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WHITE PAPER ON ELECTRICITY MARKET CONCEPT DESIGN OF GEORGIA

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ACRONYMS

BM	Balancing Market
BoD	Board of Directors
CfD	Contract for Difference
DAM	Day Ahead Market
ESCO	Electricity Market Operator
ETM	Electricity Trade Mechanism
EU	European Union
GEMM 2015	Georgian Electricity Market Model 2015
GNERC	Georgian National Energy and Water Supply Regulatory Commission
GoG	Government of Georgia
GSE	Georgian State Electrosystem
HPP	Hydro Power Plant
IDM	Intraday Market
MO	Market Operator
MoESD	Ministry of Economy and Sustainable Development of Georgia
MP	Market Player
MW	Megawatt
MWh	Megawatt hour
PPA	Power Purchase Agreement
PSO	Public Service Obligations
SC	Steering Committee
Telasi	Electricity Distribution Company of Tbilisi
TPP	Thermal Power Plant
TSO	Transmission System Operator
USAID	United States Agency for International Development
WAP	Weighted Average Price
WG	Working Group

CONTENT

ACKNOWLEDGEMENT

USAID Energy Program acknowledges that the initial intent of this work on electricity market concept design was to produce a draft legislation that would be acceptable for the Government approval. However, due to Ministry of Economy and Sustainable Development of Georgia (MoESD) recent decision, the Georgian State Electrosystem (GSE) hired Nord Pool Consulting to develop market design and asked USAID to stop its work on the market concept design until Nord Pool Consulting produces their version of the market design and until it is accepted by the Government and stakeholders. Therefore, USAID Energy Program turned the draft market concept design that was discussed with stakeholders earlier, into the white paper for the use by the MoESD, the Electricity Market Development Working Group (WG) and the Steering Committee (SC) and the stakeholders.

USAID Energy Program also acknowledges that if the MoESD may require further assistance with finalizing market concept design legislation after Nord Pool Consulting submits their deliverable on the market concept design and it is approved by the Government and accepted by the key stakeholders, USAID Energy Program will be available to provide required assistance per the relevant deliverable approved under the list of legislative activities approved in May 2018. If no further assistance will be required by the MoESD, this white paper will replace the deliverable titled legislative act for electricity market concept design.

EXECUTIVE SUMMARY

On October 14, 2016 Georgia signed Protocol “Concerning the Accession of Georgia to the Treaty Establishing the Energy Community”, undertaking obligation to implement mandatory reforms in energy sector in compliance with European Union (EU) Energy Acquis. Respective requirements have to be implemented within the set deadlines.

Georgian Energy Market must go through major transformation towards fully competitive (at least hourly) and liberalized market model by January 1, 2020. In this regards several activities have been launched and are ongoing under leadership of MoESD and with inclusion of main stakeholders in the sector.

USAID Energy Program reviewed all energy related obligations undertaken by the country towards EU and also reviewed the new draft Law on Energy, planned to be initiated for adoption in fall 2018.

USAID projects have been actively supporting Government of Georgia (GoG) in reform making process. WGs on Electricity and Gas Market Development were established to develop and support implementation of Action Plans for necessary activities and results. USAID Energy Program has provided numerous recommendations for smooth transition to the target market model and has identified list of transitional issues that still remain challenging and need to be addressed properly.

The White Paper on Electricity Market Concept Design (“Paper”) describes the process for the electricity market reform towards the target model. The process progresses stepwise through phases and requires restructuring of the market and its opening. The list of priority actions to be completed for transition from one phase to another in accordance with deadlines are also proposed.

The paper also provides the necessary structural changes, in particular, the establishment of Market Operator (MO), Universal Suppliers for vulnerable consumer protection, and so forth.

The specifics of the Georgian market are proposed to be carried out through contracts for difference, the types of which are presented in the report.

BACKGROUND

In accordance with draft Law on Energy (2017), starting from 2020 the target market model must include:

- *Bilateral contracts (free negotiable);*
- *Day Ahead Market (DAM);*
- *Intraday Market (IDM);*
- *Market of imbalance services.*

Given that today's electricity market is monthly, this plan can be deemed as overly optimistic.

There are two main concerns:

- *Transition to fully free bilateral contracts system (elimination of the regulated contracts) due to Georgian market specifics (Abkhazia's subsidy, protection of a large number of vulnerable consumers, and other related issues);*
- *IDM implementation due to metering system improvement necessity and lack of experience of Market Players (MPs) to operate on hourly markets.*

Taking into account that the draft Law on Energy is not adopted yet, it is necessary to consider the possibility of revising the draft in regards to implementation timing, as it will l be possible to completely eliminate regulated segment and use intraday trade.

At the same time the target and transitional models must be approved soon.

Furthermore, in accordance with the Draft Law on Energy, during the first stage of the reform (May 2018) a few large consumers were forced to enter into the competitive electricity market, based on the amendments made to the existing Law on Electricity and Natural Gas. However, the entry of consumers into the competitive market should be voluntary, considering that trading mechanism and enabling environment provide an opportunity to ensure their benefits.

Taking into account the above considerations the first task to be solved is the transition to hourly market starting from January 2019.

The proposed transitional models include:

1. *Starting from January 2019 – implementation of hourly bilateral and regulated firm contracts and market of deviations (imbalance services);*
2. *Starting from July 2019 – Model 1 + DAM implementation.*

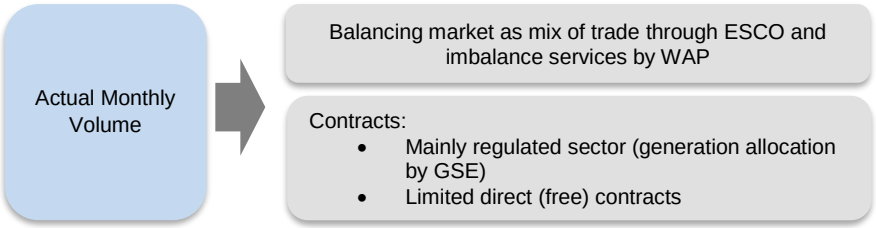
The DAM requires establishment of a MO. The functions performed by the MO in accordance with the Draft Energy Law also require the revision of the functions of the Transmission System Operator (TSO).

The real power market opening in Georgia is possible only after the introduction of clear and transparent rules for its functioning that will ensure the principle of voluntariness for consumers to exit from the regulated market. Within the current situation, the large consumers are forced to enter, which can't be assessed as effective.

CURRENT ELECTRICITY TRADE MECHANISM AND MAIN SHORTCOMINGS

Current electricity trade in Georgia (Figure 1) is carried out on monthly basis by two trade segments: (1) contractual and (2) balancing (according to accepted terminology).

Figure 1: Existing electricity trade mechanism



ESCO – Electricity Market Operator
WAP – Weighted Average Price
GSE – Georgian State Electrosystem

The settlement period is 1 month.

With respect to contractual framework there are regulated and free (direct) contracts, however:

- *No clear rules of generation allocation;*
- *No firm contracts (100% of contract fulfillment) implementation, centralized adjustments occur during the contract period;*
- *Electricity Market Operator (ESCO) without alternative forces small Hydro Power Plants (HPPs) to sell electricity by low prices in 'high water' season;*
- *Only pre-arranged matching of buyers and sellers of direct contracts including the purchase of own generation by relevant consumers.*

Moreover, trade through the ESCO is not contractual, it is the electricity traded on the so-called Balancing Market (BM), which essentially means, e.g., the non-participation of small HPPs in the contract market.

The lack of firm contracts, the mixing of trade through ESCO and the deviations of the actual regime of MP from the contracted values prevents the establishment of market of deviations as an imbalance services. The main goal the introduction of imbalance services is the introduction of the participant's personal liability for deviations. All market participants are involved in the balancing market, which implies a collective responsibility regardless of how the participant functioned on the market. Collective responsibility as well as irresponsibility does not create an incentive to improve the efficiency of any business. Based on the above considerations the following recommendations are outlines:

- Clear rules for bilateral electricity sales and purchase contracts should be implemented;
- Trade through ESCO must be based on planning data and be contractual (splitting from imbalances);
- All contracts must be firm (no adjustments) that will allow determining the real deviations of each market participant.

The applied model of a monthly market (trade in monthly MWh) is in conflict with the dispatching of the power system (by MW). Transition to at least an hourly market is necessary. For example, monthly deviations can't assess the impact on the financial result in the market (the participant may deviate every hour in different directions, but for a month may have even a zero deviation).

The transition to an hourly market was proposed several years ago in Georgia Electricity Market Model 2015 (GEMM 2015) and the Electricity Trade Mechanism (ETM[1]).

[1] GEORGIAN ELECTRICITY MARKET MODEL 2015 AND ELECTRICITY TRADE MECHANISM, USAID HIPP PROJECT (IMPLEMENTED BY DELOITTE CONSULTING), APRIL 2012

Unfortunately, until present only a small amount of the necessary market reforms has been completed, which translates to an intensive reform schedule for the upcoming months. The trading model according to the Draft Law on Energy implies first of all to the functioning of the hourly market.

Currently, there was a focus on the market opening, in particular, the exit of large consumers to the wholesale market from May 1, 2018 (a corresponding decision was taken). Even though a few large consumers were forcibly moved to the competitive market, the opportunities for competition were limited (according to the decision, consumers in the competitive market have the opportunity to negotiate the purchase of electricity with generators.

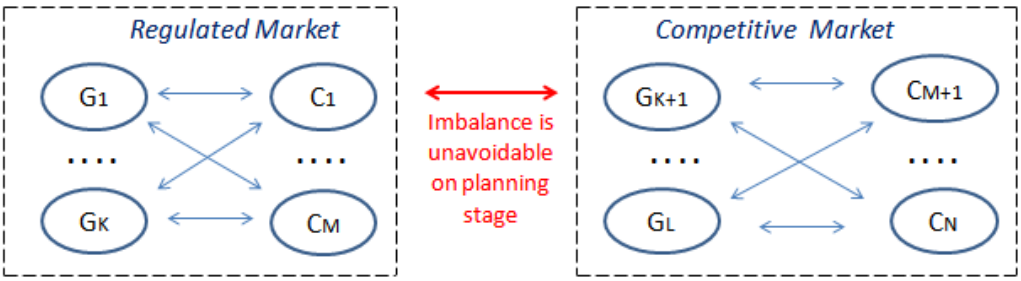
The limitation is a capacity of not more than 40 MW and also any Power Plants built after August 2008. The issue of access to import is also not regulated.

The participation of only a limited number of generators in a competitive market severely limits the ability of consumers to find good energy solutions. The possible amount of available competitively-priced generation can also be significantly reduced when generator sell their production to their own company (wholesale consumers up to May 2018 had their own generation, mostly cheap HPPs).

The lack of sufficient generation in the competitive market leads to the need to change the generation available to the competitive market and the enabling environment when new consumers enter the market, including legislative and regulatory development. Markets, to operate effectively, not only need sufficient capacity and energy to fully satisfy the demand, they, in fact, must have sufficient surplus to create robust price formation.

Obviously, previous proposals to separate the wholesale market into two parts (regulated and competitive) with fixed structure of generators and consumers leads to the imbalance between the markets even at the planning stage (Figure 2), which will be centrally covered (through ESCO) according to the existing balancing mechanism (the disadvantages are noted above).

Figure 2: Proposed electricity trade mechanism from May 1, 2018



Avoiding even a partial liberalization of cheap large generators will make it difficult to introduce a full-fledged institution of responsibility through the market of deviations (imbalance services).

Based on the above considerations the following recommendations are defined:

- All generators and consumers should be participating on regulated and competitive markets. In addition, in the regulated sector the generators can participate by different shares (0-100%), and consumers have different requirements for energy from particular generation. Generation and consumption can be allocated by trade segments (regulated and competitive of one market) not by generators and consumers;
- Clear and fair rules of trade in the regulated segment should be created. The structure of regulated segment must be optimized by seasons based on simulations.

If above mentioned conditions are not satisfied, it may cause the lack of interest and even barriers for consumers in entering the wholesale market. The consumer should be able to assess the benefits of entering the wholesale market, and customer exit from the regulated market must be only on a voluntary basis.

The main conclusion - the Target Market Model must be agreed upon first and only then it is possible to take into account the specific competitive market features and not to build a model based on the current market specifics.

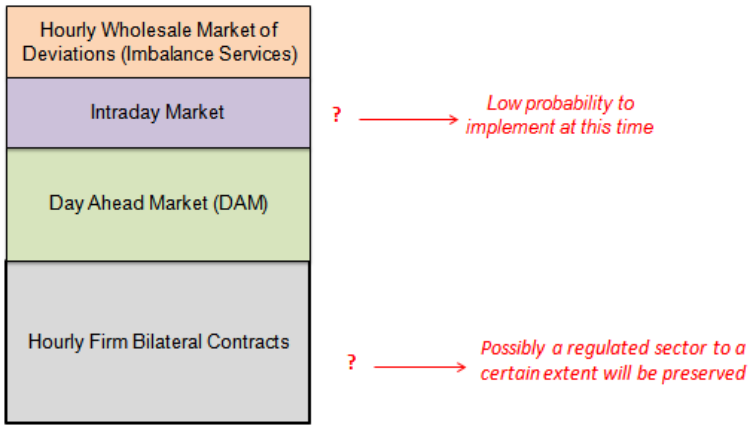
TARGET MARKET MODEL OF ELECTRICITY TRADE (2020)

In accordance with the Draft Law on Energy (2017), from 2020 the target market model must include:

- *Bilateral contracts;*
- *DAM;*
- *Intraday Market;*
- *Market of imbalance services.*

There are two main problems (Figure 3) associated with the timing of the implementation of separate segments of trade only, namely:

Figure 3: Target model from 2020 and concerns about the timing of implementation



1. Transition to fully free bilateral contracts system (elimination of the regulated contracts).

   Decision-making on the elimination of the regulated segment of trade is difficult to implement, taking into account the solvency of consumers, the presence of large number of vulnerable consumers, the possible price increase at the initial stage of the formation of a competitive market due to the lack of a sufficient effective surplus of generation.

2. IDM implementation.

   The main problem for market implementation is associated with the wholesale market metering system. In order for MPs to adjust their Day Ahead offers/bids during the day (in the developed markets, the settlement periods can be as short as 15 minutes), they need to know the current load in real time. This is possible in the presence of the correct actual data (metering system with recalculations where needed) in real time, as well as the participants' readiness for operational forecasting. Undoubtedly, the implementation of intraday trade can decrease prices by reducing the volume of an imbalance services market, where prices are usually higher in accordance with Optimal Dispatch Scheduling. However, the remaining one and a half years (January 1, 2020) to introduce the IDM are not sufficient for the effective use of this market taking into account the lack of experience of MPs to even operate on the hourly markets.

Recommendation - Taking into account that the draft Law on Energy is not adopted, it is necessary to consider the possibility of amending the implementation time for the complete elimination of the regulated segment and the use of intraday trade.

In any case, timing of electricity market reform under draft law seems ambitious. Its success will be determined by the effectiveness of the phased implementation of transition models.

In addition, it is necessary to change the organizational structure of market management and to introduce the institution of traders and suppliers and an urgent need to establish the electricity MO (the possible options are presented on Figure 4).

Figure 4: Options for MO establishment

ESCO – Electricity Market Operator; MO – Market Operator; GSE – Georgian State Electrosystem; IMO – Independent Market Operator; BoD – Board of Directors

MO tasks based on draft Law on Energy are:

- Preparing Revisions to Market Rules;
- Registration of Electricity Generation Facility;
- Revision to Market Organization, Propose Improvement Measures;
- Opinion on Balancing Rules Within Network Code;
- Opinion on Cross-Border Capacity and Congestion Management;
- Surveillance of Trading Facility;
- Reporting to Georgian National Energy and Water Supply Regulatory Commission (GNERC) on Infringement of Rules;
- Organizing DAM And IDM;
- Possibility of Stock Exchange in Derivatives;
- Justify Fee Structure;
- Annual Operational and Financial Plan;
- Contracts Registration and Database;
- Daily Scheduling of Contacts;
- Informing TSO of Daily Schedules;
- MPs Database;
- Data Publishing Required to Support Market Activity;
- Settlement system;
- Cyber Security/Data Security;
- Dispute Resolution.

Moreover, it is also necessary to revise the functions currently performed by the TSO (GSE). Many of the activities are now provided by the TSO and other activities of the TSO are not currently provided including the provision of system operational data on a real-time basis.

ISSUES RELATED WITH GEORGIAN SITUATION AND ADDITIONAL RECOMMENDATIONS

There are some important currently unresolved issues that need special approaches for a successful implementation of the target Market Model.

PURCHASE OF LOSSES ON THE MARKET

Two main options are basically possible:

1. *Purchase by wholesale consumers;*
2. *Purchase by TSO.*

When option 1 is taken, losses in the contracting segment and on DAM are bought by all consumers in the proportion of hourly consumption based on the average % of planning balance of Power system, on the balancing market - only by the BM's buyers (the difference between the actual and planned losses is bought).

If option 2 is used, first of all, it is necessary to determine what losses are purchased by TSO - planned (the corresponding amount can be included in the TSO tariff) or actual (an imbalance of financial resources is possible). Here it is possible to apply a combined approach when planned losses are bought by TSO, and the difference is purchased by the buyers of BM.

Since May 2018 GSE (TSO) purchases all losses on the market, for which a certain amount is considered in the tariff, corresponding to planned losses. Financial imbalance for deviations of actual losses from planned losses is taken into account when revising tariffs.

Recommendation **-** The option 2 must be included in Market Rules.

CONTRACT FOR DIFFERENCE (CFD)

The application of CfD is an opportunity to take into account the specifics of the Georgian market. All participants will operate in accordance with the general rules for the segments of trade, and the specificity is taken into account in the final settlements through CfDs.

These contracts must be classified and can be applied in different ways:

1. *Subsidy of Abkhazia's energy requirements above that provided by Enguri HPP;*
2. *Power Purchase Agreements (PPAs) existence for generators (purchasing by fixed GoG-guaranteed price);*
3. *Special conditions for Universal Suppliers and other buyers, e.g., Telasi (Electricity Distribution Company of Tbilisi) in current situation.*

The CfD is defined as the difference between the amount (payable / receivable) on the market by common rules and determined in accordance with the terms of the appropriate agreement (fixed prices in PPAs, nonpayment from Abkhazia, etc.).

CfDs can be covered by different ways.

- *Abkhazia – (1) by wholesale buyers, (2) through Public Service Obligations (PSO) or (3) budget (unlikely);*
- *PPAs – (1) by wholesale buyers, (2) by guaranteed state trader (ESCO) or (3) PSO;*
- *Universal Supplier - (1) by wholesale buyers or (2) PSO.*

The PSO mechanism is implemented mainly through end-user tariffs.

In this case there is an additional incentive for consumers to enter the market.

Recommendation **-** It is necessary to decide on the use of CfDs for off-market adjustments.

ANCILLARY SERVICES MARKET

The main task of the system ancillary services market to stimulating financing and economic operation of the power system equipment, including:

- *Ability to participate in a normalized primary frequency control;*
- *Ability to participate in an automatic secondary frequency control at the Thermal Power Plants (TPPs);*

- *Provide reactive power control;*
- *Participate in anti-emergency control.*

The TSO shall define the technical requirements, select service suppliers and make long-term contracts that will specify payment terms and conditions for the services.

Ancillary Services can be implemented through Capacity Market Mechanism and System Operator's special fee.

CAPACITY MARKET

It is unrealistic now to introduce the classical capacity market due to the lack of the necessary surplus of competitive generators.

Preservation of the existing principle of payment for guaranteed capacity is possible, however, this issue needs to be considered in the context of the implementation of the ancillary services market provided in the draft Law on Energy.

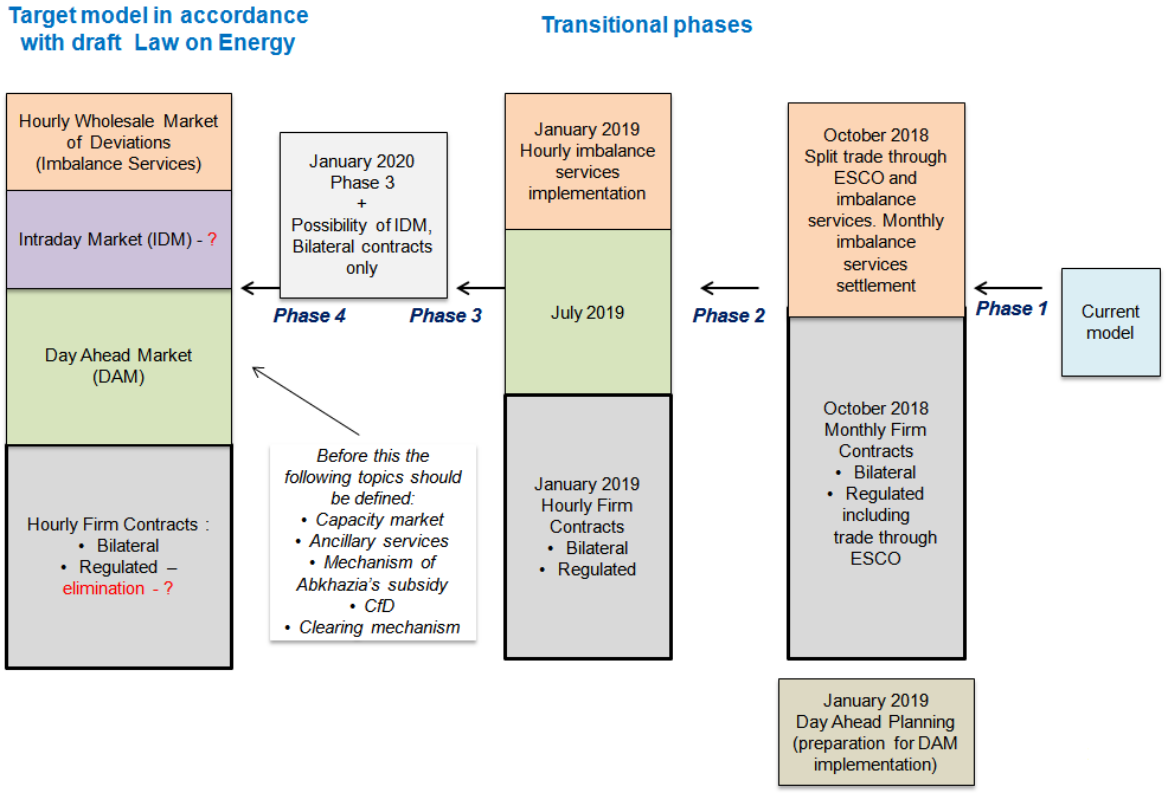
Recommendation **-** It is necessary to develop the main principles of Capacity and Ancillary Services markets as soon as possible.

Obviously, the gradual transition to a new electricity trading mechanism is needed. The proposed Transitional Plan is described in the next Chapter.

TRANSITIONAL PLAN FOR TARGET MARKET MODEL IMPLEMENTATION

The proposed Transitional Plan to the target market model consists of 4 phases (Figure 5).

Figure 5: Transition to target market model



ESCO – Electricity Market Operator; IDM – Intraday Market; DAM – Day Ahead Market; CfD – Contract for Difference

Below is the list of priority actions needed to be completed for transition from one phase to another indicating the timeline per phase.

October 2018

1. GoG approval on the target market model for 2020;
2. MO establishment;
3. Allocation of TSO and MO responsibilities and functions;
4. Clear and fair rules for the regulated generation hourly allocation - Partial Pool mechanism is proposed (Annex 1), optimal structure of Partial Pool determination based on simulations (simulation software is available);
5. Increased number of generators and consumers free to conclude bilateral contracts;
6. Trade through ESCO, with the separate settlements for ESCO purchases and sales contracts and settlements calculated for imbalance services;
7. Implementation of firm contracts principle for all contracts (principle of 100% fulfillment of obligations by MPs);
8. Ensuring consumers' non-discriminatory access to international interconnection so they can freely import energy;
9. To approve the settlement principles for the market of deviations;
10. "Parallel Market" software using. Parallel Market means that for a certain time the target market model will function in parallel with the existing one without financial obligations for the participants. This will also ensure effective capacity building for the market participants.

January 2019

1. The implementation of a contract system on an hourly basis (hourly Partial Pool mechanism);

2. Assessment of metering system and improvement for obtaining hourly data;
3. Metering Rules for hourly market including requirements for new consumers;
4. Hourly imbalances calculations, initiatives determination and implementation;
5. Hourly settlement system;
6. Day Ahead Planning (as preparation for DAM implementation).

July 2019

1. DAM implementation;
2. Target Electricity Market software development/purchase and testing;
3. Hourly settlement system update.

January 2020

1. Analysis of the possibilities to transition to a system of only freely price-negotiated bilateral contracts (elimination of regulated segment);
2. IDM implementation (if the appropriate requirement in the draft Law on Energy will not change);
3. Contracts for difference system finalization;
4. Clearing mechanism implementation;
5. Target Market Rules approval and transition to Target Market.

MAIN CONCLUSIONS

1. The target market model must be agreed upon through the engaged Stakeholders and then this market can be successfully opened in contrast to the current situation when consumers are forced to enter the market with a lot of uncertainties.
2. The consumers must have the choice to enter the competitive market voluntarily on the basis of clear rules for its functioning.
3. The target Electricity Market must be one and not divided into separate regulated and competitive markets (see Annex 1). MPs, during the transitional phases, will participate in these segments of trade with different shares.
4. The terms of reform outlined in the draft Law on Energy are very short and require the immediate phased development and implementation of appropriate mechanisms.
5. It is urgent to create a MO, whose initial task will be to create regulatory documents that will form the basis for the creation of Target Market Rules.
6. It is immediately necessary to make the transition from the monthly market to the hourly.
7. Transitional actions should be carried out in parallel in accordance with Action Plan mentioned above. Particular attention should be paid to the creation / purchase of software.
8. To ensure a smooth transition to the Target Market, the time is needed for the target (without financial obligations to participants) and the existing markets to operate in parallel by the use of special software (it will be ready by August 2018).
9. The main critical issue is the current situation with obtaining the actual hourly balance without which it is impossible to make the transition to the hourly market.
10. Lack of work experience on hourly markets requires start of the capacity building for market players as soon as possible. This process should be phased and on permanent basis.

ANNEX1. REGULATED GENERATION ALLOCATION (PARTIAL POOL CONCEPT)

The requirement of smooth transition to competitive market to protect domestic consumers requires the preservation of the regulated segment of trade.

As a transparent mechanism for allocating of generation to wholesale buyers, the concept of Partial Pool is proposed.

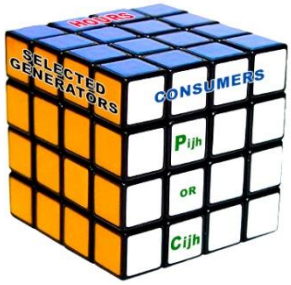
The Partial Pool concept assumes allocation any share of generation of selected generators between consumers (structure can be different for different seasons).

The following algorithms are given for hourly calculations, but the mechanism can be applied to the monthly market as well.

As a result, the generation volumes of each generator to cover the consumption of each consumer P_{ijh} and the corresponding costs are obtained C_{ijh}.

$$P_{ijh} = L_{ih} / (1-\%loss_h/100) * G_{jh} * g_{jh} * p_{ji} / \sum_I L_{ih} * p_{ji}$$

$$C_{ijh} = P_{ijh} * t_{jh}$$



where
L_{ih} – Planning capacity of i^{th} off-taker for hour h
$loss\%_h$ – Planning losses percentage for hour h
G_{jh} – j^{th} Generator net generation for hour h
g_{jh} – j^{th} Generator share using in PP (can be varied by hours)
p_{ji} – Priority coefficient of i^{th} off-taker in allocation of j^{th} generation
t_{jh} – j^{th} Generator price for hour h

Generation allocation of each power plant is carried out in proportion of consumption of each consumer taking into account possible preferences (priority coefficients.)

Generation volume, included in the Partial Pool, would define the level of deregulation of market both as a whole and for each MP (different shares, priority coefficients).

It should be noted that if a MP has bilateral contracts, it participates in the Partial Pool with the corresponding residues of consumption/generation.

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