

Electricity Market in the Context of the Capital Market

Abstract: *This paper examines the electricity market in relation to capital market mechanisms, with a focus on market participants, trading models, and the Serbian market. Based on a literature review and practical insights from electricity supply, it shows that limited storability and price volatility require specific mechanisms, including bilateral contracts, day-ahead, intraday, and balancing markets. The Serbian market combines regulated and market-based elements, with an important role for SEEPEX and the Energy Agency.*

Keywords: *electricity market, capital market, power exchange, SEEPEX, electricity supply*

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INTRODUCTION

Electricity is one of the most important resources in modern society. Neither households, businesses, nor public institutions can function without a stable electricity supply. For this reason, the manner in which electricity is generated, transmitted, purchased, and sold is of considerable importance both to individuals and to the national economy as a whole.

The electricity market differs from other markets in many respects. Electricity is a specific commodity that cannot be stored easily and cost-effectively, which means that electricity generation and consumption must be balanced at all times. This characteristic gives the electricity market its distinctive nature and makes it an interesting subject of analysis.

The study of capital markets examines how organised markets operate, how prices are formed, the role of supply and demand, and how market participants trade different types of assets. Today, the electricity market relies to a considerable extent on these same principles. Electricity is no longer traded solely through direct contracts between producers and consumers, but also on organised exchanges, through standardised products, with prices determined by the interaction of supply and demand. In this way, the electricity market represents an example of how capital market mechanisms can be applied to a specific and distinctive commodity. For this reason, analysing the electricity market makes it possible to examine theoretical concepts studied within the field, such as exchanges, market participants, trading mechanisms, and price formation, through a practical and contemporary real-world example.

The aim of this paper is to explain how the electricity market operates, identify its main participants and mechanisms, and present the current state of this market in Serbia. The paper is particularly relevant because the author works at EPS Snabdevanje in billing and collection operations, which enables theoretical considerations to be linked with direct practical experience. In this way, the paper combines the theoretical framework of capital markets with the actual functioning of the electricity market in Serbia.

THE CONCEPT AND SPECIFIC CHARACTERISTICS OF ELECTRICITY AS A COMMODITY

At the outset, it is useful to explain the concept and specific characteristics of electricity as a commodity. In order to understand the electricity market, it is first necessary to explain why electricity represents a specific type of commodity. In economic theory, a commodity is generally defined as a good produced for the purpose of exchange in the market. Electricity meets this condition, but it possesses a number of characteristics that distinguish it from conventional commodities such as oil, grain, or metals.

The first and most important characteristic is the difficulty of storing electricity in a simple and cost-effective manner. Electricity must, to a large extent, be consumed at the moment it is generated. Consequently, supply and demand must remain continuously

balanced, while any deviation may cause disruptions in the system. It can therefore be stated that this characteristic fundamentally shapes all trading mechanisms in the electricity market.

The second characteristic relates to pronounced price volatility. Since electricity demand changes from hour to hour, and even from minute to minute, electricity prices may fluctuate significantly over the course of a single day. During periods of high consumption, prices increase, whereas during periods of low consumption, they decrease. Such price dynamics are rarely encountered in other commodity markets and make electricity trading particularly complex.

The third characteristic is related to physical infrastructure. Electricity cannot be transmitted without a developed network, that is, without transmission and distribution systems. This means that the electricity market is closely linked to the technical constraints of the network, which is not the case to the same extent with other commodities.

Serbian authors dealing with financial markets emphasise that every market is based on the relationship between supply and demand and on the role of price as a signal that coordinates the interests of market participants. In their work on financial markets and institutions, Šoškić and Živković explain the fundamental principles of market functioning, which also apply to the electricity market, subject to the specific characteristics described above (11). Similarly, Ristić and Komazec, in their works on financial markets and exchanges, point to the importance of organised markets and clearly defined trading rules (9), principles that can also be applied to power exchanges. Erić and Đukić, writing about financial markets under crisis conditions, note that markets become particularly sensitive during periods of instability (4), while the electricity market is especially exposed to such instability due to the constant need to maintain a balance between supply and demand.

Based on the above, it can be concluded that electricity is indeed a commodity, but one with a number of specific characteristics. Limited storability, price volatility, and dependence on the electricity network collectively mean that the electricity market requires specific trading mechanisms, which will be discussed in the following sections.

STRUCTURE AND PARTICIPANTS OF THE ELECTRICITY MARKET

The electricity market consists of several interconnected participants whose roles complement one another. In order to understand how this market operates, it is necessary to explain who these participants are and what function each of them performs. Unlike a simple exchange between two parties, the electricity market is based on a complex chain linking electricity generation to final consumption.

The first group of participants consists of electricity producers. These are business entities that operate electricity generation facilities, such as thermal power plants, hydropower plants, wind farms, and solar power plants. Their role is to generate electricity and offer it on the market. The quantity of electricity offered by producers and the price at which they are willing to sell it influence the overall relationship between supply and demand.

The second group of participants comprises system operators. A distinction is made between the transmission system operator and distribution system operators. The transmission system operator manages the high-voltage network through which electricity is transmitted over long distances and is also responsible for maintaining a continuous balance between electricity generation and consumption. Distribution system operators manage the lower-voltage networks through which electricity is delivered to final customers. The role of system operators is primarily technical, but the market cannot function without them, since electricity cannot be delivered without a properly functioning network.

The third group of participants consists of electricity suppliers. Suppliers purchase electricity on the wholesale market and sell it to final customers on the retail market. They do not necessarily own electricity generation facilities; rather, their role is to connect the market with the final consumer, calculate electricity consumption, and collect payment for the electricity supplied. This segment of the market also encompasses the activities performed by the author within EPS Snabdevanje, which will be discussed in greater detail in the practical section of the paper.

The fourth group of participants consists of final customers. These may include households, business entities, and public institutions. Final customers differ in terms of their level of consumption and the manner in which they are connected to the electricity network, and consequently also in the conditions under which electricity is supplied and charged.

Power exchanges have acquired particular importance under modern market conditions. A power exchange is an organised marketplace where supply and demand meet and where prices are determined on the basis of a large number of buy and sell orders. The emergence of power exchanges demonstrates the extent to which the electricity market has adopted the logic of capital markets, as trading is conducted through standardised products and transparent price formation. Serbian authors have also discussed the role of exchanges as organised markets. In their works on financial markets and exchanges, Ristić and Komazec emphasise that exchanges provide trading security, transparency, and clearly defined rules, characteristics that can also be recognised in modern power exchanges (9). Šoškić and Živković, writing about financial markets and institutions, point out that developed markets require clearly defined participants and institutions that ensure confidence in the market, and the same principle applies to the electricity market (11).

Finally, regulatory authorities should also be mentioned. Their role is to supervise market operations, protect consumer interests, and ensure compliance with applicable rules. Without an appropriate regulatory framework, there would be a risk of market abuse and instability, particularly given that electricity is a service and commodity of general public importance.

The above analysis demonstrates that the electricity market consists of a number of interconnected participants, ranging from producers, system operators, and suppliers to final customers, with power exchanges and regulatory authorities also playing an important role. Only by considering this entire chain as a whole is it possible to understand the trading mechanisms that will be discussed in the following section.

MODELS AND MECHANISMS OF ELECTRICITY TRADING

Since electricity cannot be easily stored, specific trading mechanisms have been developed to enable supply and demand to be balanced across different time horizons. These mechanisms differ according to how far in advance delivery is contracted and according to the degree of market organisation. In practice, the most common forms are bilateral contracts, the day-ahead market, the intraday market, and the balancing market.

The first model consists of bilateral contracts. These involve a direct agreement between two parties, most commonly a producer or supplier on one side and a buyer on the other. Under this model, the parties themselves agree on the quantity, price, and delivery period. Bilateral contracts provide a degree of certainty because the terms are known in advance, but they are less flexible and less transparent than exchange-based trading. This form of trading is closest to the traditional understanding of a market as an exchange between two entities (8).

The second model is the so-called day-ahead market. On this market, electricity is traded for delivery on the following day, on an hourly basis. Participants submit orders specifying the amount of electricity they wish to buy or sell and the price at which they are willing to trade. Based on all submitted orders, a market price is then determined for each hour of the following day. This model is largely similar to the operation of an exchange in the capital market, as prices are formed through the interaction of supply and demand under transparent trading rules (10).

The third model is the intraday market. It enables electricity trading during the delivery day itself, until shortly before actual delivery. It is particularly important due to the increasing share of renewable energy sources, whose output is not always predictable. If, for example, wind power generation is lower than expected, market participants may compensate for the shortfall by purchasing electricity on the intraday market. This increases flexibility and reduces the risk of imbalances (7).

The fourth model is the balancing market. It is used by the transmission system operator to maintain a continuous balance between electricity generation and consumption. Since even relatively small deviations may jeopardise system stability, the balancing market serves as a fine-tuning mechanism by activating additional quantities of electricity or reducing generation when necessary. This demonstrates the extent to which the technical dimension is inseparable from the economic dimension when it comes to electricity (8).

Considered together, these models demonstrate that the electricity market operates simultaneously at several levels. Bilateral contracts provide longer-term certainty, while the day-ahead and intraday markets enable adjustments over shorter time horizons, and the balancing market serves to maintain system stability in real time. The very existence of organised exchange-based mechanisms, such as the day-ahead market, demonstrates how closely the electricity market has come to resemble the logic of capital markets. Serbian authors have also discussed the importance of organised markets and clearly defined trading rules. Understanding these mechanisms provides the basis for examining the specific characteristics and current state of the electricity market in Serbia, which will be discussed in the following section.

The functioning of the electricity market is closely related to the financing conditions under which companies invest in electricity generation capacity. In a 2025 study, Wilson, Shrimali, and Caldecott examined how the cost of debt and climate policy influence investments by electric utility companies in low-carbon and high-carbon energy sources. Based on a sample of publicly listed companies over the period from 2012 to 2021, they found that a lower cost of debt and higher levels of borrowing increase investment in both types of energy sources (12). This means that capital market conditions, such as interest rates and the availability of financing, directly shape both the scale of investment and the types of energy sources in which investments are made, thereby also influencing the future structure of the electricity market.

The aforementioned study also demonstrates that climate policy plays an important role in directing capital flows. The authors found that market-based measures, such as carbon pricing and carbon taxes, increase investment in low-carbon energy sources while simultaneously strengthening the relationship between borrowing and such investment, whereas they have the opposite effect on investment in high-carbon energy sources (12). This finding confirms that capital market principles and economic policy measures intersect directly within the electricity market, since financing decisions and the regulatory framework jointly determine the direction in which electricity generation develops. For the Serbian electricity market, which is undergoing further development and alignment with European standards, these findings suggest that the availability of favourable financing and a clearly defined climate policy will be important factors for future investment in electricity generation capacity.

THE ELECTRICITY MARKET IN SERBIA

The electricity market in Serbia has undergone significant changes over the past two decades. From a system in which virtually all activities were concentrated within a single large state-owned enterprise, Serbia has gradually moved towards a model involving multiple market participants and in which trading is partly organised according to market principles. This process is known as the liberalisation of the electricity market.

Liberalisation has meant opening the market to competition and allowing final customers to choose their electricity supplier. Previously, electricity prices and supply conditions were fully regulated, and customers had no possibility of choosing a supplier. Through the gradual opening of the market, first to large consumers and subsequently to other categories of customers, conditions were created for the development of competition and the emergence of a larger number of suppliers (8).

Elektroprivreda Srbije (EPS) continues to occupy a central position in Serbia's electricity system. EPS encompasses electricity generation capacities and acts as a supplier to the largest number of final customers. Within its organisational structure, electricity supply activities have been separated into a dedicated segment responsible for selling electricity to final customers, calculating consumption, and collecting payments (2).

An important step in the development of the market was the establishment of a power exchange. In Serbia, this role is performed by SEEPEX, where electricity is traded on the basis of the day-ahead market model. The establishment of this power exchange enabled transparent price formation based on supply and demand and brought the Serbian market closer to the practices of developed European electricity markets (10). The emergence of an organised power exchange provides a good example of how capital market principles are also applied to the electricity market, since trading takes place through standardised products and clearly defined rules.

For the market to function properly, the existence of an independent regulatory authority is essential. In Serbia, this role is performed by the Energy Agency of the Republic of Serbia (5). Its responsibilities include supervising market operations, issuing licences to market participants, monitoring price formation, and protecting the interests of final customers. The existence of a regulatory authority is particularly important because electricity is a commodity and service of general public interest, and it is therefore necessary to ensure that the market operates in a stable and fair manner.

Although the electricity market in Serbia has made considerable progress, it continues to face a number of challenges (1). A proportion of customers, particularly households, are still supplied under regulated conditions within the framework of so-called guaranteed supply, while another segment of the market operates at market-based prices (3). This dual character of the market reflects the transitional stage in which the Serbian electricity sector currently finds itself. Authors dealing with financial markets point out that the development of any market requires time, clearly defined rules, and the establishment of trust among market participants (6), and the same conclusion can also be applied to the electricity market in Serbia.

Based on the above, it can be seen that the electricity market in Serbia represents a combination of regulated and market-based elements. On the one hand, the state continues to play a significant role through Elektroprivreda Srbije and regulated electricity supply, while on the other hand, competition and organised exchange-based trading are continuing to develop.

BILLING AND COLLECTION ACTIVITIES IN ELECTRICITY SUPPLY

In the previous sections, the electricity market was examined from a theoretical perspective, through its participants, trading mechanisms, and specific characteristics in Serbia. This section connects the theoretical framework with the practical functioning of electricity supply, with particular emphasis on billing and collection activities. The aim is to demonstrate how theoretical concepts relating to capital markets and the electricity market are reflected in everyday operations involving final customers.

Electricity supply represents the final link in the chain connecting generation with final consumption. Billing and collection activities are located precisely at this point in the process, ensuring that the electricity delivered is properly measured, recorded, and charged.

The billing process begins with electricity consumption data. Based on the measured quantity of electricity consumed during a specific billing period, an invoice is issued to the final customer. In this process, account is taken of the customer category, since supply conditions differ between households and business customers, as well as of whether the customer is supplied under regulated or market-based conditions. Accurate billing requires reliable metering data and knowledge of the applicable prices and tariffs, since even a minor error in the input data may result in an incorrectly stated amount payable by the customer.

In practice, a clear distinction can be observed between guaranteed and commercial supply. Guaranteed supply is primarily intended for households and small customers, which are supplied at regulated prices, whereas under commercial supply electricity prices are determined on a market basis. This distinction affects both the calculation of electricity consumption and the manner in which supply conditions are presented to customers. Under regulated supply, the price is predetermined and prescribed, which makes the billing process more straightforward from the customer's perspective, whereas under market-based supply, the price depends on contractual terms and market developments.

Collection represents the second important component of these activities. Once an invoice has been issued, it is necessary to ensure that the customer settles the amount due. In practice, various situations may arise, ranging from regular and timely payments to late payments and cases in which overdue receivables are collected through specific collection procedures. This aspect of the business demonstrates that an electricity supplier not only delivers electricity but also assumes financial risk, since it must pay for the electricity it has purchased regardless of whether all customers have settled their obligations on time. Consequently, efficient collection is of considerable importance for the financial stability of the supplier's operations.

This is also where the connection with the capital market becomes evident. The supplier operates between the wholesale market, where prices are determined according to market principles similar to those applied on organised exchanges, and the final customer, to whom electricity is supplied under previously defined conditions. In this way, the supplier assumes both price risk and collection risk, in a manner comparable to the way in which participants in financial markets manage different forms of risk. Serbian authors dealing with financial markets emphasise that risk management is one of the key functions of every market participant, and this principle can also clearly be identified in electricity supply activities.

The practical functioning of electricity supply also demonstrates the importance of data accuracy and trust between the supplier and the customer. An incorrectly calculated invoice or unclear supply conditions may adversely affect the relationship with the customer, whereas clear communication and accurate billing contribute to the stability of that relationship. This confirms the theoretical proposition that every market is based on trust and clearly defined rules. Based on the above, it can be concluded that billing and collection activities, although at first glance they may appear to be primarily technical and administrative, in fact represent the point at which the electricity market directly interacts with the final customer.

CONCLUSION

This paper has demonstrated that the electricity market consists of a number of interconnected participants, ranging from electricity producers, system operators, and suppliers to final customers, with power exchanges and regulatory authorities also playing an important role. Each of these participants performs a specific function, while only their coordinated interaction enables the market to operate in a stable and reliable manner. Particular emphasis has been placed on the role of power exchanges, which demonstrate the extent to which the electricity market has adopted mechanisms characteristic of capital markets.

The analysis of trading mechanisms has shown that the electricity market operates simultaneously at several levels. Bilateral contracts provide longer-term certainty, the day-ahead and intraday markets enable adjustments over shorter time horizons, while the balancing market serves to maintain the balance between generation and consumption in real time. The existence of organised exchange-based mechanisms clearly confirms that capital market principles are also applied to electricity trading.

The case of Serbia has shown that the electricity market has a dual character, combining regulated and market-based elements. On the one hand, the state continues to play a significant role through Elektroprivreda Srbije and regulated electricity supply, while on the other hand, competition and organised exchange-based trading through SEEPEX are continuing to develop under the supervision of the Energy Agency of the Republic of Serbia. Such a model reflects the transitional stage in which the Serbian electricity sector continues to operate.

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Tržište električne energije u kontekstu tržišta kapitala

Apstrakt: Rad analizira tržište električne energije kao primer primene mehanizama tržišta kapitala na specifičnu robu. Cilj je da se objasne učesnici, modeli trgovanja i stanje tržišta u Srbiji. Analizom literature i uvidima iz prakse snabdevanja pokazuje se da električna energija, zbog nemogućnosti skladištenja i promenljivosti cene, zahteva posebne mehanizme: bilateralne ugovore, dan unapred, unutarдневно i balansno tržište. Zaključuje se da srpsko tržište spaja regulisane i tržišne elemente, uz rastuću ulogu berze SEEPEX i Agencije za energetiku.

Ključne reči: tržište električne energije, tržište kapitala, berza električne energije, SEEPEX, snabdevanje

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UVOD

Električna energija predstavlja jedan od najvažnijih resursa savremenog društva. Bez stabilnog snabdevanja električnom energijom ne mogu da funkcionišu ni domaćinstva, ni privreda, ni javne institucije. Upravo zbog toga način na koji se električna energija proizvodi, prenosi, kupuje i prodaje ima veliki značaj, kako za pojedinca tako i za celu nacionalnu ekonomiju.

Tržište električne energije po mnogo čemu se razlikuje od ostalih tržišta. Električna energija je specifična roba koju nije moguće skladištiti na jednostavan i jeftin način, što znači da proizvodnja i potrošnja moraju da budu usklađene u svakom trenutku. Ova osobina daje tržištu električne energije poseban karakter i čini ga zanimljivim predmetom analize.

Tržište kapitala izučava način na koji funkcionišu organizovana tržišta, kako se formira cena, koja je uloga ponude i potražnje i kako učesnici trguju različitim oblicima imovine. Tržište električne energije se danas u velikoj meri oslanja na iste te principe. Električnom energijom se ne trguje više samo kroz direktne ugovore između proizvođača i potrošača, već i na organizovanim berzama, putem standardizovanih proizvoda, sa cenama koje se formiraju na osnovu odnosa ponude i potražnje. Na taj način tržište električne energije postaje primer kako se mehanizmi tržišta kapitala primenjuju na jednu konkretnu i specifičnu robu. Iz tog razloga analiza tržišta električne energije omogućava da se teorijski pojmovi koji se izučavaju na predmetu, poput berze, učesnika tržišta, mehanizama trgovanja i formiranja cene, sagledaju na „živom” i aktuelnom primeru iz prakse.

Cilj ovog rada jeste da objasni kako funkcioniše tržište električne energije, koji su njegovi osnovni učesnici i mehanizmi, kao i da prikaže stanje tog tržišta u Srbiji. Poseban značaj rada ogleda se u tome što autorka radi u EPS Snabdevanju, na poslovima obračuna i naplate, pa teorijska razmatranja može da poveže sa neposrednim iskustvom iz prakse. Na taj način rad spaja teorijski okvir tržišta kapitala sa stvarnim funkcionisanjem tržišta električne energije u Srbiji.

POJAM I SPECIFIČNOSTI ELEKTRIČNE ENERGIJE KAO ROBE

Na samom početku je smisleno objasniti pojam i specifičnosti električne energije kao robe. Da bi se razumelo tržište električne energije, potrebno je prvo objasniti zašto je električna energija specifična roba. U ekonomskoj teoriji roba se najčešće definiše kao dobro koje se proizvodi radi razmene na tržištu. Električna energija ispunjava taj uslov, ali poseduje niz osobina koje je razlikuju od klasičnih roba poput nafte, žitarica ili metala.

Prva i najvažnija specifičnost jeste nemogućnost jednostavnog skladištenja. Električna energija se u najvećoj meri mora potrošiti u trenutku kada je proizvedena. Zbog toga ponuda i tražnja moraju da budu u stalnoj ravnoteži, a svako odstupanje izaziva poremećaje u sistemu. Može se reći da upravo ova osobina suštinski oblikuje sve mehanizme trgovanja na tržištu električne energije.

Druga specifičnost odnosi se na izraženu promenljivost cene. Pošto se potražnja za električnom energijom menja iz sata u sat, pa i iz minuta u minut, cena električne energije može znatno da varira tokom jednog dana. U periodima visoke potrošnje cena raste, dok u periodima niske potrošnje opada. Takva dinamika cene retko se sreće kod drugih roba i čini trgovanje električnom energijom posebno složenim.

Treća specifičnost vezana je za fizičku infrastrukturu. Električna energija ne može da se prenosi bez razvijene mreže, odnosno bez prenosnog i distributivnog sistema. To znači da je tržište električne energije usko povezano sa tehničkim ograničenjima mreže, što kod drugih roba nije slučaj u istoj meri.

Domaći autori koji se bave finansijskim tržištima naglašavaju da svako tržište počiva na odnosu ponude i potražnje i na ulozi cene kao signala koji usklađuje interese učesnika. Šoškić i Živković u svom radu o finansijskim tržištima i institucijama objašnjavaju osnovne principe funkcionisanja tržišta, koji važe i za tržište električne energije, uz navedene specifičnosti (11). Slično tome, Ristić i Komazec u svojim radovima o finansijskim tržištima i berzama ukazuju na značaj organizovanog tržišta i jasnih pravila trgovanja (9), što se kasnije može primeniti i na berze električne energije. Erić i Đukić, pišući o finansijskim tržištima u uslovima krize, podsećaju da tržišta postaju posebno osetljiva u periodima nestabilnosti (4), a tržište električne energije je tome izloženo zbog stalne potrebe za ravnotežom ponude i potražnje.

Na osnovu navedenog može da se zaključi da električna energija jeste roba, ali roba sa nizom posebnih osobina. Nemogućnost skladištenja, promenljivost cene i zavisnost od mreže zajedno čine da tržište električne energije zahteva posebne mehanizme trgovanja, o kojima će biti reči u narednim poglavljima.

STRUKTURA I UČESNICI TRŽIŠTA ELEKTRIČNE ENERGIJE

Tržište električne energije čini više učesnika koji su međusobno povezani i čije se uloge dopunjuju. Da bi se razumelo kako ovo tržište funkcioniše, potrebno je objasniti ko su ti učesnici i koju funkciju svaki od njih obavlja. Za razliku od jednostavne razmene između dve strane, tržište električne energije počiva na složenom lancu koji povezuje proizvodnju i krajnju potrošnju.

Prvi učesnik su proizvođači električne energije. To su privredni subjekti koji raspolazu proizvodnim kapacitetima, poput termoelektrana, hidroelektrana, vetroelektrana i solarnih elektrana. Njihova uloga jeste da proizvedu električnu energiju i ponude je na tržištu. Količina koju proizvođači nude i cena po kojoj su spremni da prodaju utiču na ukupan odnos ponude i potražnje.

Drugi učesnik su operatori sistema. Ovde se razlikuju operator prenosnog sistema i operatori distributivnog sistema. Operator prenosnog sistema upravlja visokonaponskom mrežom kojom se električna energija prenosi na velike udaljenosti, a uz to ima i odgovornost za održavanje stalne ravnoteže između proizvodnje i potrošnje. Operatori

distributivnog sistema upravljaju mrežom nižeg napona kojom električna energija stiže do krajnjih kupaca. Uloga operatora je tehnička, ali bez nje tržište ne može da funkcioniše, jer se električna energija ne može isporučiti bez ispravne mreže.

Treći učesnik su snabdevači. Snabdevači kupuju električnu energiju na veleprodajnom tržištu i prodaju je krajnjim kupcima na maloprodajnom tržištu. Oni nemaju nužno svoje proizvodne kapacitete, već njihova uloga jeste da povežu tržište sa krajnjim potrošačem, da obave obračun potrošnje i da naplate isporučenu energiju. Upravo u ovom delu tržišta nalazi se i posao kojim se autorka bavi u okviru EPS Snabdevanja, o čemu će više reći biti u praktičnom delu rada.

Četvrti učesnik su krajnji kupci. To mogu da budu domaćinstva, privredni subjekti i javne ustanove. Krajnji kupci se razlikuju po obimu potrošnje i po načinu na koji su priključeni na mrežu, pa se prema tome razlikuju i uslovi pod kojima im se električna energija isporučuje i naplaćuje.

Poseban značaj u savremenim uslovima imaju berze električne energije. Berza je organizovano mesto trgovine na kome se susreću ponuda i potražnja i na kome se formira cena na osnovu velikog broja naloga za kupovinu i prodaju. Pojava berzi električne energije pokazuje koliko se ovo tržište približilo logici tržišta kapitala, jer se trgovanje obavlja kroz standardizovane proizvode i transparentno formiranje cene. O ulozi berze kao organizovanog tržišta pišu i domaći autori. Ristić i Komazec u svojim radovima o finansijskim tržištima i berzama naglašavaju da berza obezbeđuje sigurnost trgovanja, transparentnost i jasna pravila, što su osobine koje se danas prepoznaju i kod berzi električne energije (9). Šoškić i Živković, pišući o finansijskim tržištima i institucijama, ukazuju na to da razvijena tržišta zahtevaju jasno definisane učesnike i institucije koje obezbeđuju poverenje, a isti princip važi i za tržište električne energije (11).

Na kraju treba pomenuti i regulatorna tela. Njihova uloga jeste da nadgledaju rad tržišta, da štite interese potrošača i da obezbede poštovanje pravila. Bez regulatornog okvira postojao bi rizik od zloupotreba i nestabilnosti, posebno zbog toga što je električna energija dobro od opšteg značaja.

Iz svega navedenog vidi se da tržište električne energije čini niz međusobno povezanih učesnika, od proizvođača, preko operatora i snabdevača, do krajnjih kupaca, uz važnu ulogu berzi i regulatornih tela. Tek kada se sagleda celina ovog lanca, moguće je razumeti mehanizme trgovanja o kojima će biti reči u narednom poglavlju.

MODELI I MEHANIZMI TRGOVANJA ELEKTRIČNOM ENERGIJOM

Pošto se električna energija ne može jednostavno skladištiti, razvili su se posebni mehanizmi trgovanja koji omogućavaju da ponuda i potražnja budu usklađene u različitim vremenskim okvirima. Ti mehanizmi se razlikuju po tome koliko unapred se ugovara isporuka i po stepenu organizovanosti tržišta. U praksi se najčešće razlikuju bilateralni ugovori, dan unapred tržište, unutarдневно tržište i balansno tržište.

Prvi model čine bilateralni ugovori. Reč je o direktnom dogovoru između dve strane, najčešće proizvođača ili snabdevača sa jedne i kupca sa druge strane. Kod ovog modela strane same dogovaraju količinu, cenu i period isporuke. Bilateralni ugovori pružaju sigurnost jer se uslovi unapred poznaju, ali su manje fleksibilni i manje transparentni od berzanskog trgovanja. Ovaj oblik trgovine najbliži je klasičnom shvatanju tržišta kao razmene između dva subjekta (8).

Drugi model je takozvano „dan unapred” tržište. Na ovom tržištu se trguje električnom energijom za isporuku narednog dana, po satima. Učesnici dostavljaju naloge u kojima navode koliko energije žele da kupe ili prodaju i po kojoj ceni, a zatim se na osnovu svih naloga formira jedinstvena cena za svaki sat narednog dana. Model je u velikoj meri sličan funkcionisanju berze na tržištu kapitala, jer se cena formira na osnovu susreta ponude i potražnje uz transparentna pravila (10).

Treći model je unutardnevno tržište. Ono omogućava trgovanje električnom energijom tokom samog dana isporuke, sve do kratko pre stvarne isporuke. Posebno je značajan zbog sve većeg učešća obnovljivih izvora energije, čija proizvodnja nije uvek predvidiva. Ako, na primer, proizvodnja iz vetra bude manja od očekivane, učesnici mogu da nadoknade razliku kupovinom na unutardnevnom tržištu. Time se povećava fleksibilnost i smanjuje rizik od neravnoteže (7).

Četvrti model je balansno tržište. Njega koristi operator prenosnog sistema kako bi u svakom trenutku održao ravnotežu između proizvodnje i potrošnje. Pošto čak i mala odstupanja mogu da ugroze stabilnost sistema, balansno tržište služi za fino podešavanje, tako što se aktiviraju dodatne količine energije ili se smanjuje proizvodnja. Pokazuje koliko je tehnička dimenzija neodvojiva od ekonomske kada je reč o električnoj energiji (8).

Kada se posmatraju zajedno, ovi modeli pokazuju da tržište električne energije funkcionise na više nivoa istovremeno. Bilateralni ugovori obezbeđuju dugoročnu sigurnost, dan unapred i unutardnevno tržište omogućavaju prilagođavanje u kraćim rokovima, a balansno tržište služi za održavanje stabilnosti u realnom vremenu. Upravo postojanje organizovanih berzanskih mehanizama, poput dan unapred tržišta, pokazuje koliko se tržište električne energije približilo logici tržišta kapitala. O značaju organizovanog tržišta i jasnih pravila trgovanja pišu i domaći autori. Razumevanje ovih mehanizama predstavlja osnovu za sagledavanje konkretnog stanja na tržištu električne energije u Srbiji, o čemu će biti reči u narednom poglavlju.

Funkcionisanje tržišta električne energije usko je povezano sa uslovima finansiranja pod kojima preduzeća ulažu u proizvodne kapacitete. Wilson, Shrimali i Caldecott u istraživanju iz 2025. godine ispitali su kako cena zaduživanja i klimatska politika utiču na ulaganja elektroprivrednih preduzeća u nisko ugljenične i visoko ugljenične izvore energije. Na uzorku javnih preduzeća u periodu od 2012. do 2021. godine pokazali su da niža cena duga i veće zaduživanje povećavaju ulaganja u oba tipa izvora energije (12). To znači da uslovi na tržištu kapitala, kao što su kamatne stope i dostupnost finansiranja, neposredno oblikuju to koliko će se i u koje izvore energije ulagati, pa samim tim utiču i na buduću strukturu tržišta električne energije.

Pomenuto istraživanje pokazuje i da klimatska politika ima važnu ulogu u usmeravanju kapitala. Autori su utvrdili da tržišne mere, poput cena emisija ugljen dioksida i poreza na ugljenik, povećavaju ulaganja u nisko ugljenične izvore energije i istovremeno jačaju vezu između zaduživanja i takvih ulaganja, dok kod visoko ugljeničnih izvora deluju u suprotnom smeru (12). Ovaj nalaz potvrđuje da se principi tržišta kapitala i mere ekonomske politike prepliću upravo na tržištu električne energije, jer odluke o finansiranju i regulatorni okvir zajedno određuju u kom pravcu se razvija proizvodnja električne energije. Za tržište električne energije u Srbiji, koje je u procesu razvoja i prilagođavanja evropskim standardima, ovakvi nalazi ukazuju na to da će dostupnost povoljnog finansiranja i jasna klimatska politika biti značajni za buduća ulaganja u proizvodne kapacitete.

TRŽIŠTE ELEKTRIČNE ENERGIJE U SRBIJI

Tržište električne energije u Srbiji prošlo je kroz značajne promene tokom poslednjih dvadesetak godina. Od sistema u kome je sve bilo u rukama jednog velikog državnog preduzeća, postepeno se prešlo na model u kome postoji više učesnika i u kome je trgovina delom organizovana po tržišnim principima. Proces je poznat kao liberalizacija tržišta električne energije.

Liberalizacija je značila da je tržište otvoreno za konkurenciju i da krajnji kupci mogu da biraju snabdevača. Pre toga su cena i uslovi snabdevanja bili u potpunosti regulisani, a kupci nisu imali mogućnost izbora. Postepenim otvaranjem tržišta, najpre za velike potrošače, a kasnije i za ostale, stvoreni su uslovi za razvoj konkurencije i za pojavu većeg broja snabdevača (8).

Centralno mesto u sistemu električne energije u Srbiji i dalje zauzima Javno preduzeće Elektroprivreda Srbije (EPS). EPS obuhvata proizvodne kapacitete i obavlja ulogu snabdevača za najveći broj krajnjih kupaca. U okviru organizacije, poslovi snabdevanja izdvojeni su u poseban deo, koji se bavi prodajom električne energije krajnjim kupcima, obračunom potrošnje i naplatom (2).

Važan korak u razvoju tržišta bilo je osnivanje berze električne energije. U Srbiji tu ulogu obavlja SEEPEX, berza na kojoj se trguje električnom energijom po principu dan unapred tržišta. Osnivanje ove berze omogućilo je transparentno formiranje cene na osnovu ponude i potražnje i približilo srpsko tržište praksi razvijenih evropskih tržišta (10). Pojava organizovane berze dobar je primer kako se principi tržišta kapitala primenjuju i na tržište električne energije, jer se trgovina odvija kroz standardizovane proizvode i jasna pravila.

Da bi tržište funkcionisalo pravilno, neophodno je postojanje nezavisnog regulatornog tela. Tu ulogu u Srbiji obavlja Agencija za energetiku Republike Srbije (5). Njen zadatak je da nadgleda rad tržišta, da izdaje licence učesnicima, da prati formiranje cene i da štiti interese krajnjih kupaca. Postojanje regulatora posebno je važno zbog toga što je električna energija dobro od opšteg značaja, pa se mora obezbediti da tržište funkcioniše stabilno i pravično.

Iako je tržište električne energije u Srbiji znatno napredovalo, ono se i dalje suočava sa izazovima (1). Deo kupaca, naročito domaćinstva, i dalje se snabdeva po regulisanim uslovima u okviru takozvanog garantovanog snabdevanja, dok se drugi deo tržišta odvija po tržišnim cenama (3). Takav dvojni karakter tržišta odražava prelazni period u kome se nalazi srpski elektroenergetski sektor. Autori koji se bave finansijskim tržištima ukazuju na to da razvoj svakog tržišta zahteva vreme, jasna pravila i izgradnju poverenja među učesnicima (6), a isti zaključak može da se primeni i na tržište električne energije u Srbiji.

Na osnovu svega navedenog vidi se da tržište električne energije u Srbiji predstavlja spoj regulisanih i tržišnih elemenata. Sa jedne strane, postoji snažna uloga države kroz Elektroprivredu Srbije i kroz regulisano snabdevanje, a sa druge strane razvija se konkurencija i organizovano berzansko trgovanje.

POSLOVI OBRAČUNA I NAPLATE U SNABDEVANJU ELEKTRIČNOM ENERGIJOM

U prethodnim poglavljima tržište električne energije sagledano je sa teorijskog stanovišta, kroz njegove učesnike, mehanizme trgovanja i posebnosti u Srbiji. U ovom poglavlju teorijski okvir povezuje se sa praktičnim funkcionisanjem snabdevanja, sa posebnim osvrtom na poslove obračuna i naplate. Cilj je da se pokaže kako teorijski pojmovi sa tržišta kapitala i tržišta električne energije izgledaju u svakodnevnom radu sa krajnjim kupcima.

Snabdevanje električnom energijom predstavlja poslednju kariku u lancu koji povezuje proizvodnju i krajnju potrošnju. Upravo na tom mestu nalaze se poslovi obračuna i naplate, koji obezbeđuju da isporučena energija bude pravilno izmerena, iskazana i naplaćena.

Posao obračuna polazi od podataka o potrošnji. Na osnovu izmerene količine električne energije za određeni obračunski period formira se račun za krajnjeg kupca. Pri tome se vodi računa o tome kojoj kategoriji kupac pripada, jer se uslovi razlikuju za domaćinstva i za privredu, kao i o tome da li se kupac snabdeva po regulisanim ili po tržišnim uslovima. Tačan obračun zahteva uredne podatke o merenju i poznavanje važećih cena i tarifa, jer i mala greška u ulaznim podacima dovodi do pogrešno iskazane obaveze za kupca.

U praksi se jasno vidi razlika između garantovanog i komercijalnog snabdevanja. Garantovano snabdevanje namenjeno je pre svega domaćinstvima i malim kupcima, koji se snabdevaju po regulisanim cenama, dok se kod komercijalnog snabdevanja cena formira na tržišnim osnovama. Ova podela utiče na to kako se obračunava potrošnja i kako se kupcu predstavljaju uslovi snabdevanja. Kod regulisanog snabdevanja cena je unapred poznata i propisana, pa je obračun u tom smislu jednostavniji za kupca, dok kod tržišnog snabdevanja cena zavisi od uslova ugovora i kretanja na tržištu.

Naplata predstavlja drugi važan deo posla. Nakon što je račun formiran, potrebno je obezbediti da kupac izmiri svoju obavezu. U praksi se javljaju različite situacije, od redovne naplate, preko zakasnelih uplata, do slučajeva u kojima se dospeli dug naplaćuje kroz posebne postupke. Ovaj deo posla pokazuje da snabdevač isporučuje energiju, ali i

preuzima i finansijski rizik, jer mora da plati energiju koju je kupio, bez obzira na to da li su svi kupci na vreme izmirili svoje obaveze. Shodno tome, vidi se da je urednost naplate od velikog značaja za stabilnost poslovanja snabdevača.

Na ovom mestu se vidi i veza sa tržištem kapitala. Snabdevač se nalazi između tog veleprodajnog tržišta, na kome se cena formira po tržišnim principima sličnim berzanskim, i krajnjeg kupca, kome se energija isporučuje pod unapred poznatim uslovima. Snabdevač time preuzima rizik razlike u ceni i rizik naplate, na sličan način na koji učesnici na finansijskim tržištima upravljaju rizikom. Domaći autori koji se bave finansijskim tržištima naglašavaju da je upravljanje rizikom jedna od ključnih funkcija svakog tržišnog učesnika, a taj princip jasno se prepoznaje i u poslu snabdevanja električnom energijom.

Praktično funkcionisanje snabdevanja pokazuje i koliko su važni tačnost podataka i poverenje između snabdevača i kupca. Pogrešno obračunat račun ili nejasni uslovi snabdevanja mogu da naruše odnos sa kupcem, dok jasna komunikacija i tačan obračun doprinose stabilnosti tog odnosa. Time se potvrđuje teorijska postavka da svako tržište počiva na poverenju i na jasnim pravilima. Na osnovu iznetog može da se zaključi da poslovi obračuna i naplate, iako na prvi pogled deluju kao tehnički i administrativni, zapravo predstavljaju mesto na kome se tržište električne energije susreće sa krajnjim kupcem.

ZAKLJUČAK

U predmetnom radu je pokazano da tržište električne energije čini niz međusobno povezanih učesnika, od proizvođača, preko operatora sistema i snabdevača, do krajnjih kupaca, uz važnu ulogu berzi i regulatornih tela. Svaki od tih učesnika obavlja posebnu funkciju, a tek njihovo zajedničko delovanje omogućava da tržište funkcioniše stabilno i pouzdano. Posebno je istaknuta uloga berzi električne energije, koje pokazuju koliko se ovo tržište približilo logici tržišta kapitala.

Analiza mehanizama trgovanja pokazala je da tržište električne energije funkcioniše na više nivoa istovremeno. Bilateralni ugovori obezbeđuju dugoročnu sigurnost, dan unapred i unutardnevno tržište omogućavaju prilagođavanje u kraćim rokovima, a balansno tržište služi za održavanje ravnoteže u realnom vremenu. Postojanje organizovanih berzanskih mehanizama jasno potvrđuje da se principi tržišta kapitala primenjuju i na trgovinu električnom energijom.

Na primeru Srbije pokazano je da tržište električne energije ima dvojni karakter, jer spaja regulisane i tržišne elemente. Sa jedne strane postoji snažna uloga države kroz Elektroprivredu Srbije i kroz regulisano snabdevanje, a sa druge strane razvija se konkurencija i organizovano berzansko trgovanje na berzi SEEPEX, uz nadzor Agencije za energetiku Republike Srbije. Takav model odražava prelazni period u kome se srpski elektroenergetski sektor i dalje nalazi.