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# New Challenges in Financial and Energy Markets

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- 1. EU Emissions Trading Scheme (ETS)**
  - 2. EU Natural Gas & Greek Electricity**
  - 3. Corporate Power Purchase Agreements (PPAs) with Renewable Energy Sources (RES)**
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## What is the EU ETS?

EU Emissions Trading Scheme (ETS) is a “cap and trade” system, launched in 2005 and trades pollution permits with official title of EU Allowance (EUA). It operates in 27 EU countries plus Iceland, Norway and Lichtenstein.

It is a single European “currency” for emissions, measured in metric tones, i.e. 1 metric tone of CO<sub>2</sub> = 1 allowance.

### Market Participants / Emitters

- Power generation and industrials



- Airlines



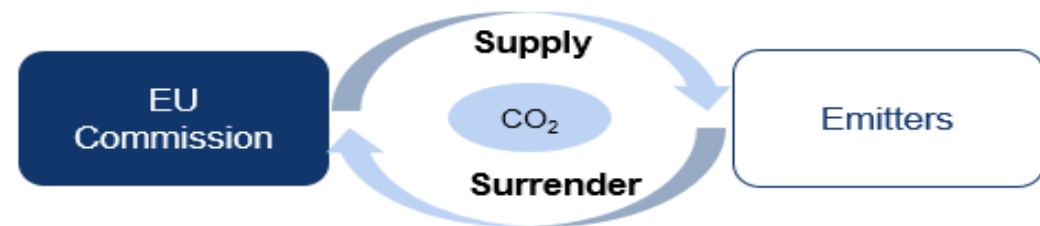
- Shippers



### Markets:

- Primary Market: The EU Commission creates primary supply of allowances and Emitters surrender the required emissions to the Ministry of the Environment and Energy to cover the emissions that they produce.

- Secondary Market: Market Participants trade allowances via Financial Institutions or Brokers.



## Shipping Industry as new entry

Since January 2024, the EU ETS has been extended to cover CO2 emissions from all large ships (5,000 gross tonnage and above) entering EU ports, regardless of their flag.

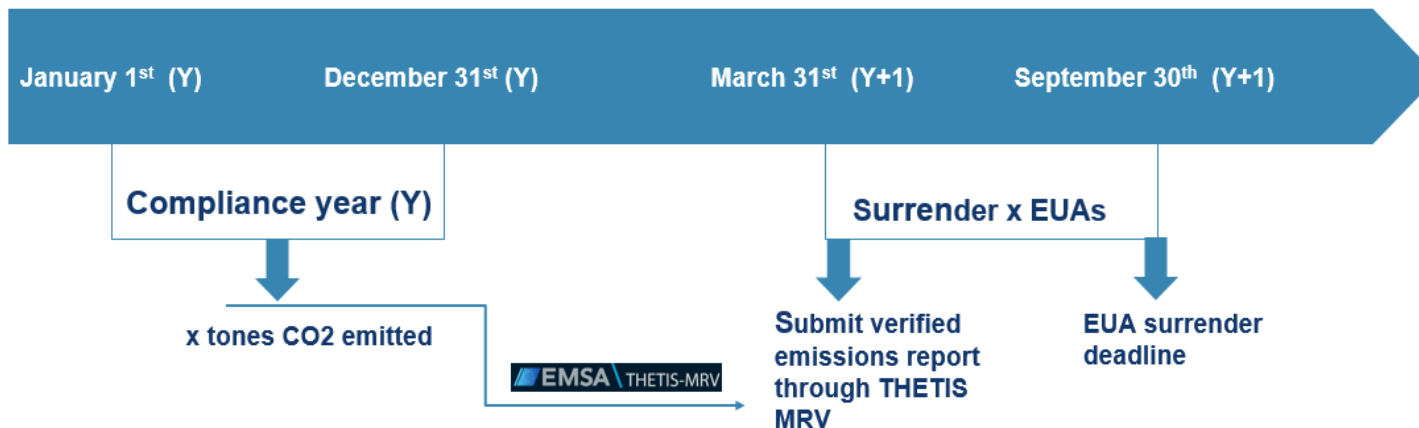
### Requirements for Shipping Companies are set below:

- 100% of emissions from voyages that occur between two EU ports.
- 50% of emissions from voyages starting or ending outside of the EU.

### The main factors affecting emissions are:

- Voyage Distance
- Speed
- Vessel Size & Technical Characteristics
- Draught & Cargo Type
- Fuel Type

### Annual schedule of Shipping Company as an Emitter



### Challenges & New Products

#### 2026

The EU Carbon Border Adjustment Mechanism (CBAM) will be introduced and applied to importers of goods to the EU for cement, iron, steel, aluminum, fertilizers, electricity and hydrogen.

Importers will have to purchase CBAM certificates, which are linked to the EU ETS, priced based on EUA auctions.

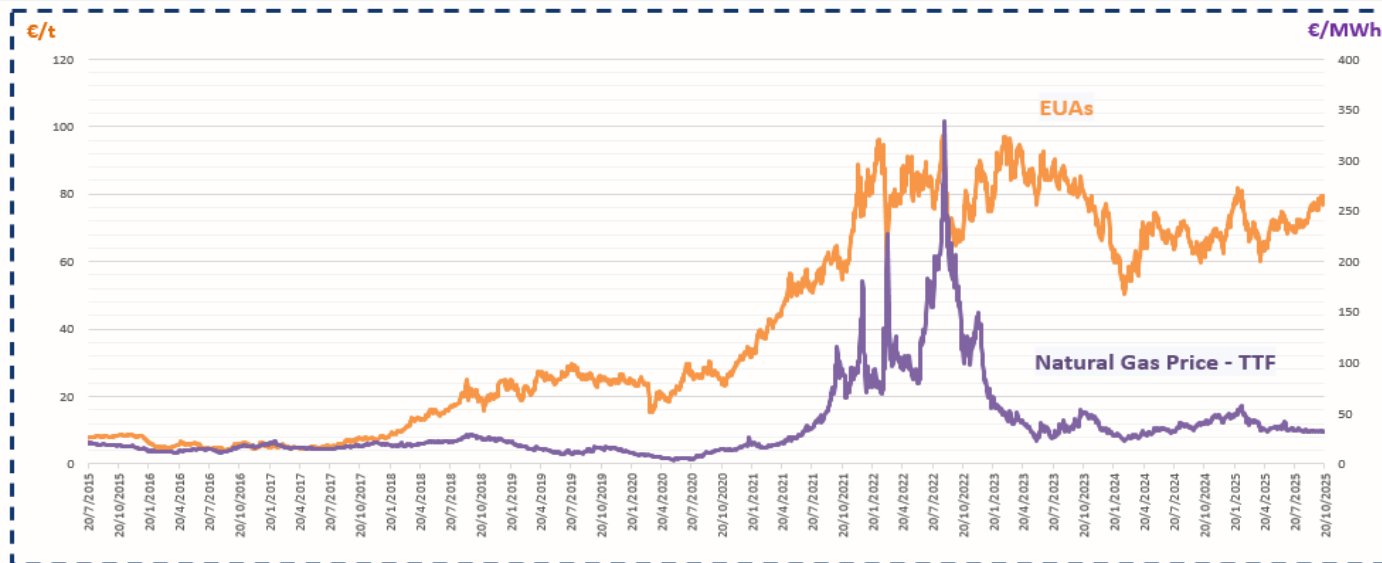
#### 2027

New Emissions Trading System named ETS2 will cover CO2 emissions to road transport and buildings.



# EUA Spot & Futures Prices

## Historical Data EUAs & TTF



## EUA Spot & Future Prices on ICE (Bloomberg as of 29.10.2025)

Description	Last	Chg	Settle	Time	Bid	Ask	Open Int	Volume	Yest Settle
Spot	78.56	+.48		11:51	78.50	78.53		44	78.08
Nov25	78.75	+.55		9:53	78.62	78.66	7130	5	78.20
Dec25	78.77	+.45		11:53	78.75	78.77	361245	5129	78.32
Jan26				10/28	78.94	79.02			78.54
Mar26	79.20	+.34		11:37	79.28	79.32	38590	10	78.86
Jun26				10/28	79.82	79.87	3659		79.40
Aug26				10/28	80.15	80.19	20078		79.72
Sep26				10/28	80.32	80.39	1739		79.92
Dec26	80.85	+.50		11:52	80.77	80.80	195651	339	80.35
Mar27				10/28	81.28	81.34	1582		80.89
Jun27				10/28					81.42
Aug27				10/28	82.24	82.33	4351		81.84
Sep27				10/28					82.05
Dec27	83.00	+.41		11:15	83.02	83.05	67477	22	82.59
Mar28				10/28	83.62	83.80	1		83.24
Aug28				10/28	84.68	84.80	175		84.27
Dec28				10/28	85.56	85.64	8269		85.12
Dec29				10/28	88.33	88.57	1715		87.92
Dec30				10/28	91.63	91.97	283		91.19

## Spot & Forward Examples

### Spot Transaction:

The buyer agrees to buy 10k SPOT EUAs at 78.56€/mt (3.11.2025).

Payment: The buyer will pay 785,600 € the next business day after the deal is done (4.11.2025).

Delivery: On the following business day after payment received (5.11.2025), the buyer will receive the units to its EU registry account.

### Forward Transaction in December 2026:

The buyer agrees on 3.11.2025 to buy 10k Forward EUAs at 80.85€/mt on 18.12.2026.

The buyer will pay 808,500 € one day before the agreed date in the future (17.12.2026) and will receive the units to its EU registry account on 18.12.2026.



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## EU Natural Gas Market and Greek Electricity

### Natural Gas

Natural gas is currently the third energy source in the world after oil and coal. It is an essential aid to energy transition with the lowest carbon footprint among fossil fuels.

Title Transfer Facility (TTF) is the leading European benchmark for wholesale natural gas prices. Unlike a physical pipeline, the TTF is a virtual marketplace in the Netherlands where traders, energy suppliers and large industrial consumers buy and sell natural gas.

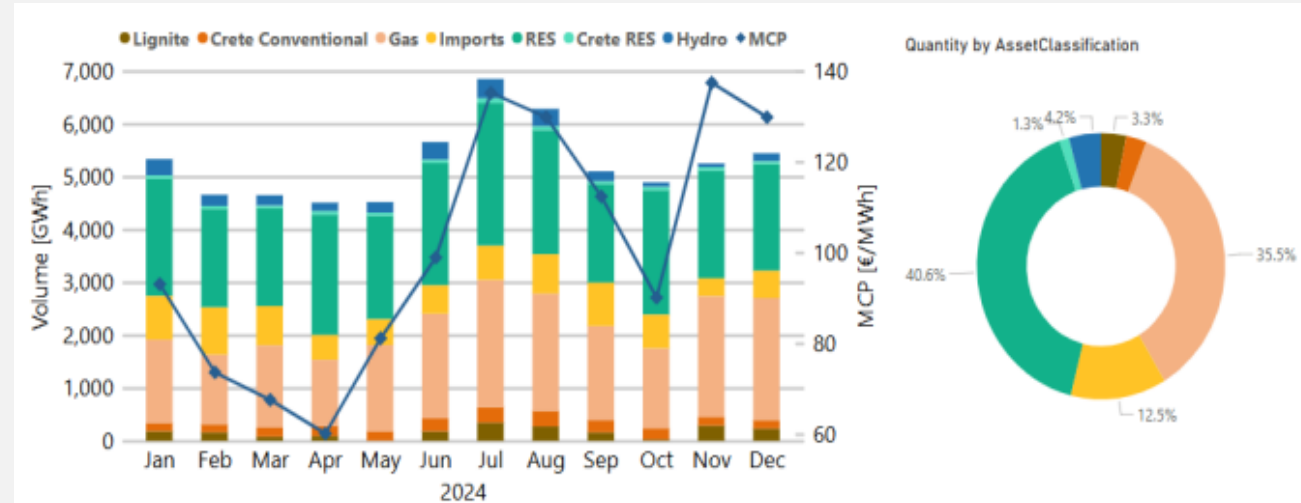
### Electricity

Electricity is a unique tradable commodity, as it is not storable. It must be produced and used simultaneously, i.e. supply must meet demand exactly in the power grid.

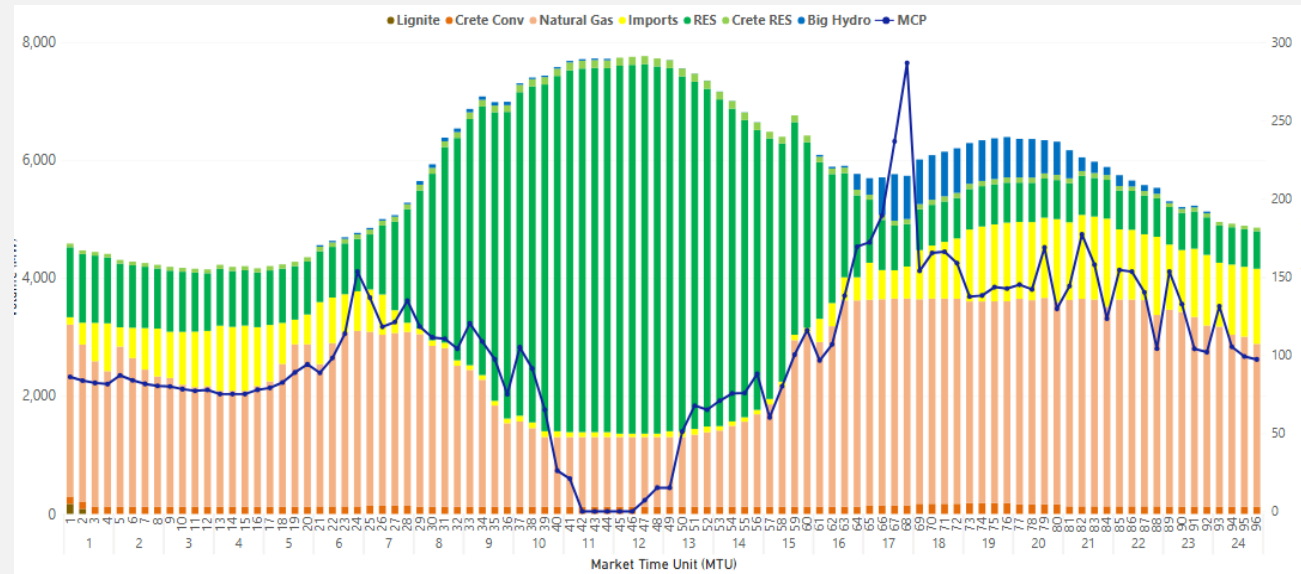
Storage capabilities (mainly via batteries systems) will help smooth out fluctuations in electricity demand and supply.

## Greek Electricity Data

### Monthly Day-Ahead Sell Side Dashboard (EnEx)



### Daily Day-Ahead with Delivery Date: 29/10/2025 (EnEx)





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## Spot & Future Prices

### Historical Data TTF & Greek DAM



### TTF Prices on ICE (Bloomberg as of 29.10.2025)

Description	Last	Chg	Settle	Time	Bid	Ask	Volume	Yest Settle
▼ Yearly								
1) Jan26 Yearly	30.780	+0.069		12:37	30.755	30.795	167	30.711
2) Jan27 Yearly	28.725	+0.022		12:36	28.730	28.775	235	28.703
3) Jan28 Yearly	25.925	-0.021		12:36	25.925	25.980	70	25.946
4) Jan29 Yearly				10/28	24.100	24.250		24.156
5) Jan30 Yearly				10/28	23.300	24.190		23.480
6) Jan31 Yearly				10/28	23.000	23.650		23.532
7) Jan32 Yearly				10/28		24.445		24.352
8) Jan33 Yearly				10/28		27.345		24.937
9) Jan34 Yearly				10/28		30.095		25.523

### Greek Baseload Prices on EEX (Bloomberg as of 29.10.2025)

Description	Last	Chg	Settle	Time	Bid	Ask	Volume	Yest Settle
▼ Yearly								
1) Jan26 Yearly	98.75	+0.50		11:54	97.25	99.00	1	98.25
2) Jan27 Yearly				10/28	95.60	98.60		96.68
3) Jan28 Yearly				10/28	87.90	90.90		89.48
4) Jan29 Yearly				10/28	86.50	89.50		88.12
5) Jan30 Yearly				10/28	82.00	85.00		83.58
6) Jan31 Yearly				10/28	79.50	82.50		80.13



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## Electricity Baseload Swap

### General Info:

- Bilateral Over-the-Counter (OTC) Derivative Contract with the exchange of future cash flows.
- The structure involves one leg with payments based on the market value of the Underlying and another leg with fixed payments
- At maturity, the transaction is cash settled.

### Contract Specifications:

- The Underlying is the Greek Electricity daily average reference price as provided by the EnEx - Day-Ahead Market (DAM).
- The contract duration (in days) and size (in MWh) are agreed between parties.

### Advantages of the product:

- Risk management and protection against market price fluctuations
- Optimization of cash flows through fixed and predictable costs / revenues.
- By executing this swap, the buyer retains the right to continue with the current electricity provider or to select any alternative provider at any time, without incurring any contractual obligation.
- With one single contract, total electricity needs can be partially or fully hedged, regardless the number of meters/contracts or grid voltage classification (high, medium or low).

### Example of OTC Electricity Baseload Swap

Start Date: 01 November 2025

End Date: 31 December 2025

Daily MWh: 240 MWh (10 MW x 24 hours)

Total Calendar Days: 61 Days

The buyer agrees to lock the price of 10 MW of electricity for 2 months i.e. 14,640 MWh (10 MW x 24 hours x 61 days) at 100 €/MWh.

At the end of the period, if the Average DAM price is 150 €/MWh, the buyer will receive 732,000 € (150 €/MWh - 100 €/MWh) x 14,640 MWh.

At the end of the period, if the Average DAM price is 80 €/MWh, the buyer will pay 292,800 € (80 €/MWh - 100 €/MWh) x 14,640 MWh.





## Corporate Power Purchase Agreements (PPAs) with Renewable Energy Sources (RES)

A corporate PPA is an agreement between a buyer and a seller for the future exchange of an amount of electricity produced from a RES at an agreed price.

### Main Characteristics

Longer Duration: 5-20 years

Type: Virtual (financial) vs. Physical

Fixed Volume (baseload) vs. Variable Volume (pay as produced)

### Advantages

#### Government:

Acceleration of the energy transition and reduction of dependence on fossil fuels.

Replacement of government subsidies (Feed-in Tariff (FiT) or Feed-in Premium (FiP) schemes).

#### RES producers (Sellers)

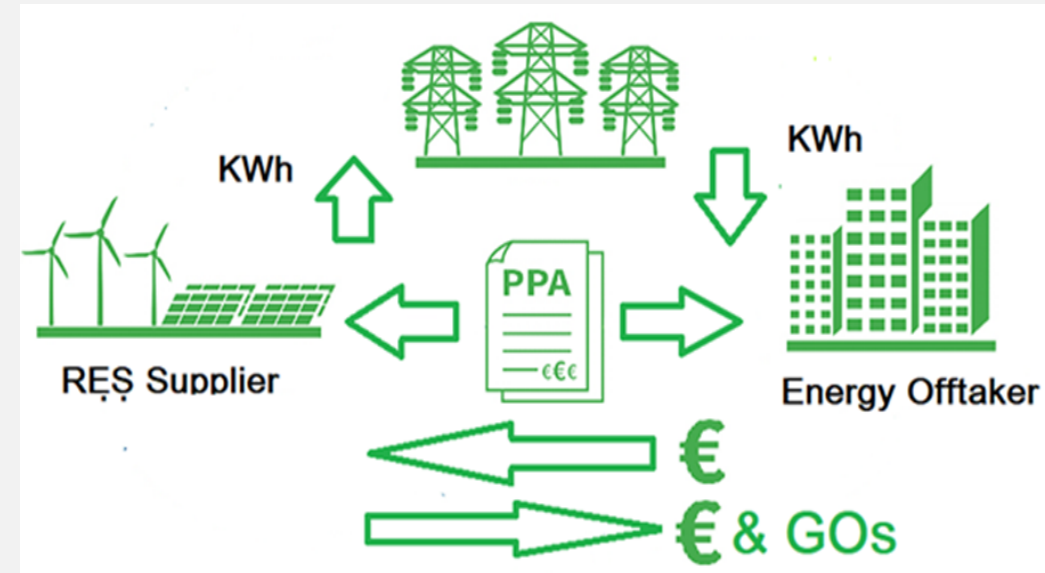
Predictable revenue streams, by stabilizing future cash flows.

Easier access to bank financing, by eliminating risk of price fluctuation for future energy production.

#### Consumers (Buyers)

Reducing electricity cost fluctuations for longer tenors, offers more stable budgeting for operating expenses.

Support decarbonization goals by indirectly funding RES and receiving Guarantees of Origin (GOs).



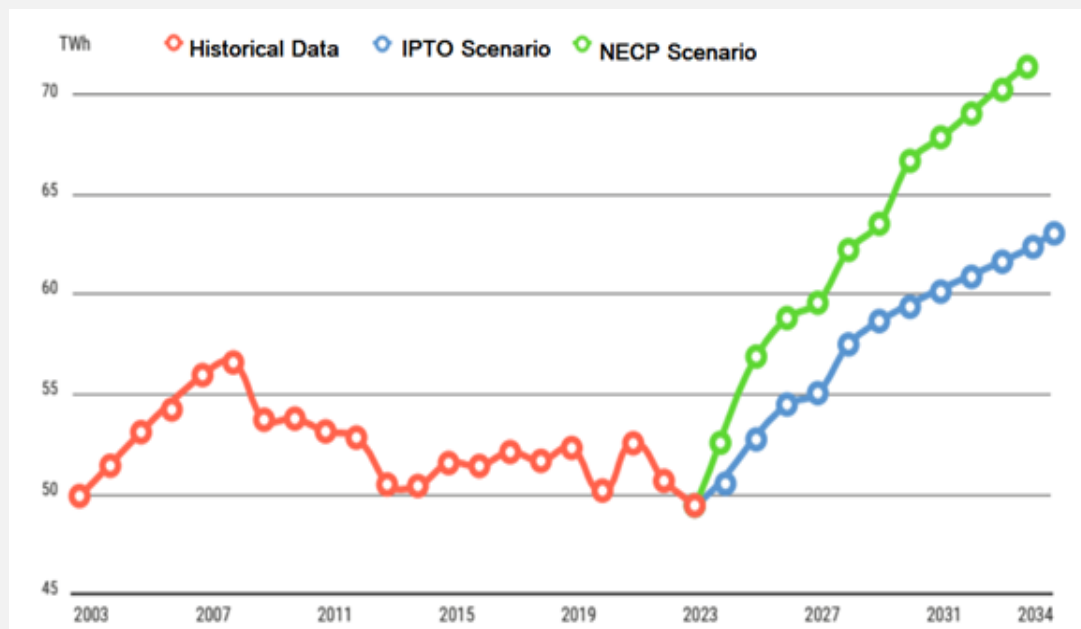
# Electricity Demand & RES Supply Outlook

## Electricity Demand in Greece

Electricity demand is expected to increase due to:

- The growing adoption of electrified technologies (e.g. heat pumps)
- Electric vehicles
- Data centers
- Economic expansion
- Potential Electrolyser demand for hydrogen

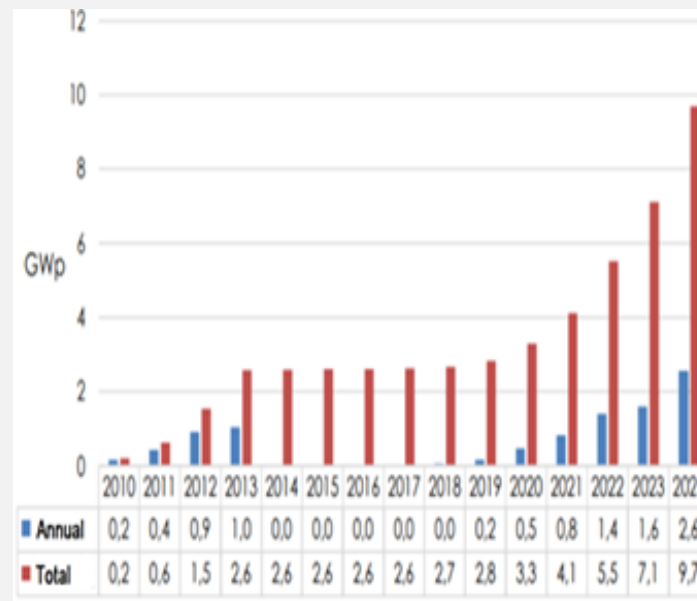
## Historical Greek Demand Electricity and IPTO & NECP Forecasts



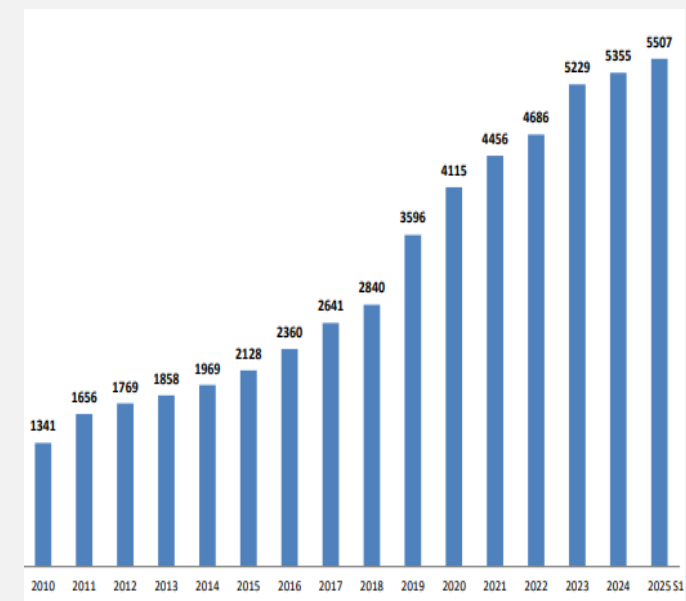
## RES in Greece (Mix Wind & Photovoltaic)

- The RES in Greece reached at 5.4 GW for Wind and 9.7 GW for PV in 2024.
- Additional 14.5 GW RES (11GW for PV and 3,5 GW for Wind) have secured Connection Terms from TSO, while 50 GW RES (43.5 GW PV and 6.5 GW Wind) have submitted to TSO to receive connection terms.
- The targets of the Revised National Energy and Climate Plan (NECP) are:  
 PV: 13.5 GW in 2030 and 35.1 GW in 2050  
 Wind: 8.9 GW in 2030 and 13.0 GW in 2050

## Total Capacity in Greek PV (HELAPCO)



## Total Capacity in Greek Wind (HWEA)





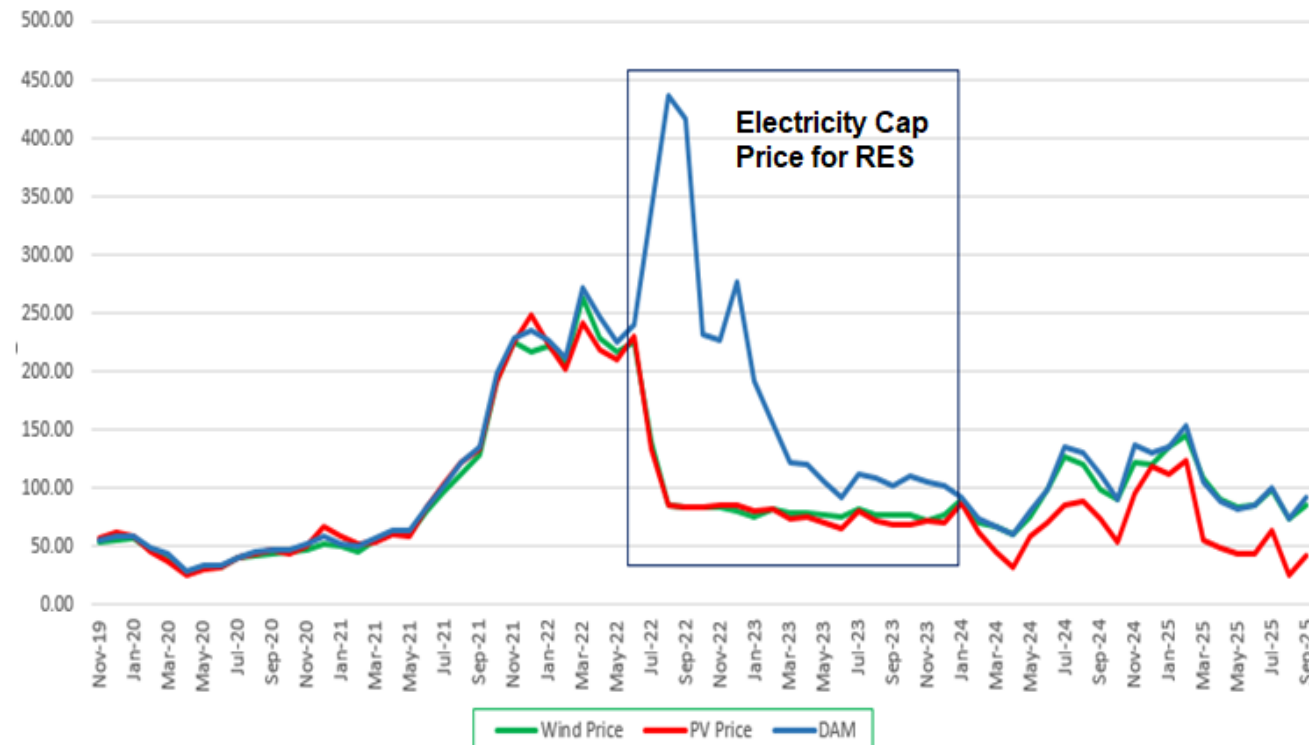
## Corporate PPAs challenges & potential solutions

- High shaping cost due to mismatch between RES output (mainly solar) and industrial demand.
- Zero, negative prices and curtailments (1.789 Gwh in 9M 2025 or 7.9% of total RES production vs. 899 GWh in 2024) have become more common in the Greek System.



Hybrid contractual structures combining RES generation and storage capabilities will support and enhance baseload stability by making supply and demand more flexible.

Greek Electricity Prices



### Need for Standardized Products

- Negotiation of a PPA contract is a lengthy and complex process both on legal & technical terms.
- Standardized products can give parties more flexibility to manage their energy exposure.
- International Swaps and Derivatives Association (ISDA) published its Financial PPA Confirmation Template.



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