STATISTICAL POCKETBOOK 2024

ESO EAD

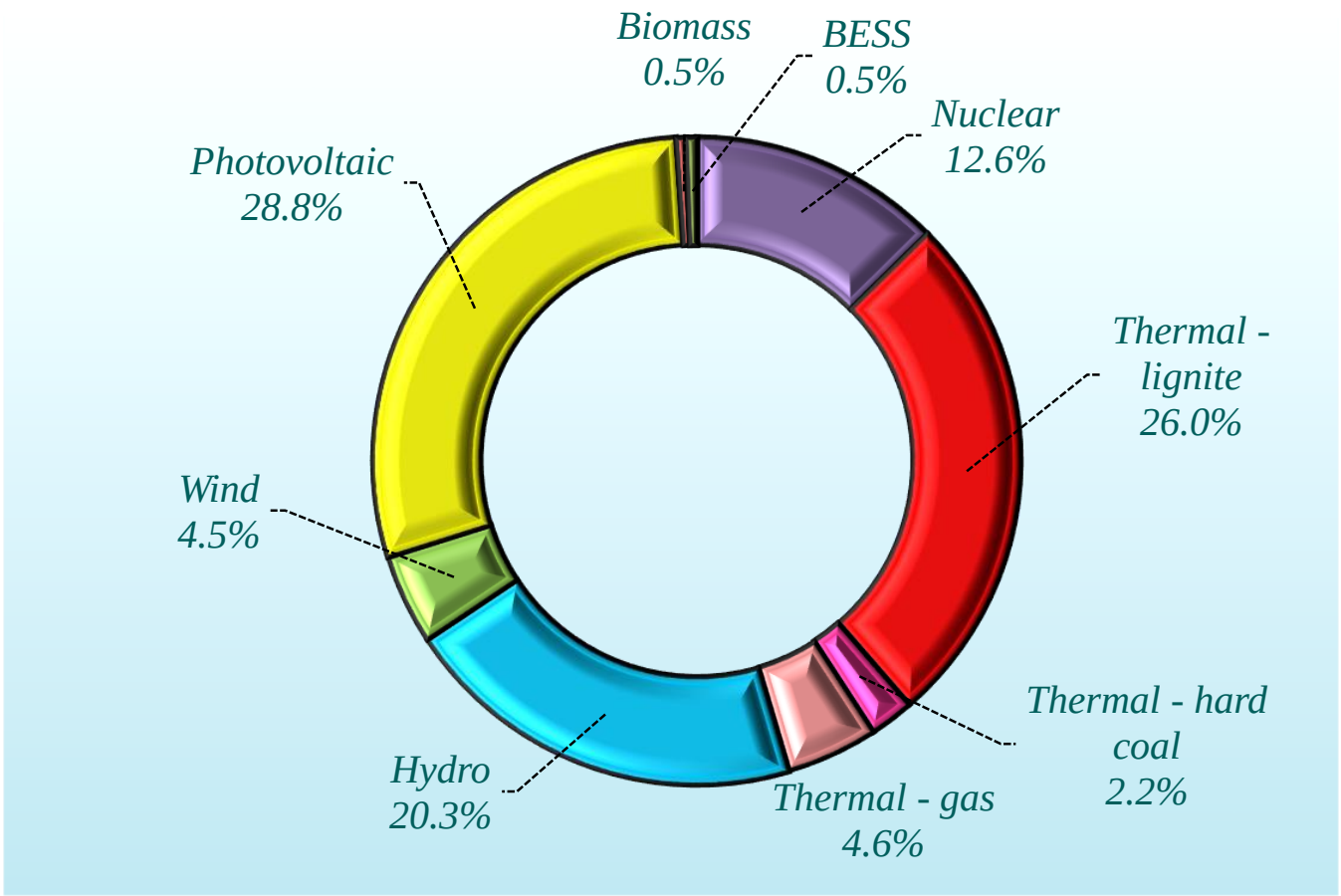
ESO is responsible for the common operational planning, coordination and control of the Bulgarian power system and its parallel synchronous operation with neighbouring systems. Its scope of activities also includes transmission grid operation, maintenance and reliable functioning, auxiliary network servicing, as well as maintenance and repair services in the energy sector. It also manages the power transit through the national grid and runs the electricity market. In performing parallel synchronous operation with ENTSO-E, ESO, being a key partner in the Balkan region, constantly strives to achieve higher transmission efficiency and asset management performance by introducing and using the newest methods of planning, control and monitoring.

ESO EAD

INSTALLED GENERATION CAPACITIES 2024

Generation type	MW	Variation 2024/2023, %	Share, %
Nuclear	2 000	0.0	12.6
Thermal - lignite	4 119	0.0	26.0
Thermal - hard coal	356	0.0	2.2
Thermal - gas	723	4.1	4.6
Hydro	3 211	-0.1	20.3
Wind	711	0.9	4.5
Photovoltaic	4 568	47.7	28.8
Biomass	77	-2.5	0.49
BESS	86	-	0.54
Total	**15 852**	**11.1**	**100.0**

Installed capacity shares by plant type



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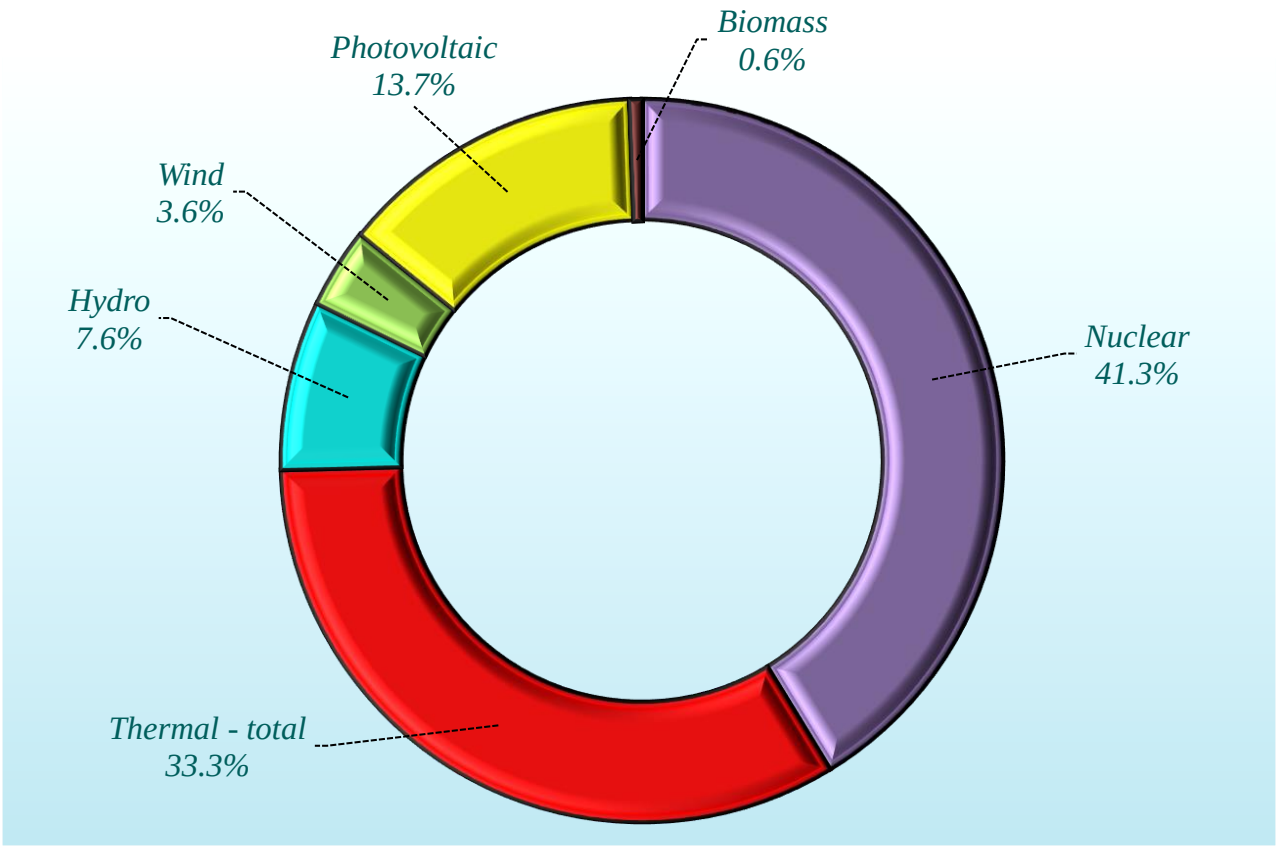
GROSS GENERATION 2024

Generation type	MWh	Variation 2024/2023, %
Nuclear	15 780 180	-2.4
Thermal - total	12 735 758	-19.2
Hydro	2 899 470	-6.5
Wind	1 377 086	-13.1
Photovoltaic	5 220 293	56.5
Biomass	214 732	-8.4
Total	**38 227 519**	**-4.9**

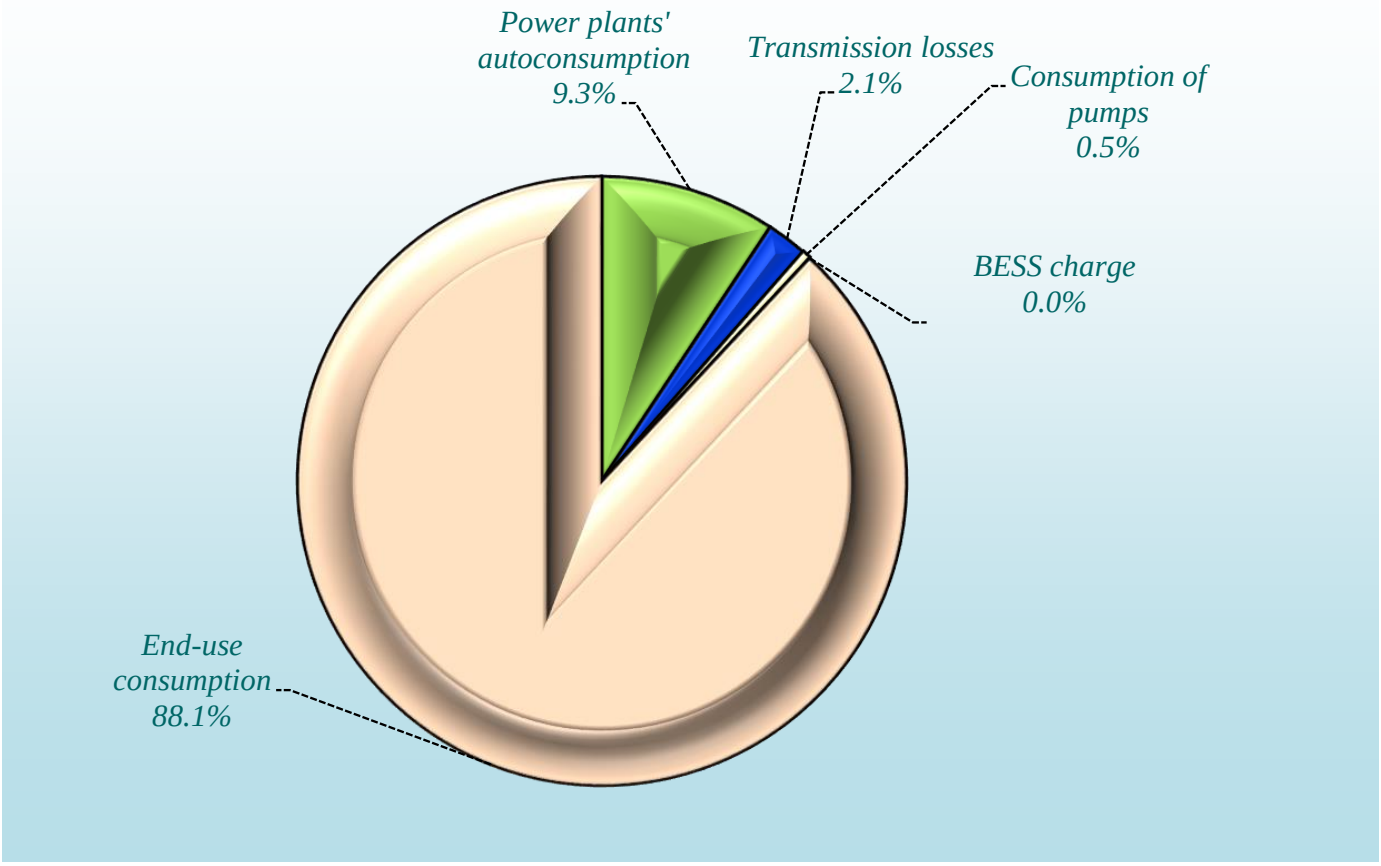
Annual gross generation shares by plant type



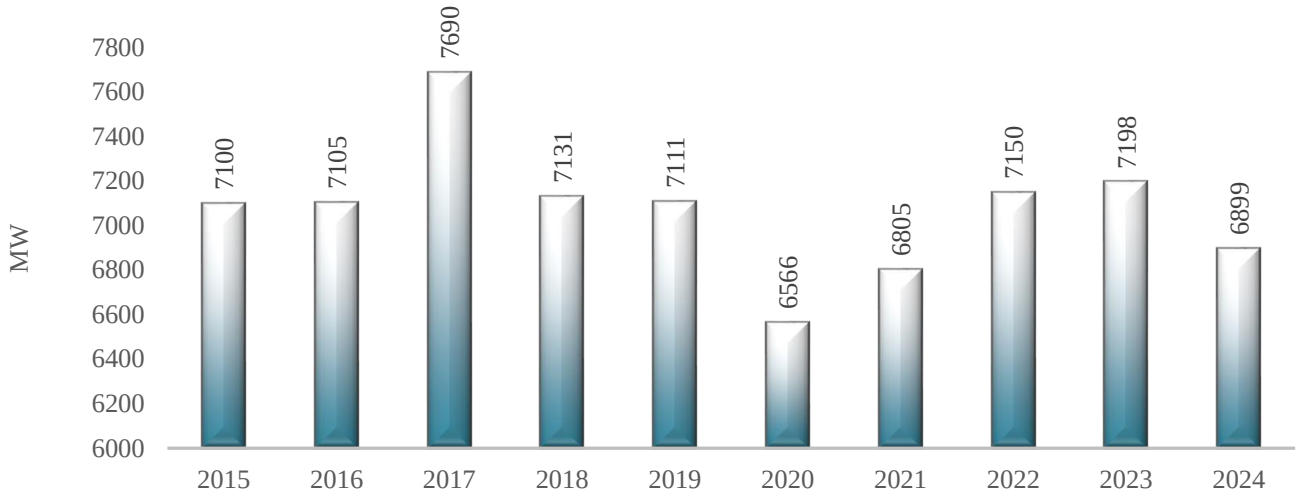
GROSS CONSUMPTION 2024

Consumption type	MWh	Variation 2024/2023, %	Share, %
Power plants' autoconsumption	3 462 911	-11.1	9.3
Transmission losses	795 779	1.3	2.1
Consumption of pumps	173 002	125.3	0.5
BESS charge	14 519	-	0.04
End-use consumption	32 794 325	2.3	88.1
Total	**37 240 535**	**1.2**	**100.0**

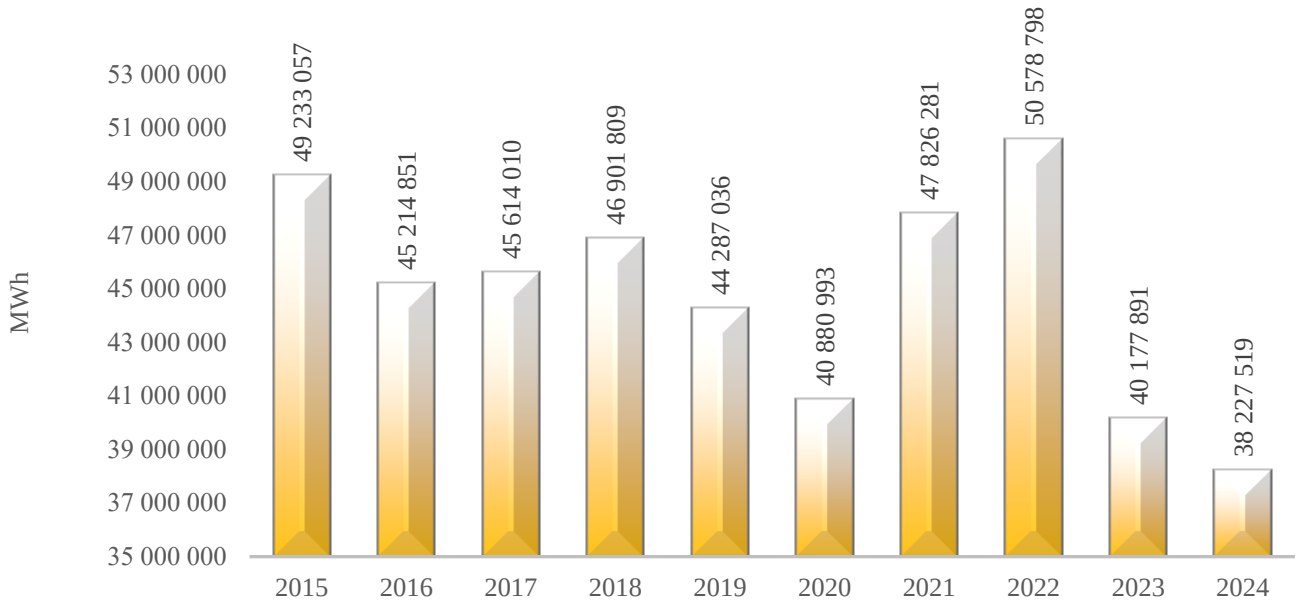
Gross consumption shares by type



ABSOLUTE ANNUAL GROSS PEAK LOADS

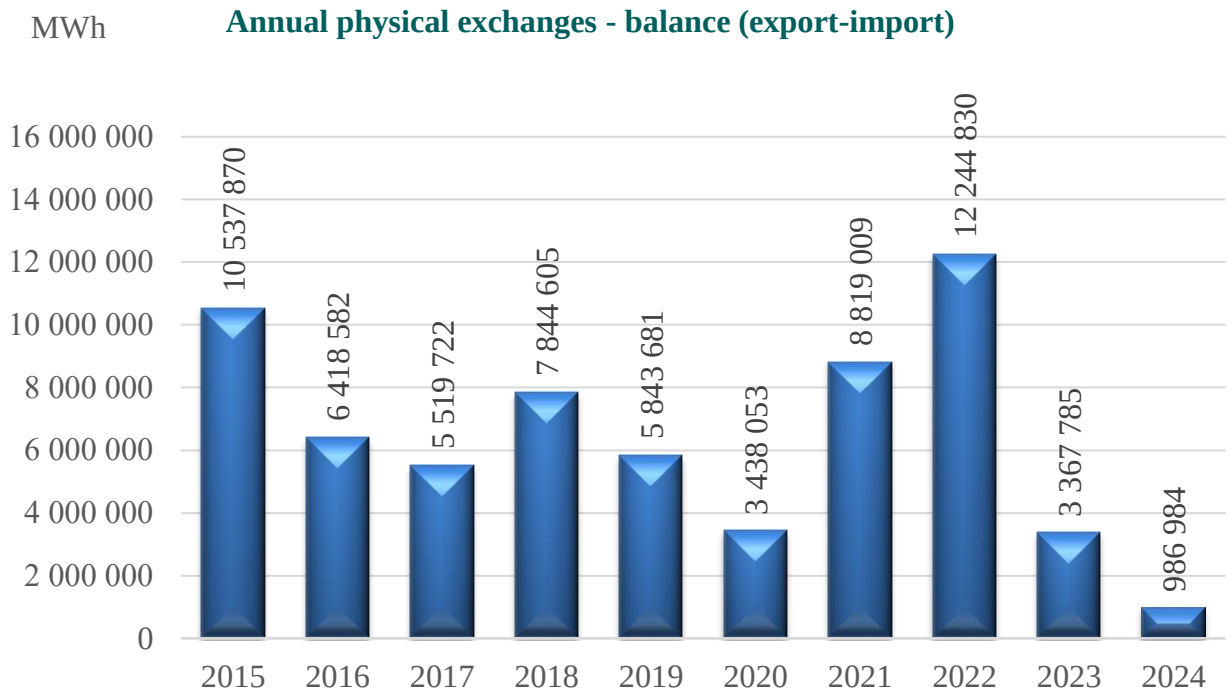


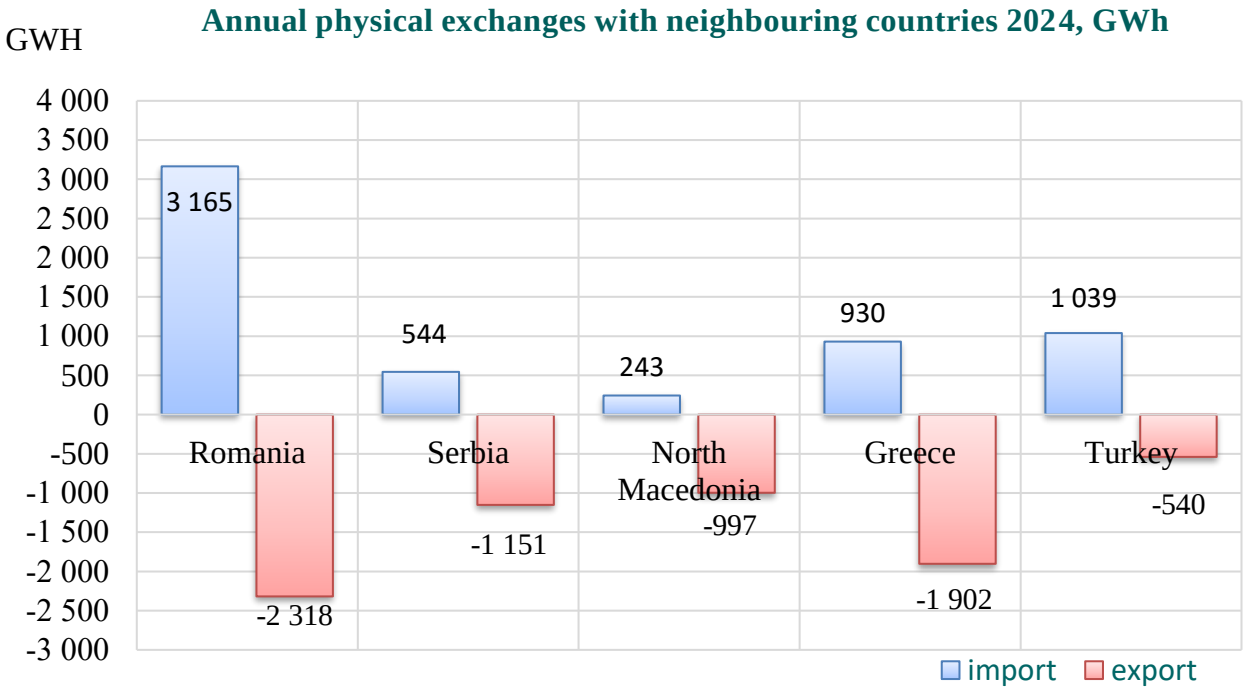
ANNUAL GROSS GENERATION



CROSS BORDER PHYSICAL EXCHANGES 2024

Exchange type	MWh	Variation 2024/2023, %
Balance (export-import)	**986 984**	**-70.7**





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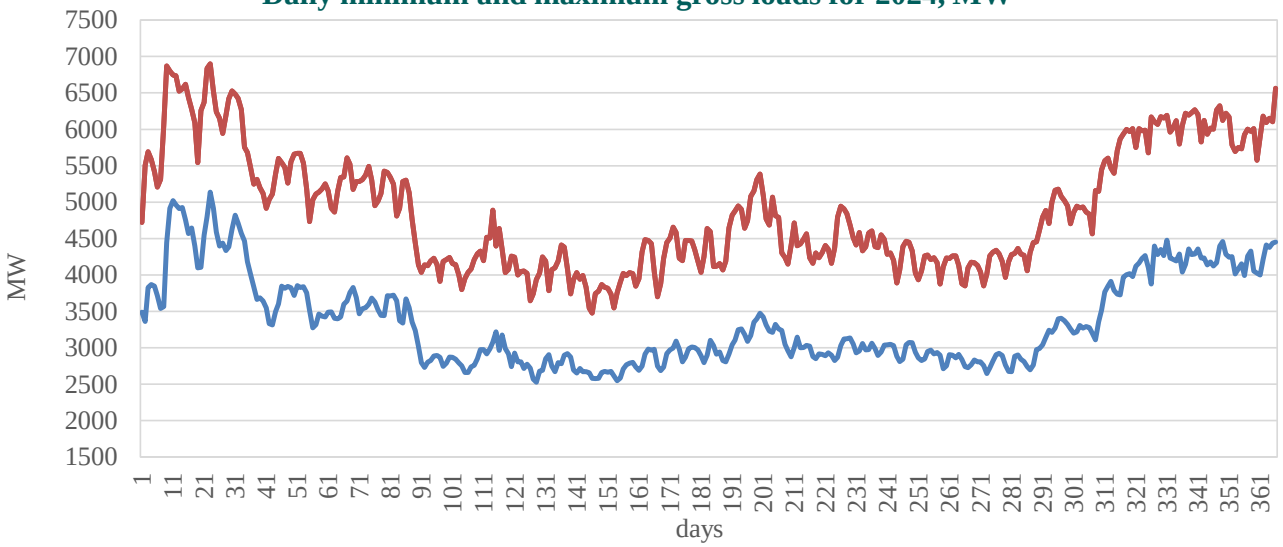
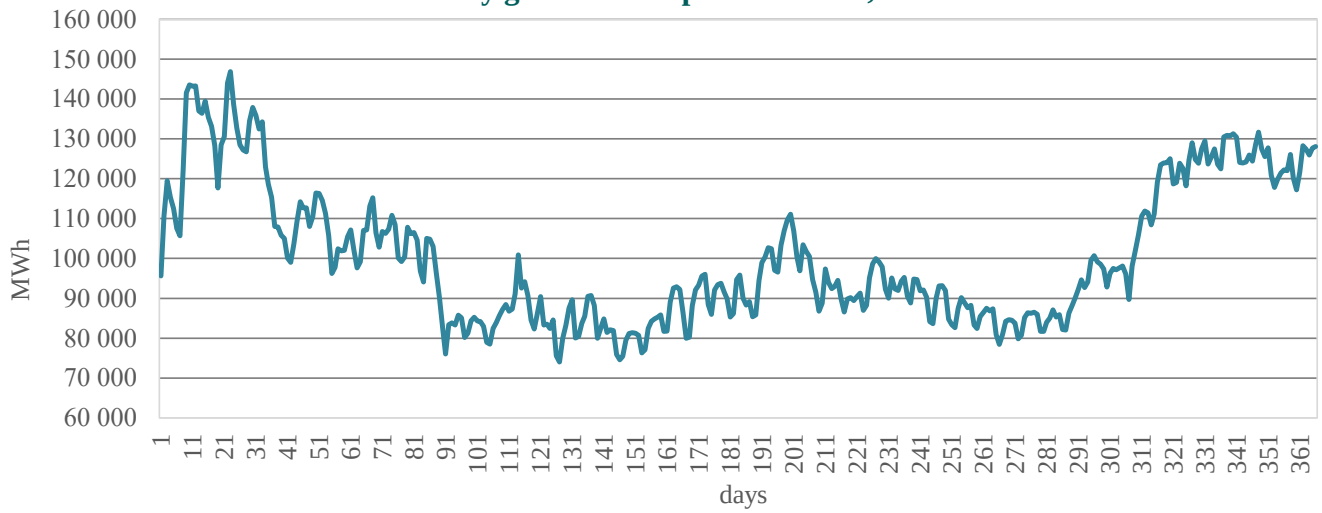
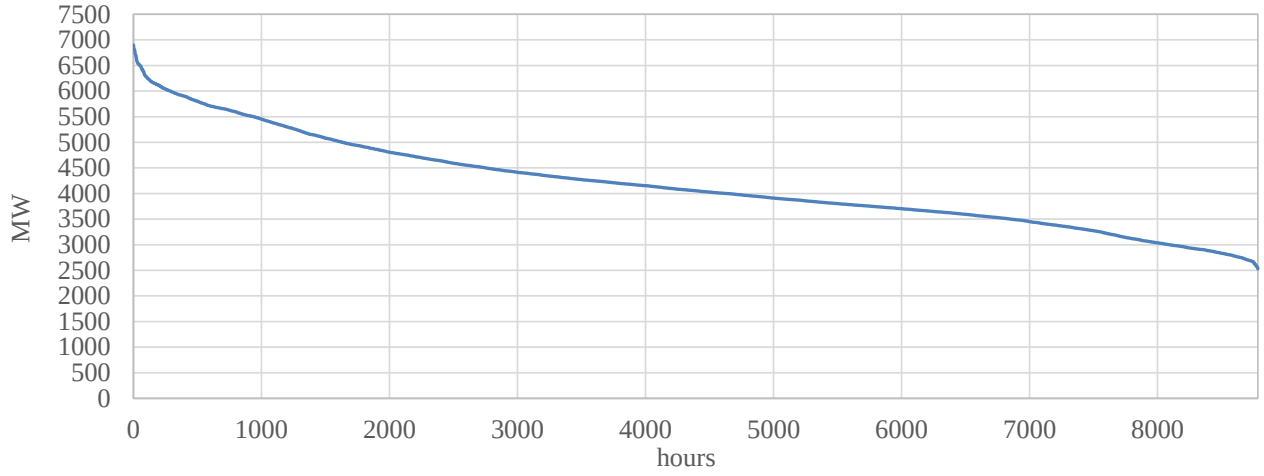
Daily minimum and maximum gross loads for 2024, MW



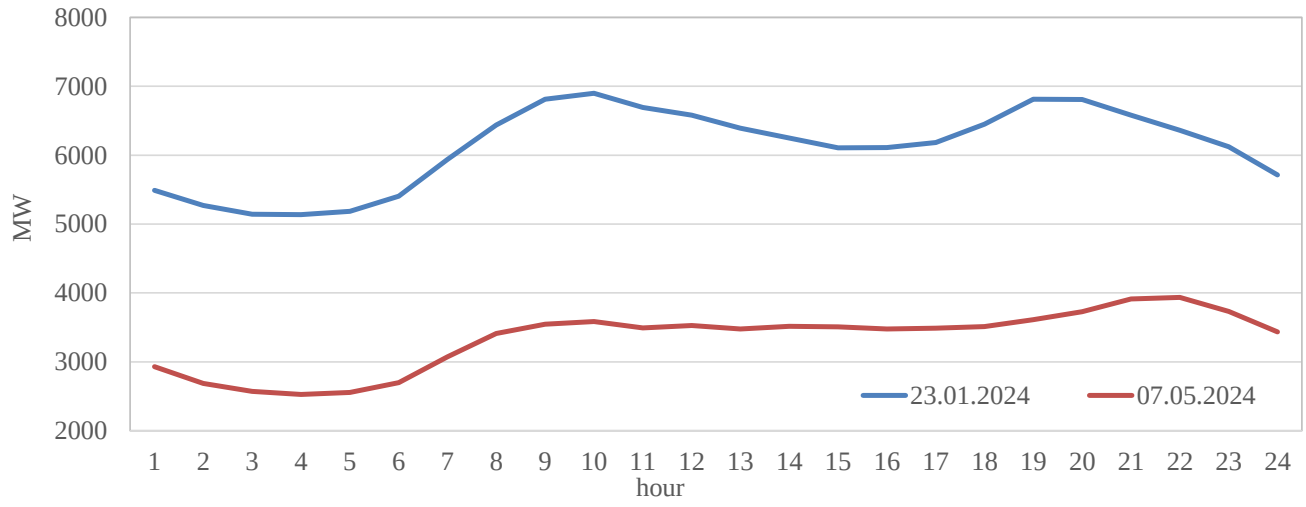
Daily gross consumption for 2024, MWh



Annual hourly gross loads duration curve for 2024



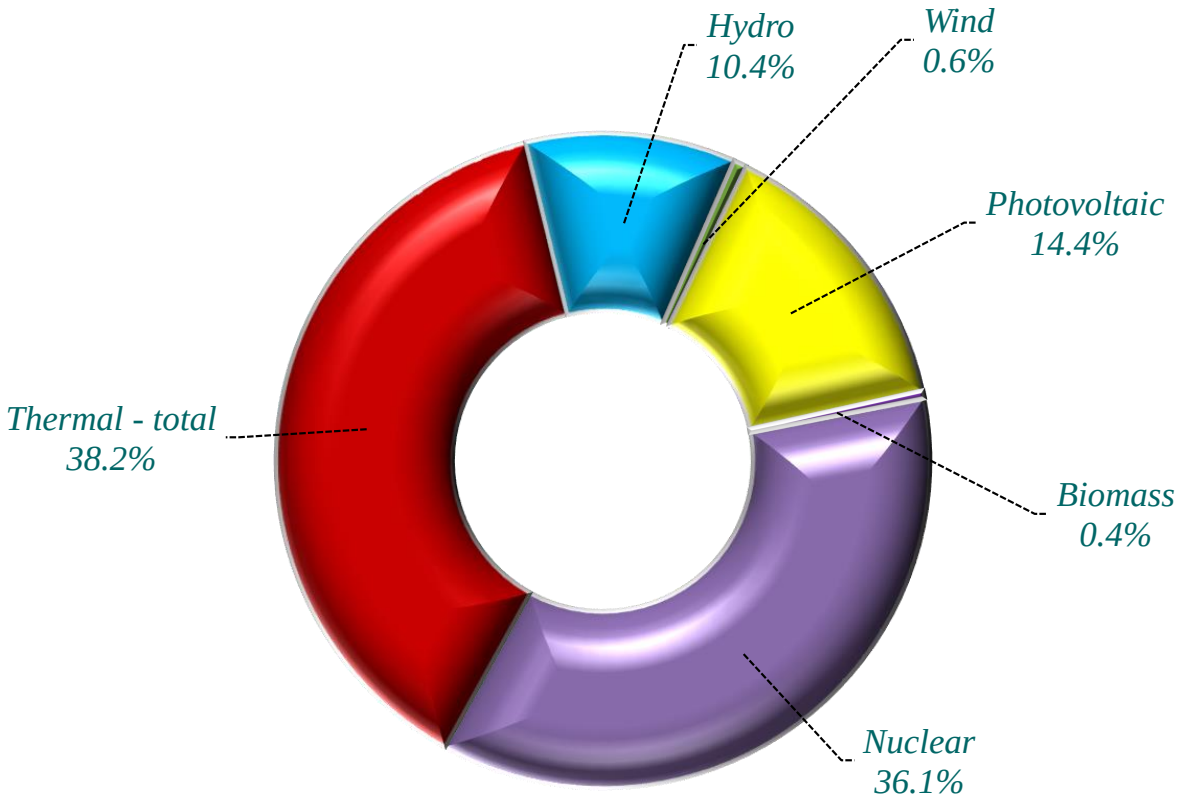
Hourly load curves for the days with the absolute annual minimum and maximum gross loads 2024



Gross system power balance for the absolute annual peak load hour - 23 January 2024, 10:00

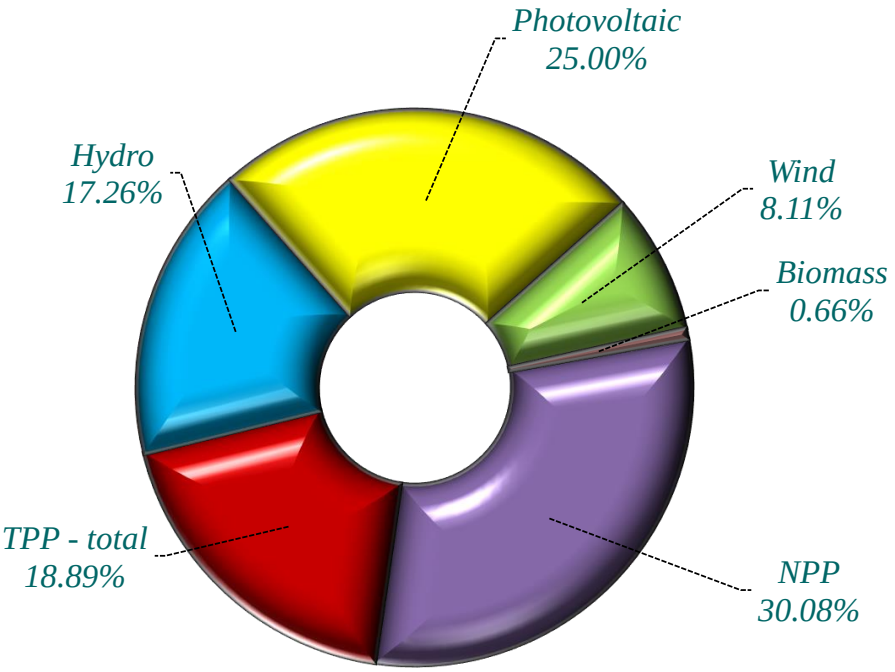
Generation type	MW
Nuclear	2123
Thermal - total	2245
Hydro	609
Wind	38
Photovoltaic	845
Biomass	22
Total	**5882**
Import	**1017**
BG peak load	**6899**

Generation shares by plant type at the absolute annual peak gross load hour

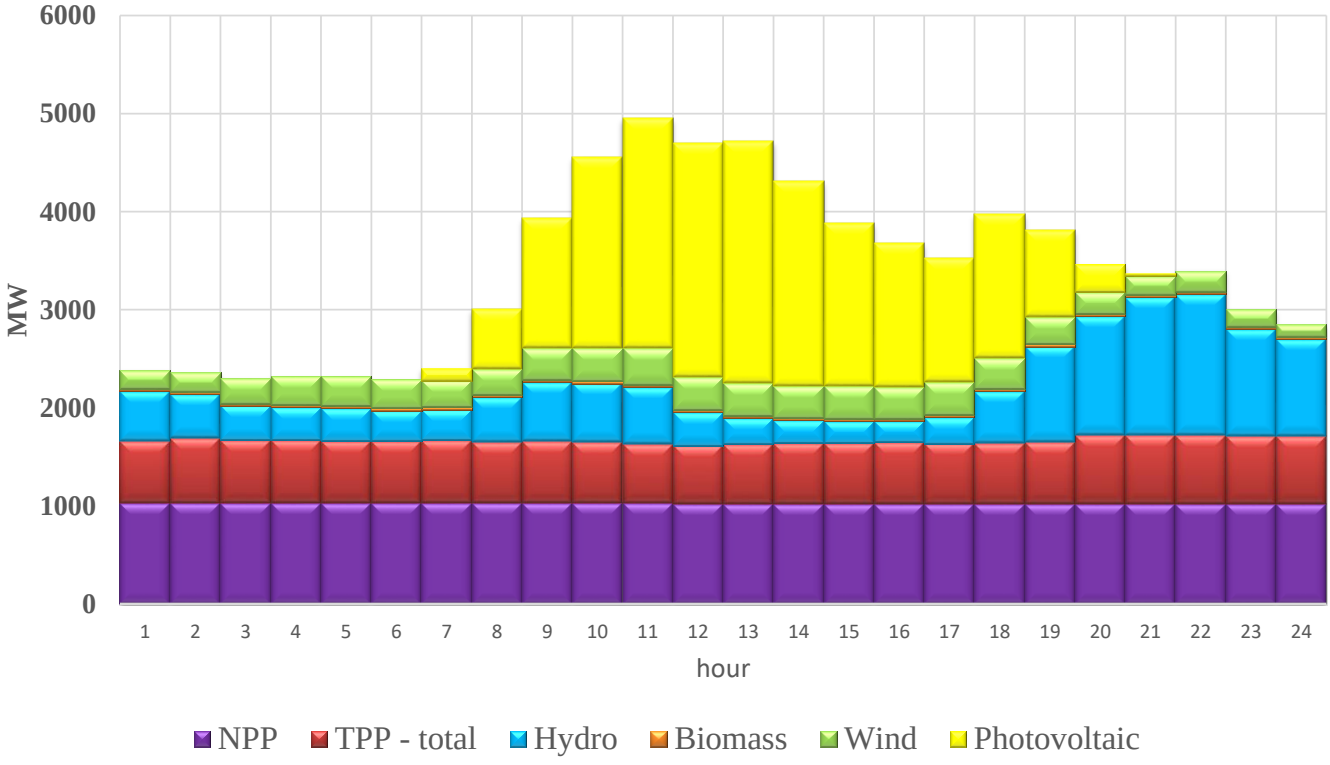


ESO EAD

Shares by plant type in the total daily gross generation for the day with the highest share (33.77%) of RES (wind, photovoltaic, biomass) - 25 May 2024



Hourly gross generations by plant type for the day with the highest share (33.77%) of RES (wind, photovoltaic, biomass) in the gross total daily generation 25 May 2024



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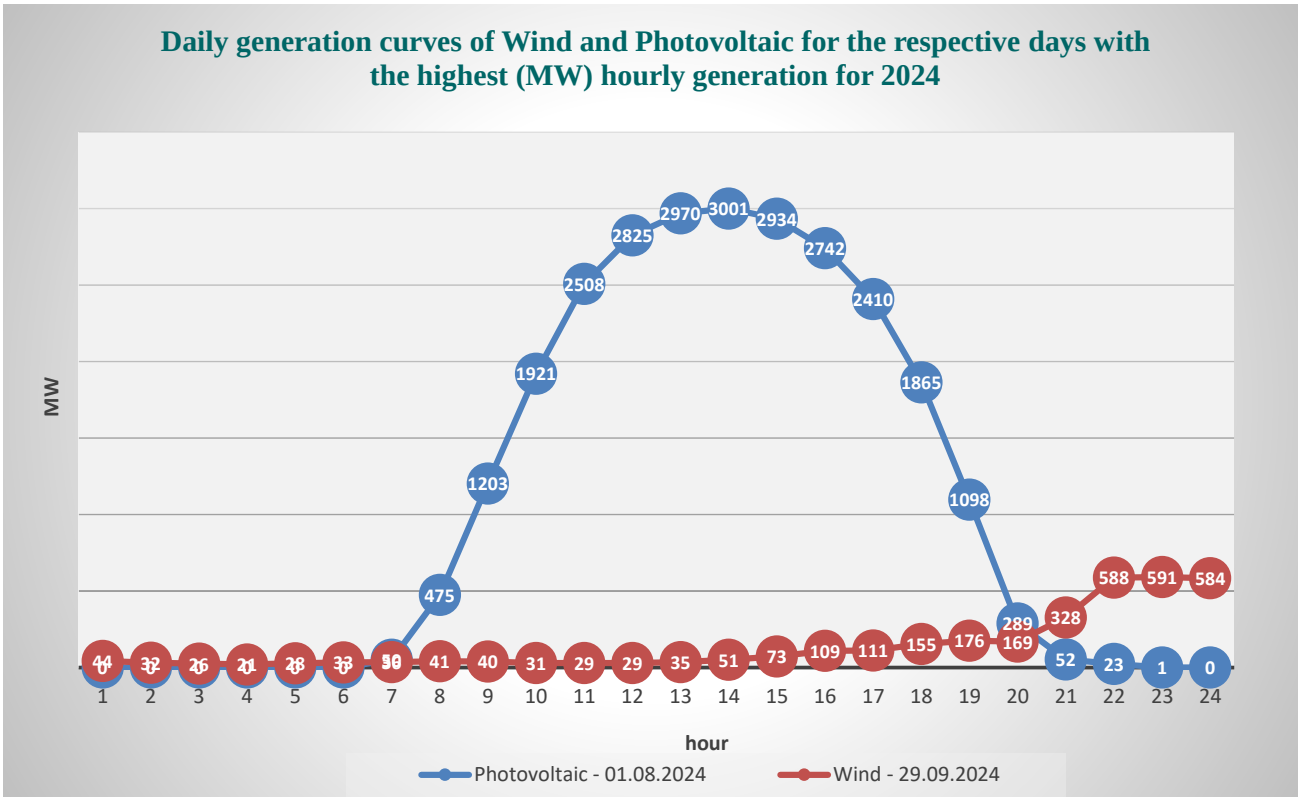
Highest shares in the gross total daily generation by plant type (groups) and dates of occurrence in 2024

Plant type / group	%	Occurrence date
Hydro+Wind+Photovoltaic+Biomass	**53.97**	Fri 24.05.2024
Wind+Photovoltaic+Biomass	**33.77**	Sat 25.05.2024
Wind+Photovoltaic	**33.11**	Sat 25.05.2024
Hydro	**28.58**	Wed 15.05.2024
Photovoltaic	**30.13**	Fri 07.06.2024
Wind	**12.19**	Mon 30.09.2024
Biomass	**0.84**	Sun 03.11.2024
Nuclear	**58.16**	Sun 29.09.2024
Thermal - total	**65.14**	Thu 14.11.2024

Daily generation curves of Wind and Photovoltaic for the respective days with the highest (MW) hourly generation for 2024



IMPORTANT EXTREMES /GROSS/ 2024

Daily maximum values	Energy		Capacity	
	MWh	date	MW	date
National generation	136 301	Thu 12.12.2024	7 013	Fri 13.12.2024
National consumption	146 879	Tue 23.01.2024	6 899	Tue 23.01.2024
Nuclear generation	51 034	Fri 01.03.2024	2 129	Wed 28.02.2024
Thermal generation	69 784	Thu 12.12.2024	3 132	Thu 12.12.2024
Hydro generation	21 427	Wed 15.05.2024	1 796	Thu 09.05.2024
PV generation	26 367	Thu 01.08.2024	3 001	Thu 01.08.2024
Wind generation	13 573	Wed 25.12.2024	591	Sun 29.09.2024
Biomass generation	649	Tue 12.11.2024	29	Fri 08.11.2024
Net export	28 981	Thu 05.09.2024	2 556	Thu 12.09.2024

Day with	Value	Date
highest consumption, MWh	146 879	Tue 23.01.2024
lowest consumption, MWh	74 025	Mon 06.05.2024
highest peak load, MW	6 899	Tue 23.01.2024
lowest peak load, MW	3 476	Sat 25.05.2024
lowest minimum load, MW	2 527	Tue 07.05.2024
highest minimum load, MW	5 137	Tue 23.01.2024
highest load variation range, MW	2 483	Mon 08.01.2024
lowest load variation range, MW	868	Sat 18.05.2024
highest density coefficient of the daily load curve	0.917	Thu 25.07.2024
lowest density coefficient of the daily load curve	0.784	Sun 20.10.2024
highest positive hourly load ramp, MW	819	Tue 09.01.2024
highest negative hourly load ramp, MW	-548	Fri 19.01.2024

Value	Number of days	Variation	Dates of occurrence
Longest series of consecutive days with increase of the maximum load	**6**	831 MW	13.10 - 18.10.2024
Longest series of consecutive days with decrease of the maximum load	**7**	1 281 MW	31.01 - 06.02.2024
Longest series of consecutive days with increase of the daily demand	**6**	16 608 MWh	10.11 - 15.11.2024
Longest series of consecutive days with decrease of the daily demand	**9**	35 243 MWh	03.02 - 11.02.2024

Value	Variation	Dates of occurrence
Highest increase of the maximum load between two consecutive days	819 MW (11.93 %)	08.01 - 09.01.2024
Highest decrease of the maximum load between two consecutive days	548 MW (09.89 %)	18.01 - 19.01.2024
Highest increase of the daily demand between two consecutive days	19 466 MWh (15.94%)	08.01 - 09.01.2024
Highest decrease of the daily demand between two consecutive days	11 252 MWh (08.38%)	02.02 - 03.02.2024

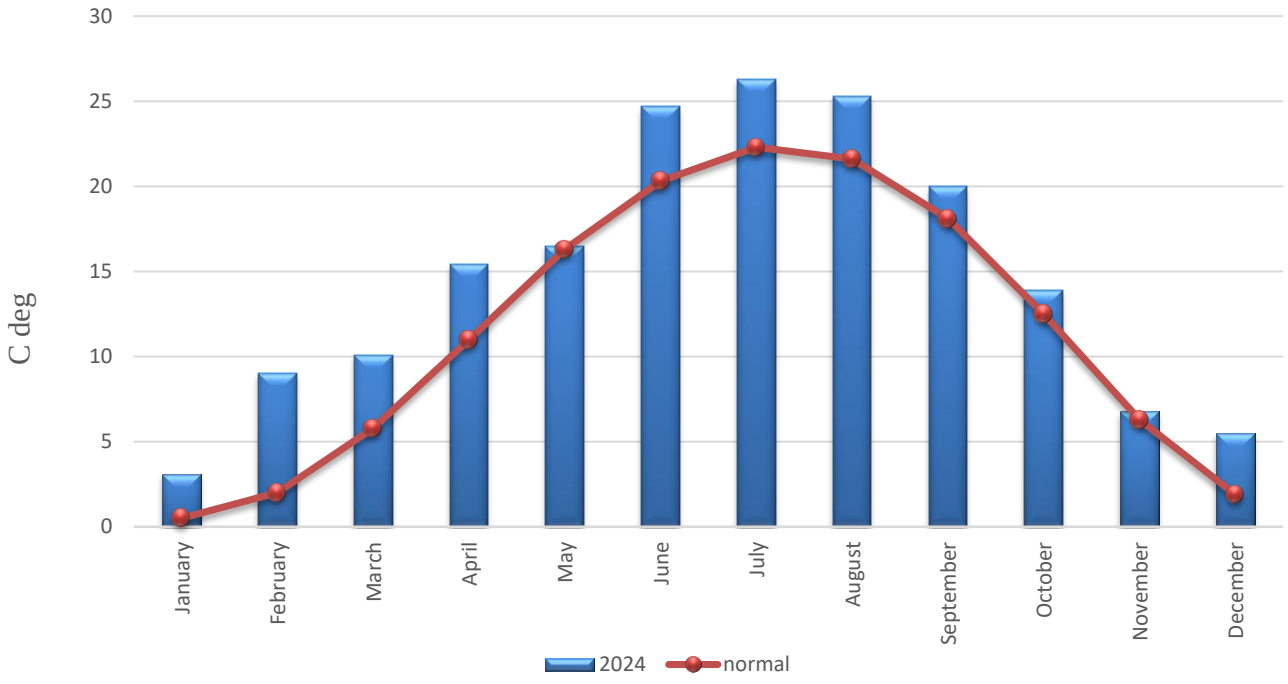
TEMPERATURE SENSITIVITIES OF TYPICAL LOADS FOR WORKING DAYS PER PERIOD TYPE, MW/C'

Typical load	Heating period	Cooling period
night minimum	-129	79
day maximum	-171	187
evening maximum	-161	178

AUTOMATIC MEASURING STATIONS OWNED BY ESO EAD

Station type	Quantity	Communication type
meteorological	19	SCADA - real time
rain measuring	23	GSM - modem
hydrometric	8	GSM - modem
dam level measuring	3	GSM - modem
anemometric	7	SCADA - real time

Registered in 2024 and normal average monthly temperatures for Bulgaria



SUBSTATIONS 2024

Substation type	Quantity	Transformer capacity MVA
400 kV	16	13 063
220 kV	16	6 160
110 kV	272	16 564
Total	**304**	**35 787**

TRANSMISSION LINES

Trasmission line type	Length km
OPL 400 kV	3 102
OPL 220 kV	2 711
OPL 110 kV	10 294
OPL 60 kV	12
CPL 110 kV, 220 kV и 400 kV	34
Total	**16 152**

Note: OPL - Overhead Power Line
CPL - Cable Power Lines

INTERCONNECTING TRANSMISSION LINES 400 kV

Transmission line	Neighbouring country	Neighbouring operator	Length, km
Druzhba	Romania	TEL	124
Tsantsareni 1	Romania	TEL	116
Tsantsareni 2	Romania	TEL	116
Saedinenie	Romania	TEL	129
Nishava	Serbia	EMS	123
Ruen	North Macedonia	MEPSO	150
Pirin	Greece	IPTO	177
Sakar	Turkey	TEIAS	149
Odrin	Turkey	TEIAS	159
Perperikon	Greece	IPTO	153

BALANCING MARKET 2024

Activated balancing energy

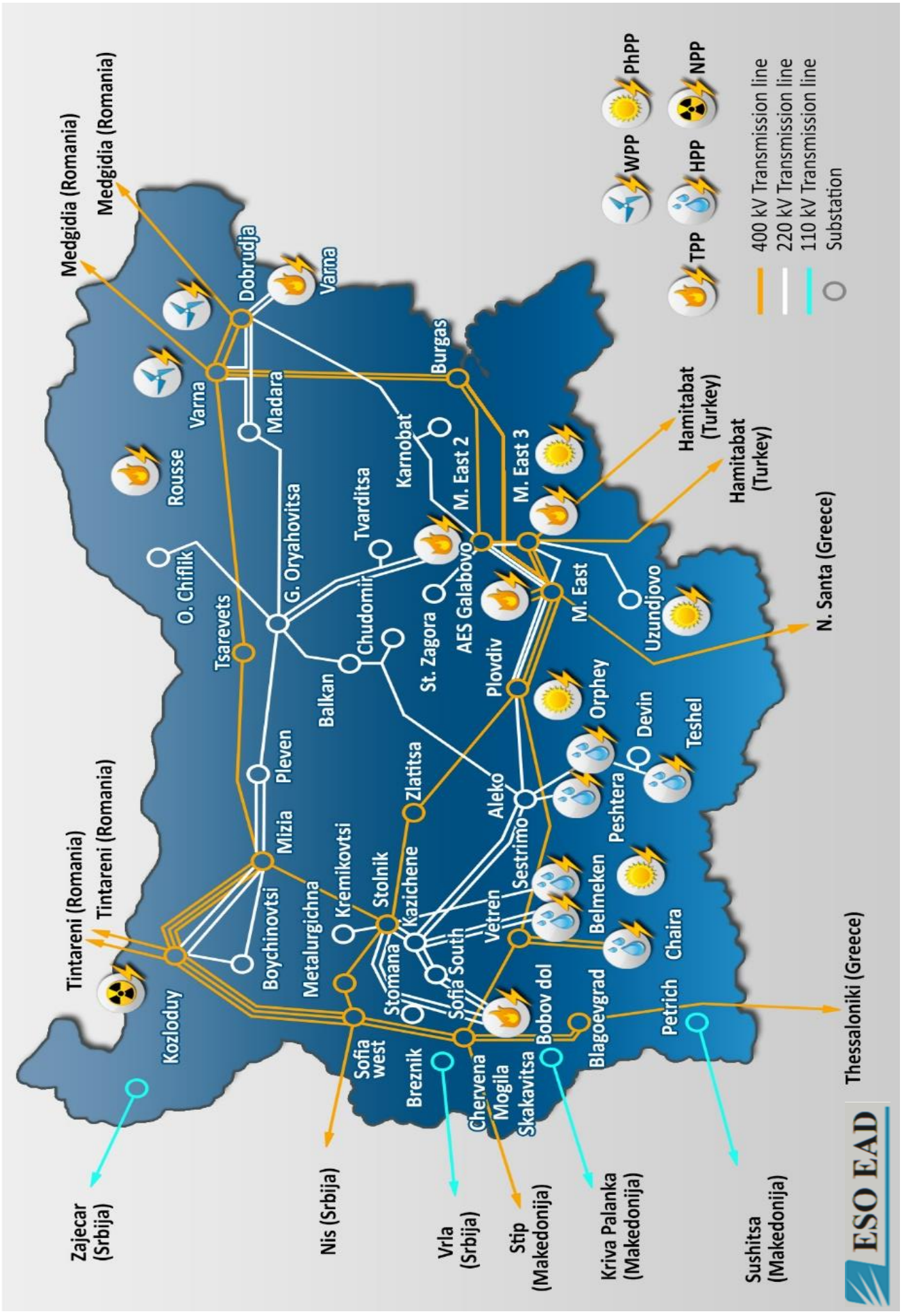
Month	UPWARD, MWh	DOWNWARD, MWh
January	31 236	20 415
February	10 594	22 333
March	12 660	22 598
April	16 761	15 339
May	17 667	23 010
June	10 758	15 692
July	12 393	23 485
August	10 020	12 466
September	9 714	12 441
October	14 943	13 556
November	23 403	11 930
December	19 367	15 499

Average monthly imbalance price

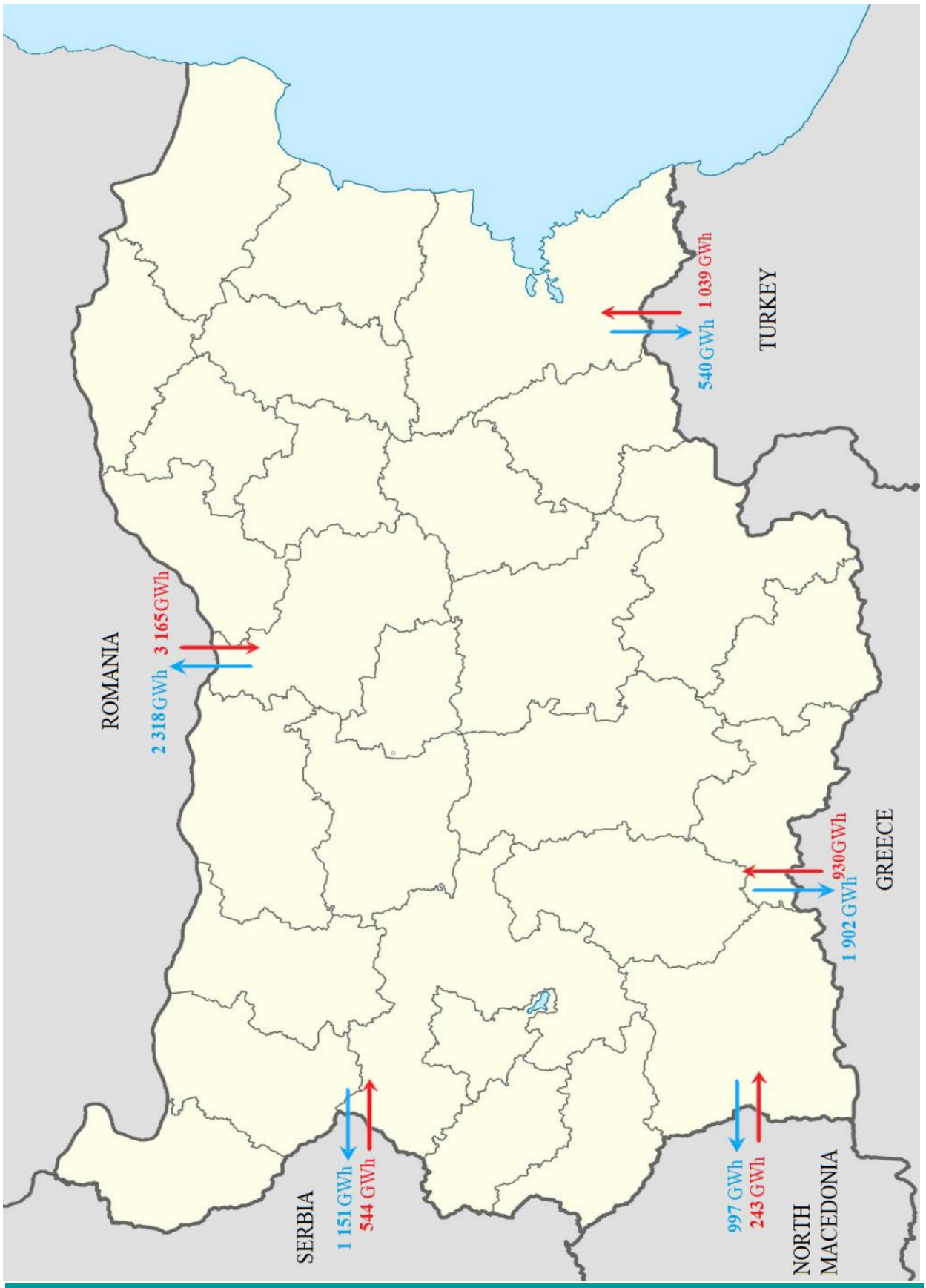
Month	SHORTAGE, BGN/MWh	SURPLUS, BGN/MWh
January	161.30	245.88
February	112.60	185.08
March	131.07	197.06
April	136.04	177.07
May*	*237.30*	*198.58*
June	*175.15*	*175.15*
July	*169.06*	*169.06*
August	*182.53*	*182.53*
September	*186.68*	*186.68*
October	*207.55*	*207.55*
November	*314.33*	*314.33*
December	*236.10*	*236.10*

* The prices after 1 May 2024 are informative according to the new Methodology for determining the prices of balancing electricity adopted by EWRC (ENERGY AND WATER REGULATORY COMMISSION)

220 kV and 400 kV TRANSMISSION NETWORK



PHYSICAL EXCHANGES 2024



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