

2024

RENEWABLE ELECTRICITY BULLETIN

OCTOBER
2024

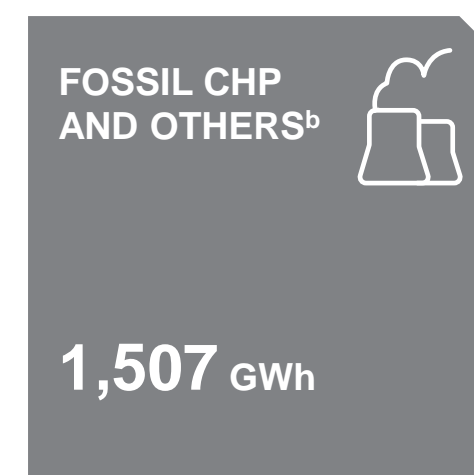
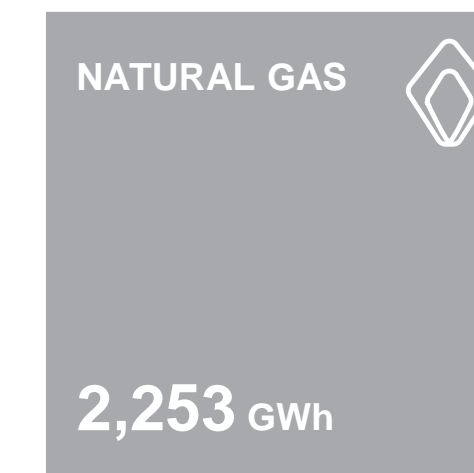
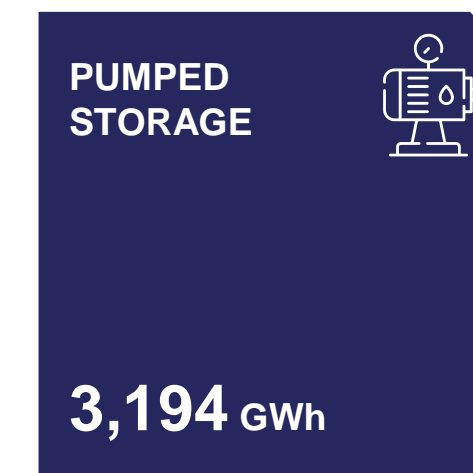
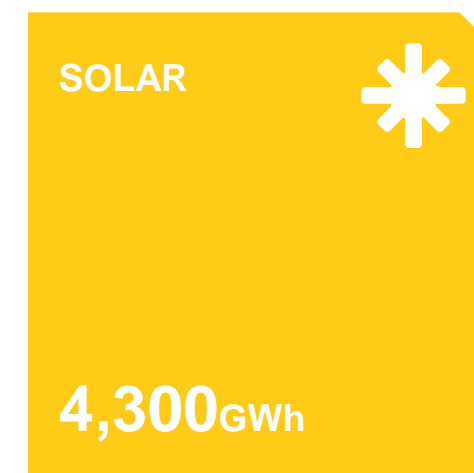
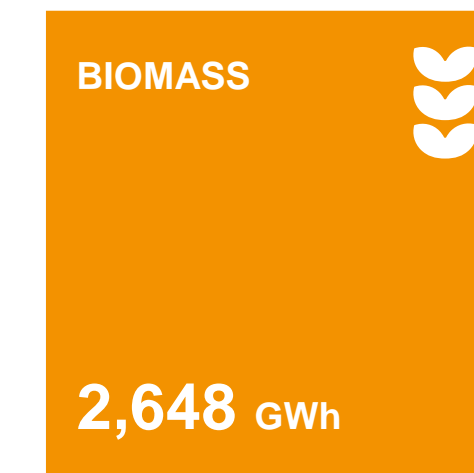
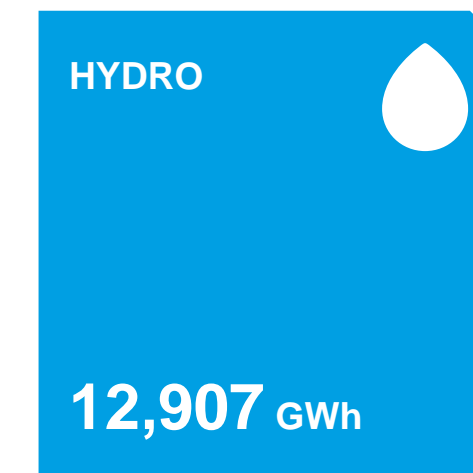
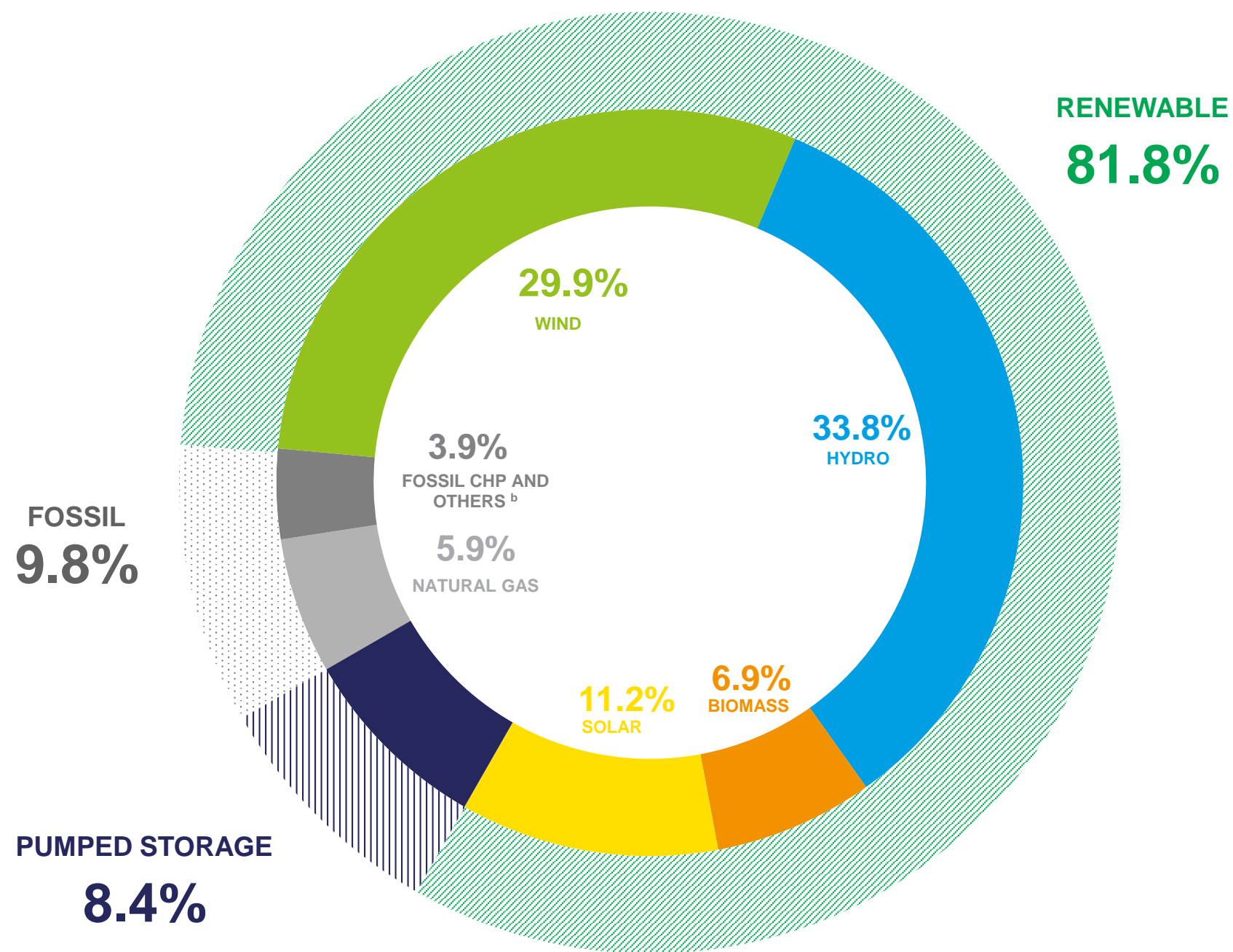
PORTUGAL NEEDS
OUR ENERGY



APREN Associação
de Energias
Renováveis

EXECUTIVE SUMMARY

GENERATION (JAN-OCT)



MAIN INDICATORS (JAN-OCT)

GWh
38,229
Generation^a

€/ MWh
54.5
MIBEL PT Price

€/ tCO₂
63.6
CO₂ Price

MtCO₂ - eq
1.33
CO₂ Emissions

GWh
8,141
Import Balance

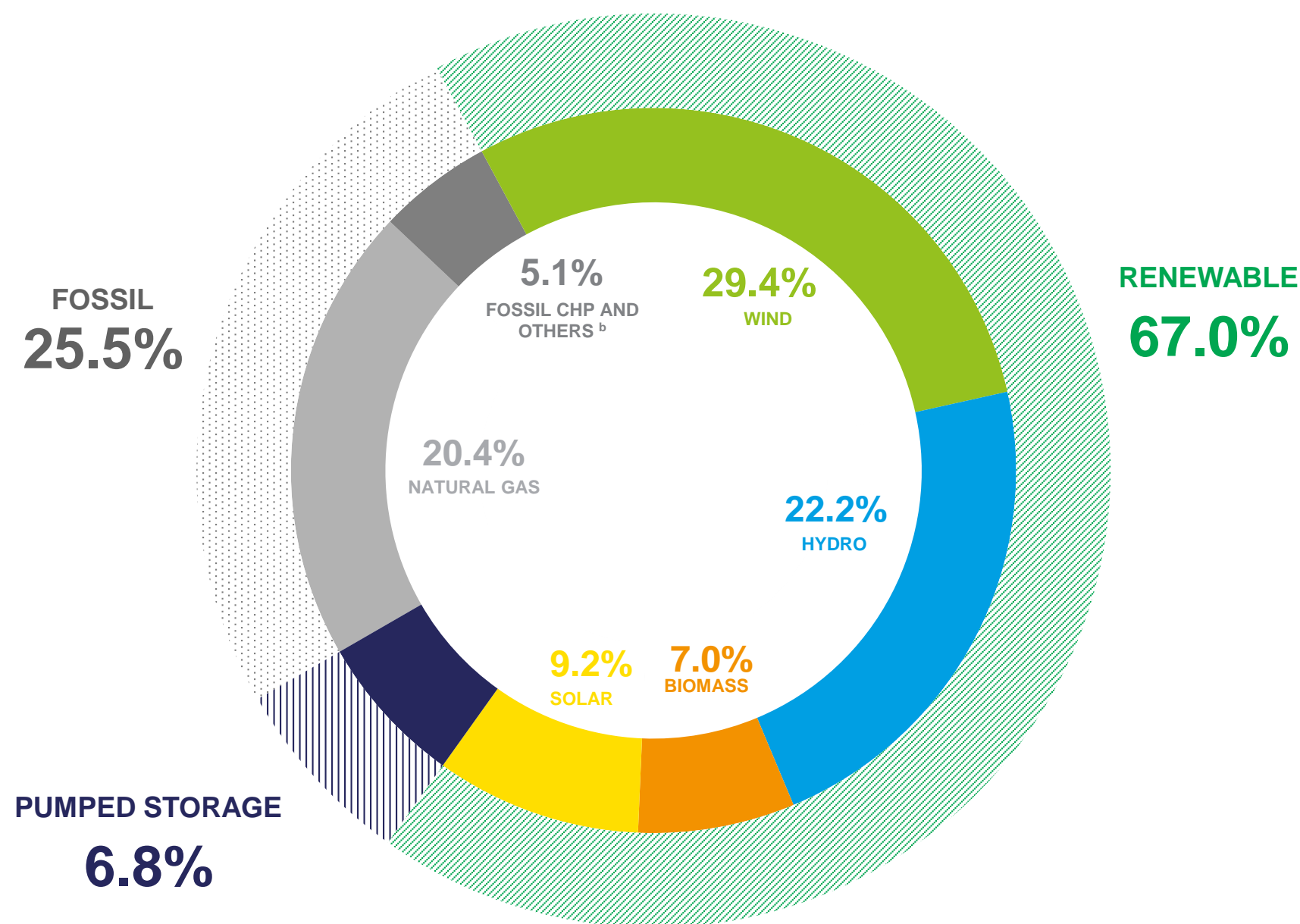
gCO₂ eq/kWh
38.6
CO₂ Specific Emissions

^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

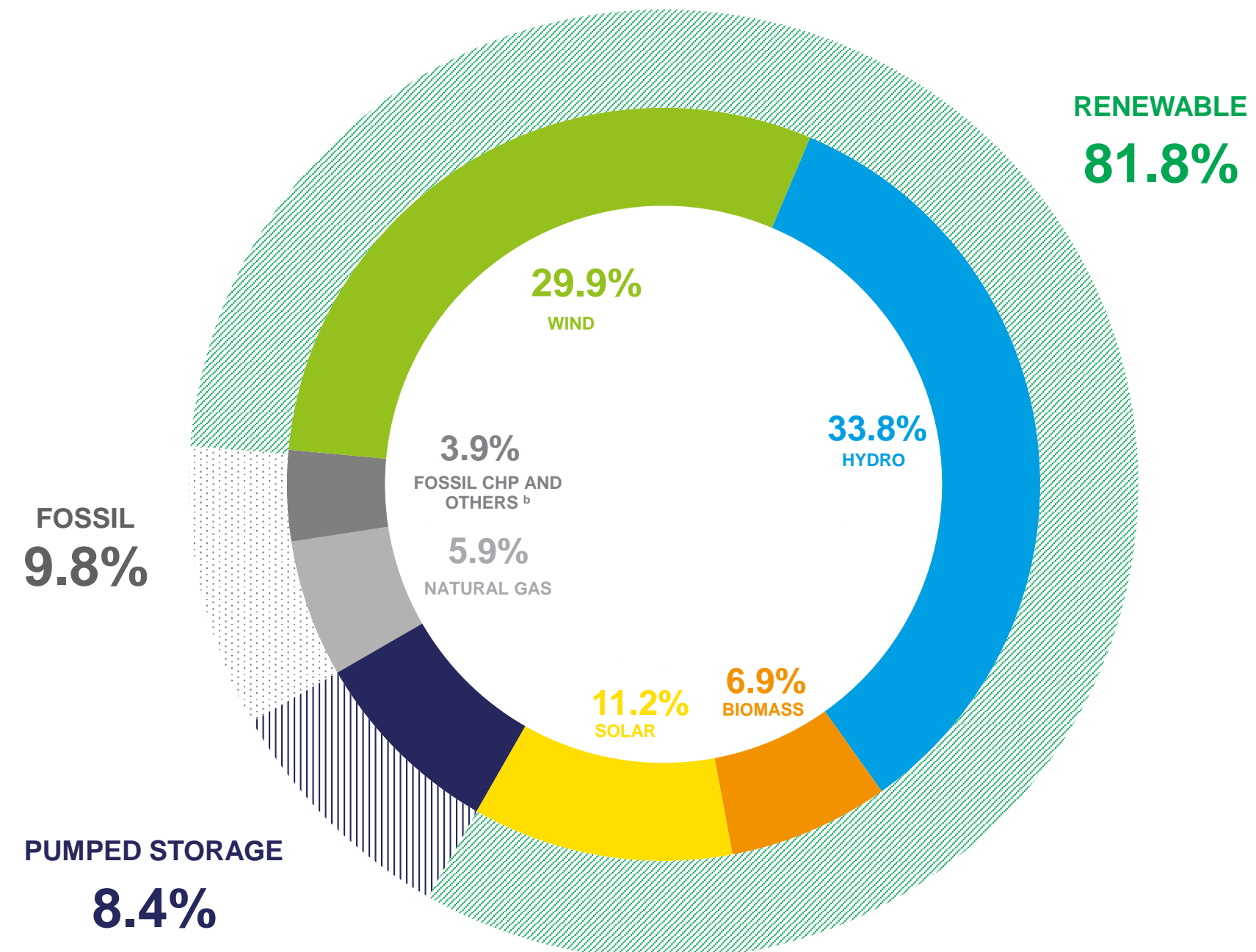
^b Includes fuel oil, diesel, the non-biodegradable fraction of MSW and new waste

EXECUTIVE SUMMARY

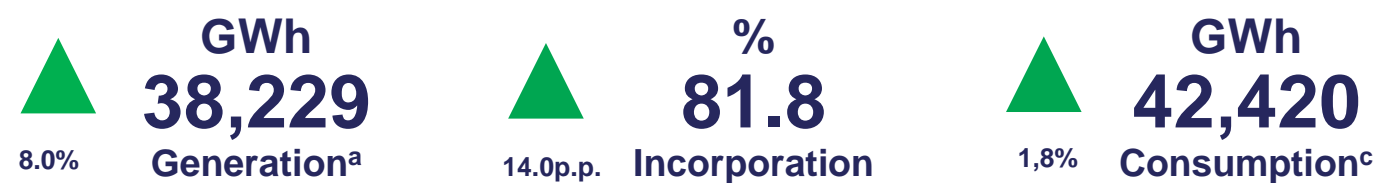
OCTOBER ACCUMULATED GENERATION 2023



OCTOBER ACCUMULATED GENERATION 2024



MAIN INDICATORS COMPARED TO OCTOBER 2023



^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

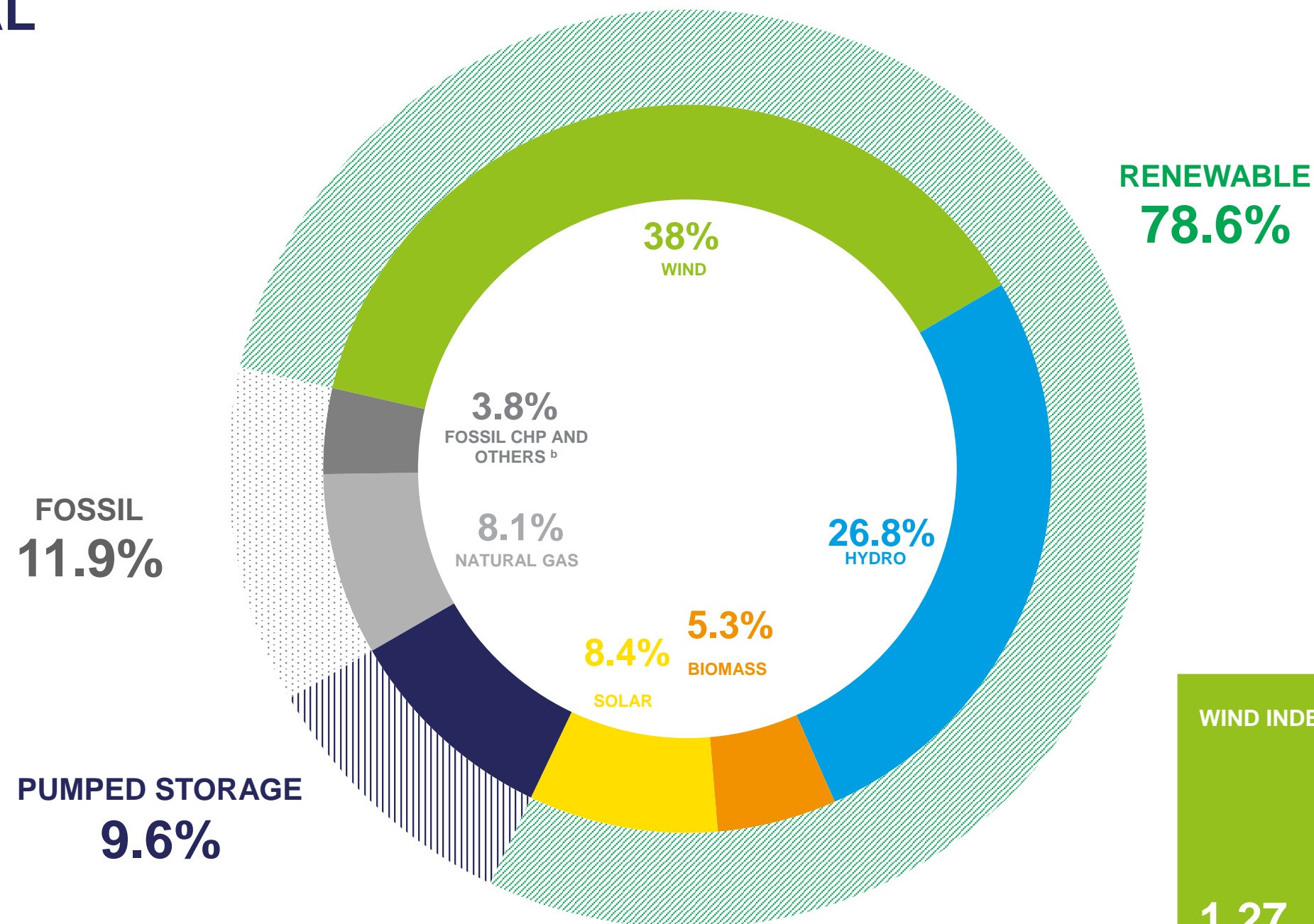
^c Consumption refers to the net generation of energy by power stations, taking into account the import-export balance.
Source: REN, APREN Analysis

MONTHLY ANALYSIS IN PORTUGAL OCTOBER

Between 1 and 31 of October 2024, renewable incorporation was 78.6%, making up 2,959 GWh of the 3,766 GWh produced in the month under review.

The amount of energy generated compared to October 2023 is similar, mainly due to a reduction in fossil production from 18.8% to 11.9%, catalysed by a reduction in natural gas fossil production from 15.6% to 8.1%.

In October 2024, imports totalled 22.9% of electricity consumption in mainland Portugal.



**RENEWABLE
78.6%**

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

GWh
3,766
Generation^a

▼ **1.4%**

GWh
4,301
Consumption^c

▲ **2.8%**

%
78.6
Renewable incorporation

▲ **4.8 p.p.**

WIND INDEX

1.27

HYDRO INDEX

1.76

SOLAR INDEX

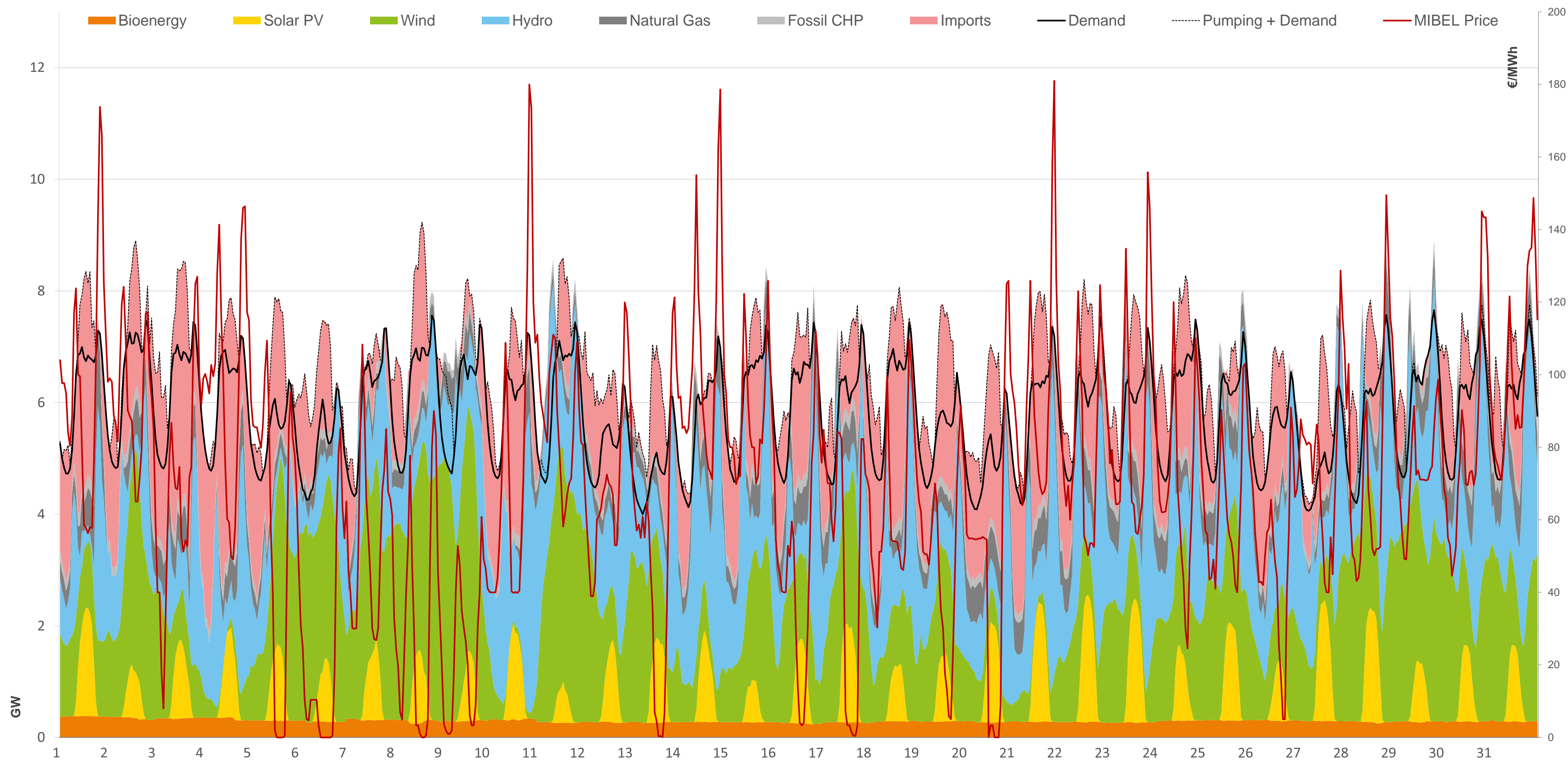
0.77

STORAGE IN DAMS

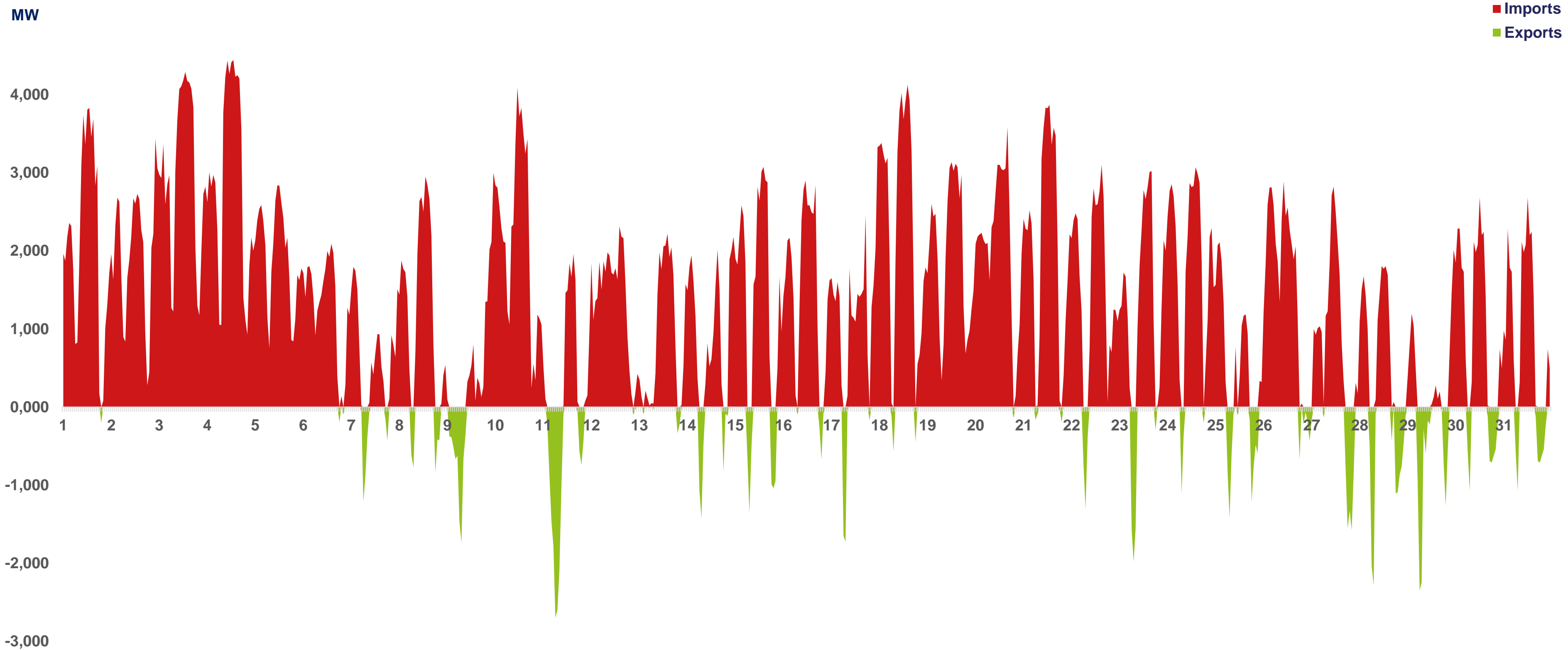
64.9%

^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 ANALYSIS IN PORTUGAL: OCTOBER 2024 LOAD DIAGRAM



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



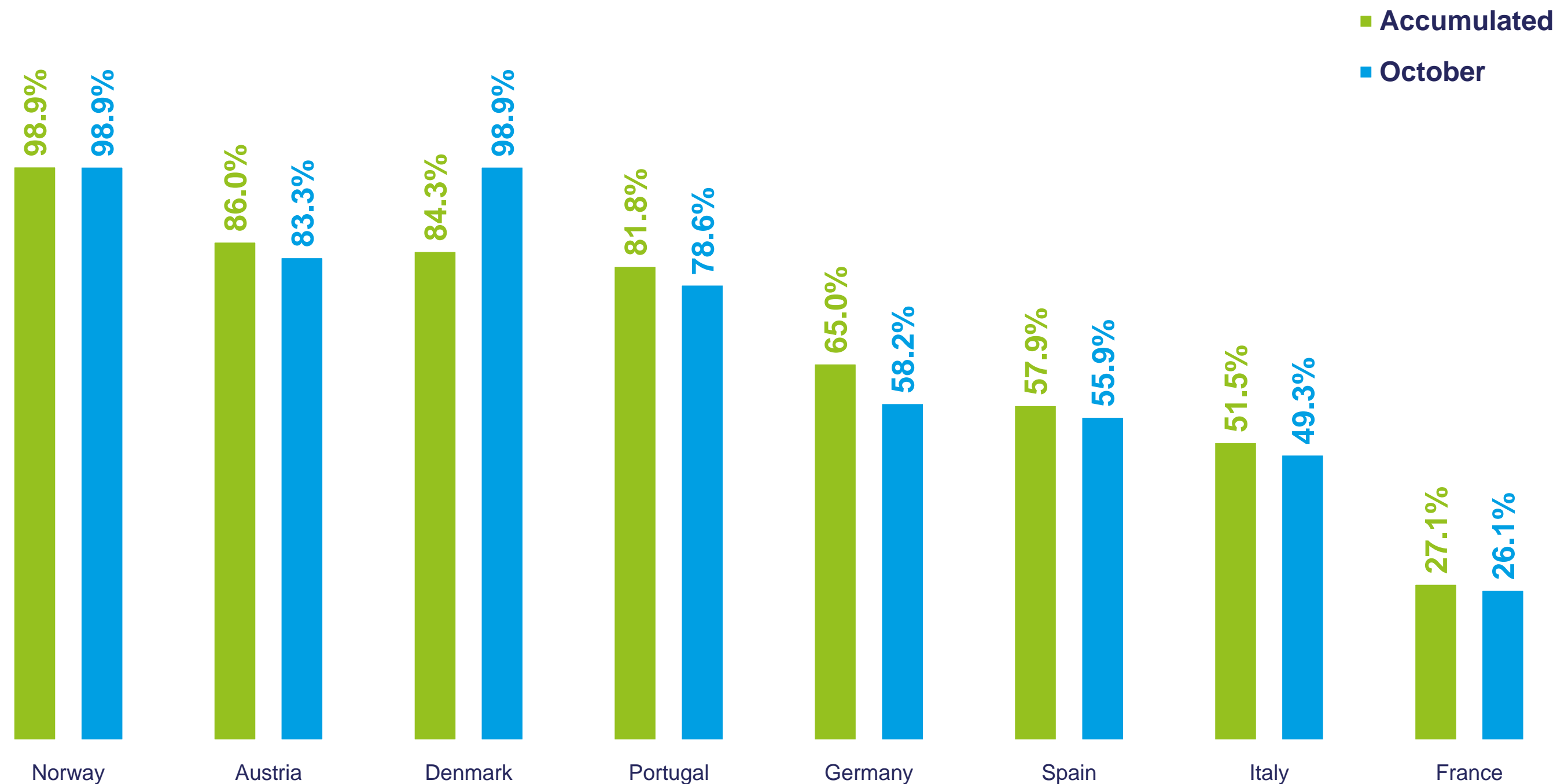
Source: REN, APREN Analysis

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 31 October 2024, Portugal was the fourth country with the highest share of renewable energy in electricity generation, with 81.8%, figuring behind Norway, Austria and Denmark, which respectively achieved 98.9%, 86.0% and 84.3%.

From 1 to 31 October, Portugal came fourth in the countries considered with the highest renewable incorporation in Europe, having reached 78.6%.

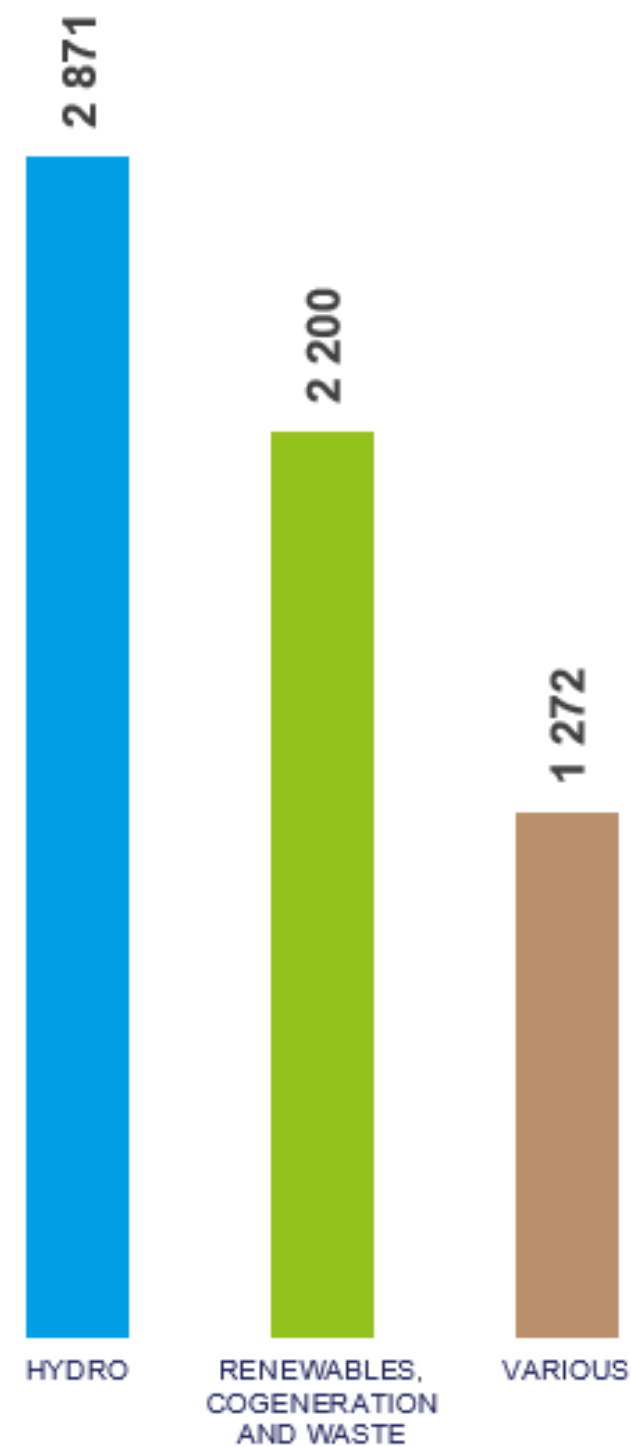


MARKET PRICE SETTING PORTUGAL

Between 1 January and 31 October, the technology that closed the market with the most hours was hydro, with 2,871 non-consecutive hours, followed by renewables, cogeneration and waste with 2,200 hours, and various technologies with 1,272 hours.

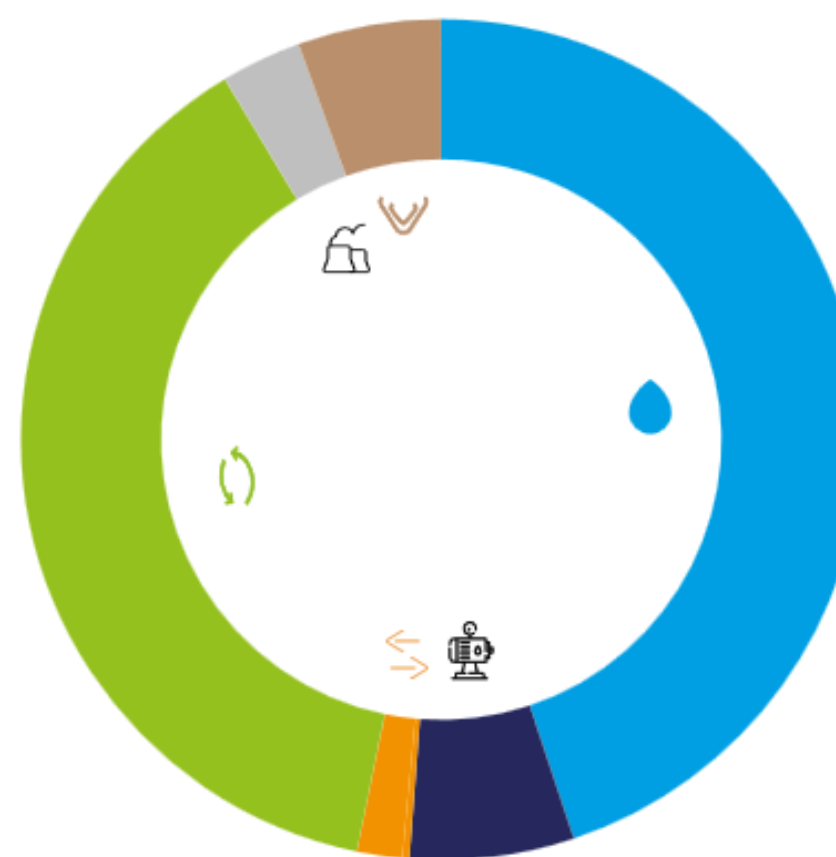


ACCUMULATED OCTOBER 2024



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

OCTOBER 2024

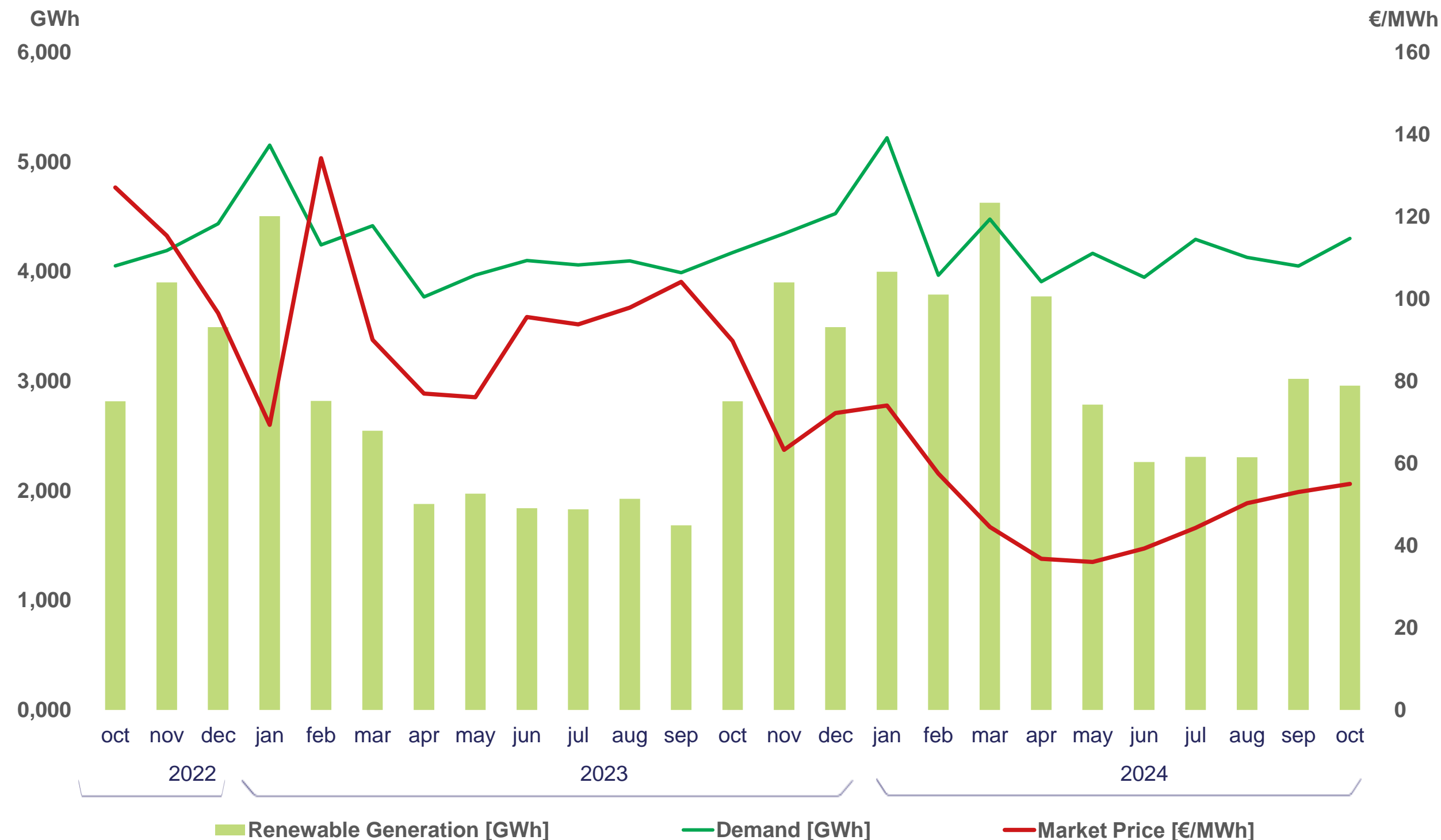


Percentage distribution of the number of hours of market closure for the various technologies, totaling 744 hours (Oct).
Source: OMIE, APREN Analysis

ELECTRICITY MARKET PORTUGAL

Between 1 January and 31 October, the average hourly price recorded in MIBEL in Portugal (54.5 €/MWh^d) represents a 41% reduction compared to the same period last year. In the same period, there were 1,749 non-consecutive hours in which renewable generation was sufficient to supply mainland Portugal's electricity consumption, with an average hourly price in MIBEL of 42.9 €/MWh.

<p style="font-size: 24px; font-weight: bold;">1,749</p> <p>Hours</p> <p style="font-size: 12px; font-weight: bold;">100% RENEWABLE HOURS [Accumulated]</p>	<p style="font-size: 24px; font-weight: bold;">42.9</p> <p>€/MWh</p> <p style="font-size: 10px; font-weight: bold;">MIBEL'S AVERAGE PRICE (IN 100% RENEWABLE HOURS) [Accumulated]</p>
<p style="font-size: 24px; font-weight: bold;">96</p> <p>Hours</p> <p style="font-size: 12px; font-weight: bold;">100% RENEWABLE HOURS [OCTOBER]</p>	<p style="font-size: 24px; font-weight: bold;">65.0</p> <p>€/MWh</p> <p style="font-size: 10px; font-weight: bold;">MIBEL'S AVERAGE PRICE (IN 100% RENEWABLE HOURS) [OCTOBER]</p>



^d arithmetic average of MIBEL prices.
Source: OMIE

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

RENEWABLE ELECTRICITY EUROPE

During the month of October 2024, there was a minimum hourly price in MIBEL in Portugal of -0.01 €/MWh, where the market was closed mainly by Hydro and Renewables, Cogeneration and Waste. The maximum hourly price was 181.00 €/MWh, where the market was closed by Renewables, Cogeneration and Waste.

MINIMUM PRICES (OCT)

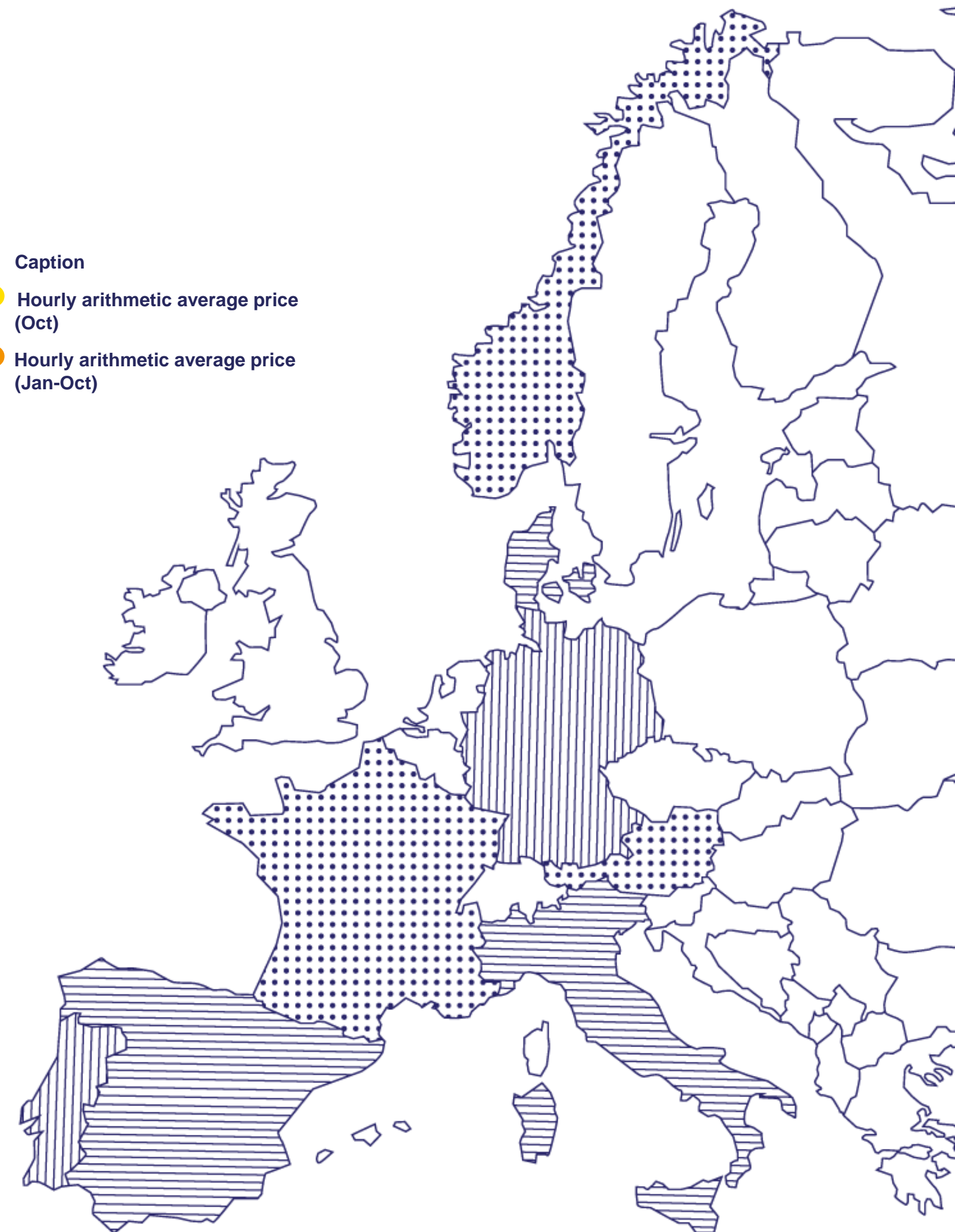
1 ^o	Germany	€/MWh	-15.69
2 ^o	Austria	€/MWh	-12.16
3 ^o	France	€/MWh	-2.01

MAXIMUM PRICES (OCT)

1 ^o	Denmark Germany	€/MWh	285.80
2 ^o	Austria	€/MWh	269.73
3 ^o	Portugal Spain	€/MWh	181.0

Portugal €/MWh	69.4	54.5
Spain €/MWh	68.5	54.1
France €/MWh	62.1	49.8
Italy* €/MWh	-	-
Germany €/MWh	86.1	72.0
Austria €/MWh	85.6	71.8
Denmark €/MWh	76.3	66.1
Norway* €/MWh	-	-

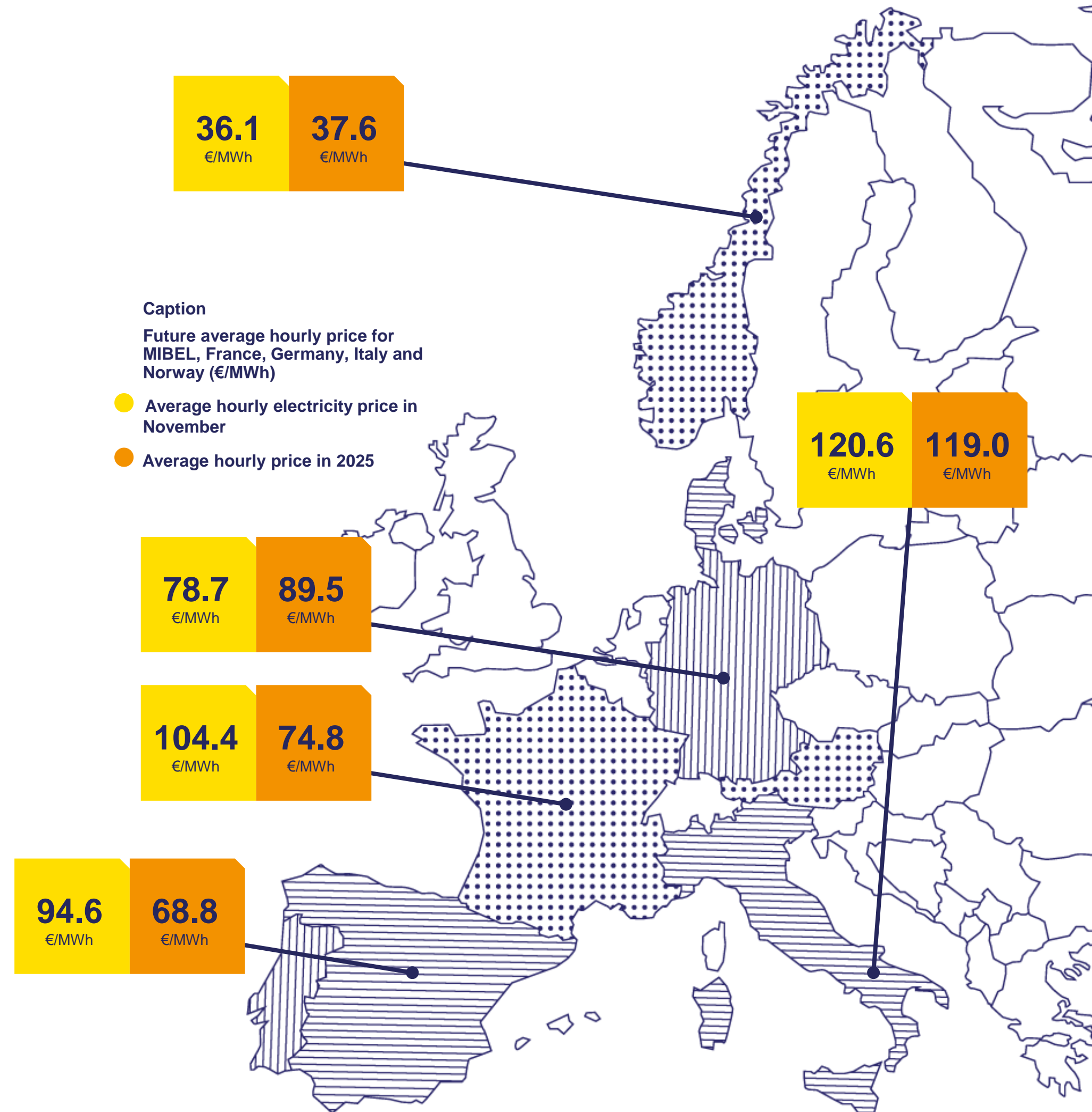
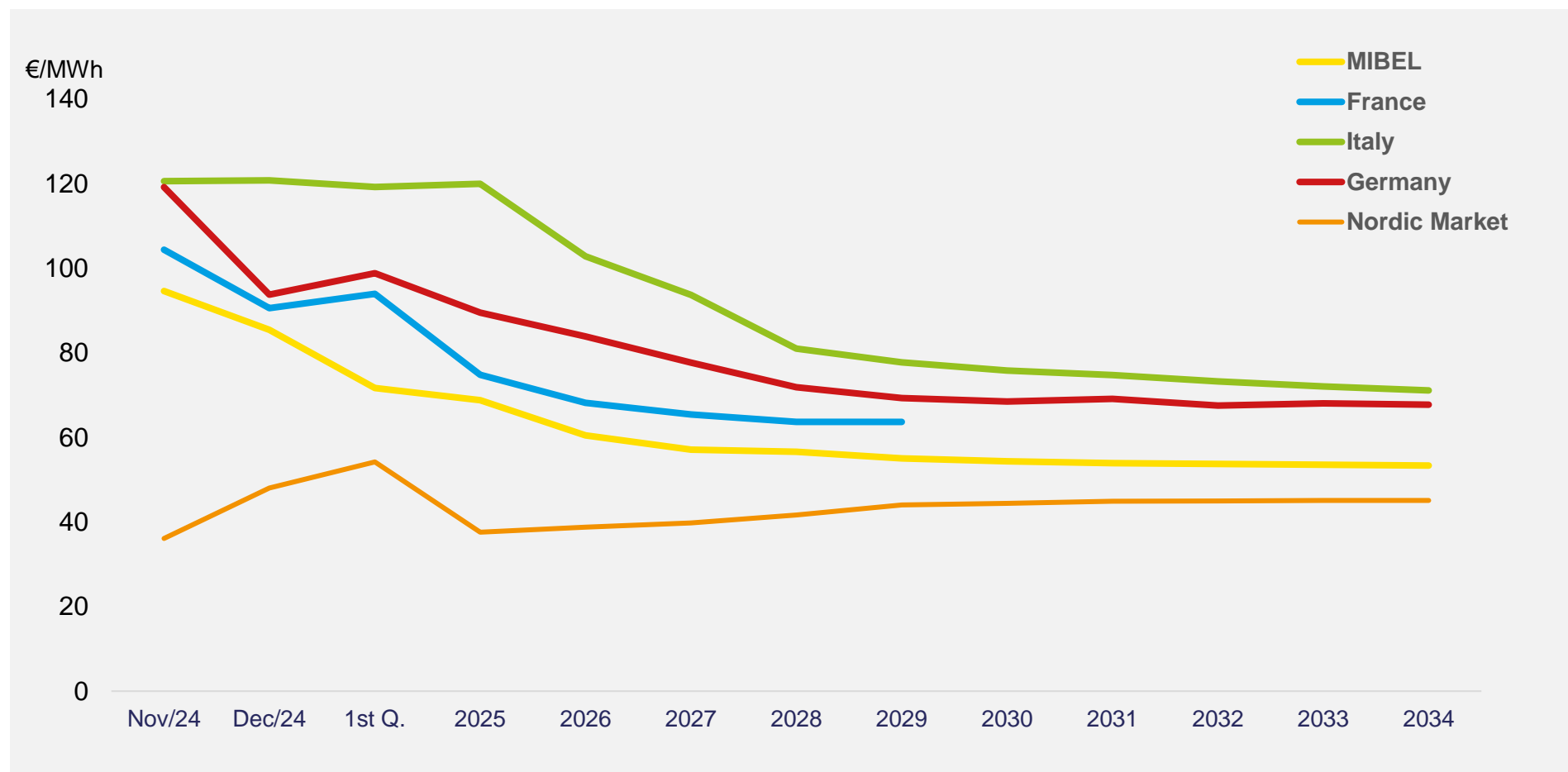
Caption
 ● Hourly arithmetic average price (Oct)
 ● Hourly arithmetic average price (Jan-Oct)



ELECTRICITY MARKET FUTURES

The evolution of the average hourly future price shown is calculated on the basis of electricity purchase and sale contracts. The map on the right shows the price values for next month (November) and next year. For next month, MIBEL is the second market with the lowest values, while for next year it is the Nordic Market that has the lowest values.

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



Caption
 Future average hourly price for MIBEL, France, Germany, Italy and Norway (€/MWh)

- Average hourly electricity price in November
- Average hourly price in 2025

^eValues updated as of 7th of November.
 Source: OMIP, EEX, APREN Analysis

INTERNATIONAL EXCHANGES EUROPE

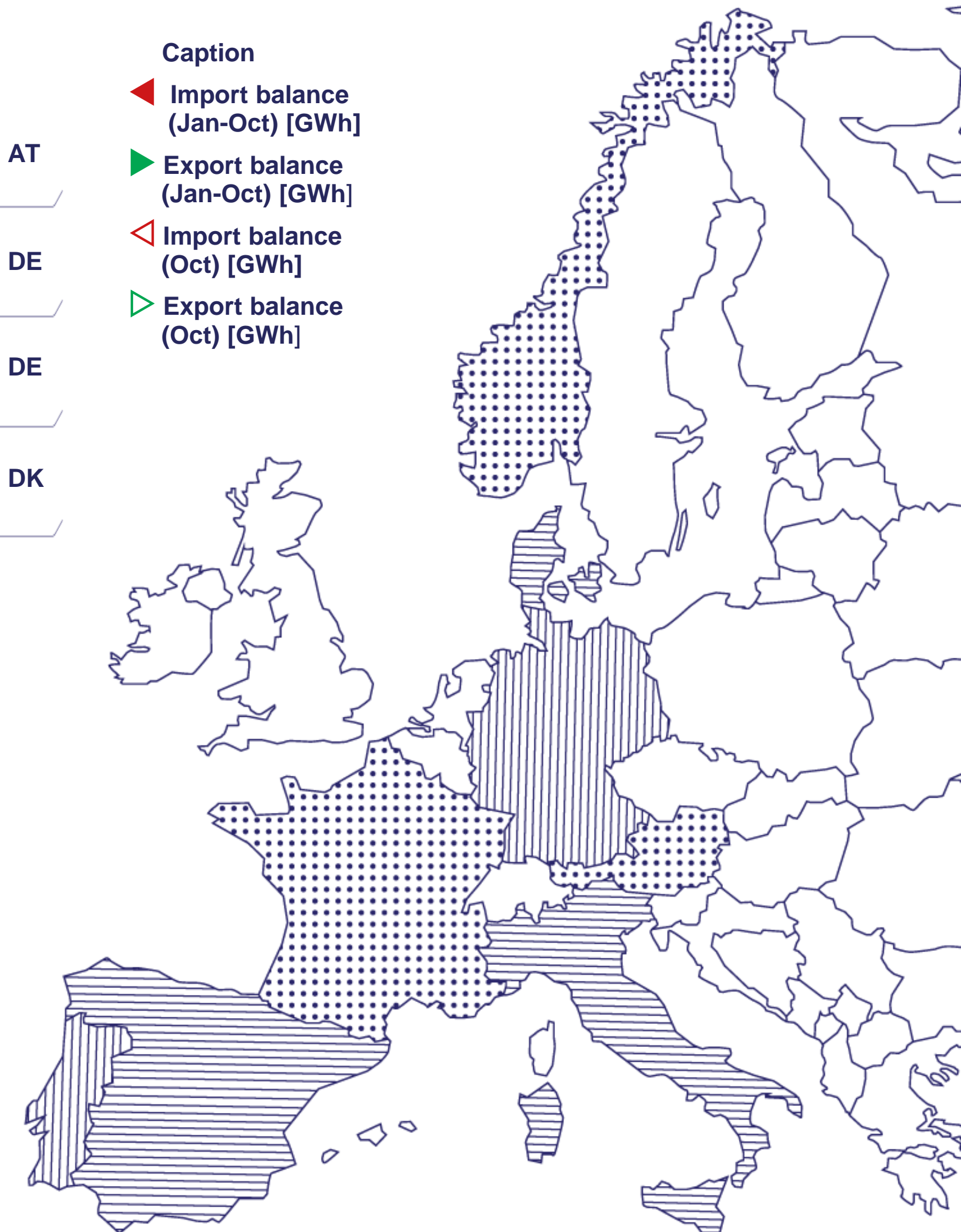
Between 1 January and 31 October 2024, mainland Portugal's electricity system registered electricity imports equivalent to 12,181 GWh and exports of 4,040 GWh, with Portugal being an importer with a balance of 8,141 GWh.

PT	8,141	983	ES	DE	592	417	AT
ES	2,322	315	MA	DK	5,704	845	DE
FR	3,452	370	ES	NO	4,557	580	DE
IT	16,374	1,842	FR	NO	5,047	728	DK
DE	16,479	2,146	FR				

Caption
 ▲ Import balance (Jan-Oct) [GWh]
 ▼ Export balance (Jan-Oct) [GWh]
 ▲ Import balance (Oct) [GWh]
 ▼ Export balance (Oct) [GWh]

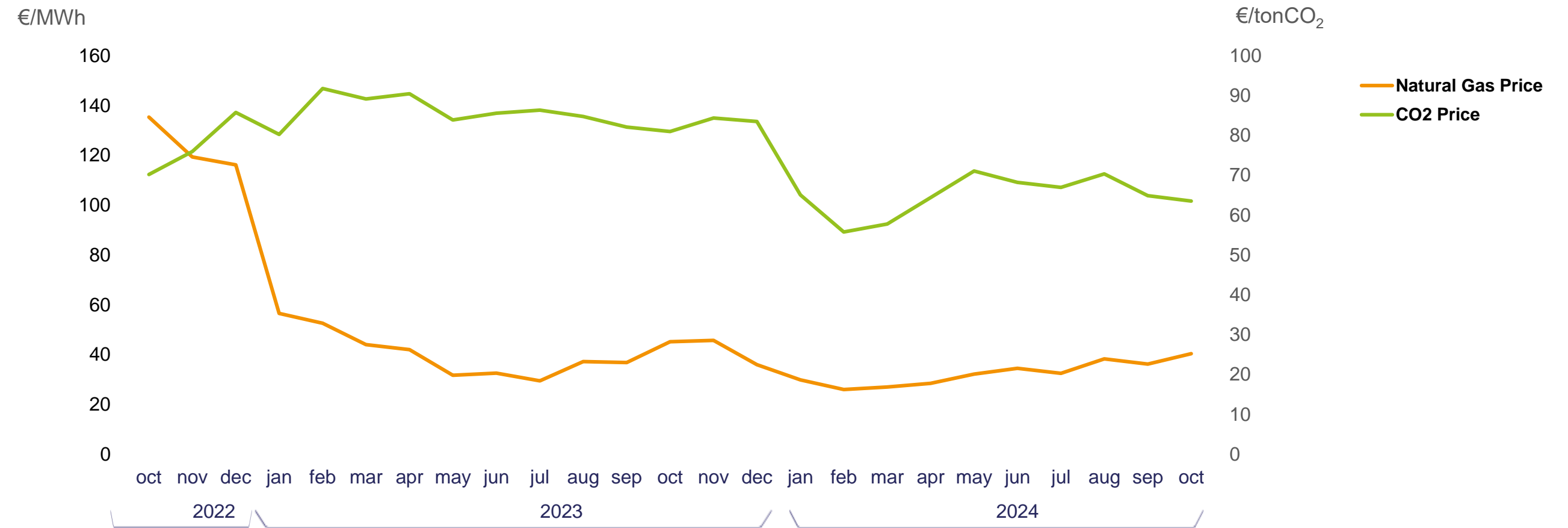
MAIN INDICATORS FOR PT-ES INTERCONNECTION

usage	6.0% (Oct) PT-ES	10.5% (Jan-Oct)	43.9% (Oct) ES-PT	39.9% (Jan-Oct)
congestion	0.5% (Oct) PT-ES	1.5% (Jan-Oct)	6.0% (Oct) ES-PT	6.1% (Jan-Oct)
market separation	7.8% (Oct) PT-ES	6.8% (Jan-Oct)	0.0% (Oct) MIBEL-FR	67.5% (Jan-Oct)



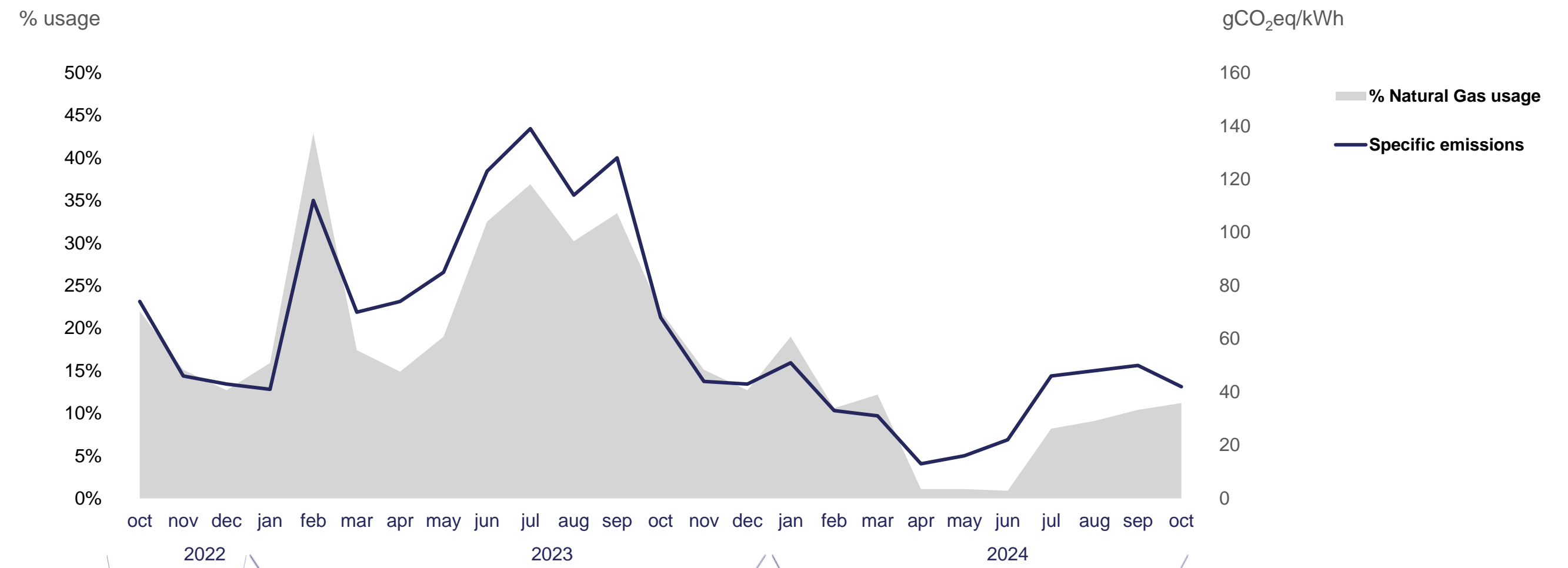
POWER PRODUCTION EMISSIONS

Between 1 January and 31 October 2024, specific emissions reached 34.8 gCO₂eq/kWh, giving total emissions from the electricity generation sector of 1.33 MtCO₂eq. The European CO₂ Emissions Trading Scheme (ETS) recorded a price of 64.8 €/tCO₂^d, a reduction of 24.2 per cent compared to the same period in 2023..



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

1.33 MtCO ₂ eq SECTOR'S EMISSIONS	64.8 €/tCO ₂ AVERAGE PRICE OF LICENCES
59.0 % ▼ COMPARED TO OCTOBER 2023 [ACCUMULATED]	24.2 % ▼ COMPARED TO OCTOBER 2023 [ACCUMULATED]



Specific emissions from the electricity sector in mainland Portugal, % use of coal and natural gas power stations (Oct-2022 to Oct-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 identify the savings achieved by the merit order between 1 January and 31 October 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..

198.8

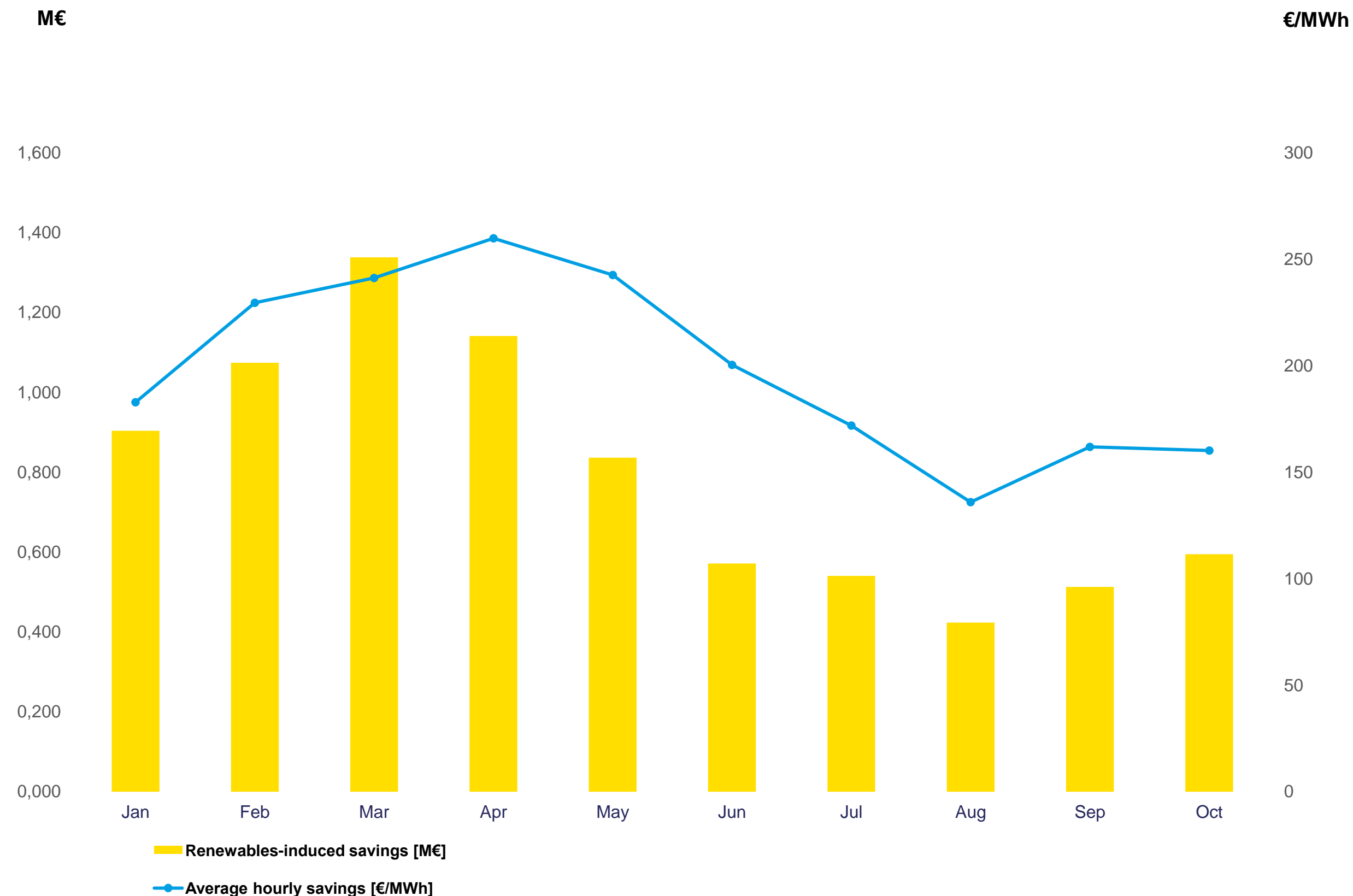
€/MWh

AVERAGE HOURLY SAVINGS (Jan-Oct)

7,922

M€

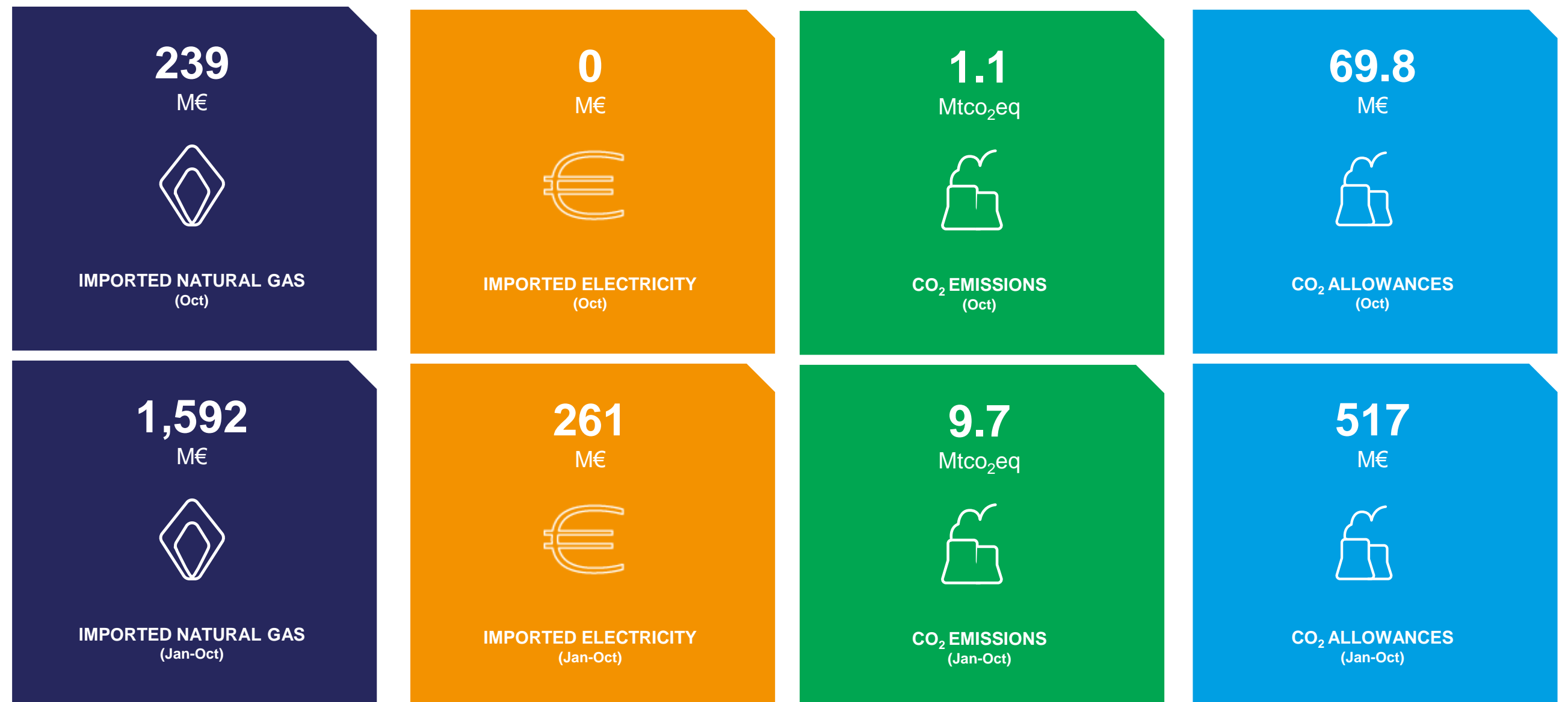
CUMULATIVE SAVINGS (Jan-Oct)



ENVIRONMENTAL SERVICE

RENEWABLES AVOIDED:

The indicators below identify the savings achieved between 1 January and 31 October 2024 in natural gas, CO2 emissions and CO2 emission allowances, as a result of incorporating renewables into electricity generation. This analysis is based on the assumption that, in the absence of renewables, production would be ensured primarily by natural gas, followed by the use of imports..



Source: OMIE, APREN Analysis.

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APREN
DEPARTAMENTO TÉCNICO
E COMUNICAÇÃO

Av. da República 59 – 2º andar
1050-189 Lisboa
(+351) 213 151 621

apren@apren.pt
apren.pt

