

汤萌 / 著

中国电力市场化改革 及其区域问题研究

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in China
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内容摘要

关键词:电力市场化 区域电力市场 运营模式 交易模式 监管

中国电力市场化的区域问题亦即区域电力市场的理论、模式、运营以及监管问题,既是中国电力市场化实践面临的重要基础问题,也是本文研究的重心。中国电力的市场化是一项复杂的系统工程,既需要系统的理论指导,又需要有切合实际的实践设计。有关中国电力市场化特别是区域电力市场理论的非系统性以及电力市场化改革实践的迫切需要,既突显了上述理论研究的重要性,也为本文的研究提供了一个相对广阔的空间。

电力市场化的实质是在电力产业内部引入竞争机制,建立竞争性的电力市场,实现电力资源的优化配置。电力市场化首先要解决的理论前提是电力产业是否适宜于竞争以及应在何种领域进行竞争,而这取决于电力产业的技术经济特性。本文首先对电力产业的技术经济特性进行了分析,进而认为,电力产业是有着自身技术经济特性的自然垄断产业,但是随着经济技术的发展,电力产业的技术经济特性也随之发生某种变异。电力产业内部各领域的自然垄断性差异以及电

力产品的准公共产品性或者说基本私人物品性,为电力产业在发电和销售领域引入竞争,实现市场化提供了可能。发电和销售领域的竞争与输配电领域的垄断经营并存,构成电力产业市场化的特殊链条,市场竞争机制与政府的管制与调控,看不见的手和看得见的手双重作用,是电力产业市场化的有机形态。

电力市场化是电力生产力发展到一定阶段的必然产物,也是各国政治、经济发展相互作用的必然结果。论文考察了世界主要国家特别是英国和美国的电力市场化实践,揭示了不同国家电力市场化的特点以及有益的启示、经验和教训。论文认为,英、美两国的实践,为中国电力市场化提供了重要的借鉴,他们的实践表明,电力市场化既遵循电力产业内在的发展规律,又与各国的国情和经济社会发展需求紧密相关,不存在普适性的电力市场化模式,各个进行电力市场化改革的国家必须根据国内的政治、经济环境和电力发展水平,从实际出发,做出自己的探索。

中国电力市场化改革尽管具有强烈的、明显的政府推动效应和特征,但就其实质而言,是电力产业自身发展的必然产物。论文考察了中国电力市场化的进程,并对中国电力市场化与西方发达国家的电力产业市场化进行了比较,揭示了中国电力市场化的特殊性,这种特殊性主要体现在,中国是一个区域发展不平衡的发展中大国,中国的电力市场化改革是在电力供需矛盾相对缓和、局部偏紧的情况下展开的,由于中国目前的工业化水平和国民经济发展的迫切需要,在一定的时间内,发展仍是中国电力产业的主题和第一要务。因而中国电力市场化的使命就不仅仅是引入竞争机制,解决效率和活力的问

题,而是以此为基础,借助市场的力量,尽可能地利用市场机制配置资源,既解决效率的问题,又解决发展的问题,实现电力产业的良性和可持续发展。论文分析了电力市场化实践中的几种市场结构模式,并从中国的国情出发,探讨了中国电力市场化的目标模式问题,指出中国电力市场化的目标模式是:在竞争模式选择上以适度有效的竞争模式为目标;在市场结构模式上以发电独立、输电开放型模式为目标,但现阶段只能采用发电独立型模式。

研究中国电力市场化的区域问题,阐明区域电力市场是中国电力市场化的基石,确定区域电力市场作为中国电力市场的优先顺序和发展路径,并在此基础上综合分析区域经济发展水平、资源分布状况以及电网结构等因素,提出中国区域电力市场的基本架构及其不同区域电力市场的运营模式以及体现其要求的交易模式,是中国电力市场化的核心问题,也是本文的中心工作和研究的意义所在。论文考察了以电力网络连接为存在和运营方式的电力产业的区域特性,分析了区域特性的具体表现即电力网络运营的区域性、电力产业布局的区域性和电力发展水平的区域性,进而认为,中国电力产业市场化必须从区域开始,以区域为基本单位进行,通过区域电力的市场化而实现全国的电力市场化,因而中国电力市场化的区域问题特别是区域电力市场建设是中国电力市场化的基本和首要的问题。论文考察了中国一次能源分布的特点及电力产业的空间布局,阐述了中国电力产业以大区为基本单位进行资源配置的必然性,得出了中国从现在起到今后一个相当长的阶段内,分六大区域进行区域电力市场建设是适宜的结论。

电力市场运营模式是电力市场建设的重要方面,是在特定的电力

市场结构模式、转换模式下,基于电网结构及输送容量等技术条件约束,市场主体通过相应的组织、制度和技术安排,以在连续的系统运营中实现公平竞争并有效地配置资源的方式。论文分析电力市场的一般特性,揭示了电力市场在本质上是通过现代人机功能模拟市场竞争机制,实现电力产品在基于供求关系的价格信号引导下有效生产、传输和消费的自组织系统。论文区分了电力市场的市场结构模式、转换模式、运营模式、交易模式及其内涵,概括了世界电力市场化改革中不同市场结构模式下的三种电力市场运营模式,即统一市场、统一运作模式,统一市场、分层运作模式,联合市场、分散运作模式,并根据中国各区域电网的实际,提出了中国各区域电力市场运营模式的优化选择:东北为统一市场、统一运作的模式;华北、华中可先行采取统一市场、分层运作的模式,经过较长时间的完善之后,即可转向统一市场、统一运作的运营模式;华东、南方、西北可先行采取联合市场、分散运作的运营模式,经过较长时间的完善之后,即可转向统一市场、分层运作模式,最终实现统一市场、统一运作的运营模式。

电力市场的交易模式是体现市场机制的核心环节,是集中体现市场结构模式和运营模式要求,实现区域电力市场交易的根本方式。论文提出了电力市场交易模式的设计和确立必须体现促进公平而有效的竞争、利于区域电力产业的可持续发展、尽量减少协调和交易成本、适宜电力产业发展的水平的原则,并以优化电力库交易模式作为中国区域电力市场的适宜模式。论文从中国区域电力产业发展的实际出发,提出了优化电力库模式的市场构成,并就其电能市场、辅助性服务市场、输电服务市场以及容量市场的结构、竞价方式进行了设计;论文

分析考察了中国电价生成机制存在的问题,提出了优化电力库模式的电价改革方案;同时对实现交易的重要环节——结算方式进行了具体设计,总体形成了中国电力市场化初期区域电力市场的交易模式雏形。

对于正在转向市场化的电力产业进行监管,既是电力市场化的制度前提,也是电力市场有效运行的重要保证。论文分析了区域电力市场监管相对于中央电力监管的特殊性,明确提出了区域电力监管机构的监管重心和着力点。论文指出,相对于中央监管机构侧重于提出与确定统一的监管政策、法律和法规,区域电力监管机构主要应侧重于维护和保障区域电力市场乃至区域电力产业的健康有序发展。具体到执行层面,区域电力监管的重心和着力点应当是进入的合法性、竞争的有效性、交易的规范与公平性以及运营的安全性等。论文探讨了电力监管的有效性问题,指出为履行上述职责,中国电力监管机构的空间布局可分为中央——区域两个层次和中央——区域——省市三个层次,具体如何设置根据区域电力市场的运营模式而定。为提高区域电力市场监管的效力,除了监管机构的积极作为外,要从健全电力监管的法律基础和建立科学有效的监管程序这两个方面入手。

论文共分为七章,具体情况如下:

第一章是对电力产业的技术经济特性进行系统分析,着重从理论上分析电力产业的自然垄断性和准公共产品性在电力产业内部各个环节的具体体现,从而阐明电力产业为什么能够引入竞争,在多大程度上以及如何展开竞争的理论依据,并揭示电力产业的技术经济特性为电力市场化提出的问题。

第二章主要考察国外电力市场化的实践,就主要发达国家特别是英国和美国的电力市场化实践中的产业组织结构与运营管理、市场结构、竞争与交易模式、监管机构与监管方式展开讨论,并就市场化的成效与问题进行分析。

第三章集中探讨中国电力市场化的客观必然性及其目标模式。首先对中国电力产业市场化改革的实践进行考察,从中揭示中国电力产业市场化的客观必然性,并通过对竞争态势与资源配置方式冲突的剖析,提出电力产业推进电力市场化,建立电力市场的迫切性;然后分析中国电力产业市场化改革面临的艰巨的发展使命,并从这一实际出发,提出中国电力产业市场化的目标模式

第四章转入探讨中国电力产业市场化的区域问题,主要是区域电力市场体系的问题。一方面从考察中国能源分布的特点、电力产业的空间布局以及六大区域电网及其市场格局出发,意在阐明“区域”在电力产业发展中的重要性;另一方面从区域电力市场与区内电力资源的优化配置以及与区域协调和区际互补的角度,分析中国区域电力市场建立的优先性和现实性,并提出中国区域电力市场的基本架构。

第五章探讨中国区域电力市场运营模式的选择问题。首先探讨几种体现有效竞争的区域电力市场运营模式,并着重对影响区域电力市场运营模式的因素进行分析,然后在分析中国六大区域经济差异及电网结构特性的基础上,提出中国六大区域电力市场的具体运营模式选择。

第六章集中探讨中国区域电力市场的交易模式。在明确区域电力市场交易模式的内涵的基础上,提出中国区域电力市场交易模式选

择的原则;并从中国电力产业发展的实际出发,就区域电力市场运作过程中有关市场构成、市场交易的方式,竞价机理和电价生成机制,交易的结算方式进行具体分析,提出电力市场化初期区域电力市场交易模式选择。

第七章集中探讨中国区域电力市场的监管问题。首先从电力市场一般意义上的监管入手,揭示电力市场化监管的主要内容;然后着重就区域电力市场监管的主要问题进行概括,揭示区域电力市场监管的重心和着力点;最后就区域电力市场监管机构的设置及监管效力展开讨论,并提出初步的政策建议。

Abstract:

Key words: power market reform; regional power market; operation; trading; regulation

The key research of this paper is the regional issue of power market process, which includes the theory, model, operation and regulation of regional power pool in China. It is also an important and fundamental issue faced by China in implementing its power market reform. As a complex system engineering, power market process in China requires a systematic theory as well as an appropriate design and plan. The urgent need of a theory for China's power market reform, especially the regional power pool, which is non-systematic in nature, not only highlights the importance of the above-stated theory research, but also provides a relatively wider vision for this paper.

The core of the power market reform is to introduce competitive mechanism into the inner part of power sector, establishing competitive power market and optimizing the allocation of electric power resources. The premier theoretical precondition of the power market is

whether and in which field competition can be introduced into power sector, and this rests largely with the technologic economic characteristic of the power sector. Firstly, this paper analyzes the technologic and economic characteristic of the power sector with the opinion that power sector is a natural monopoly industry with its own technologic and economic attributes. However, with the development of economy and technology, some changes have taken place on the technologic and economic characteristic in power sector. The differences in natural monopoly conditions within power sector as well as electricity characteristic of a quasi — public goods or the basic personal goods provide possibility to introduce competition into power generation and distribution and to realize power market process. Competition and monopolistic management coexisting in power generation, transmission and distribution constitute special market chain in power industry. Market competitive mechanism and government regulation and control, that is, the visible hand and invisible hand interaction, make up the conformation of the power market process.

Power market process is an inevitable outcome of power sector after it developed to a certain degree, as well as a result of the interaction of politics and economy in different countries. After reviewing the power pool practice in main countries, especially in Britain and USA, this paper illustrates the characteristics of different power markets and some useful experiences and lessons. The paper holds the

view that power market practice in Britain and USA offers important and useful references to China's power market. That is, power market should follow the inner developing laws of power sector as well as comply with its own situation and the demand of economic and social development. No power market model can adapt to all countries and situations. Countries exploring their power market should give full considerations to their different political and economic environment and electric power development to make their efforts in accordance with their own situations.

China's power market reform, in essence, is the inevitable result of the development of power sector itself, though it is obviously promoted by the government. This paper looks into the power market evolution in China, compares the China's power market reform with that of the western developed countries and illustrates the particularity of China's power market. The particularity is that China is a big developing country with unbalanced development in different regions. China implements its power market reform under the condition that the unbalance between power demand and supply relatively eases up while unbalance still exists in a few regions. The urgent need of current industry and domestic economic development determines that in a certain period, development is still the main task for China's power sector. Therefore, China's power market should put emphasis not only on introducing competitive mechanism, efficiency and vigor, but

also on making use of market power and market mechanism to allocate resource, to achieve both efficiency and development and to realize the perfect and sustainable development of power industry. After analyzing several practical market structure models, this paper discusses the target model of China's power market from the point of view appropriate to its situation, pointing out that China's power market should take moderate and efficient competition as its competitive model and independent power generation and open distribution as its market structure model. However, only independent power generation model is applicable to current situation.

It is the core and main research of this paper to study the regional issue of China's power market, to define regional power pool as the priority and developing path of China's power market and to analyze some factors such as the regional economic development level, resource distribution condition and grid structure, etc., finally putting forward the basic framework of regional power pool, the management models of different regional power pools and their coincident trading. This paper looks into the regional peculiarity of power sector, which is characterized by network connections and operation, analyzes the specific aspects of regional identity: that is, the regional grid operation, regional power sector layout and regional power development level and holds the view that China's power market reform should start with regional power pool with "region" as its basic unit and a

national power market can be established through successful operation of regional power pool. Therefore, the regional issue, especially establishing regional power pool, has become the principal problem on China's power market. The paper also looks into the primary energy distribution and the geographical distribution of power sector in China, illustrates that henceforward, it is appropriate to establish regional power pools in six large regions of China.

As an important part of power market establishment, power market operation model is that market principal part should make use of organization, system and technology to implement fair competition and efficient resource allocation in a continuous systematic management under a given power market structure model, transition model and the technology limitation of grid structure and transmission capacity. The common characters of power market are also analyzed in this paper to illustrate that essentially, power market is a self-organizing system to organize efficient production, transmission and consumption of electricity with the guidance of demand-supply correlation and price signal by means of modern market competition mechanism of man-machine function simulation. The paper also distinguishes the market structure model, transition model, management model, transaction model of power market and their connotations, and summarizes three power market operation models under different market structure models used in international power market

reform, which can be described as the unified operation model in uniform market, the hierarchy operation model in uniform market and the separated operation model in united market. According to each regional grid situation, the optimization of each regional power pool's operation model is also put forward: The uniform market and unified operation model can be applied to the northeast grid. North China grid and Central China can implement the uniform market and hierarchy operation model at first and shift to the uniform market and unified operation model after it develops and perfects during a long period. The East China grid, South China grid and northwest grid had better adopt the uniform market and separated operation model at present, shift to the unified market and hierarchy operation model after a long time development, and finally carry out the uniform market and unified operation model.

As the key link to reflect market mechanism, power market transaction model is a basic way to materialize the requirement of market structure model and operation model and to implement regional power pool transactions. The paper puts forward the model design of power market transaction and establishes proper principles for power sector's development that are necessary to promote efficient and fair competition, to help sustainable development in regional power sector and to decrease coordination and transaction cost, pointing out that optimized power pool transaction model is suitable for

China's regional power market. According to the development of China's regional power industry, the paper proposes the market components of optimized power pool model and provides design on the market structure and bid model for electric energy market, auxiliary service market, transmission service market and capacity market. Finally, the research looks into the tariff mechanism problems in China, brings forward tariff reform plan of optimized power pool, makes a detailed design of balance which is the most important part of electricity transaction and shapes the premier framework of China's power market transaction model in the initial stage of our power market process.

It is a system precondition as well as an important guarantee to ensure efficient operation of the power market to regulate power industry at its transition process to market. After analyzing the regulation's particularity of regional power pool, compared with that of the national regulation, the paper proposes the key points of regulation in regional power regulatory departments, pointing out that national regulatory department focuses on establishing a serious of uniform regulatory policies, laws and rules, while regional regulatory department should put emphasis on maintaining and guaranteeing orderly and perfect development of regional power market and power industry. As far as the administration concerns, regional power regulation should focus on legitimacy for entry, efficient competition,