2024

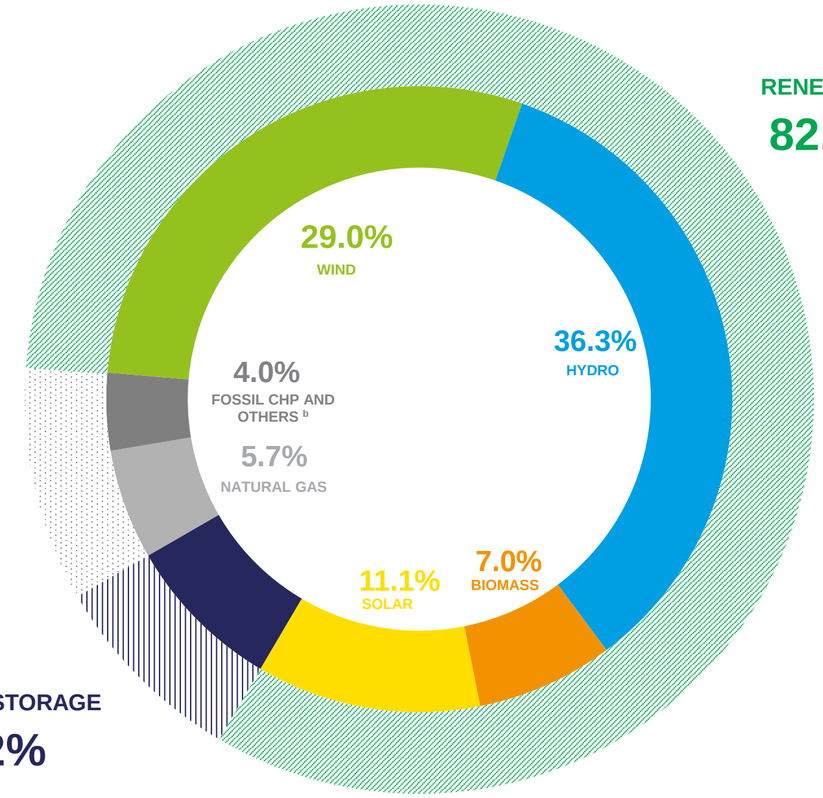
RENEWABLE ELECTRICITY BULLETIN

SEPTEMBER 2024

PORTUGAL NEEDS OUR ENERGY

APREN Associação de Energias Renováveis

EXECUTIVE SUMMARY
GENERATION (JAN-SEP)



WIND 9,988 GWh

HYDRO 11,897 GWh

BIOMASS 2,447 GWh

SOLAR 3,984 GWh

PUMPED STORAGE 2,834 GWh

NATURAL GAS 1,949 GWh

FOSSIL CHP AND OTHERS[b] 1,364 GWh

MAIN INDICATORS (JAN-SEP)

GWh	€/ MWh	€/ tCO_2	$MtCO_2$ - eq	GWh	gCO_2 eq/kWh
34,463	52.8	65.0	1.2	7,158	33.9
Generation[a]	MIBEL PT Price	CO_2 Price	CO_2 Emissions	Import Balance	CO_2 Specific Emissions

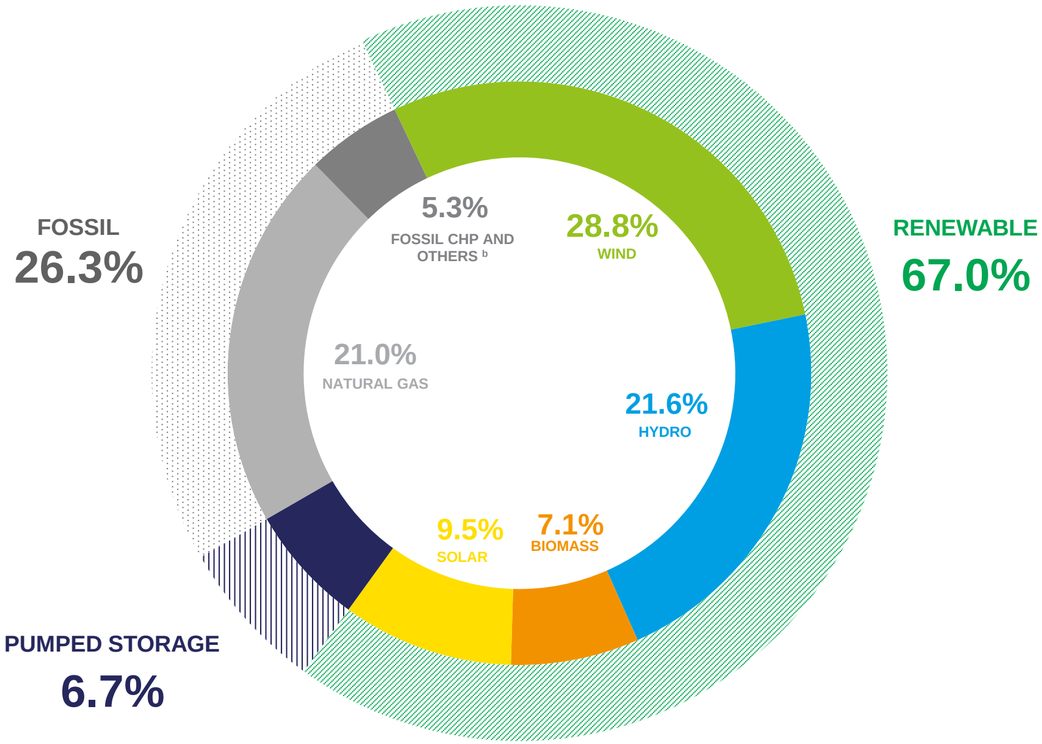
[a] Generation refers to the net energy generation of the power stations, taking into account the pumping production recently disclosed by REN. Production from pumping is not included in the percentage of production from renewable sources
[b] Includes fuel oil, diesel, the non-biodegradable fraction of MSW and new waste

.

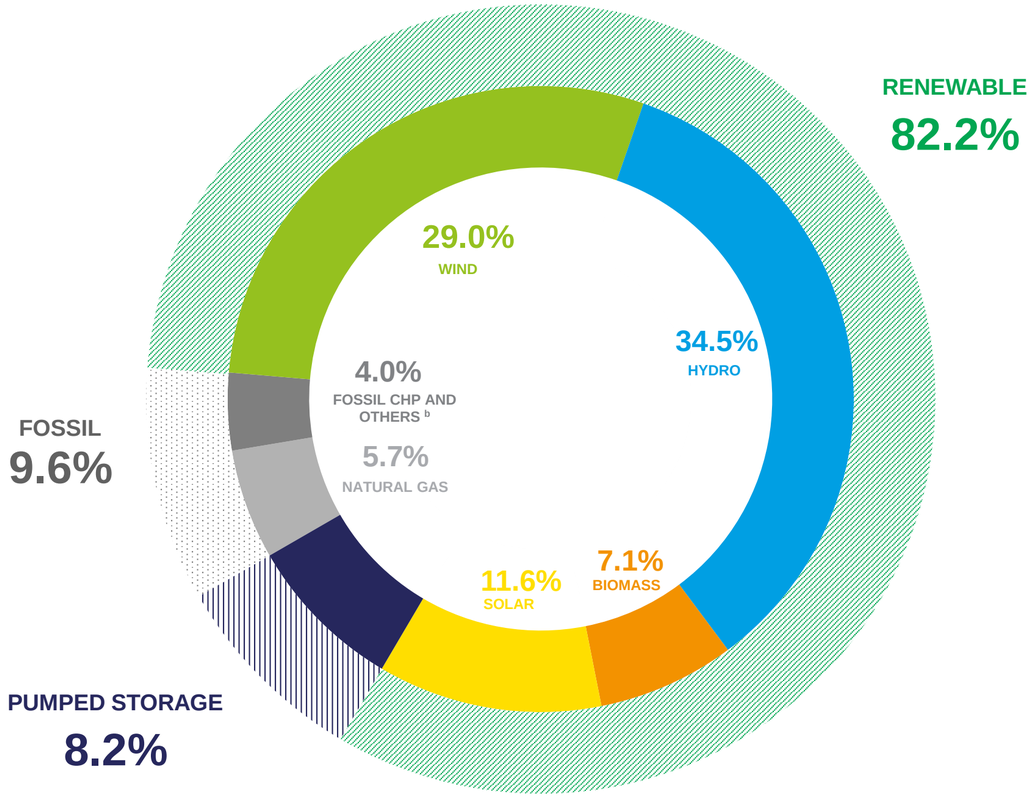
Source: REN, APREN Analysis

EXECUTIVE SUMMARY

SEPTEMBER ACCUMULATED GENERATION 2023



SEPTEMBER ACCUMULATED GENERATION 2024



MAIN INDICATORS COMPARED TO SEPTEMBER 2023

▲ 9.1%	GWh 34,463 Generation[a]	▲ 15.1p.p.	% 82.2 Incorporation	▲ 1,6%	GWh 38,119 Consumption[c]

1.07 Wind index		1.33 Hydro index		0.96 Solar index	

[a] Generation refers to the net energy generation of the power stations, taking into account the pumping production recently disclosed by REN. Production from pumping is not included in the percentage of production from renewable sources.
Source: REN, APREN Analysis

[b] Includes fuel oil, diesel, the non-biodegradable fraction of MSW and new waste

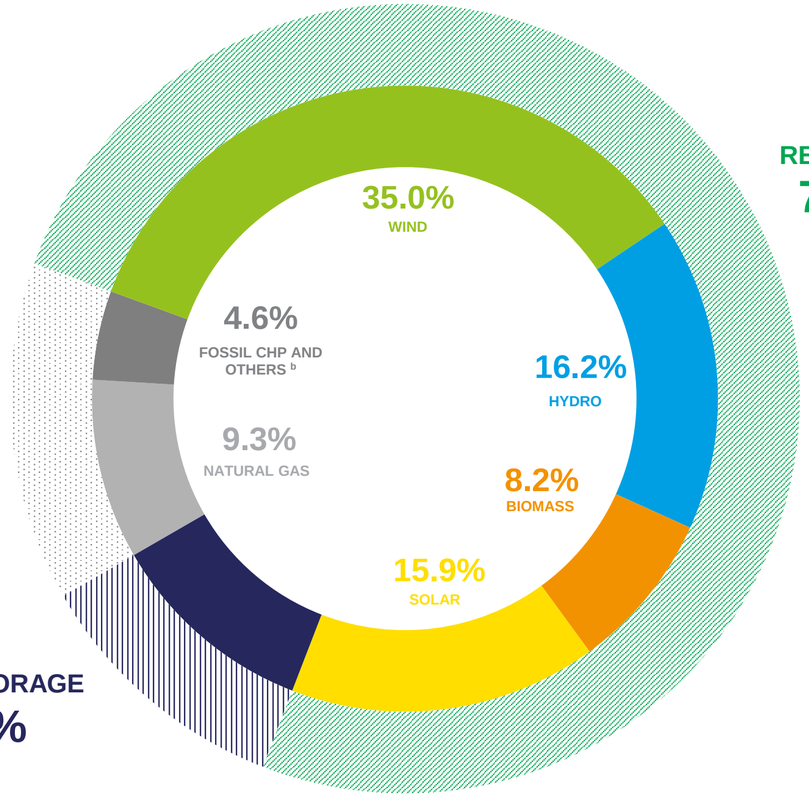
[c] Consumption refers to the net generation of energy by power stations, taking into account the import-export balance.
Source: REN, APREN Analysis

MONTHLY ANALYSIS IN PORTUGAL
SEPTEMBER

Between 1 and 30 September 2024, renewable incorporation was 75.3%, corresponding to 2,274 GWh of the 3,020 GWh produced in the month under review.

The amount of electricity generated in comparison to September of 2023 is similar, which is due to a reduction from 30.0% to 9.3% in fossil production through natural gas, whereas wind production increased from 24.2% to 35.0%.

In September 2024, imports were high, totaling 35.3% of the electricity consumed in mainland Portugal.



RENEWABLE
75.3%

FOSSIL
13.9%

PUMPED STORAGE
10.8%

ELECTRICITY SECTOR'S INDICATORS (IN COMPARISON WITH SEPTEMBER 2023)

GWh
3,020
Generation[a]
▲ 0.1%

GWh
4,058
Consumption[c]
▲ 2.1%

%
75.3
Renewable incorporation
▲ 19.4 p.p.

WIND INDEX
1.39

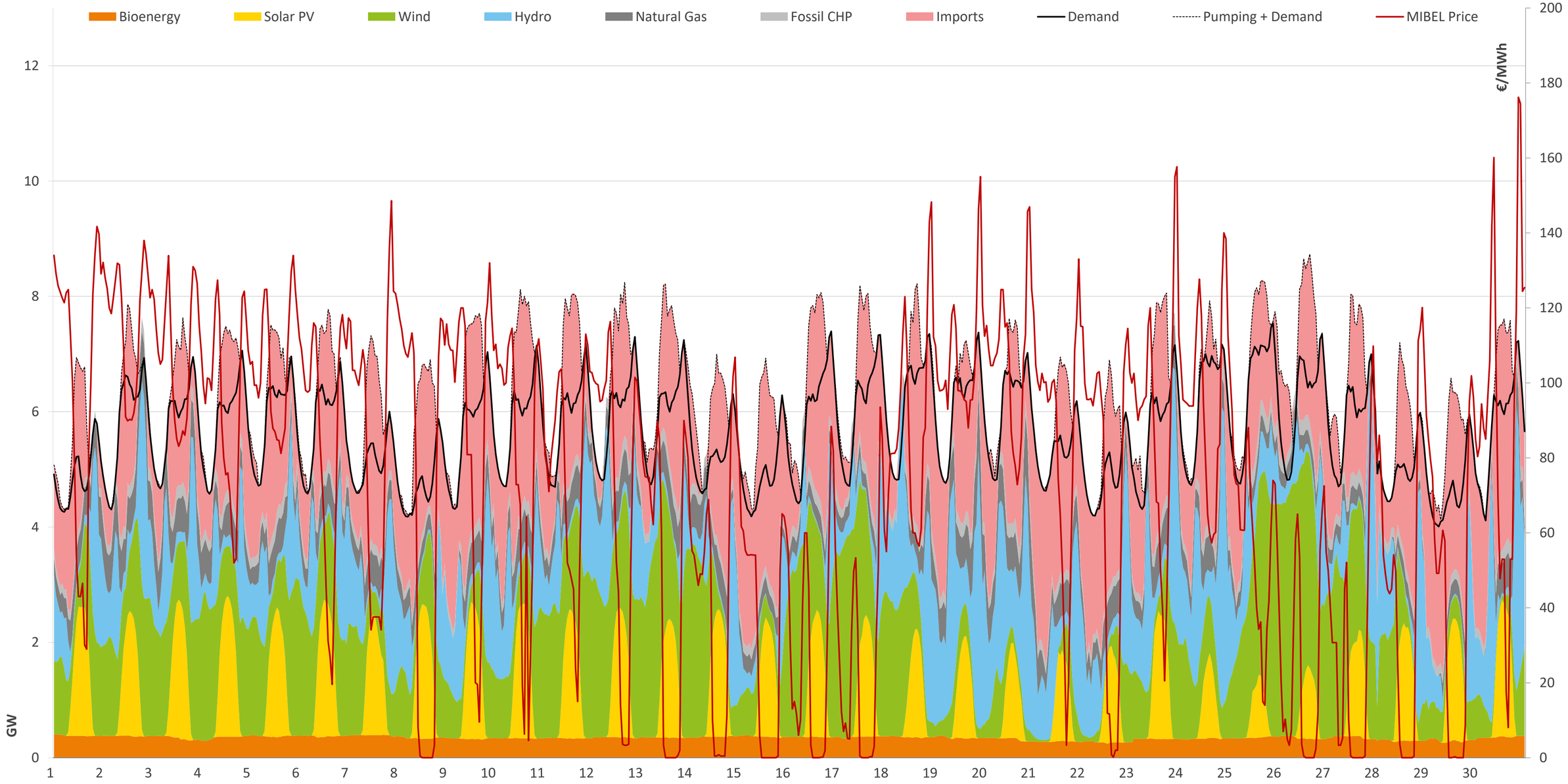
HYDRO INDEX
1.22

SOLAR INDEX
0.95

STORAGE IN DAMS
59.9%

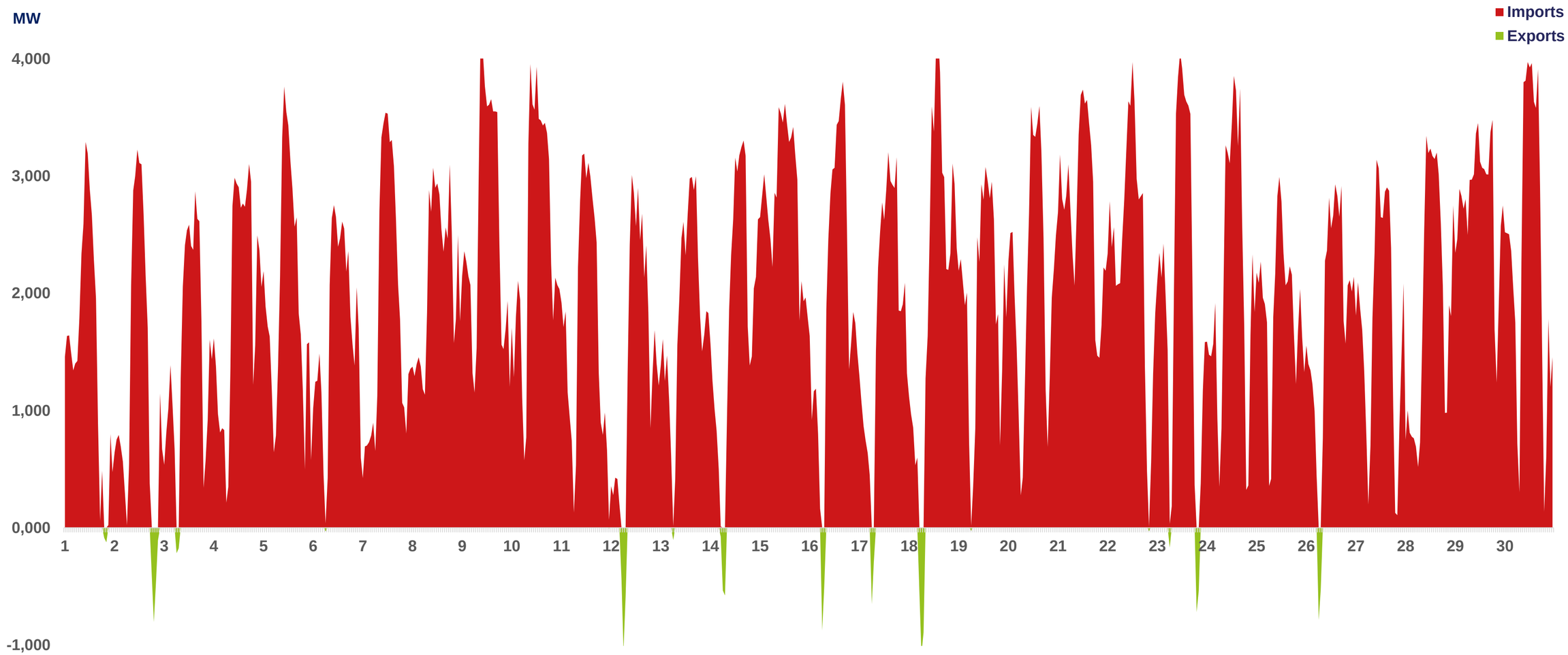
[a] Generation refers to the net energy generation of the power stations, taking into account the pumping production recently disclosed by REN. Production from pumping is not included in the percentage of production from renewable sources.
[b] Includes fuel oil, diesel, the non-biodegradable fraction of MSW and new waste
[c] Consumption refers to the net generation of energy by power stations, taking into account the import-export balance.
Source: REN, APREN Analysis

MONTHLY ANALISYS IN PORTUGAL:
SEPTEMBER 2024 LOAD DIAGRAM



Source: REN, OMIE, APREN Analysis

MONTHLY ANALYSIS IN PORTUGAL:
DIAGRAM OF IMPORTS AND EXPORTS IN PORTUGAL



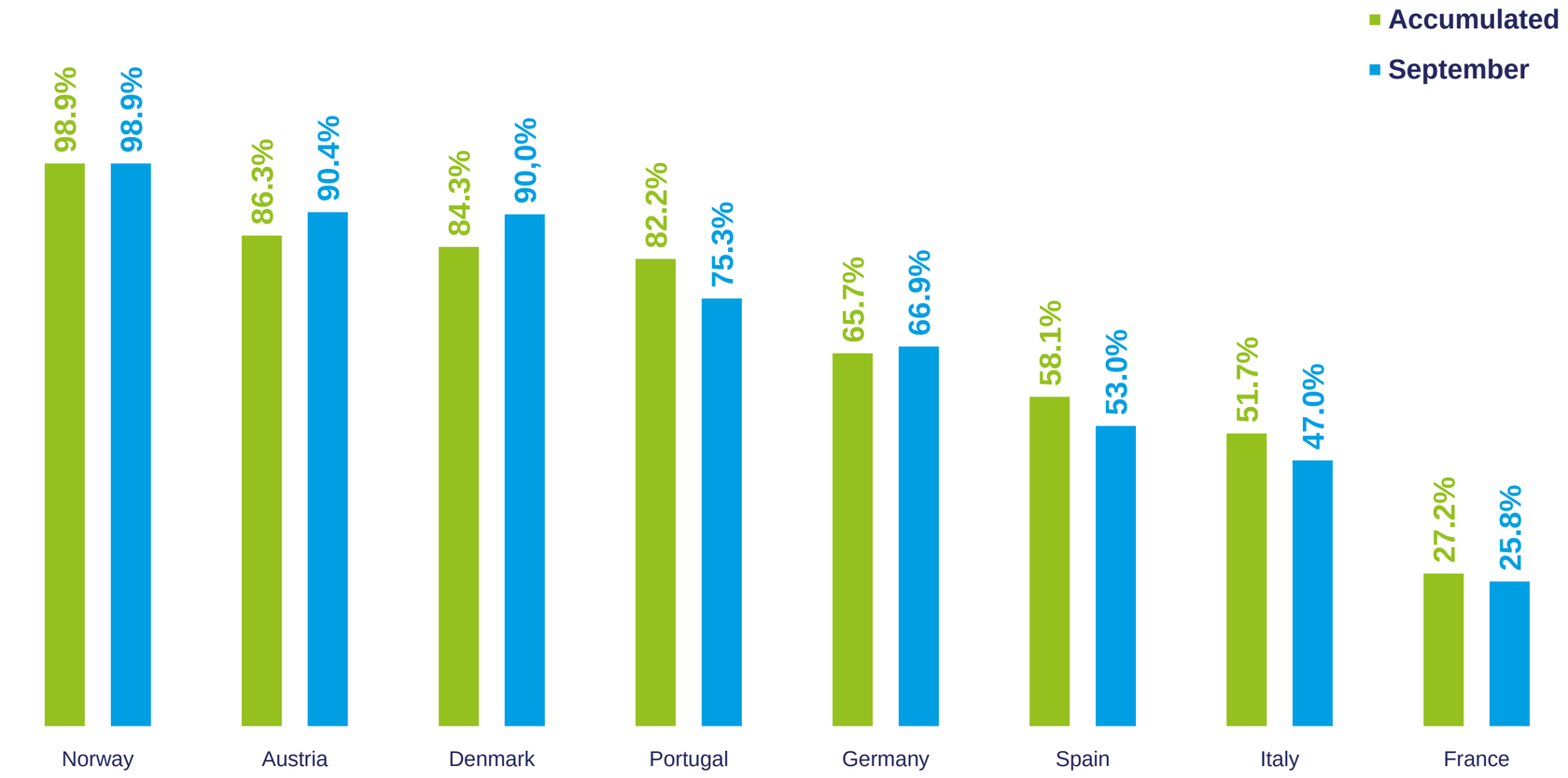
Source: REN, APREN Analysis

RENEWABLE ELECTRICITY
EUROPE

In this analysis, only the main countries in the different European markets were considered, to obtain a representative panorama for comparison.

Between 1 January and 30 September 2024, Portugal was the fourth country with the highest share of renewable energy in electricity generation, with 82.2%, figuring behind Norway, Austria and Denmark, which respectively achieved 98.9%, 86.3% and 84.3%.

From 1 to 30 September, Portugal came fourth in the countries considered with the highest renewable incorporation in Europe, having reached 75.3%.

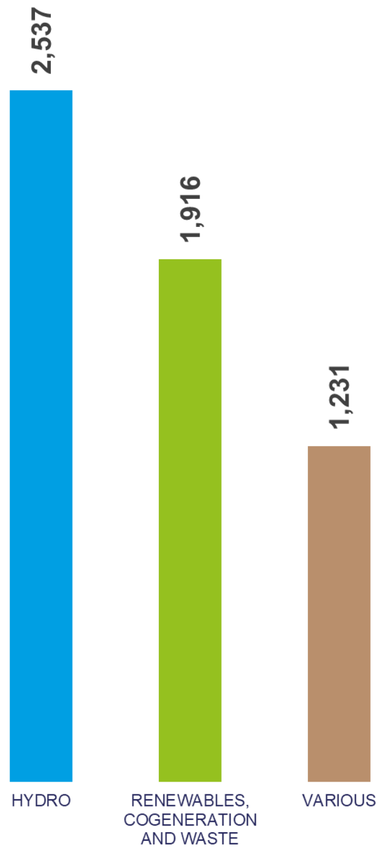


Renewable incorporation in cumulative (Jan-Sep) and monthly (Sep) electricity generation.
Source: REN, Fraunhofer, REE, Terna, National Grid, ENTSO-E, Análise APREN

MARKET PRICE SETTING
PORTUGAL

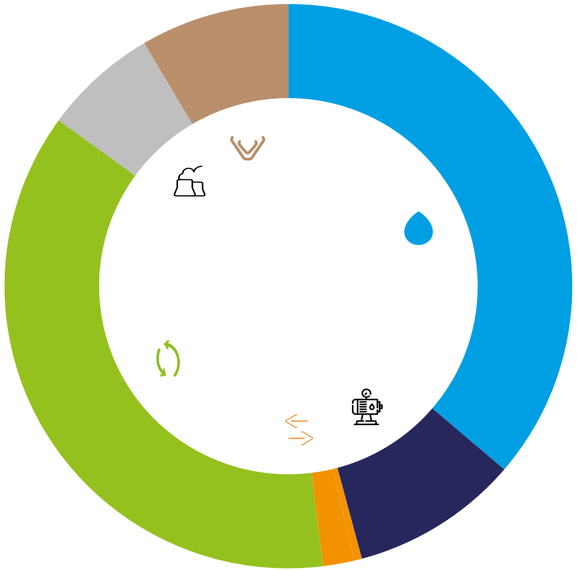
Between 1 January and 30 September, the closing technology that recorded the most hours was Hydro, with 2,537 non-consecutive hours, followed by Renewables, Cogeneration and Waste with 1,916 hours, and Various technologies with 1,231 hours.

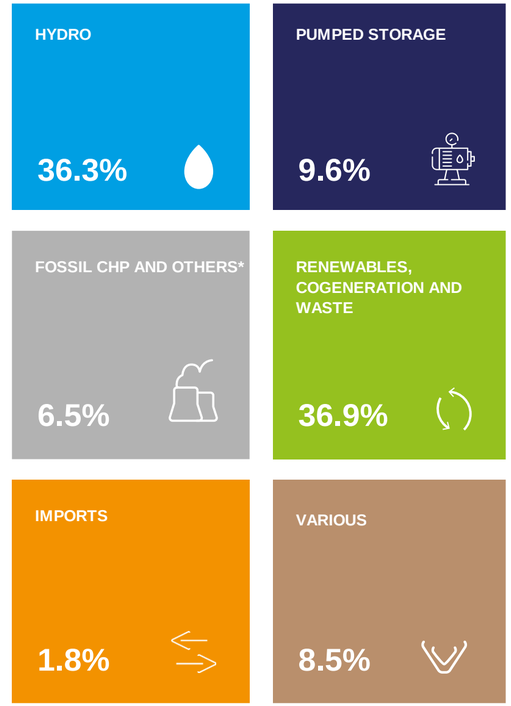
ACCUMULATED SEPTEMBER 2024



Number of market closing hours (accumulated) for the three main closing technologies (Sep).
Source: OMIE, APREN Analysis

SEPTEMBER 2024





Percentage distribution of the number of hours of market closure for the various technologies, totaling 720 hours (Sep). Apart from the technologies represented, additional 0.4% from International Imports were registered.
Source: OMIE, APREN Analysis

ELECTRICITY MARKET
PORTUGAL

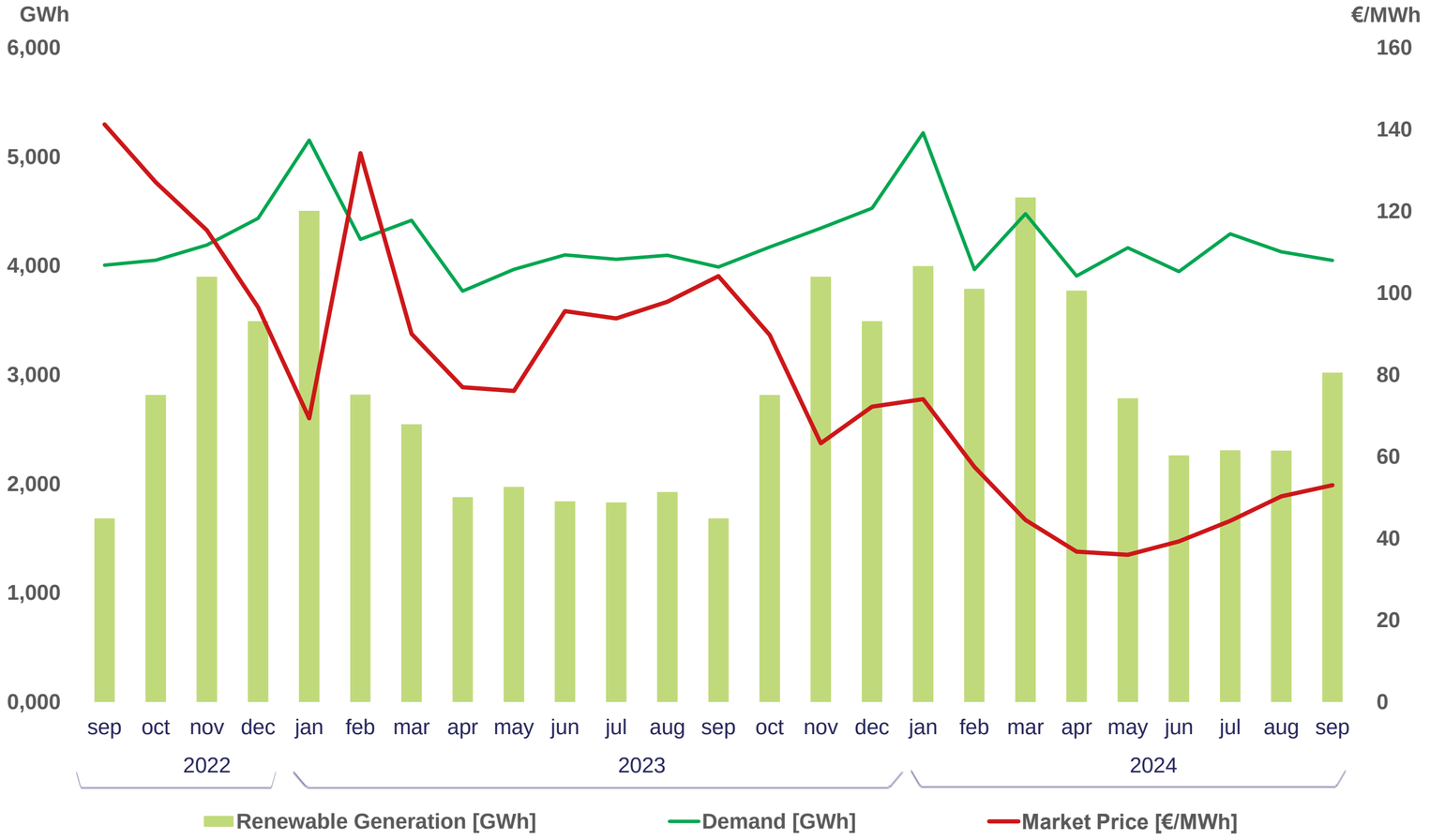
Between January 1 and September 30, the average hourly price recorded in MIBEL in Portugal (52.8 €/MWh[d]) represents a 43% reduction compared to the same period last year. In the same period, there were 1,640 non-consecutive hours in which renewable generation was sufficient to supply mainland Portugal's electricity consumption, with an average hourly price in MIBEL of 33.9 €/MWh.

1,640
Hours
100% RENEWABLE HOURS [Accumulated]

33.9
€/MWh
MIBEL'S AVERAGE PRICE (IN 100% RENEWABLE HOURS) [Accumulated]

13
Hours
100% RENEWABLE HOURS [SEPTEMBER)

59.3
€/MWh
MIBEL'S AVERAGE PRICE (IN 100% RENEWABLE HOURS) [SEPTEMBER]



Electricity market analysis, renewable generation, consumption and market price (Sep-2022 a Sep-2024)
Source: OMIE, APREN analysis

[d] arithmetic average of MIBEL prices.
Source: OMIE

RENEWABLE ELECTRICITY
EUROPE

During the month of September 2024, there was a minimum hourly price in MIBEL in Portugal of 0.00 €/MWh, where the market was cleared by mostly Hydro and Renewables, Cogeneration and Waste. The maximum hourly price was 176.21 €/MWh, where the market was cleared by Combined-Cycle Thermal generation.

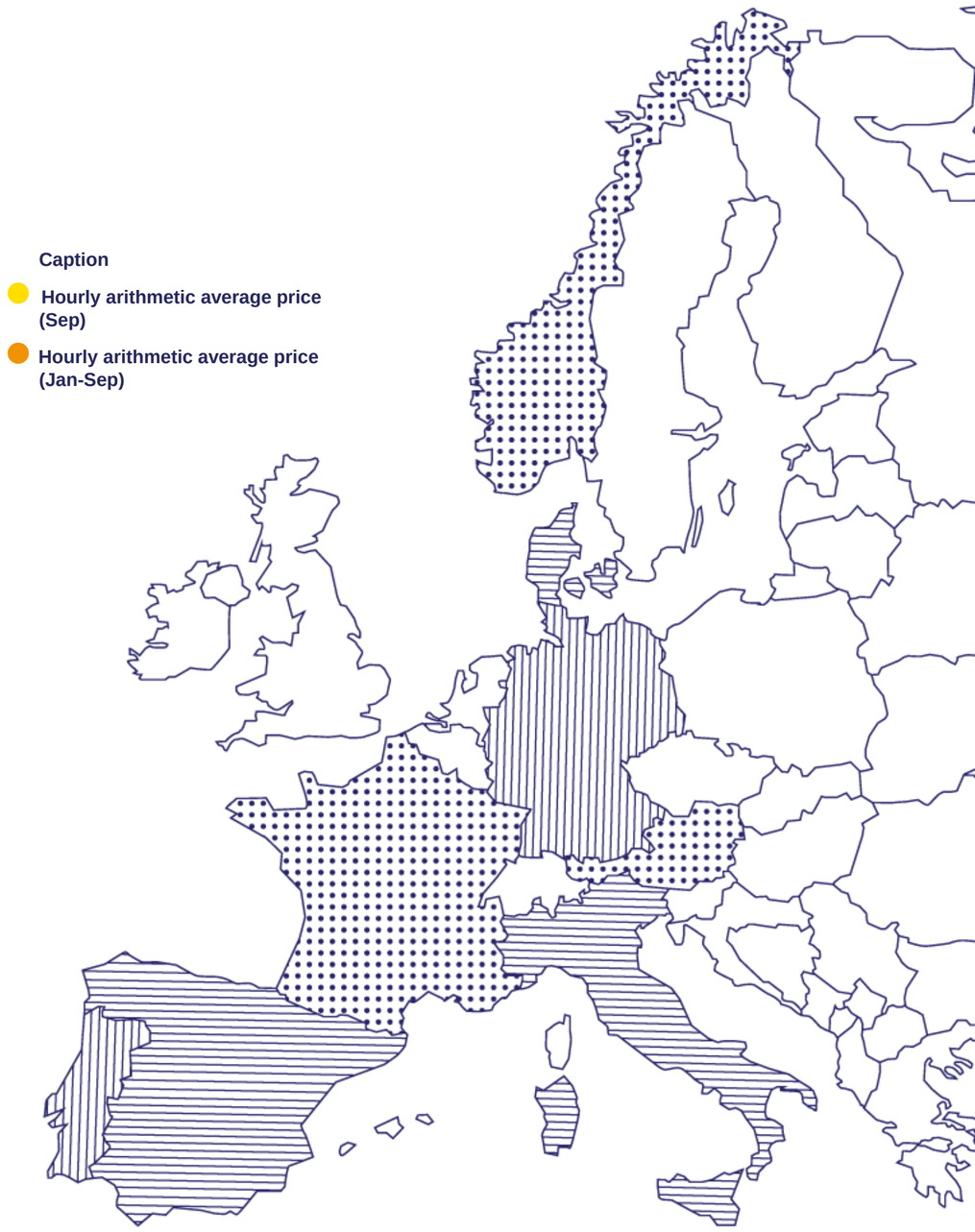
MINIMUM PRICES (SEP)

		€/MWh
1º	Germany	-24.00
2º	Austria	-9.36
3º	France	-6.18

MAXIMUM PRICES (SEP)

		€/MWh
1º	Germany	656.37
2º	Austria	555.73
3º	Denmark	340.00

Portugal €/MWh	73.6	52.8
Spain €/MWh	72.6	52.4
France €/MWh	51.9	48.4
Italy €/MWh	72.6	96.2
Germany €/MWh	78.3	70.4
Austria €/MWh	81.9	70.2
Denmark €/MWh	71.1	64.9
Norway €/MWh	19.5	38.4

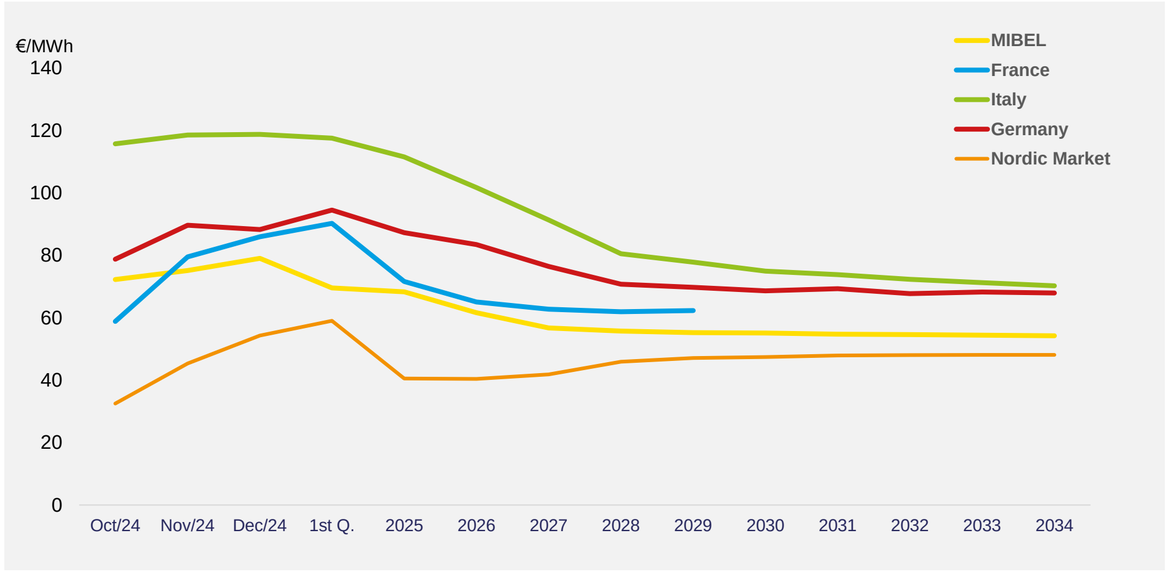


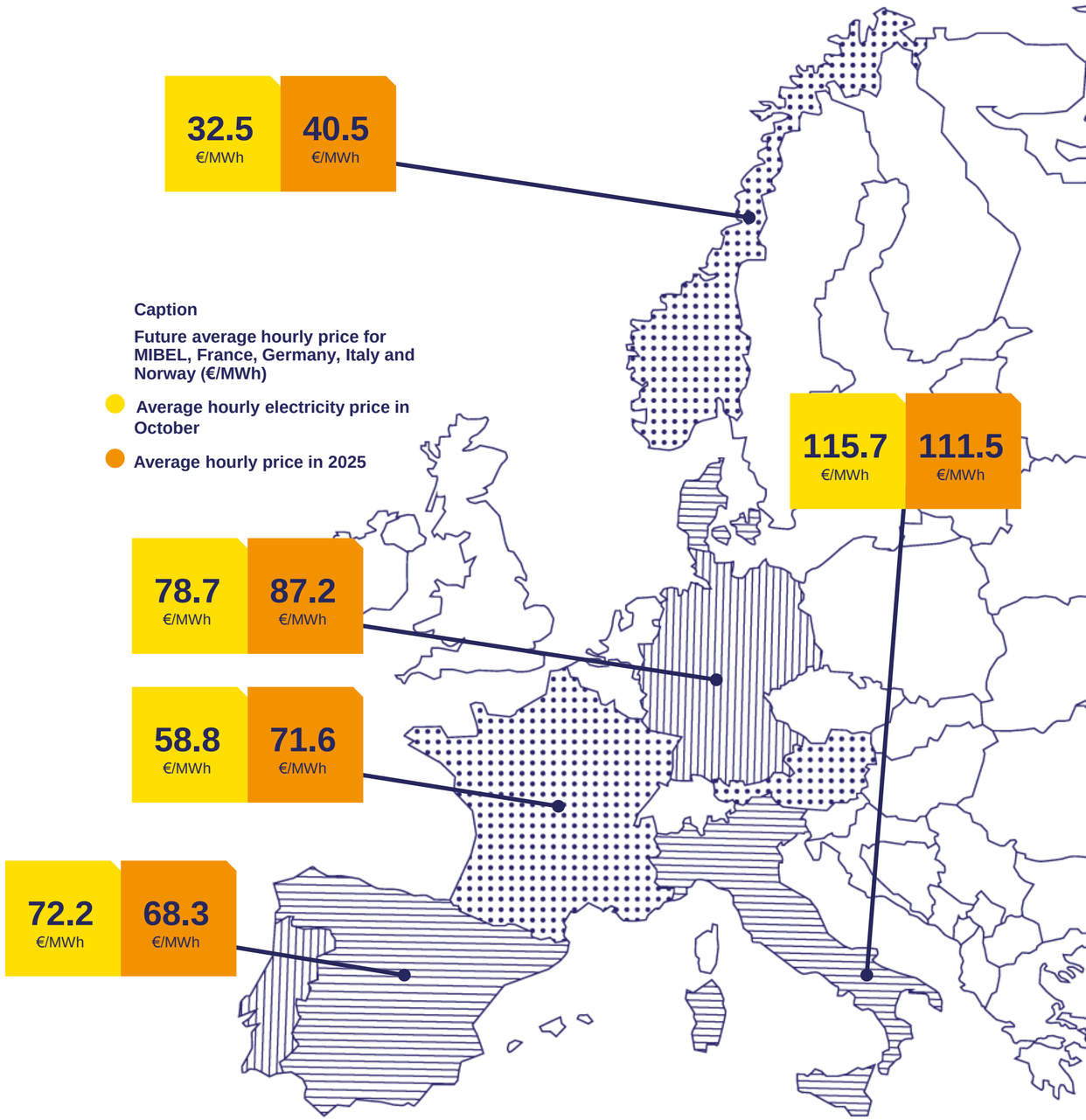
Fonte: ENTSO-E, OMIE, APREN Analysis

ELECTRICITY MARKET FUTURES

The evolution of the average hourly future price shown is calculated on the basis of electricity[e] purchase and sale contracts. The map on the right shows the price values for next month (October) and next year. In the coming month, MIBEL is the market that presents the third lowest figures, whereas the Nordic market presents the lowest figures for the next year.

MIBEL has the second lowest values until 2034, due to the increasing investment in renewable production.





[e] Values updated as of 2nd October.

Source: OMIP, EEX, APREN Analysis

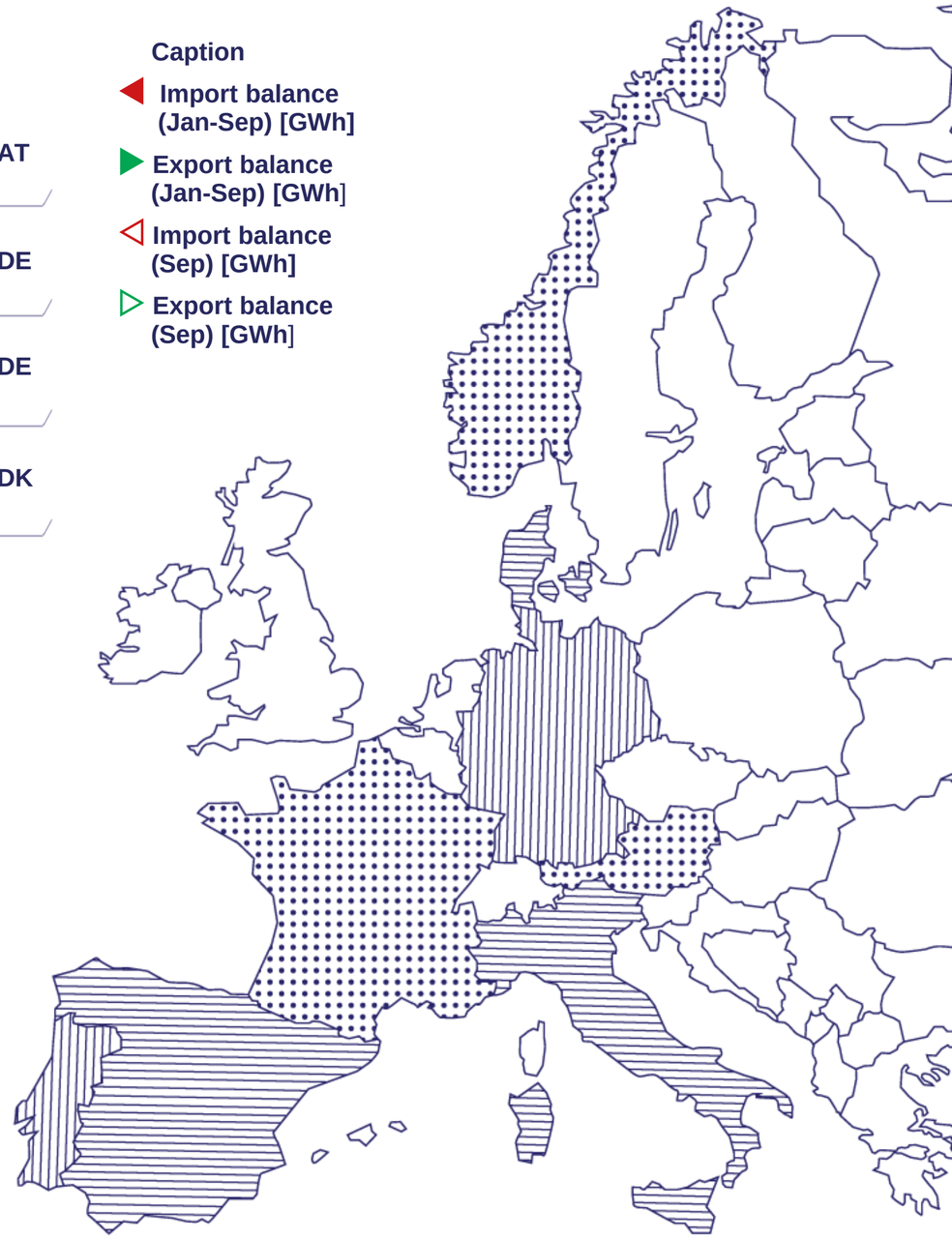
INTERNATIONAL EXCHANGES
EUROPE

Between 1 January and 30 September 2024, mainland Portugal's electricity system registered electricity imports equivalent to 10,898 GWh and exports of 3,740 GWh, with Portugal being an importer with a balance of 7,158 GWh.

PT	5,726 ◀	1,490 ◁	ES	DE	959 ▶	211 ▷	AT
ES	2,040 ▶	312 ▷	MA	DK	4,861 ▶	576 ▷	DE
FR	3,870 ◀	634 ◁	ES	NO	3,974 ▶	423 ▷	DE
IT	14,533 ◀	1,312 ◁	FR	NO	4,319 ▶	803 ▷	DK
DE	14,305 ◀	2,052 ◁	FR				

Caption

- ◀ Import balance (Jan-Sep) [GWh]
- ▶ Export balance (Jan-Sep) [GWh]
- ◁ Import balance (Sep) [GWh]
- ▷ Export balance (Sep) [GWh]



MAIN INDICATORS FOR PT-ES INTERCONNECTION

	PT-ES (sep)	PT-ES (jan-sep)	ES-PT (sep)	ES-PT (jan-sep)
usage	0.8%	11.0%	53.3%	39.4%
congestion	0.0%	1.6%	9.7%	6.2%
market separation	8.5%	7.8%	76.1% (MIBEL-FR)	67.5%

Source: ENTSO-E, OMIE, APREN Analysis

POWER PRODUCTION EMISSIONS

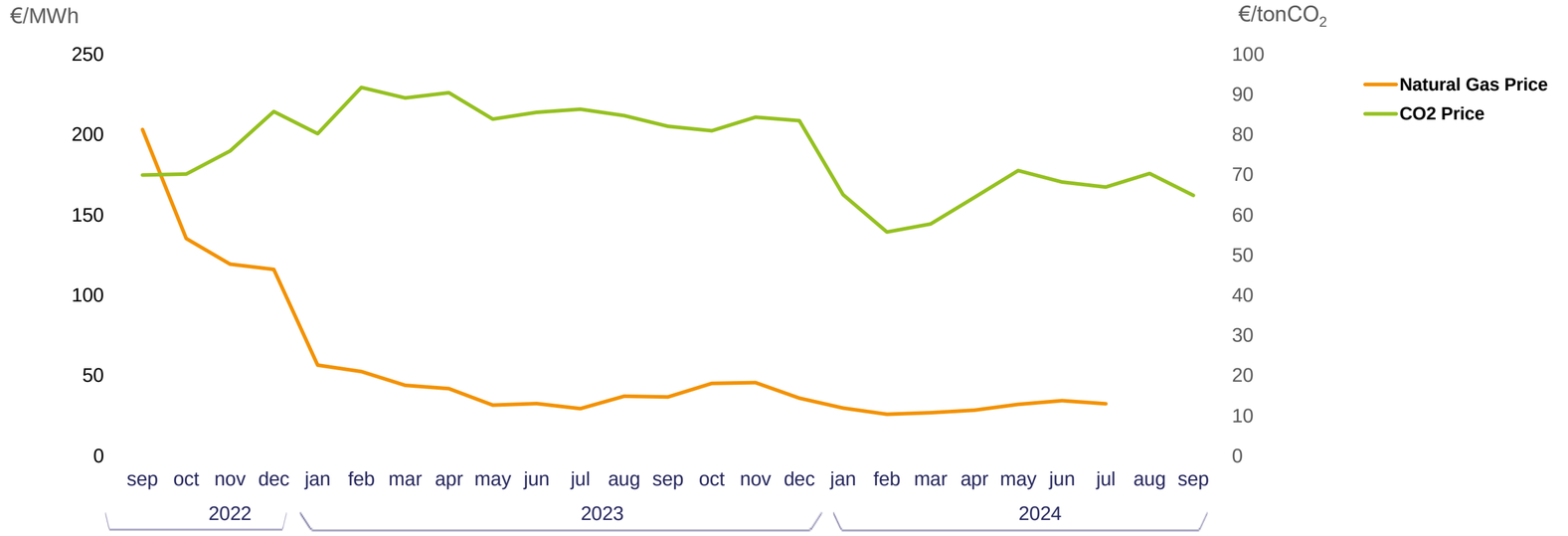
Between 1 January and 30 September 2024, the specific emissions reached the value of 33.9 gCO_2eq/kWh, corresponding to a total of 1.17 $MtCO_2eq$ of emissions from the electricity generation sector. The European CO_2 Emissions Trading Scheme (ETS) recorded a price of 65.0 €/tCO_2[d], a reduction of 24.5% compared to the same period in 2023.

1.17
$MtCO_2eq$
SECTOR'S EMISSIONS

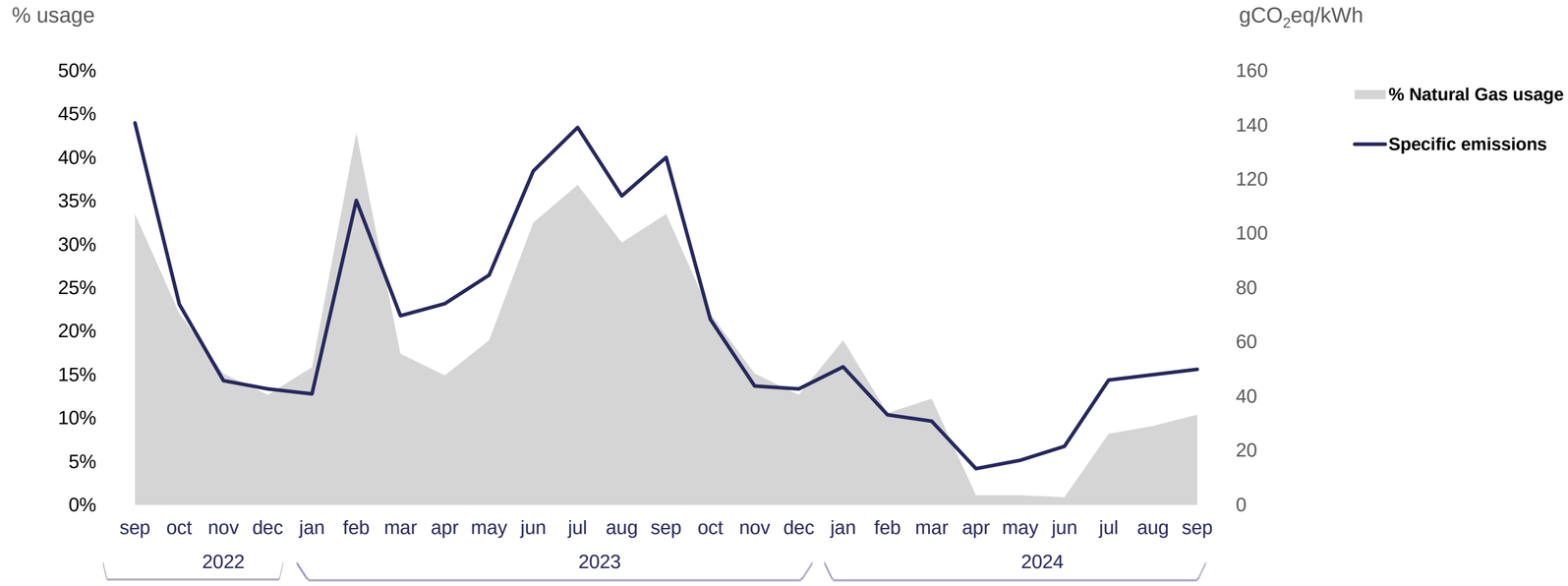
65.0
€/tCO_2
AVERAGE PRICE OF LICENCES

60.8
%
▼
COMPARED TO SEPTEMBER 2023 [ACCUMULATED]

24.5
%
▼
COMPARED TO SEPTEMBER 2023 [ACCUMULATED]



Price of CO2 allowances in the EU ETS and price of natural gas in Europe (Sep-2022 to Sep-2024).
Source: SendeCO2, WorldBank.



Specific emissions from the electricity sector in mainland Portugal, % use of coal and natural gas power stations (Sep-2022 to Sep-2024).
Source: REN, DGEG, ERSE, APREN Analysis

[d] arithmetic average of hourly prices

Source: OMIE, WorldBank.

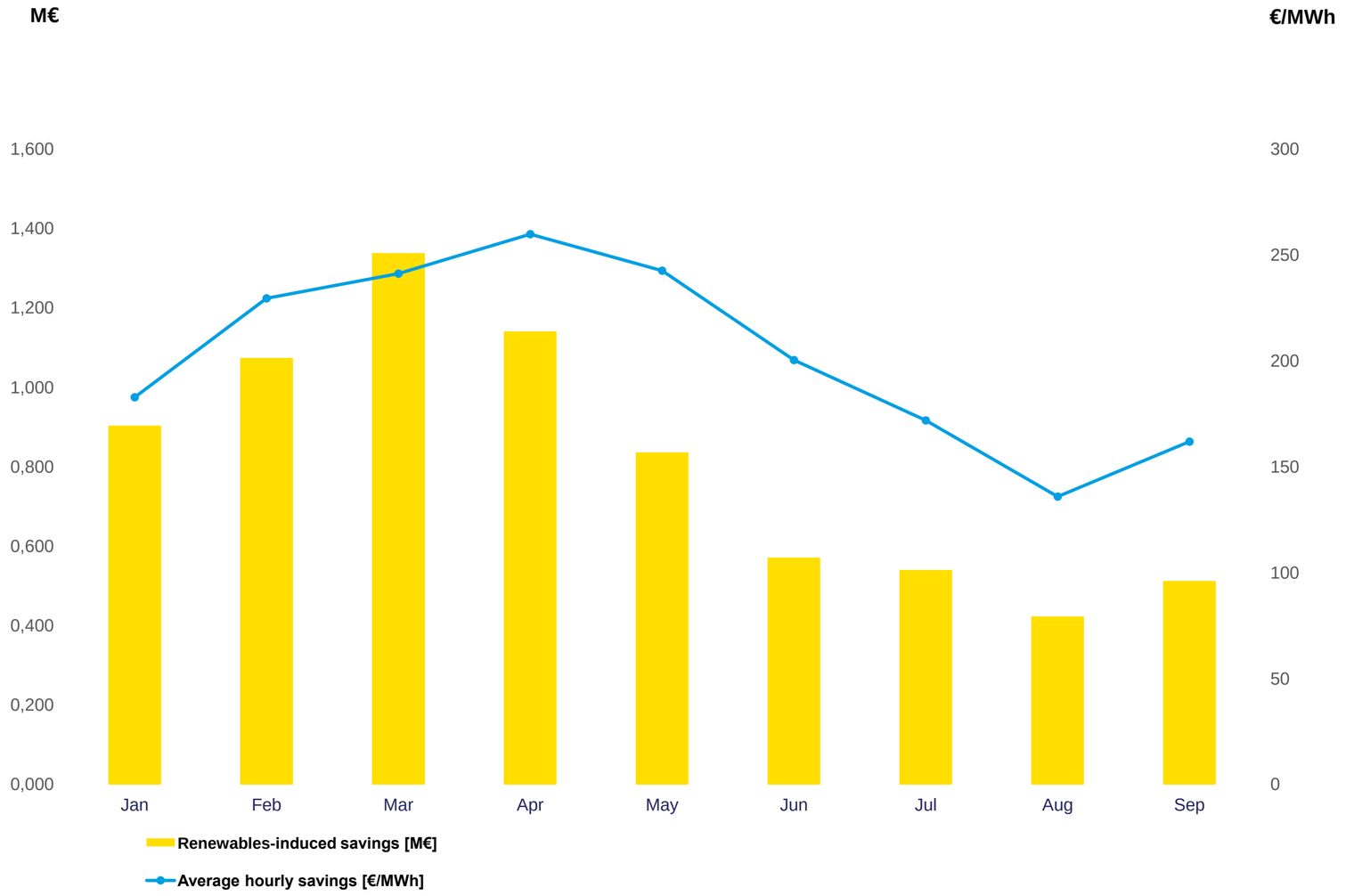
SIMULATION OF PRICE FORMATION WITHOUT SRP

RENEWABLES AVOIDED:

The indicators below show the savings achieved by the merit order between January 1 and September 30 of 2024 by the contribution of special regime production (PRE). This study is carried out for PRE, which includes all installed fossil cogeneration power. Bearing in mind that the capacity equivalent to this technology within PRE is residual and that the other technologies are renewable, the figures are close to the real savings generated by renewables.

203
€/MWh
AVERAGE HOURLY SAVINGS (JAN-SEP)

7,340
M€
CUMULATIVE SAVINGS (JAN-SEP)



Disclaimer: This analysis is carried out using a program developed by APREN, based on the Deloitte calculation method.

ENVIRONMENTAL SERVICE
RENEWABLES AVOIDED:

The indicators below identify the savings achieved between January 1 and September 30 of 2024 in natural gas, CO_2 emissions and CO_2 emission allowances, resulting from incorporating renewables into electricity generation. This analysis assumes that, in the absence of renewables, production would be ensured primarily by natural gas, followed using imports.

164 M€
IMPORTED NATURAL GAS (Sep)

0 M€
IMPORTED ELECTRICITY (Sep)

0.9 $Mtco_2eq$
CO_2 EMISSIONS (Sep)

54.8 M€
CO_2 ALLOWANCES (Sep)

1,353 M€
IMPORTED NATURAL GAS (JAN-SEP)

261 M€
IMPORTED ELECTRICITY (JAN-SEP)

8.6 $Mtco_2eq$
CO_2 EMISSIONS (JAN-SEP)

517 M€
CO_2 ALLOWANCES (JAN-SEP)

Source: OMIE, APREN Analysis.

2024

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