APREN Associação de Energias Renováveis

OCTOBER

2022 BULLETIN
RENEWABLE ELECTRICITY

Portugal precisa da nossa energia!

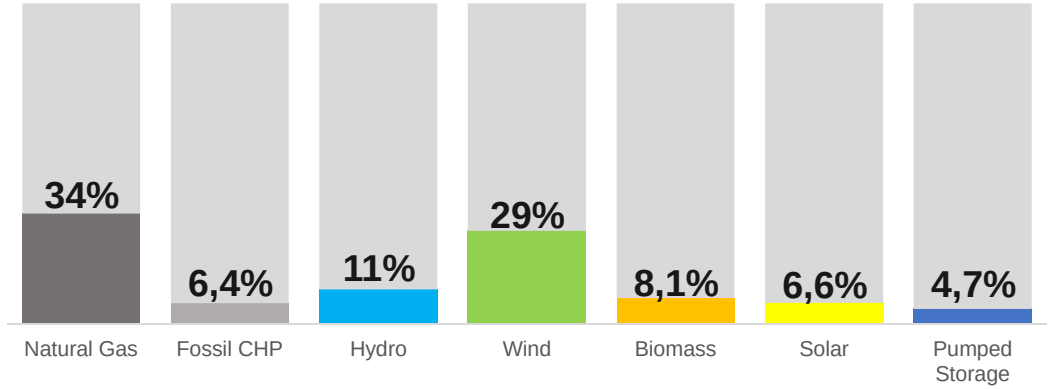
Portugal needs our energy!

Executive Summary

ACCUMULATED GENERATION (Jan-Oct)

% **40.9** // 15, 805 GWh
Fossil

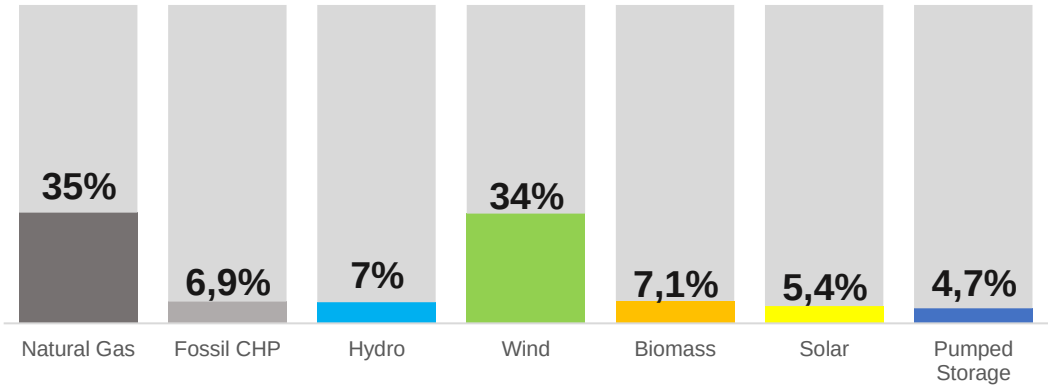
% **54.4** // 18,890 GWh
Renewables



MONTHLY GENERATION (Oct)

% **41.6** // 1,445 GWh
Fossil

% **53.6** // 1,861 GWh
Renewables



ELECTRICITY SECTOR INDICATORS (Jan-Oct)

GWh **34,695** Generaion[a]

€/tCO$_2$ **80.9** Price CO$_2$

€/MWh **180.3** MIBEL Price PT

MtCO$_2$eq **5.2** CO$_2$ Emmissions

GWh **9,472** Import balance

gCO$_2$eq/kWh **149** CO$_2$ Specific emmissions

[a] 'Generation' refers to the net power generation of the power plants, considering the pumped storage generation recently disclosed by REN. Generation through pumped storage is not accounted for in the percentage of generation from renewable sources.
Source: REN, Analysis APREN.

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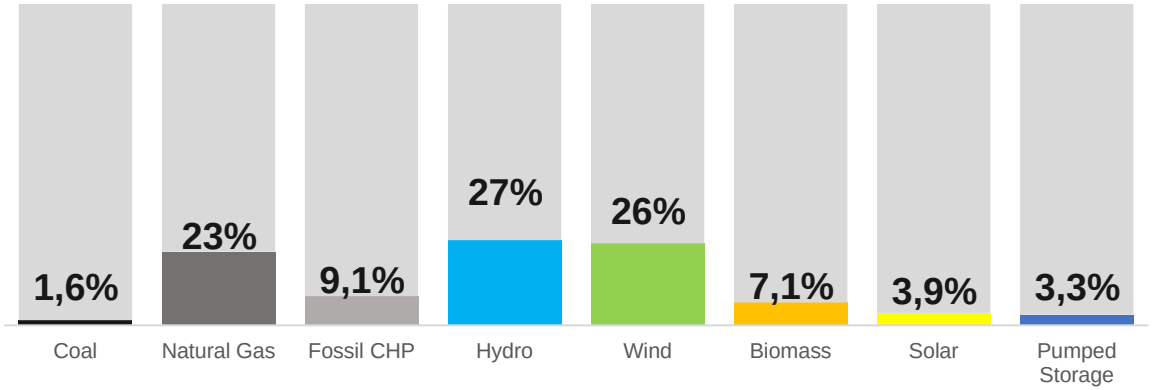
Electricity Generation: Mainland Portugal

ACCUMULATED OCTOBER 2021 (Jan-Oct)

% 33.4 // 14,191 GWh
Fossil

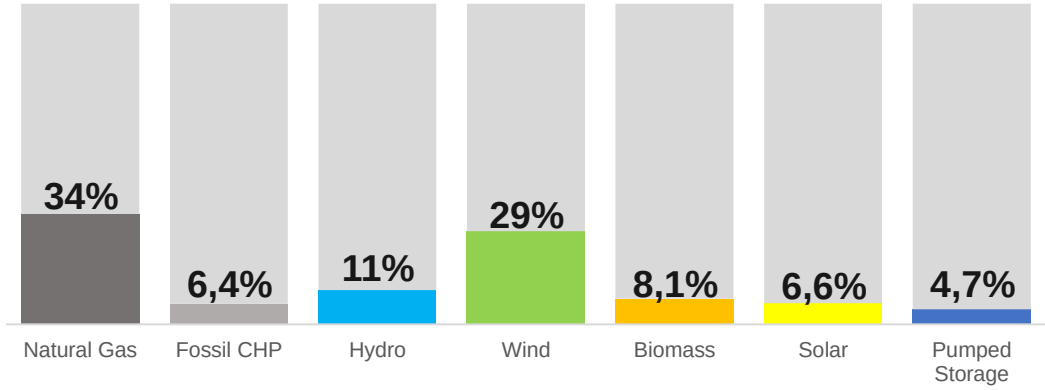
% 63.0 // 24,212 GWh
Renewables



ACCUMULATED OCTOBER 2022 (Jan-Oct)

% 40.9 // 15,805 GWh
Fossil

% 54.4 // 18,890 GWh
Renewables



MAIN INDICATORS

GWh 34,695
Generation[a]

% 54.4
Renewable incorporation

GWh 41,757
Consumption[b]

8.6% in comparison to Oct 2021

10.7% in comparison to Oct 2021

2.6% in comparison to Oct 2021

0.97 Wind index

0.39 Hydro index

1.09 Solar index

[a] 'Generation' refers to the net power generation of the power plants, considering the pumped storage generation recently disclosed by REN.
Generation through pumped storage is not accounted for in the percentage of generation from renewable sources.

[b] Consumption refers to the liquid generation of power of the plants, considering the import-export balance.
Source: REN, Analysis APREN

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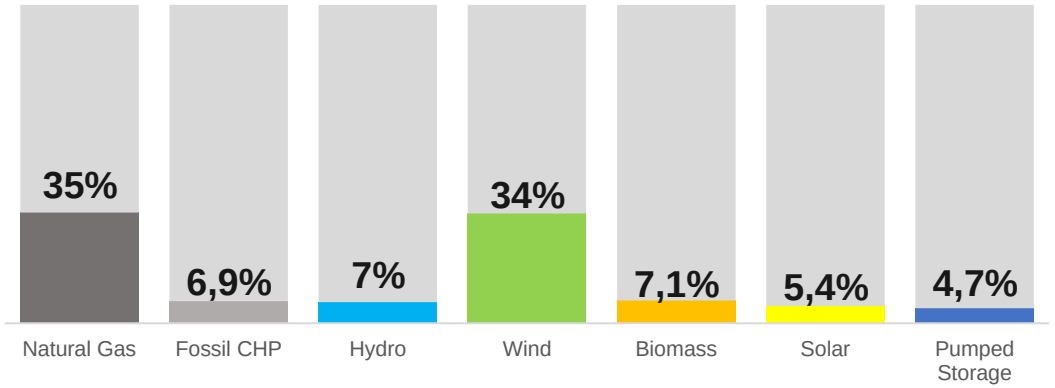
Monthly analysis in Portugal: October

Between October 1 and 31, 2022, renewable incorporation was 53.6%, totaling 3,470 GWh generated. The decrease of 7.7% compared to October 2021 is mainly due to the decrease in the hydro index, resulting in a sharp decrease in hydro production.
It should also be noted that hydro generation and the maximum percentage of storage in dams have increased in comparison with the previous months. However, the values are low when compared to the same period in the last 10 years.

Source: REN, Analysis APREN

% **4.6** Fossil // 1,445 GWh

% **53.6** Renewables // 1,861 GWh



Source: REN, Analysis APREN

INDICATORS OF THE ELECTRICITY SECTOR

GWh **3,403** Generation [a] — 7.7% in comparison to Oct 2021

% **53.7** Renewable incorporation — 1.0% in comparison to Oct 2021

GWh **4,006** Consumption [b] — 0.6% in comparison to Oct 2021

1.12 Wind index

0.98 Solar Index

0.59 Hydro index

35.5% Dams storage

[a] 'Generation' refers to the net power generation of the power plants, considering the pumped storage generation recently disclosed by REN.
[b] Consumption refers to the liquid generation of power of the plants, considering the import-export balance.

Source: REN, Analysis APREN

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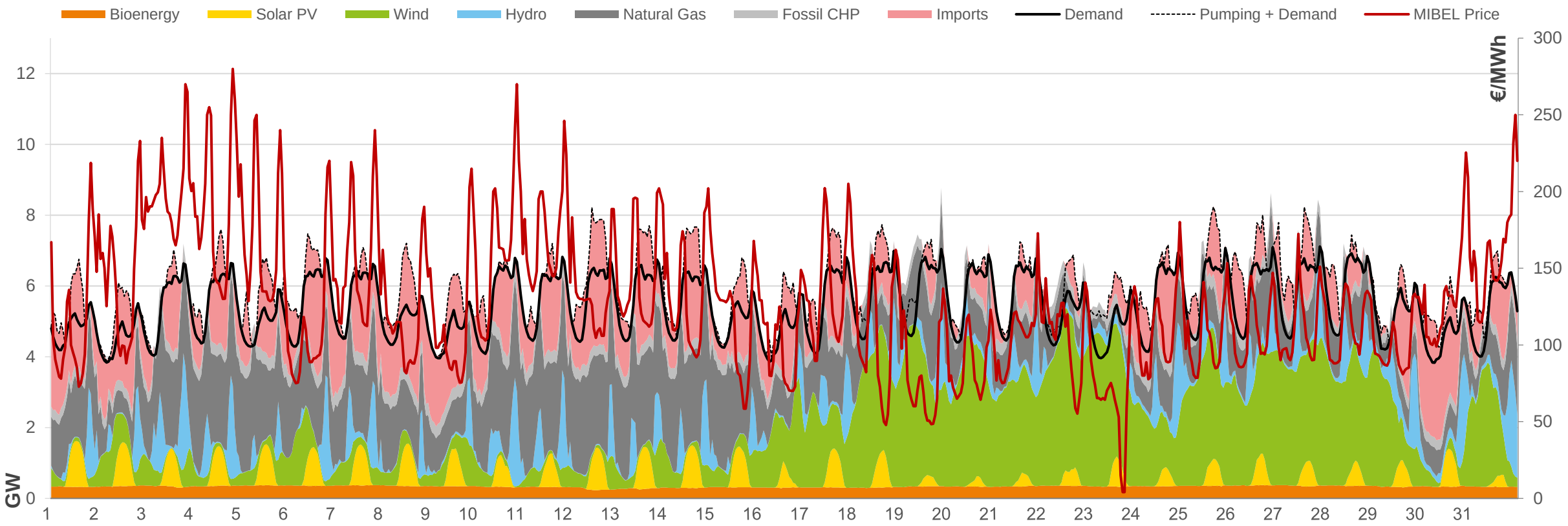
Monthly Analysis in Portugal: October

Load diagram for the month of October 2022



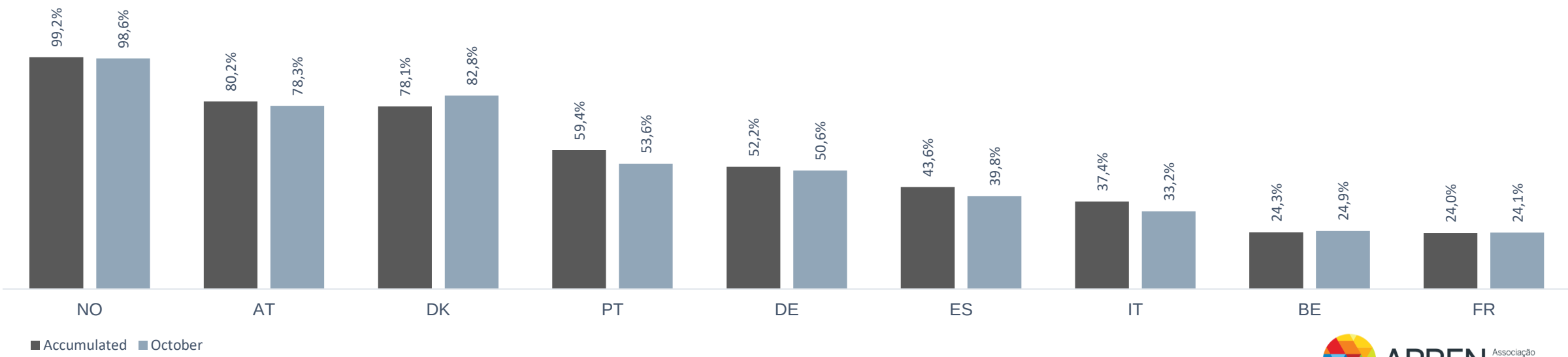
Source: REN, Analysis APREN

Renewable Electricity

Europe

In the present analysis, only the main countries from the different European markets were considered, in order to have a representative framework of comparison.
Between January 1 and October 31, 2022, Portugal was the fourth country with the highest renewable incorporation in electricity generation, behind Norway, Austria and Denmark, which obtained 99.2%, 80.2% and 78.1%, respectively, from RES. From October 1 and October 31, Portugal was fourth in the analysed countries with the largest renewable incorporation in Europe.

Source: OMIE, Analysis APREN



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

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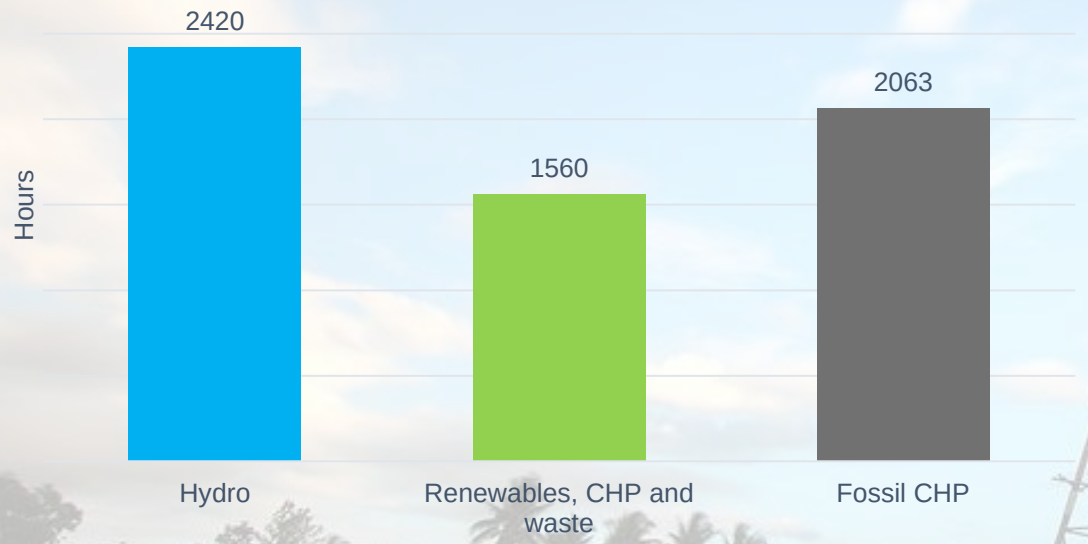
Market Price Setting: Portugal

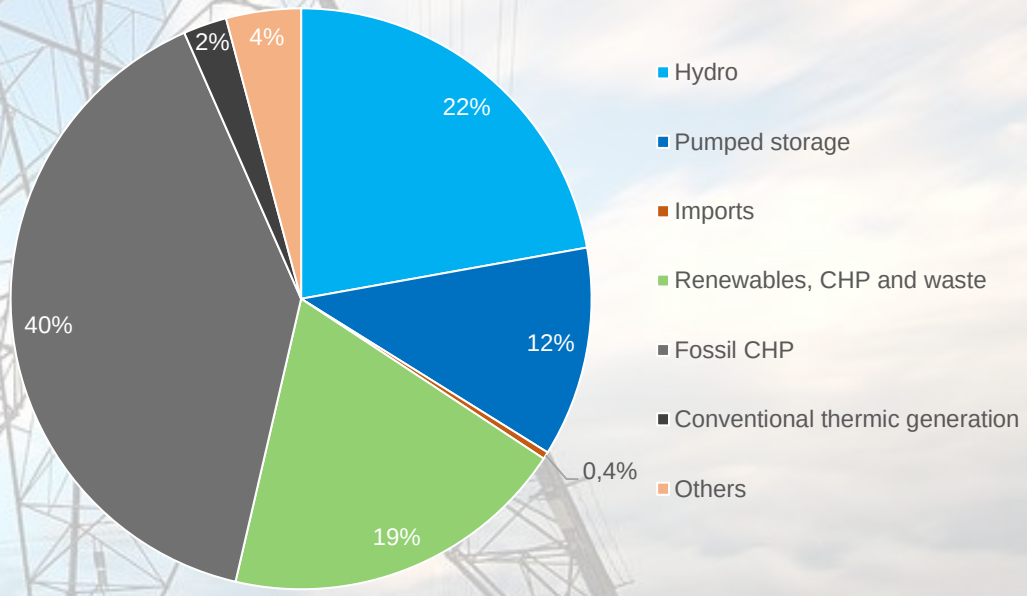
Between January 1 and October 31, hydro was the market price setting technology that recorded the most hours, with 2,420 non-consecutive hours, followed by thermal generation combined cycle with 2,063 hours and by renewables, cogenaration and waste with 1,560 hours.

ACCUMULATED JAN-OCT



Number of market price setting hours of the three main technologies (Jan-2022 Oct-2022).
Source: OMIE, Analysis APREN

OCTOBER 2022



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

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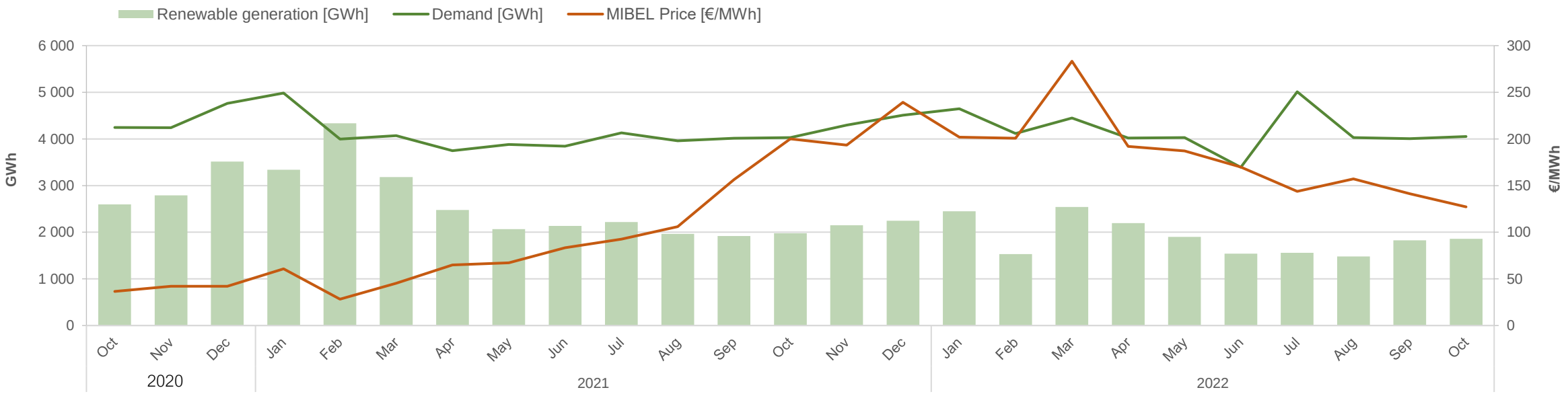
Electricity Market

Portugal

Between January 1 and October 31, the average hourly price recorded in MIBEL in Portugal (€180.3/MWh[c]) represents an increase to double compared to the same period last year.
In the same period, 77 non-consecutive hours were recorded, in which renewable generation was sufficient to supply the electricity consumption in mainland Portugal, with an average hourly price in MIBEL of €133.8/MWh. From October 1 and October 31, renewable generation supplied consumption for 18 non-consecutive hours.

[c] Arithmetic average hourly prices
Source: OMIE, Analysis APREN



Market price, electricity consumption and renewable generation (Oct 2020 to Oct 2022).
Source: OMIE, REN, Analysis APREN

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Electricity Market

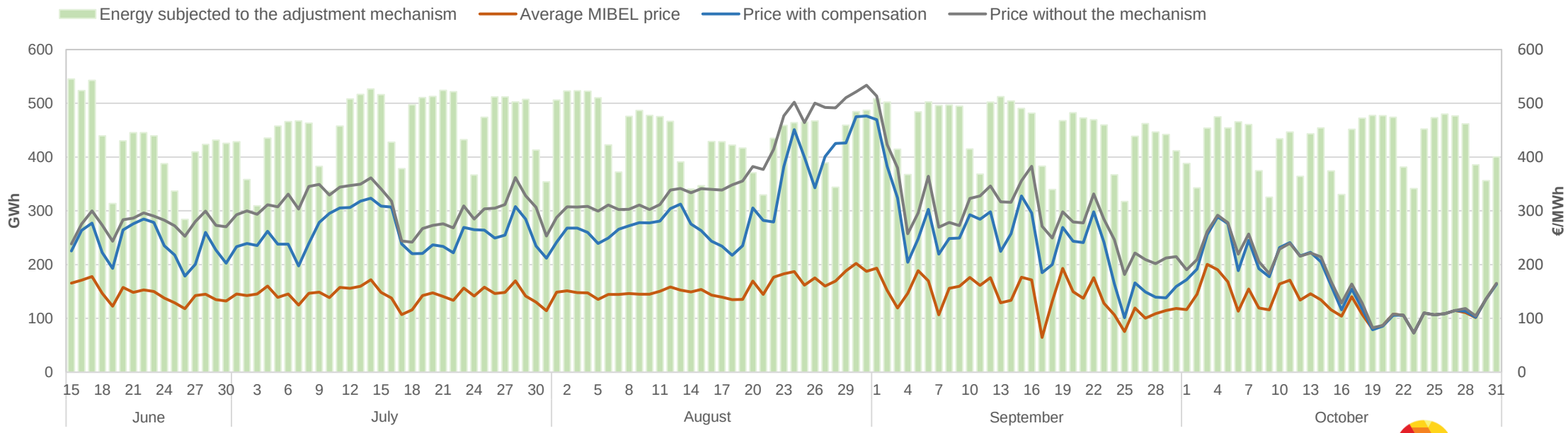
Iberian gas price limit mechanism

Since 15 June, when the Iberian natural gas price limit mechanism came into force, until October 31, the mechanism generated savings of €43.1/MWh[c], which amounted to a 13,4 % reduction in the average hourly price in MIBEL.

The savings due to the limit on the price of natural gas, corresponding to the difference between the price without the mechanism and the price with the compensation payable to natural gas plants, reached a maximum value of €157.2/MWh[c], and a minimum of €1.30/MWh[c].

In total, 61.2 of the 116.4 TWh produced, were subject to the consumer adjustment mechanism in the Iberian Peninsula.

[c] Arithmetic average hourly prices
Source: OMIE, Analysis APREN



Market price, with and without natural gas price limit mechanism.
Source: OMIE, Analysis APREN.

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Electricity Market: Europe

During the month of October 2022, there was a minimum hourly price at MIBEL in Portugal of €4.11/MWh[c], for an hour in which the market price setting was due to renwables, cogeneration and waste. The maximum hourly price reached €280.00/MWh[c], where market price setting was pumped storage and hydro, due to the reversal of the import-for-export flow in this time period.

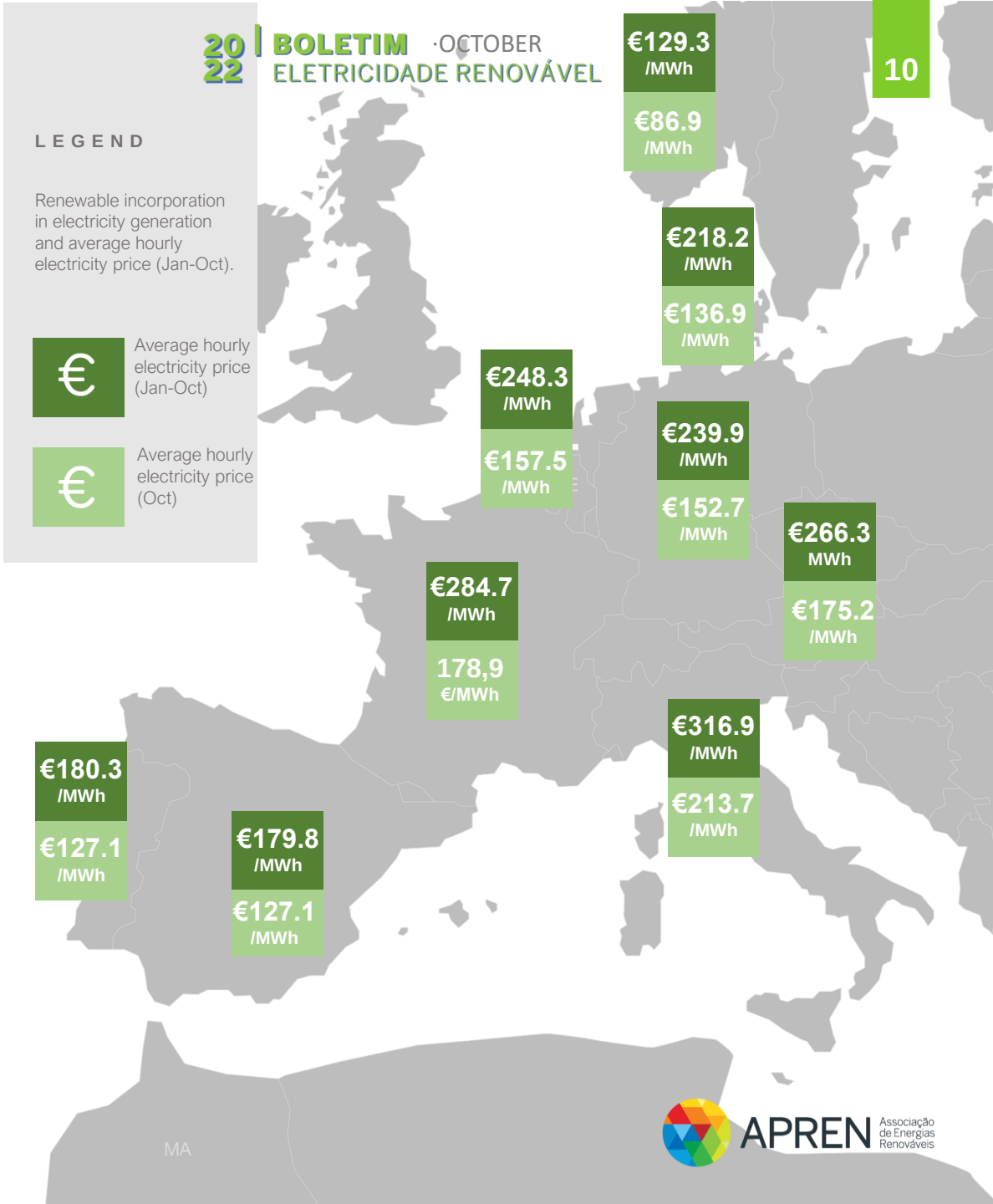
Concerning the prices in Europe, it should be noted that the average values decreased in comparison to the previous month, as well as the maximum prices.

PRICES MINIMUM (Oct)

1st	- €76.4 /MWh	BELGIUM
2nd	€0.03 /MWh	NORWAY
3rd	€0.06 /MWh	DENMARK

PRICES MAXIMUM (Oct)

1st	€600.0 /MWh	FRANCE ITALY
2nd	€497.4 /MWh	AUSTRIA BELGIUM DENMARK GERMANY
3rd	€280.0 /MWh	PORTUGAL SPAIN



[c] Arithmetic average hourly prices
Source: ENTSO-E, OMIE, Analysis APREN

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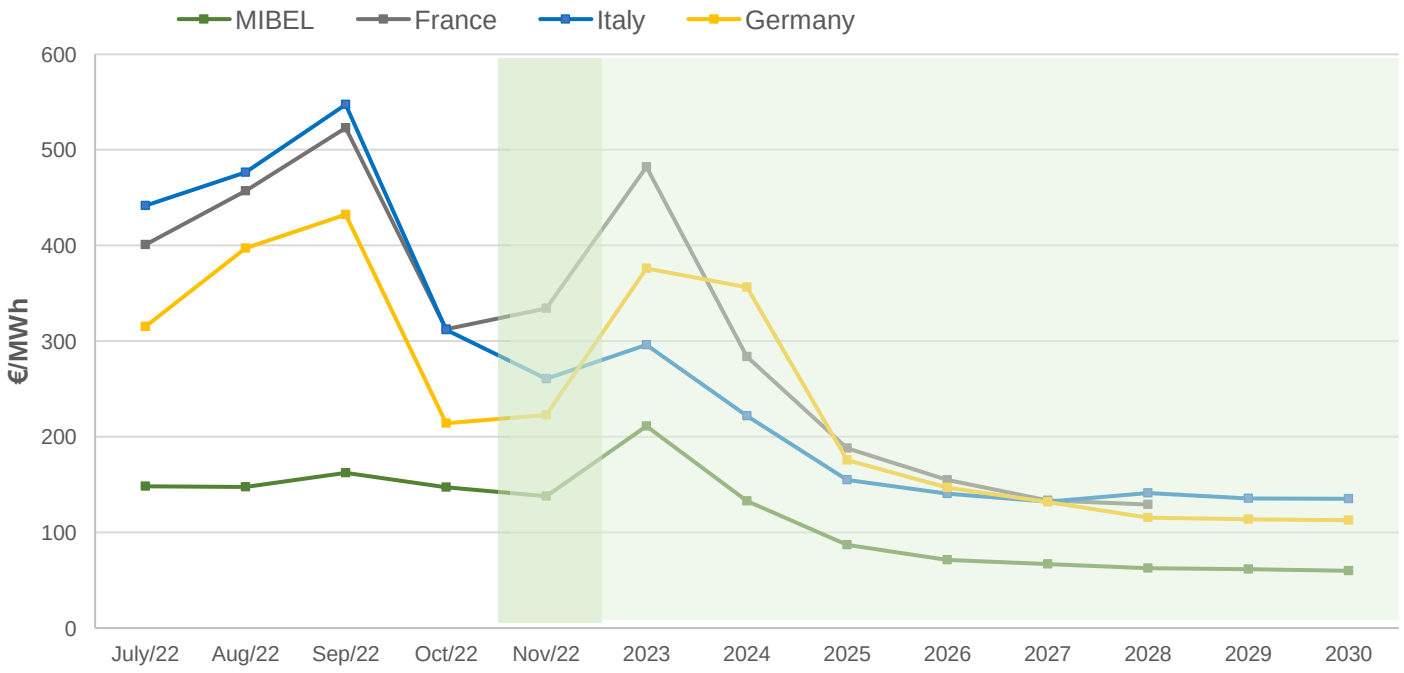
Future Electricity Market

The evolution of the average future hourly price shown here, is calculated based on the contracts for the purchase and sale of electricity[d].
The map on the right shows the price values for the next month (November) and for next year. In both cases, MIBEL has the lowest values, while the French market has the highest ones.
MIBEL also has the lowest figures until 2030, coming from the Iberian gas price limit mechanism by June next year, and from investment in renewable production.

[d] Values updated on November 2.
Source: OMIP, EEX, Analysis APREN

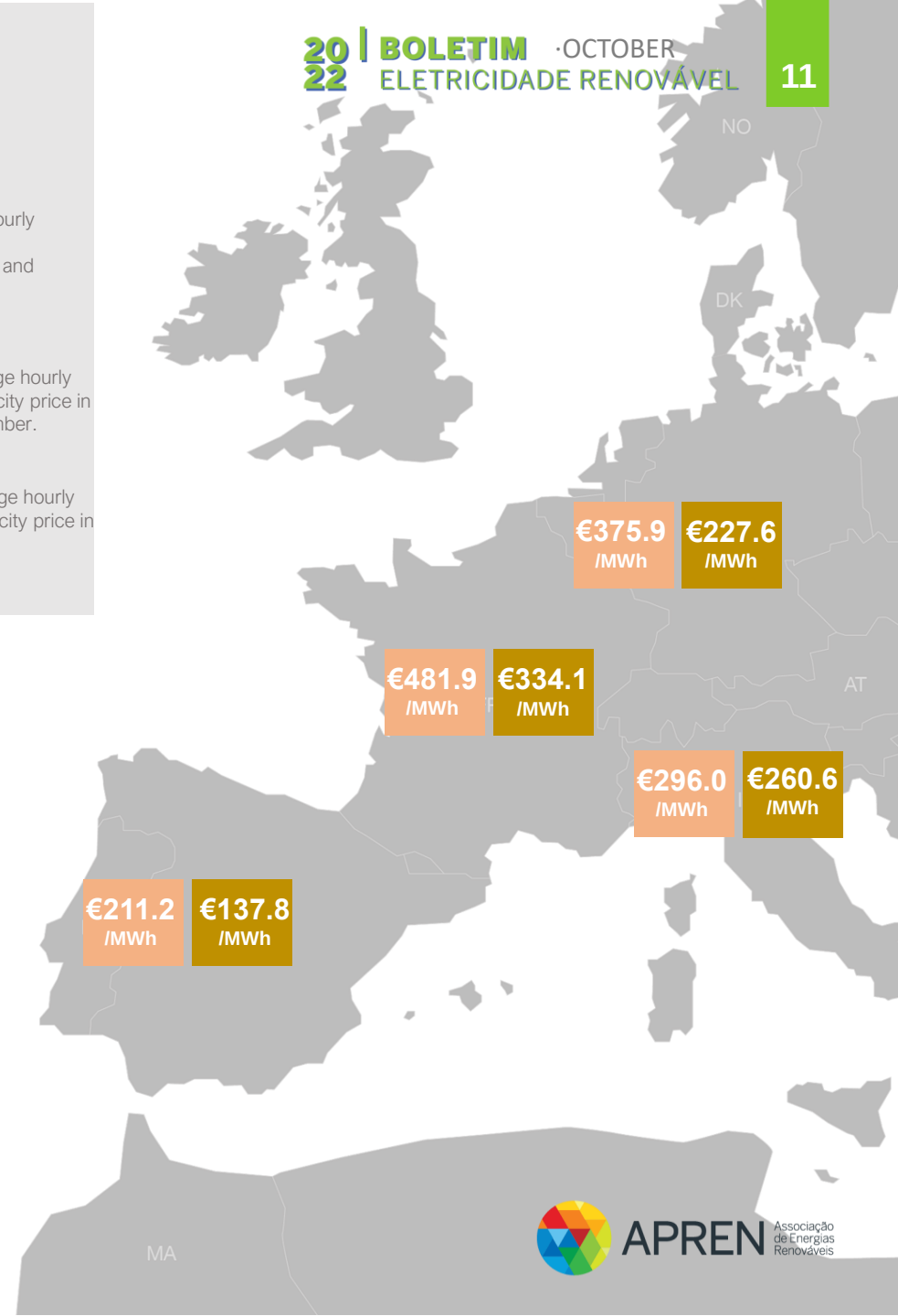


LEGEND

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

€ Average hourly electricity price in November.

€ Average hourly electricity price in 2023.



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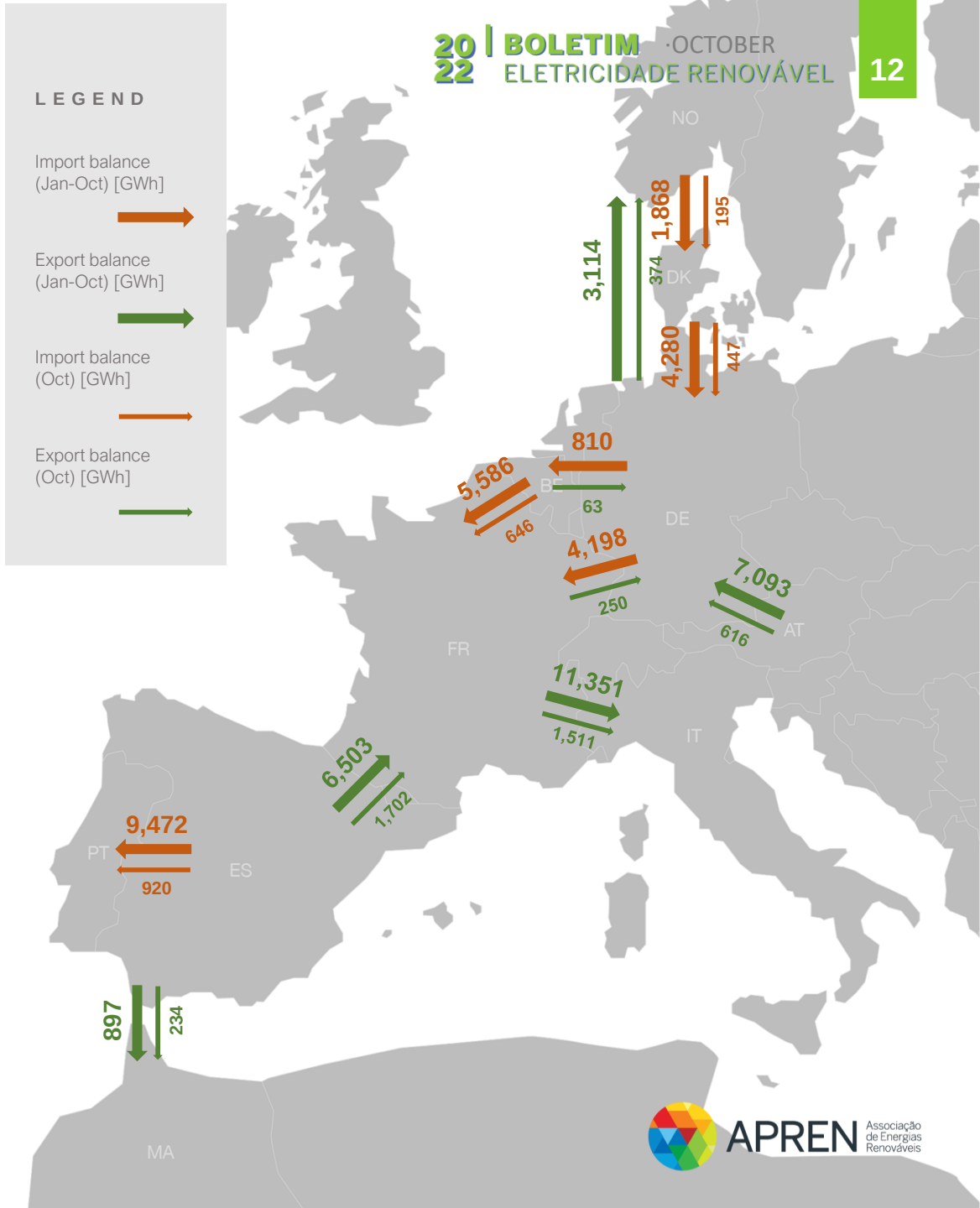
International Trade

Between January 1 and October 31, 2022, the electricity system of Mainland Portugal recorded electricity imports equivalent to 11,250 GWh and exports of 1,778 GWh, with Portugal being an importer with a balance of 9,472 GWh.

MAIN INTERCONNECTION INDICATORS PT-ES

	PT-ES		ES-PT	
USAGE	% 5.6 (Jan-Oct)	% 3.0 (Oct)	% 31.6 (Jan-Oct)	% 23.4 (Oct)
CONGESTION	% 0.3 (Jan-Oct)	% 0.0 (out)	% 1.1 (Jan-Oct)	% 0.0 (Oct)
MARKETS SPLIT	PT-ES		MIBEL-FR	
	% 3.4 (Jan-Oct)	% 1.2 (out)	% 71.1 (Jan-Oct)	% 73.6 (Oct)

Source: REN, Analysis APREN.



Simulation of price formation without SRP

SRP ESTIMATED SAVINGS

The indicators on the right identify the savings achieved between January 1 and October 31, by the contribution of production under special regime (SRP).

This is a study for SRP, which includes all installed capacitiy 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 that renewables have generated.

€206.2/MWh
Accumulated savings (Jan-Oct)

€215.2/MWh
Monthly savings (Oct)

€7.169 M
Accumulated savings (Jan-Oct)

€747 M
Monthly savings (Oct)

Note: This analysis is prepared using a program developed by APREN, based on Deloitte's calculation method.

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Power sector emissions

Between January 1 and October 31, 2022, specific emissions reached 149 gCO_2eq/kWh, while the total emissions from the electro-producing sector reached 5,2 $MtCO_2eq$.
The European Emissions Trading System (EU-ETS) recorded an average price of €80.9/tCO_2[c]. It is a sharp increase compared to the same period in 2021.

[c] Arithmetic average hourly prices.
Source: OMIE, Analysis APREN

SECTOR EMISSIONS

5.2

$MtCO_2eq$

16.7%

in comparison to Oct 2021

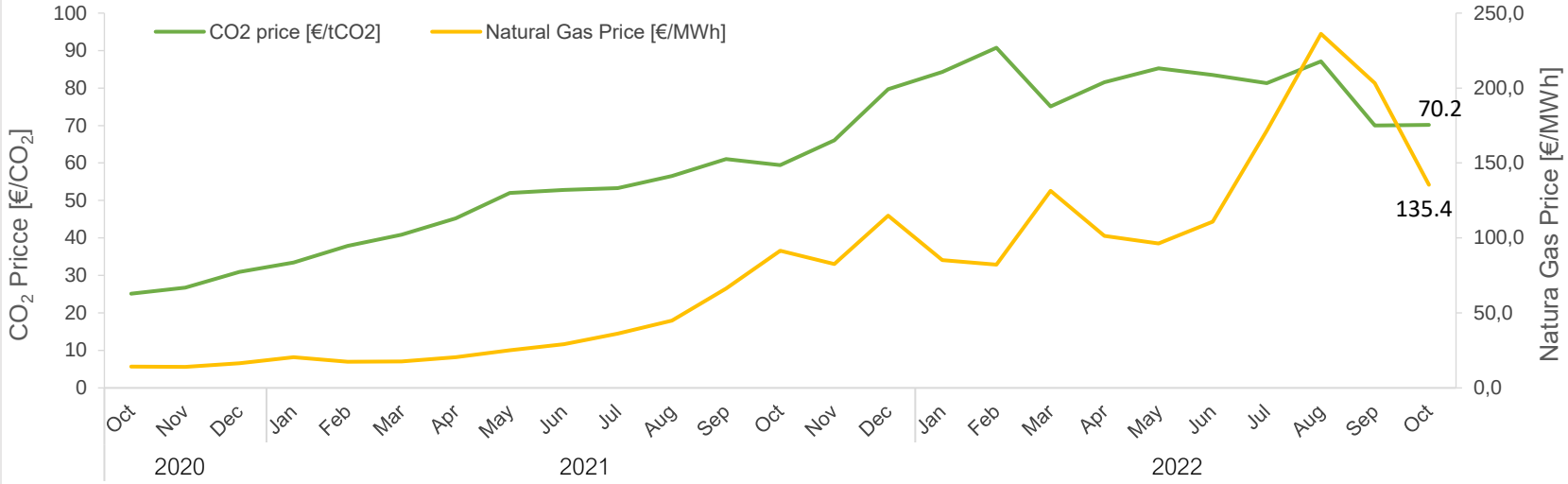
ALLOWANCES AVERAGE PRICE

€80.9

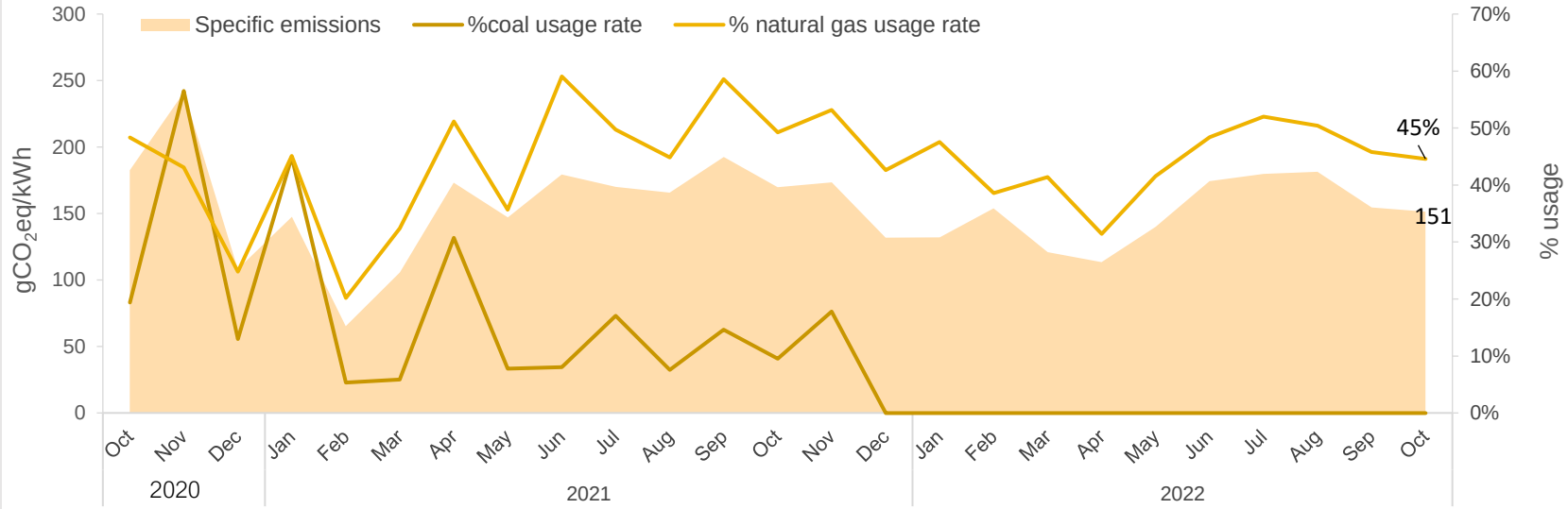
/ tCO_2

64.0%

in comparison to Oct 2021



Preço das licenças de CO_2 no CELE e preço do gás natural na Europa (out-2020 a out-2022).
Fonte: SendeCO2, WorldBank.



Market price, electricity consumption and renewable generation (Oct-2020 to Oct-2022).
Source: OMIE, REN, Analysis APREN

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Environmental Service

The indicators on the right identify the savings reached between January 1 and October 31, 2022, in natural gas, CO_2 emissions and CO_2 emission allowances, resulting from renewable incorporation into electricity generation.

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

Renewables avoided:

€4.240 M
Imported natural gas (Jan-Oct)

€636 M
Imported natural gas (Oct)

6.3 $MtCO_2eq$
CO_2 emissions (Jan-Oct)

0.6 $MtCO_2eq$
CO_2 emissions (Oct)

€763 M
Imported electricity (Jan-Oct)

€39 M
Imported electricity (Oct)

€452 M
CO_2 allowances (Jan-Oct)

€40 M
CO_2 allowances (Oct)

Source: REN, REE, SendeCO2, WorldBank, DGEG, ERSE, Analysis APREN.
Note1: For the estimate of the savings in imported natural gas, the price of natural gas in Europe indicated in the WorldBank has been considered.
Nota2: For the estimation of savings in imported electricity, the average price on the MIBEL market has been considered.

European Barometer

European Alliance of the photovoltaic solar industry

On October 11, the European Commission formally endorsed a new Solar Photovoltaic Industry Alliance, with the aim of expanding the technologies of manufacturing components of photovoltaic solar panels, in order to accelerate the production of solar energy in Europe.

Intervention in energy prices

On October 18, the European Commission presented new measures to reduce high energy prices and ensure security of supply.

Report *State of the Energy Union*

On October 18, the European Commission published the report *State of the Energy Union 2022*, reviewing the latest developments in European legislation and progress towards meeting the seted targets.

Reduction of natural gas imports

On October 18, E3G and Ember published a report on the impact of increased renewable production on the import of natural gas, where savings of EUR 99 billion are reported in imports since the beginning of the war in Ukraine. That is, more than 11 billion euros compared to last year due to solar and wind production.

Price of natural gas and electricity in 2022

On October 31, the European Commission shared Eurostat's recent data on the price of natural gas and electricity in Europe in the first half of 2022.

National Barometer

State budget 2023

On October 9, the Presidency of the Council of Ministers presented the Proposal for Law No. 38/XV/1st, concerning the State Budget for 2023, where measures to support the increase in decentralised solar production and the reduction of the cost of electricity are mentioned.

Energy efficiency and cogeneration production

On October 14, the Decree-Law No. 71/2022 was published, transposition of Directive (EU) 2018/2002 by amending provisions on energy efficiency and cogeneration production.

Projects and initiatives for the production and storage of renewable energy

On October 19, the Decree-Law No. 72/2022 was published, amending exceptional measures for the implementation of renewable energy production and storage projects and initiatives.

Cogeneration Rates

On October 21, the Dispatch No. 25/2022 was published, updating cogeneration reference tariffs for Q3 2022.

Social electricity tariff

On October 25, the Dispatch No. 12461/2022 was published, setting the social tariff for the supply of electricity, applicable from 1 January 2023.

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