

## Study on electricity markets in Romania

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*In this paper, we detail about the components of the wholesale electricity market in Romania: Market for Bilateral Contracts (Central Market with continuous double negotiation of bilateral electric energy contracts (CM - OTC), Centralized Market for bilateral electric energy contracts), Day-Ahead Market (DAM), Inter-Daily Market (IM), Balancing Market (BM), Centralized Market for universal service (CMUS).*

*In addition, for each type of market we generated diagrams with the main business processes.*

**Keywords:** *Electricity Market, Renewable Energy, Wholesale Market, Retail Market, Balancing Market*

### 1 Introduction

Electricity transactions between the various participants in the electricity market in Romania are carried out in two categories of markets, namely:

- **Regulated market** - the quantities and prices are set by the National Energy Regulatory Authority (NERA). Regulated contracts are used in its activity;
- **Competitive market** - uses the principle of supply and demand in the activity, being legislatively governed by NERA. This comprises:
  - a) **Wholesale market**, in which electric energy is purchased for resale or own use, by suppliers, from producers or other suppliers. Also, in this market, network operators buy electric energy for own technological consumption.
  - b) **Retail market**, in which end users or their aggregators purchase electric energy for their own consumption.
  - c) **Market of green certificates** envisages promotion of electric energy coming from renewable sources and is based on trading of green certificates and mandatory shares system.

From a theoretical standpoint, the regulated market operates until the competitive market reaches an opening

threshold of 100%. Because of the difficulties of implementation, the low level of preparedness of small residential and commercial consumers, and providers and aggregators in the retail market, in Romania, the regulated market continues to operate.

In the competitive market, in order to trade electric energy, there are mainly used the following instruments: bilateral contracts between suppliers and local producers, concluded to ensure consumption of eligible customers; import contracts of local producers to ensure obligations in bilateral contracts; import contracts of suppliers; export contracts; contracts of transport and distribution operators; spot market transactions at closing market price; green certificates market transactions.

According to the legislation in Romania, in terms of the producers and suppliers, the electricity market has a competitive nature. The transport and distribution of electric energy are regulated and are considered a natural monopoly. Their regulation takes into account the compulsoriness of network operators to provide access to transportation and distribution networks for licensees.

The main actors that take part of the energy market are:

*National Energy Regulatory Authority (NERA)*- independent administrative authority with legal personality, under parliamentary control, entirely financed from own incomes, decision-making,

organizational and functional independent. Its main activity is developing, approving and monitoring the application of mandatory regulations at national level. They are necessary for the sector and market of electric and heat energy, and natural gas, in terms of efficiency, competition, transparency and consumer protection. In order to ensure the exercise of its powers in the territory, NERA has in its structure offices without legal personality.

*Romanian Transmission and System Operator (TSO) "Transelectrica" - S.A.*, which is tasked to continuously keep functioning the national power system, in safety and in compliance with quality standards set out in the Technical Code of Electricity Transmission Grid. To this end, the Company uses its own resources, called functional system services, and purchases from electricity producers technological system services. Also for real-time balancing of production to consumption, the Company uses market-balancing mechanisms. TSO receives monthly, from the producers and the networks operators to which they are connected, notifications regarding the quantities of energy from renewable sources delivered over networks. It issues, monthly, green certificates to producers for renewable energy produced and delivered to the network in the previous month. The amounts corresponding to penalties are collected from suppliers who have not met the mandatory quota compliance at the end.

*Electricity and Gas Market Operator in Romania (EGMO)* - manages electricity markets and ensures the transactional thereof.

*Producers, suppliers and consumers of electric energy* that are NERA accredited and have commercial licenses.

## 2 The structure of the wholesale electricity market

The activity of purchasing power by the suppliers from producers or other

suppliers, for resale or use for their own consumption, takes place in an organized way in Romania, represented by wholesale electricity market (WEM). Components of the wholesale electricity market are [1]:

- Centralized Market for Bilateral Contracts: extended auction, continuous double negotiation or through processing contracts;
- Day-Ahead Market (DAM);
- Inter-daily Market (IM);
- Balancing market;
- Centralized Market for universal service (CMUS)
- Technological system services market

In order to conduct transactions, producers, self-producers, electricity providers and network operators have access to the wholesale electricity market. Within this market, transactions are about sale and purchase of electricity and technological system services. Romanian and foreign legal persons have access to the wholesale electricity market if they are being recorded as participating in the Day Ahead Market (DAM), in the Centralized Market for mandatory balancing, in auctions or as parties responsible for balancing. License holders can engage in the Market for Bilateral Contracts with electricity in bilateral transactions, export and import of electricity, under the terms of specific legislation, the Commercial Code and the license. The conclusion of these transactions is achieved through contracts for purchase-sale of energy for certain periods of time.

## 3 Central Market with continuous double negotiation of bilateral electric energy contracts (CM - OTC)

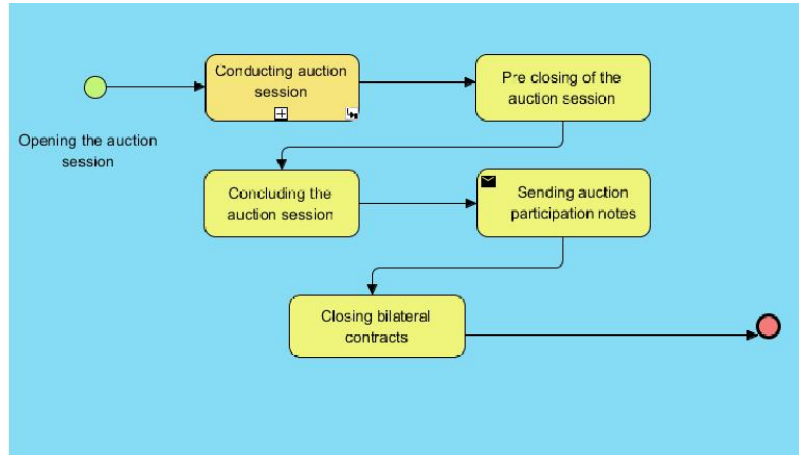
Under the Central Market with continuous double negotiation of bilateral electric energy contracts, trading takes place online using the terminals of the participants enrolled in the market, this being carried out continuously. Regarding standardization of offers, this is done taking into account the daily profile of supplies, the delivery periods and offered power [2].

The main activities in the Central Market

with continuous double negotiation of bilateral electric energy contracts are detailed in [2] and consist of:

- a) auction session opens;
- b) auction session takes place;

- c) pre-closing auction session;
- d) auction session ends;
- e) auction participation notes with final prices are sent to the participants;
- f) conclude bilateral contracts.



**Fig. 1.**Main activities on the CM - OTC

#### 4 Centralized Market for Bilateral Electric Energy Contracts

By concluding bilateral electricity contracts, a trading framework for the competitive electricity market, based on compliance with conditions of non-discrimination, competition and transparency needs to be achieved [3]. In what follows, we present in detailed three types of bilateral contracts for electricity, according to the different ways of trading: by extended auction, by continuous negotiation or by processing contracts.

##### 4.1. Centralized Market for Bilateral Electric Energy Contracts having as way of trading the extended auction (CMBC-EA)

CMBC-EA mechanism has the effect of identifying the identity and intentions of bidding of market participants for the whole business environment. In terms of deliveries profile, the offerings are standardized. For the auctions that are organized for the published sale offers,

consider as opening price, the minimum price, and for the auctions that are organized for published purchase offers, consider as opening price, the maximum price.

The offers proposed for Bilateral Electric Energy Contracts having as way of trading the extended auction have as minimum delivery period a month. For any published initiating offer, there can be formulated co-initiative and respond intentions. If a participant wishes to withdraw an offer must comply with the provisions stipulated in [4] on a penalty payment. In setting transactions, the framework contract for the purchase-sale of electricity specific to CMBC-EA is used. On CMBC-EA, licensees can participate, that fall and respects [5]. Bidders list becomes public after closing auction takes place. The amount of energy that was contracted using as way of trading the extended auction can be proposed for the trading in subsequent session calls, but only until the entry into delivery of the contract. In figure 2, there are presented the main business processes for CMBC-EA.

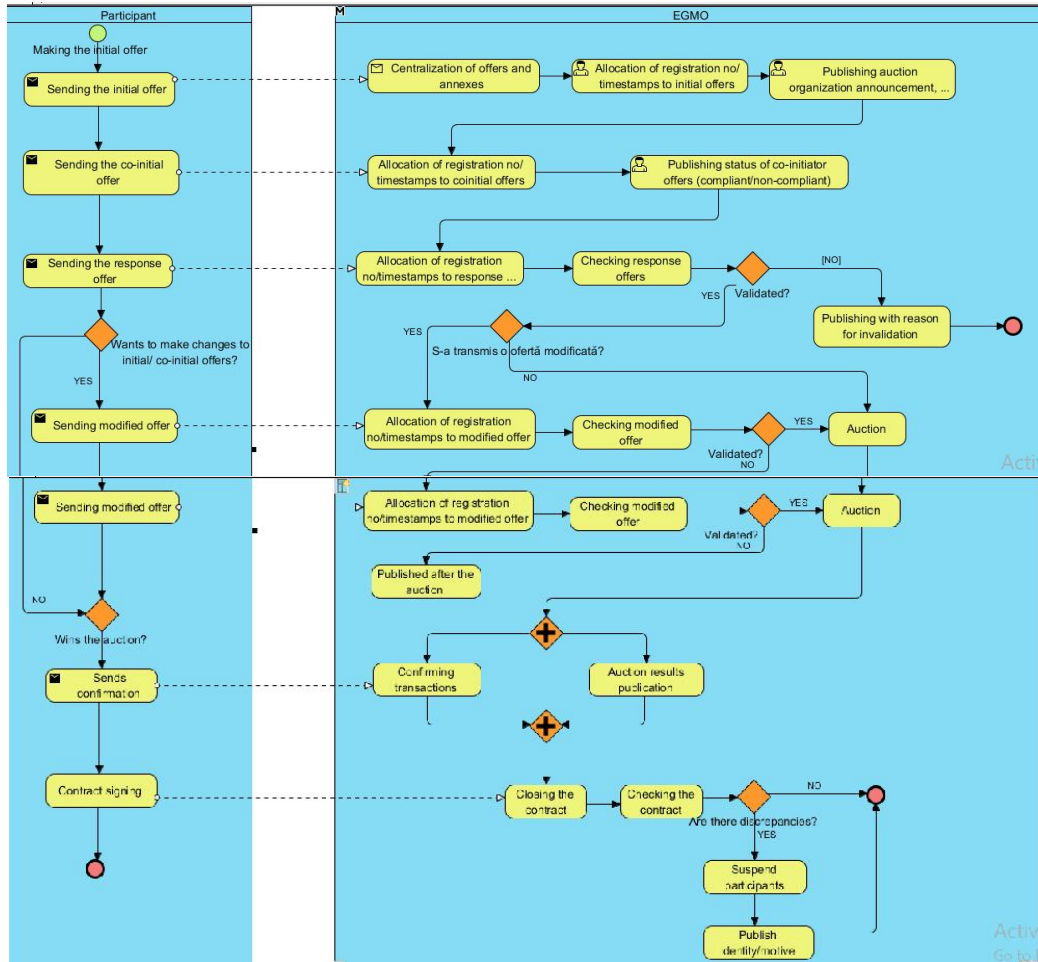


Fig. 2. Main activities on the CMBC-EA

4.2. Centralized Market for Bilateral Electric Energy Contracts having as way of trading the continuous negotiation (CMBC-CN)

Under this mechanism, trades occur on-line, each participant signed up into the market using their own terminal, subject to the terms laid down in trading published schedule. Every weekday trading sessions (between 12 and 14) are held. Throughout the trading session, participants' identity is anonymous and the trading system is available on the website of the Electricity and Gas Market Operator (EGMO) in real time. From the point of view of the offered power, of the

daily profile of supplies and of delivery periods, the offerings are standard. The CMBC-CN license holders can participate if they sign up for and follow [6]. At the end of the trading session, EGMO publishes the results of the auction: the characteristics of the traded products, the number of contracts that were traded, the price, the seller's and the buyer's identity. The amount of energy that was contracted using as a way trading the continuous negotiation may be proposed for the trading in further auction sessions, but only until the entry into delivery of the contract. In figure 2, there are presented the main business processes for CMBC-CN.

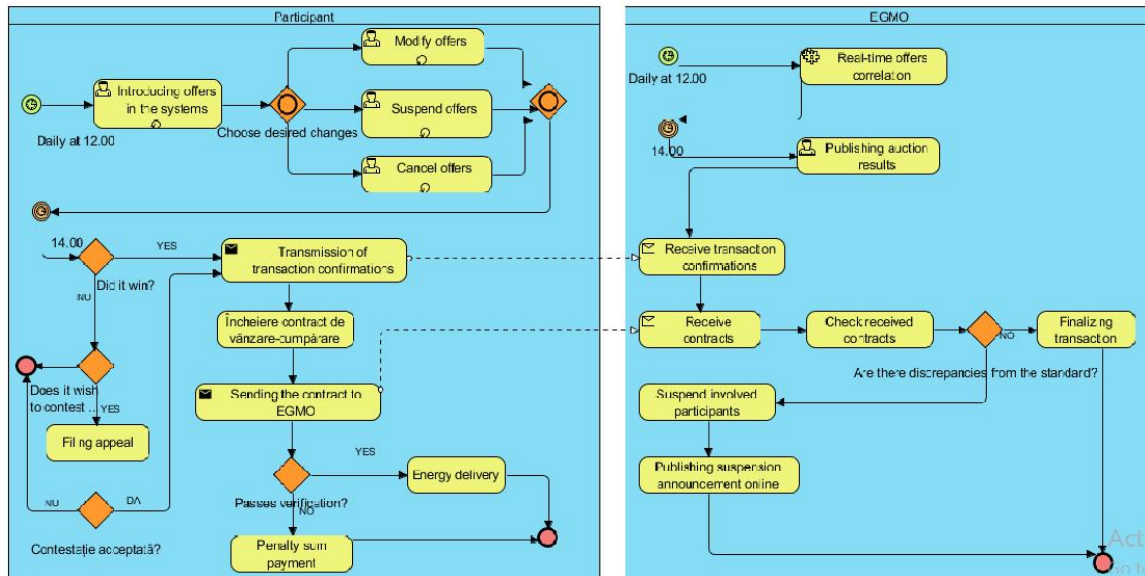


Fig. 3. Main activities on the CMBC-CN

The first day when the delivery is made must be at least 6 days after the closing session of the auction, of which 5 days should be working days. Invoice for this transaction must be issued in one of the first 3 working days of the following month from which the transaction was effected. The payment of this invoice is done according to [4].

#### 4.3. Centralized Market for Bilateral Electric Energy Contracts having as way of trading the processing contracts (CMBC-PC)

This mechanism is used when the electricity market crises occur. CMBC-PC mechanism has the effect of getting to know the identity and bidding intentions of market participants for the entire business environment. Proposals of initiating offers may be made only by electricity supply license holders, while offers of response can be formulated only by license holders of commercial exploitation of electricity production

capacity. The delivery period must be less than the energy market crisis period. For bilateral contracts of electricity that have as trading method the processing contracts, the opening price is considered to be the highest price of electricity resulting from processing, that the initiator agrees to pay. For any initiating offer that was published, response intentions can be formulated. If a participant wishes to withdraw an offer, he must comply with the provisions stipulated in [4] on a penalty payment.

In establishing the transactions, a framework contract for processing the fuel specific to CMBC-PC is used. On the Centralized Market for Bilateral Electric Energy Contracts having as way of trading the processing contracts, supply of electricity and commercial exploitation license holders can participate if they sign up and follow [7]. Bidders list becomes public after closing the auction takes place.

In figure 2, there are presented the main business processes for CMBC-PC.

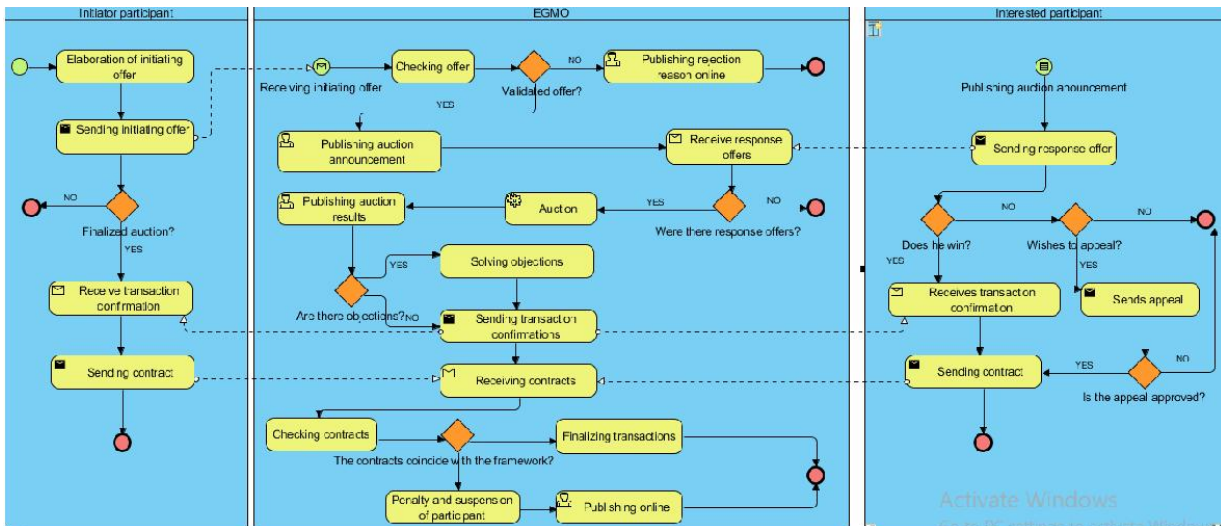


Fig. 4. Main activities on the CMBC-PC

The first day when the delivery is made must be at least 6 days after the closing session of the auction, of which 5 days should be working days. Invoice for this transaction must be issued in one of the first 3 working days of the following month from which the transaction was effected. The payment of this invoice is done according to [4].

**5 Day-Ahead Market (DAM)**

Component of the wholesale electricity market, the Day-Ahead Market (DAM) allows transactions with electricity to be delivered the day following the trading day. This market works in Romania since November 19 2014 through a price

coupling mechanism, in a coupled regime with similar markets in the Czech Republic, Slovakia and Hungary. This project is known as 4M Market Coupling - 4M MC [OPCO16].

The trading program for the Day-Ahead Market is presented in detail in [OPCO16] and consists of the following main activities:

- Opening access to the trading system;
- Publication of available transmission capacities on the interconnections;
- Closing the bidding gates for the next day of delivery;
- Publication of transactions confirmations;
- Creation of physical notifications files;
- Closing access to the trading system.

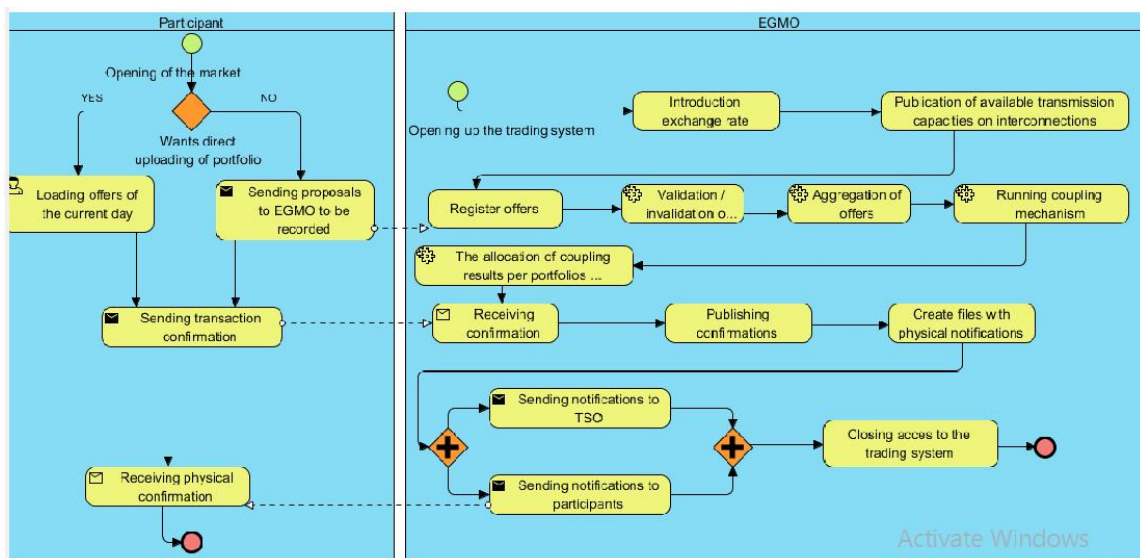


Fig. 5. Main activities on the DAM

If changes from the normal operation program are required, the procedures for operating on the Day-Ahead Market are applied.

*The Electricity and Natural Gas Market Operator (ENGMO) established an agreement with Eurex Group - European Energy Exchange (EEX) and Power Exchange Central Europe (PXE) and obtained the right to use indexes of the ROPEX\_DAM electricity spot market. These indices are useful for recording transactions with derivative financial contracts as well for the trading of products to reduce the volatility risk of Day-Ahead Market price.*

### **6 Inter-daily Market (IDM)**

The centralized framework for buying and selling energy created by the Inter-daily electricity Market is needed to create a wholesale energy market based on compliance with conditions of non-discrimination, competition and transparency and to establish in a transparent and fair manner the prices for trading energy. This market represents for participants a useful tool, which further facilitates adjustment of the portfolio of contracts for the delivery day, for each hour, in order to achieve a balance between bilateral contracts portfolio, consumption forecast and the technical capacity of unit's production, as close to the time of delivery as possible. By selling or buying electricity on the next day market, we can balance the deficit or surplus of electricity.

On the Inter-daily Market the participants can be license holders and operators, foreign legal entities that have obtained from NERA the right to provide or sell electricity in Romania and are registered market participants.

Applicants wishing to register on the IDM must conclude with the national transport and system operator (NTSO) an accountability convention regarding balancing or to prove that he has transferred this responsibility to a third party.

Also, applicants must sign participation on the IDM convention with EGMO, and to comply with obligations stipulated by this [9] [10].

In the Inter-daily Market a trading day is considered any calendar day, the trading interval is one hour and EGMO is this market counterparty for all trades concluded by market participants.

Each participant on the IDM can launch offers, both for sale and for purchase for each trading period. Participants' offers are validated or invalidated by the computer system, according to the procedures set out in [9]. Bids entered into the trading system by participants to the IDM end with the conclusion of transactions after the correlation conditions are met.

The criteria for arranging the offers of participants to IDM which are taken into account by the matching algorithm are considering ordering decreasing prices for purchase orders, ordering upwards for the sale offers and an order by timestamp, when orders have equal prices. By accessing the trading system, market participants obtain information on their transactions in the IDM. Following confirmation of transactions for each day, EGMO establishes physical notifications for transactions on the IDM, transmits them to the transmission and system operator (TSO) and make them known to Balancing Responsible Parties (BRP) of each participant.

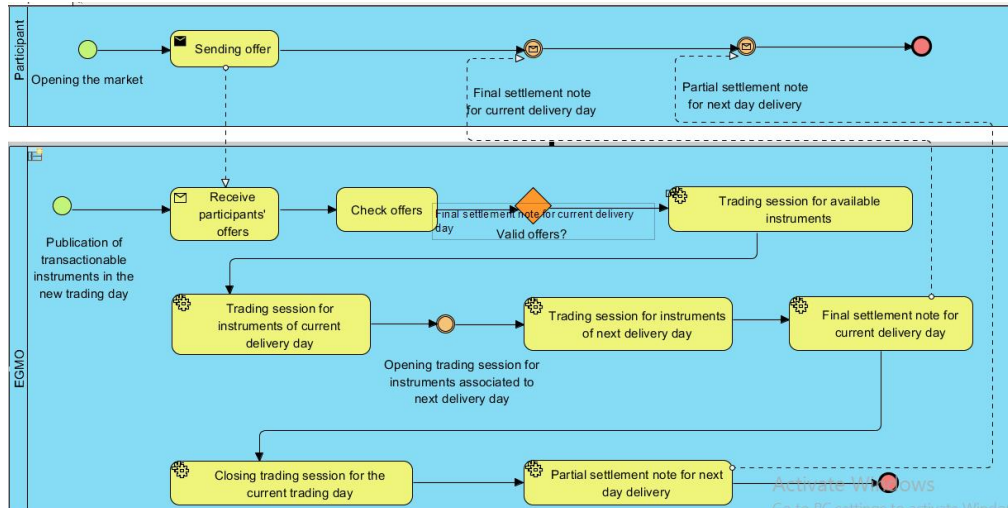


Fig. 6. Main activities on the IDM

**7 Balancing Market (BM)**

On the mandatory centralized Balancing Market, participants owners of dispatchable units sell (or buy) active electricity to (from) the Transmission System Operator. The purpose of these transactions is to offset deviations in production or consumption of electricity from the planned values.

Participants in the wholesale electricity market are forced to take responsibility towards TSO for deviations caused by imbalances between notified production / consumption and the ones achieved, or between the scheduled and actually performed transactions. To minimize these

imbalances, participants can organize themselves in the form of Balance Responsible Parties (BRP). When there is a power increase, dispatchable producers are obliged to announce their offer in this market regarding the amount of additional electricity available in addition to the forecasted value. Similarly, if there is a reduction in power, dispatchable producers must offer on the market the amount of electricity notified. On this market, offers and transactions occur at the level of each dispatch able unit and market administration is performed by the Balancing Market Operator[1].

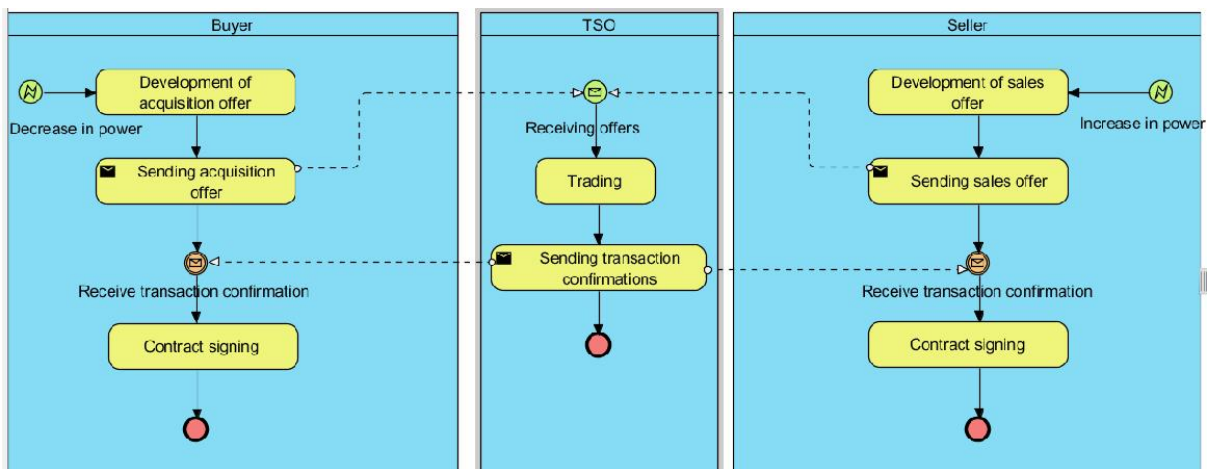


Fig. 7. Main activities on the BM



## 8 Centralized Market for Universal Service (CMUS)

In [8] the operation manner of the CMUS is presented in detail. Thus, in order to register of the CMUS the participants must provide the following documents:

- Letter of intent (except for the last resort supplier - LRS);
- Convention of participation on CMUS (2 original copies);
- A copy of the license issued by NERA (including license conditions);
- NERA's decision to grant a license or to be designated as LRS;
- Official document attesting to the legal existence of the company;
- Copy of the Certificate of tax registration;
- Transelectrica's confirmation on assuming balancing responsibility or transferring ownership of this responsibility;
- A summary document containing data necessary for registration in the trading register;
- Proof of payment of the regulated tariff (in case the CMUS is the first market to register on) that represents the enrollment component on the centralized markets;
- Bailment agreement for the token (2 original copies);
- Payment of the regulated tariff representing the management component of centralized markets.

If the applicant is already registered on another centralized electricity market it must submit the letter of intent, the participation agreement and an affidavit stating that the documents submitted in the enrollment earlier do not require updating, they are in force and in full applicable. Participants on the CMUS can be buyers through auction or participants with offers to sell at auction [8].

Buyers through auction are required to attend, as they are license holders appointed by NERA for the provision of LRS services. Bids are set in compliance

with the Regulation. Auction buyers cannot enter bids in to CMUS's IT platform.

Participants with sale offers in the auction are manufacturers or suppliers of electricity (except for LRS). They are, due to the bailment agreement signed with EGMO, holders of a passkey to the trading system of CMUS, they hold the user ID, password and perform the input operations, update and cancellation of sale offers from their own terminals.

They must sign the Convention to participate in CMUS at least 13 working days before the opening date of the auction session.

On the Centralized Market for Universal Service auctions are conducted quarterly, covering two or three specific products whose delivery is carried out in the following calendar quarter. NERA sets the number of products traded simultaneously and days / time intervals specific to each product. They may differ depending on the delivery period covered by the auction.

In order to participate in the auction license holders must be registered in a first stage on the CMUS and then to sign the convention of participate in CMUS at least 13 working days before the date of tender opening session. License holders must possess, as a result of bailment contract signed with EGMO, a passkey to connect to the trading system of CMUS and to have received their username and password from the administrators of CMUS. Also, licensees must constitute financial guarantee to tender and to submit indicative offers [8].

## 9 Conclusions

National Energy Regulatory Authority (NERA) is the main authority that acts on the Energy Contracts Markets and tries to establish the parameters for the auctions. This way the characteristics of the traded products, the number of contracts that were traded, the price, the seller's and the buyer's identity can be verified and approved.

Electricity transactions between the various participants in the electricity market in Romania take place on a competitive or on a regulated market.

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