# 2025

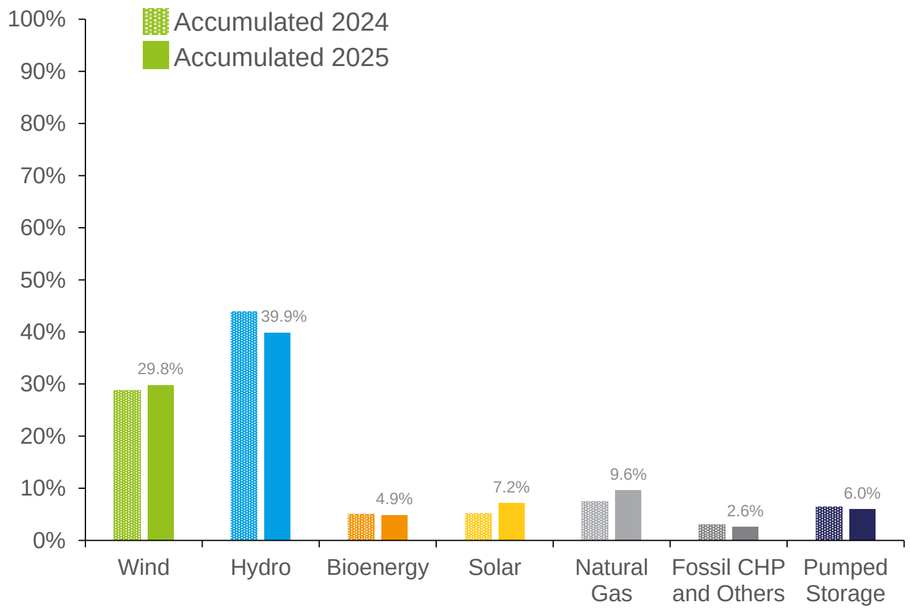
# RENEWABLE ELECTRICITY BULLETIN

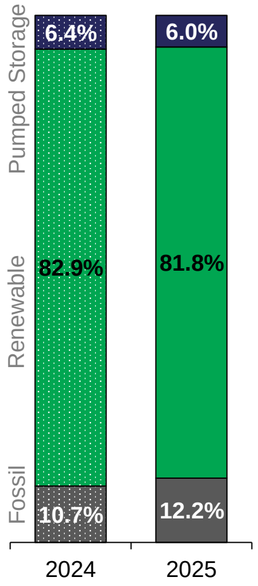
MARCH
2025

PORTUGAL NEEDS
OUR ENERGY

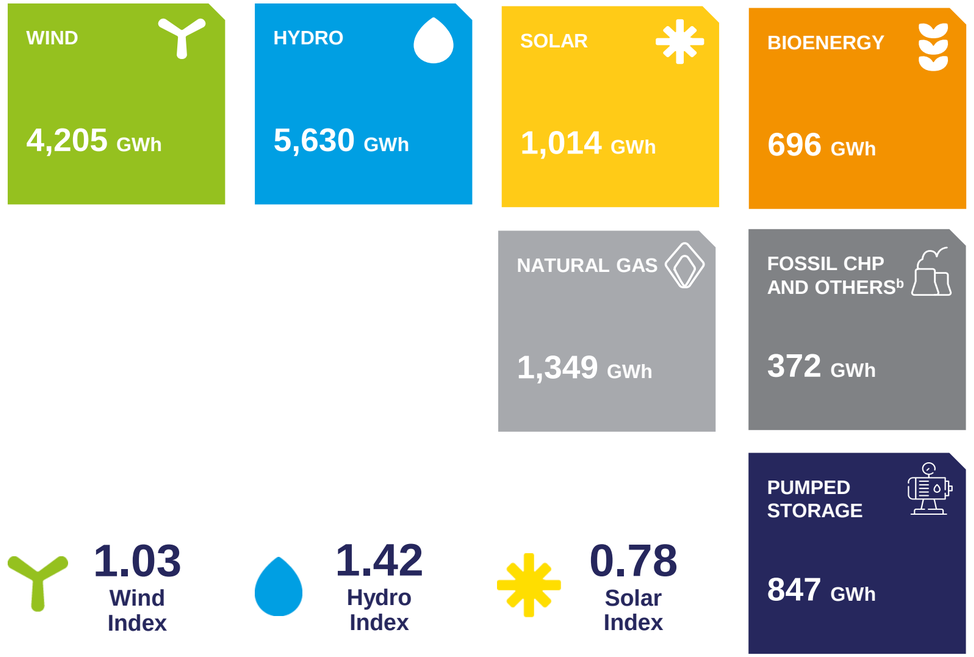
APREN Associação de Energias Renováveis

# EXECUTIVE SUMMARY
## CUMULATIVE GENERATION MAR 2025




## MAIN INDICATORS




## COMPARING TO THE SAME PERIOD IN 2024

| GWh | % | GWh | GWh |
|---|---|---|---|
| ▽ 6.1% | ▽ 1.1 p.p. | △ 3.2% | △ 770% |
| **14,113** Generation | **81.8** Renewable Incorporation in Generation | **14,069** Consumption | **1,072** Net Imports |

| €/MWh | €/ $tCO_2$ | $MtCO_2$ - eq | $gCO_2$ eq/kWh |
|---|---|---|---|
| **85.1** MIBEL PT Price | **73.4** $CO_2$ Price | **0.62** $CO_2$ Emissions | **44.1** $CO_2$ Specific Emissions |

a Generation refers to the net energy generation of the power stations, considering 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, considering the import-export balance.
Source: REN, APREN Analysis

# MONTHLY ANALYSIS IN MAINLAND PORTUGAL

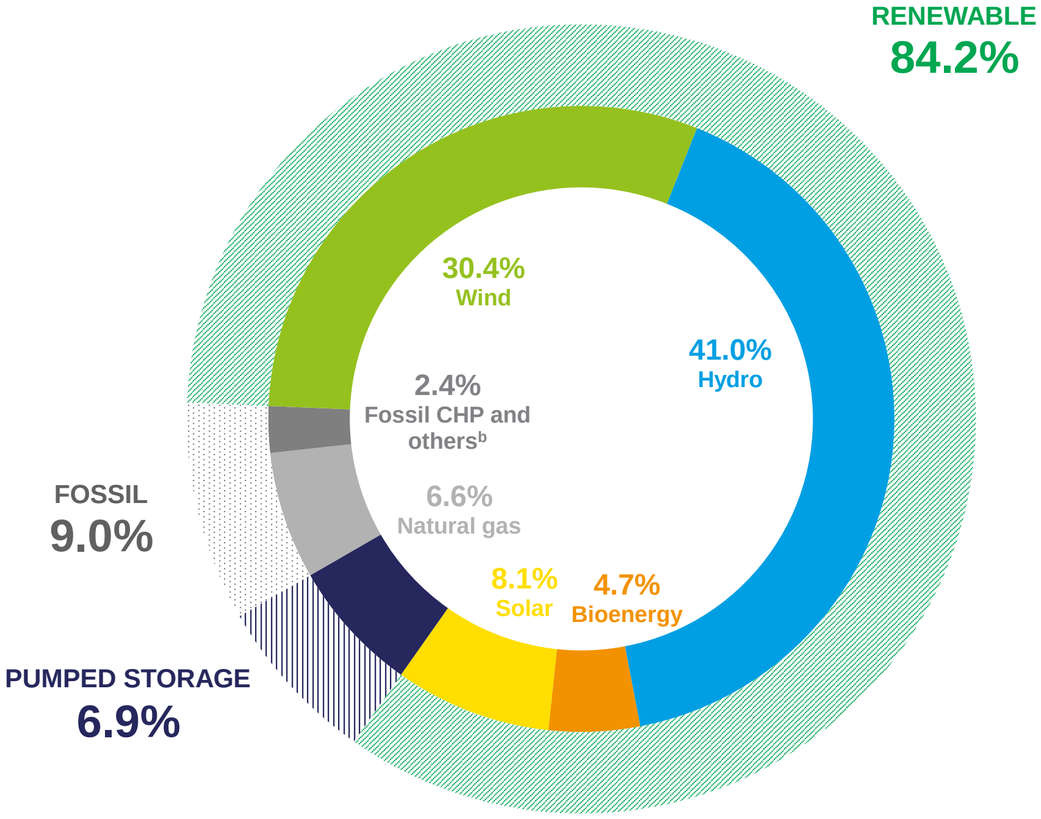
## MARCH 2025

Between 1th and 31th March 2025, **renewable incorporation** was 84.2%, making up 4,180 GWh of the 4,966 GWh produced in the month under review.

Compared to March 2024, there was a 9.0% reduction in national electricity production, which was mainly the result of a 451 GWh decrease in hydro production.

In March 2025, imports totalled 3.3% of the electricity consumption in mainland Portugal.

To highlight the occurence of **curtaiment** for seven consecutive hours in wind and solar, which consisted in an instruction to curtail the generation of a cumulative of 1,490 MW in the 30th.




## MAIN INDICATORS COMPARING TO MARCH 2024

| | | |
|---|---|---|
| GWh | GWh | % |
| **4,966** | **4,649** | **84.2** |
| Generation[a] | Consumption[c] | Renewable incorporation |
| ▽ 9.0% | ▽ 3.7% | △ 0.6 p.p. |

WIND INDEX
1.07

HYDRO INDEX
1.86

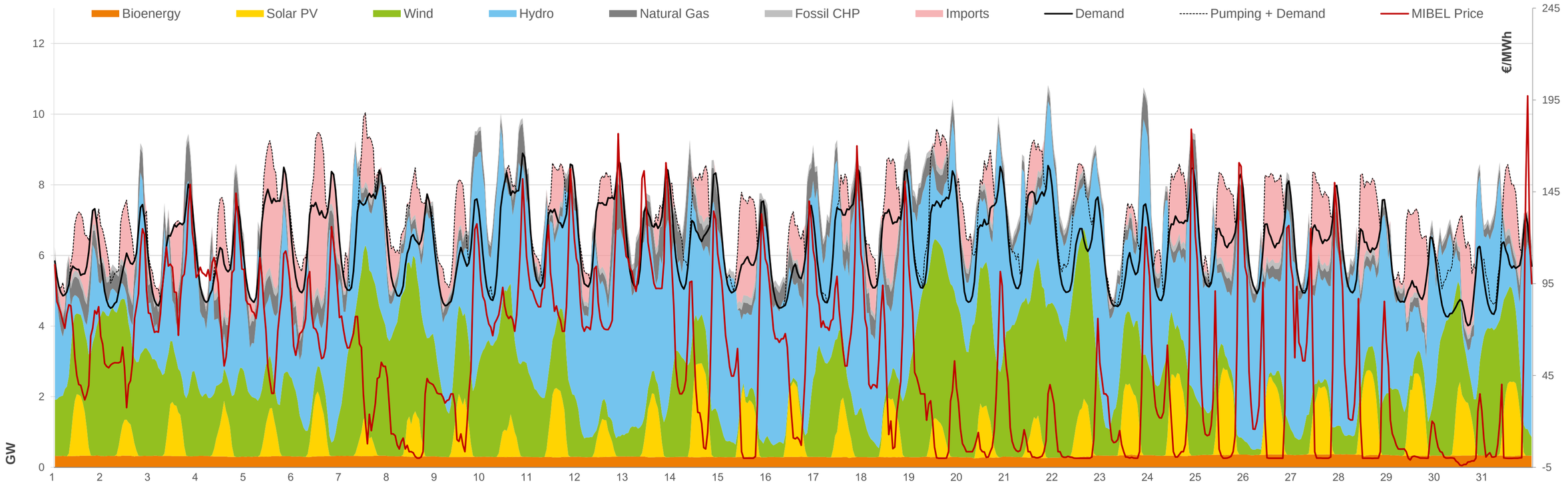
STORAGE IN DAMS
87.1%

SOLAR INDEX
0.71

a Generation refers to the net energy generation of the power stations, considering 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, considering the import-export balance.
Source: REN, APREN Analysis

# MONTHLY ANALYSIS IN MAINLAND PORTUGAL

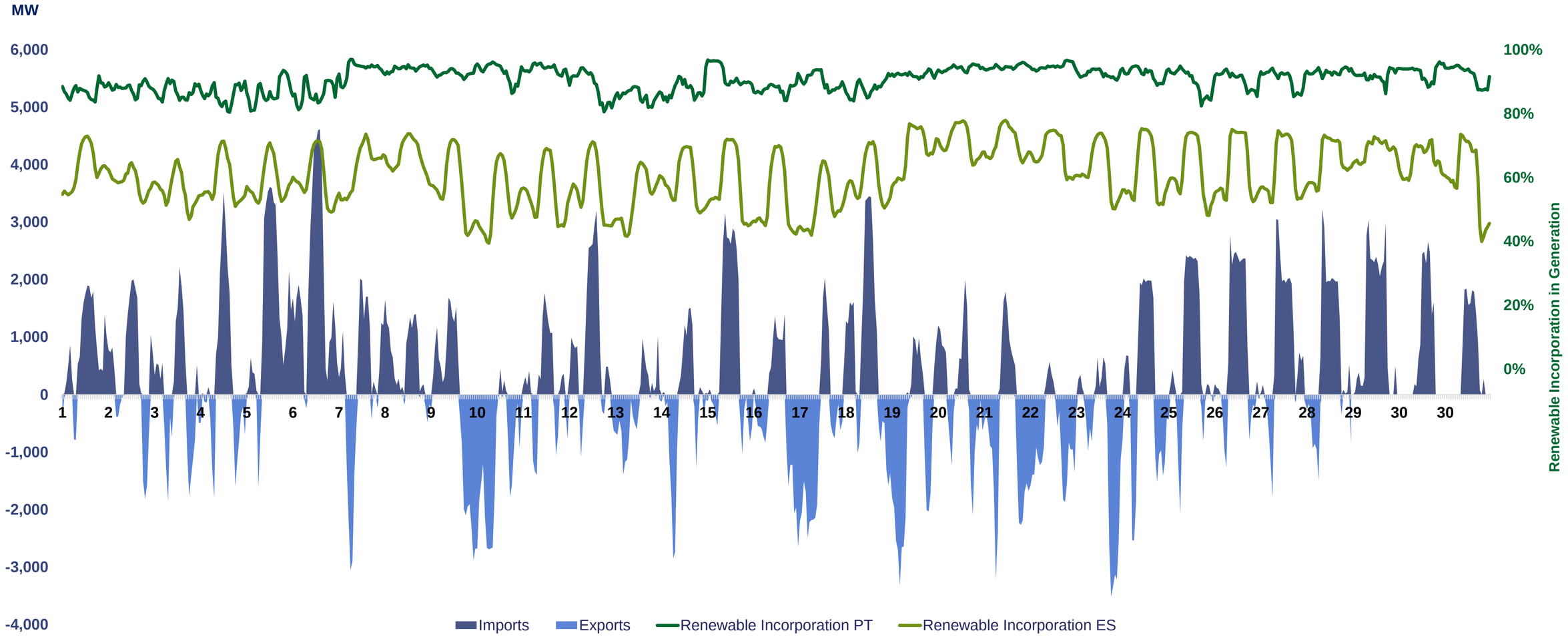
## LOAD DIAGRAM FOR MARCH 2025




Source: REN, OMIE, APREN Analysis

# MONTHLY ANALYSIS IN MAINLAND PORTUGAL

## IMPORTS AND EXPORTS DIAGRAM



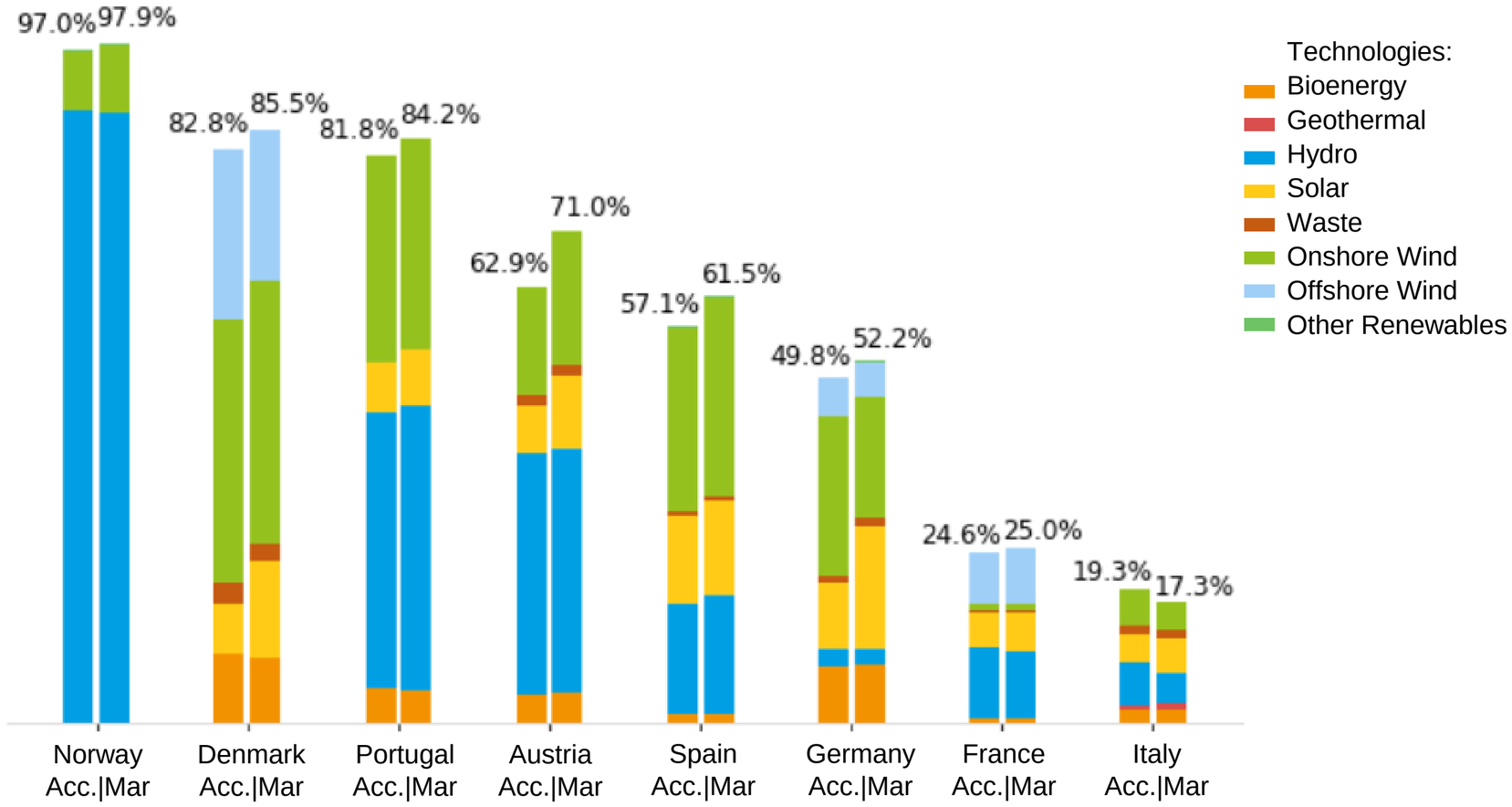

Source: REN, APREN Analysis

# 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 March 2025, Portugal was the country with the third highest share of renewable energy in electricity generation, with 81.8%, behind Norway and Denmark, which had 97.0% and 82.8%, respectively.

The renewable technology with the largest share of the European electricity generation mix this month was hydro, followed by onshore wind.




Renewable incorporation in cumulative (1 Jan - 31 Mar) and monthly (Mar) electricity generation.
Source: REN, Fraunhofer, REE, Terna, National Grid, ENTSO-E, APREN Analysis.

# ELECTRICITY MARKET
## PORTUGAL

Between 1 January and 31 March, the average hourly price recorded in MIBEL in Portugal (85.09 €/MWh[d]) represents an increase of 91.1% compared to the same period last year.

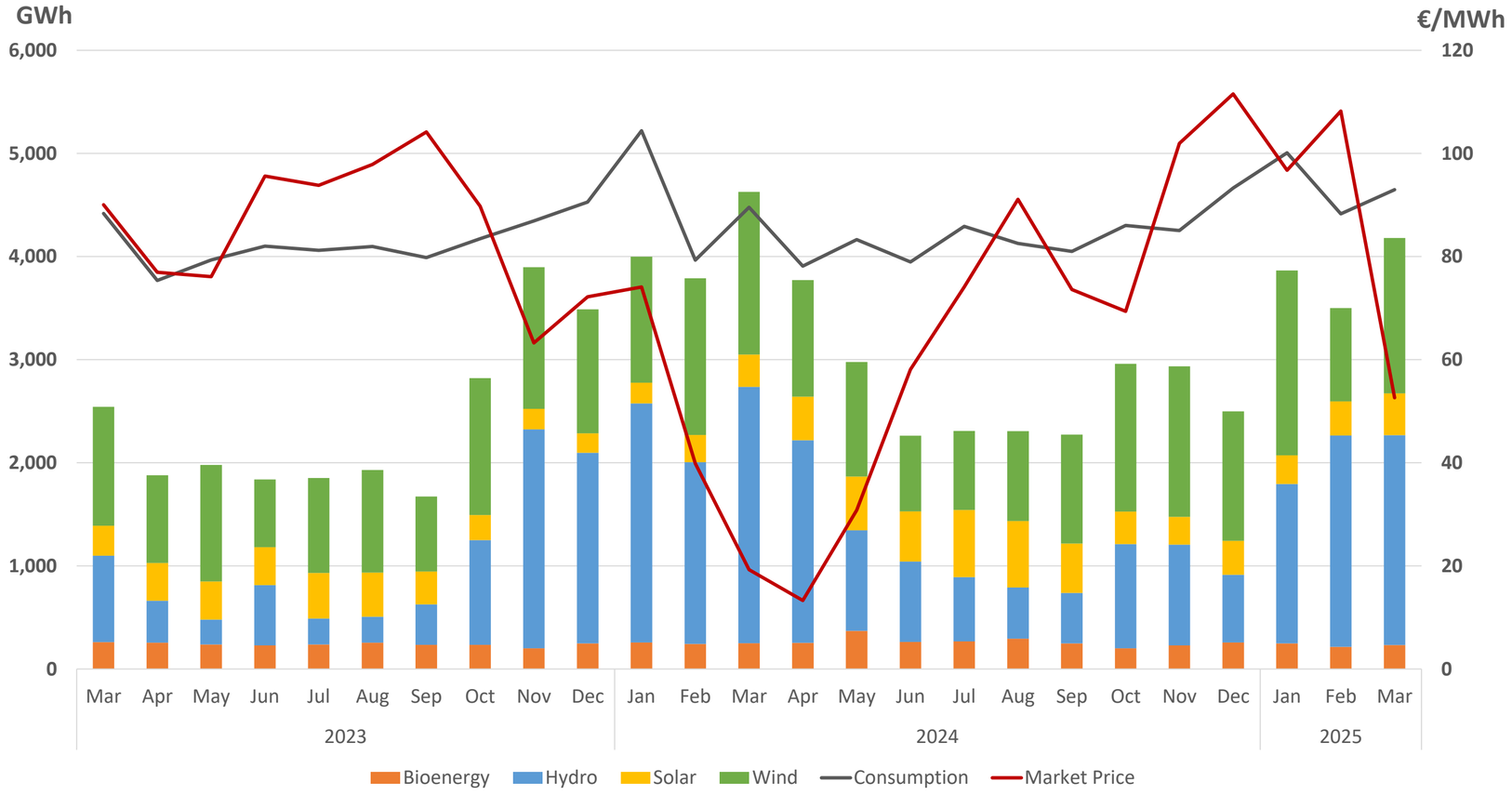
In the same period, there were 641 non-consecutive hours in which renewable generation was sufficient to supply mainland Portugal's electricity consumption, with an average hourly price in MIBEL of 75.9 €/MWh.

**641**
Hours
**100% RENEWABLE HOURS [Accumulated]**

**75.9**
€/MWh
**MIBEL'S AVERAGE PRICE (IN 100% RENEWABLE HOURS) [Accumulated]**

**311**
Horas
**100% RENEWABLE HOURS [Mar]**

**43.5**
€/MWh
**PREÇO MÉDIO MIBEL (EM HORAS 100%RENOVÁVEIS) [Mar]**




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

Electricity market analysis, renewable generation, consumption and market price (Mar-2023 a Mar-2025)
Source: OMIE, APREN analysis

# RENEWABLE ELECTRICITY
## EUROPE

During the month of March 2025, the **minimum hourly price in MIBEL** in Portugal equalled -4.00 €/MWh*.

On the other hand, the **maximum hourly price** reached up to 197.3 €/MWh*.

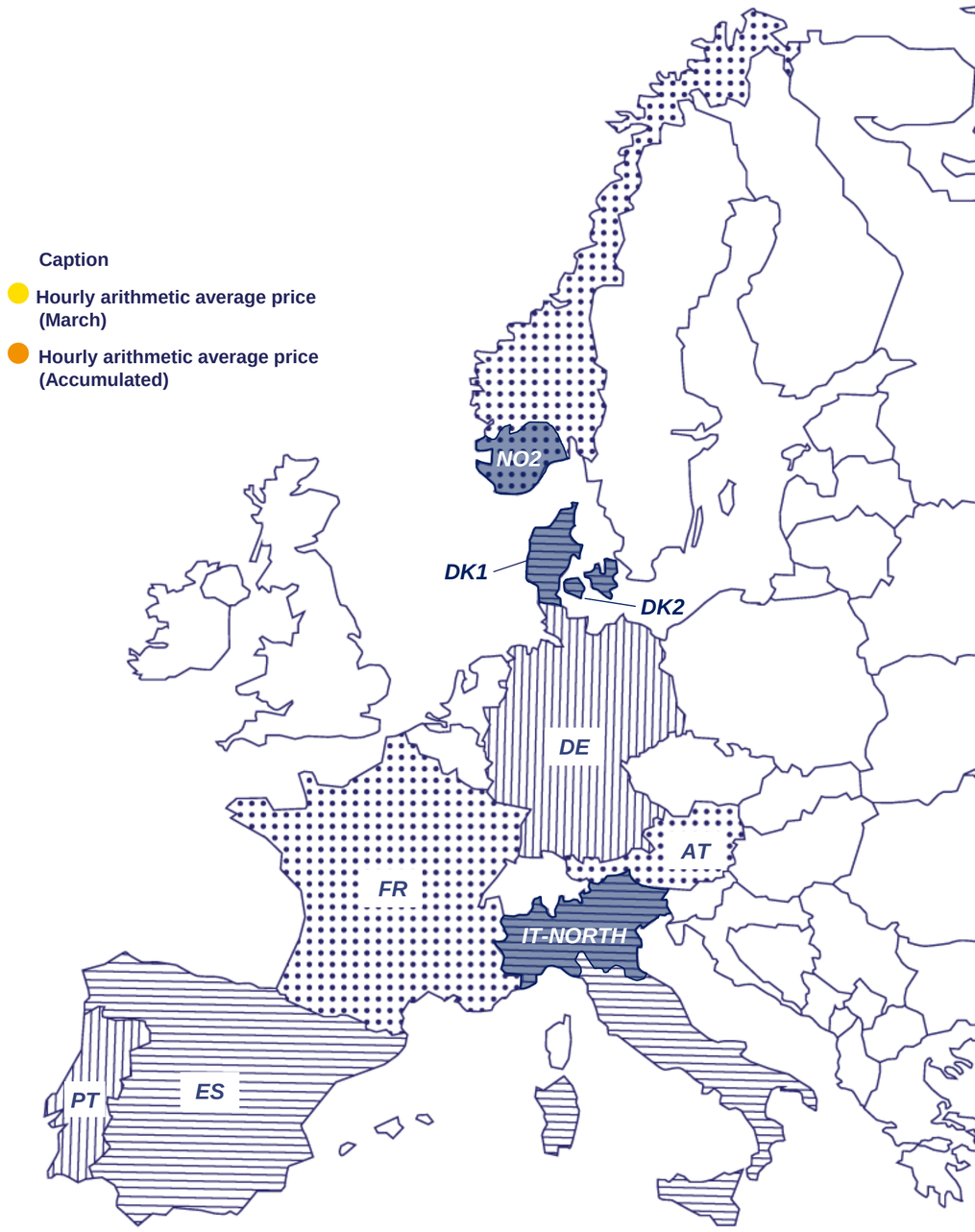
### ▽ MINIMUM PRICES (Mar)

| | | €/MWh |
|---|---|---|
| 1º | Germany | -26.07 |
| 2º | Austria | -24.02 |
| 3º | Denmark$^{DK1}$ | -13.39 |

### △ MAXIMUM PRICES (Mar)

| | | €/MWh |
|---|---|---|
| 1º | Germany | 280.07 |
| 2º | Denmark$^{DK2}$ | 279.34 |
| 3º | Austria | 262.62 |

| | | |
|---|---|---|
| Portugal €/MWh | 52.60 | 85.09 |
| Spain €/MWh | 53.10 | 85.28 |
| France €/MWh | 76.84 | 99.90 |
| Italy$^{IT-NORD}$ €/MWh | 121.18 | 137.94 |
| Germany €/MWh | 94.69 | 111.97 |
| Austria €/MWh | 103.86 | 125.69 |
| Denmark$^{DK1}$ €/MWh | 84.27 | 97.94 |
| Denmark$^{DK2}$ €/MWh | 82.78 | 99.75 |
| Norway$^{NO2}$ €/MWh | 40.20 | 75.77 |



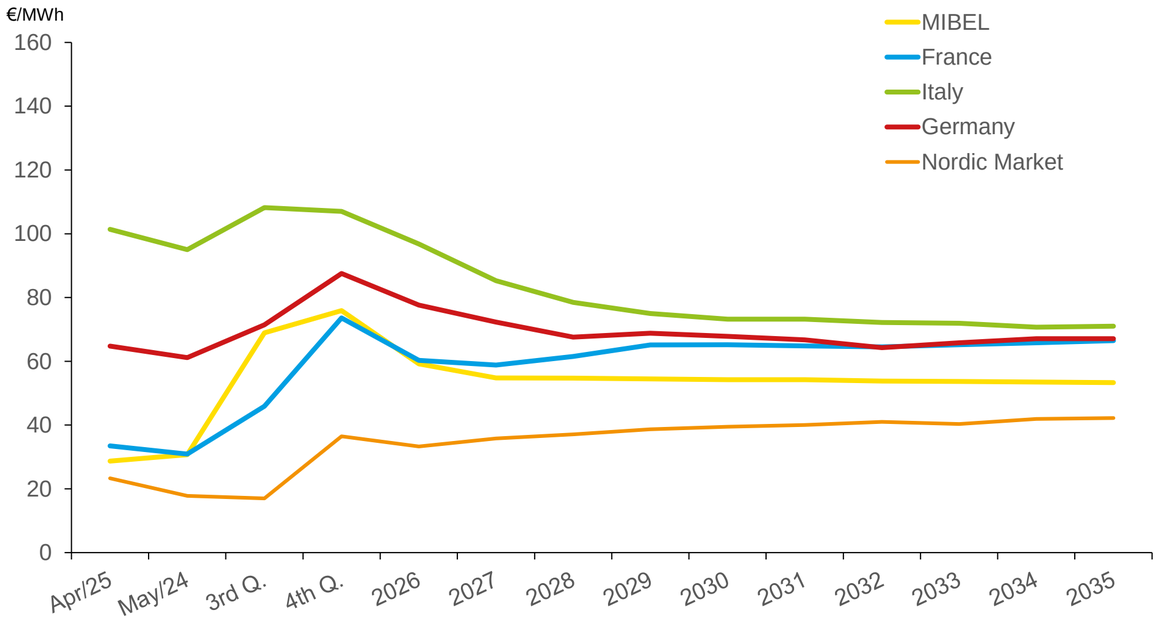

Source: ENTSO-E, OMIE, APREN Analysis
Note: given recent changes in the data reporting format by the ENTSO-E platform, the price values presented correspond to the bidding zones, when applicable. As such, in the case of Italy, Denmark and Norway only the bidding zones with interconnection with neighbouring countries were considered.
* Due to the unavailability of information on the OMIE platform, it is currently not possible to provide data regarding market closing technologies.

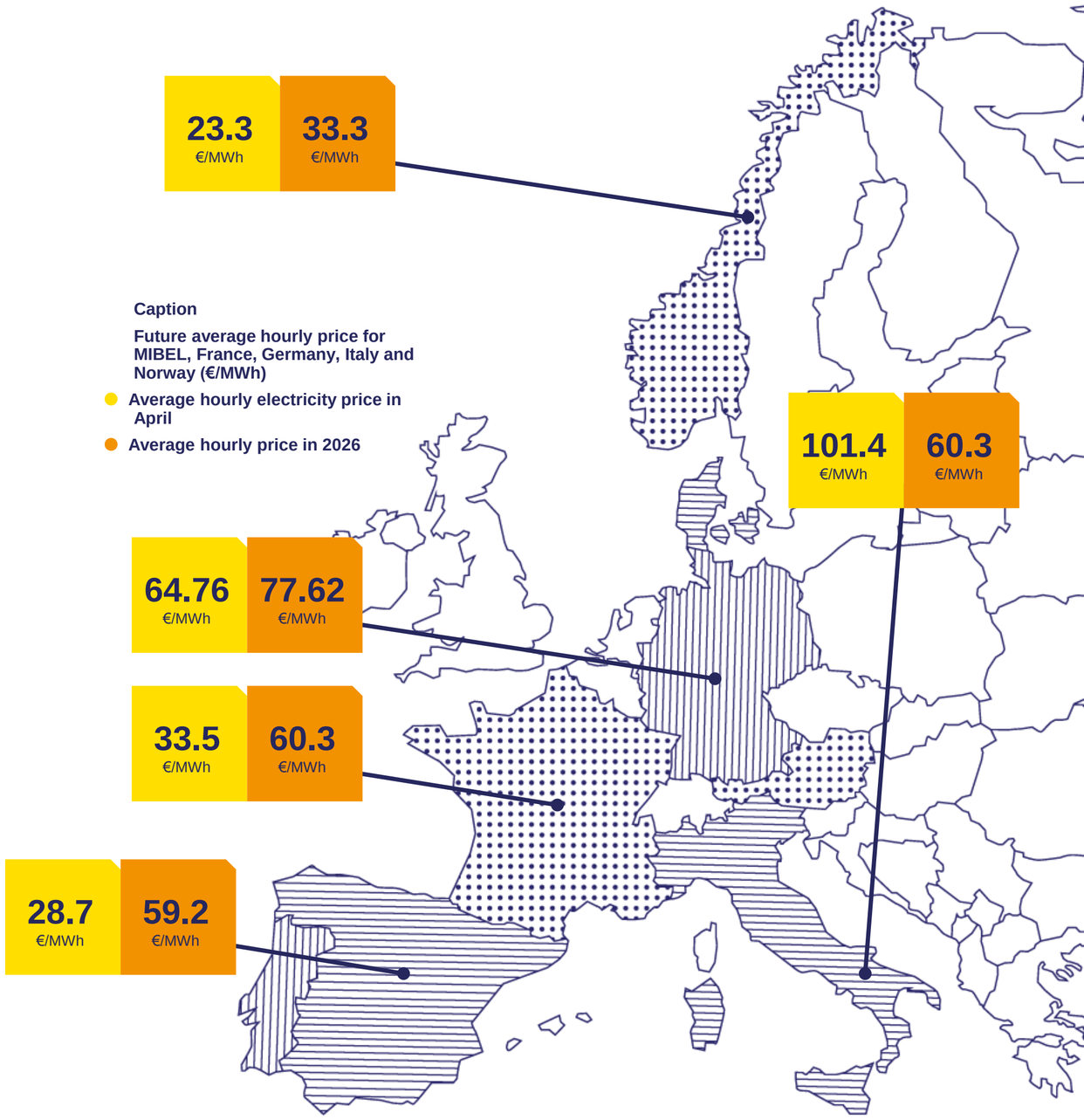
# ELECTRICITY MARKET FUTURES

In the European futures market, the average hourly price values for next month (April) and next year, according to the records for a specific day, are an example. At the time of collection, in April 2025, MIBEL will be the second lowest electricity futures market.

From a long-term perspective, and according to the data for the specific day shown, MIBEL will have the second lowest values until 2035, due to investment in renewable production. The evolution of the average hourly future price shown is calculated based on electricity purchase and sale contracts.

However, it should be emphasised that the respective volumes traded represent very low quantities when compared to the countries' consumption.




[e] values updated as of 4th of April.

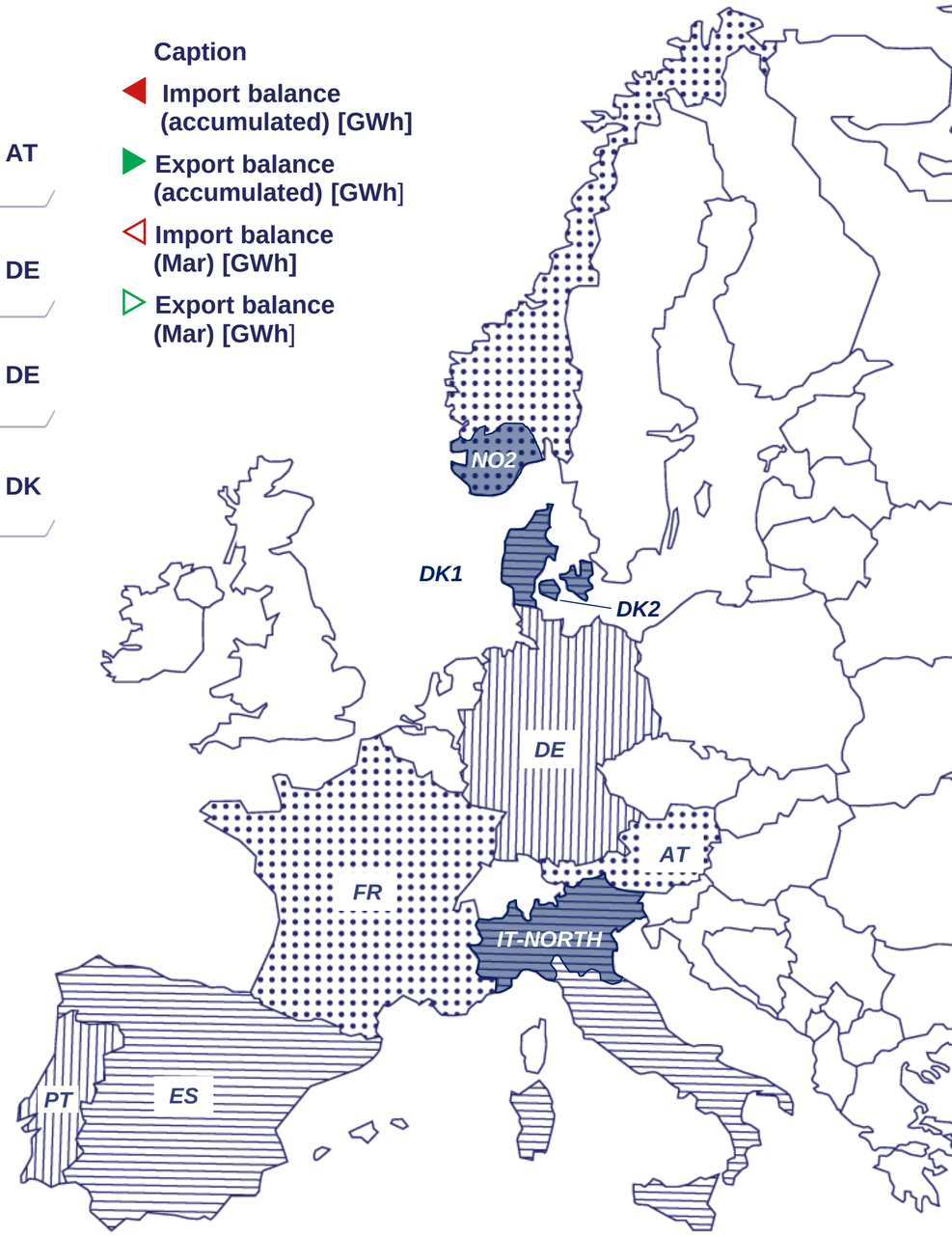
Source: OMIP, EEX, APREN Analysis

# INTERNATIONAL TRADES
## EUROPE

Between 1 January and 31 March 2025, mainland Portugal's electricity system recorded **electricity imports equivalent to 2,606 GWh and exports of 1,534 GWh**.

Up until this month, Portugal was characterised as an **electricity importer**, with a balance of **1,702 GWh**.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PT | 1 072 | 160 | ES | DE | 2 798 | 773 | AT |
| ES | 407 | 170 | MA | DK | 2 991 | 1 221 | DE |
| FR | 2 261 | 1 191 | ES | NO | 2 015 | 557 | DE |
| IT | 4 089 | 2 072 | FR | NO | 2 295 | 843 | DK |
| DE | 2 731 | 1 041 | FR | | | | |




## MAIN INDICATOR FOR PT-ES INTERCONNECTION

| | PT-ES (mar) | PT-ES (jan-mar) | ES-PT (mar) | ES-PT (jan-mar) |
|---|---|---|---|---|
| usage | 14.5% | 17.3% | 20.0% | 14.7% |
| congestion | 1.9% | 2.2% | 6.9% | 4.0% |
| market split | 70.0% | 27.4% | 71.9% | 76.6% |

| | MIBEL-FR (mar) | MIBEL-FR (jan-mar) |
|---|---|---|
| market split | 71.9% | 76.6% |

Source: ENTSO-E, OMIE, APREN Analysis
Note: given recent changes in the data reporting format by the ENTSO-E platform, the price values presented correspond to the bidding zones, when applicable. As such, in the case of Italy, Denmark and Norway only the bidding zones with interconnection with neighbouring countries were considered.

# POWER PRODUCTION EMISSIONS

From the 1st of January to the 31st of March, the **specific emissions** reached up to 44.1 $gCO_2eq/kWh$, corresponding to a total of emissions from the electricity generation sector of around 0.62 $MtCO_2eq$.

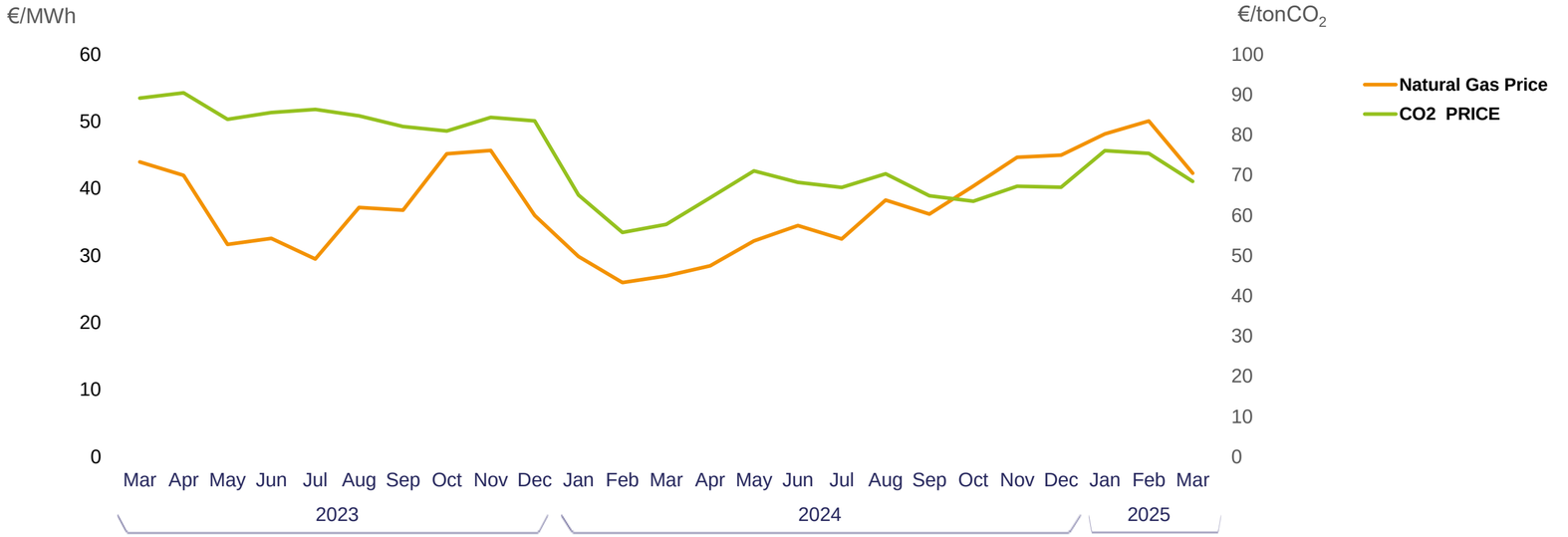
The **European Carbon Emission Trading Scheme** (ETS) registered a price of 73.4 €/$tCO_2$[d], which means a reduction of 23.2% comparing to the same period of 2024.

**0.62**
$MtCO_2eq$
**SECTOR'S EMISSIONS**

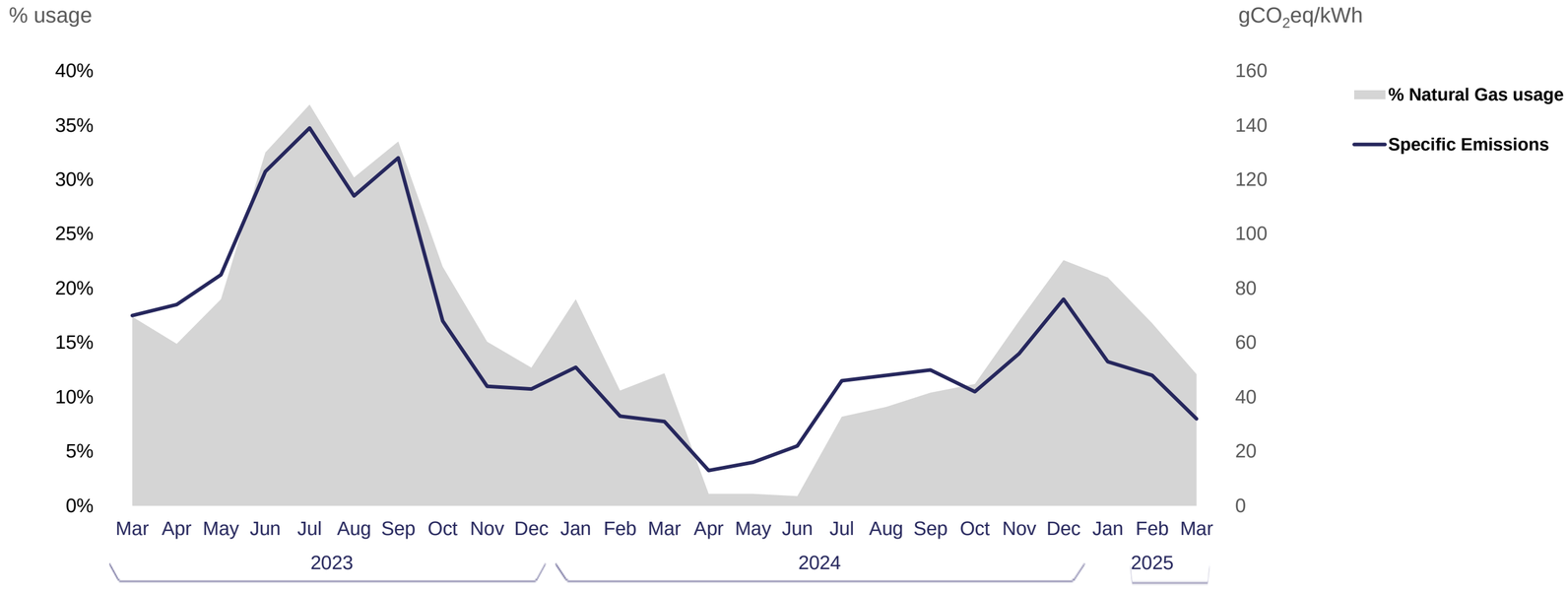
**73.4**
€/$tCO_2$
**AVERAGE ALLOWANCE PRICE**

**8.0**
%
▼
**COMPARED TO MAR 2024 [Accumulated]**

**23.2**
%
▲
**COMPARED TO MAR 2024 [Accumulated]**




Price of $CO_2$ allowances in the EU ETS and price of natural gas in Europe (Mar-2022 to Mar-2024).
Source: SendeCO2, WorldBank, REN




Specific emissions from the electricity sector in mainland Portugal, % use of coal and natural gas power stations (Mar-2023 to Mar-2025).
Source: REN, DGEG, ERSE, APREN Analysis

[d] Arithmetic mean of the hourly prices
Source: OMIE, MIBGAS.

# SIMULATION OF PRICE FORMATION WITHOUT SPECIAL REGIME PRODUCTION (PRE)

## RENEWABLES HAVE AVOIDED:

The indicators below identify the savings achieved by the **Order of Merit** between the 1st of January and the 31st of March of 2025 given the contribution of special regime production (PRE).

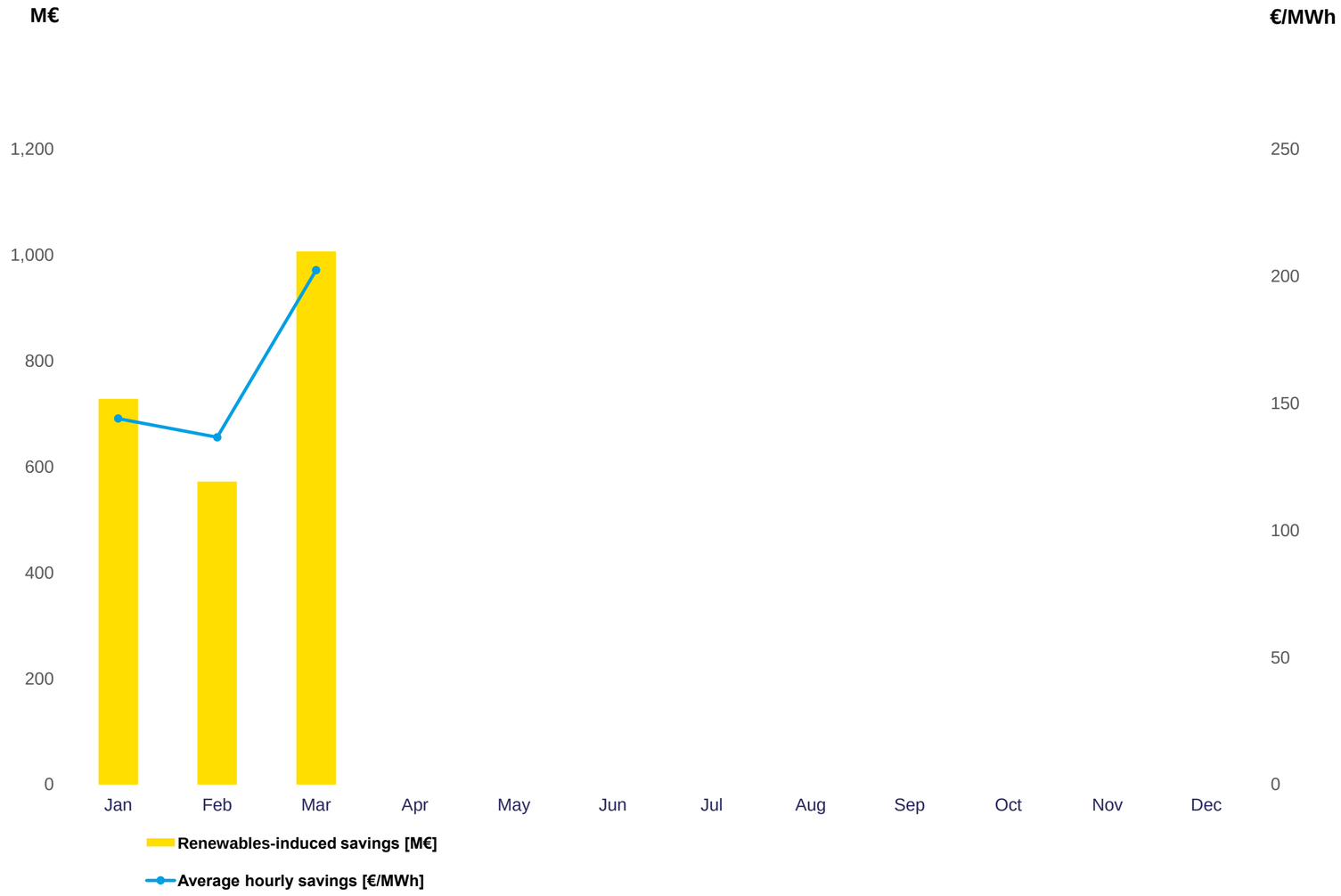
This study is carried out for PRE, which includes all installed fossil cogeneration power. Considering that the capacity equivalent to this technology within PRE is residual and that the other technologies are renewable, the figures are close to the real savings generated by renewables.

**161.0**
€/MWh

**AVERAGE HOURLY SAVINGS (Accumulated)**

**2,308**
M€

**CUMULATIVE SAVINGS (Mar)**




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 the 1st of January and the 31st of March of 2025 in natural gas, $CO_2$ emissions and $CO_2$ emission allowances, because of incorporating renewables into electricity generation.

This analysis assumes that, in the absence of renewables, production would be ensured primarily by natural gas, followed by electricity imports.

**103** M€
**NATURAL GAS IMPORTS (Mar)**

**93** M€
**ELECTRICITY IMPORTS (Mar)**

**1.1** $Mtco_2eq$
**$CO_2$ EMISSIONS (Mar)**

**62** M€
**$CO_2$ ALLOWANCES (Mar)**

**310** M€
**NATURAL GAS IMPORTS (Accumulated)**

**413** M€
**ELECTRICITY IMPORTS (Accumulated)**

**2.9** $Mtco_2eq$
**$CO_2$ EMISSIONS (Accumulated)**

**181** M€
**$CO_2$ ALLOWANCES (Accumulated)**

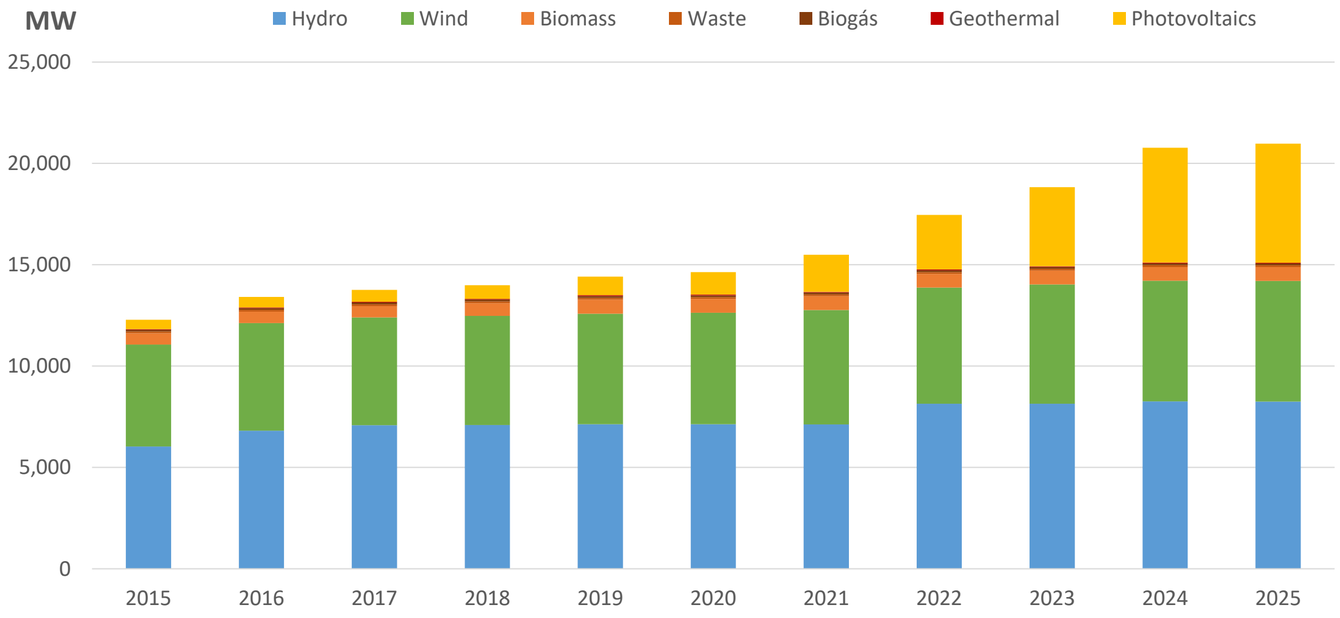
Source: OMIE, APREN Analysis

# RENEWABLE INSTALLED CAPACITY
## PORTUGAL

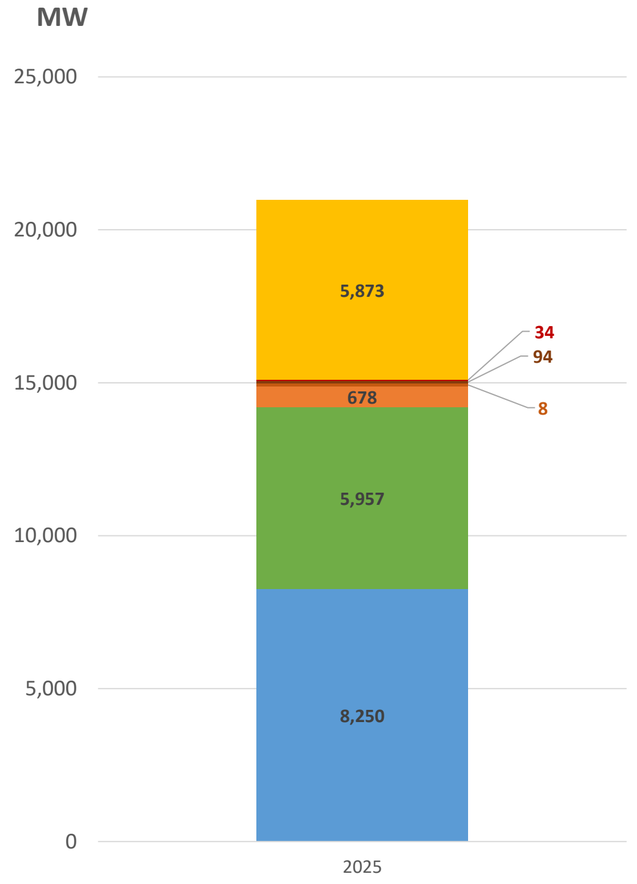
From 2015 to February 2025, installed renewable capacity increased by 8,693 MW, representing growth of 70.8%.

From December 2024 to February 2025, installed capacity increased by 198 MW, especially solar photovoltaic technology, which grew by 109 MW in the centralised component and 124 MW in the decentralised component.

At the end of January 2025, renewable capacity accounted for around 78.3% of total installed capacity in Portugal.




## JANUARY 2025




Source: DGEG, APREN Analysis
Nota: information available at the source with one month of delay to the month under analysis.

# 2025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