needs to use foreign technology as a driving force for economic industrialization and modernization, both as a domestic source of transportation fuel and a critical foreign exchange source.

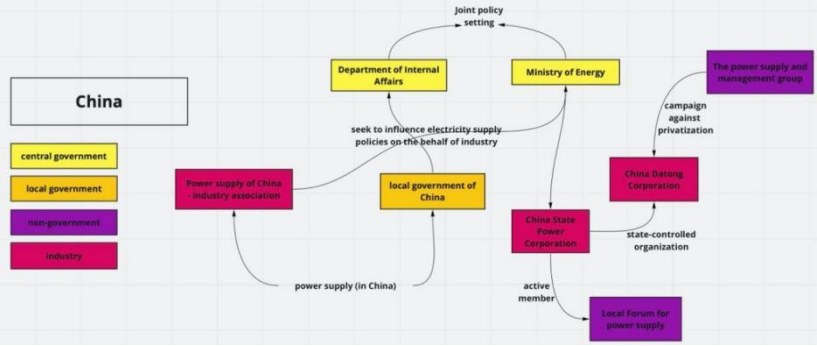
Energy sources

Energy demand in China continues to grow, with the expected growth of a quarter of global energy consumption by 2035 (Zhu et al., 2020). The quest for energy supplies has now picked over geopolitical interest. There is evidence that China has led an intensive search for all possible energy sources, ranging from coal to hydroelectric power (Liu & Wei, 2018). China's energy balance is highly based, far more than the rest of the planet, on fossil fuels.

Actors and Actor Map

Four main roles in electricity supply in China (selling electricity, purchasing electricity, transmission, and market operation) are controlled by government and government-funded/state-owned companies.

Figure 2. Actor Map for Power Supply of China.



Comparative Synthesis

To sum up, we found the following differences for electricity supply in Britain and China:

1.Different ownership of companies: In China, electricity supply companies are fully controlled by government-funded and state-owned companies, while in the UK, privately-owned companies are cooperating with the government. Although privatized electricity market is achieving coordination between generation and distribution with minimum costs for users in the system where ownership and operation are separated (Bell and Gill, 2018), electricity trading is uncoordinated and low efficient (Bell et al., 2011).

2.Different regulatory agencies: Different regulatory agencies: The technological innovation of China's power supply facilities and the replacement of power supply equipment has national and financial support, which regulate by the government. However, electricity suppliers in the UK are private companies, and the cost of electricity prices has received double supervision from consumers and the government.

3.Different levels of efficiency: In China, the power supply is operated by a single company, and the power grid is uniformly deployed. However, the UK has independent power grids in all regions and is separate from the transmission grid. Sometimes if customers need to involve different power grids simultaneously, the efficiency of communication is very low. There are also certain inefficiencies in the communication between the power grid and the power grid.

4.Different role of NGOs. The current understanding of NGOs' role has been under-studied in China's governance, which have three characteristics: organizational growth with insufficient technical capacity, government cooperation with minimal political space, low public advocacy awareness. However, NGOs have an influence on the government in making electricity policies and build collaborative solutions with useful guidelines for the government in Britain (Dzhengiz, 2018).

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