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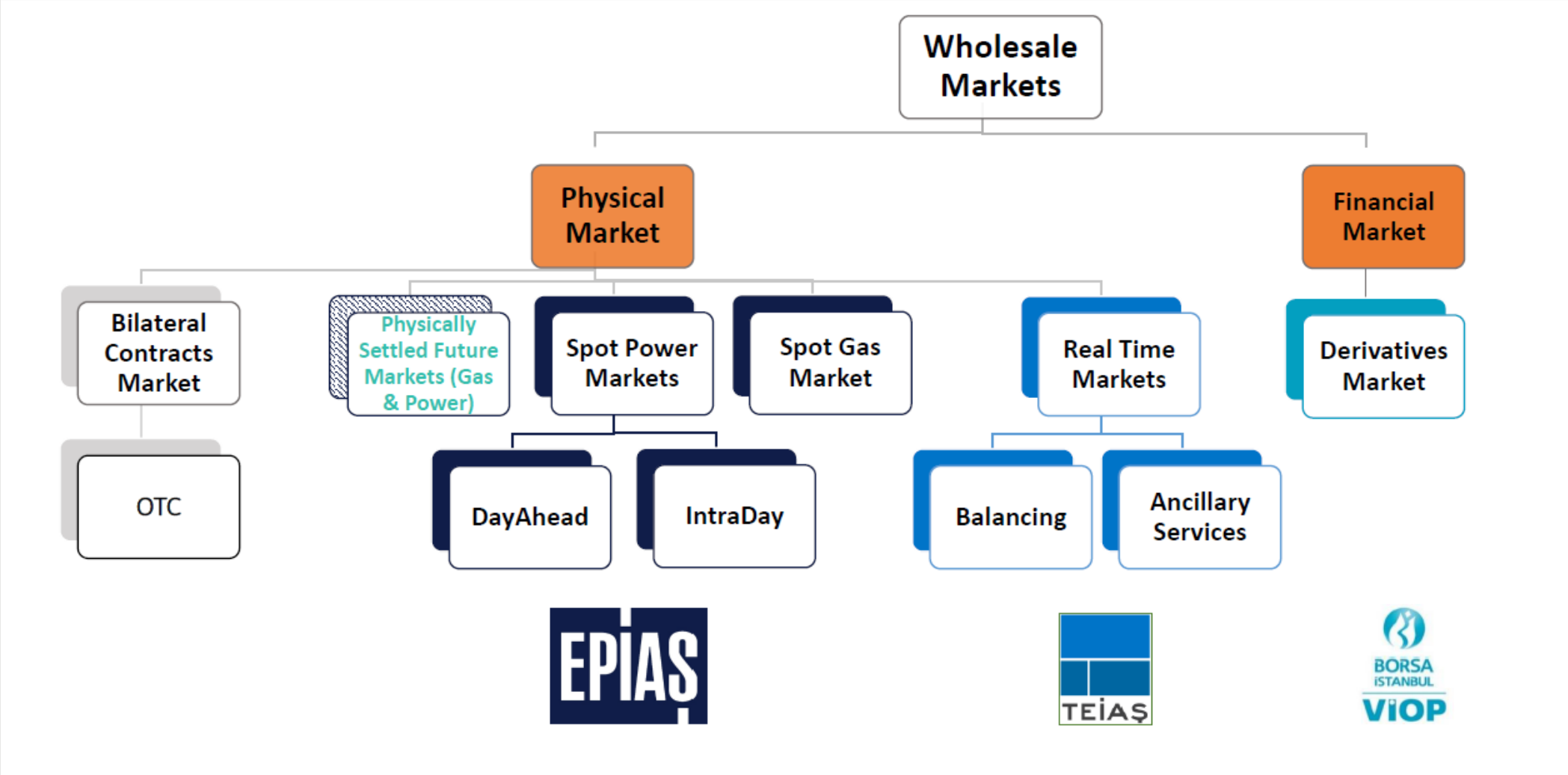
Energy
Security
Project

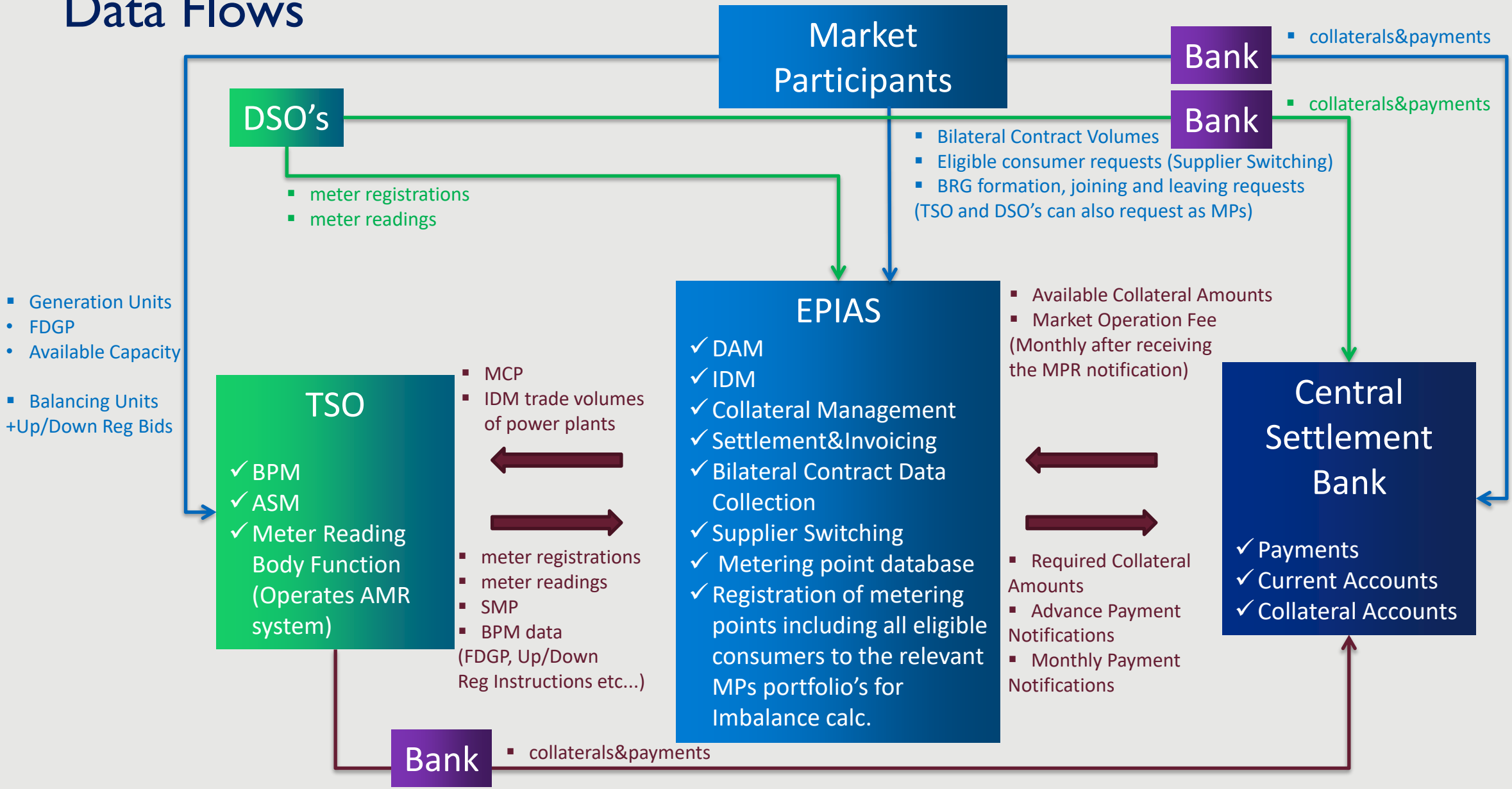
TURKISH ELECTRICITY MARKETS
Role Of EPIAS (Energy Exchange Istanbul)

Kyiv, Ukraine
April 15, 2021

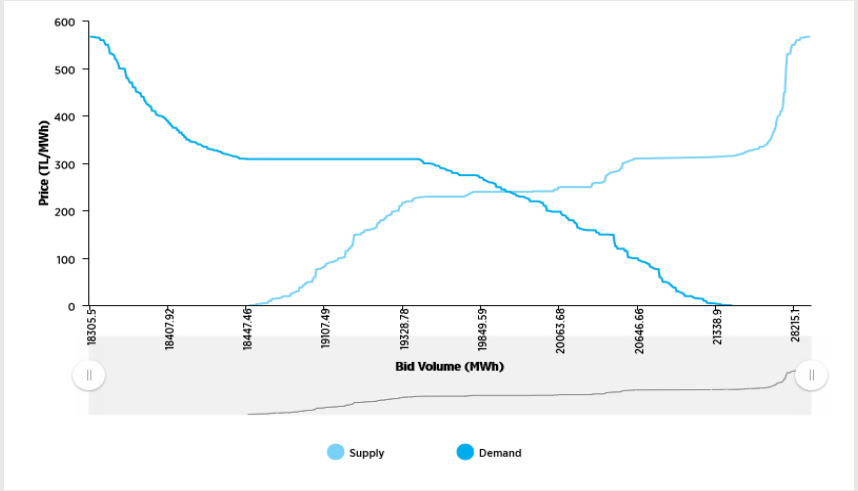
Electricity Market Model in Turkey



Data Flows


Market Participants
Bank
collaterals&payments
Bank
collaterals&payments
DSO's
Bilateral Contract Volumes
Eligible consumer requests (Supplier Switching)
BRG formation, joining and leaving requests
(TSO and DSO's can also request as MPs)
meter registrations
meter readings
Generation Units
FDGP
Available Capacity
Balancing Units
+Up/Down Reg Bids
EPIAS
DAM
IDM
Collateral Management
Settlement&Invoicing
Bilateral Contract Data Collection
Supplier Switching
Metering point database
Registration of metering points including all eligible consumers to the relevant MPs portfolio's for Imbalance calc.
Available Collateral Amounts
Market Operation Fee
(Monthly after receiving the MPR notification)
Central Settlement Bank
Payments
Current Accounts
Collateral Accounts
TSO
BPM
ASM
Meter Reading Body Function (Operates AMR system)
MCP
IDM trade volumes of power plants
meter registrations
meter readings
SMP
BPM data
(FDGP, Up/Down Reg Instructions etc...)
Required Collateral Amounts
Advance Payment Notifications
Monthly Payment Notifications
Bank
collaterals&payments

Day-Ahead Market



- Price is determined at the intersection point of aggregated electricity demand and supply curves.

- Maximum sellable volume={max[25MWh,(NBPQ*1.5)]+Ins.Capacity} (Net Bilateral Purchase Quantity (NBPQ) is the maximum net purchase quantity on a settlement period on the last 180 day period.)

- Bids can be submitted for the following 5 days and market participants shall submit their bids until 12:30 on the auction day and final results announced by EPIAS at around 14:00.

- Advance Payment Notifications including both DAM and IDM amounts sent to the Central Settlement Bank on the following workday. (Physical Delivery Day+1)

- Payments realised on the second following workday of the physical delivery day
  Debtors shall pay until 15:00
  Creditors will be paid until 17:00

Intraday Market

- IDM enables market participants to adjust their trading positions and adjust their imbalances.

- Sellers and buyers submit the volumes and prices of electricity that they want to trade and waiting for their counterparty.

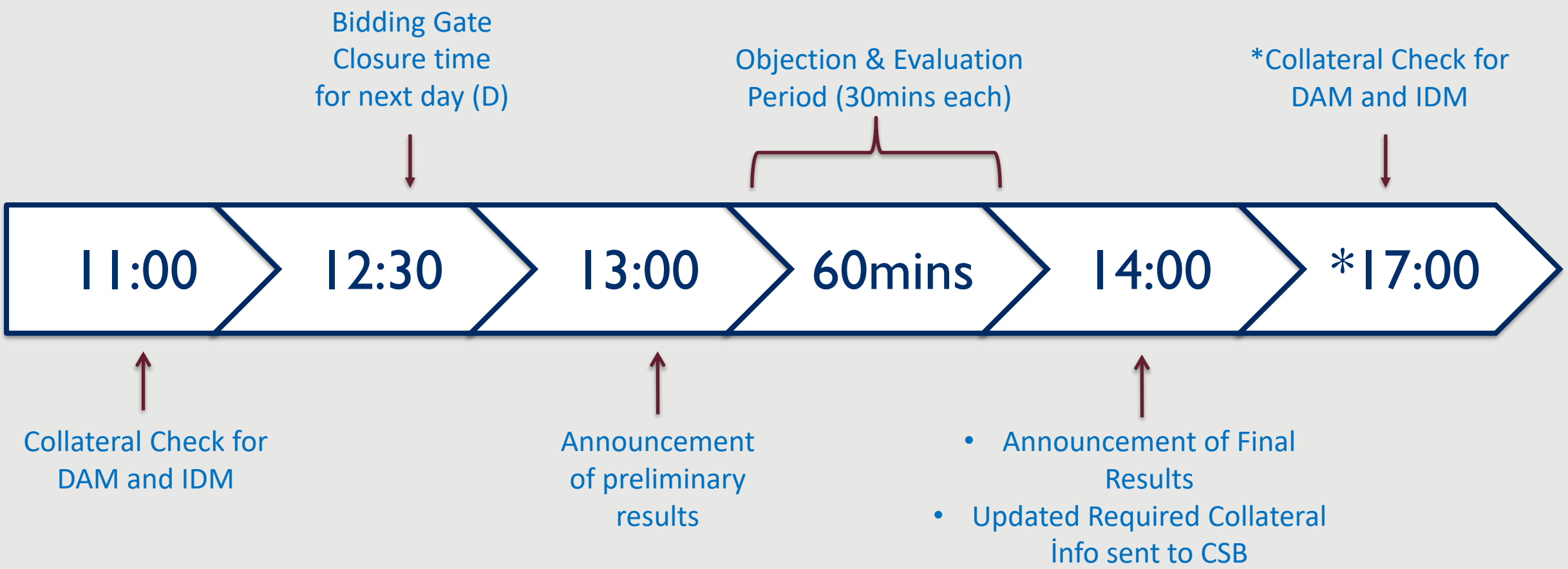
- Continious Trading
  Trading starts at 18:00 before the physical delivery day
  Trading lasts until the last 60mins prior to the physical delivery time (IDM gate closure time)

- In case of matching the price of the matched quantity is determined as the price of the bid which has an earlier entry time.

- Two colletreal checks (11:00 and 17:00)

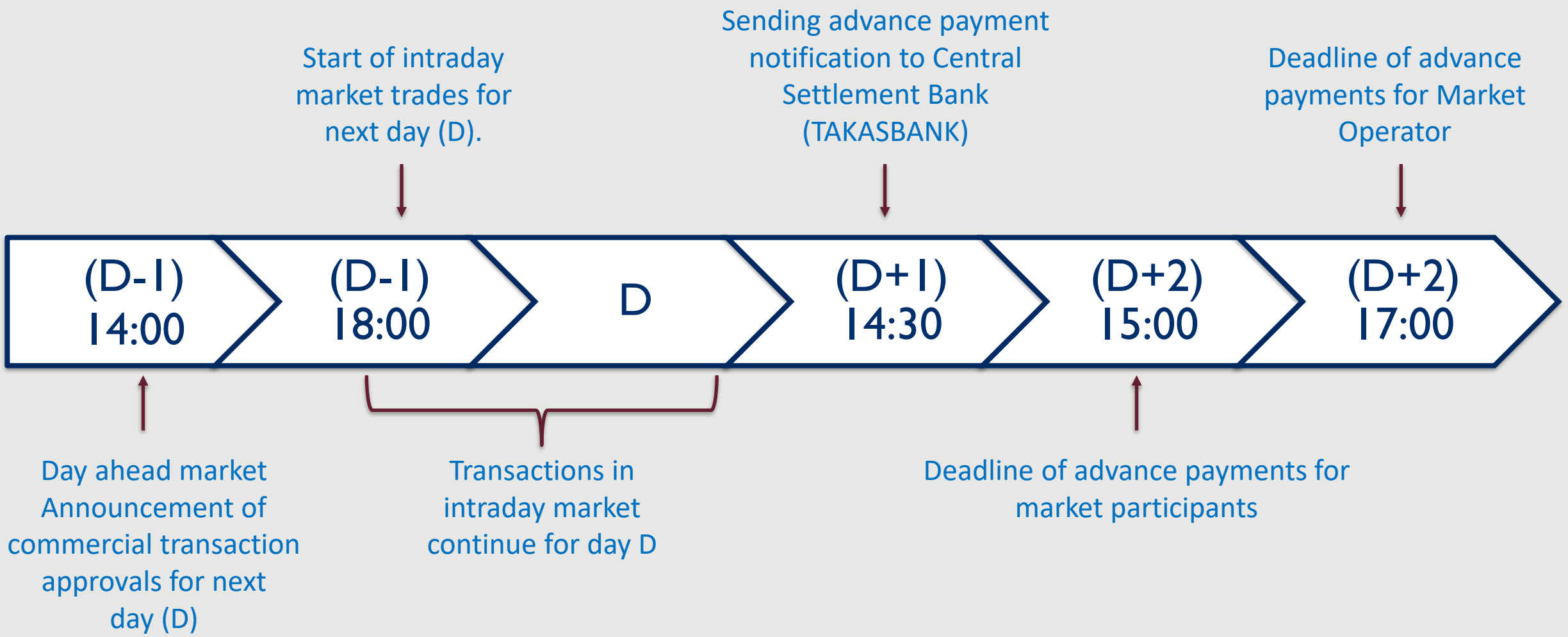
(Note: Collateral check performed at 17:00 on the last working day before a holiday enables MPs to be able to participate on the IDM.)

Spot Markets



*Collateral check performed at 17:00 on the last working day before a holiday enables MPs to be able to participate on the DAM & IDM during holidays. Colletral checks of other working days are for participating only on IDM until the next check at 11:00.

Settlement Process of DAM&IDM



Monthly Settlement Process (Imbalances, BPM, RE)

Submission of the meter data to the Market Operator

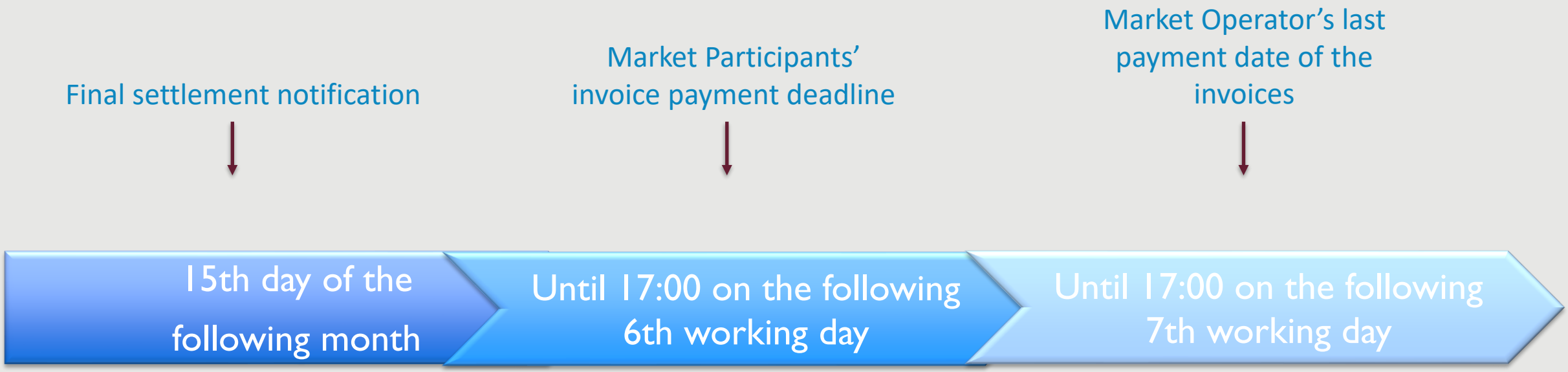
Evaluation and finalization of objections by Market Operator

*M: Invoice month considered during settlement calculations
**In case 15. day of a month coincides with a holiday then the following workday will be the publication day.

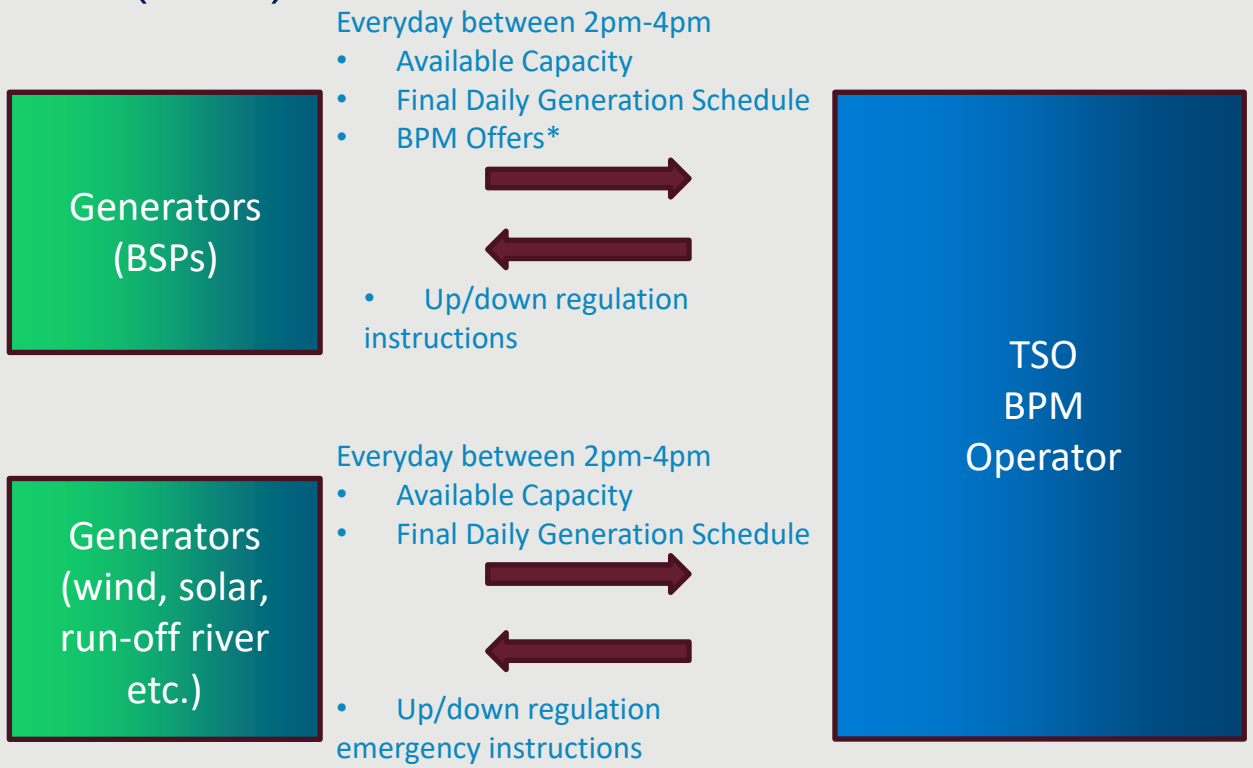
- Announcement of the preliminary settlement notifications on a daily basis
- Checking the settlement notification and applying for the objections and/or corrections by market participants.

**Publication of the final settlement notification

Settlement, Invoicing and Payment



Balancing Power Market (BPM)



Available Capacity: 500 MWh

Final Daily Generation Schedule: 300 MWh

BPM Offers	Volume (MWh)	Price (TL/MWh)
Up-regulation	200	250
Down-regulation	300	20

Balancing Power Market Settlement

Calculations of accepted and fulfilled instruction volumes and amounts

➢ **UpReg instruction volume and receivable**

- Supply Vol (MWh) ≥ FDGS (MWh) + UpReg Instruction (MWh)

UpReg Inst. Amount (TL) = [UpReg Inst. Volume (MWh) X SMP (TL/MWh)] - Unfulfilled UpReg Inst. Cost (TL)

➢ **DownReg instruction volume and payable**

Supply Vol (MWh) ≤ FDGS (MWh) - DownReg Instruction (MWh)

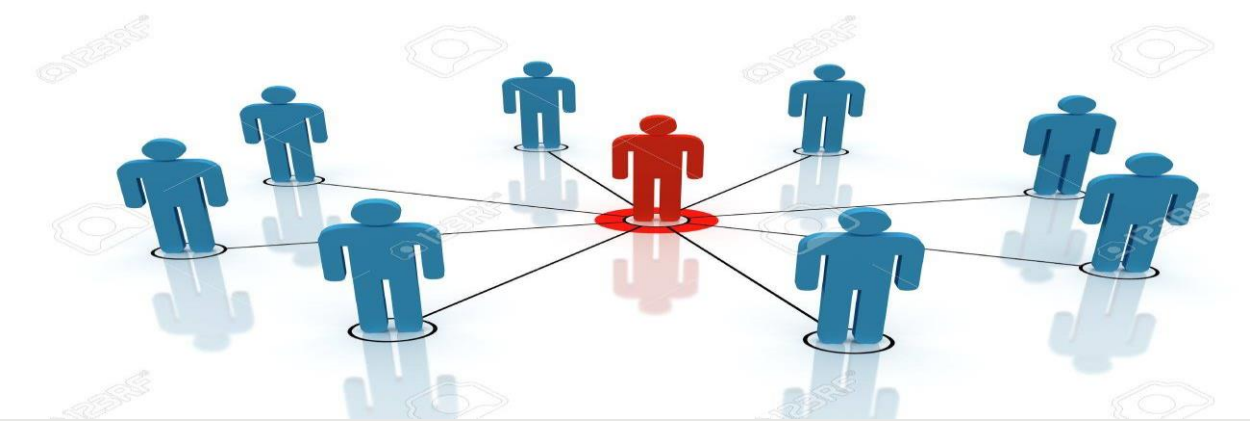
DownReg Inst. Amount (TL) = [DownReg Inst. Volume (MWh) X SMP (TL/MWh)] - Unfulfilled DownReg Inst. Cost (TL)

Cost of Deviation from Generation Schedule

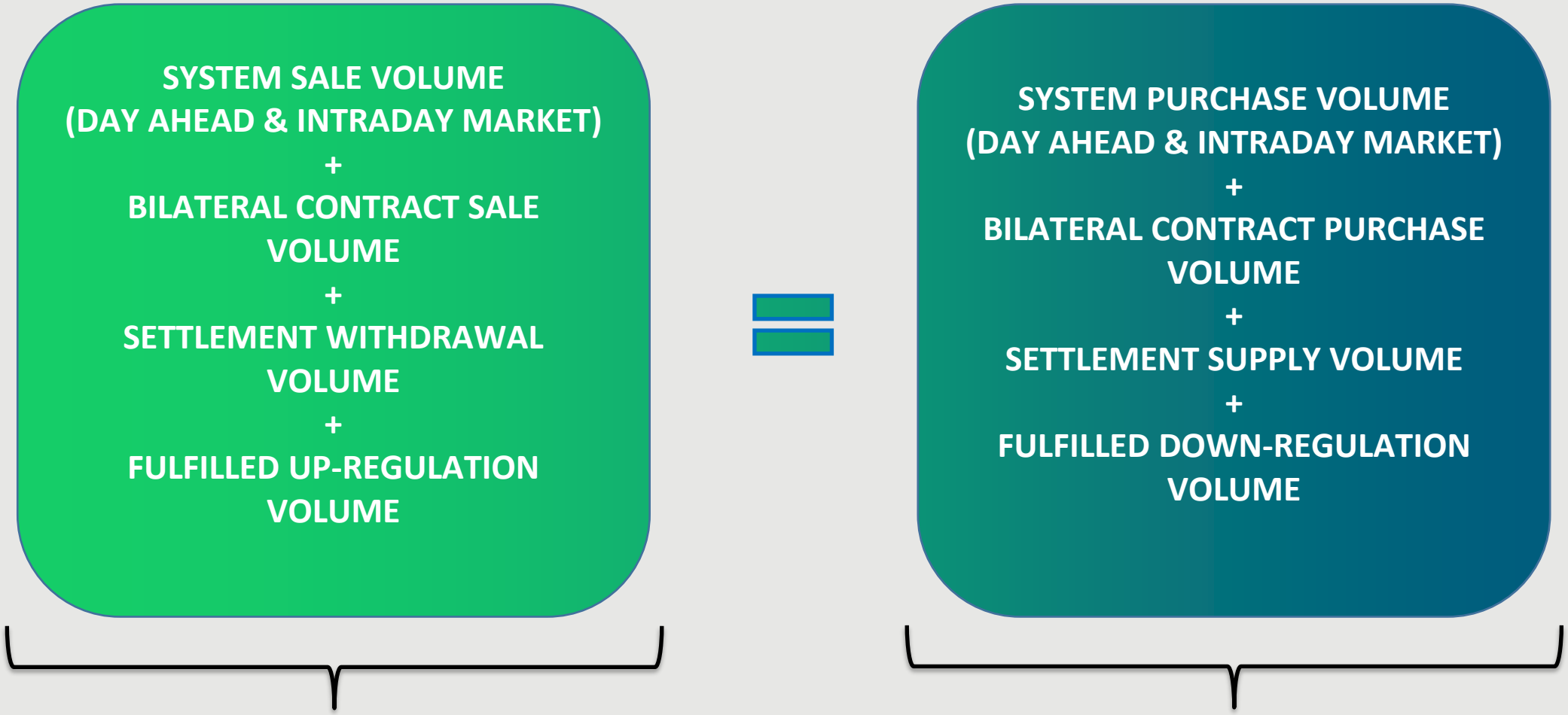
- Intraday market transactions → FDGS update
- Updated FDGS + BPM Instructions → Expected generation volüme
- Deviation from the expected generation → 10% tolerance
- Cost reflected to deviation above the tolerance
- Unit cost of the deviaton → max (MCP , SMP) * 0,03

Balance Responsible Group

- Market participants can form a balance responsible group by notifying the Market Operator.
- On behalf of the group, the balance responsible party takes over the financial liability against the Market Operator for the energy imbalance of the balance responsible group.
- In the settlement notification, imbalances are calculated over the net imbalance of the participants in the group.

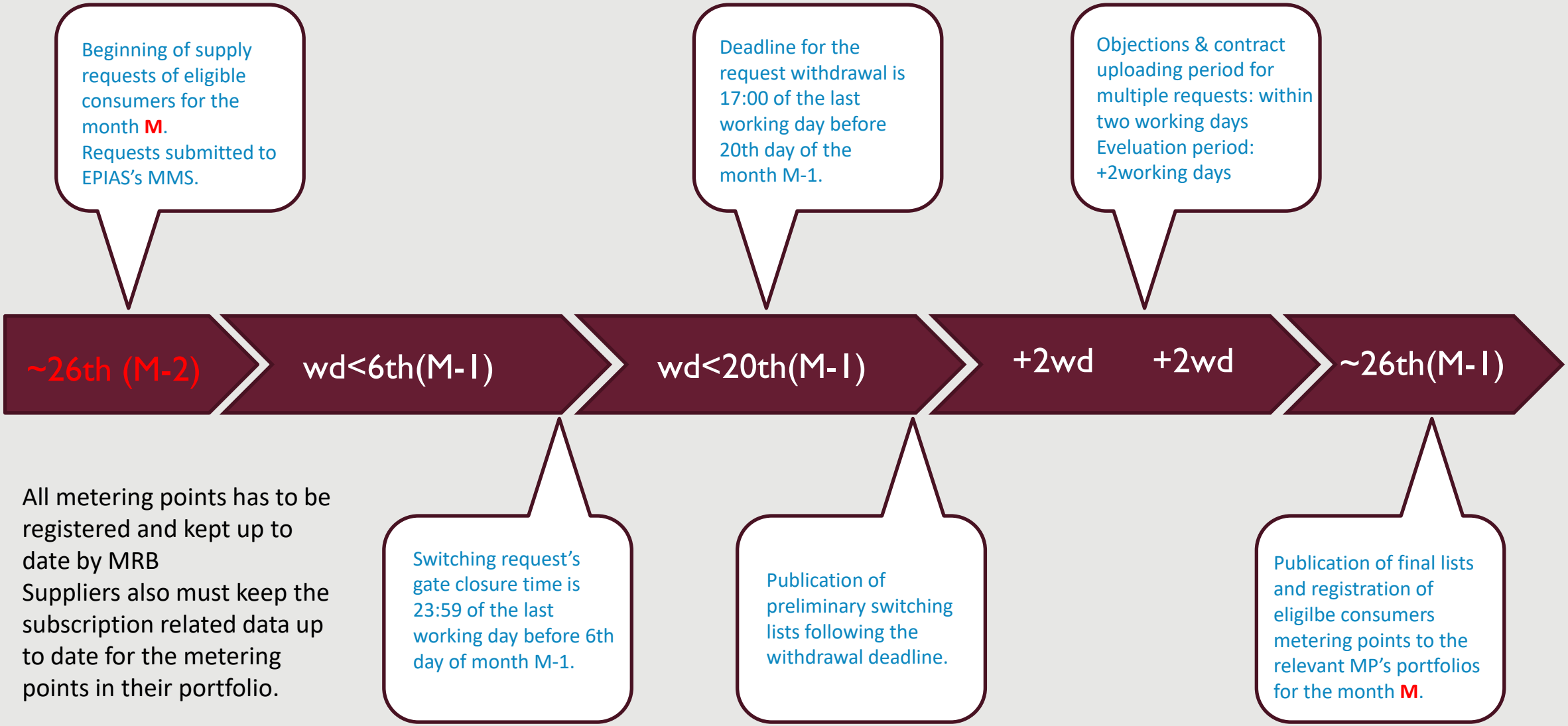


Settlement of Energy Imbalances



Dual pricing:
Positive Imbalance Price: min(MCP,SMP)*0,97
Negative Imbalance Price: max(MCP,SMP)*1,03

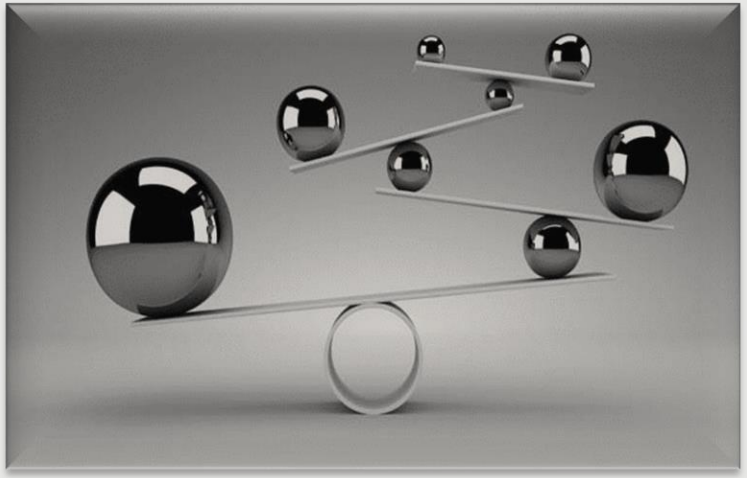
Supplier Switching Process



All metering points has to be registered and kept up to date by MRB
Suppliers also must keep the subscription related data up to date for the metering points in their portfolio.

Collateral Mechanism I

- The purpose of the collateral mechanism is to secure the continuity of the cash flow between the participants in case market participants could not fulfill their obligations.
- Takasbank (Central Settlement Bank) provides collateral management services.
- Participants open accounts at Takasbank for the execution of transactions related to collaterals, advance payments and invoice payment. (Current Account&Collateral Account)
- Required collateral for each participant is calculated by EXIST on working days and announced to participants via MMS and Takasbank. Market participants manage their own accounts via CSB webpage
- Depending on the availability of MP's current account, CSB is able to withdraw automatically for due payments and/or transfer money to collateral account when necessary



Collateral Mechanism II

Initial Collateral

Day Ahead - Intraday Collateral

Additional Collateral

TOTAL COLLATERAL

TC = max (IC, DA-ID) + AC

(AC = Imbalance Col. + Risk Col. + RESM Col.)

Collateral Types-I

Initial Collateral

- **InstalledCap≤50MW = 10.000TL**
- **50MW<InstalledCap<1000MW = (Installed Capacity*200TL/MW)**
- **InstalledCap≥1000MW = 200.000TL**
- **Wholesale, TSO and DSO = 200.000TL**

DA-ID Collateral

- **DA-ID collateral amount is calculated if the total System Purchase Amount is more than the total System Sales Amount on a daily basis.**

Most recent 3 days' business transactions on the last 30 days.

Date	Purchase Amount (DAM)	Sale Amount (DAM)	Purchase Amount(IDM)	Sale Amount (DAM)	Net Purchase Amount
02April2021			0	1000	0
03April2021	20000	5000	1000	300	15700
04April2021			2000	1000	1000
*05April2021	50000	0			50000
06April2021	10000	30000			0
				DA-ID Collateral	**66.700**

Collateral Types-2

Additional Collateral = Imbalance Collateral + Risk Col + RESM Col

- **Imbalance Collateral**

IC = MAX SMP × |MİN NEGATIVE IMBALANCE| × 1,5

Invoice Period	Avarage SMP (TL/MWh)	Net Energy Imbalance (MWh)
01.01.2021	305	-100
01.02.2021	300	500
01.03.2021	260	-900

IC = 305 X 900 X 1,5
= 411.750 TL

Collateral Types-3

Additional Collateral = Imbalance Collateral + Risk Col + RESM Col

- **Risk Collateral**

Risk collateral is calculated;

- **For the invoice periods that the settlement notifications have not been published yet**
- **On a daily basis**
- **Over the estimated imbalance volumes of balance responsible group and the average SMP**

Daily Risk Volume

(DAM&IDM Sales + Bilateral Sales + UpReg Instructions + EstimatedDailyConsumption)
minus
(DAM&IDM Purchases + Bilateral Purchases + DownReg Instructions + DailyGenerationVolumes)

Risk Collateral = ∑ (Daily Risk Volume (MWh) * Monthly Avg SMP)

***If this equation yields a negative amount then Risk Collateral will be set as 0.**

Collateral Types-4

Additional Collateral = Imbalance Collateral + Risk Col + RESM Col

- **RESM Collateral**

Amount arising from RESM is reflected to market participants as debt in proportion to their

withdrawal volume (eligible&non-eligible consumers monthly consumptions and net monthly consumptions of power plants if any) therefore these amounts needed to be collateralized.

RESM collateral is calculated;

- **For the invoice periods that the settlement notifications have not been published yet**
- **On a daily basis**
- **Over the estimated consumption volumes and estimated monthly unit price of FiP**

RESM Collateral = ∑ (Daily Consumption Volume (MWh) * RESM unit price (TL/MWh))

***Estimated RESM unit price is calculated and announced by EMRA (Regulatory Authority)**

Power Derivatives Market

Estimated annual volume: 45-50TWh

Sessions for continious trading: 13:00-16:00 on working days only.

Contracts: Monthly, Quarterly, Balance of Month (Load Type: Base)

The best buy order is the one with highest price and the best sell order is the one with lowest price.

They will be appear at the top of the order book.

Daily Reference Price*(0.93) <Bid Price <Daily Reference Price*(1.07)

Maximum bid price can be %7 more than the daily reference price.

Seller ⟺ Buyer (OTC)

Market Operator assumes the counterparty risk between the buyer and seller.

Seller ⟺ Market Operator // Market Operator ⟺ Buyer

Collateral Mechanism : Covers net losses arising from closing positions, collaterals are updated according to the daily reference price changes (marked-to-market component)

Guarantee Fund : Covers the payables in case the collateral amount is insufficient

Settlement Period : Monthly (after physical delivery)

Energy Security Project

THANK YOU!

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