

EPIAS

2017
ELECTRICITY MARKET
REPORT

Highlights of 2017

By 16,53% increase, average MCP was 163,84 TL/MWh in comparison to 2016,

By 7.411 MW addition, installed capacity was 85.200 MW,

By 8,4% increase, annual electricity generation was 295,5 TWh and by 6,3% increase, annual electricity consumption was 294,9 TWh,

The highest MCP was 967,15 TL/MWh at 14:00 on Monday, September 11,

Cleared volume was 123,32 TWh in Day Ahead market and traded volume was 1,72 TWh in Intraday Market,

67,7% of annual market volume consists of bilateral contracts, 27,5% consists of Day Ahead Market, 4,5% consists of Balancing Power Market and 0,4% consists of Intraday Market transactions

Regarding the shares of electricity generation by energy source, generation from natural gas-LNG power stations increased by 6% to 32%, generation from hydropower stations declined by 5% to 20%

The highest hourly peak demand was 47.062 MWh at 15:00 on Wednesday, July 26 and the lowest demand was 18.336 MW at 06:00 on Monday, June 26,

According to the final list published by EMRA in 2016, the installed capacity of the power stations utilizing from Feed-in Tariff Mechanism (YEKDEM) is increased from 15.083 MWh to 17.400 MWh by 2.317 MW change,

Table of Contents

1. Spot Market Operations	8
2. Day Ahead Market	9
2.1. DAM Web Application Improvements	9
2.2. Annual Average Market Clearing Price (MCP)	10
2.3. Monthly Average Market Clearing Price, 2016-2017.....	10
2.4. Daily Average Market Clearing Price.....	11
2.5. Hourly Market Clearing Price	11
2.6. Average Market Clearing Prices on Hourly Basis	12
2.7. Distribution of Market Clearing Price during Weekdays-Weekend.....	12
2.7.1. Distribution of Market Clearing Price during Weekdays	13
2.7.2. Distribution of Market Clearing price during Weekend.....	14
2.9. Yearly Cleared Volumes, 2012-2017	15
2.10. Monthly Cleared Volume, 2016 - 2017	15
2.11. Daily Cleared Volume.....	16
2.12. Hourly Cleared Volume	16
2.13. Cleared Hourly - Block Order Statistics	17
2.13.1. Shares of Cleared Hourly-Block Orders in Sales Side	17
2.13.2. Shares of Cleared Hourly- Block Orders in Purchase Side.....	18
2.13.3. Cleared Hourly-Block Orders Sales Volume on Monthly Basis.....	18
2.13.5. Submitted-Cleared Block Orders Sales Volume on Monthly Basis	19
2.13.6. Submitted-Cleared Block Orders Purchase Volume on Monthly Basis.....	19
2.14. Price Independent Sales-Purchase and Cleared Volume on Monthly Basis	20
2.15. Day Ahead Market Annual Transaction Volume	21
2.16. Average Number of Submitted Orders	21
2.18. European Energy Exchanges and EXIST DAM Prices	22
2.18.2. Eastern Europe and EXIST Day Ahead Market Prices.....	22
2.19. European Energy Exchanges and EXIST DAM Clearing Volumes.....	23
2.19.1. Central and Western Europe and EXIST Day Ahead Market Clearing Volumes.....	23
2.19.2. Eastern Europe and EXIST Day Ahead Market Clearing Volumes	23
3. Intraday market	25
3.1. Updates in Intraday Market in 2017	25
3.2. Annual Traded Volume of Intraday Market	25
3.3. Monthly Traded Volume of Intraday Market, 2016 - 2017.....	26
3.4. Average Hourly Traded Volume of Intraday Market in Total.....	26
3.5. Number of Intraday Market Participants Active in Trade.....	26

3.6.	Intraday Market Total Purchase Volume per Participant	27
3.7.	Intraday Market Total Sales Volume per Participant	27
3.8.	Monthly Intraday Market Weighted Average Price, MCP and SMP	28
3.9.	Total Number of Orders in Intraday Market	28
3.10.	Annual Total Number of Bids-Offers in Intraday Market	29
3.11.	Number of Submitted and Matched Orders in Intraday Market	29
3.12.	Annual Traded Volume of Intraday Market	30
3.13.	Monthly Traded Volume of Intraday Market	30
4.	Market Volume	32
5.	Balancing Powers Market	34
5.1.	Monthly Average MCP-SMP	34
5.2.	Hourly System Marginal Prices	34
5.3.	Hourly Difference between MCP and SMP	35
5.4.	Monthly Volumes of 0 - 1 - 2 Coded Regulations	35
6.	Financial Settlement and Registration	36
6.1.	SBDT (Residual Balance Adjustment Amount)	36
6.2.	İSKK (Transmission System Loss Coefficient)	37
6.3.	YEKDEM	37
6.3.1.	Total YEKDEM Payment	37
6.3.2.	Unit Costs of YEKDEM	38
6.4.	Total BPM Amount	38
6.5.	Imbalance	39
6.5.1.	Total Volume of Energy Imbalances	39
6.5.2.	Total Amount of Energy Imbalance	39
6.6.	Injection Volume (UEVM) – Withdrawal Volume (UEÇM) Basis to Financial Settlement	40
6.7.	Number of Eligible Customers	40
6.8.	Number of Market Participants	41
7.	TEİAŞ Data	43
7.1.	Generation and Consumption, 2016-20178	43
7.2.	Monthly Generation, 2016-2017	43
7.3.	Number of Power Stations by Electric Utilities	44
7.4.	Number of Power Stations by Energy Source	44
7.5.	Installed Capacity by Energy Source	45
7.6.	Installed Capacity by Electric Utilities	45
7.7.	Electricity Generation Figures, 2016 - 2017	46
7.7.1.	Electricity Generation Figures by Energy Source, 2016 - 2017	46

7.7.2.	Generation by Energy Source, 2016 - 2017.....	46
7.7.3.	Electricity Generation by Electric Utilities in 2017.....	47
7.8.	Annual Electricity Generation by Cities.....	47
7.9.	Monthly Volumes of Electricity Import-Export.....	48

List of Abbreviations

EMRA	Energy Market Regulatory Authority
EPIAŞ	Energy Exchange Istanbul
TEİAŞ	Turkish Electricity Transmission Company
EÜAŞ	Electricity Generation Company
TETAŞ	Turkish Electricity Trading and Contracting Company Inc.
DAM	Day- Ahead Market
IM	Intraday Market
BPM	Balancing Power Market
YEKDEM	Renewable Energy Sources Support Mechanism
SBDT	Residual Balance Adjustment Amount
İSKK	Transmission System Loss Coefficient
UEVM	Injection Volume Basis to Financial Settlement
UEÇM	Withdrawal Volume Basis to Financial Settlement
MCP	Market Clearing Price
SMP	System Marginal Price
PI	Price Independent Order
BC	Bilateral Contract
FS	Financial Settlement
BO	Build-Operate
BOT	Build-Operate-Transfer
TOR	Transfer of Operational Rights
IoC	Immediate or Cancel
FoK	Fill or Kill



1. Spot Market Operations

Within the scope of Market Operation activities, Day Ahead and Intraday Markets are operated by EPIAŞ. In line with orders submitted by market participants to Day Ahead Market, supply and demand volumes are announced alongside the Market Clearing Prices while there are matches with continuous trading method in the Intraday Market. Objections to transactions for both markets are evaluated and resulted accordingly.

Convenience is provided to non-Turkish users performing transactions at the market, by adding an English language option to the Day Ahead and Intraday Market softwares. Both market software user guides were prepared in Turkish and in English, and became available for users. In addition, call center services are provided to market participants in order to provide 7/24 efficient and fast assistance about operated markets.

EPIAŞ has taken measures to prevent serious financial risks that market participants may encounter as a result of material errors made in their orders. The "Limit Determination Section" has been developed in order to prevent users' (fat finger) in orders in Day Ahead Market software. It is aimed to prevent the possible errors in the submitted bids by determining the maximum purchase and sell limits for the transactions that the market participants will perform during the Day Ahead Market on the hourly basis.

Suggestions and requests by market participants are taken into consideration and evaluated in accordance with legislation as quick as possible.

Within the period of January 1 2017- December 31 2017 only two times time extension was given due to some technical problems whereas at remaining days the market clearing prices were announced on time in the Day Ahead Market.

For continuous Intraday Market, only one time market process time has been changed due to technical reasons and for the rest of year there were no problems only once except for scheduled maintenance and in Intraday Market.

Data Publishing Activities Related to the Markets

Regarding data publishing activities; statistics are being published on price formation and transactions for the purpose of ensuring independent, transparent and non-discriminated approach among the parties. Besides, information and data are published for market participants as daily, weekly, monthly and annual reports. These reports can be accessed from the "Bulletins" section at the EPIAŞ website

MCP Assessment and Market Analysis

Analysis are conducted to assess the changes on market clearing price on daily basis. To do this, orders submitted by market participants are taken into account in comparison to previous delivery day.

In addition to market assessment and analysis regarding Day Ahead Market, the activities of market participants in Balancing and Power Market are also analyzed.

For Intraday market, bids and offers of market participants are also analyzed in order to examine possible effects on balancing power market.

Apart from daily analysis, the reasons of price changes in the long run, effects of legislation changes and effects of optimization algorithm are also analyzed.

Detailed reports are sent to the management and regulatory bodies regarding abovementioned topics.

2. Day Ahead Market

2.1. DAM Web Application Improvements

Second Phase of Day Ahead Market Web Application Project

Market clearing price has been calculated by optimization algorithm which was created as an in-house source by EPIAŞ since June 2016.

In-House Developed Day Ahead Market software with a user-friendly interface is designed and developed with our own resources, and developments on new order types were started under the name of second phase process in 2017.

In this new project, it is aimed to meet technical needs of market participants by developing new order types. Thus, order types provided by European Electricity markets were carefully investigated. Also, suggestions from market participants were taken into consideration. Consequently, project was divided into two terms. In the short run, decreasing time interval of block orders which was already concluded as minimum three hour time interval and increasing the number of linked block orders which was already concluded by allowing participants to submit a block order with six links were aimed. In the long run, creating two new products as profile and flexible block order types are aimed.

As of today, analysis and design of profile and flexible block orders are finalized. In this respect, relevant sections of Day Ahead Market web application were determined to make these developments effectively. For instance, order submission, order display, notification of results, web service requirements, optimization algorithm of profile and flexible block orders, stress and performance test regarding profile and flexible block orders were completed. These changes have been made in light of sector's requirements and all changes were determined parametrically. Software development in Day Ahead market web application will be completed in 2018.

2.2. Annual Average Market Clearing Price (MCP)

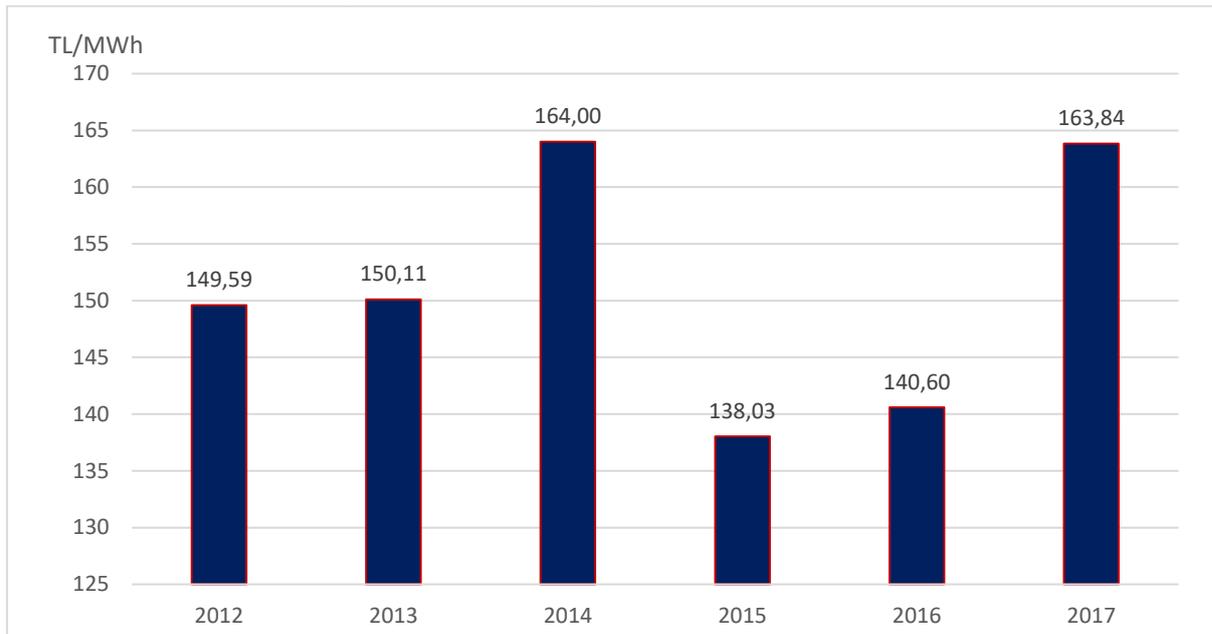


Figure 1: Annual Average Market Clearing Price

By 16,53% increase, average MCP was 163,84 TL/MWh in comparison to 2016.

2.3. Monthly Average Market Clearing Price, 2016-2017

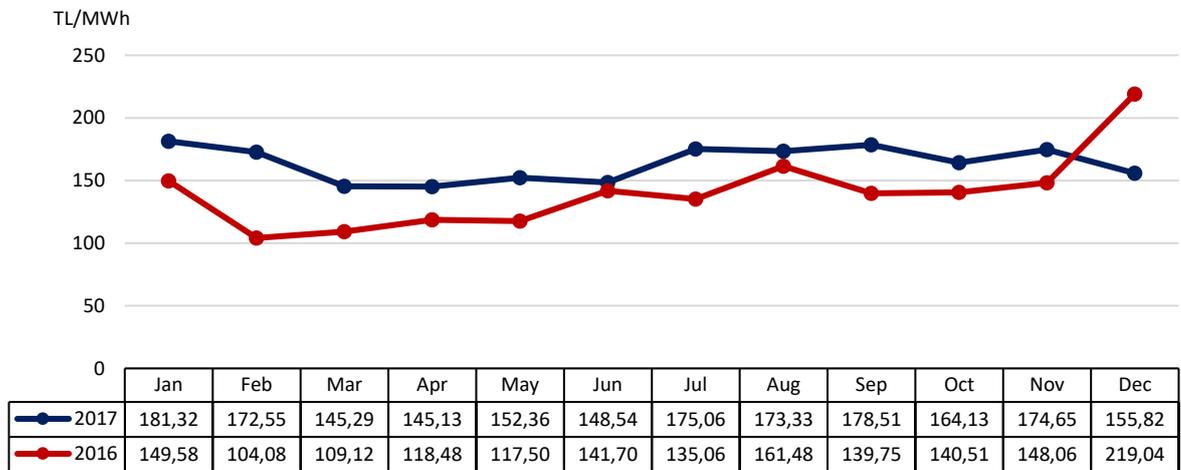


Figure 2: Monthly Average Market Clearing Price 2016 - 2017

As average MCPs are analyzed on a monthly basis for 2017, it is observed that the lowest price was in April as 145,13 TL/MWh and the highest price was in January as 181,32 TL/ MWh. While average MCP was higher from January to November in 2017 in comparison to same months in 2016, average MCP was higher in December in 2016 compared to December 2017 because of natural gas curtailment for natural gas power plants in December, 2016. For monthly comparison of these consecutive years, the highest increase took place as February 2017 monthly average reached 172,55 TL/MWh with an increase of 68,47 TL/MWh compared to same month in 2016.

2.4. Daily Average Market Clearing Price

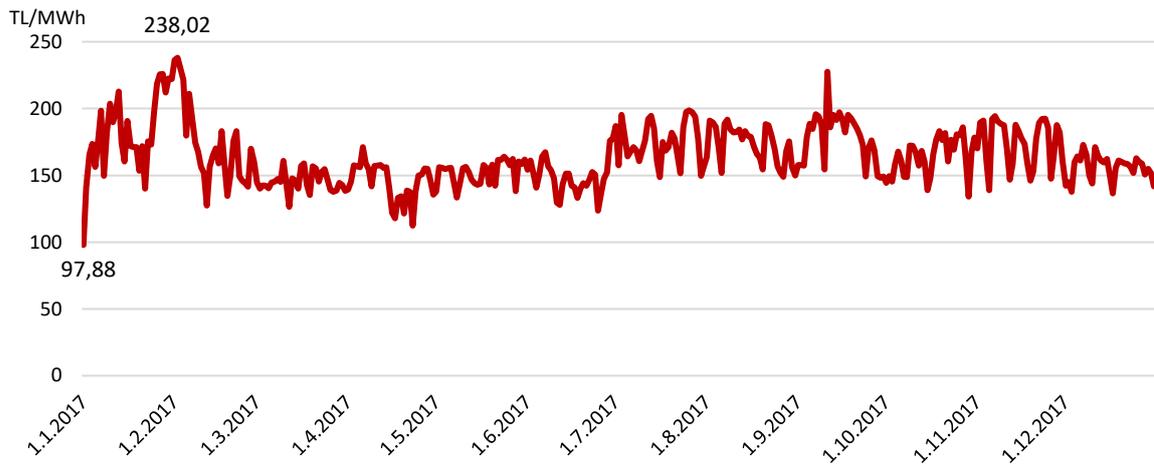


Figure 3: Daily Average Market Clearing Price

Over the past year the daily average MCP was below 200 TL / MWh. In 2017, daily average MCP was less than 100 TL / MWh for the once, between 100-150 TL / MWh for hundred four times, between 150-200TL / MWh for two-hundred forty six times and over 200 TL / MWh for fourteen times and above.

On Sunday, January 1, daily average MCP was 22.93 TL / MWh, which was the lowest value of the year due to the low demand especially at night hours. On Thursday, February 2 daily average MCP was 238,02 TL/MWh, which was the highest value of the year due to the natural gas curtailment, partially continued from 2016.

2.5. Hourly Market Clearing Price

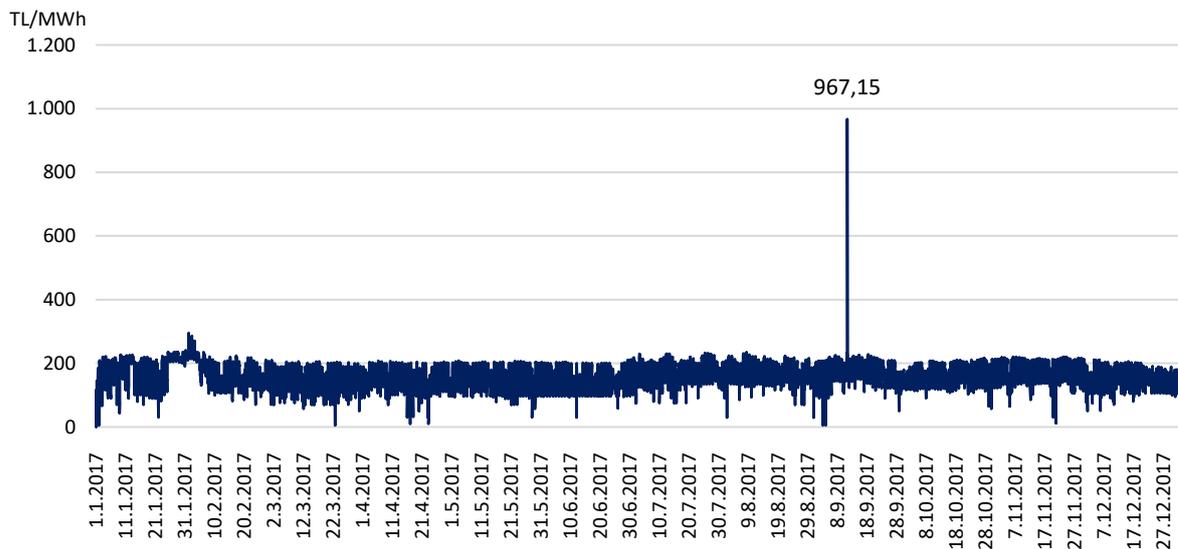


Figure 4: Hourly Market Clearing Price

Hourly MCP in 2017 is realized,

- Between 0-5 TL/MWh for 2 hours,
- Between 5-100 TL/MWh for 424 hours,
- Between 100-150 TL/MWh for 3.186 hours,
- Between 150-200 TL/MWh for 2.800 hours,
- Between 200-300 TL/MWh for 2.347 hours,
- Between 300-2000TL/MWh for 1 hour.

The highest MCP was 967,15 TL/MWh at 14:00 on Monday, September 11, whereas the lowest MCP was 1,04 TL/MWh at 08:00 on Sunday, January 1.

2.6. Average Market Clearing Prices on Hourly Basis

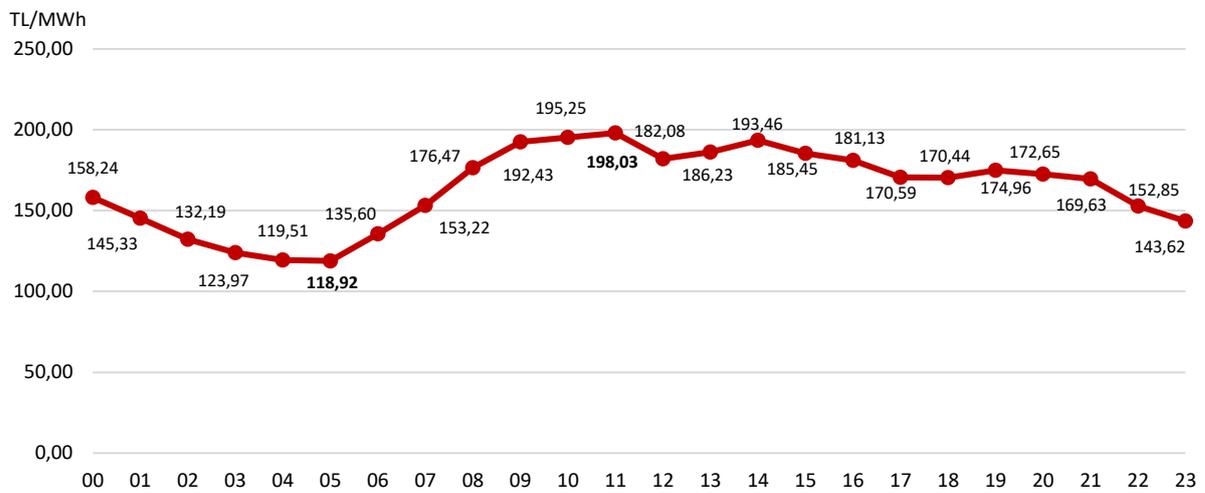


Figure 5: Average Market Clearing Prices on Hourly Basis in 2017

As average MCPs are examined on hourly basis, the lowest MCP average was 118,92 TL/MWh at 05:00 and the highest MCP average was 198,03 TL / MWh at 11:00.

While hourly average MCP was above the annual average MCP between the hours of 08:00 and 21:00, between hours of 00:00-07:00 and 22:00-23:00 average MCP was below the annual average MCP.

2.7. Distribution of Market Clearing Price during Weekdays-Weekend

Distribution of market clearing prices during 2017 on weekdays and weekends is shown at boxplots. Hourly weekdays and weekend hourly MMCP distribution, degree of dispersion from median values, degree of skewness and outliers were shown at the boxplots. Two different colored boxes are shown in Figures respectively indicate lower and upper quartile of distribution and colored areas represent most dense 50% of the distribution of related hour's MCP. The band values in the middle of the boxes represent the median of the distribution, and the error bars added respectively to the beginning and end of the boxes, represent the minimum and maximum values of by the MCP distribution at the related hour. Related distribution values are also indicated under the charts of the boxplots.

2.7.1. Distribution of Market Clearing Price during Weekdays

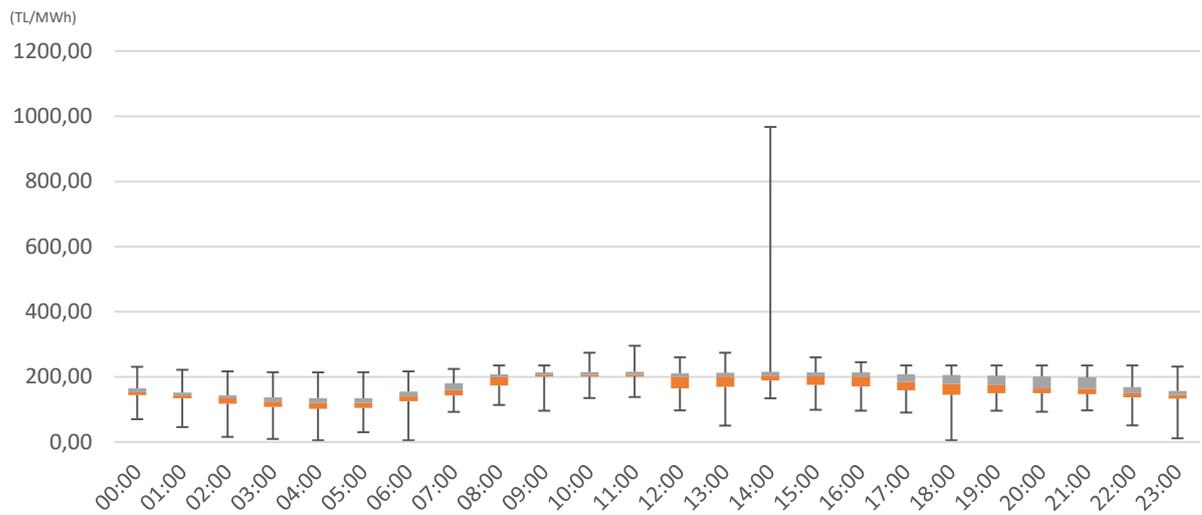


Figure 6: Distribution of Market Clearing Price during Weekdays in 2017

	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00
MINIMUM	69,99	45,78	15,78	9,41	5,09	29,99	5,08	92,44	113,63	96,00	134,94	138,07
LOWER QUARTILE	144,09	133,77	117,24	107,50	102,10	104,83	124,95	142,95	173,30	200,46	200,53	200,98
MEDIAN	152,98	142,95	133,99	123,99	120,00	120,01	140,01	159,51	199,09	204,76	205,30	205,97
UPPER QUARTILE	164,94	151,94	143,13	137,12	134,62	133,99	155,00	180,01	207,26	213,20	214,52	215,75
MAXIMUM	230,81	221,62	216,88	214,19	213,70	214,26	216,87	224,25	235,00	235,01	274,00	295,32

Table 1: Weekdays MCP Distribution for the hours of 0-11

	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
MINIMUM	96,99	50,23	133,99	98,78	96,01	90,36	5,06	96,01	92,78	97,00	50,87	11,31
LOWER QUARTILE	164,19	169,06	188,90	174,97	170,06	158,99	145,00	150,01	149,78	147,38	136,80	133,56
MEDIAN	199,99	201,02	203,68	201,95	201,27	183,69	178,55	173,99	165,00	164,04	149,48	144,01
UPPER QUARTILE	211,06	212,11	215,22	213,70	213,22	207,93	205,37	203,31	201,18	198,42	168,12	157,14
MAXIMUM	260,00	273,99	967,15	260,00	245,00	235,01	235,01	235,00	235,00	235,00	235,00	231,54

Table 2: Weekdays MCP Distribution for the hours of 12-23

2.7.2. Distribution of Market Clearing price during Weekend

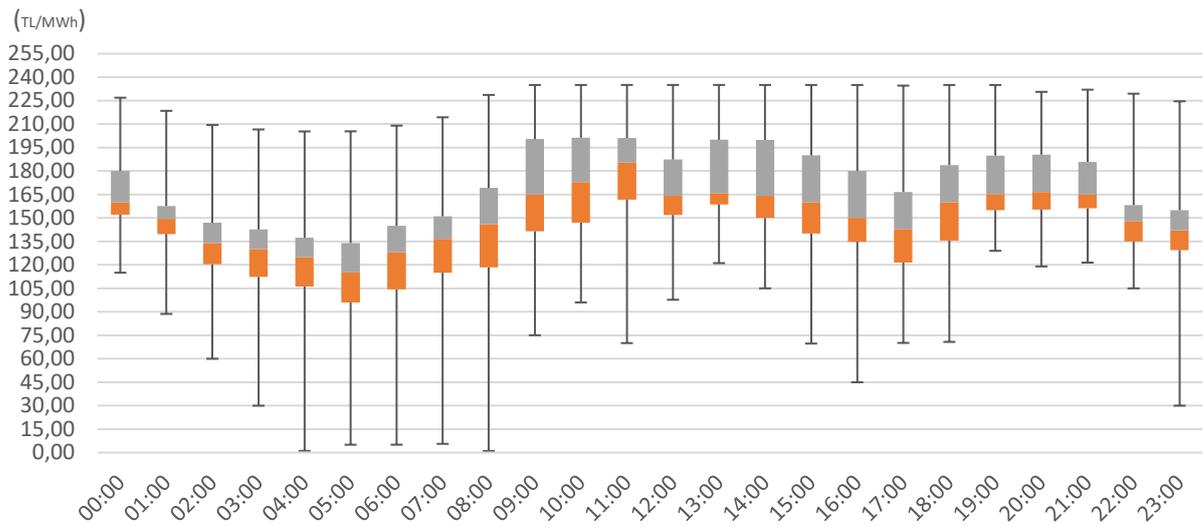


Figure 7: Hourly Weekend MCP Boxplot Distribution in 2017

	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00
MINIMUM	115,00	88,66	60,01	29,99	1,08	5,04	5,03	5,60	1,04	75,01	96,00	70,00
LOWER QUARTILE	152,15	139,74	120,37	112,30	106,18	96,00	104,35	115,00	118,33	141,48	147,02	161,60
MEDIAN	160,00	149,49	134,00	130,01	124,96	115,16	127,98	136,66	145,91	165,05	173,00	185,35
UPPER QUARTILE	180,00	157,68	146,97	142,69	137,39	134,00	145,01	151,10	169,18	200,38	201,25	201,04
MAXIMUM	226,87	218,48	209,41	206,57	205,31	205,39	209,01	214,34	228,65	235,00	235,00	235,01

Table 3: Weekends MCP Distribution for the hours of 0-11

	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
MINIMUM	97,69	121,12	105,01	69,69	44,97	70,10	70,77	128,99	119,00	121,47	105,00	30,00
LOWER QUARTILE	151,95	158,63	149,99	140,00	134,83	121,51	135,52	154,98	155,41	156,09	134,98	129,50
MEDIAN	164,19	165,87	164,19	160,00	150,00	142,95	160,00	165,19	166,53	164,99	147,99	142,00
UPPER QUARTILE	187,45	199,99	199,89	189,97	180,02	166,68	183,77	189,88	190,48	185,85	158,24	155,00
MAXIMUM	235,01	235,01	235,00	235,00	235,00	234,61	235,00	235,00	230,60	232,00	229,43	224,59

Table 4: Weekends MCP Distribution for the hours of 12 - 23

2.8. Standard Deviation Analysis

According to statistical tests, the daily standard deviations of the average market clearing prices in 2017 have increased between 18 and 28 TL/MWh with a 95% confidence rate in comparison to 2016.

2.9. Yearly Cleared Volumes, 2012-2017

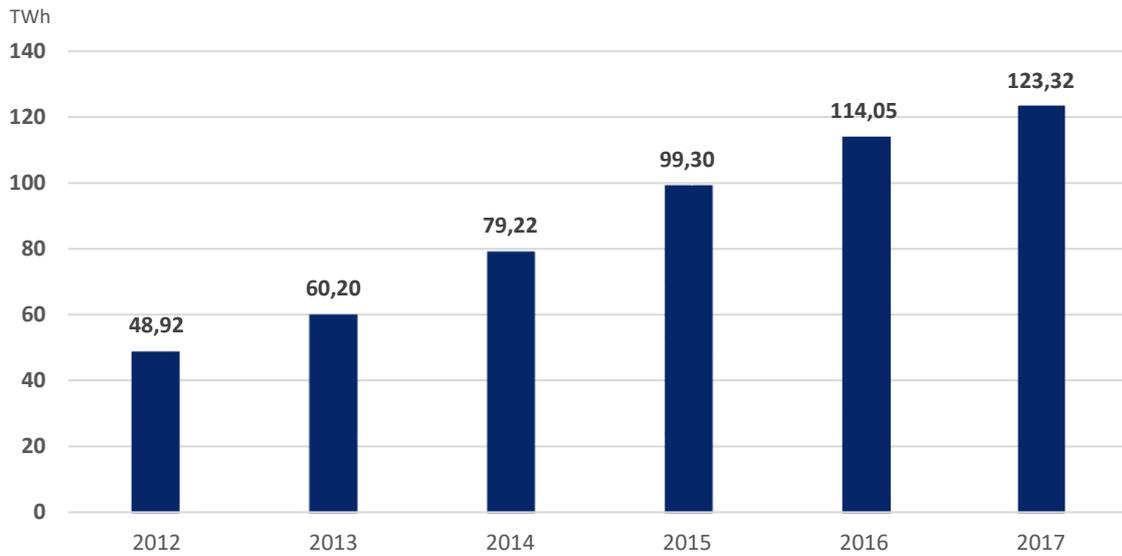


Figure 8: Yearly Cleared Volumes

Cleared volume of Day Ahead Market is increasing every year. Annual market clearing volume increased by 8,12% to 123,32 TWh in comparison to previous year.

2.10. Monthly Cleared Volume, 2016 - 2017

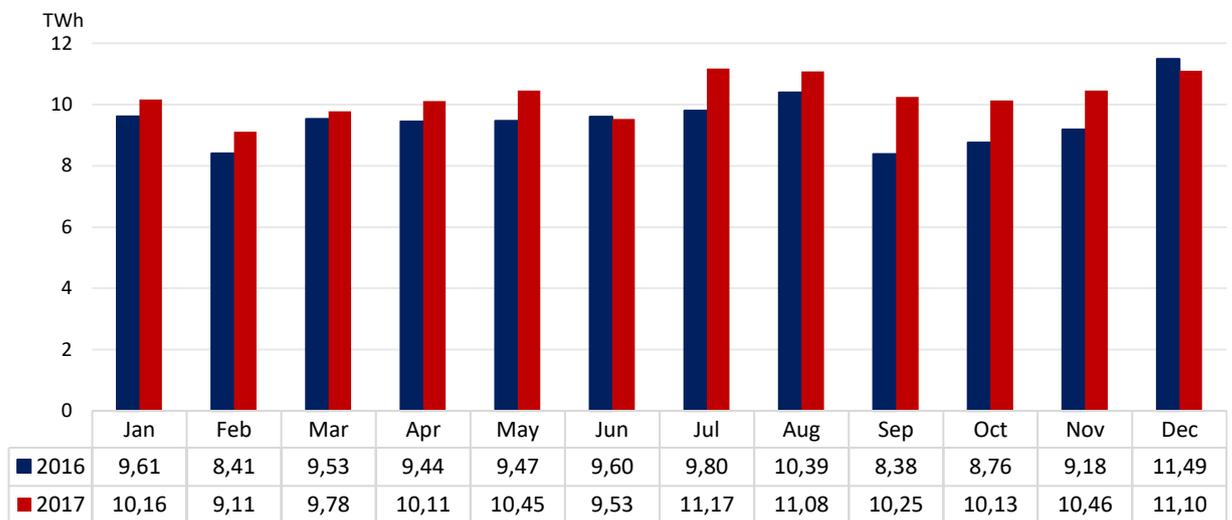


Figure 9: Cleared Volume on a monthly basis, 2016-2017

When the monthly distribution of the total number of cleared volumes in Day-Ahead Market is examined, the highest cleared volume was 11,17 TWh in December and the lowest cleared volume was 9,11 TWh in September. Except at June and December, monthly cleared Day-Ahead Market volumes were increased compared to previous year.

2.11. Daily Cleared Volume

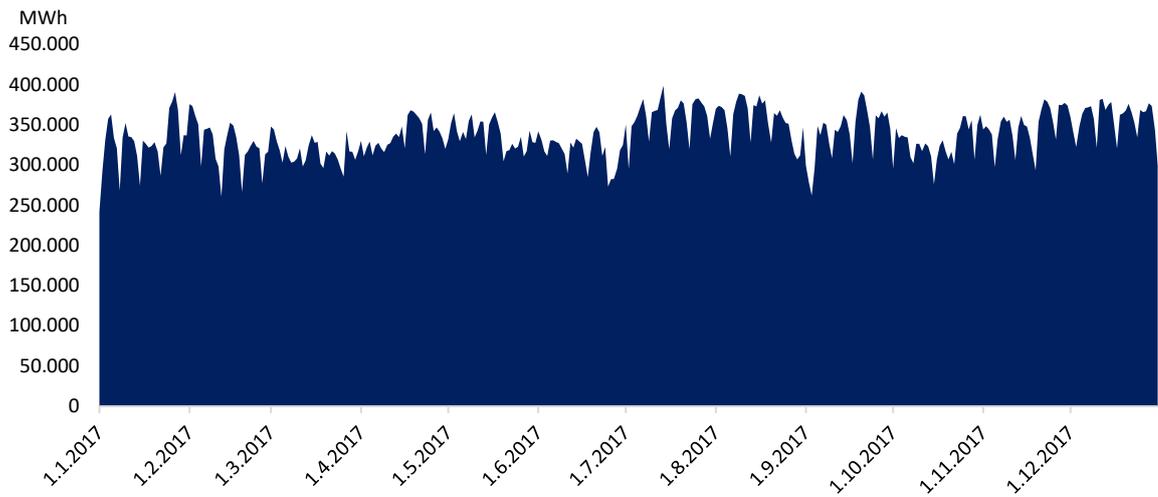


Figure 10: Cleared Volume on daily basis in 2017

While daily average cleared volume was 337.875 MWh in Day Ahead Market, the highest daily cleared volume was 398.551 MWh on Friday, July 14 and the lowest daily cleared volume was 241.986 MWh on Sunday, January 1.

Daily cleared volume in 2017:

- Between 0-300.000 MWh for 30 days (8%),
- Between 300.000 and 350.000 MWh for 200 days (55%),
- Between 350.000 and 400.000 MWh for 135 days (37%),

2.12. Hourly Cleared Volume

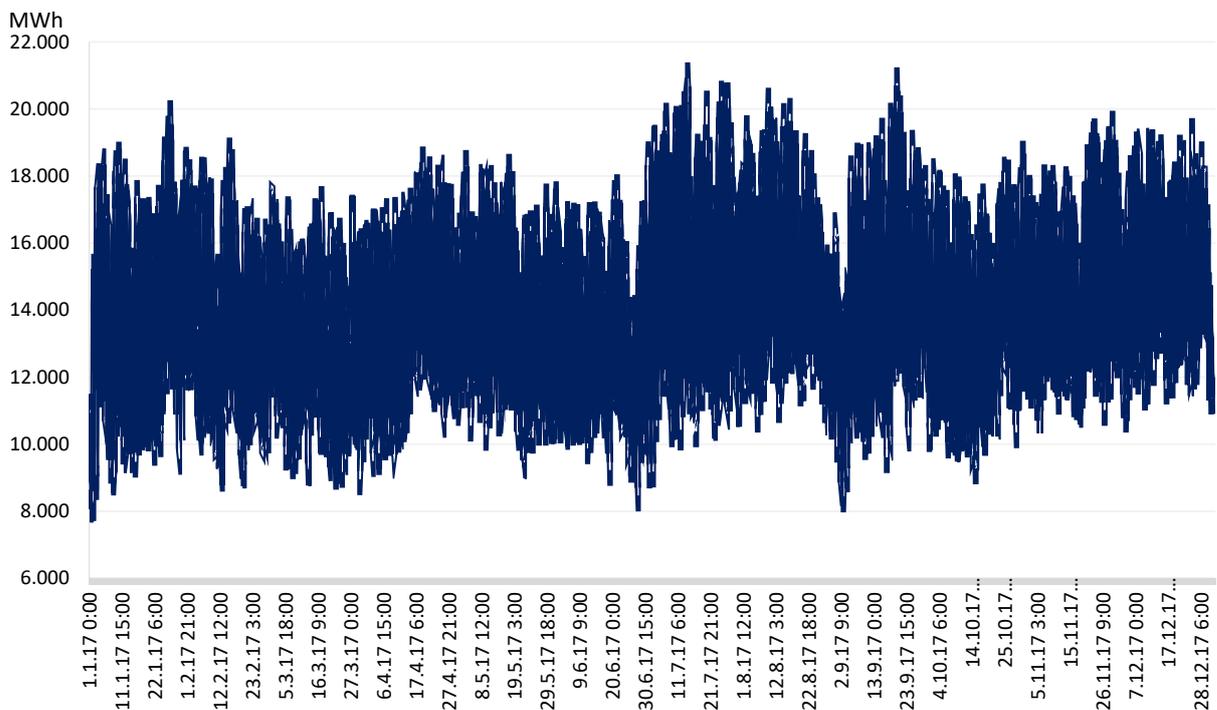


Figure 11: Hourly Cleared Volume in 2017

In Day Ahead Market, the hourly average cleared volume was 14.078 MWh in 2017, and thus when the hourly cleared volume are examined specifically it can be seen below;

- Between 0-10.000 MWh for 215 hours (2,5%),
- Between 10.000-12.000 MWh for 1602 hours (18,3%),
- Between 12.000-15.000 MWh for 3811 hours (43,5%),
- Between 15.000 and 20.000 MWh for 3120 hours (35,6%),
- 20.000 MWh and over for 12 hours (0.1%).

The lowest cleared volume in 2017 was 8.370 MWh at 02:00 on Monday, January 2, and the highest cleared volume was 20.680 at 14:00 on Tuesday, July 14.

In 2017, for 482 hours Day Ahead Market cleared volume accounted for 50% and more of the hourly consumption volume in Turkey. At 07:00 on April 17, the cleared volume of Day Ahead Market was accounted for 61% of hourly consumption.

2.13. Cleared Hourly - Block Order Statistics

62% of the cleared volume in the sales side in 2017 were hourly orders and 38% were block orders. 96% of the cleared volume in the purchase side in 2017 were hourly orders and 4% were block orders.

The highest cleared block order volume in purchase side was 9% in June and the highest cleared block order volume in sales side was 46% in November. The highest cleared block volume was 47% in August.

When the cleared block order volume is examined on daily basis, it is observed that in sales side highest cleared block order volume accounted for 56% of total cleared volume on November 26 and the lowest cleared block order volume was 9% on June 25, whereas in purchase side the highest cleared block order volume was 20% on August 31 and the lowest cleared block order volume was 0,03% on May 27, 2017.

2.13.1. Shares of Cleared Hourly-Block Orders in Sales Side

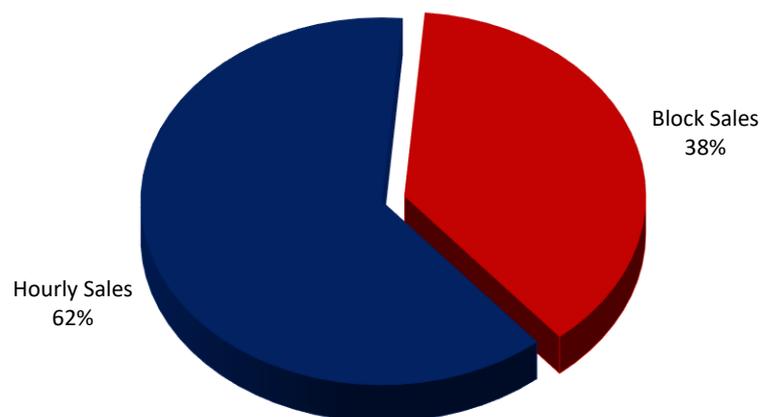


Figure 12: Shares of Hourly-Block Orders in Sales Side in 2017

2.13.2. Shares of Cleared Hourly- Block Orders in Purchase Side

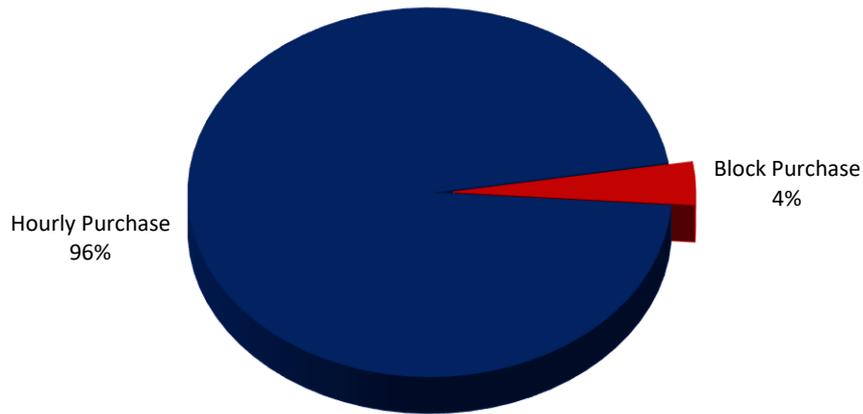


Figure 13: Shares of Hourly – Block Orders in Purchase Side in 2017

2.13.3. Cleared Hourly-Block Orders Sales Volume on Monthly Basis

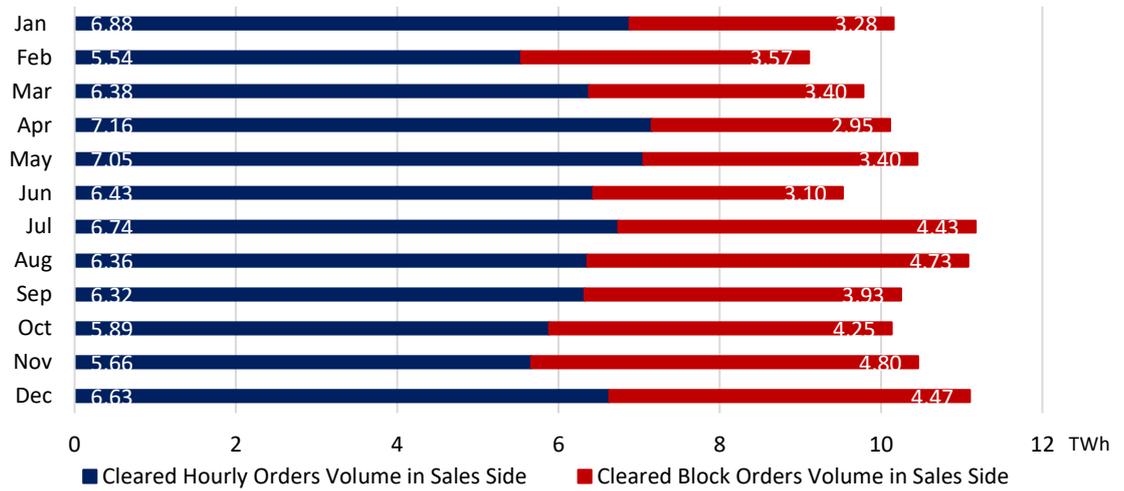


Figure 14: Cleared Hourly-Block Order Sales Volume in 2017

2.13.4. Cleared Hourly-Block Orders Purchase Volume on Monthly Basis



Figure 15: Hourly-Block Order Purchase Volume in 2017

2.13.5. Submitted-Cleared Block Orders Sales Volume on Monthly Basis



Figure 16: Submitted-Cleared Block Orders Sales Volume in 2017

2.13.6. Submitted-Cleared Block Orders Purchase Volume on Monthly Basis



Figure 17: Submitted-Cleared Block Orders Purchase Volume in 2017

2.14. Price Independent Sales-Purchase and Cleared Volume on Monthly Basis



Figure 18: Price Independent Orders & Average Cleared Volume on Monthly Basis in 2017

Average hourly price independent purchase volume was 12.350 MWh, average hourly price independent sales volume was 7.118 MWh, and average hourly cleared volume was 14.073 MWh in 2017. The average hourly price independent purchase volume accounted for 88% of the total cleared volume and the price independent sale volume accounted for 51% of total the cleared volume.

In July, the price independent purchase volume reached year's maximum value of 14.048 MWh (94% of the cleared volume), in April price independent sale volume reached its maximum value with 8.820 MWh (63% of the cleared volume).

The highest value of hourly average cleared volume took place in July with 15,016 MWh. In July average hourly cleared volume was 943 MWh (7%), which was more than yearly average. In this month, 94% of the total cleared volume consisted of the independent purchase volume and 47% of the total cleared volume was independent sales volume.

2.15. Day Ahead Market Annual Transaction Volume

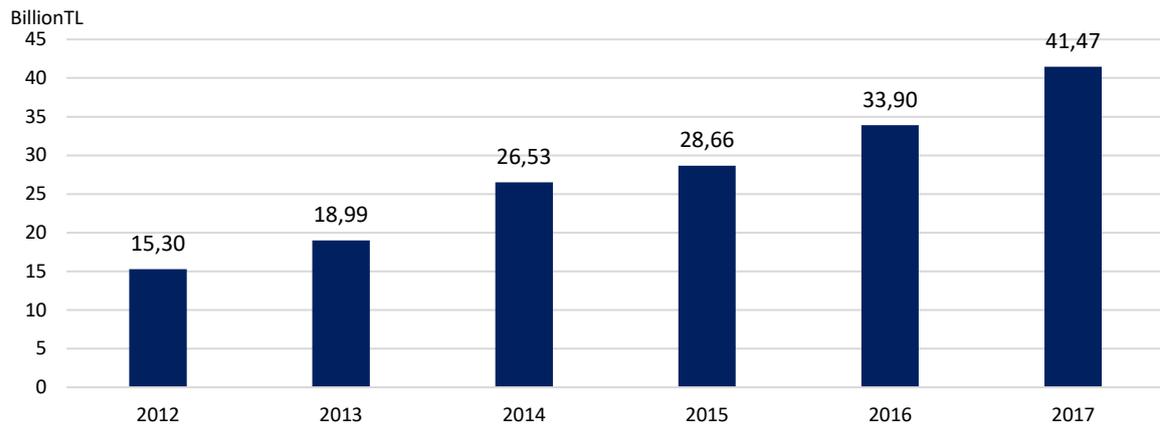


Figure 19: Day Ahead Market Annual Transaction Volume

Annual transaction volume was 41,47 billion TL with an increase of 22,34% in comparison to previous year in Day Ahead Market in 2017.

2.16. Average Number of Submitted Orders

Yearly average number of submitted orders and uplift payment amount made, since deployment of in-house developed DAM Web Application and are given below;

Years	Average Number of Hourly Orders	Average Number of Block Orders in Sales Side	Average Number of Block Orders in Purchase Side	Average Number of Flexible Orders	Average Number of Cleared Orders with Uplift Payment Made	Average Uplift Payment Amount (TL)
2016*	15.028,5	128,0	20,1	2,7	4,2	34.012,6
2017	15.590,0	113,0	27,0	2,5	4,1	35.261,1

*Encompassing the period of June 1 – December 31 2016.

Table 5: Average Number of Submitted Orders

2.17. Number of Day Ahead Market Participant Active in Trade

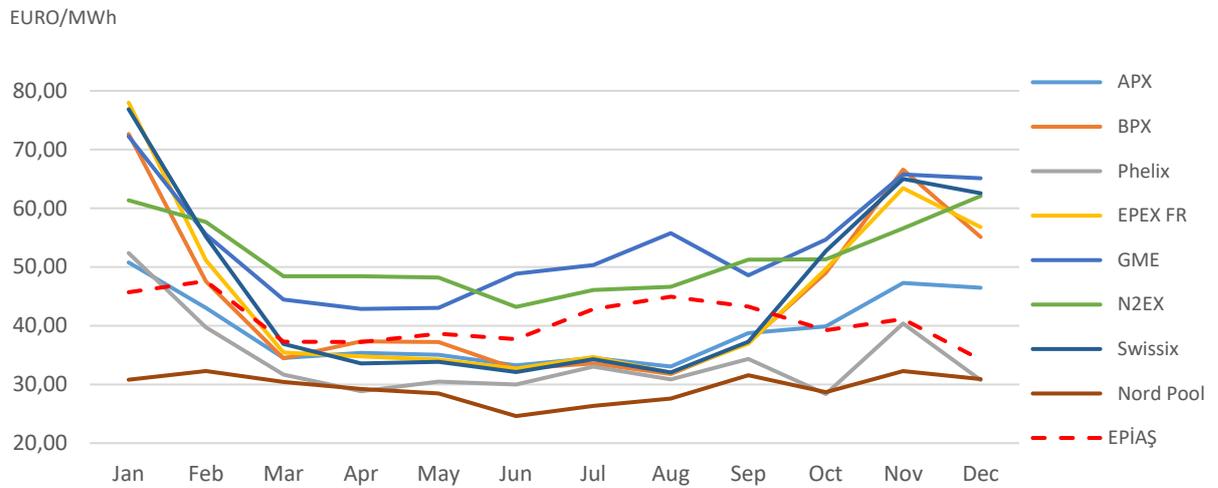
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
687	693	699	707	713	736	729	711	707	713	726	728

Table 6: Number of Day Ahead Market Participant Active in Trade

The average number of participants placed orders at the Day Ahead Market were 712 in 2017

2.18. European Energy Exchanges and EXIST DAM Prices

2.18.1. Central and Western Europe and EXIST Day Ahead Market Prices

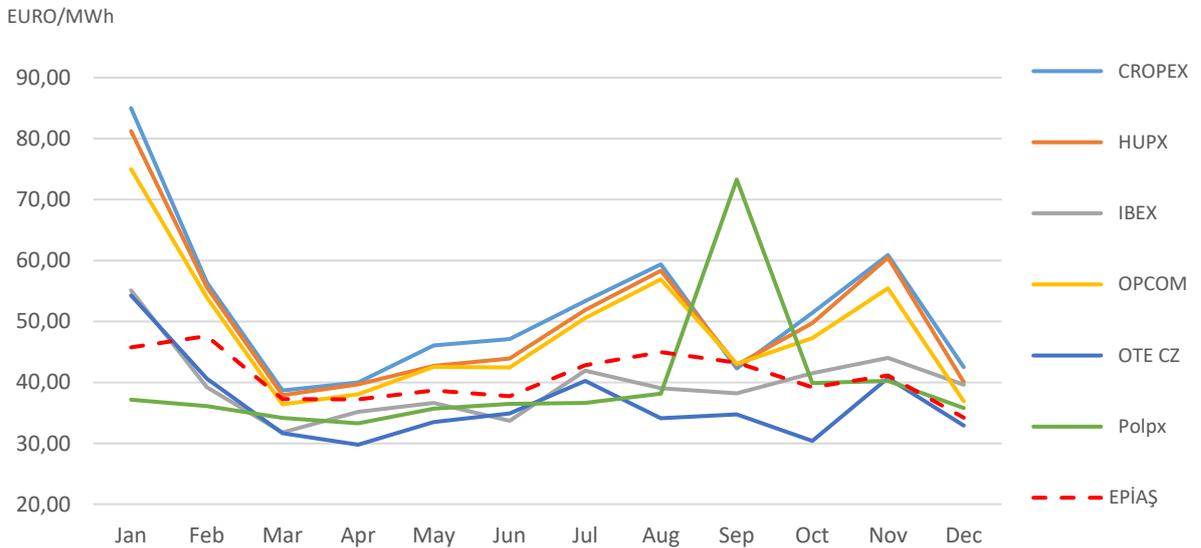


*Source: Montel-Foreks

* Exchange rate data: Central Bank of the Republic of Turkey.

Figure 20: Central and Western Europe and EXIST Day Ahead Market Prices

2.18.2. Eastern Europe and EXIST Day Ahead Market Prices



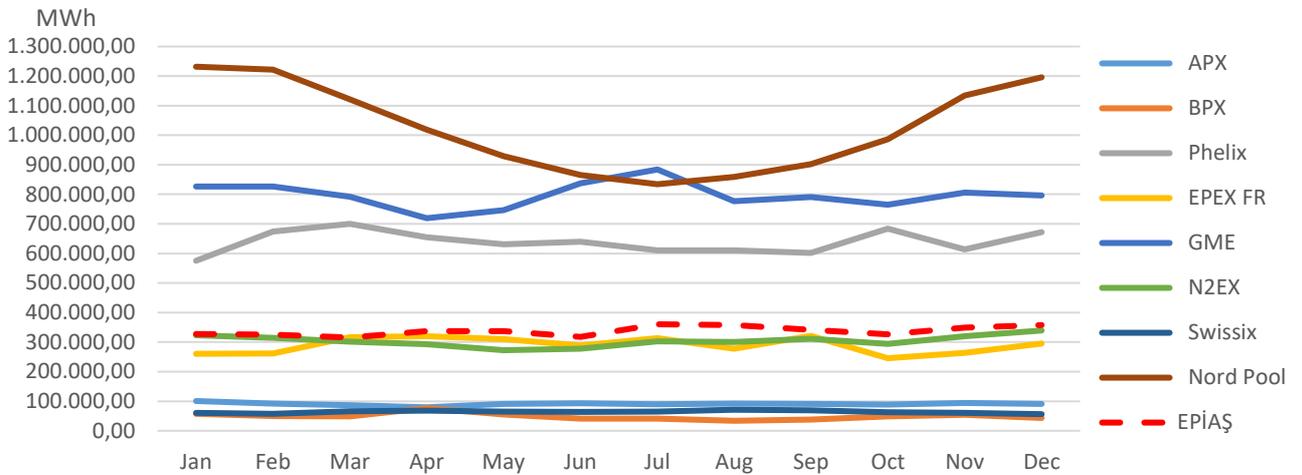
*Source: Montel-Foreks

* Exchange rate data: Central Bank of the Republic of Turkey.

Figure 21: Eastern Europe and EXIST Day Ahead Market Prices

2.19. European Energy Exchanges and EXIST DAM Clearing Volumes

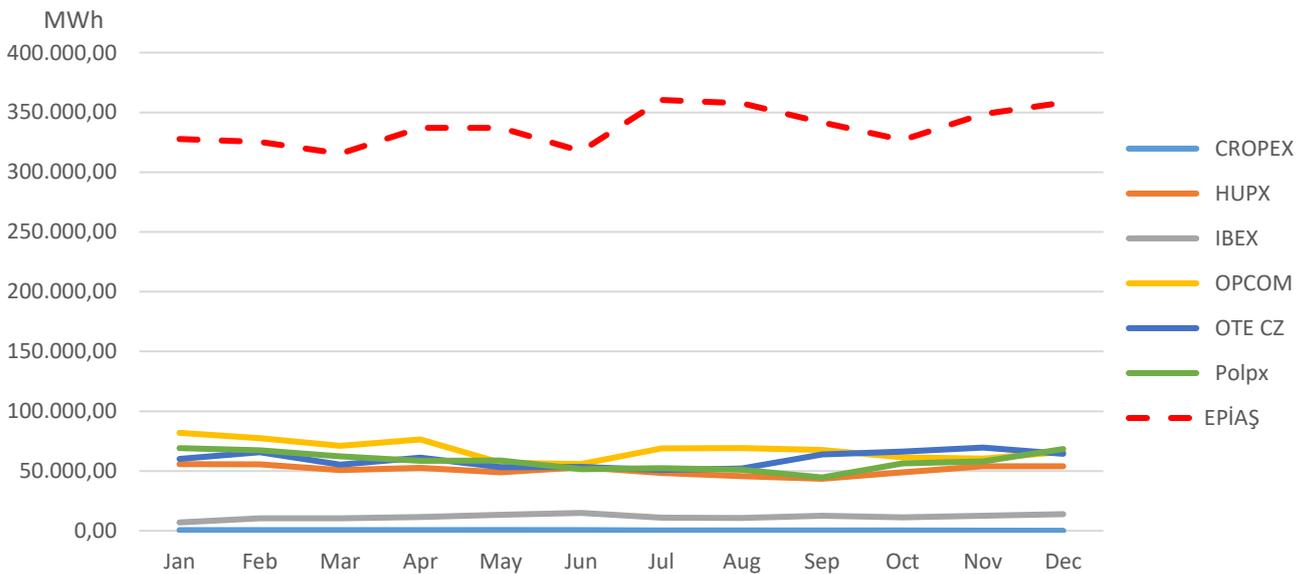
2.19.1. Central and Western Europe and EXIST Day Ahead Market Clearing Volumes



*Source:Montel-Foreks

Figure 22: Central and Western Europe and EXIST Day Ahead Market Clearing Volumes

2.19.2. Eastern Europe and EXIST Day Ahead Market Clearing Volumes



*Source:Montel-Foreks

Figure 23: Eastern Europe and EXIST Day Ahead Market Clearing Volumes



3. Intraday market

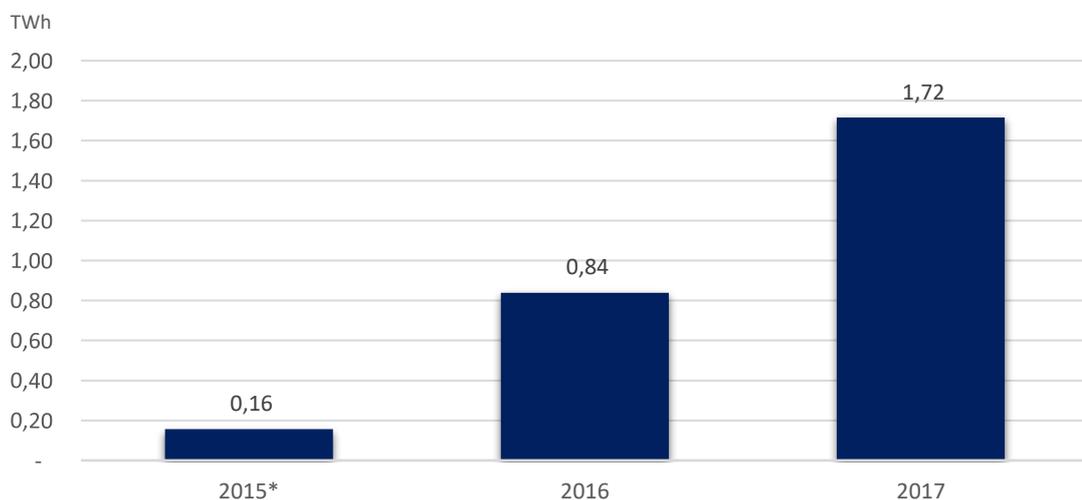
3.1. Updates in Intraday Market in 2017

It was aimed to improve Intraday Market Web Application in 2017 in accordance with feedbacks received from participants for more efficient utilization of Intraday Market.

Intraday Market Web Application, deployed on July 1, 2015 and funded by in-house sources, updates in 2017 are listed below.

- Web service calls in Intraday Market was developed. While web service calls were 120 seconds, it was decreased to 10 seconds.
- To provide better services and improve user friendly interface of intraday market web application, some updates were taken place as follows;
 - It was aimed to minimize order submission errors of users. In this respect, some filtering features were added to intraday market web application as “Make order check with respect to MCP” and “Price deviation with respect to MCP” in addition to “Admin and user limits”.
 - Upper limit of price were 9.999 TL/MWh and it was changed as 2.000 TL/ MWh. Upper limit of order volume was 99.999 Lot and it was changed as 20.000 Lot in intraday web application.

3.2. Annual Traded Volume of Intraday Market



* Encompassing the period of July 1 – December 31 2015

Figure 24: Annual Traded Volume of Intraday Market (MWh)

Traded volume of Intraday market increased by 105% in 2017 in comparison to 2016.

3.3. Monthly Traded Volume of Intraday Market, 2016 - 2017

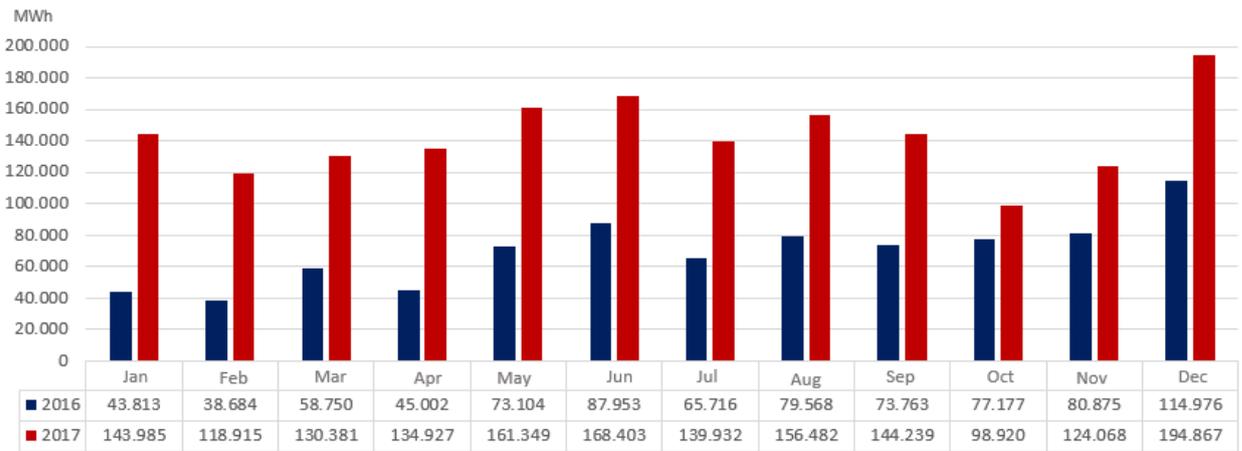


Figure 25: Intraday Market Monthly Traded Volume, 2016 - 2017

Total traded volume of Intraday Market was 1,72 TWh in 2017. The maximum traded volume was 194.867 MWh in December.

The maximum daily traded volume was 11.740 MWh on September 4, 2017, and maximum hourly traded volume was 1.377 MWh at 14:00 on Sunday, December 10.

3.4. Average Hourly Traded Volume of Intraday Market in Total

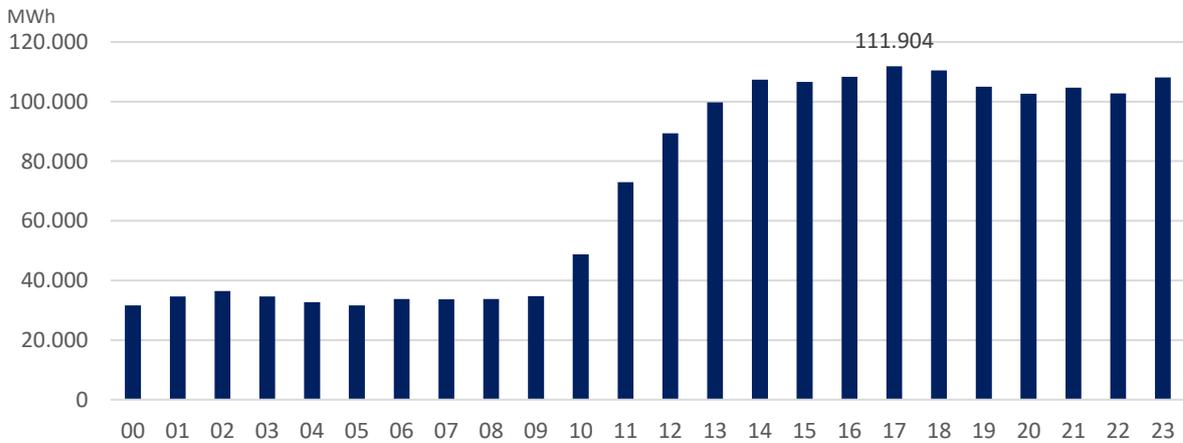


Figure 26: Total Average Intraday Market Traded Volume on hourly basis in 2017

The maximum average traded volume on hourly basis was 111.904 MWh at 17:00 of each trading day in 2017 and minimum average traded volume on hourly basis was 31.604 MWh at 05:00 of each trading day in 2017.

3.5. Number of Intraday Market Participants Active in Trade

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
221	212	232	242	246	259	257	241	234	253	251	272

Table 7: Number of Intraday Market Participants Active in Trade in 2017

243 participants in average were active in Intraday Market trade in 2017.

3.6. Intraday Market Total Purchase Volume per Participant

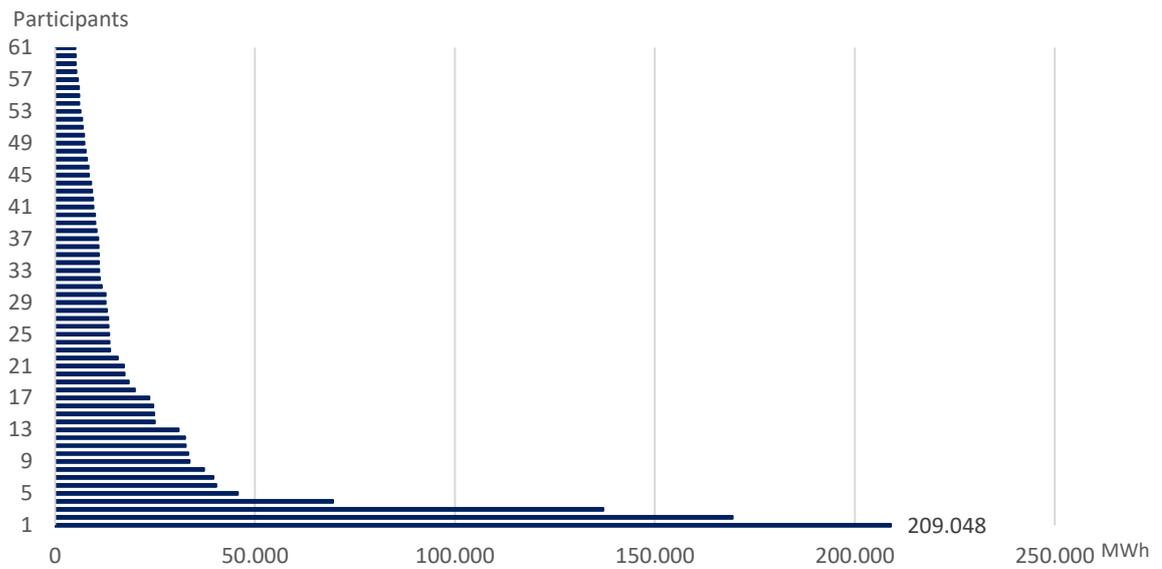


Figure 27: Intraday Market Total Purchase Volume per Participant in 2017

There were 61 market participants whose transactions in purchase side were minimum 5.000 MWh and thus maximum purchase volume was 209.048 MWh by a single participant.

3.7. Intraday Market Total Sales Volume per Participant

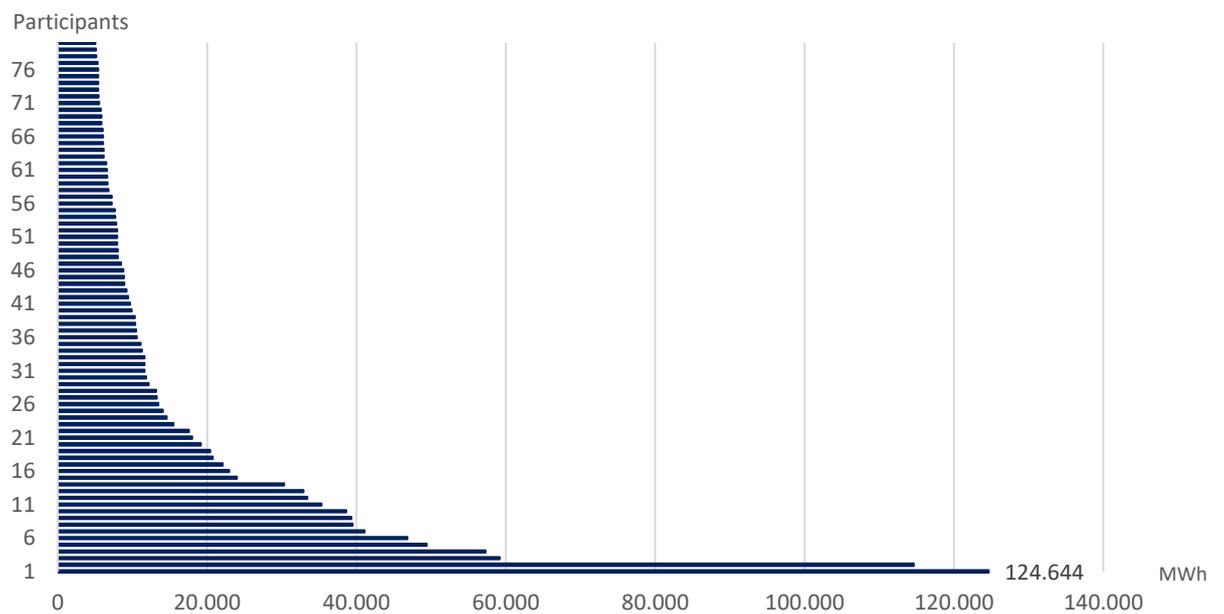


Figure 28: Intraday Market Total Sales Volume per Participant in 2017

There were 80 market participants whose transactions in sales side were minimum 5.000 MWh and thus maximum sales volume was 124.644 MWh by a single participant.

3.8. Monthly Intraday Market Weighted Average Price, MCP and SMP

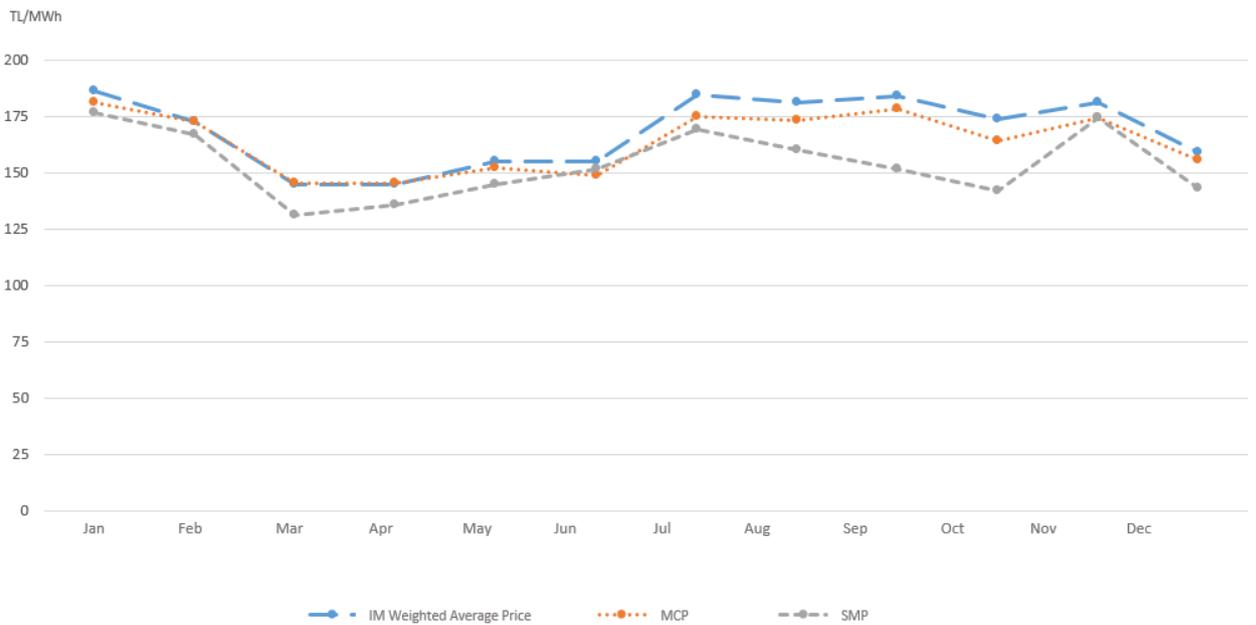


Figure 29: IM Weighted Average Price, MCP and SMP on a monthly basis in 2017

Monthly weighted average price of intraday market was higher than average MCP and SMP for almost every month of 2017 except for February, March, and April. The biggest difference between weighted average price of intraday market and MCP took place in July.

3.9. Total Number of Orders in Intraday Market

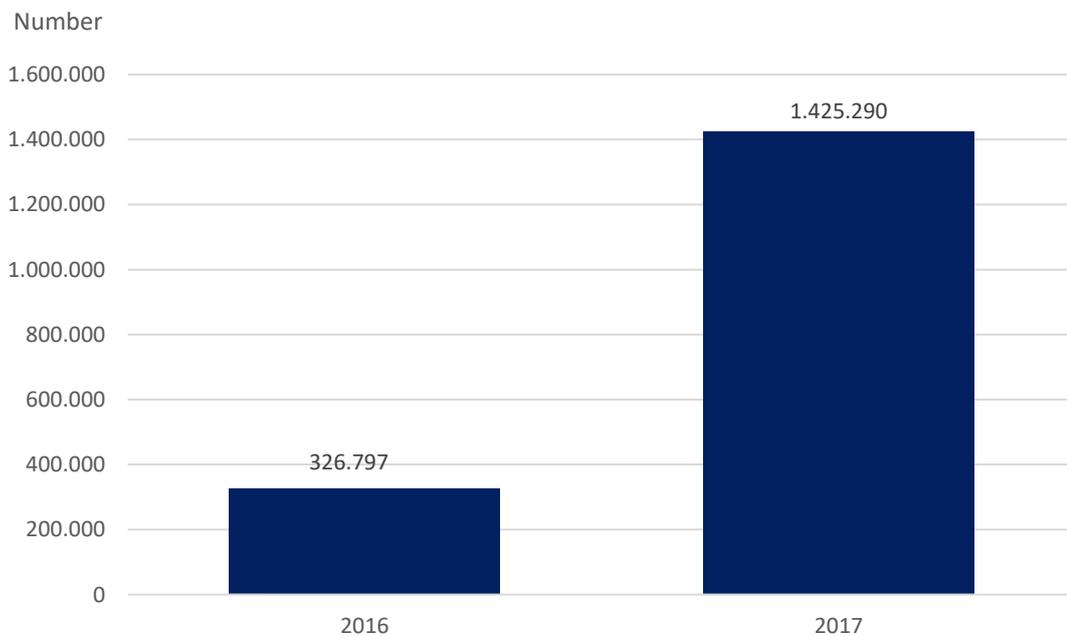


Figure 30: Total Number of Orders in Intraday Market for 2016-2017

Number of orders increased by 336% in 2017 in comparison to previous year.

3.10. Annual Total Number of Bids-Offers in Intraday Market

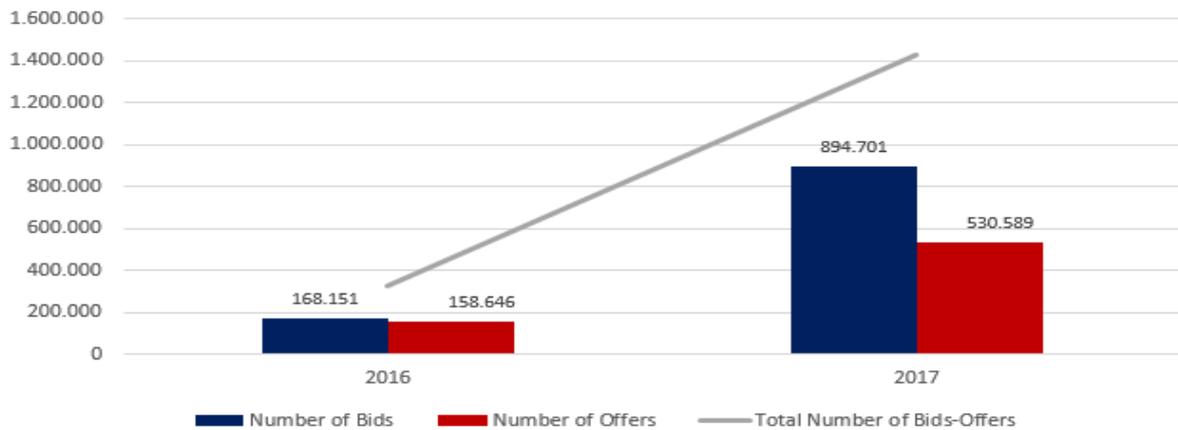


Figure 31: Annual Total Number of Bids-Offers in Intraday Market

62,7 % of 1.425.290 orders were in purchase side and 37,3 % of 1.425.290 orders were in sale side in 2017.

Option	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IoC	23	64	18	6	18	27	8	9	3	12	1	52
FoK	2	18	47	40	1	8	3	0	3	4	2	1
Total	25	82	65	46	19	35	11	9	6	16	3	53

Tablo 8: Monthly Numbers of IoC-FoK

IoC option was used for 0,02 % of 1.425.290 orders, whereas FoK option was used for 0,01% of 1.425.290 orders in 2017.

Y/M	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016	14.178	12.229	25.301	15.928	27.020	33.383	27.809	30.767	32.116	33.792	33.786	40.488
2017	46.524	43.139	66.187	62.971	69.821	77.328	114.221	213.476	116.536	154.061	128.573	332.453

Tablo 9: Monthly Number of Orders, 2016-2017

3.11. Number of Submitted and Matched Orders in Intraday Market

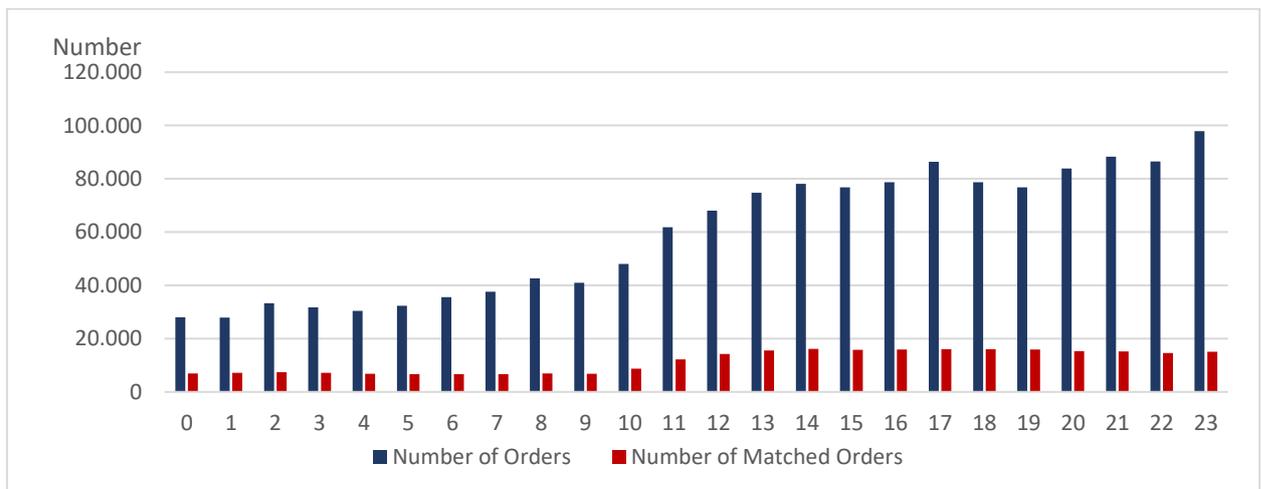
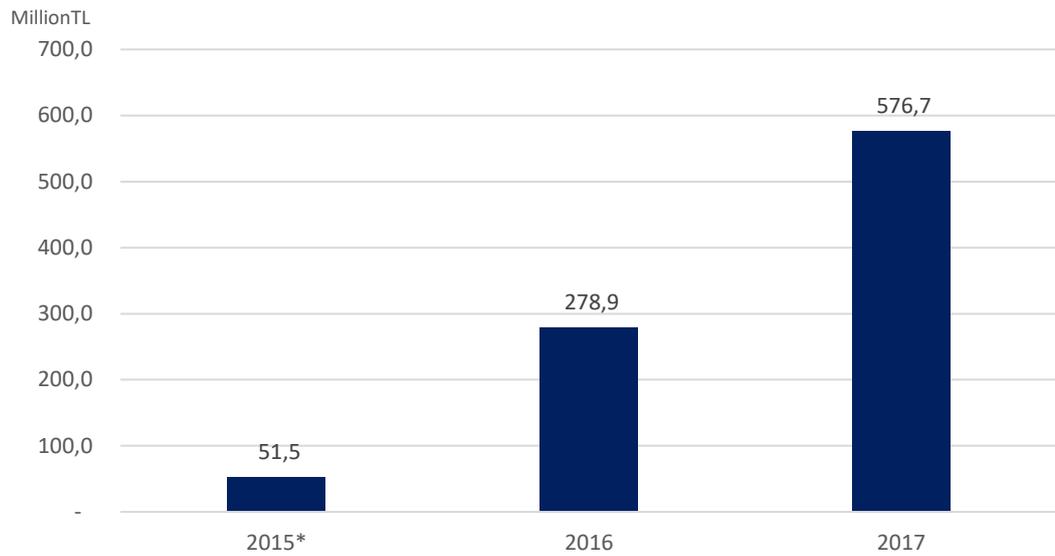


Figure 32: Number of Submitted and Matched Orders in 2017

19,38% of orders matched in 2017.

3.12. Annual Traded Volume of Intraday Market



*Encompassing period of June 1– December 31, 2015.

Figure 33: Annual Traded Volume in 2017

3.13. Monthly Traded Volume of Intraday Market

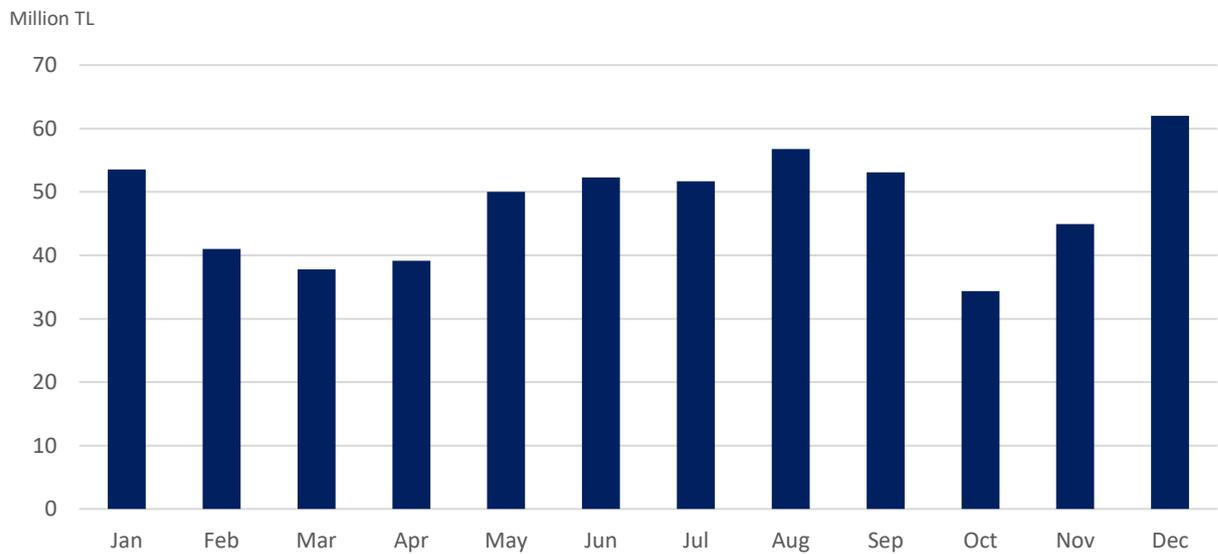


Figure 34: Monthly Traded Volume in 2017

Total traded volume of intraday market was 576 million TL in 2017.



4. Market Volume

4.1. Monthly Volume of Electricity Market

Month	Total BC	BCs between Private Entities	EÜAŞ BC Sales	TETAŞ BC Sales	Other Public BCs	DAM Cleared Volume	IM Traded Volume	BPM Volume	Total Market Volume
Jan	27.081.660	11.246.275	4.148.195	10.387.191	1.300.000	10.158.328	143.985	2.889.162	40.273.135
Feb	23.921.910	10.273.693	3.243.316	9.004.901	1.400.000	9.105.614	118.915	2.041.987	35.188.426
Mar	23.711.640	10.516.899	2.557.544	9.087.198	1.550.000	9.779.670	130.381	1.613.735	35.235.426
Apr	23.304.347	10.457.476	2.925.098	8.421.774	1.499.999	10.110.473	134.927	1.494.761	35.044.508
May	23.313.139	10.265.081	2.964.477	8.533.581	1.550.000	10.450.372	161.349	1.515.278	35.440.137
Jun	23.492.402	9.745.455	3.080.821	9.166.126	1.500.000	9.527.884	168.403	1.581.120	34.769.809
Jul	28.034.226	11.305.257	4.234.718	10.888.957	1.605.294	11.171.912	139.932	1.706.370	41.052.439
Aug	30.108.935	12.464.274	4.682.847	11.310.984	1.650.830	11.082.791	156.482	1.451.146	42.799.355
Sep	25.642.330	11.655.056	2.967.553	9.412.561	1.607.160	10.246.487	144.239	1.230.387	37.263.443
Oct	23.547.252	10.350.754	2.157.347	9.121.543	1.917.608	10.131.302	98.920	1.275.814	35.053.288
Nov	24.070.139	10.341.029	2.404.380	9.262.034	2.062.696	10.457.865	124.068	1.666.025	36.318.097
Dec	27.948.961	10.833.230	3.876.445	11.097.161	2.142.125	11.101.757	194.867	1.577.263	40.822.848
Total	304.176.941	129.454.479	39.242.741	115.694.011	19.785.710	123.324.453	1.716.469	20.043.048	449.260.911

Table 10: Electricity Market Volume on a monthly basis in 2017

The highest market volume of bilateral contracts took place as 30.108.935 MWh and the highest bilateral sales contract volume of EÜAŞ was 4.682.847 MWh in August.

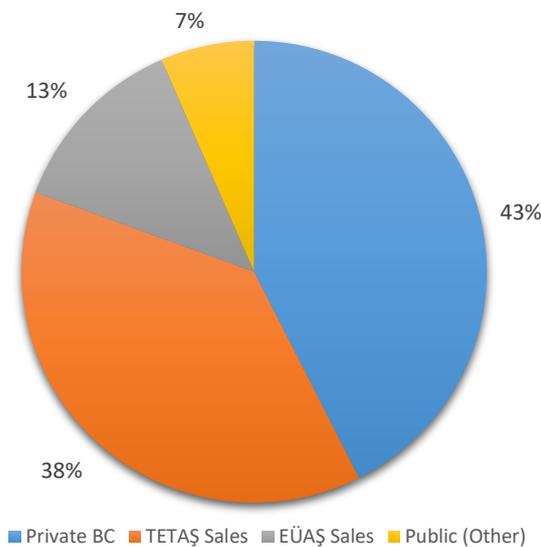


Figure 36: Volumes of Bilateral Contracts on annual basis

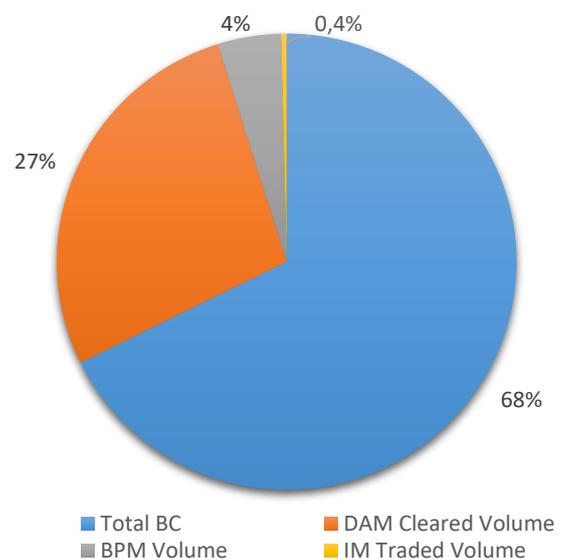


Figure 35: Market Volume on annual basis

- Total BC: Sum of bilateral contract volume in purchase or sales side,
- Private BC: Sum of bilateral contract volume between private entities,
- Public (Other): Difference between TETAŞ BC purchase volume and EÜAŞ BC sales volume,
- DAM Cleared Volume: Cleared sales volume of DAM,
- IM Traded Volume: Traded sales volume of IM,
- BPM Volume: Sum of executed up and down regulation volume.



5. Balancing Powers Market

5.1. Monthly Average MCP-SMP

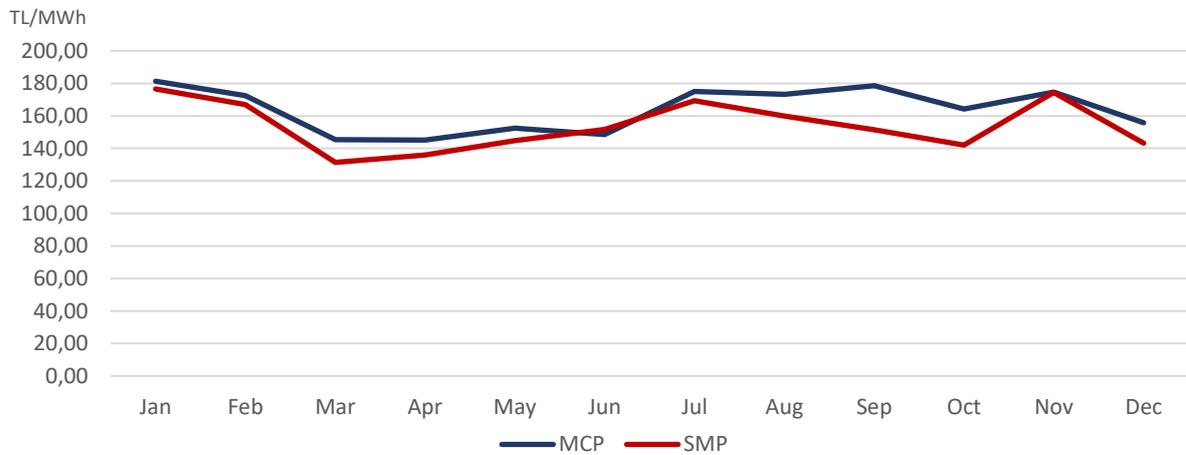


Figure 37: Average MCP-SMP on a monthly basis

Average System Marginal Price was lower than Average Market Clearing Price on a monthly basis in 2017.

The highest System Marginal Price was 176,66 TL/MWh and the highest Market Clearing Price was 181,32 TL/MWh in January, 2017. The lowest System Marginal Price was 131,38 TL/MWh in March, 2017.

5.2. Hourly System Marginal Prices

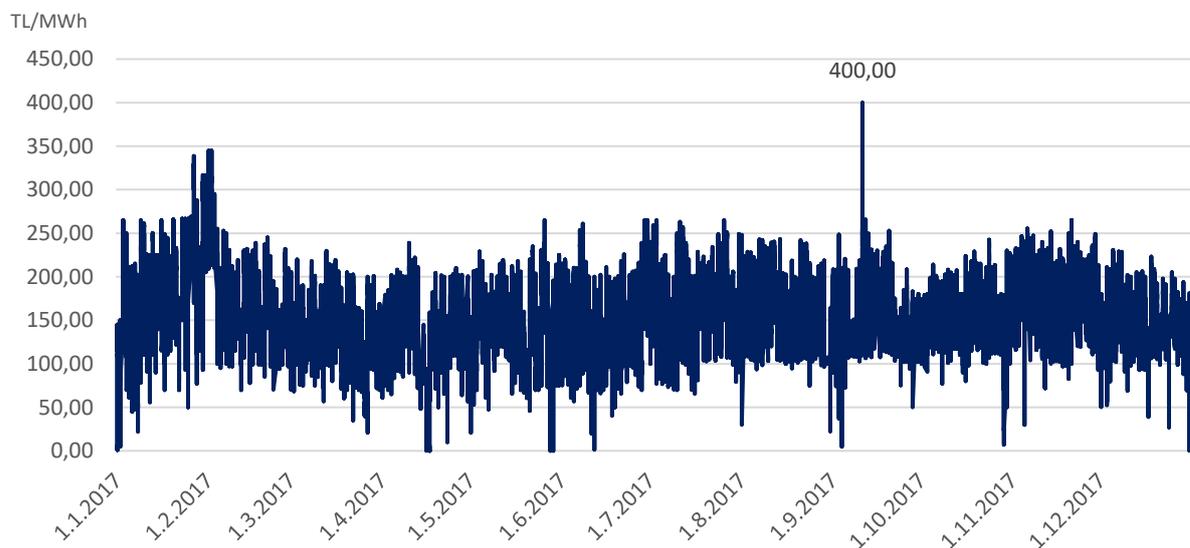


Figure 38: SMP on hourly basis

Daily average of SMP was 153,88 TL/MWh in 2017. The highest SMP was 400 TL/MWh at 14:00 on Monday, September 11, 2017.

5.3. Hourly Difference between MCP and SMP

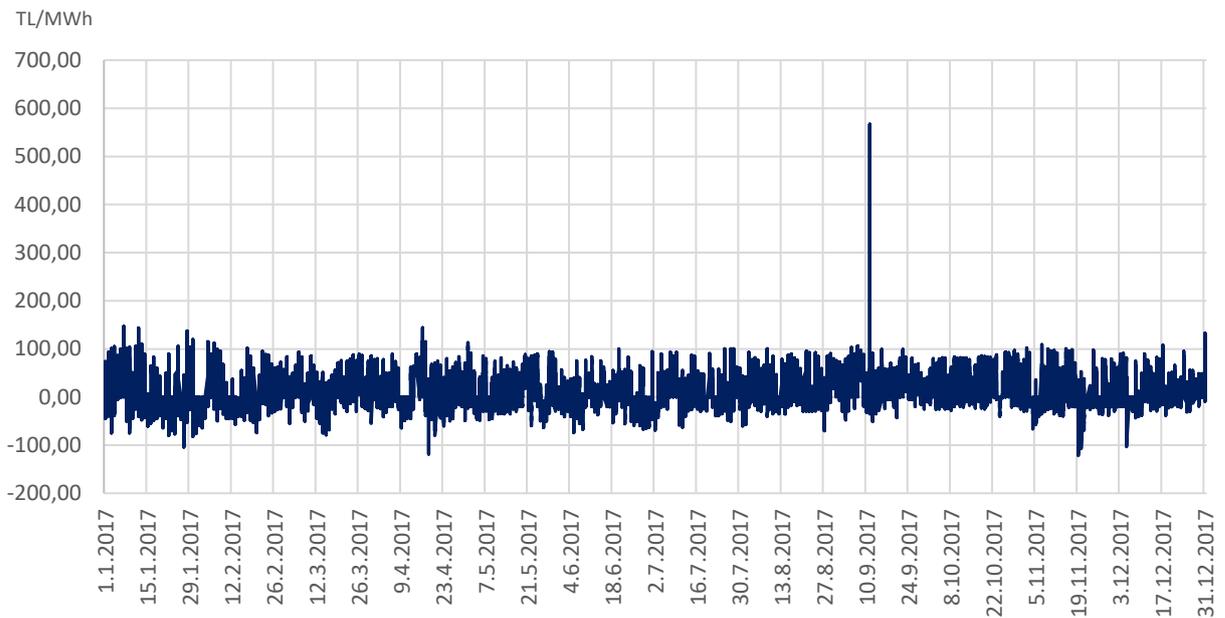


Figure 39: Difference between MCP and SMP on hourly basis

The highest difference between MCP and SMP was 567,15 TL/MWh at 14:00 on Monday, September 11, 2017. The highest difference between SMP and MCP was 121,78 TL/MWh at 23:00 on Monday, November 19, 2017.

5.4. Monthly Volumes of 0 - 1 - 2 Coded Regulations

System Direction Months/Reg. Code	Up			Down		
	0	1	2	0	1	2
January	437.589	1.051.256	45.838	549.975	223.187	596.675
February	934.319	208.506	7.280	70.854	255.735	578.306
March	639.149	124.971	16.808	136.054	82.963	625.417
April	722.457	2.025	45.032	116.124	40.073	580.824
May	799.719	11.363	9.776	102.360	8.248	586.447
June	917.817	1.048	38.242	68.904	4.971	559.772
July	1.028.598	4.890	860	82.803	847	594.571
August	767.940	9.650	0	53.448	9.748	611.801
September	522.623	612	1.565	78.694	356	635.140
October	566.116	192	16.960	54.804	846	647.182
November	1.008.348	0	7.041	18.232	2.480	640.165
December	611.669	185.978	4.431	129.329	324	657.234

Table 11: 0 - 1 - 2 Coded Regulation Volume on a monthly basis

The highest total number of up-down regulation took place in January, 2017. The lowest number of up regulation occurred in September and the lowest number of down regulation took place in June.

6. Financial Settlement and Registration

EPIAŞ operates the financial settlement of Day Ahead Market, Intraday Market, Balancing Power Market, Energy Imbalances and YEKDEM. These operations are performed in a fast, secure, transparent manner in accordance with Balancing and Settlement Regulation and EPIAŞ does not incur any profit/loss during financial settlement operations.

The settlement of Day Ahead Market and Intraday Market are performed considering purchase and sales amount on a daily basis. Here, the participants' calculation of uplift, debt and receivable advances are proceeded on a daily basis.

In addition to financial settlement, minimum collateral amount, imbalance collateral, collateral amount required for Day Ahead Market transactions, collateral amount required for Intraday Market transactions and risk collateral are calculated and announced.

At the end of each month, final up-down regulation volumes which are in scope of Balancing Power Market, are calculated. Moreover, final up-down regulation volumes for each participant in BPM are determined on a monthly basis and receivable and payable for each participant are calculated based on up-down regulation offer prices are being calculated. In case commitment of regulation are not realized, associated extra cost is being calculated and participant is being informed

6.1. SBDT (Residual Balance Adjustment Amount)

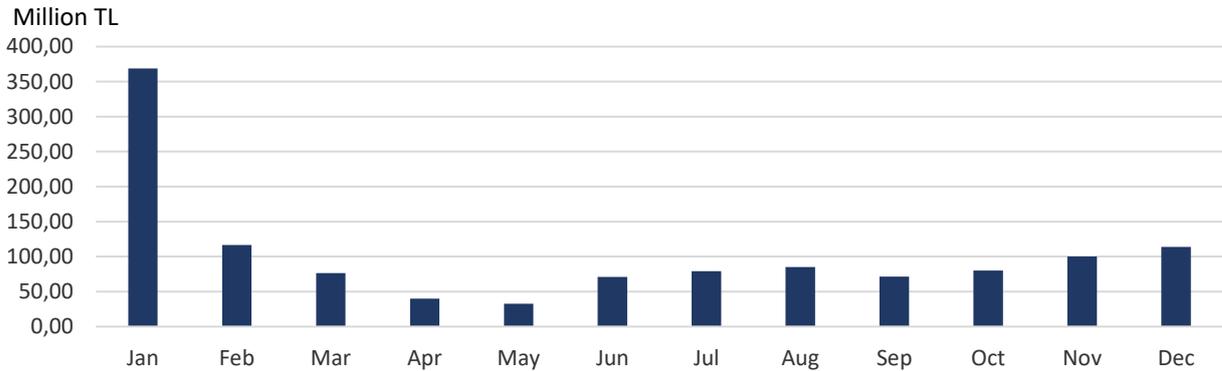


Figure 40: Residual Balance Adjustment Amount on a monthly basis

TEİAŞ is liable for SBDT resulted from transactions of BPM, Energy Imbalances and Retroactive Adjustment and monthly proportion of net consumption. Changes in SBDT are shown in Figure 40 on a monthly basis.

6.2. İSKK (Transmission System Loss Coefficient)

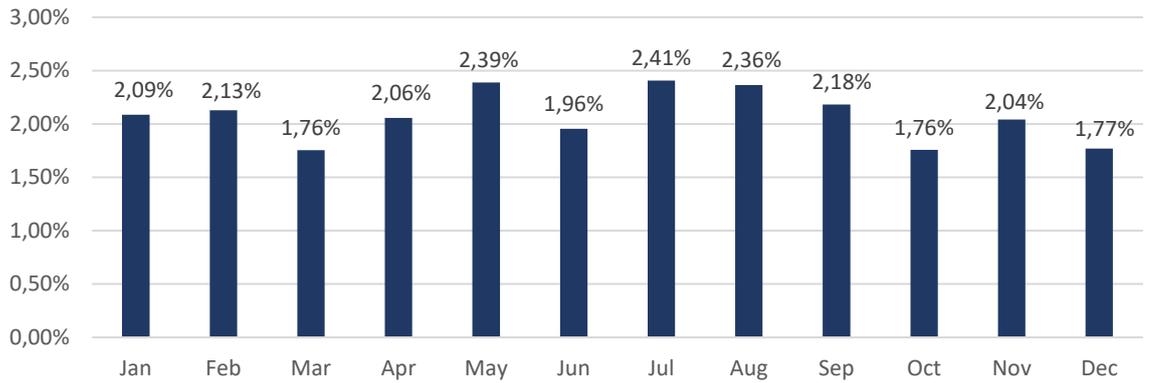


Figure 41: Transmission System Loss Coefficient on a monthly basis

Transmission System Loss Coefficient for 2017 is given in Figure 43 on a monthly basis.

6.3. YEKDEM

6.3.1. Total YEKDEM Payment

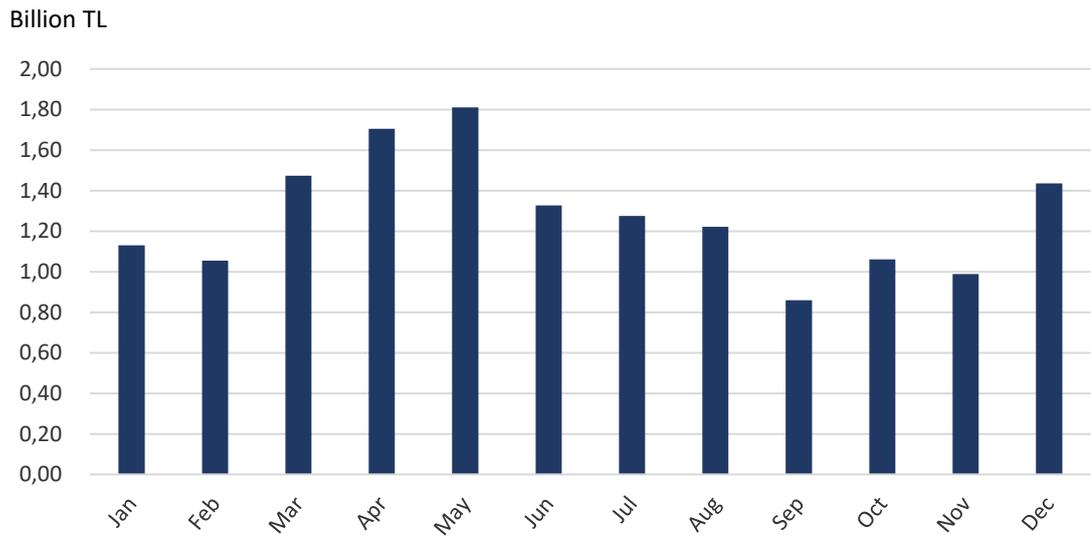


Figure 42: Total Payment to YEKDEM Participants in 2017

The changes in total payment made YEKDEM participant are shown in Figure 42 on a monthly basis.

6.3.2. Unit Costs of YEKDEM

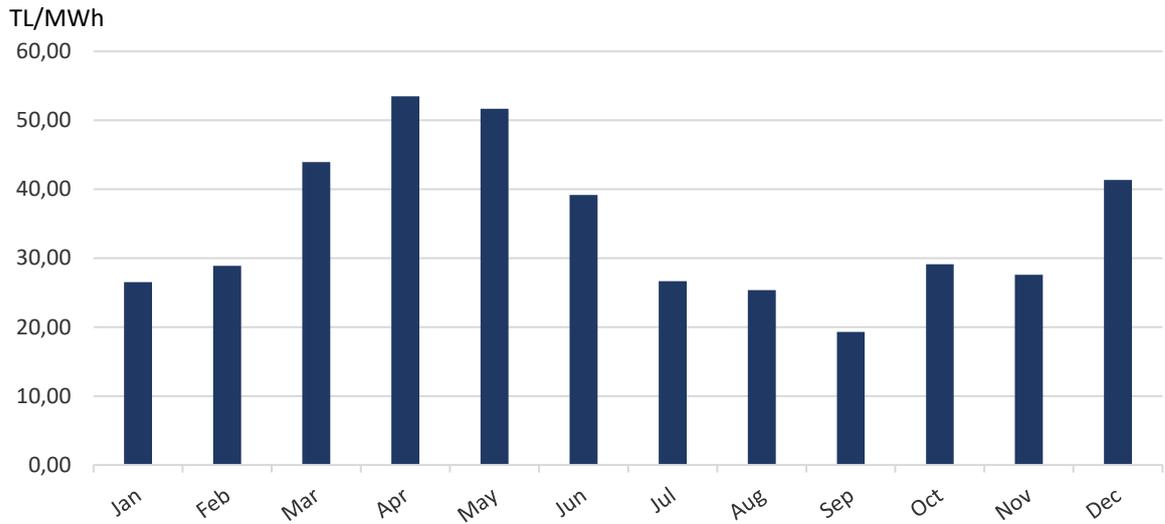


Figure 43: Unit Cost of YEKDEM

After YEKDEM settlement, monthly average unit costs per MWh that are liable for participants, are shown in Figure 43 above. The highest unit cost of YEKDEM per MWh took place in April, whereas the lowest unit cost of YEKDEM per MWh occurred in September.

6.4. Total BPM Amount

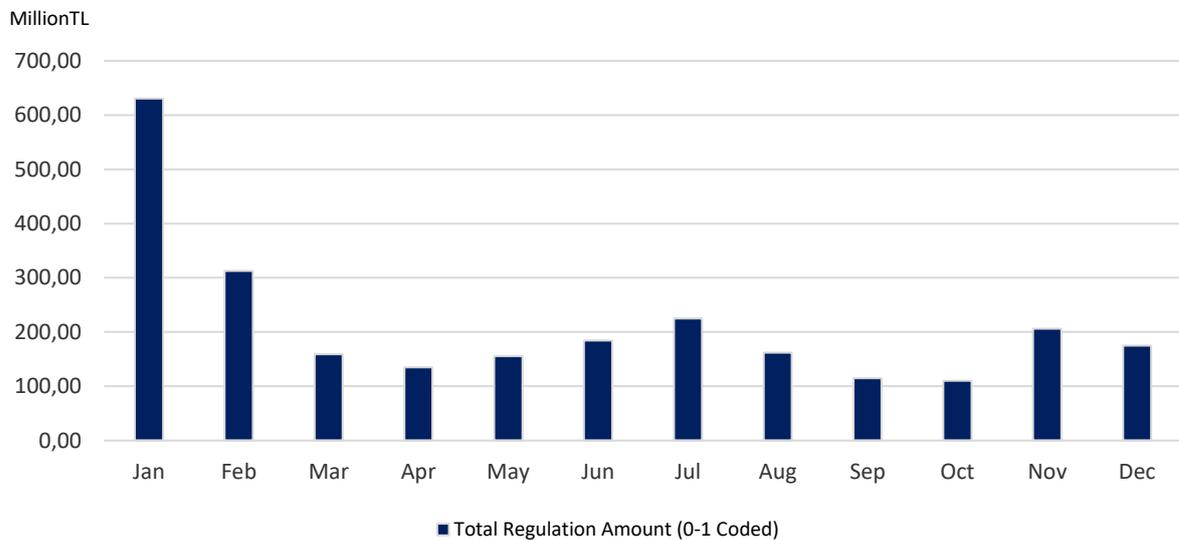


Figure 44: Total BPM Amount in 2017

Total calculated amount of Balancing Power Market for 2017 is shown in Figure 44.

6.5. Imbalance

6.5.1. Total Volume of Energy Imbalances

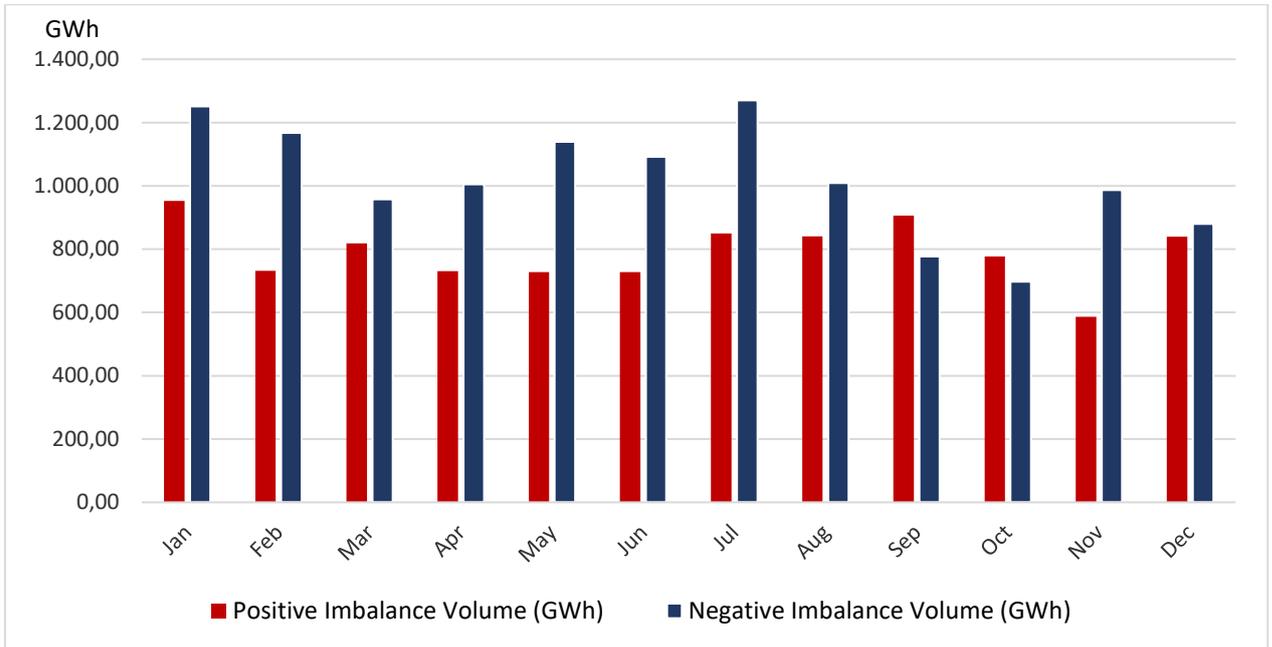


Figure 45: Total Energy Imbalances Volume in 2017

The highest imbalance volume was in January, whereas the lowest imbalance volume was in October for 2017.

6.5.2. Total Amount of Energy Imbalance

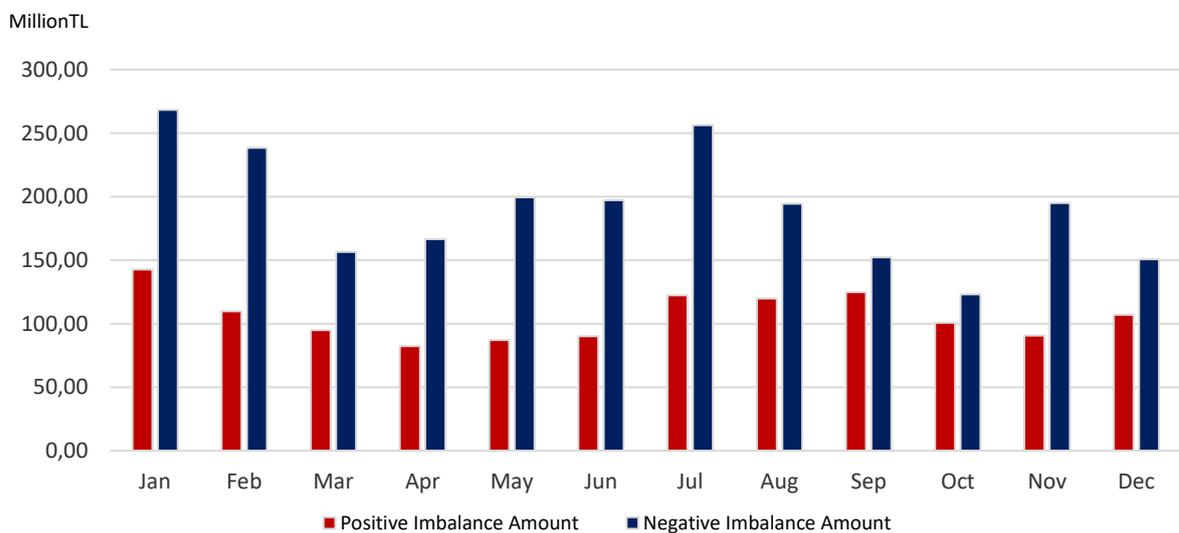


Figure 46: Total Energy Imbalances Amount in 2017

Monthly distribution of financial amount resulted from imbalances is shown in Figure 46. Monthly settlement of YEKDEM mechanism is announced under YEKDEM payable and receivable bullets.

6.6. Injection Volume (UEVM) – Withdrawal Volume (UEÇM) Basis to Financial Settlement

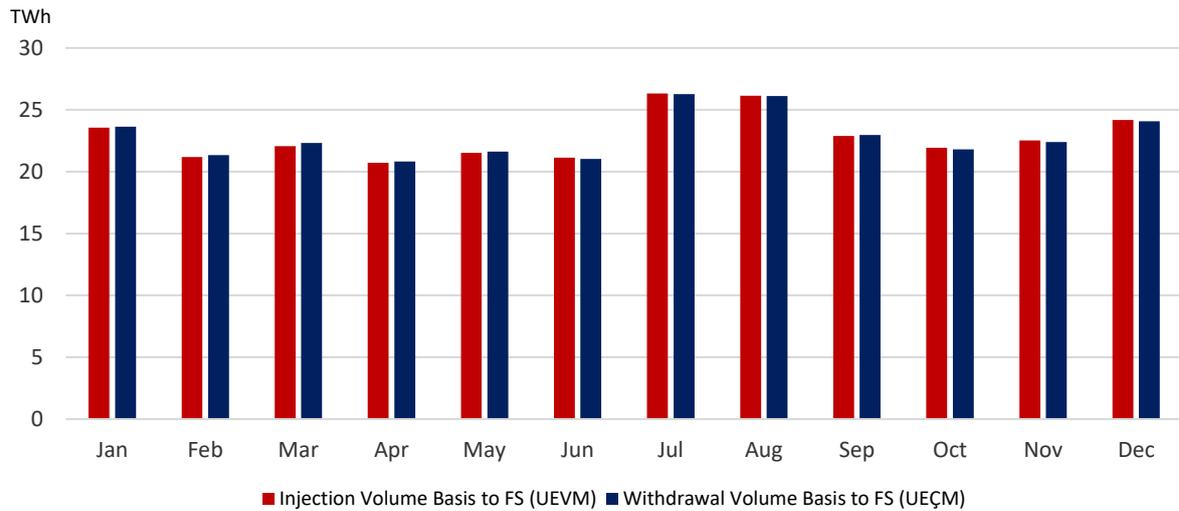


Figure 47: Injection-Withdrawal Volumes Basis to Financial Settlement

Monthly changes in injection and withdrawal volumes basis to financial settlement for 2017 are shown in Figure 47.

6.7. Number of Eligible Customers

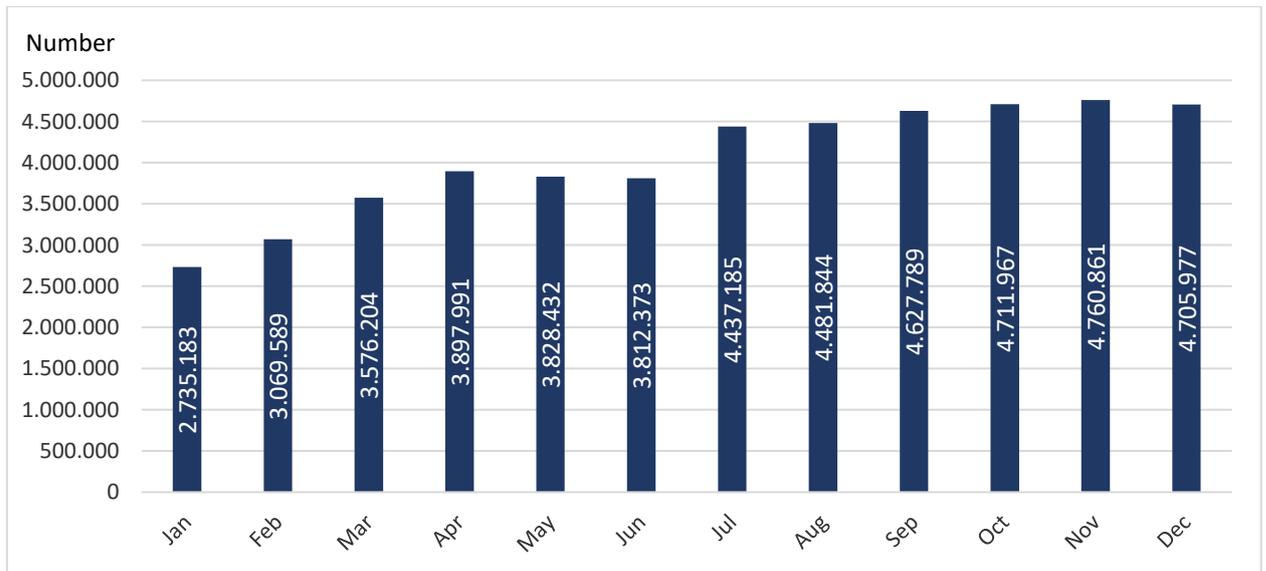


Figure 48: Number of Eligible Customers in 2017

The number of eligible customers are given in Figure 48.

6.8. Number of Market Participants

MONTH	DISTRIBUTION	RETAIL	TRANSMISSION	OSB GENERATION	WHOLESALE	GENERATION	TOTAL
January	21	42	1		152	749	965
February	21	42	1		149	754	967
March	21	42	1	1	148	762	975
April	21	42	1	1	149	765	979
May	21	63	1	1	150	772	1.008
June	21	63	1	1	152	772	1.010
July	21	63	1	1	154	773	1.013
August	21	63	1	1	155	780	1.021
September	21	63	1	1	156	783	1.025
October	21	63	1	1	156	800	1.042
November	21	63	1	1	156	814	1.056
December	21	63	1	1	153	819	1.058

Table 12: Number of Participants on monthly basis

Registration process consists of approval of power plants, participation agreement, registration of participants' legal entities and eligible customers. As such, the number of active participants in market is listed in terms of licenses granted by EMRA.



7. TEİAŞ Data

*This part of market report comprises of data compiled from TEİAŞ and National Dispatch Center Database (YTBS).

7.1. Generation and Consumption, 2016-2017

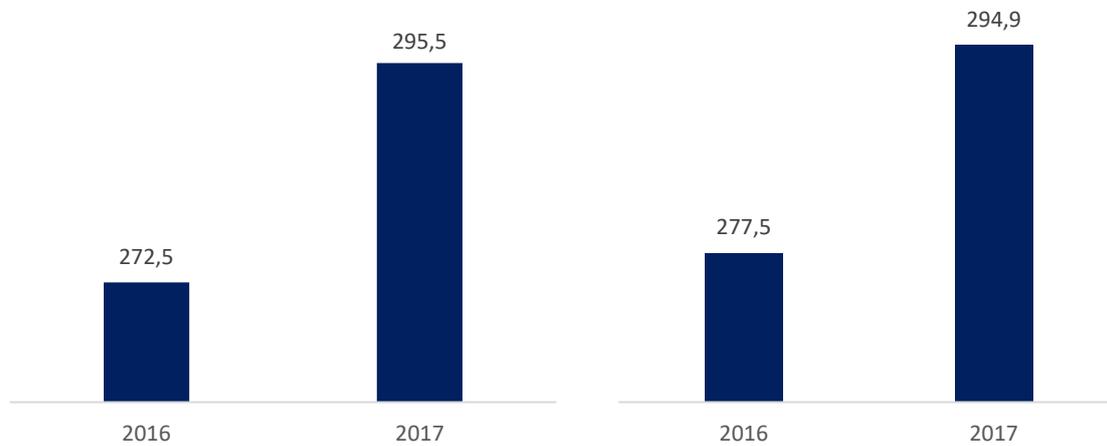


Figure 50: Generation (TWh), 2016-2017

Figure 49: Consumption (TWh), 2016-2017

As seen in Figure 49 and Figure 50, in 2017 generation volume increased by 8,4% and consumption volume increased by 6,3% compared to those of 2016.

7.2. Monthly Generation, 2016-2017

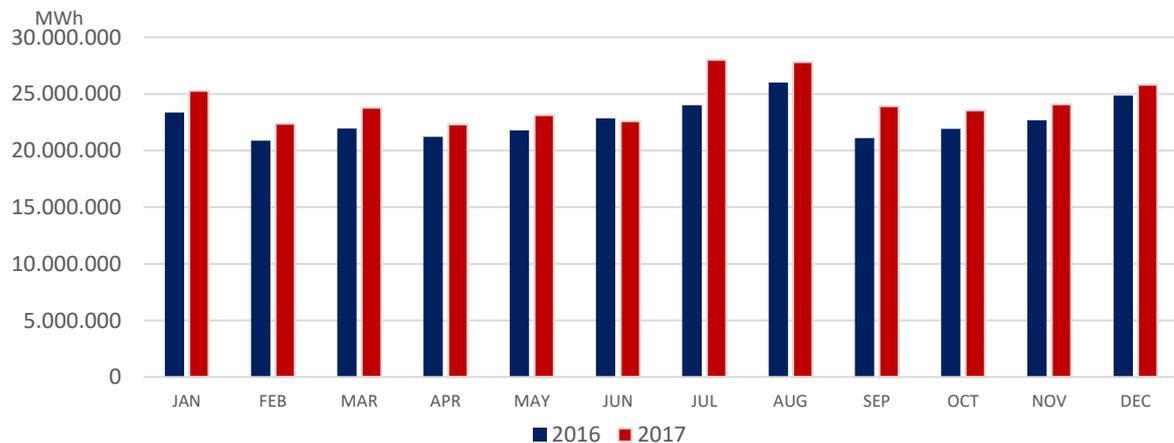


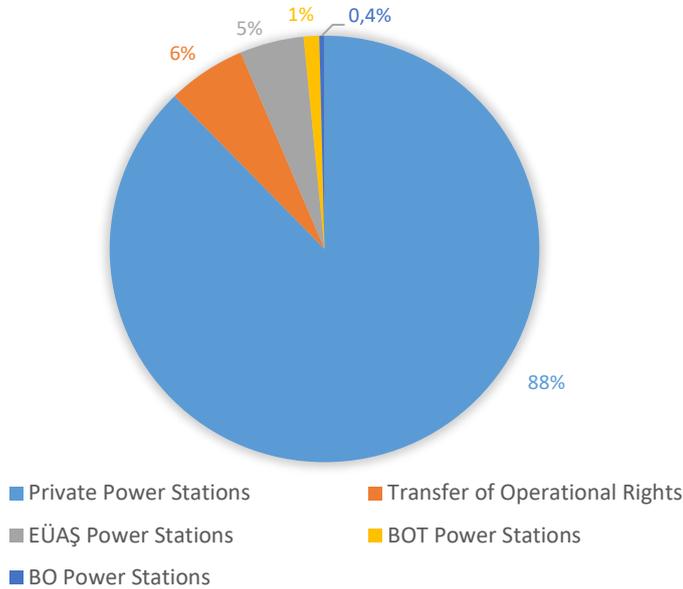
Figure 51: Monthly Generation, 2016 - 2017

Compared to values 2016 vs. 2017;

- The highest increase in generation volume took place in July by 18,1% in 2017.
- The highest monthly power generation was in July, whereas the lowest monthly power generation was in February in 2017. As for power generation by energy source in 2017, natural gas power stations had the greatest portion of generation by 40%, while imported coal power stations was in second place by 18%.

- The highest peak demand was 47.062 MWh at 15:00 on July 26, 2017. The highest instentaneous peak demand was 47.660 MW at 14:40 on July 26, 2017 and lowest instentaneous demand was 18.336 MW at 06:00 on June 26, 2017.

7.3. Number of Power Stations by Electric Utilities

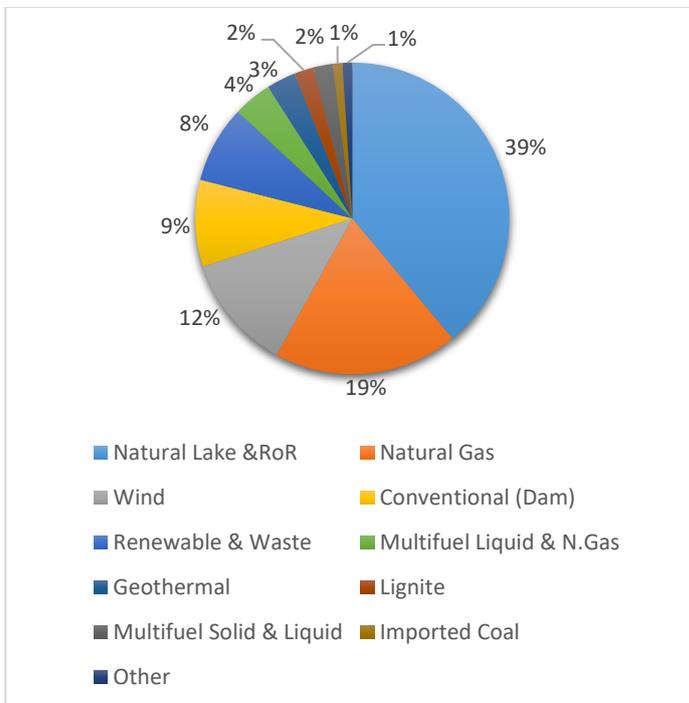


Electric Utilities	Number of Powers Stations
Private Power Stations	1.127
Transfer of Operational Rights	76
EÜAŞ Power Stations	62
BOT	15
BO	5
Unlicensed Power Stations	3.736

Table 13: Number of Power Stations by Electric Utilities in 2017

Figure 52: % of Power Stations by Electric Utilities in 2017

7.4. Number of Power Stations by Energy Source



Grafik 53: % of Licensed Power Stations by Energy Source in 2017

Energy Source	Licensed Stations
RoR & Natural Lake	510
Natural Gas	243
Wind	161
Conventional (Dam)	117
Biomass	99
Multifuel Liquid & N.Gas	47
Geothermal	40
Lignite	27
Multifuel Solid & Liquid	22
Imported Coal-Fired	11
Other	19

Energy Source	Unlicensed Stations
Solar	3.613
Wind	46
Cogeneration	42
Biomass	23
RoR	1

Table 14: Number of Power Stations in 2017

7.5. Installed Capacity by Energy Source

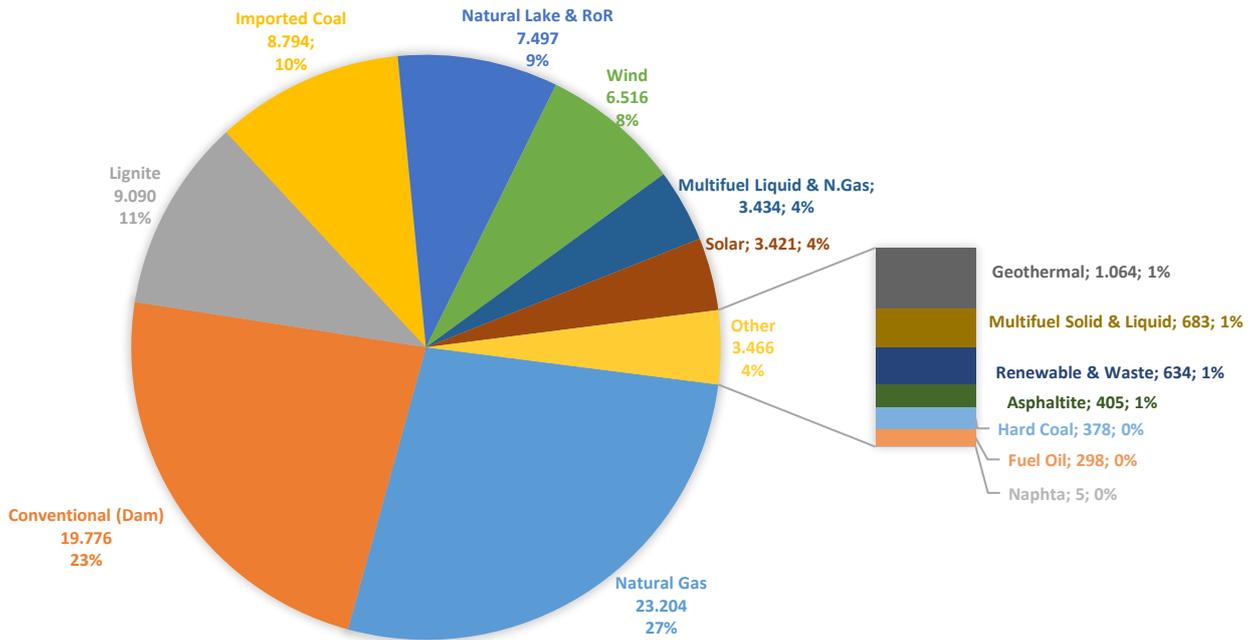


Figure 54: Installed Capacity (MW) by Energy Source in 2017

Turkey's total installed capacity is 85.200 MW, comprised of 81.555 MW licensed and 3.645 MW unlicensed power stations as of January 1, 2018. The installed capacity of power stations benefited from renewable support mechanism is 19.266 MW.

The proportion of power stations based on renewable energy sources in total installed capacity is 43,6%.

Stations generate power with imported coal and wind had the highest increase in installed capacity respectively from 2016 to 2017.

7.6. Installed Capacity by Electric Utilities

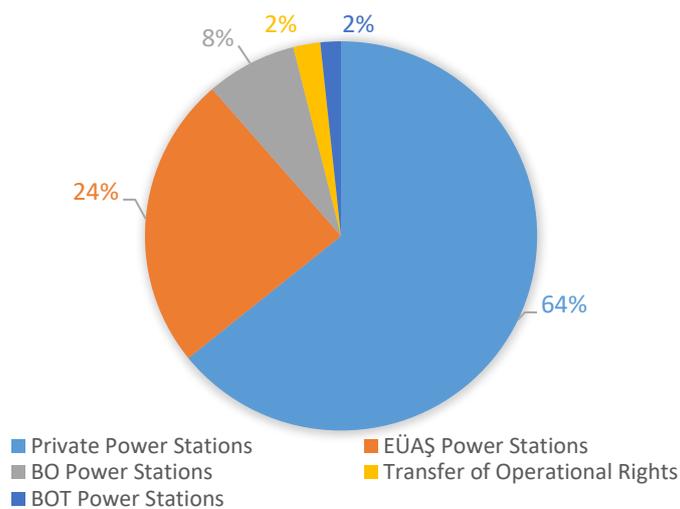


Figure 55: % of Installed Capacity by Licensed Electric Utilities in 2017

Private power stations cover 76,6% of installed capacity state owned public power stations cover 23,4% of installed capacity.

Kuruluş Adı	Kurulu Güç (MW)
Private Power Stations	52.353
EÜAŞ Power Stations	19.900
BO Power Stations	6.102
Transfer of Operational Rights	1.821
BOT Power Stations	1.379
Unlicensed Power Stations	3.645
Total	85.200

Table 15: Installed Capacity by Electric Utilities in 2017

7.7. Electricity Generation Figures, 2016 - 2017

7.7.1. Electricity Generation Figures by Energy Source, 2016 - 2017

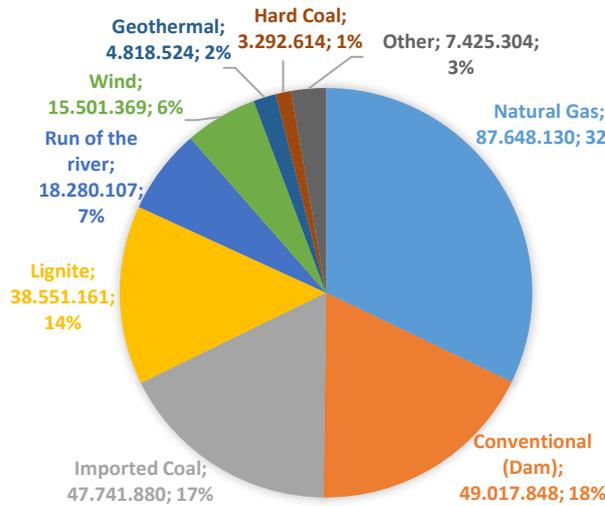


Figure 57: Generation (MWh) by Energy Source in 2016

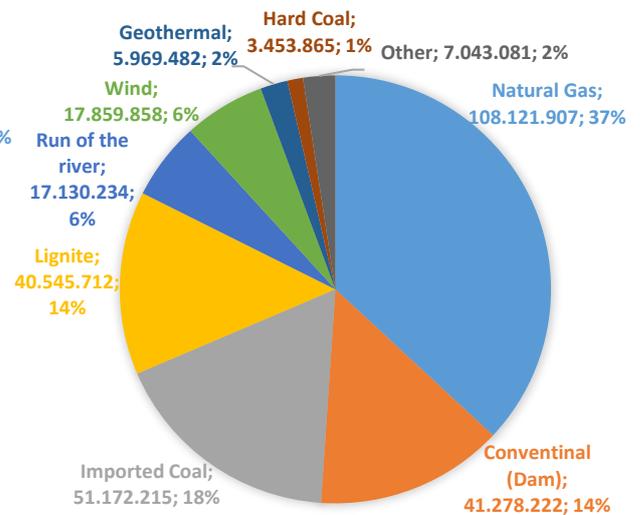


Figure 56: Generation (MWh) by Energy Source in 2017

While generation of natural gas power stations increased by 5% compared to 2016, generation of run of the river power stations decreased by 1% and conventional (dam) power stations decreased by 4% compared to 2016 in 2017.

7.7.2. Generation by Energy Source, 2016 - 2017

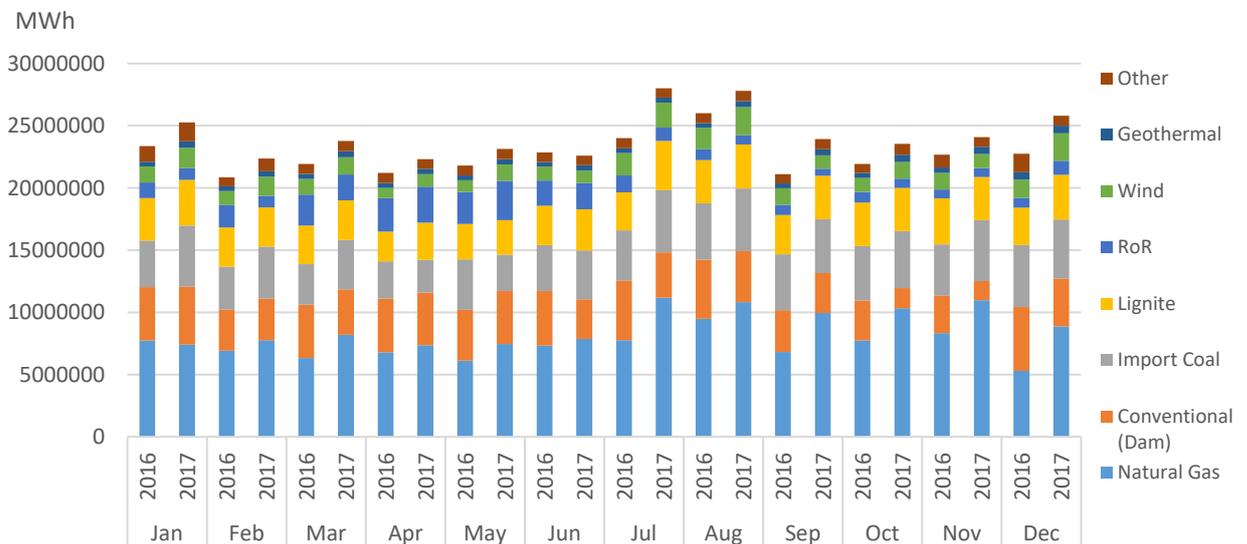


Figure 58: Generation Figures by Energy Sources, 2016-2017

While generation of natural gas power stations increased, generation of conventional (dam) power stations decreased in 2017 comparing to 2016.

7.7.3. Electricity Generation by Electric Utilities in 2017

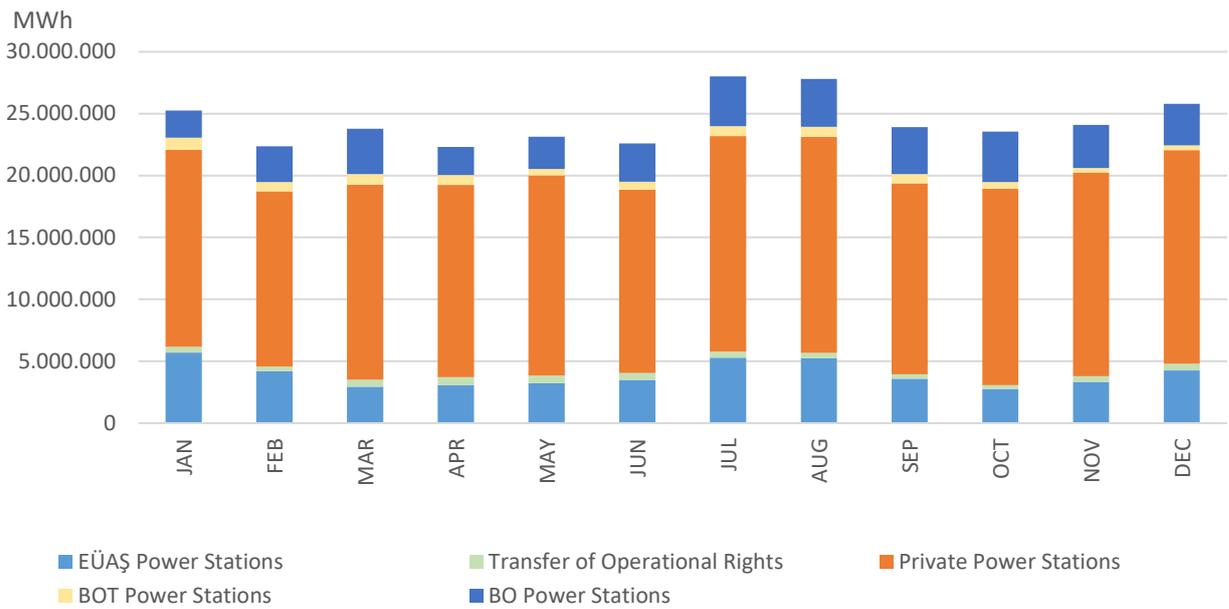


Figure 59: Electricity Generation by Electric Utilities in 2017

Shares of state owned utilities in power generation is 16%, while share of private utilities in power generation is 84% in 2017.

7.8. Annual Electricity Generation by Cities

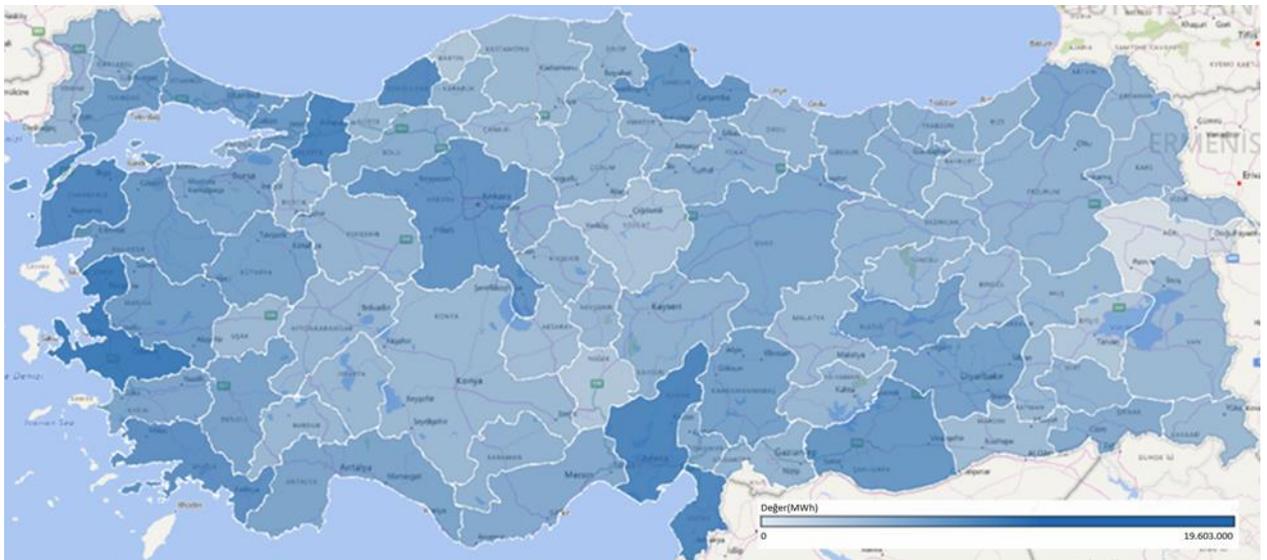


Figure 60: Annual Electricity Generation by Cities in 2017

As for yearly generation figures by cities in Turkey, Izmir, Zonguldak, Adana, Sakarya and Hatay were top five cities in electricity generation respectively.

7.9. Monthly Volumes of Electricity Import-Export

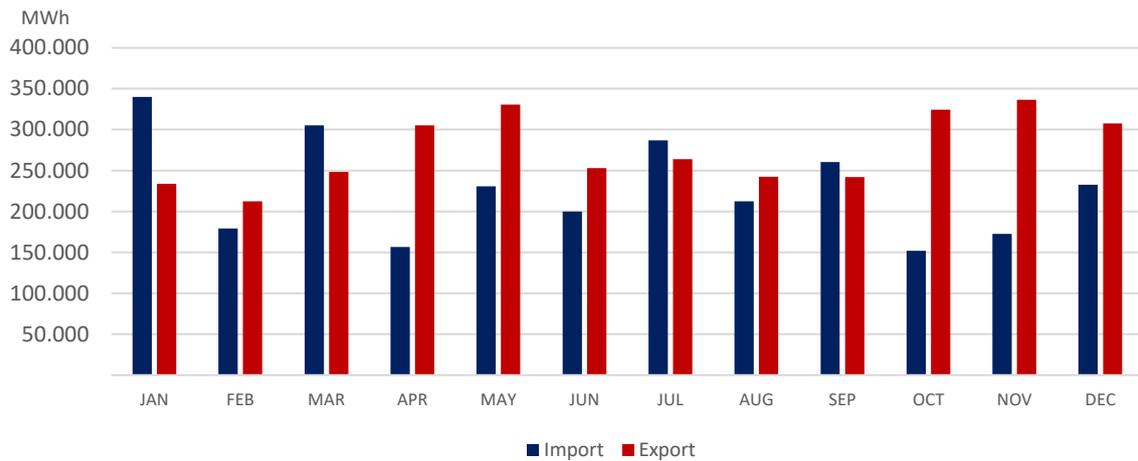


Figure 61: Import-Export of Electricity Trade on a monthly basis in 2017

Total volume of import of electricity was 2.729.061 MWh and total volume of export was 3.300.096 MWh in 2017. During 2017, the largest volume of electricity import was 339.837 MWh in January, whereas the largest volume of electricity export was 336.604 MWh in November.

LIST OF FIGURES

Figure 1: Annual Average Market Clearing Price	10
Figure 2: Monthly Average Market Clearing Price 2016 - 2017	10
Figure 3: Daily Average Market Clearing Price	11
Figure 4: Hourly Market Clearing Price	11
Figure 5: Average Market Clearing Prices on Hourly Basis in 2017	12
Figure 6: Distribution of Market Clearing Price during Weekdays in 2017	13
Figure 7: Hourly Weekend MCP Boxplot Distribution in 2017	14
Figure 8: Yearly Cleared Volumes	15
Figure 9: Cleared Volume on a monthly basis, 2016-2017	15
Figure 10: Cleared Volume on daily basis in 2017	16
Figure 11: Hourly Cleared Volume in 2017	16
Figure 12: Shares of Hourly-Block Orders in Sales Side in 2017	17
Figure 13: Shares of Hourly – Block Orders in Purchase Side in 2017	18
Figure 14: Cleared Hourly-Block Order Sales Volume in 2017	18
Figure 15: Hourly-Block Order Purchase Volume in 2017	18
Figure 16: Submitted-Cleared Block Orders Sales Volume in 2017	19
Figure 17: Submitted-Cleared Block Orders Purchase Volume in 2017	19
Figure 18: Price Independent Orders & Average Cleared Volume on Monthly Basis in 2017	20
Figure 19: Day Ahead Market Annual Transaction Volume	21
Figure 20: Central and Western Europe and EXIST Day Ahead Market Prices	22
Figure 21: Eastern Europe and EXIST Day Ahead Market Prices	22
Figure 22: Central and Western Europe and EXIST Day Ahead Market Clearing Volumes	23
Figure 23: Eastern Europe and EXIST Day Ahead Market Clearing Volumes	23
Figure 24: Annual Traded Volume of Intraday Market (MWh)	25
Figure 25: Intraday Market Monthly Traded Volume, 2016 - 2017	26
Figure 26: Total Average Intraday Market Traded Volume on hourly basis in 2017	26
Figure 27: Intraday Market Total Purchase Volume per Participant in 2017	27
Figure 28: Intraday Market Total Sales Volume per Participant in 2017	27
Figure 29: IM Weighted Average Price, MCP and SMP on a monthly basis in 2017	28
Figure 30: Total Number of Orders in Intraday Market for 2016-2017	28
Figure 31: Annual Total Number of Bids-Offers in Intraday Market	29
Figure 32: Number of Submitted and Matched Orders in 2017	29
Figure 33: Annual Traded Volume in 2017	30
Figure 34: Monthly Traded Volume in 2017	30
Figure 35: Market Volume on annual basis	32
Figure 36: Volumes of Bilateral Contracts on annual basis	32
Figure 37: Average MCP-SMP on a monthly basis	34
Figure 38: SMP on hourly basis	34
Figure 39: Difference between MCP and SMP on hourly basis	35
Figure 40: Residual Balance Adjustment Amount on a monthly basis	36
Figure 41: Transmission System Loss Coefficient on a monthly basis	37
Figure 42: Total Payment to YEKDEM Participants in 2017	37
Figure 43: Unit Cost of YEKDEM	38
Figure 44: Total BPM Amount in 2017	38

Figure 45: Total Energy Imbalances Volume in 2017	39
Figure 46: Total Energy Imbalances Amount in 2017	39
Figure 47: Injection-Withdrawal Volumes Basis to Financial Settlement	40
Figure 48: Number of Eligible Customers in 2017.....	40
Figure 49: Consumption (TWh), 2016-2017	43
Figure 50: Generation (TWh), 2016-2017	43
Figure 51: Monthly Generation, 2016 - 2017.....	43
Figure 52: % of Power Stations by Electric Utilities in 2017	44
Grafik 53: % of Licensed Power Stations by Energy Source in 2017	44
Figure 54: Installed Capacity (MW) by Energy Source in 2017	45
Figure 55: % of Installed Capacity by Licensed Electric Utilities in 2017.....	45
Figure 56: Generation (MWh) by Energy Source in 2017	46
Figure 57: Generation (MWh) by Energy Source in 2016	46
Figure 58: Generation Figures by Energy Sources, 2016-2017	46
Figure 59: Electricity Generation by Electric Utilities in 2017	47
Figure 60: Annual Electricity Generation by Cities in 2017.....	47
Figure 61: Import-Export of Electricity Trade on a monthly basis in 2017	48

LIST OF TABLES

Table 1: Weekdays MCP Distribution for the hours of 0-11	13
Table 2: Weekdays MCP Distribution for the hours of 12-23	13
Table 3: Weekends MCP Distribution for the hours of 0-11.....	14
Table 4: Weekends MCP Distribution for the hours of 12 - 23	14
Table 5: Average Number of Submitted Orders.....	21
Table 6: Number of Day Ahead Market Participant Active in Trade.....	21
Table 7: Number of Intraday Market Participants Active in Trade in 2017	26
Table 8: Monthly Numbers of IoC-FoK.....	29
Table 9: Monthly Number of Orders, 2016-2017	29
Table 10: Electricity Market Volume on a monthly basis in 2017.....	32
Table 11: 0 - 1 - 2 Coded Regulation Volume on a monthly basis.....	35
Table 12: Number of Participants on monthly basis.....	41
Table 13: Number of Power Stations by Electric Utilities in 2017	44
Table 14: Number of Power Stations in 2017 Kaynak Bazında Santral Sayısı	44
Table 15: Installed Capacity by Electric Utilities in 2017.....	45

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