

# **Energy Security in China: Perspectives from a 4-As Analytical Framework**

Youngho Chang

Nanyang Technological University

## **Abstract**

This study constructs the quantitative tools for assessing China's energy policies and energy security status. It looks into China's energy security trends starting from the initial period of the economic reform and opening up of Deng Xiaoping Administration in 1980 and ends with the late period of Hu Jintao Administration in 2010. The stated timeframe is divided into six periods, reflecting the policy priority change of China's Five-Year Plans (FYP) of Economic and Social Development during different administrations. The six FYPs to be discussed are the sixth (1981-1985), seventh (1986-1990), eighth (1991-1995), ninth (1996-2000), tenth (2001-2005), and eleventh (2006-2010) FYP compassing Deng Xiaoping, Jiang Zemin, and Hu Jintao Administrations. Using the 4As evaluation framework (availability, applicability, acceptability and affordability), key energy policies implemented and their effects on China's energy security are examined.

The quantitative indicators show that China's energy security was the best during the sixth FYP period (1981 – 1985) and it had been deteriorating until the new millennium. During the tenth and eleventh FYP periods (2001 – 2005 and 2006 – 2010, respectively), the situation had improved but was not commensurate to the level of the sixth FYP period. A policy priority appears to affect the country's energy security status during a specific FYP period. The key driver for the highest level in energy security was the expansion of energy supply during the period geared to fuel the economy. In the sixth FYP, The overall low level in technology affected the status of energy security negatively but it was offset by relatively low volatility in energy prices and cleaner environment. The policy priority of expanding energy supply did not change much during the seventh FYP. The efforts to increase energy production led to an obvious decrease of resources available to China for further exploitation.

The goal to establish a 'socialist market economy' during the 1990s stimulated several strong reform measures including government restructuring, fiscal and tax reforms, financial reforms, and reforms on state-owned enterprises. A prominent reform was the change in energy pricing. Coal prices (except coal for electricity generation) were freed up and electricity tariffs were allowed to fluctuate according to the prices of primary energy in the eighth FYP. This resulted in the fastest energy price growth and high price volatility. The environment continued to deteriorate and the energy security situation hit the lowest in 1995 across the years in calculation. The situation has improved a little bit in 2000 mainly due to stabilization of price growth and improved

energy technology. In the 1980s and the 1990s, although environmental protection had been stated in policy documents, the government did not take many practical measures to improve the environment.

The expansion of energy supply continued to be a key goal the country must pursue to sustain the fast growing economy during the tenth and eleventh FYP periods, technology advancement was emphasized and achieved by the government. The tenth FYP (2001-2005) emphasized the introduction of market mechanism into the energy sector. Price liberalization of energy products has become more mature. The environment protection, however, has been neglected long, which has resulted in the worst consequence: the environmental dimension of energy security hit the lowest level across the years in calculation. In the eleventh FYP, the government took several practical and operational measures to stop the deterioration of the environment further. Together with the continued advancement of technology and the adoption of market mechanism, the energy security situation has improved during this period.

In sum, unlike other studies that mainly discuss qualitative aspects of energy security, this study presents quantitatively and qualitatively how energy security status in China has changed in terms of four dimensions of energy security – availability of energy resources, applicability of technology, societal acceptability and affordability of energy resources. The analysis shows that China's energy security has not improved during its thirty years' economic reform. The enlarging appetite for energy resources has made the quantitative value of availability dimension decline; environmental (acceptability) dimension had deteriorated along with the energy utilization, only improving a little recently. Affordability dimension has improved after it hit the worst status in 1995. Although the country's technology has progressed continuously, the improvement of the applicability dimension cannot reverse the overall energy security status to the early reform period level. Energy policy priority appeared to affect the energy security status directly and deeply.

Key words: 4A-framework, Availability, Applicability, Acceptability, Affordability, Energy Policy