

POWER INVESTMENT PLANNING UNDER DIFFERENT POLICY SCENARIOS THROUGH 2050: A CASE STUDY OF CHINA

Driven by its high economic growth, large population, and rapid urbanization, energy consumption in China has expanded dramatically over the past 3 decades. Statistics by the International Energy Agency (IEA) shows that since 2010 China has overtaken the United States as the world biggest energy consumer. China's share in the global energy demand has climbed from less than 10% at the beginning of the 1980s to more than 20% after the first decade of the 21 century.

However, China's energy supply is heavily reliant on coal. More than half of the country's energy demand is met by coal. The share of coal in power sector is even higher, nearly 80%. This over-dependence on coal is believed to be one of the major causes behind the country's severe air pollution. Dealing with air pollution has become a high priority on the government's agenda. Given this background, shifting from coal to other cleaner fuels for power generation will be one of the major components in the energy policy of China.

A lot of studies have been carried out on China's power sector, or low-carbon pathways. However, few studies have conducted a comprehensive and quantified analysis of long-term impacts of the most recent energy policies on the country's whole power sector in terms of economic affordability, environmental influence, as well as energy security. The IEA, in cooperation with China's Energy Research Institute has published a report on low carbon policy options for the country's power sector (IEA and ERI, 2012). However, the study put the focus on the policy of emission trading system and the time span is until 2030. In Qixin Chen, Chongqing Kang, and et al.'s study, low carbon technology scenario for China's power sector was examined, yet the study mainly focused on the technology rather than policy implications and the time span is also until 2030 (Qixin Chen, Chongqing Kang, and et al., 2011). In the study published by Dongjie Zhang, Linwei Ma, and et al. long term (until 2050) power planning optimization under different low-carbon policy scenarios was carried out, but in the study the weight was put on carbon tax or carbon cap policies and other policies like feed in tariff was not examined and policy implications from the energy security perspective was not discussed in the paper (Dongjie Zhang, Linwei Ma, and et al., 2012).

This study is focused on the low carbon pathway of the power generation in China. Using a power investment planning model a quantified analysis is carried out to evaluate the long-term impacts of different energy policies and possible future low carbon policies. A carbon reduction target through 2050 is assumed by the authors. By analysing the simulation results and their implications the authors try to figure out a preferable way of carbon reduction for the power sector in China.