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Zhaoguang Hu, Xinyanh Han, & Quan Wern, *Integrated Resource Strategic Planning and Power Demand-Side Management,* Springer, 2015, 576 pp. $171 Hardcover.

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Abstract. The edited volume presents an engaging cartography of Indian economy following two decades of liberalization on the backdrop of globalization and problem of sustainability - two defining moments of post-reforms reorganization of the economy. A wide variety of sector-specific and economy-wide studies in the collection, examine the central tenets of market-centric reforms representing globalization. The research works dealing with micro- and macro-aspects of development help us form an idea of important issues, emerging debates, dominant institutions and changes required for attainment/restoration of efficiency. Most of these writings indicate the limitations of current developmental logic in their specific settings. These studies also propose measures to tackle the problems faced while presuming growth-sustainability disconnect to be temporary in nature. A number of studies introduced new analytical categories and empirical frameworks to capture current reality in better and more meaningful ways. A third strand of writings portrays conflict between the project of globalization and issue of sustainability as a distinguishing characteristic of global capitalism although the present policy framework accord highest priority to capitalist expansion. This conflict however, has put the Indian state in a perpetual act of balancing the growth objective of global capital and welfare objective meant for those experiencing exclusion in the development process..
Keywords. Low-carbon electricity, Demand side management, Integrated resource strategic planning, Efficiency power plant, Renewable energy, Ddemand response, Sustainable development, CO_2 emissions in China.
JEL. P28, Q01, Q20, Q28, Q30, Q40, Q50.

Book Review

Electricity has been widely used in almost all economic activities and household, and electricity demand will grow fast than other forms of energy in the future due to the growing up electrification. However, the pollution emissions on power supply side will contribute more than other sectors in the world. Therefore, a lot of nations focus on low carbon electricity development.

People used to pay more attentions on power supply side than demand side. Although demand side management (DSM)including demand response (DR) have been studied, the input-outputs on both power supply side and demand side are lack of systematic analysis in power market. Peak load shifting and energy savings by DSM are more important resource on demand side, and it can be called as

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Efficiency Power Plant (EPP), the virtual power plant for generating negative electric power.EPP is clean and green. It is clear that the EPP on demand side is more important and valuable than traditional power plant (TPP)on supply side. What is the cost of the EPP per-kWh? Is it cheaper than TPP on power supply side? What are the potentials of energy saving and load factor rising on EPPs? How to promote EPPs and renewable energy TPPs economically? This is the low carbon electricity issue which will be discussed in this book.

Low carbon electricity means to use the lowest electricity to meet the economic development and house hold on demand side, and to integrate more renewable power on supply side to mitigate emissions from power sector. On the other words, lower carbon electricity is to promote more EPPs and more renewable TPPs. How to do that in the power market? What policies would promote EPPs to reduce the electricity demand? What policies would promote more renewable TPPs generation in to grid?

Integrated Resource Strategy Planning (IRSP) is a tool to do that. Based on the input-output analysis on both power supply side and demand side, it can optimize the power resources on the supply side (such as coal, gas, hydro, nuclear power, wind power, etc.) to promote renewable TPPs generation and on demand side (such as EPPs) to reduce peak load and electricity demand. The potentials of EPPs and renewable TPPs generation into the grid will be resulted from the policies on both of power demand side and supply side by IRSP model. Therefore, IRSP is a low carbon electricity model and also a policy study model.

What about the potentials and the costs of global EPPs? It can be answered by IRSP model. According to the EIA report (EIA 2009), global electricity demand would be 31782 TWh in 2030. Based on the data, our study by using IRSP model shows following findings.

1. The global potentials of energy saving by EPPs would be 31361 TWh during 2011-2030, around 5.72% in the total electricity demand of the period.
2. The total cost of EPPs would be 1309 billion USD from 2011 to 2030. The average cost of EPPs is about 0.04USD/kWh which is less than TPPs on power supply side.
3. The CO_2 emission reduction would be 2.85 billion tons by EPPs during 2010-2030.
4. The power generation capacity of TPPs would be 6453 GW by 2030. Total investment and operating cost would be 27233 billion USD on power supply side during 2011-2030.

What about China? China is the biggest country in electricity consumption and power generation, and the CO2 emissions in the world. In this book, the theory of IRSP, the model and case studies have been introduced in Chapter 1. China's power generation was 4.2trillion kWh in 2010, and the coal-fired power generation shared around 80% of the total power generation. It is great challenge on pollutions and sustainable development. What about potentials of EPPs and the cost in China? In Chapter 1, the potentials of EPPs and renewable TPPs have been studied in the period of 2011-2020 by using IRSP model. The findings are as follows.

1. The potentials of EPPs would be 198GW and the electricity saving would be 388TWh, which shares 5% of the total electricity demand about 7.6 trillion kWh in 2020.
2. The total investment and operation cost of TPPs and EPPs would be 16.2 trillion RMB during 2011-2020.
3. The electricity saving by EPPs would be 2 trillion kWh during 2011-2020. The EPPs investment would be 0.11 trillion RMB, and the average cost of EPPs is 0.055RMB/kWh in the case of rebates and incentive policies to promote EPPs in China.

4. The mitigating CO_2 emissions by EPPs would be around 448 million ton by 2020 in China.

It also shows that the great potential of EPPs is Lighting EPP. The consumption of power for lighting accounted for 10% of the total power generation nationwide in China, which was about 42 billion kilowatt-hour in 2010. If 80% of the lighting devices in the country were replaced to energy-saving ones, 33 billion kilowatt-hour' electricity would be saved in 2010. Other than reducing energy consumption, Lighting EPP can also reduce load demands.

Others like energy efficiency motor EPP, energy efficiency transformer EPP, etc. are also in great potentials in China. Therefore, there are lots of opportunities of DSM in China.

How to get the potentials of EPPs in China? It has been studied the barriers of implementing DSM projects such as people have few knowledge on EPPs and DSM, what is the role of central and local governments on promoting DSM, what is the role of power utilities in implementing DSM in China? It shows that the power utilities do not have the proper incentives to carry out DSM programs and energy service companies (ESCo) are too weak in the market etc. In order to move the barriers, from Chapter 2 to Chapter 6 in this book will let readers to know detail on how to do DSM projects.

The basic DSM concept and methodology has been introduced in Chapter 2. Readers can learn more about input-output analysis of DSM project and some calculations in details.

In chapter 3, it has studied the how to promote DSM by government in China. Chinese government has enough power to promote DSM implementation with a series measures. Therefore, it is necessary to let government know the role and the responsibility on DSM implementation. It points out the following opinions.

1. Government must play a leading role on promoting DSM program.
2. Government is the subject of the responsibility of the DSM program and the representative of overall national benefits of DSM.
3. Government is the best choice for coordinating interests of all parties on DSM project.
4. The main responsibilities of government on promoting DSM include formulation of laws and regulations, establishment of incentive policies, and supervisory market mechanism.

In Chapter 4, it shows how to support power utilities to do DSM projects in China. Power utilities are state owned companies in China. It has some advantages on implementing DSM project. It shows Power Utilities must play an important role on DSM.

1. Power Gird Enterprises---the best choices for the subjects of DSM implementation. In 2004 the National Development and Reform Commission and the State Electricity Regulatory Commission jointly issued *Guiding Opinions on Strengthening Demand Side Management Work*, which formally defines "Power Grid Enterprises as the Subjects of Demand-side Management Implementation". State Grid Corporation of China and China Southern Power Grid Co., Ltd. as well as their affiliated enterprises undertake important tasks in DSM project.
2. Power Grid Enterprises---the closed links for connecting main participants of DSM project. Power grid enterprises which have unique advantages that the other relevant subjects do not haves are the links for connecting all parties like government, power generation enterprise, energy conservation service company and power user and others. Power grid enterprises give DSM policy suggestions to governments, and carry out DSM projects, technology promotion (including energy efficiency management, load management and

orderly power utilization, etc.) and idea promotion and others. It will carry through the government regulations and policies to the users and promote energy conservation. It can do the improvement of overall power utilization efficiency and overall efficiency. The users and power generation enterprises are connected together by means of implementing time-of-use price linkage with the power generation enterprises and others. The benefit generated at the power saving on the terminal user side is transferred to the power generation enterprises with price signal platform. The implementation of the DSM projects can be promoted jointly through the strategic cooperation with the affiliated energy conservation service company and the third party energy conservation service company.

3. Demand-side Management Implementation---the effective path for improving power load characteristics and optimizing power grid operation. With the economic development of the improvement of people's living standard, the peak load demand of the power grid increases quickly. The economic efficiency is comparatively bad only by enlarging the investment scale and increasing installed capacity and power transmission and transformation equipment to meet transitory peak power consumption. Cutting down part of power demand in peak time and shifting it to the valley time. At the same time, developing DSM project can help users to use power more rationally and decrease electricity charge expenditure, which is good for improving excellent service level of power grid enterprises.
4. Implementing DSM project by power grid enterprises is the important foundation for sustainable development. The more important requirements of the scientific development is complete, harmonious and sustainable development of economy, society and environment. At the same time, "Harmonious Society" requires both realizing harmony between human beings and maintaining harmony between human and nature. Power grid enterprises undertake social responsibilities exceed the single profit making goal by implementing DSM projects. It has to consider the overall social benefit, to pay attention to each factor like man, environment and resource in the enterprise regeneration process in an all-round way. As the state owned enterprises, power utilities have to actively undertake social responsibilities by promoting energy conservation and emission reduction of the whole society.

In Chapter 5, it focuses on training Energy-saving Service Company abbreviated as ESCo to do DSM project. is the hardcore with qualification to assist the government and power enterprises in carrying out DSM plan or voluntarily implementing DSM projects. Energy Service Company is a successful international experience as the medium for carrying out DSM. ESCo acquires energy-saving benefits from offering various energy services to customers. It can carries out jointly undertaking energy-saving investment risks, sharing energy-saving benefits and managing operation mechanism. Its highlighted advantage is to raise the ability of customers to overcome primary investment obstacles, drive reasonable configuration of resources and offer more new job opportunities.

The following types of Energy Service Companies are carrying out DSM businesses in China:

1. Local/ industrial energy-saving service center:

   Since the early 1980s, China has built the largest and the most unique energy-saving system in the world, which has been operated by the central energy-saving competent department, local/ industrial energy-saving service center and energy-saving management departments in enterprises; the country has offered special funds to energy-saving demonstration projects.

Under the original planned economic system, local/ industrial energy-saving service centers have played important function in the planned energy-saving system.

Since 1990s, local/ industrial energy-saving service centers have gradually changed the operation mode according to instructions of the government in the past, explored and carried out commercial operation for energy-saving technologies and services and offer information, consultancy and technical services to enterprises in all fields so as to adapt to new economic trends along with reform of economic system in China.

2. Energy Service Companies supported by the government

The World Bank(WB)/Chinese Energy-saving Promotion Project of Global Environment Facility(GEF)is jointly carried out by the National Development and Reform Commission, the WB and GEF, aiming at saving energy sources, raising utilization ratio of energy sources, reducing discharging greenhouse gases and protecting large international cooperation projects in global environment, which is also a large international cooperation project for government to transform mechanism by foreign capital.

3. Other types of Energy Service Companies

Since2000, energy-saving and emission-reduction has been focused gradually in order to restrict energy consumption in GDP of enterprises high, bringing infinite business opportunities to energy-saving markets and emerging plenty of Energy Service Companies with obvious market characteristics. These Energy Service Companies take private enterprises as the main body and attract domestic and international famous large enterprise and electrical equipment giants such as Mainland Hope, Broad Air Conditioning, ABB, Siemens, Schneider and Honeywell etc. to enter into energy-saving service industry and join in energy-saving services in China. Electricity saving potential of terminal electrical equipment and technology Electricity-saving actual effect of DSM is achieved mainly by updating and upgrading of terminal electrical equipment. It also shows that there are great opportunities in China to do DSM for ESCo since the government is provide more promotions for supporting ESCo's business.

In chapter 6, it shows how to join DSM project for customers. There are lots of examples and case studies to show how the DSM projects can be successfully implemented in China. Readers will easy to learn and understand the process of joining DSM projects step by step.