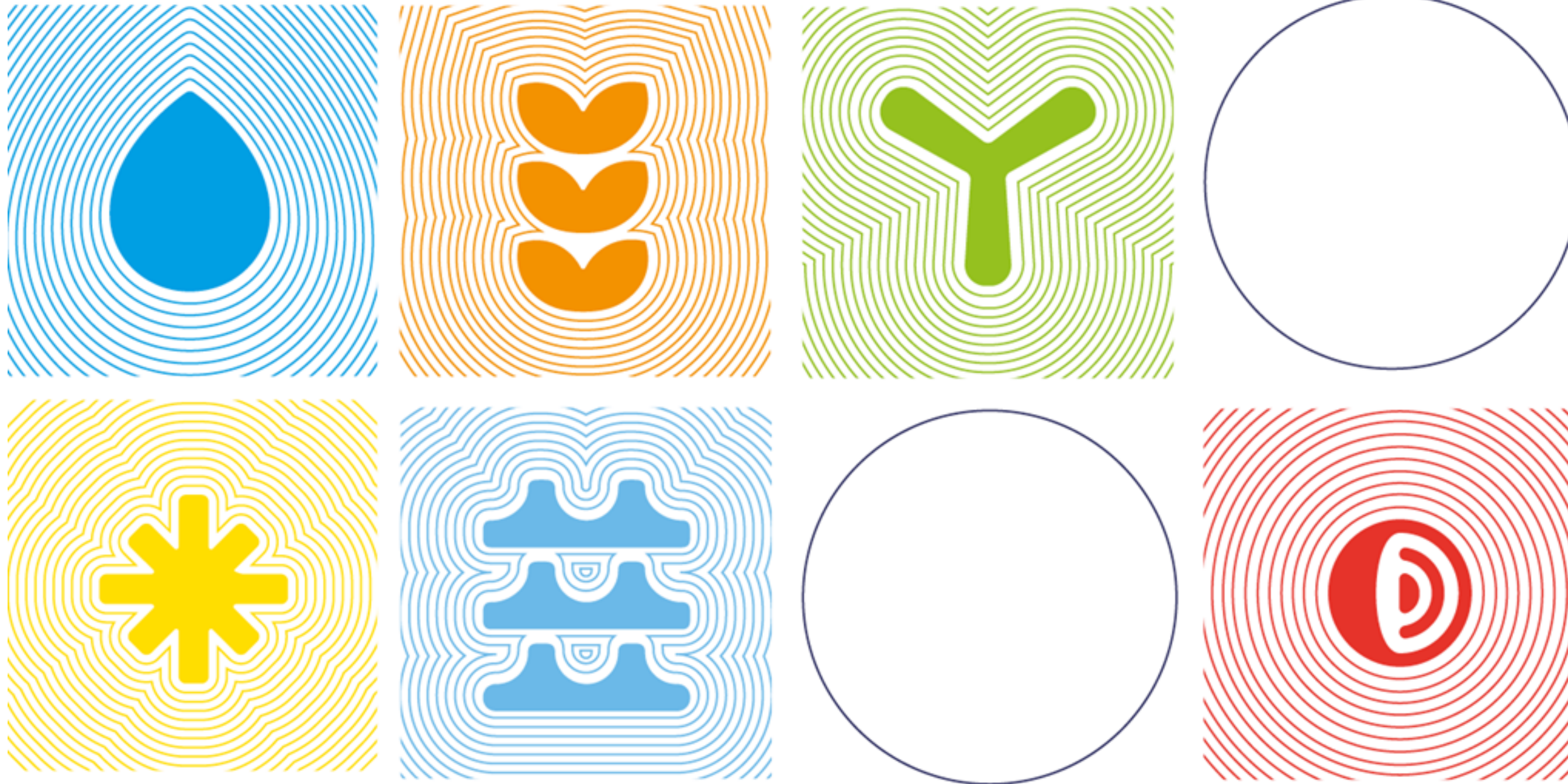


**Renewable Electricity Bulletin  
March 2023**

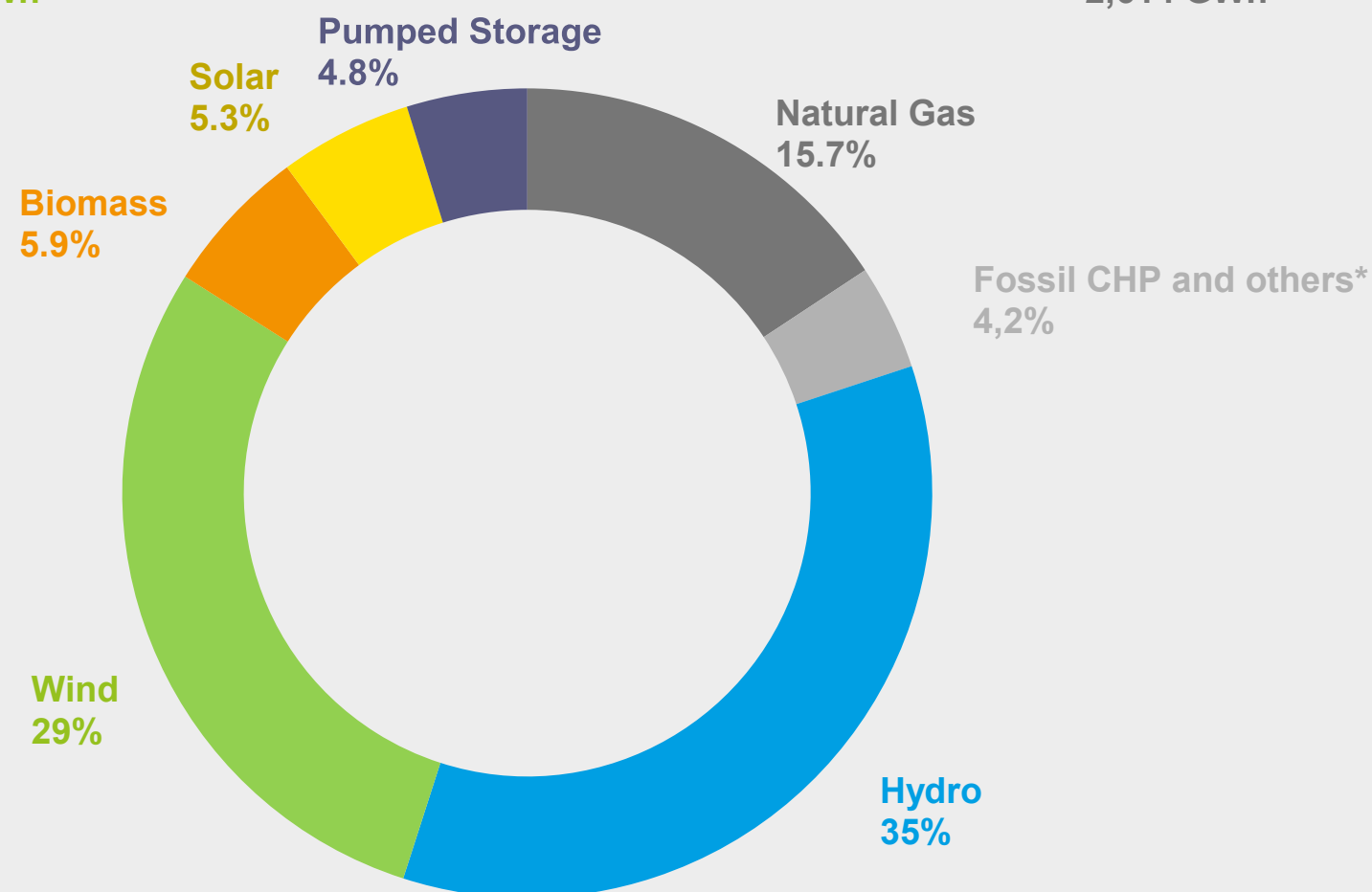


**2023**

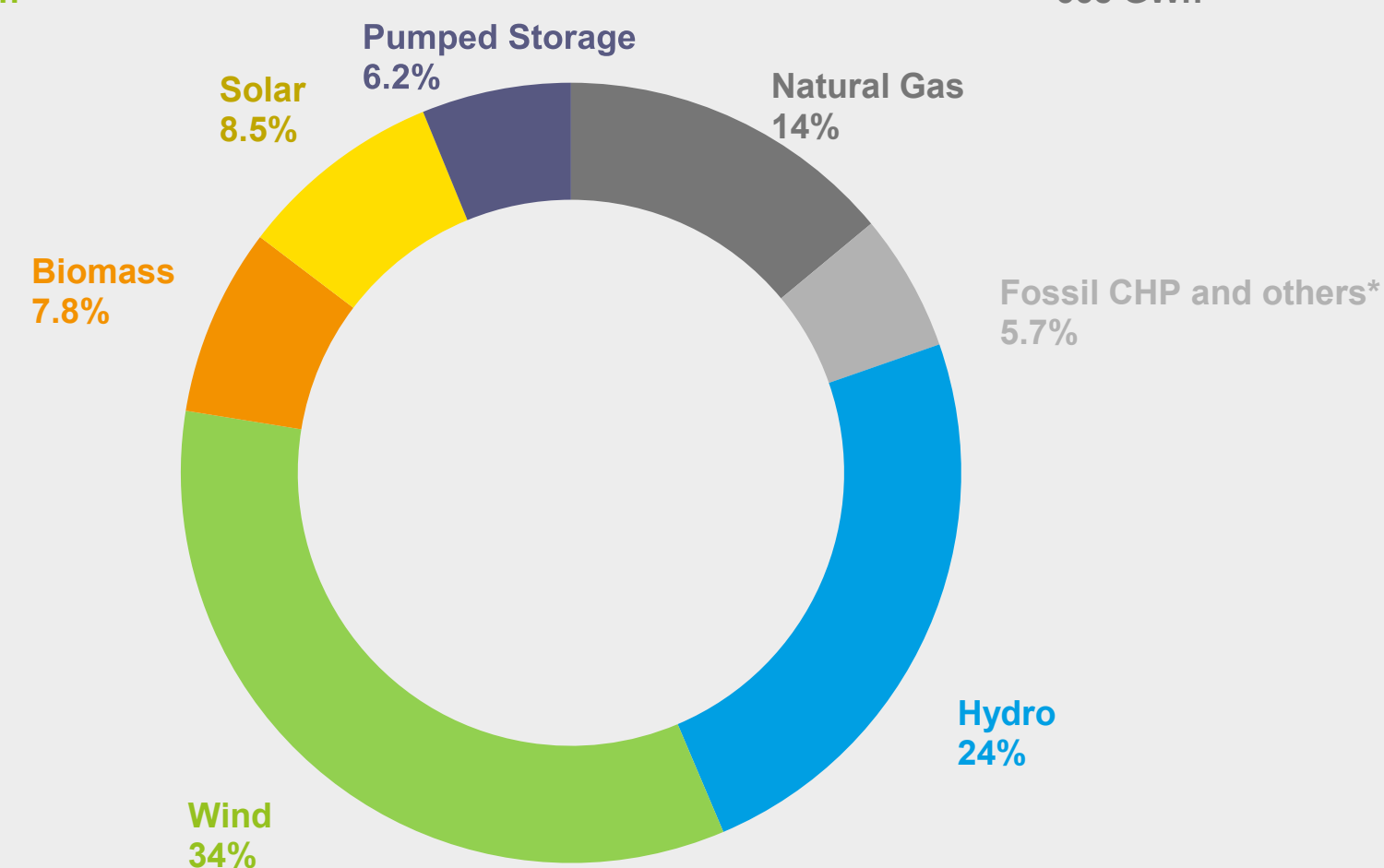
**PORTUGAL NEEDS  
OUR ENERGY**

# Executive Summary

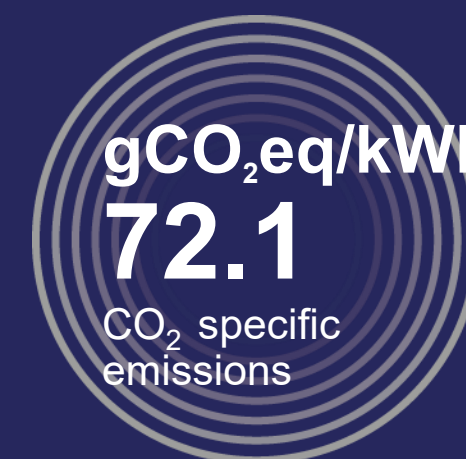
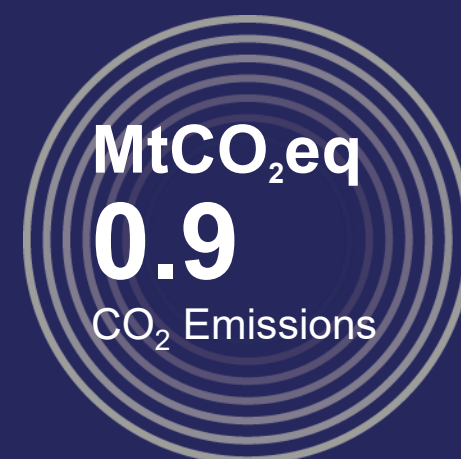
## Accumulated Generation (Jan-Mar)



## Monthly Generation (Mar)



## Electricity sector indicators (Jan-Mar)

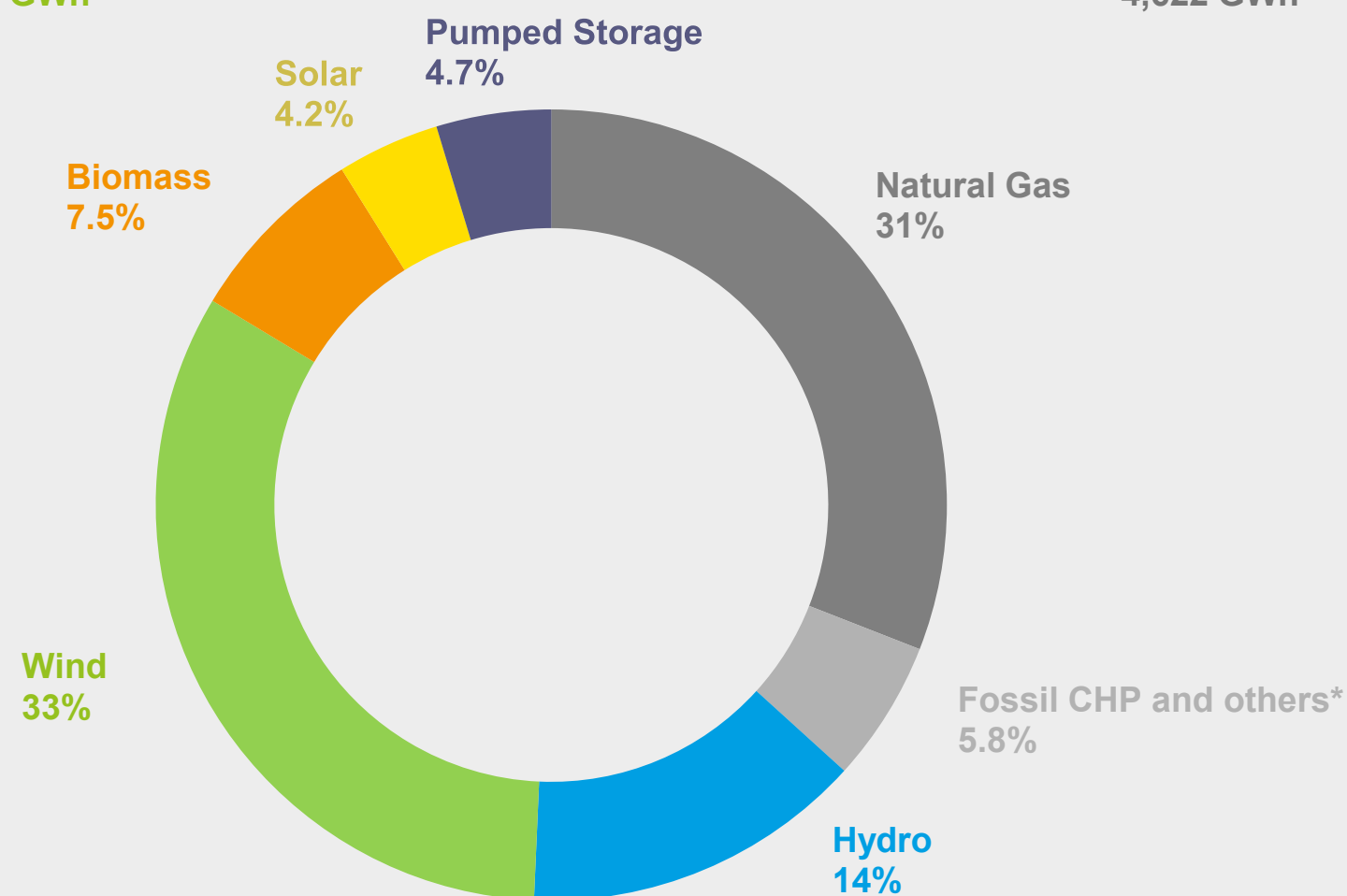


<sup>a</sup>Generation refers to the net power generation of the power plants, considering the production by pumping recently disclosed by REN. Pumping production is not accounted for in the percentage of production from renewable sources. Source: REN; Analysis APREN.

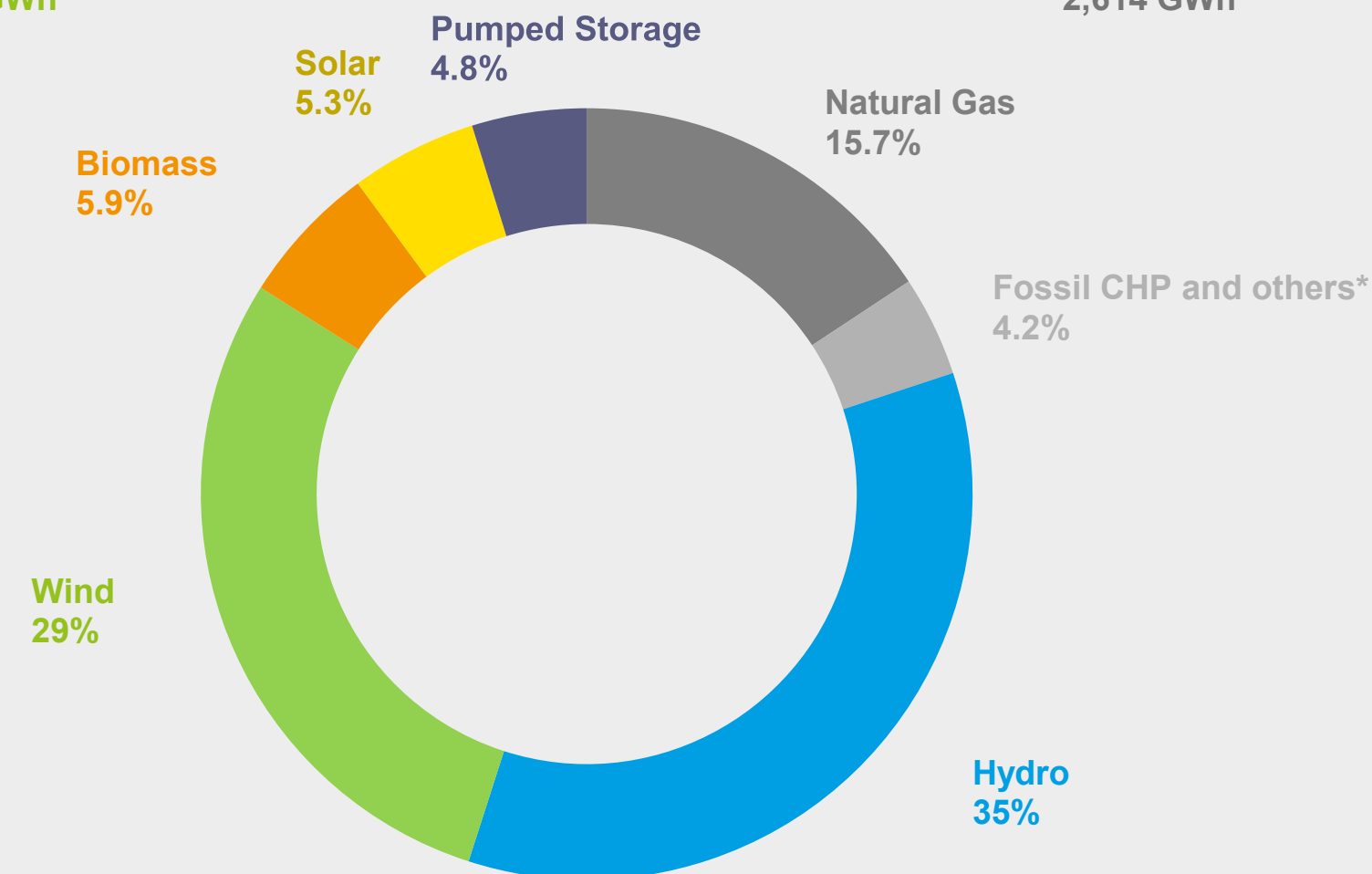
\* Includes fuel oil, diesel, the non-biodegradable fraction of urban solid waste and other waste.

# Executive Summary

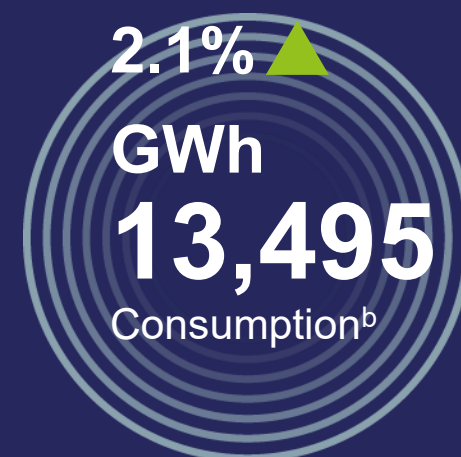
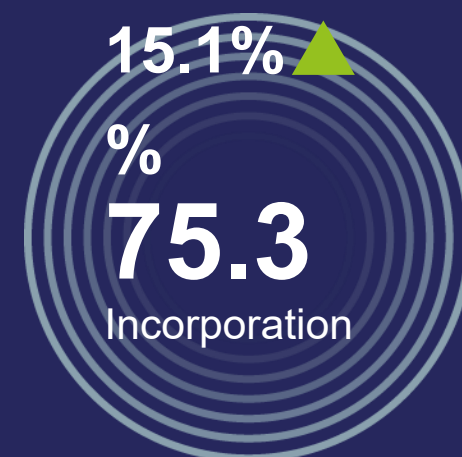
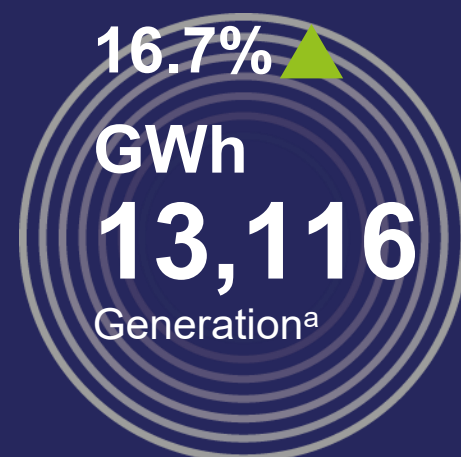
## Accumulated March 2022 (Jan-Mar)



## Accumulated March 2023 (Jan-Mar)



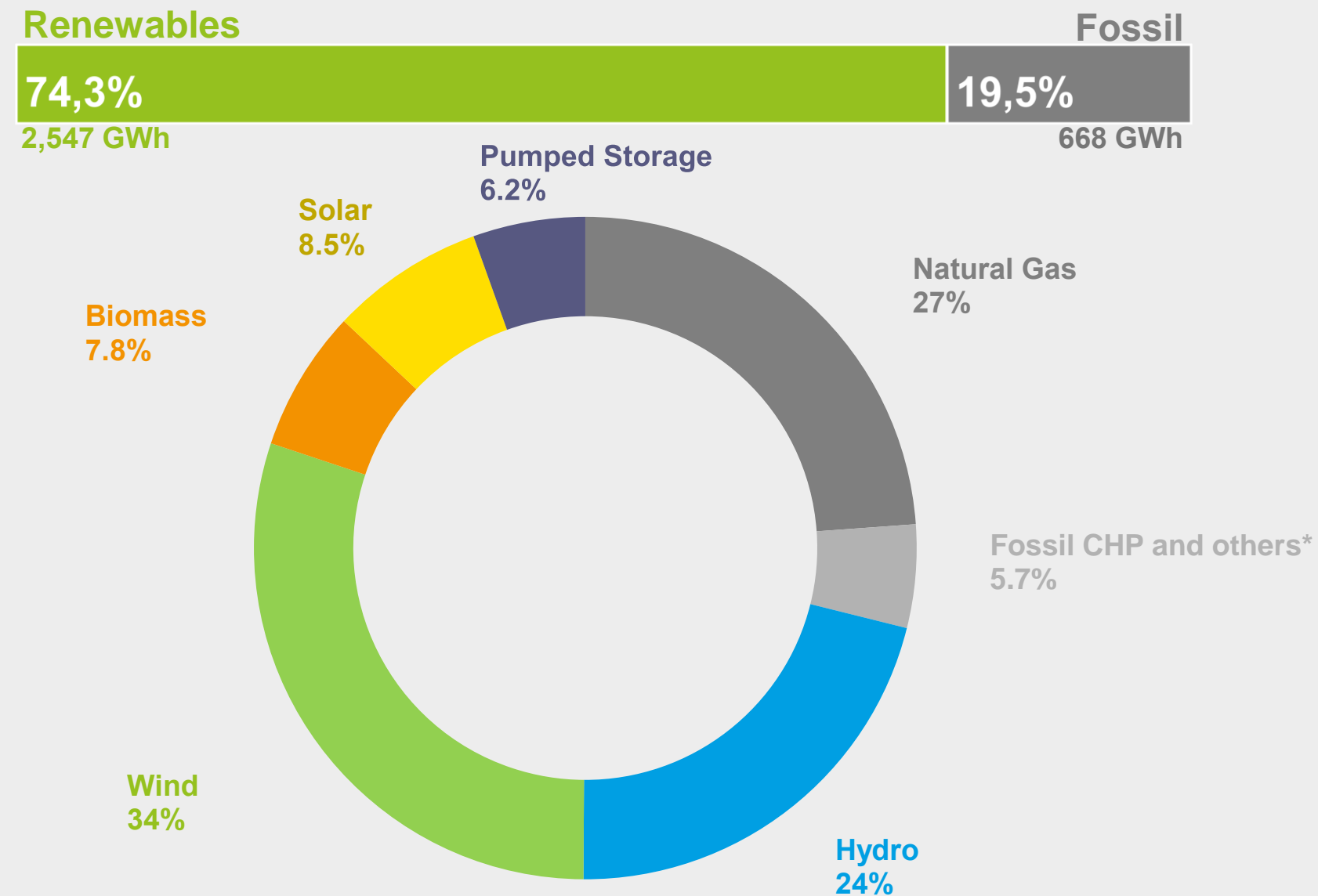
### Main indicators In comparison to Mar 2022



<sup>a</sup> Generation refers to the net power generation of the power plants, considering the production by pumped storage recently disclosed by REN. Pumping production is not accounted for in the percentage of production from renewable sources. Source: REN, Analysis APREN

<sup>b</sup> Consumption refers to the liquid generation of power of the plants, considering the import-export balance. \* Includes fuel oil, diesel, the non-biodegradable fraction of urban solid waste and other waste. Source: REN, Analysis APREN

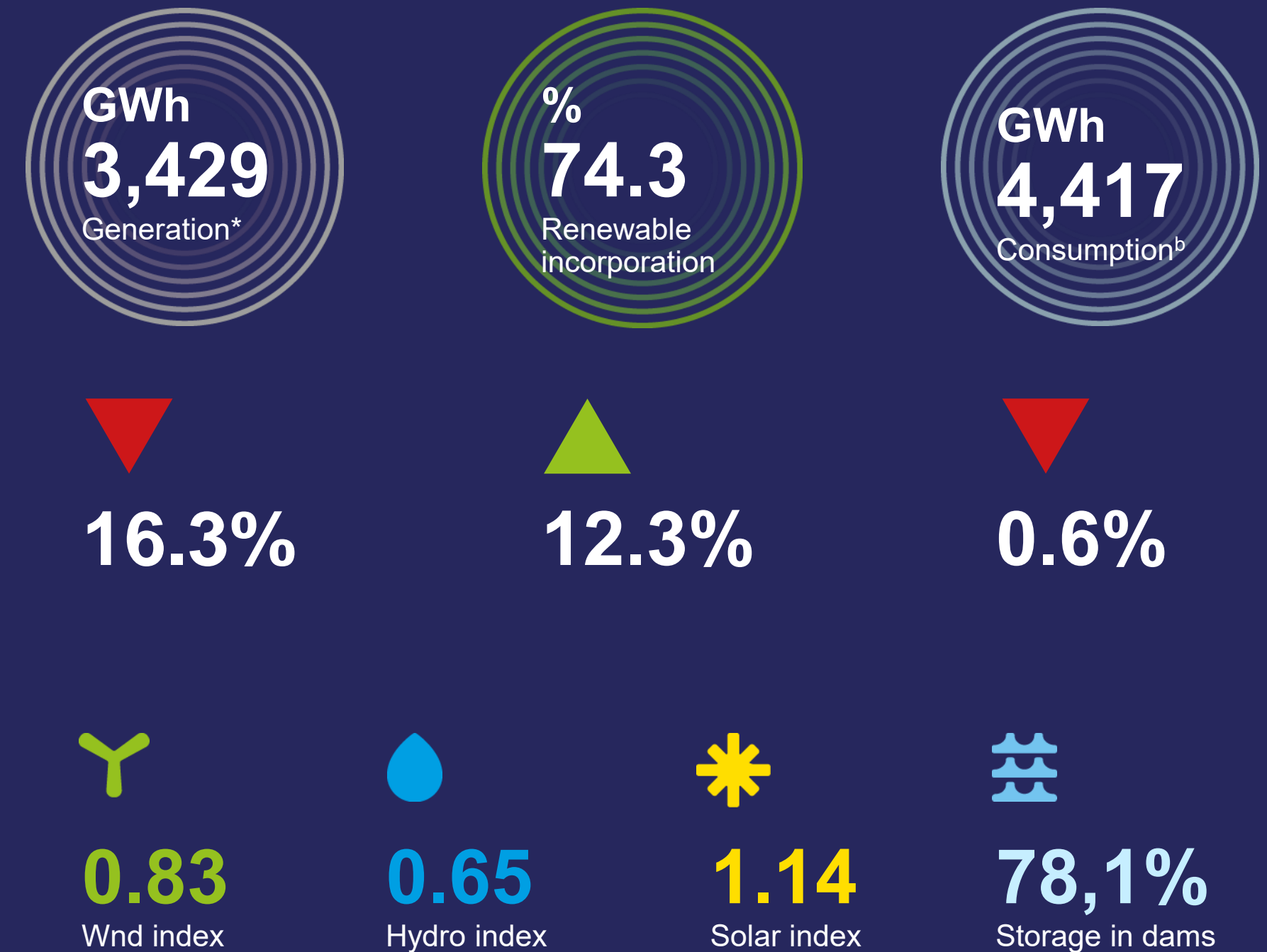
# Monthly analysis in Portugal: March



Between March 1 and 31, 2023, renewable incorporation was 74.3%, with a total of 3,429 GWh produced. The increase of 12.3 % compared to March 2022 is mainly due to the decrease in fossil incorporation, with a total production of 668 GWh in comparison with the 1,557 GWh in March 2022.

\* Includes fuel oil, diesel, the non-biodegradable fraction of urban solid waste and other waste .

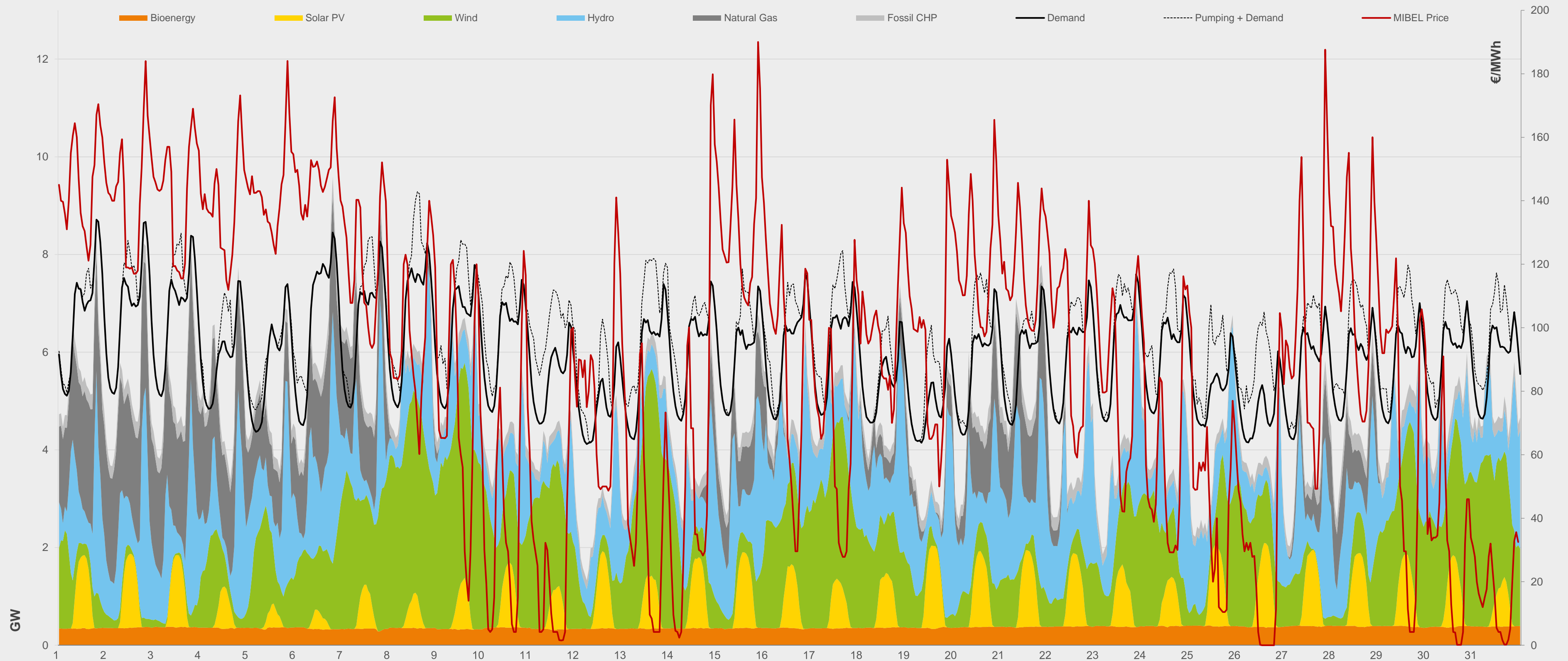
## Indicators of the electricity sector (in comparison to March 2022)



<sup>a</sup> Generation refers to the net power generation of the plants, considering the pumping production recently disclosed by REN. Pumping production is not accounted for in the percentage of production from renewable sources. Source: REN, APREN Analysis  
<sup>b</sup> Consumption refers to the liquid generation of power of the plants, considering the import-export balance. Source: REN, Analysis APREN

# Monthly analysis in Portugal: March

## Load diagram for the month of March 2023

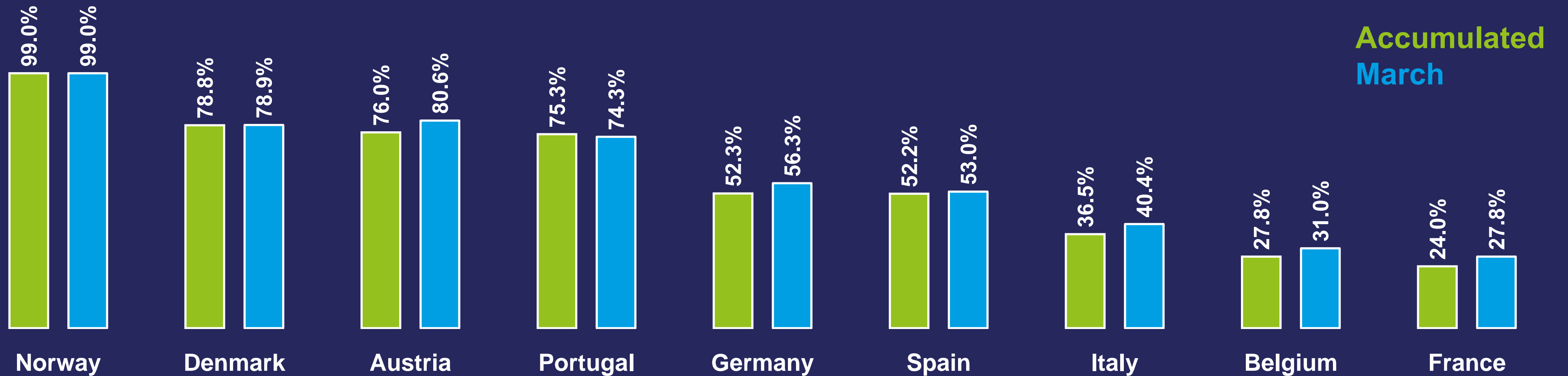


Source: REN, Analysis APREN

# Renewable Electricity Europe

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

Between January 1 and March 31, 2023, Portugal was the fourth country with the highest renewable incorporation in electricity generation, behind Norway, Denmark and Austria, which obtained 99.0%, 78.8% and 76.0% from RES, respectively. From 1 to 31 March, Portugal remained in fourth place in the countries considered, with the largest renewable incorporation in Europe.



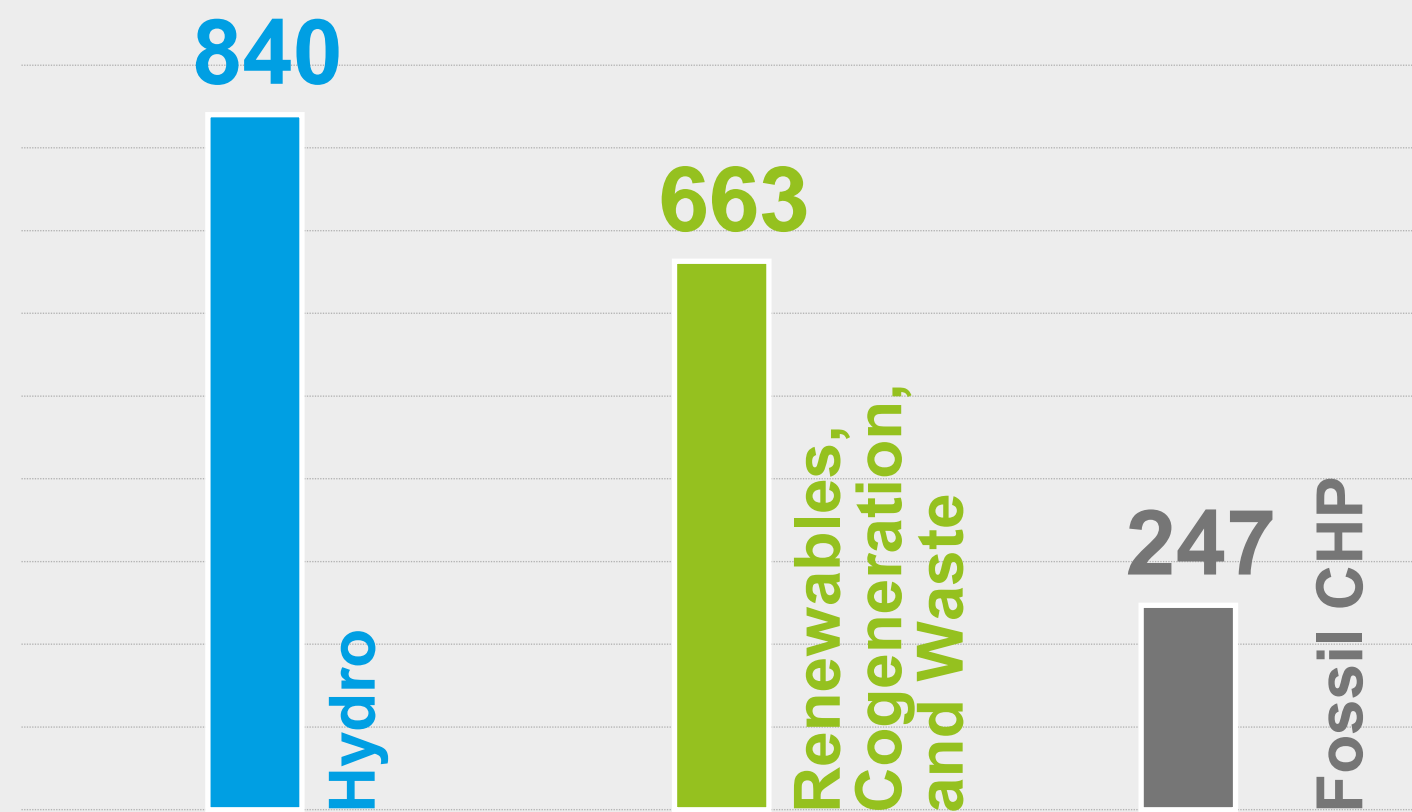
Renewable incorporation in the accumulated generation of electricity (Jan-Mar) and monthly (Mar).  
Source: REN, Fraunhofer, REE, Terna, National Grid, ENTSO-E, Analysis APREN

# Market price setting Portugal

Between January 1 and March 31, hydro was the market price setting technology that recorded the most hours, with 840 non-consecutive hours, followed by renewables, cogeneration and waste with 663 hours, and thermal generation combined cycle with 247 hours.

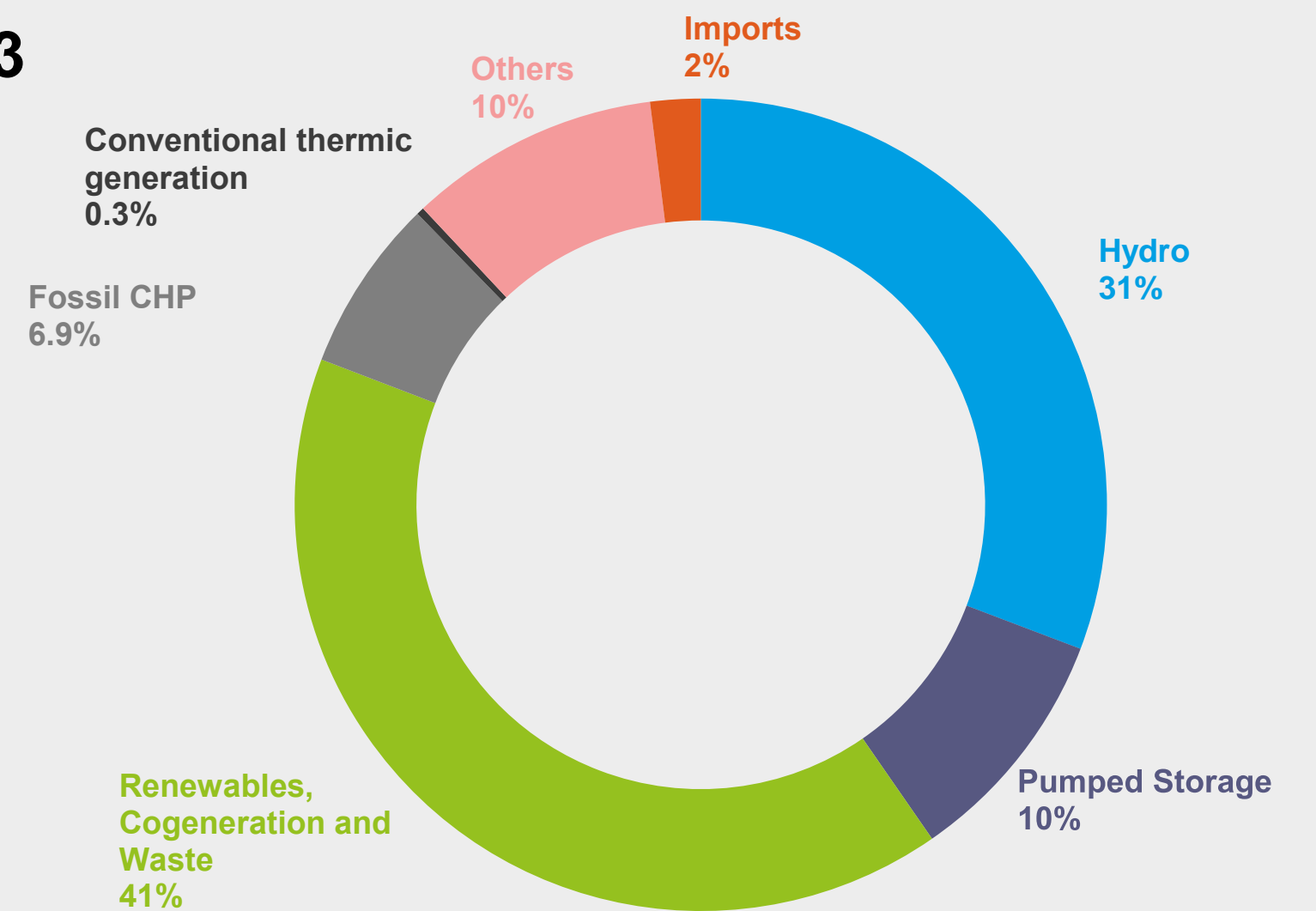


## Accumulated January-March



Number of market price setting hours of the three main market setting technologies (Jan-2023 to Mar-2023).  
Source: OMIE, Analysis APREN

## March 2023



Percentage distribution of the number of market price setting hours of the various technologies, in a total of 672 hours (Mar).  
Source: OMIE, Analysis APREN

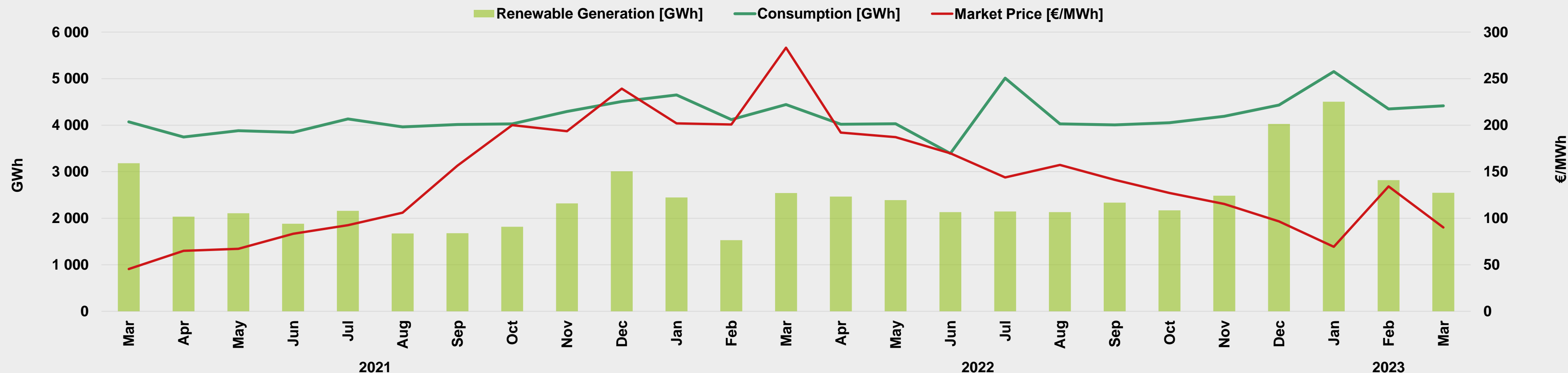
# Electricity Market Portugal

Between January 1 and March 31, the average hourly price recorded in MIBEL in Portugal was €96.7/MWh<sup>c</sup>, representing a decrease in approximately half compared to the same period last year.

In the same period, 404 non-consecutive hours were recorded in which renewable generation was sufficient to supply electricity consumption in mainland Portugal, with an average hourly price in the MIBEL of €58.64/MWh. From the March 1 to 31, renewable generation was sufficient to supply consumption for 65 non-consecutive hours.



## Accumulated January-March



Number of market price setting hours of the three main market setting technologies (Mar-2021 to Mar-2023).  
Source: OMIE, Analysis APREN



# Electricity Market

## Iberian gas price limit mechanism

Since June 15, 2022, when the Iberian natural gas price limit mechanism came into operation, until March 31st, the mechanism generated savings of €34.8/MWh<sup>°</sup>, which amounted to a reduction of 16.7% in the average hourly price at MIBEL.

The savings due to the price limit of natural gas, corresponding to the difference between the price without the mechanism and the price with the compensation to be paid to natural gas plants, reached a maximum value of €157.2/MWh<sup>°</sup>, and a minimum of €0/MWh<sup>°</sup>. In total, 148.8 of the 215.8 TWh produced, were subject to the consumer adjustment mechanism in the Iberian Peninsula.



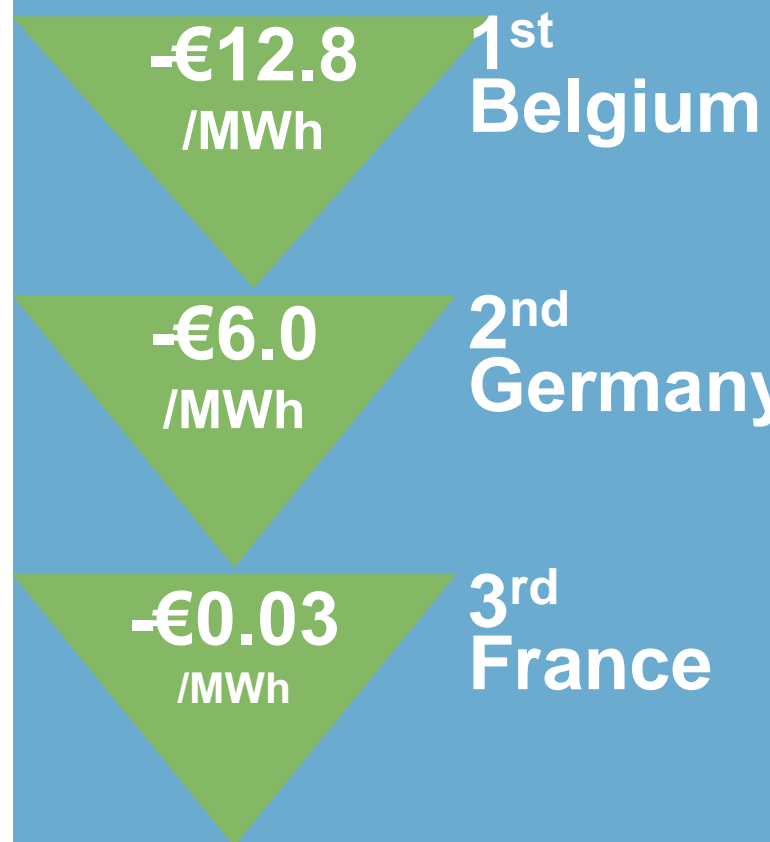
<sup>°</sup> Arithmetic average hourly prices  
Source: OMIE, Analysis APREN

# Renewable Electricity Europe

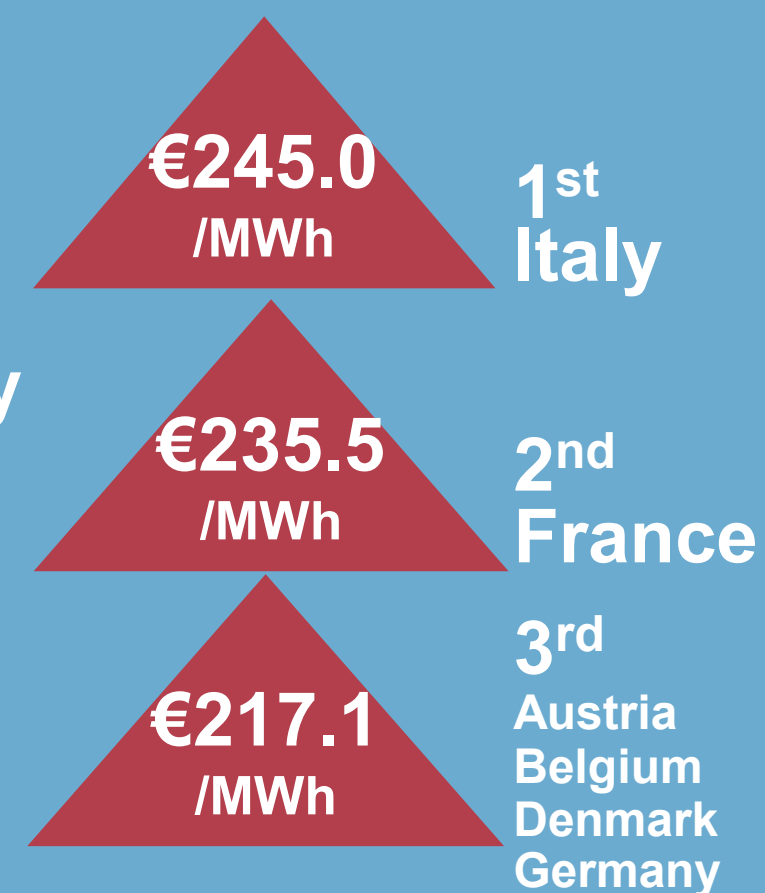
During the month of March 2023, there was a minimum hourly price at MIBEL in Portugal of €0.0/MWh for seven consecutive hours, in which the market setting was due to a combination of technologies. The maximum hourly price reached €190.0/MWh, where the market set with pumped hydro.

Regarding prices in Europe, it should be noted that the average values were inferior to those of the previous month. Maximum and minimum prices were also inferior to those re

## Minimum Prices (Mar)

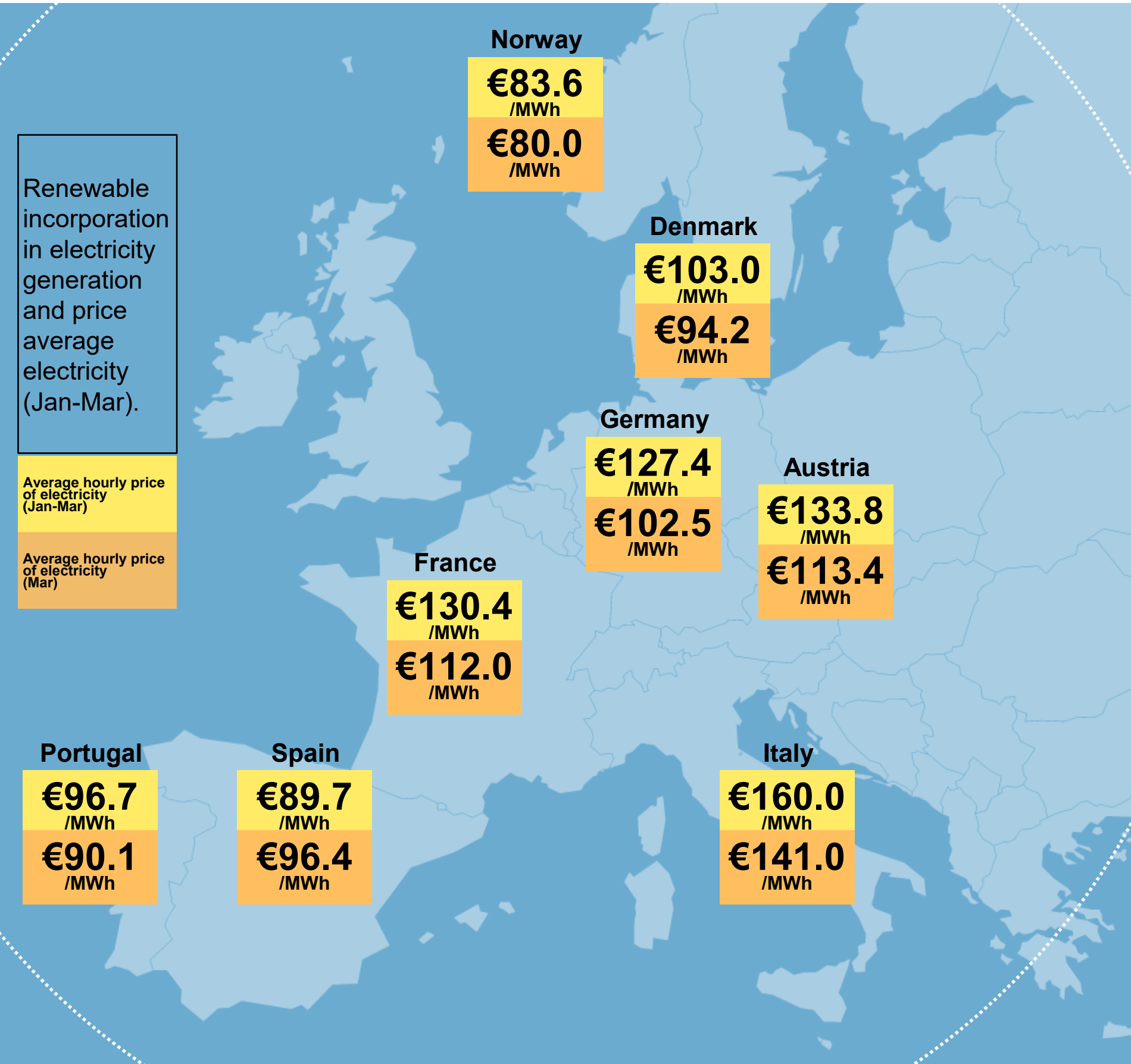


## Maximum Prices (Mar)



Renewable incorporation in electricity generation and price average electricity (Jan-Mar).

Average hourly price of electricity (Jan-Mar)  
Average hourly price of electricity (Mar)



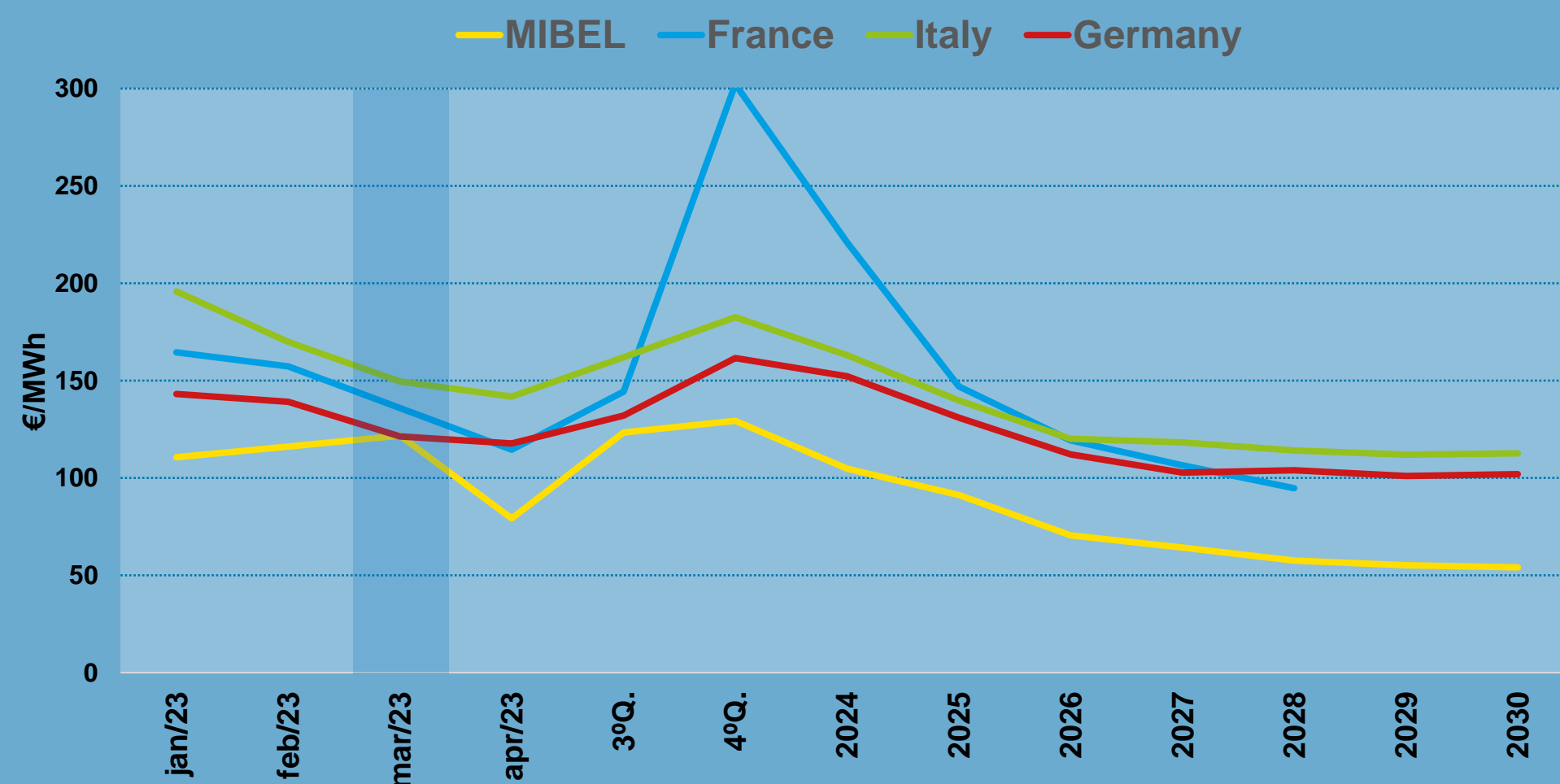
Source: ENTSO-E, OMIE, Analysis APREN

# Future Electricity Market

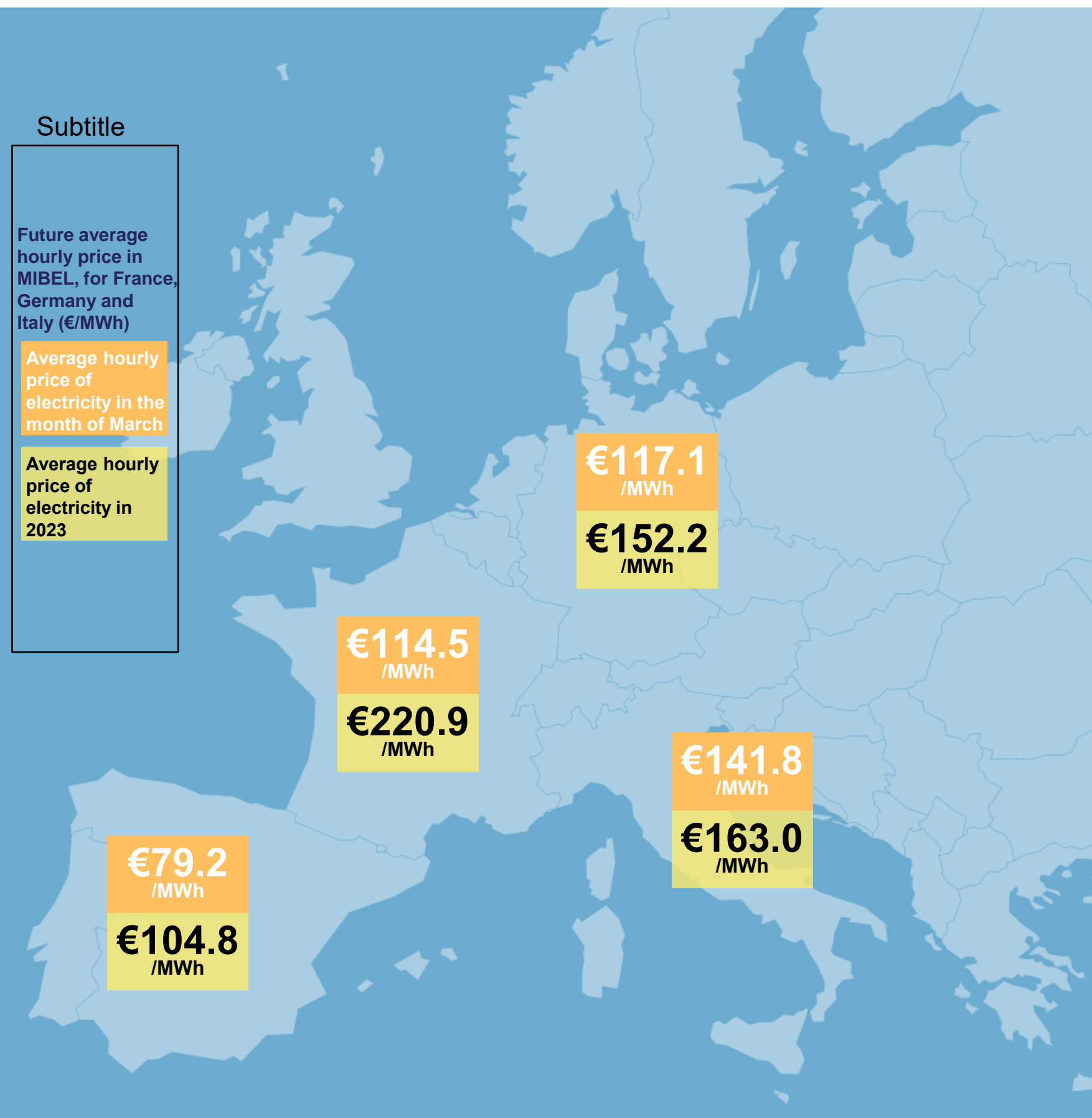
The evolution of the average future hourly price is calculated based on the contracts for the purchase and sale of electricity<sup>d</sup>.

The map on the right displays the price values for the next month (April) and for the next year. In both cases, MIBEL has the lowest values, while the French and German markets have the highest.

MIBEL also has the lowest figures by 2030, coming from the Iberian gas price limit mechanism by June next year, and from investment in renewable production.



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



<sup>d</sup> Values updated in the 5<sup>th</sup> of April.  
Source: OMIP, EEX, Analysis APREN

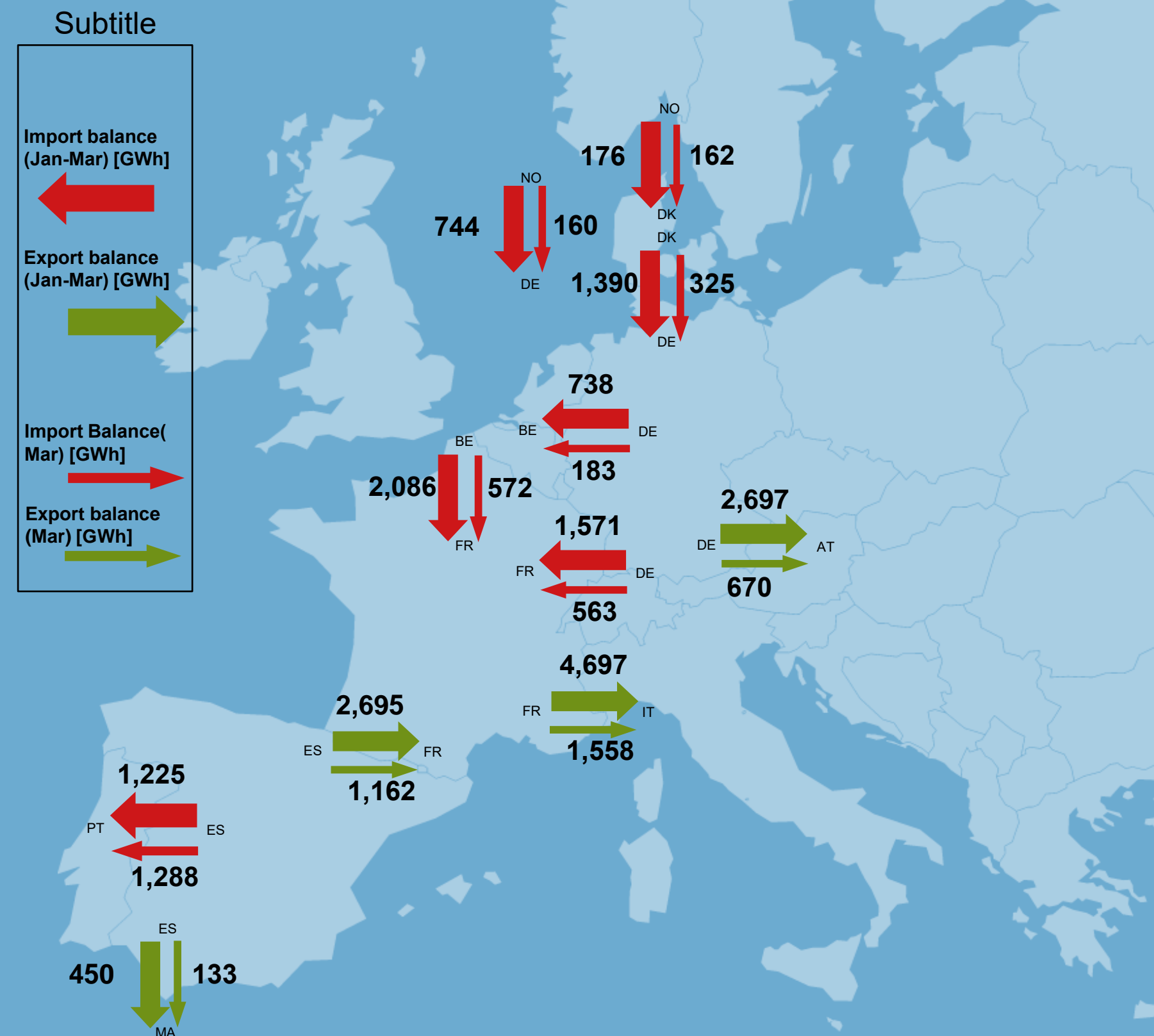
# International trade

## Europe

Between January 1 and March 31, 2023, the electricity system of Mainland Portugal recorded electricity imports equivalent to 2,482 GWh and exports of 1,257 GWh, with Portugal being an importer with a balance of 1,225 GWh.

### Main Interconnection Indicators PT-ES

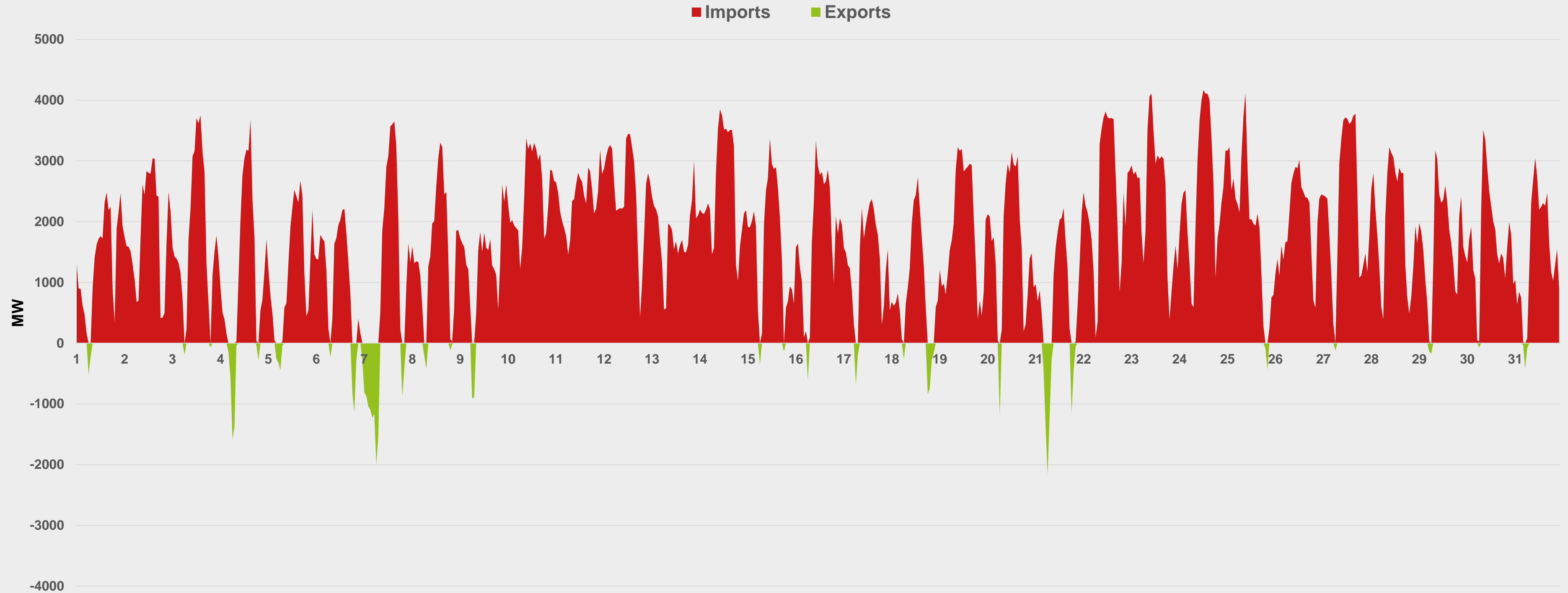
	PT-ES		ES-PT	
<b>Usage</b>	<b>11.9%</b> (Jan-Mar)	<b>0.8%</b> (Mar)	<b>19.2%</b> (Jan-Mar)	<b>32.7%</b> (Mar)
<b>Congestion</b>	<b>0.0%</b> (Jan-Mar)	<b>0.0%</b> (Mar)	<b>0.1%</b> (Jan-Mar)	<b>0.3%</b> (Mar)
<b>Markets split</b>	<b>3.2%</b> (Jan-Mar)	<b>3.6%</b> (Mar)	<b>60.2%</b> (Jan-Mar)	<b>62.9%</b> (Mar)



Source: ENTSO-E, OMIE, Analysis APREN

# International trade: March

## Diagram of imports and exports in Portugal



Source: REN, Analysis APREN

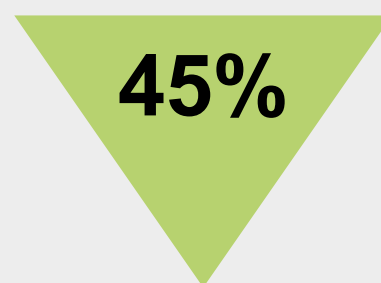
# Power sector emissions

Between January 1 and March 31, 2023, specific emissions reached 72.1 gCO<sub>2</sub>eq/kWh, with a total emissions from the power sector of 0.9 MtCO<sub>2</sub>eq

The European Emissions Trading System (EU-ETS) recorded an average price of €87.1/tCO<sub>2</sub><sup>c</sup>, being this figure a reduction in 4% compared to the same period in 2022.

## Sector emissions

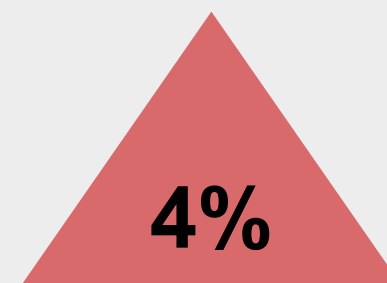
**0.9**  
MtCO<sub>2</sub>eq



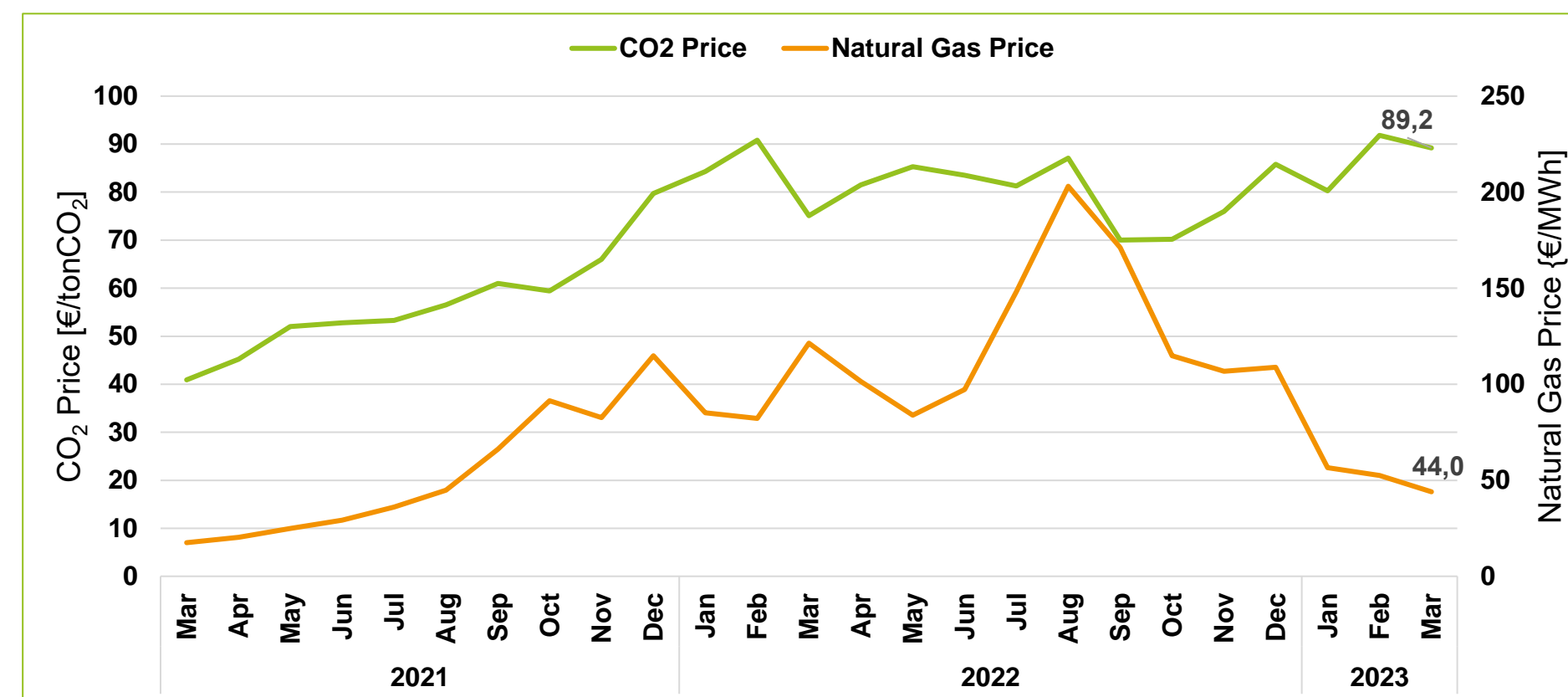
In comparison to Mar 2022

## Allowances average price

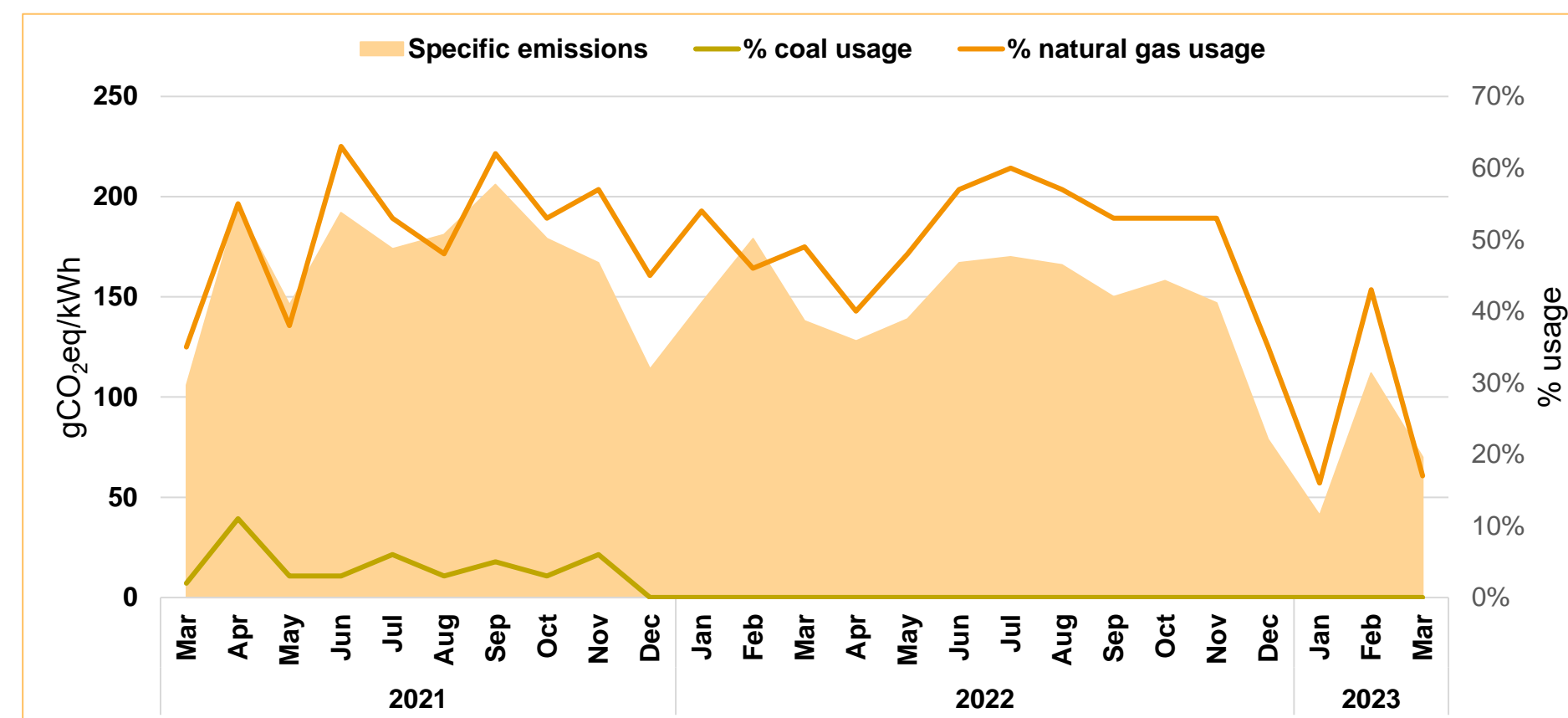
**€87.1**  
/tCO<sub>2</sub>



In comparison to Mar 2022



Price of CO<sub>2</sub> allowances in EU-ETS and natural gas price in Europe (Mar-2021 to Mar-2023).  
Source: SendeCO<sub>2</sub>, WorldBank.



Specific emissions from the power sector of Mainland Portugal, % use of coal-free power plants and natural gas (Mar-2021 to Mar-2023).  
Source: REN, DGE, ERSE, Analysis APREN

<sup>c</sup> Arithmetic average hourly prices  
Source: OMIE, WorldBank.

# Simulation of price formation without SRP

## Renewables have avoided:

The indicators below identify the savings achieved between January 1 and March 31, 2023, due to the contribution Special Regime Production (SRP).

This study is conducted for SRP and includes all installed power of fossil cogeneration. Given that the capacity equivalent to this technology within the SRP is quite residual and that the other technologies are renewable, the figures are very close to the real savings generated by renewables.



**€133.4/MWh**

Accumulated savings (Jan-Mar)

**€143.4/MWh**

Monthly savings (Mar)



**€1,763.1 M**

Accumulated savings (jan-mar)

**€491.6 M**

Monthly savings (Mar)

# Environmental Service

The figures below identify the savings achieved between January 1 and March 31, 2023, in natural gas, CO<sub>2</sub> emissions and CO<sub>2</sub> emission allowances resulting from the renewable incorporation in electricity generation.

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

## Renewables have avoided:



**€604 M**

Imported Natural Gas  
(Jan-Mar)

**€201 M**

Imported Natural Gas  
(Mar)



**€374 M**

Imported Electricity  
(Jan-Mar)

**€23 M**

Imported Electricity  
(Mar)



**2.7 MtCo<sub>2</sub>eq**

CO<sub>2</sub> emissions (Jan-Mar)

**0.9 MtCo<sub>2</sub>eq**

CO<sub>2</sub> emissions (Mar)



**€190 M**

CO<sub>2</sub> allowances (Jan-Mar)

**€76 M**

CO<sub>2</sub> allowances (Mar)

Source: REN, REE, SendeCO2, WorldBank, DGEG, ERSE, Analysis APREN.

Note 1: For the estimate of the savings in imported natural gas, the price of natural gas in Europe indicated in the WorldBank has been considered.

Note 2: For the estimation of savings in imported electricity, the average price on the MIBEL market has been considered.





**APREN**  
**Departamento Técnico e Comunicação**  
Av. da República 59 - 2º Andar 1050 - 189 Lisboa  
(+351) 213 151 621  
apren@apren.pt  
www.apren.pt

