

Restructuring of Electric Power Sector: The Transition from Monopoly to Competitive Market Conditions

Dario Maradin

University of Rijeka, Faculty of Economics and Business, Ivana Filipovića 4, 51000 Rijeka, Croatia.

ABSTRACT: The electric power sector is facing comprehensive changes reflected in the reorganization of the entire market, in the economic relations management and the technical and technological functioning of companies. The changes are in fact a consequence of various restructuring processes in the electric power sector, which are parallelly unfolding depending on the course and dynamics of the structural reforms implementation. In the electric power industry, these processes primarily involve liberalization, namely, opening the market to all business entities, and thus introducing competition to the electricity power market. The establishment of competition in the electric power industry is facilitated by the process of vertical unbundling of electric power activities, which can be divided into market-oriented and regulated activities. The purpose of this paper is to present the structural reforms and processes of restructuring the electric power industry which is transforming from monopoly market structures to competitive market conditions.

KEYWORDS: electric power market, liberalization, competition, vertical unbundling of electric power activities

1. INTRODUCTION

Various electricity management processes take place in the electric power industry. The electric power sector represents the electricity generation industry and the end-users supply. In this sense, although electricity as an input is present in most production and service industries, the electric power industry is determined by the electricity generation and supply process. The electric power sector is present on the market as a specific technical and technological system. The particularity of electric power sector arises, first of all, from the market relations of the overall system functioning and the manner in which the system operates on competitive and regulated bases, and from the formation and application of production output in the form of electricity. Initially, the entire electric power industry developed in monopoly market conditions where there was a monopoly, vertically integrated company performing all electric power activities. Over time, due to the impact of structural reforms and restructuring processes, the electric power market began to transform from monopoly market conditions to bilateral market relations, competitive and non-competitive. Therefore, the electric power sector operates in market oriented electric power activities and regulated electricity activities due to the existence of a natural monopoly in that part of the electric power sector.

Given the mentioned above, the purpose of this paper is to present the structural reforms and processes of restructuring the electric power industry which is transforming from monopoly market structures to competitive market conditions.

2. LIBERALIZATION AND COMPETITION IMPLEMENTATION INTO ELECTRIC POWER SECTOR

In the electric power sector, as well as in other infrastructure activities of the public sector, for example, in the telecommunications sector, water supply or gas markets, structural reforms and restructuring processes aiming to improve market efficiency are carried out. The resulting changes implied transformation from monopoly market structures into, initially partially, competitive market conditions¹. Since the beginning of the 1980s until present time, the electric power sector has been facing a series of

¹ Restructuring, privatization and deregulation of electric power industry began in the early 1980s in Chile, New Zealand and the United Kingdom (Larsen and Bunn, 1999).

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reforms and related restructuring processes aiming to improve the efficiency of the electricity market (Cerović, Maradin and Čegar, 2014).

Encouraged by the structural reforms of the electric power industry in different countries worldwide, common measures and steps in the achievement and functioning of the market-oriented electric power industry can be displayed. Structural reforms in the electric power sector usually require the implementation of one or more mutually related steps which involve the restructuring of the sector in the form of vertical and horizontal unbundling of electric power activities, the introduction of competition to the wholesale market, as well as to the electric power production and retail market, namely, electricity supply, incentive regulation in transmission and distribution network, independent regulatory body establishment, and the privatization of electric power companies.

Therefore, Table 1 lists the reform steps of the vertically integrated state-owned electric power company towards the competitive, privatized electric power industry. In practice, it is necessary to consider the actual reform measures which depend on the specifics of the national electric power sector and the general features of reform model.

Table 1. Basic steps in the electric power sector reform

Restructuring	Vertical unbundling of production, transmission, distribution and supply
	Horizontal unbundling of production and supply
Competition and markets	Wholesale and retail market competition
	Enabling entrance for new production and supply companies
Regulation	Independent regulatory body establishment
	Permission for access to the network activities for third parties
	Incentive regulation of transmission and distribution network
Ownership	Permission for access to new private companies
	Privatization of state-owned electric power companies

Source: Jamasb and Pollitt, 2005

In addition to the basic steps in the reform of electric power sector, the following Table 2 displays the emerging changes at the level of electric power industry which occur when the industry is restructured, namely, when it moves from a monopoly market structure to competitive market conditions.

Table 2. Industry level changes upon restructuring

Characteristic	Monopoly market	Competitive market
Business environment	Stable, with gradual adjustments and technically engineered changes; uncertainty in demand and costs	Unstable, price volatility, new market shareholders with different objectives; market, corporate and regulatory uncertainties
Information	Publicly available	Become secret
Regulatory environment	Related to social well-being	Balance between the interests of consumers and new business entities achieved in a difficult manner
Market power	Not questionable due to the regulated (natural) monopoly	Crucial for regulators and companies
Environment protection	Simply involved in energy policy	Becomes an additional element in market regulation
Public investment into R&D	Significant participation in long-term commitment	Companies cannot justify the public domain of research and development

Source: Larsen and Bunn, 1999

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While the business environment is stable on monopoly market, with relatively predictable development, the conditions at competitive market are significantly changes with the entrance of new business entities and new owners of existing electric power companies. Apart from the fact that the former monopoly electric power company cannot maintain active pricing policy and supply the overall consumers (e.g. Denona Bogović, Cerović and Maradin, 2012), a capital market uncertainty is present as well as company ownership uncertainty since the latter can be changed from yearly. Furthermore, in the monopoly market, most of the information is publicly available. On the other hand, in the competitive electric power industry, information are valuable and provide commercial advantage. None of electric power company wishes to disclose investment plans, maintenance schedules, upgrades or company outflows, unless those are specified by the regulatory body or public authorities.

In addition to the technological, organizational and economic factors which led to structural reforms in the electric power sector, the following reasons for electric power system reorganization are also mentioned (Tešnjak, Banovac and Kuzle, 2010):

1. the implementation of deregulation which presumes the removal of state regulations elements and state control over market (national economy), since the electric power infrastructure is, in its major part, encouraged by the state which owns it, this is not in line with market principles;
2. the reduction in electricity prices which could occur due to the expected reduction of costs in competitive electricity generation and supply activities because of a more efficient organization of newly established companies;
3. increase in the number of choices and the quality of services for consumers achieved by competition in the electricity supply activities;
4. encouraging innovative and faster development of the electric power sector and, consequently, the national economy due to opening of the market and the expected more efficient solutions, and the application of new technologies and business approaches.

The regulation issue of electric power industry, namely the companies, has also impacted the transition from monopoly to competitive market. In monopoly market, it represented the balancing between consumer spending and corporate receipts. In competitive market, the aim is to achieve deregulation, along with the wholesale market for generated electricity and the retail market for electricity supply. In this manner, self-regulation through competitive relationships is achieved, while regulation is maintained only for transmission network operations and electricity distribution, as traditionally natural monopoly.

With the emergence of the electric power sector reforming processes, public authorities face certain issues and dilemmas which may be the following (Vlahinić-Dizdarević and Žiković, 2011):

1. the method of realization of unbundling of electric power activities;
2. the dynamics of market opening;
3. the model choice and organization of electricity market;
4. the inherited costs resolution;
5. the public services obligations;
6. the protection of socially sensitive customers.

The particularly important aspect for the economic policy holders, and consequently for electricity consumers and the entire national economy, is the choice of the electric power organization model. The models actually represent individual phases of electric power market restructuring. Depending on the restructuring process and market opening and different levels of competition, four basic models of the electric power sector organization can be listed (Hunt and Shuttleworth, 1996):

1. *Vertically integrated monopoly* is the model before the restructuring of the electricity market. There is no competition on the market neither in the electricity generation nor in the supply and consumers have no choice because they are able to buy energy exclusively from a monopoly company that is owned by the state (Vlahinić-Dizdarević and Žiković, 2011). All the functions and activities of the company are consolidated and regulated. This model has worked well for almost a century and is still present in certain electric power industries.
2. *One customer* is the model which was first adopted in 1978 in the United States² where a single company (vertically integrated) is enabled or required to purchase electricity from more than one generator/producer. The model represents the first step in the electric power sector liberalization where the electricity production investments are realized by

² In the US, the goal was not to introduce competition, but to encourage production from environmentally friendly resources.

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private capital. In this model, independent producers sell electricity exclusively to an existing integrated company which, on the other hand, has a monopoly in end-consumer supply.

3. *Wholesale market* is a model in which distribution companies (or large industrial consumers) are competing on the wholesale market, and can choose the supplier from which they would buy electricity (competition in electricity production is still present) while retaining monopoly over end-users in retail market. In other words, the first three activities of the electric power sector are unbundled, while electricity distribution and supply remain integrated (Ferrari and Giulietti, 2005).
4. *Retail market* is the final phase electric power sector restructuring model in which, the choice of suppliers is available for all consumers on a completely open market. As in the wholesale and retail market models, there competition among distribution companies is present, but with securing additional elements such as consumer contracts, electric meter, invoicing, and more. The advantage of this model is that all consumers are offered the choice of electricity supplier which eliminates potential market failures.

The optimal model of the electric power market depends on the economic, technical, as well as institutional and social characteristics of each individual country, and it is therefore necessary to adopt market rules and technical standards which encourage opening and development of the market (Vlahinić-Dizdarević and Žiković, 2011).

Electric power companies face new challenges in the liberalized electric power industry. Liberalization and deregulation have caused changes in almost all areas of the involved electric power companies; the employment system and the provision of financial resources for required investments, planning and companies' business strategies. In order to illustrate the changes that take place at company level upon the restructuring of the electric power industry³, or when the industry gradually transits from monopoly market structure to the competition market, the following table 3 is presented below.

Unlike the monopoly market structure in which one electric power company performs all electrical power activities; in the competitive, liberalized market, the electric power companies are driven by different motives and goals in certain activities.

Table 3. Company level changes upon industry restructuring

Characteristic	Monopoly market	Competitive market
Focust	Best technical solution	Best cost-efficient solution
Management	Technical	Business
Consumers' choice	No choice	Competition brings choices
Methods of planning	Classic operational research methods	New methods associated with strategic planning, limited information and uncertainty
Outsourcing	Small or none	Increased
Business operation	Social balance	Stakeholder's value

Source: Larsen and Bunn, 1999

In monopoly conditions, vertically integrated electric power companies do not have enough incentives to implement economic efficiency and their goals are, among other kinds, politically motivated and may represent company growth, income maximization, employment increase, additional services provision alongside the continuous electricity supply, or any other goal (Dyner and Larsen, 2001). The company focus is shifted from "the best possible technical and technological solutions", namely, from the view that managing overall company resources in consideration of their prices does not represent the company's main interest towards the "best possible cost-efficient solution". With that, the core of electric power company management and operation is centred around manners of using resources in an optimal ratio, taking into account their prices, along with the available technological and technological capabilities. Moving from technical/political orientation towards more business/economic focus and operation is a demanding process involving fundamental reorganization towards customers and their needs, market competitors, owners, namely company shareholders, and other stakeholders as well. This especially refers to the market where actual competition is present and encouraged (Larsen and Bunn, 1999).

³Changes refer to the electric power sector, but most of them can be generalized also to other (municipal) sectors

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On monopoly market, one vertically integrated electric power company produces electricity, regardless of the number of production units of the monopoly company⁴ or the energy resource used to generate electricity. On the other hand, in competitive, liberalized electric power industry, more companies, or electricity producers participate on the same market share.

Furthermore, once monopoly companies, which are now "transformed" and operate in electricity generation field, as well as new business entities, have to adapt to new business planning methods, managing ways and company operation on a deregulated competitive market. The traditional methods of analysing electric power industry are replaced with the dynamic, uncertain and subjective nature of assumptions which need to be included in the strategic analyses of electric power company operation planning (Larsen and Bunn, 1999). In order for the existing electric power companies to stay competitive on the market to or maintain market share regarding the growing number of new business entities, namely electricity producers, they should reduce operating costs and improve business performance, or improve business efficiency without lowering service quality or profitability. Similarly, new business entities (electricity producers) gain profit by selling electricity on a competitive, liberalized market, and to maintain their position on such a market, they have to introduce certain measures and activities to reduce costs and compete with other electric power companies. Also, companies are trying to achieve and maintain, as long as possible, market power with higher electricity prices. This is particularly evident in the initial phases of restructuring and liberalization of the electric power market. Regarding the operating costs of electricity generation, electric power companies can specialize in managing a particular type of electric power company. Vertically integrated companies traditionally had enough production capacity to meet the demands in the area which they supplied with electricity. In doing so, the companies used different production technologies (steam turbines, gas turbines, combined turbine process) and various energy resources (coal, oil, gas, nuclear fuel) in the production of electricity. On the liberalized market, new business entities, on the other hand, no longer need to secure electricity demand in a particular geographic area⁵ and can choose the cost-optimal type of electric power company or energy resource for electricity production (Wolfram, 2003). In such new market conditions with different organizational structure, the optimization of planning and operation of electric power company becomes crucial, whether it is a technical and/or economic aspect of electricity generation (e.g. Maradin, 2015).

3. VERTICAL UNBUNDLING OF ELECTRIC POWER ACTIVITIES

The electric power sector restructuring, with liberalization, market opening, vertical unbundling of electric power activities and other reform processes, presumes the transformation of sectors from monopoly market structures into competitive market conditions. It is precisely the vertical unbundling of electric power activities that enabled market competition to be realized in electric power market activities, namely the activities of electricity production and supply.

The unbundling of vertically integrated companies, or the unbundling of separate electric power sector activities such as electricity generation, transmission, distribution⁶ and supply or the selling of electricity, enables efficient market relationships in certain parts of the electric power industry. The main objective of the vertical unbundling of electric power activities is to prevent discrimination in market-competitive activities of the electric power sector, but also to ensure access to other business entities in the regulated electricity transmission and distribution activities, if that is feasible considering the technical and/or economic constraints.

Therefore, there is a need for a certain level of unbundling between electric power activities, namely transmission and production; distribution and production, and distribution and supply of electricity. The unbundling of electricity production and transmission makes it easier for new business entities to enter the competitive electric power production business, thereby creating and stimulating market competition which should lead to the produced electricity price reduction. Since the cost of electricity production is approximately 65% of the total cost of delivered electricity, and in order to ensure competition in the production and reduce electricity prices, it is stated that the unbundling of electricity transmission is the most important element in the process of electric power market opening (Copenhagen Economics, 2005).

⁴ A monopoly company which owns two or more production units is called a multi-company monopoly (Pavić, Benić and Hashi, 2007).

⁵ This does not exclude *the obligation of public service provision* which implies the necessity of a secure and reliable supply of electricity as a public service, which must be ensured in competitive, liberalized market conditions (Public service obligations, 2004).

⁶ New Zealand was the first country in the world which carried out the ownership unbundling of electricity distribution from the rest of the electric power industry in 1998 (Nillesen and Pollitt, 2008).

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Also, the vertical unbundling of electric power activities is carried out with the aim of ensuring the operation transparency of electric power companies. It also aims to prevent possible subsidies between regulated, network and market activities in the event that a vertically integrated company is present on the market and which can also have a negative impact in such a manner that as an entity with significant market and financial power, it uses its jurisdiction of managing electricity network transmission and distribution activities to provide advantage to market activities, or production and/or supply segment of the company in its possession (Tešnjak, Banovac and Kuzle, 2010). This can result in the conflict of interest within a vertically integrated company and also discriminates other electric power companies on the market.

4. CONCLUSION

The processes of restructuring electric power sector, among others, along with the liberalization processes and vertical unbundling of electric power sector, led to the emergence of market-oriented and regulated electric power activities. This ensures the possibility for the presence of competition in one part of electric power sector, while in the second part, regulatory measures and activities due to the existence of natural monopoly are carried out.

Nowadays, depending on the level of restructuring, namely, market openness and vertical unbundling of electric power activities, the national electric power markets are essentially competitive with the existence of regulated activities of natural monopoly of electricity. Although the regulation in the network, monopoly activities of electric power sector necessary and justified, monopoly market as such is no longer the basic framework for electric power sector.

ACKNOWLEDGEMENT

This work has been fully supported by/supported in part by the University of Rijeka, Croatia under the project “New Energy Paradigm – How to Reconciliate Sustainability and Feasibility”, Faculty of Economics and Business, Rijeka.

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