Turkish Energy Market Review
Türkiye Enerji Piyasası Değerlendirme

APLUS
Energy Consulting

December 2, 2025

TÜREB 2. Finansal Kurum Paydaşları Toplantısı, İstanbul

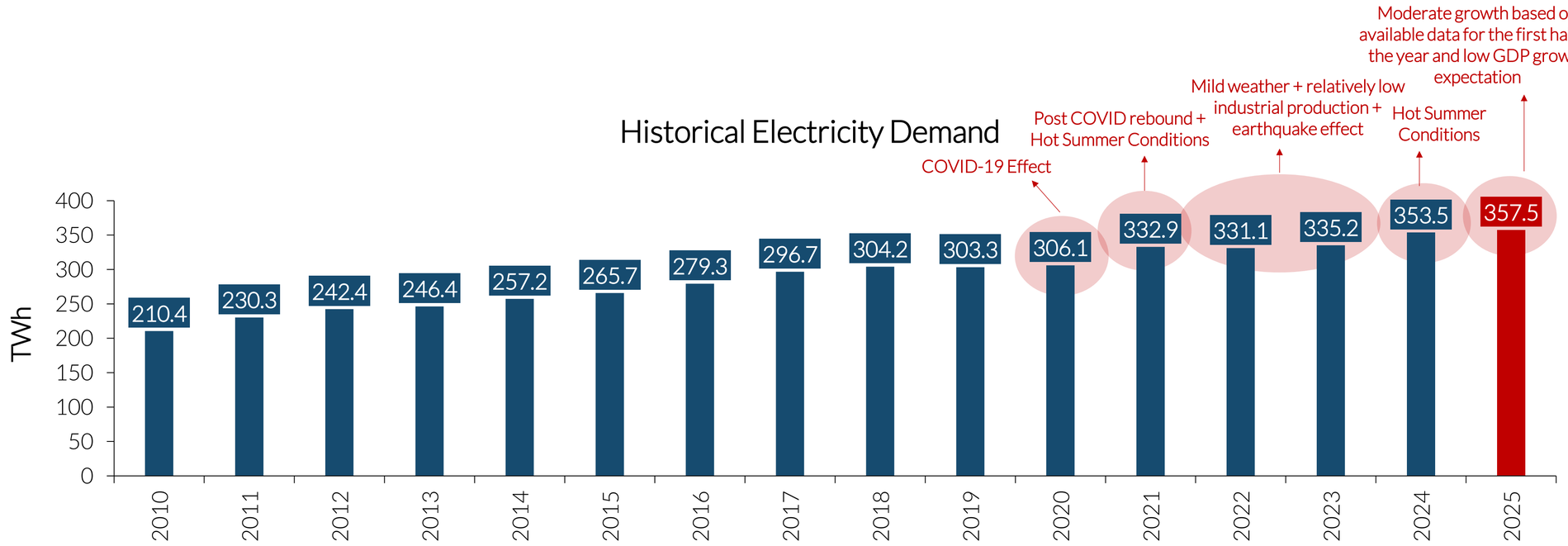
The compound annual growth rate of the electricity demand in Türkiye between 2001 and 2024 is recorded as 4.5%

> The Turkish Electricity Market has grown rapidly in recent years due to the rapid industrialization that has taken place. The electricity demand has had a **compound annual growth rate (CAGR) of 4.5%** since the liberalization of the electricity market started in 2001.

> The compound annual growth rate of electricity demand between **2001** and **2008** was **6.6%**. The electricity demand dropped by **2.0%** in **2009**, due to the effect of the global economic crisis. In 2010 and 2011, Türkiye's electricity demand recovered with **annual growth rates of 8.4% and 9.4%,** respectively.

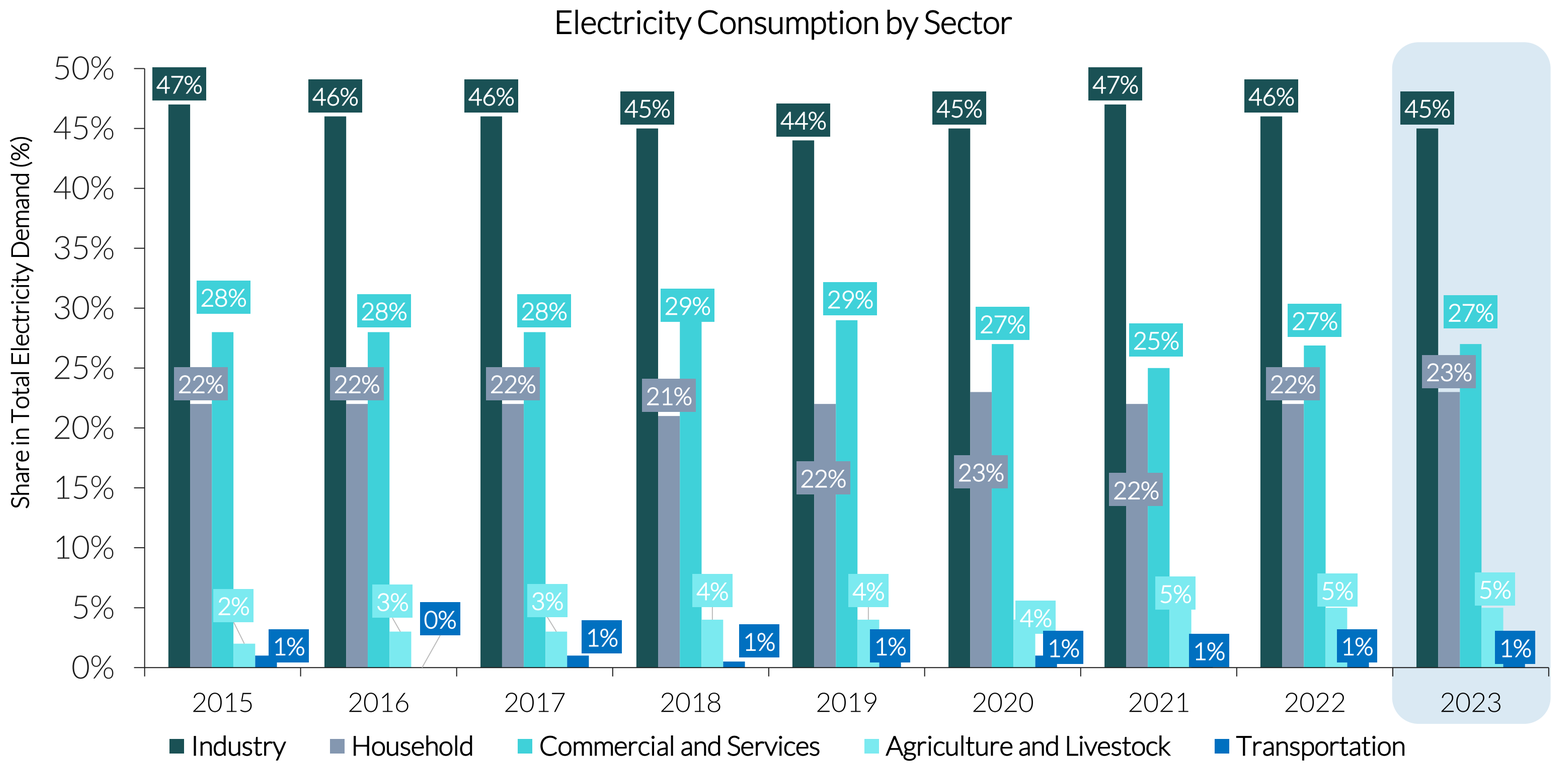
> After the decrease in 2020 gross demand due to COVID-19, the demand rapidly increased in 2021. As a result of this increase, the electricity demand growth rate was considerably higher compared to the previous years. In 2022, in addition to the decrease in industrial production, **relatively mild meteorological conditions** during the winter and summer caused lower electricity consumption in the country compared to the previous year. 2023 saw the **disastrous earthquake that affected the southeastern parts of the country** which contributed to the stagnant demand in that year. According to the updated value announced by TEİAŞ, the gross electricity demand for 2024 was 353.5 TWh.

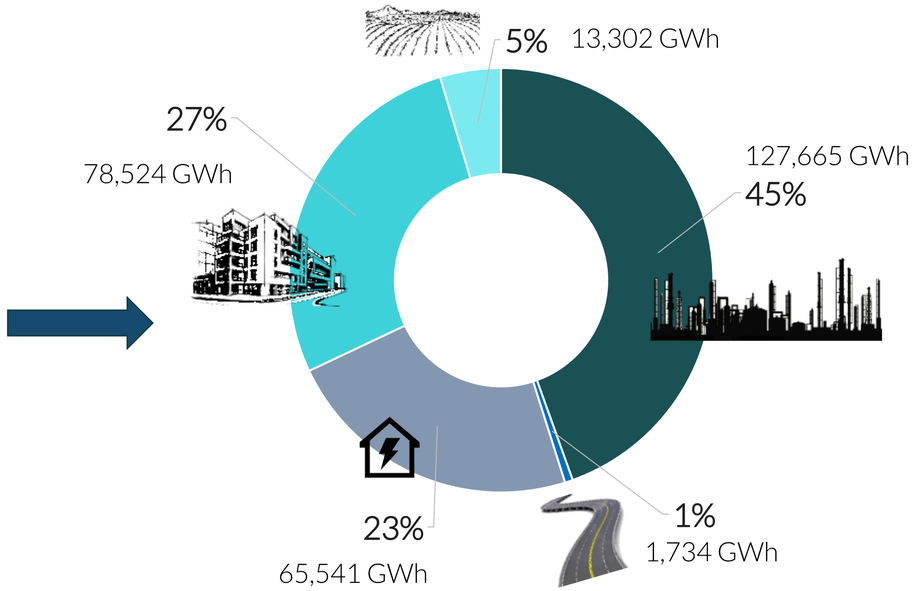
- 2020 — COVID-19 Effect
- 2021 — COVID-19 Recovery Effect
- 2022 — Lower Industrial Output & Mild Weather conditions
- 2023 — Effect of the 2023 Earthquake
- 2024 — The hottest year in the country in 53 years



Source: TEİAŞ, MENR, EPİAŞ, AA

Industry is the clear leader in electricity consumption among the five main sectors





> In **Türkiye**, the **industrial sector** is the largest consumer of electricity, covering activities such as mining, food & beverage, textiles, chemicals, metals, and construction. It is followed by **commercial/services** and **households**, while **agriculture/livestock** account for only **2–5%**, and **transportation** has the smallest share.

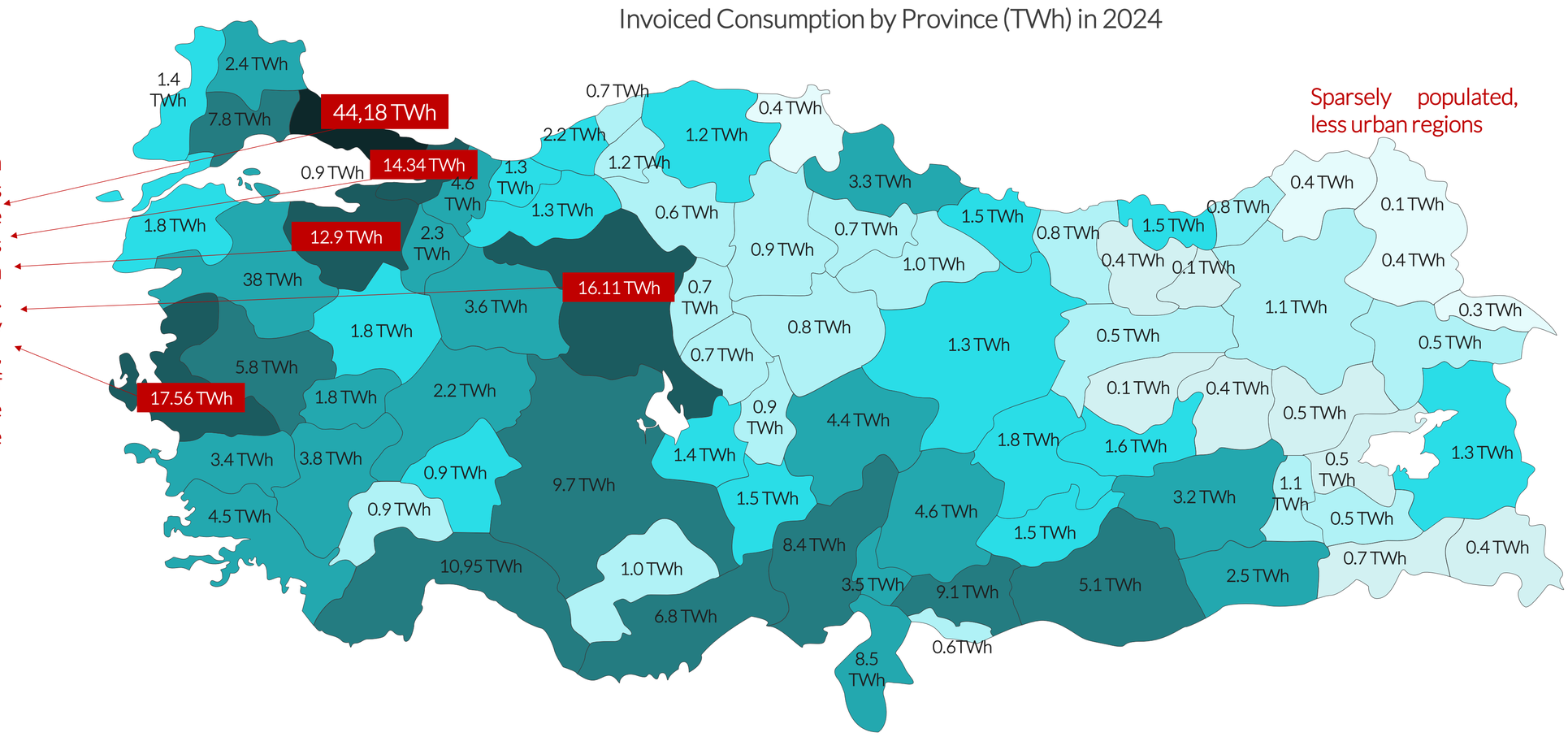
> According to the **Energy Balance Table 2023**, total electricity consumption was **286.8 TWh** (excluding refinery, internal use & losses), while **final consumption** was **335.2 TWh**. In 2023, **industry accounted for 45%**, **commercial/services 27%**, and **households 23%** of total demand.

APLUS Energy Consulting

Source: MENR

Most of the electricity demand in Türkiye is based on the Western part of the country due to the high population and industrial development in these regions

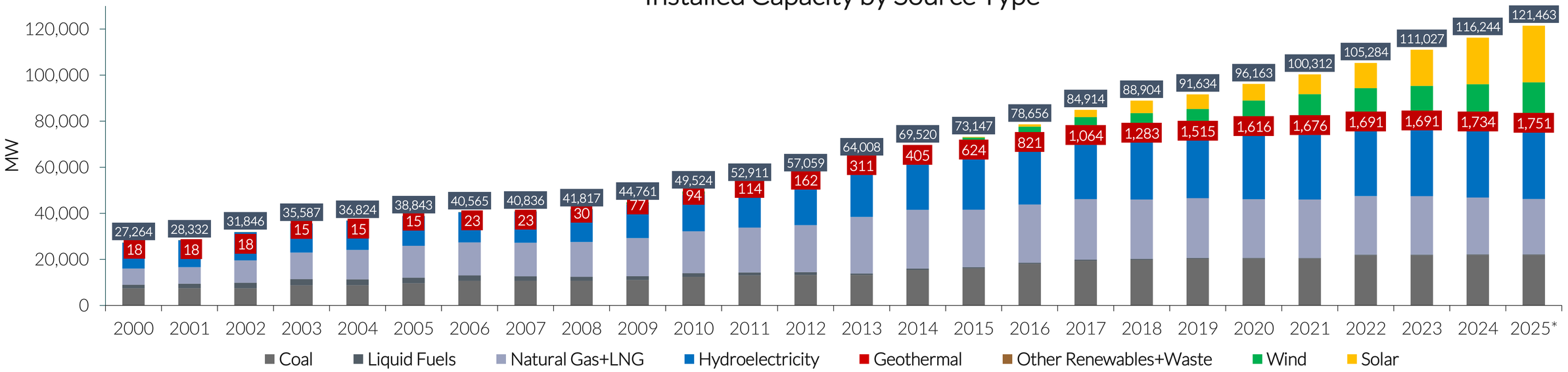
Most of the main metropolitan centers in Türkiye such as İstanbul, Ankara and İzmir and the main industrial centers such as Bursa and İzmit and located on the Western part of the country. This results in a high electricity demand on the Western regions, and a significant amount of electricity needs to be transmitted from the East to the West.



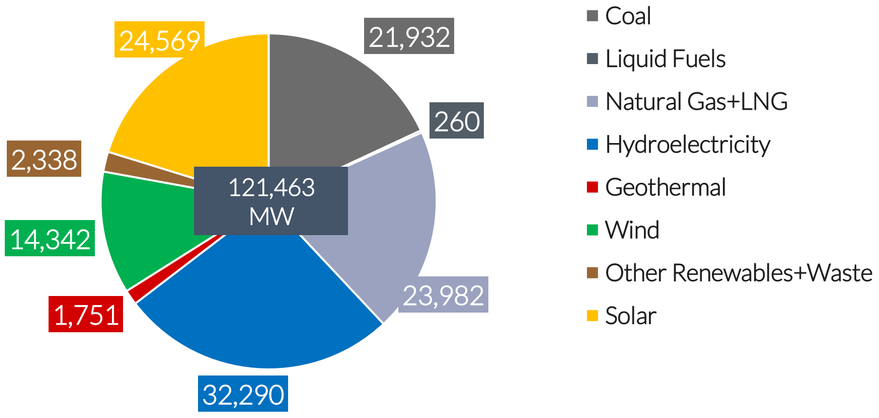
Source: EMRA

Total installed capacity has expanded rapidly and diversified in the last decade

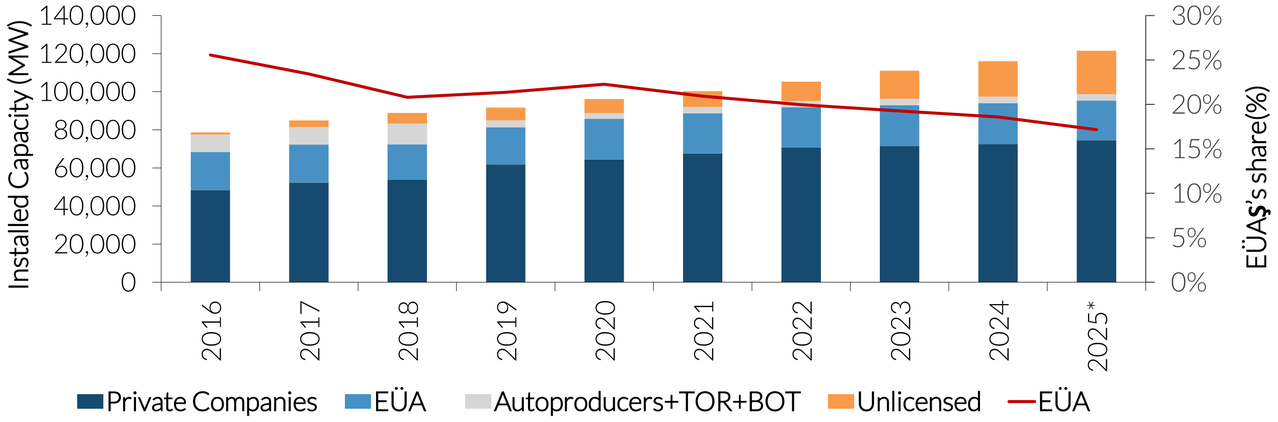
Installed Capacity by Source Type



Installed Capacity by Source in 2025* (MW)



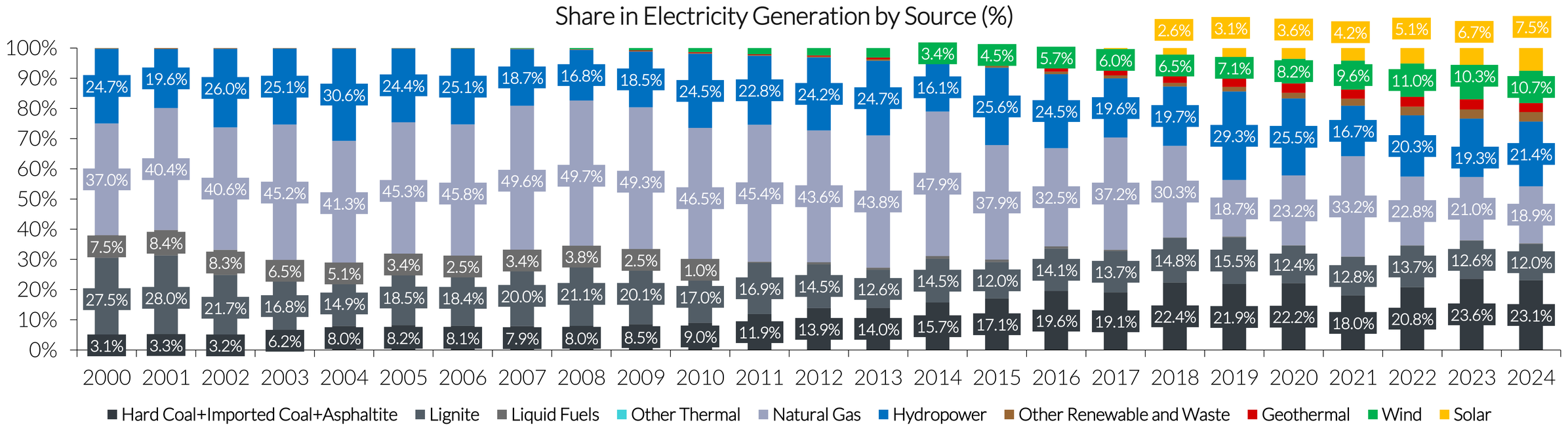
Installed Capacity by Institutions



Source: TEİAŞ YTBS

*Data includes the end of November 2025.

The share of renewable energy sources have greatly increased in recent years with new investment, reaching 45.8% in 2024



> The main trend over the last 10 years been the increasing share of renewable energy sources in the electricity generation mix. The bulk of the increase in these years was due to new solar and wind capacity increases. In 2024, the total share of **renewables in electricity generation was 45.8%** while the **share of solar and wind reached 18.2% up from only 3.1%** in 2013.

> The share of renewables in electricity generation tends to fluctuate over the years due to the changing hydrological conditions. The share of **hydropower in total generation has fluctuated between 16% and 30%** since the early 2000's.

APLUS Energy Consulting

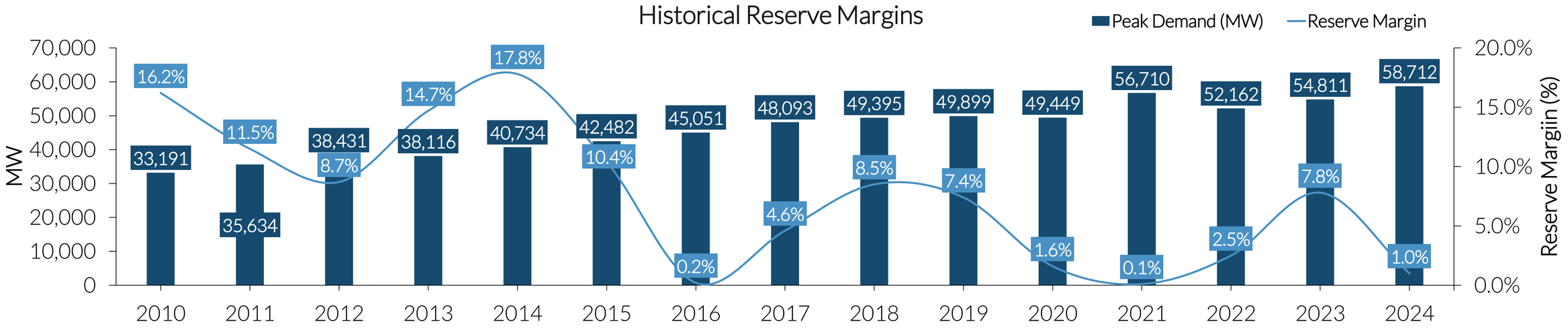
Source: TEİAŞ, EPİAŞ

Reserve margins dangerously tightened in the last three years due to the increased demand growth following the COVID-19 pandemic and the repeated low hydro generation

> After a **period of relative oversupply** caused **by increased investments into the sector in the first half of 2010's** and the **stable electricity demand between 2018 and 2020,** the reserve margins narrowed in the last two years due to **increasing demand starting from the second half of 2020** and the **historically low hydro generation** in 2021.

> **Reserve margins narrowed dangerously** in some summer days from 2020 and 2021 due to **temperatures well above the seasonal averages.** This effect was particularly acute in 2021 when a record **peak demand of around 57 GW** was observed, well above the highest hourly demand in **2020 at around 49 GW**. A similar problem was observed in **February 2022** due to **lower-than-average temperatures** and the **interruptions in natural gas supply** which reduced the available capacity in the system.

> **General planned outages in several regions** were observed in those days which means that the actual reserve margin in the market was perhaps negative with power not able to be supplied in all of the country. This hints at a **growing problem of under capacity** in the market which is set to **exacerbate in the near future** due to **demand increases** and the **dearth of expected investments.**



Note: The reserve margin is the ratio of the demand and available capacity per hour. The electricity demand and available capacity figures are actual values taken from TEİAŞ figures. With the exception of reservoir hydro power plants, the renewable energy generation is assumed to be equal to the available capacity. The available capacity for other sources include the values taken from TEİAŞ YTBS system. Both the demand and the available capacity values include unlicensed generation. The values before 2016 show the reserve margin at the annual peak demand hour due to lack of data availability. The values after 2016 show the lowest reserve margin value of the year.

APLUS Energy Consulting

Source: TEİAŞ

The target of achieving 120 GW of installed wind and solar energy capacity by 2035 reflects Türkiye's determination in its energy transition

- 2022 Dec — 2053 National Energy Plan
- 2024 Oct — 2035 Roadmap for Renewable Energy
- 2024 Nov — 2024-2028 Strategic Plan
- 2024 Nov — 2053 Long-Term Climate Strategy

	2024 Actual	2028 Target Strategic Plan	2035 Target National Energy Plan	2035 Target Renewable Energy Roadmap	2053 Target National Energy Plan
Solar Installed Capacity (MW)	19,882 MW	33,100 MW	52,900 MW	76,900 MW	-
Wind Installed Capacity (MW)	12,864 MW	19,300 MW	29,600 MW	43,100 MW	-
Hydroelectricity Installed Capacity (MW)	32,203 MW	*Other renewable installed capacity totalling 38,963 MW	35,100 MW	-	-
Geothermal and Biomass Installed Capacity (MW)	3,861 MW		5,100 MW	-	-
Thermal Installed Capacity (MW)	49,301 MW	49,077 MW	59,800 MW	-	-
Renewable Installed Capacity (MW)	66,682 MW	91,363 MW	122,700 MW	-	-
Battery Installed Capacity (MW)	-	10,000 MW	7,500 MW	-	-
Electrolyser Installed Capacity (MW)	-	1,500 MW	5,000 MW	-	-
Nuclear Installed Capacity (MW)	-	4,800 MW	7,200 MW	-	-
Elektricity Consumption (TWh)	347.9 TWh	-	510.5 TWh	-	1,271.4 TWh
Share of Renewable Energy in Total Generation	%45.8	%50.0	%54.7	-	%69.1

APLUS Energy Consulting

Source: MENR, TEİAŞ, TEİAŞ YTBS

Note: The total 120 GW of wind and solar installed capacity outlined in the 2035 Renewable Energy Launch has been broken down in the '2053 Long-Term Climate Strategy' report published by the Directorate of Climate Change, with solar installed capacity set at 76.9 GW and wind installed capacity at 43.1 GW as part of the energy sector targets.

According to the new Roadmap for Renewable Energy, the installed capacity of solar and wind is expected to quadruple compared to the previous plan, reaching 120 GW in 2035

The achievement of these targets remain doubtful in the wake of the 80-100 billion USD investment into the sector, the lengthy licensing procedures and the inadequacy of the current transmission sector to account for new generation investments and increased intermittency in the grid

Installed Capacity Targets

Wind Installed Capacity 2025*

13.6 GW

Solar Installed Capacity 2025*

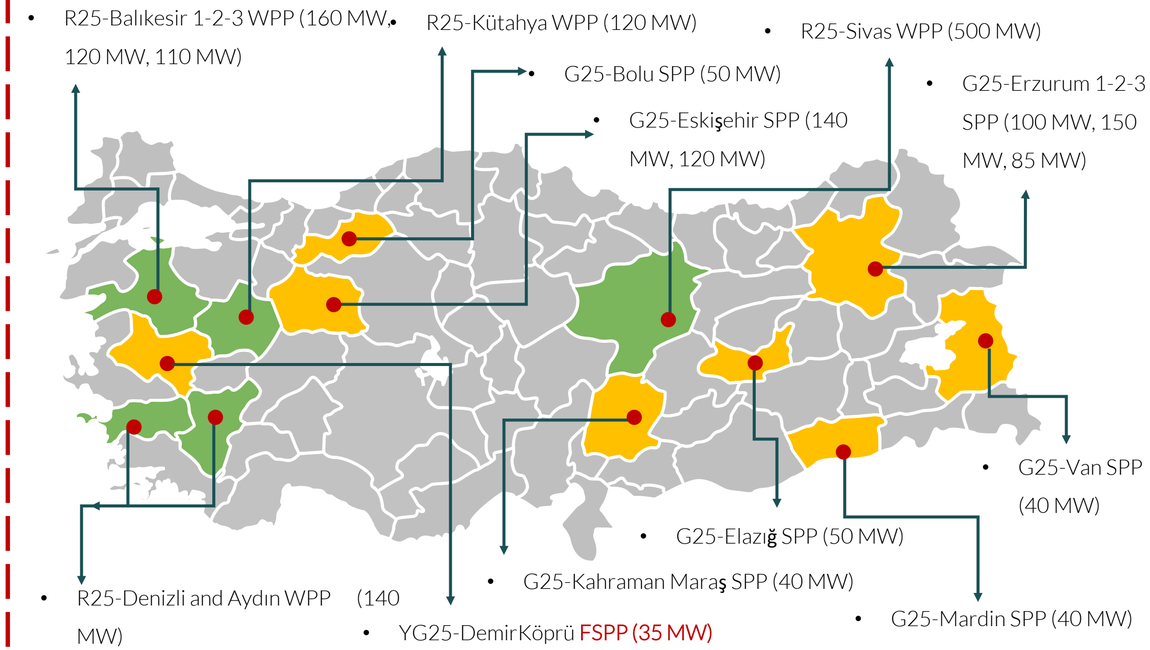
23.4 GW

- 5 GW offshore WPP
- At least 2 GW YEKA each year
- Hybrid capacity for existing power plants
- Self-consumption capacity allocation at the same connection point without supplying energy to the grid
- International projects

Targeted Wind and Solar Installed Capacity 2035

43.1 GW

76.9 GW



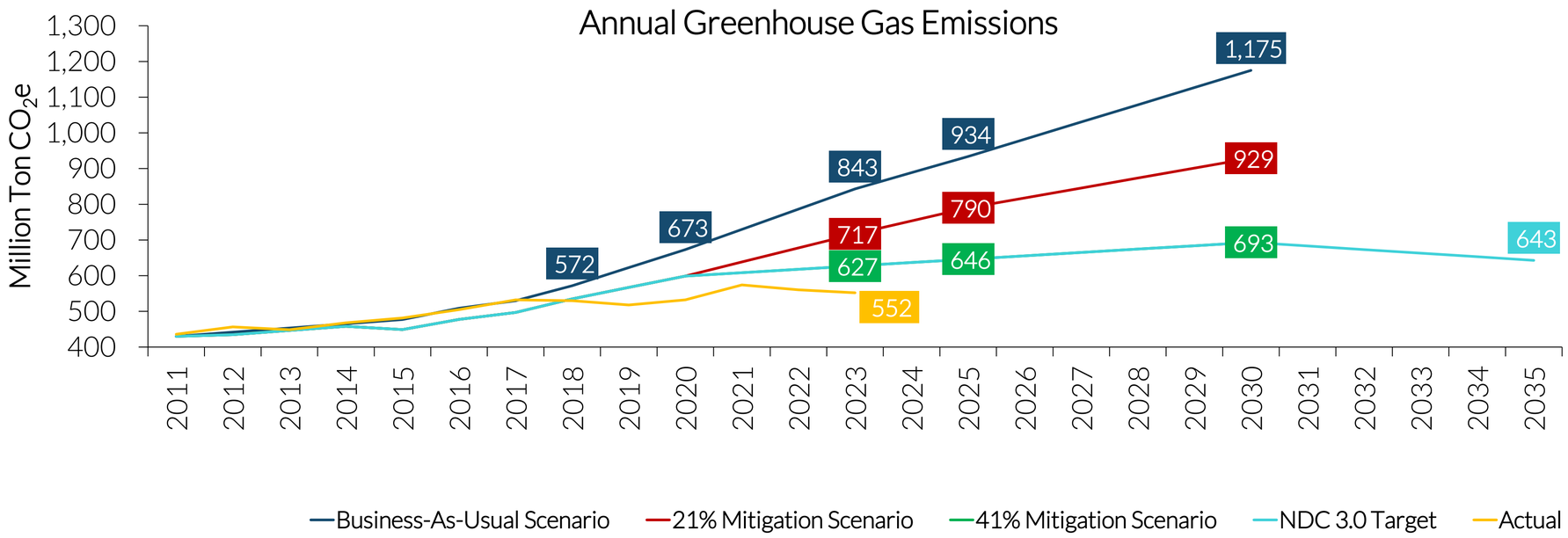
Türkiye announced YEKA tenders totaling 2,000 MW: 850 MW SPP on November 4 and 1,150 MW WPP on November 18. A 35 MW floating SPP at the Demirköprü Hydroelectric Reservoir in Manisa will also be tendered. Terms include free market sales rights of 72 months for wind and 60 months for solar, a 20-year PPA, and a minimum local content requirement.

*The data cover the period through end August 2025.

Source: MENR, TEİAŞ YTBS

Previous NDCs set a latest peak year of 2038, but NDC 3.0 removes this commitment, and several analyses suggest that the lack of a defined peak year

- *Türkiye's updated NDC 3.0, published in 2025, introduced a major shift by adopting 2018 as the base year (458.8 Mt CO_2e) and setting a 2035 target to limit emissions to 643 Mt CO_2e, corresponding to a projected reduction of 466 Mt CO_2e from the revised BAU scenario.* NDC 3.0 provides a longer-term, absolute emissions commitment and covers the entire economy, including all IPCC greenhouse gases and all sectors such as energy, industry, agriculture, land use and waste. Actual emissions reached 552 Mt CO_2e in 2023, allowing comparison with mitigation pathways and highlighting the gap between BAU trajectories and target-consistent levels.
- *Türkiye also is planning to host COP31 in the upcoming year in Antalya with Australia being the lead of the negotiations, is highlighting its updated climate commitments through NDC 3.0, which introduces a more comprehensive and economy-wide emissions reduction framework based on 2018 data, setting targets for 2035 and reinforcing its long-term net-zero vision for 2053.*



Earlier INDC

21% Reduction from the Business-As-Usual

246 million tons of CO_2e mitigated

NDC Update in 2023

41% Reduction from the Business-As-Usual

482 million tons of CO_2e mitigate

NDC Update in 2025

Emission Reduction from the Business-As-Usual by 2035

466 million tons of CO_2e mitigate

APLUS Energy Consulting

Source: Turkish Statistical Institute, Republic of Türkiye Intended Nationally Determined Contribution

The carbon market expected to be implemented in Türkiye by 2028 is anticipated to bring significant changes to the electricity sector

CBAM Regulation

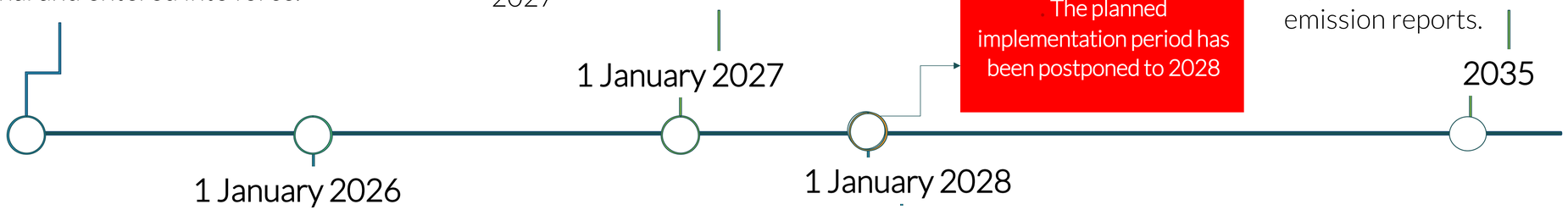
After being signed by member states in May 2023, it was published in the EU Official Journal and entered into force.

First Phase Reporting Period

The current draft regulation sets the mandatory reporting date as January 1, 2027

End of the First Implementation Period

The delivery of allocations to the Directorate of Climate Change equivalent to the amount in the 2034 emission reports.



The Start of the Pilot Phase

The publication of the 2026 National Allocation Plan by the Carbon Market Board in the Official Gazette was targeted to start on January 1, 2026.

Start of the First Implementation Period

The publication of the 2028 National Allocation Plan by the Carbon Market Board in the Official Gazette

The implementation of the carbon taxing price is expected in 2028.

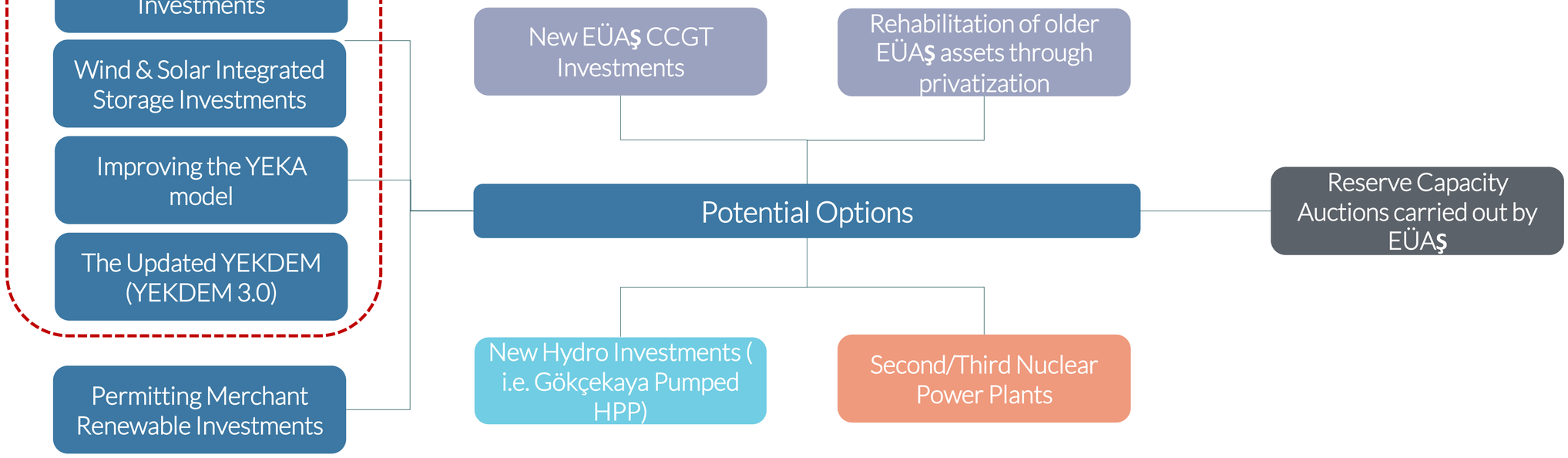
Free Allocation Distribution with Lower-Than-Normal Penalties

A minimum 2-year period is included in the Climate Council decisions.

Source: Republic of Turkey Ministry of Environment, Urbanization and Climate Change, Directorate of Climate Change

There are several options that the policymakers will need to consider to address the growing problem of supply security in the market in the medium term

- *Unlicensed renewable (mostly solar) projects offered the largest potential for development for the last few years*
- *"Wind & Solar Integrated Storage" model will be the leading investment model for the next decade*
- *YEKA auctions are providing more stable but less attractive income potential but despite this lower potential, interest and competition is quite high.*
- *The updated YEKDEM can be a third option after the auction and capacity allocation details are determined.*



Four new YEKA tenders will be completed by the end of 2025, with high competition among participants

- **Total Capacity:** 1,200 MW
- **Floor Price:** 3.50 USD-cent/kWh
- **Ceiling Price:** 5.50 USD-cent/kWh
- **Sale of Electricity:** 6 years in the free market, 20 years at the unit electricity energy purchase price.
- **Minimum Localization Rate**: minimum 55%

YEKA WPP Competition	Capacity (MW)	Winner Company	Bidding Price ($cent/kWh)	Contribution Price (USD/MW)
R24-Edirne	410	Enerjisa Üretim	3.50	60,000
R24-Balkaya	340	Enerjisa Üretim	3.50	92,000
R24-Sergen	200	RT Enerji	3.50	140,000
R24-Yellice	160	Efor Holding	3.50	140,000
R24-Gürün	90	ADY Akdeniz	3.50	148,000

- **Total Capacity:** 800 MW
- **Floor Price:** 3.25 USD-cent/kWh
- **Ceiling Price:** 5.50 USD-cent/kWh
- **Sale of Electricity:** 5 years in the free market, 20 years at the unit electricity energy purchase price.
- **Minimum Localization Rate:**
  - **FV Module:** 75%
  - **DC Solar Cable:** 51%
  - **Carrier System:** 51%
  - **Inverter:** 0.3 USD-cent/kWh contribution to be applied to the purchase price for the first 5 years with a minimum of 51% local content

YEKA SPP Competition	Capacity (MW)	Winner Company	Bidding Price ($cent/kWh)	Contribution Price (USD/MW)
G24-Konya	385	Kalyon	3.25	67,000
G24-Karaman	200	Temmuz Güneş	3.25	150,000
G24-Malatya	75	Öz Erka Enerji	3.25	232,000
G24-Van	60	Şen Güneş	3.25	270,000
G24-Antalya	40	ErdemSoft	3.25	122,000
G24-Kütahya	40	Çumra Güneş	3.25	162,000

*In the specifications of the YEKA wind and solar tenders held in 2025, it was stated that the entire contribution fee must be paid to EPİAŞ within 20 business days following the bidder's invitation to sign the contract. The amount shall be paid in Turkish Lira, based on the CBRTs foreign exchange selling rate on the date of payment. It was also specified that **EPİAŞ will allocate the paid amount under the YEKDEM mechanism in equal monthly installments over the course of one year.***

Source: MENR, Solar3GW

The YEKA model mandates producers to comply with the minimum local content obligations

Wind

Concluded

YEKA - 1 (2017, 1,000 MW)
*required a **local content ratio of 65%***

YEKA - 2 (2019, 1,000 MW)
*required a **local content ratio of 65%***
65% for towers, 60% for blades, and 51% for other equipment

YEKA - 3 (2022, 850 MW)
*required a **local content ratio of 55%***

YEKA – 2025 (2025, 1,200 MW)
*required a **local content ratio of 55%***

Solar

Concluded

YEKA - 1 (2017, 1,000 MW)
*required a **local content ratio of 60-70%***

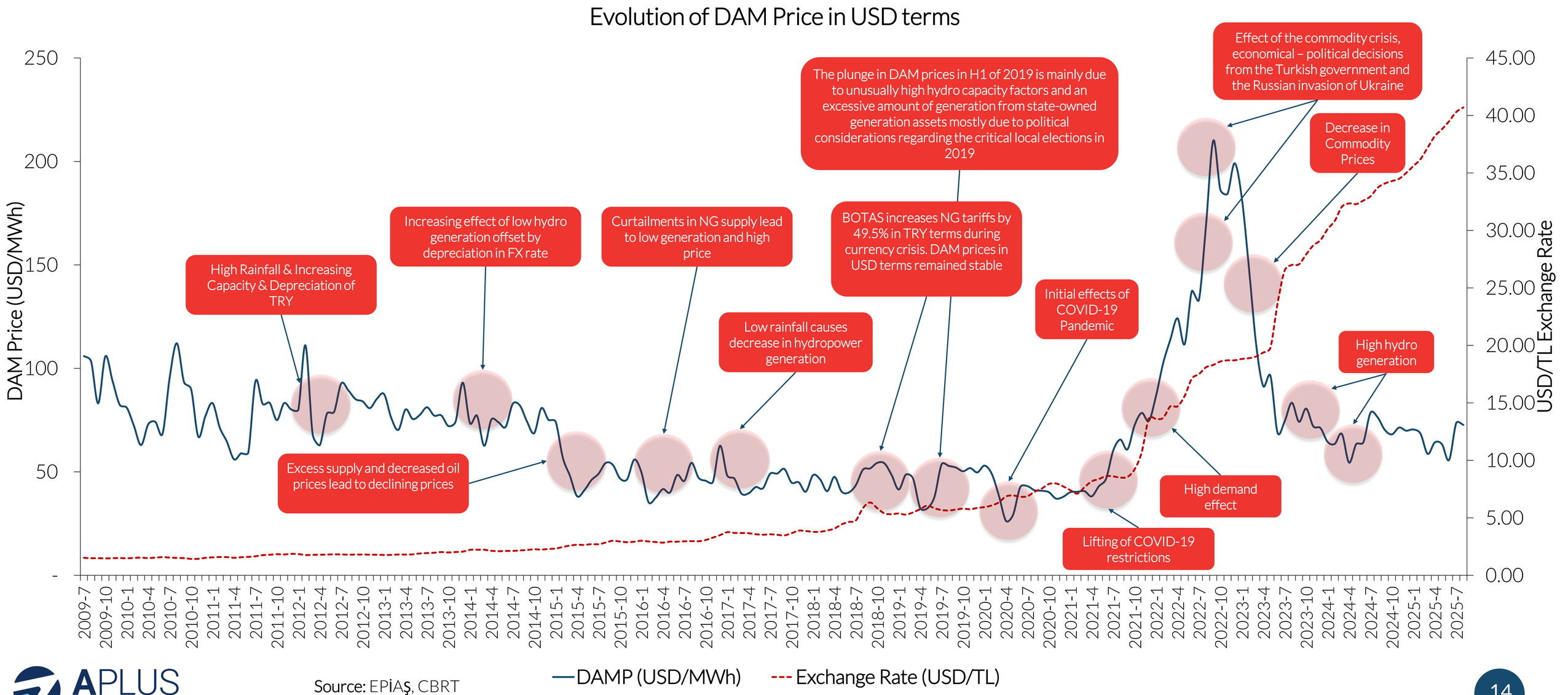
YEKA - 3 (2021, 1,000 MW)
*required a **local content ratio of 70%***

YEKA - 4 (2022, 1,000 MW)
*required a **local content ratio of 75%***

Solar YEKA – 2025 (2025, 800 MW)
*required a **local content ratio of 75%***

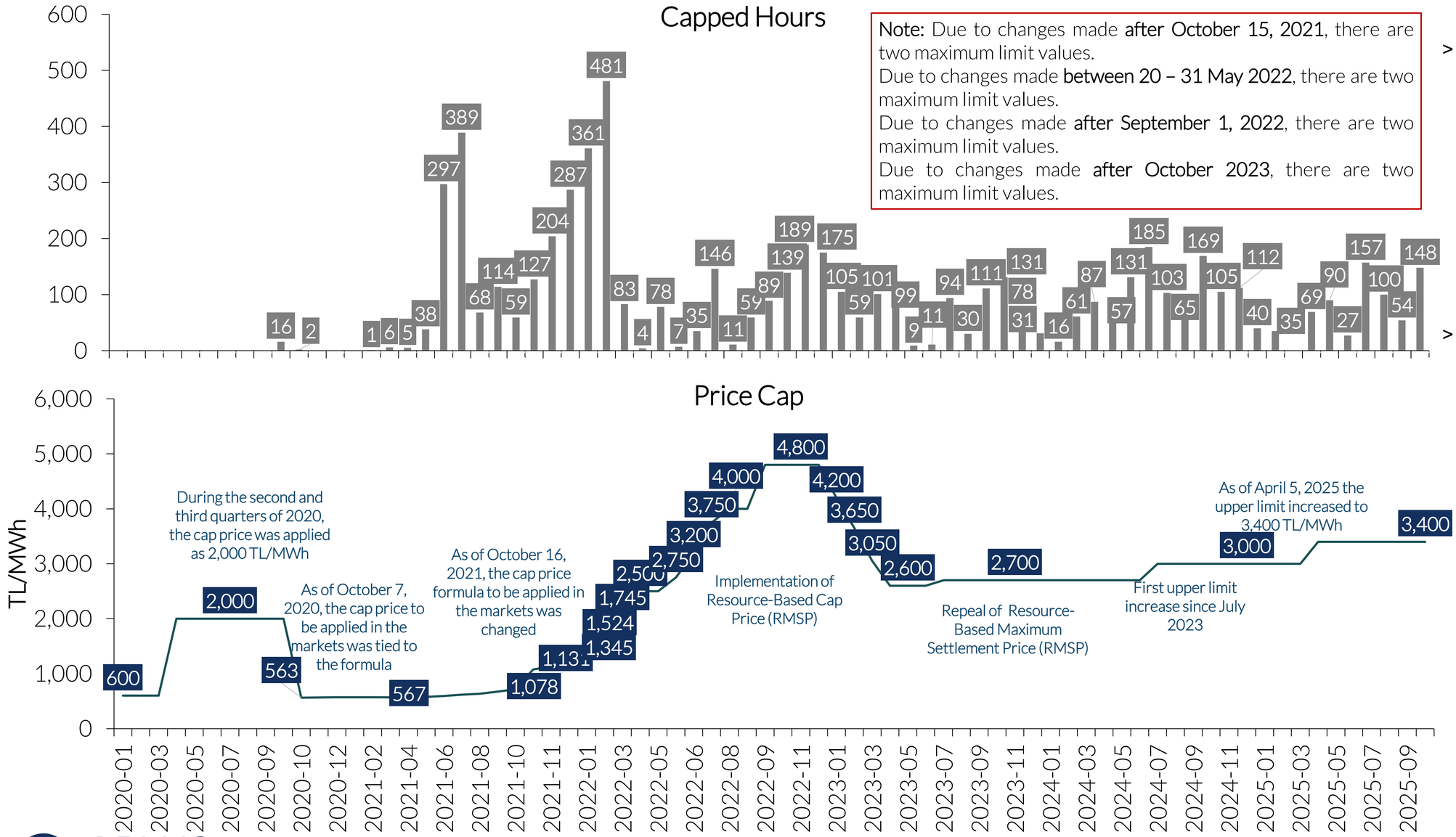
APLUS Energy Consulting

Several factors have played a role in the changing DAM prices over the years



Source: EPİAŞ, CBRT

As of the end October 2025, the market price was capped in 881 out of 7,296 hours



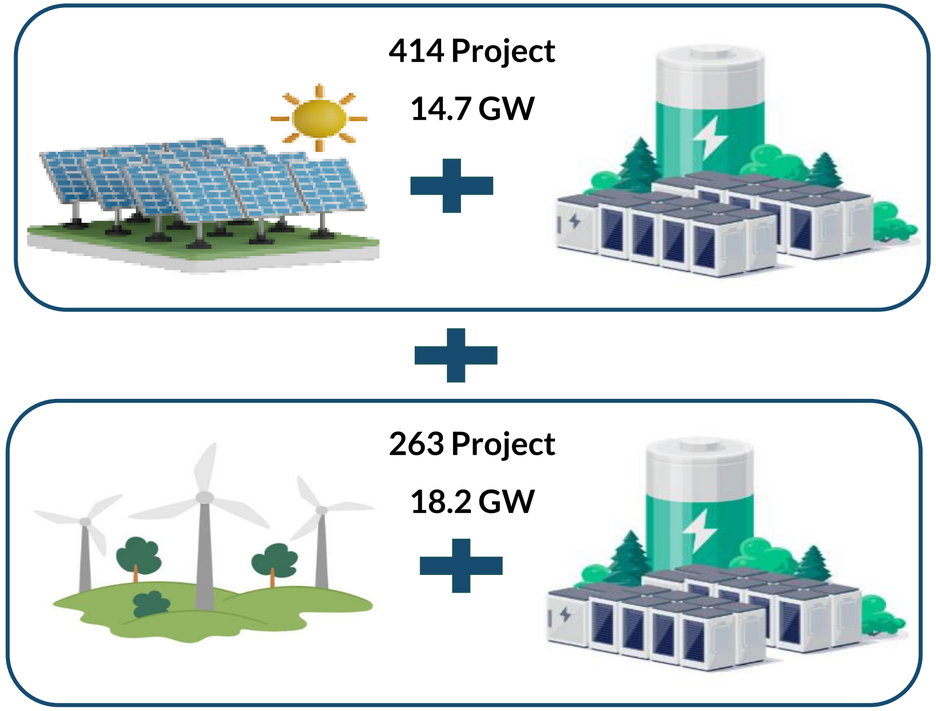
Note: Due to changes made **after October 15, 2021**, there are two maximum limit values.
Due to changes made **between 20 – 31 May 2022**, there are two maximum limit values.
Due to changes made **after September 1, 2022**, there are two maximum limit values.
Due to changes made **after October 2023**, there are two maximum limit values.

- The price caps to be applied in the Day-ahead Market and Balancing Power Market have been implemented differently in the last years and this has created a problem in terms of market predictability. Due to **tariff changes**, the market price cap has been raised to **3,400 TL/MWh**, effective from 5 April 2025.
- In 2020, the number of hours with price formation at the maximum limit was only 10. This increased rapidly in the following years with changes in the maximum limit application:
  - **1,308** hours out of 8,760 hours in **2021** (14.9%),
  - **1,966** hours out of 8,760 hours in **2022** (22.4%),
  - **1,013** hours out of 8,760 hours in **2023** (11.6%),
  - **1,102** hours out of 8,784 hours in **2024** (12.5%) and
  - In **2025**, as of the end of October, the maximum limit value occurred in **881** hours out of 7,296 hours (12.1%).

Source: EPİAŞ

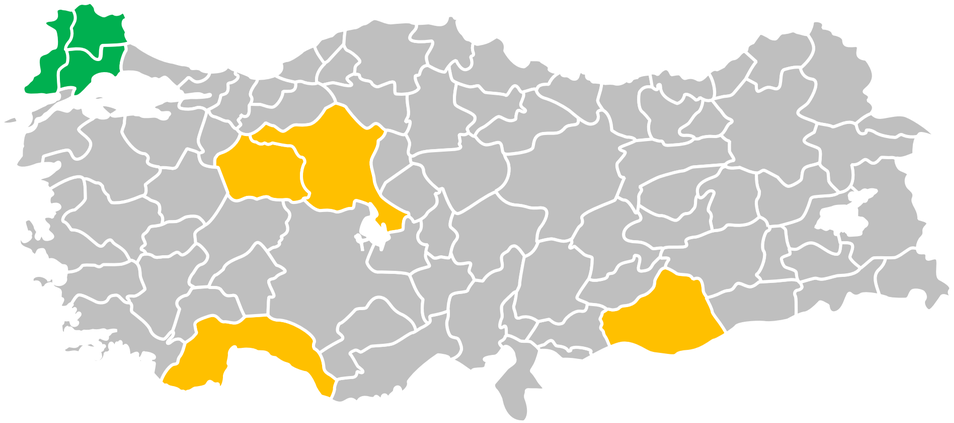
Following the November 2022 regulation allowing non-competitive pre-licenses for WPPs and SPPs with storage, 32.9 GW of pre-licenses were obtained by as of October 1, 2025

> Following the granting of the right to obtain a license without a pre-license competition for power plants with energy storage, many investors have applied for pre-licenses. According to the pre-license list announced by the EMRA, as of the 1st of October 2025, a total capacity of 32.9 GW has been granted pre-licenses for storage-integrated power plants.



Total Pre-licensed Capacity
(as of October 1, 2025)

= 32.9 GW



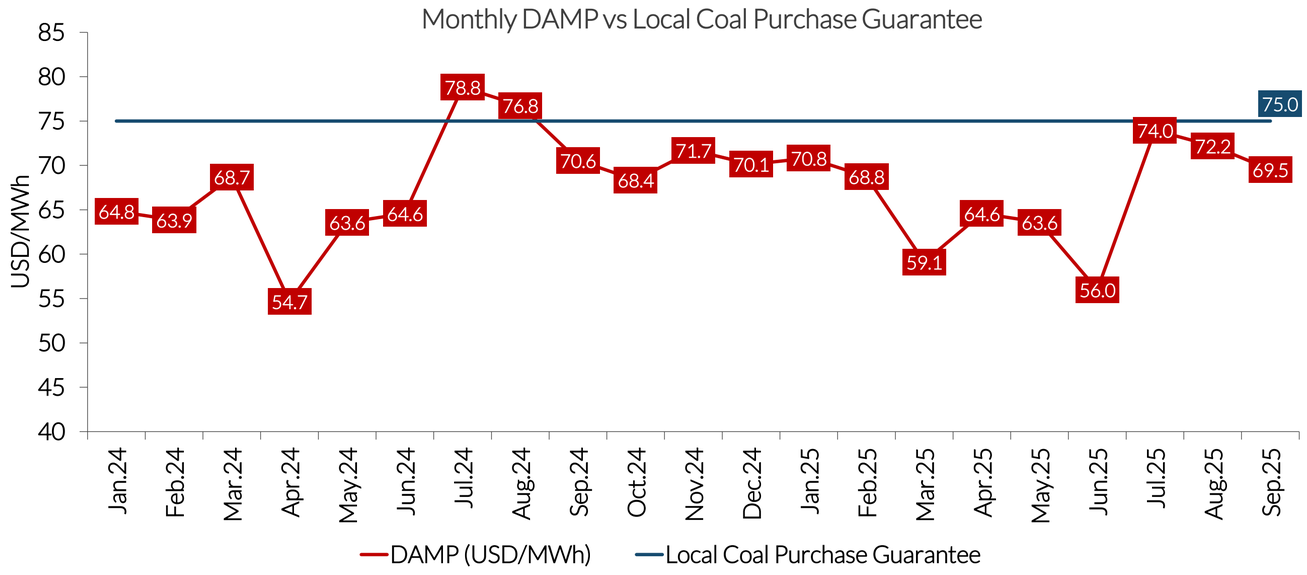
While 54% of the 19.3 GW of wind capacity that received a preliminary license is planned to be installed in three Thrace provinces, 29% of the 15.2 GW of solar capacity is planned to be installed in 4 provinces!

APLUS Energy Consulting

Source: EMRA

Local coal purchases will continue to be one of the major cost items for EÜAŞ for the foreseeable future

- Purchase guarantees have historically been provided for local coal power plants from 2016. In 2017, TETAŞ announced a seven-year purchase guarantee at 201.35 TL/MWh, indexed to inflation, starting from 2018. Under this scheme, 50% of domestic coal generation was purchased by EÜAŞ. However, in 2022 domestic coal operators did not sign the renewed contracts due to soaring day-ahead price.
- According to the 2018 regulation, quarterly escalation was tied to CPI + PPI averages, later revised in 2019 to CPI (25%), PPI (25%) and USD/TRY exchange rate (50%).. EÜAŞ also maintained a price corridor of 50–55 USD/MWh as a floor and ceiling.
- Building on this earlier framework, Minister of Energy Alparslan Bayraktar announced a new incentive program. Under the new scheme, 60% of domestic coal generation will receive a purchase guarantee of 7.5 USD cent/kWh until 2030, while new coal plants will be covered by guarantees until 2045.



APLUS Energy Consulting

While Türkiye has a strong policy framework and a growing appetite for renewable energy, the readiness of its grid infrastructure is a major limiting factor

Grid Connection Capacity Limitations

- This is the most significant challenge. A considerable number of new renewable energy projects are being rejected due to a lack of available grid connection capacity at both the transmission and distribution levels. In a recent 15-month period, 65% of the capacity applying for grid connection at the transmission level was unable to secure approval.
- As of August 2025, no new transmission-level capacity was available for distribution, leading to the rejection of applications.

Regional Imbalances

- The available grid capacity is not evenly distributed across the country. In some regions, there is no capacity left, while others may have some.
- This geographical constraint means that even if a project is viable from a resource perspective, it may be unable to connect to the grid.

Slow Grid Infrastructure Development

- The construction of high-voltage transmission projects is a time-consuming process, with timelines ranging from 5 to 13 years.
- This slow pace of infrastructure expansion is a major bottleneck that cannot keep up with the fast-paced installation of new renewable energy capacity.

Need for System Flexibility

- With the growing share of variable renewable sources like solar and wind, the grid requires increased flexibility to maintain stability.
- While plans for battery storage and other flexible technologies are in place, their full implementation is crucial to prevent curtailment of renewable energy generation during periods of high supply and low demand.

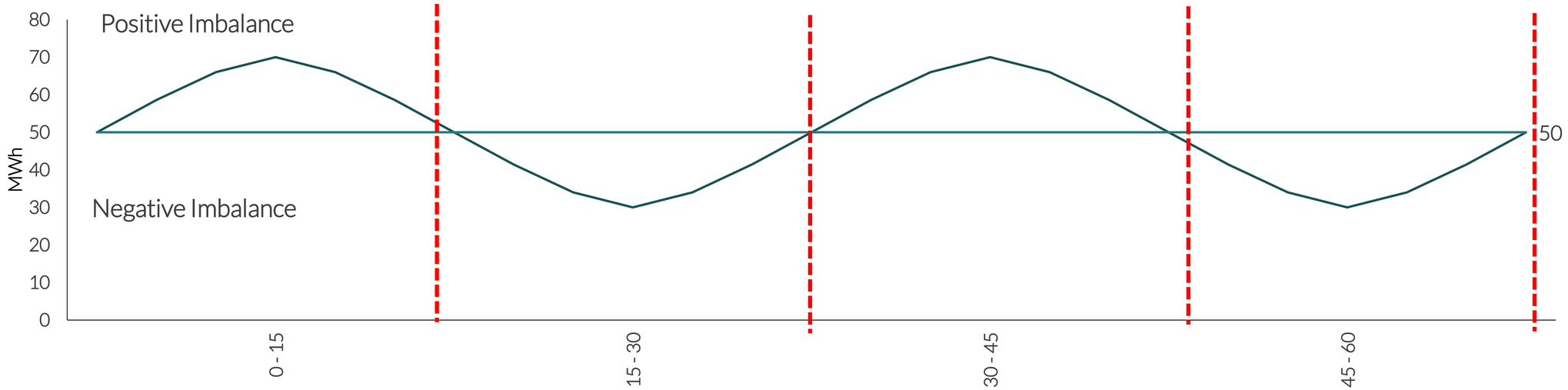
- The rapid increase in solar and wind installations, especially from unlicensed plants, has outpaced the expansion of the transmission and distribution networks. While significant investments and projects are underway to modernize the grid and add crucial storage capacity, the current deficit in available connection capacity poses a substantial obstacle to the country's clean energy ambitions. To fully realize its renewable energy potential, Türkiye must accelerate its grid infrastructure investments and ensure a more coordinated and efficient process for connecting new projects.

APLUS Energy Consulting

Source: TEİAŞ

While imbalances are currently calculated on an hourly basis, shifting to 15-minute intervals exposes short-term deviations that are not visible today

> The imbalance penalty for power plants is determined by the **DAMP–SMP spread**; therefore, a **wider spread** results in **higher imbalance costs**. Currently, **hourly settlement** keeps these costs limited because **deviations are netted out** and **price caps restrict volatility**. However, moving to **15-minute settlement** is expected to **increase price volatility** and **prevent netting**, ultimately **raising imbalance costs for generators**.



> As illustrated in the graph, although the hourly average imbalance appears to remain around **50 MWh**, dividing the same hour into four quarter-hour periods reveals that some intervals create **positive imbalance**, while others create **negative imbalance**. Under the **hourly settlement system**, these deviations **cancel each other out** through averaging. However, under **15-minute settlement**, each quarter-hour is **priced independently**, leading to **higher total imbalance costs**.

> The increase in cost is mainly driven by three mechanisms:

> **Loss of netting effect:** Under hourly settlement, deviations offset each other. In the **15-minute system**, each deviation is **priced separately**, resulting in **both positive and negative imbalance charges**.

> **Higher price volatility:** Short-term fluctuations become more visible, so **each quarter-hour forms a different price**, making spot prices **more volatile**.

> **More punitive renewable forecasting errors:** With 15-minute granularity, RES/GES forecast errors become **more frequent**, **more noticeable**, and **more costly**

Thank you...

APLUS
Energy Consulting

info@aplusenerji.com.tr