APREN Associação de Energias Renováveis

AUGUST

Special Edition
1st Semester Azores and Madeira

2022

BOLETIM ELETRICIDADE RENOVÁVEL

Portugal precisa da nossa energia!

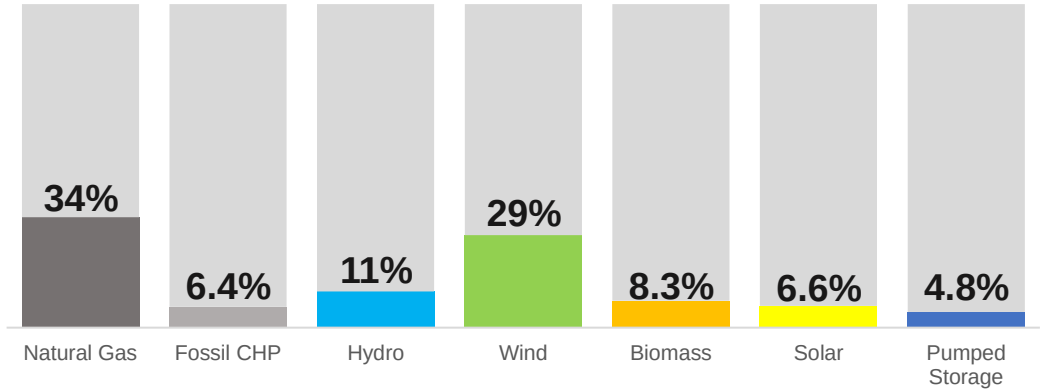
Portugal needs our energy!

Executive Summary

ACCUMULATED GENERATION (Jan-Aug)

% **40.6** // 12,619 GWh
Fossil

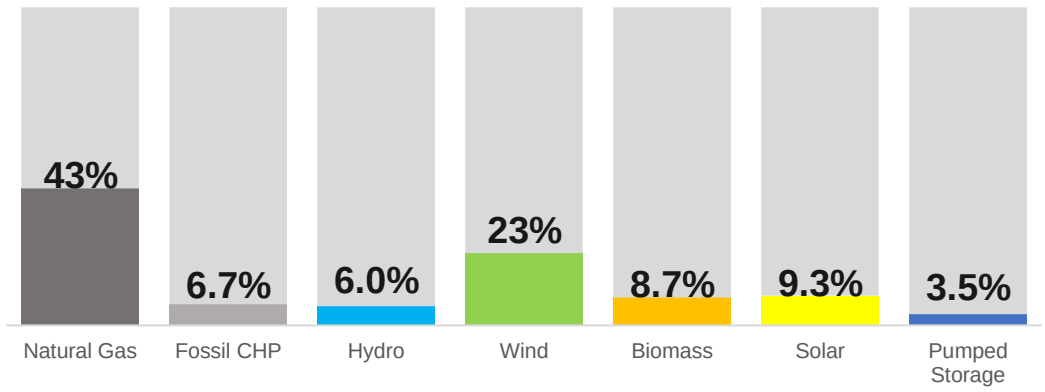
% **54.6** // 15,203 GWh
Renewables



MONTHLY GENERATION (Aug)

% **49.7** // 1,574 GWh
Fossil

% **46.8** // 1,483 GWh
Renewables



ELECTRICITY SECTOR INDICATORS (Jan-Aug)

GWh **27,822**
Generaion[a]

€/tCO$_2$ **83.6**
Price CO$_2$

€/MWh **192.0**
MIBEL Price PT

MtCO$_2$eq **4.1**
CO$_2$ Emmissions

GWh **7,691**
Import balance

gCO$_2$eq/kWh **148**
CO$_2$ Specific emmissions

[a] '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, Analysis APREN.

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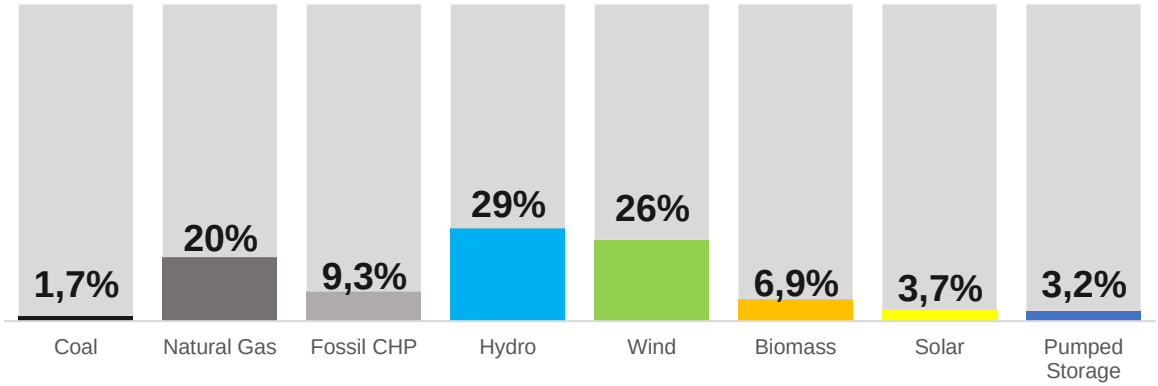
Electricity Generation: Mainland Portugal

ACCUMULATED AUGUST 2021 (Jan-Aug)

% 31.2 // 10,873 GWh
Fossil

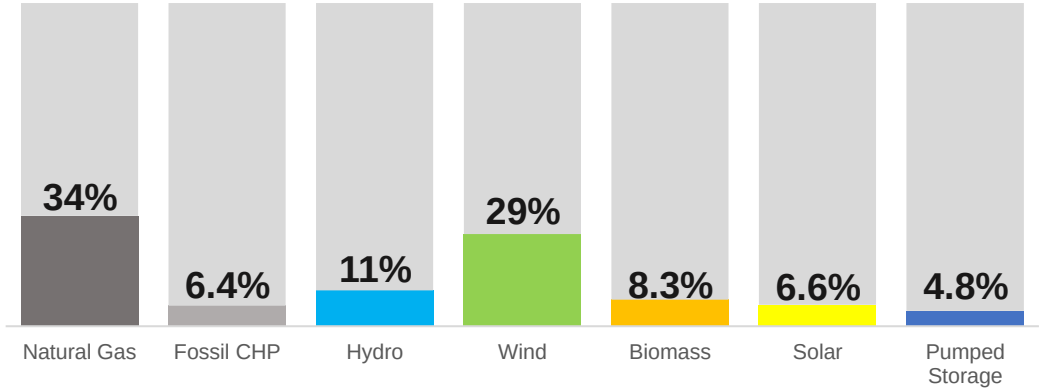
% 65.6 // 20,718 GWh
Renewables



ACCUMULATED AUGUST 2022 (Jan-Aug)

% 40.6 // 12,619 GWh
Fossil

% 54.6 // 15,203 GWh
Renewables



MAIN INDICATORS

GWh 27,822
Generation[a]

% 54.6
Renewable incorporation

GWh 33,699
Consumption[b]

10.9%	13.5%	3.2%
in comparison to Aug 2021	in comparison to Aug 2021	in comparison to Aug 2021

0.93 Wind index

0.34 Hydro index

1.10 Solar index

[a] 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.

[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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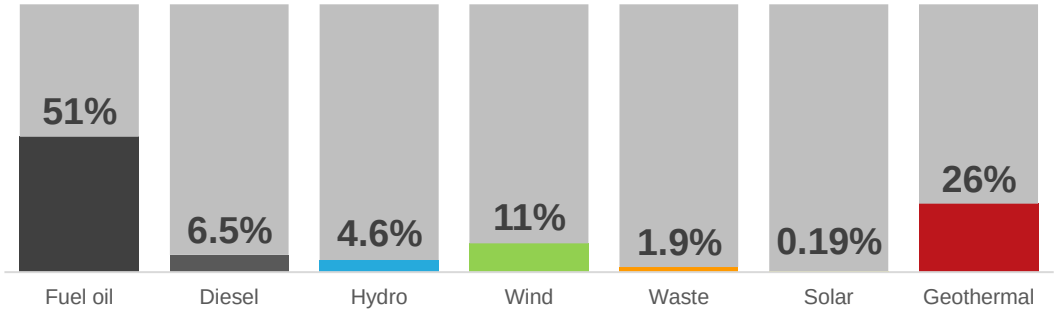
Electricity Generation: Azores

ACCUMULATED AUGUST 2021 (Jan-Aug)

% 57.0 // 222 GWh
Fossil

% 43.0 // 167 GWh
Renewables

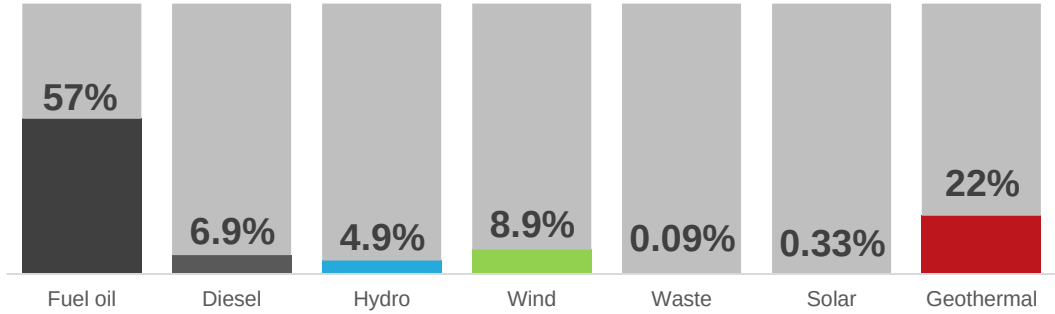


Source: EDA, Analysis APREN

ACCUMULATED AUGUST 2022 (Jan-Aug)

% 64.3 // 251 GWh
Fossil

% 35.7 // 139 GWh
Renewables



Source: EDA, Analysis APREN

MAIN INDICATORS

GWh 391
Generation[a]
▲ 0.77%
in comparison to Aug 2021

% 35.7
Renewable incorporation
▼ 7.3%
in comparison to Aug 2021

GWh 373
Consumption[b]
▲ 1.3%
in comparison to Aug 2021

[a] 'Generation' refers to the net power generation of the plants, considering the pumping production recently disclosed by EDA.

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

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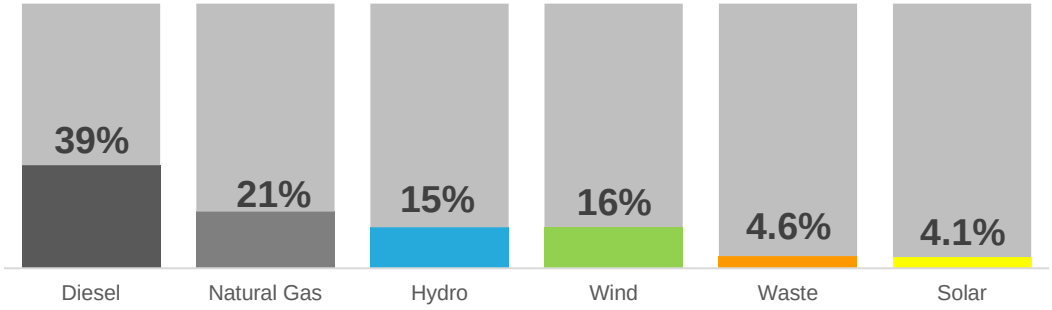
Electricity Generation: Madeira

ACCUMULATED AUGUST 2021 (Jan-Aug)

% 60.3 // 282 GWh
Fossil

% 39.7 // 109 GWh
Renewables

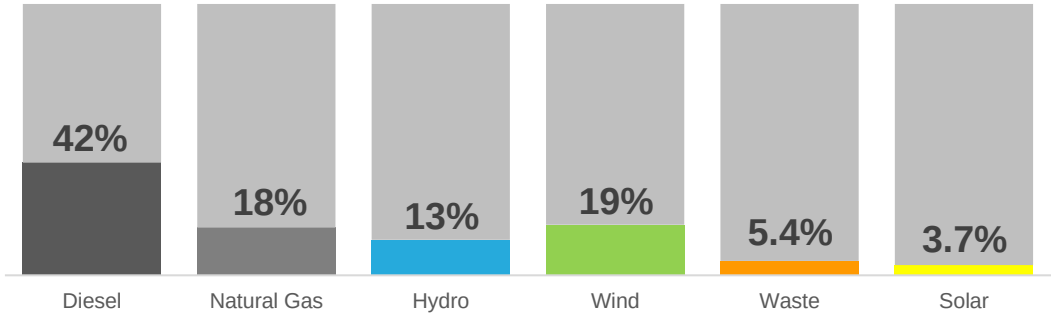


Source: EEM; Analysis APREN

ACCUMULATED AUGUST 2022 (Jan-Aug)

% 59.1 // 247 GWh
Fossil

% 40,9 // 178 GWh
Renewables



Source: EEM, Analysis APREN

MAIN INDICATORS

GWh 424
Generation[a]

▲ 7.8%
in comparison to Aug 2021

% 40.9
Renewable incorporation

▲ 1.2%
in comparison to Aug 2021

[a] 'Generation' refers to the net power generation of the plants, considering the pumping production recently disclosed by EEM.

Source: EEM, Analysis APREN

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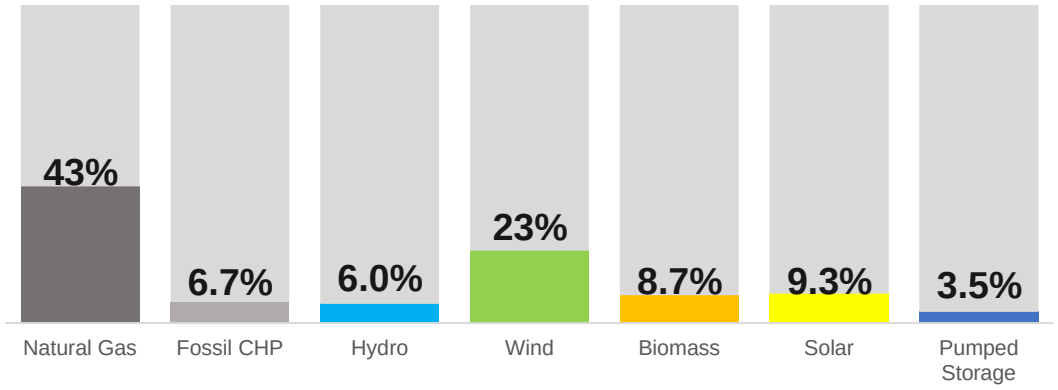
Monthly analysis in Portugal: August

Between August 1 and 31, 2022, renewable incorporation was 46.8%, totaling 3,169 GWh produced. The decrease of 10.4% compared to August 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 production and the maximum percentage of storage in dams have reached minumum values compared to the same period in the last 10 years, which contributed to an increase in production from fossil sources.

Source: REN, Analysis APREN

% **49.7** // 1,574 GWh
Fossil

% **46.8** // 1,483 GWh
Renewables



Source: REN, Analysis APREN

INDICATORS OF THE ELECTRICITY SECTOR

GWh **3,169** Generation [a]
10.4% in comparison to Aug 2021

% **46.8** Renewable incorporation
8.8% in comparison to Aug 2021

GWh **4,029** Consumption [b]
1.7% in comparison to Aug 2021

0.84 Wind index

1.10 Solar Index

0.37 Hydro index

26.1% Dams storage

[a] '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.
[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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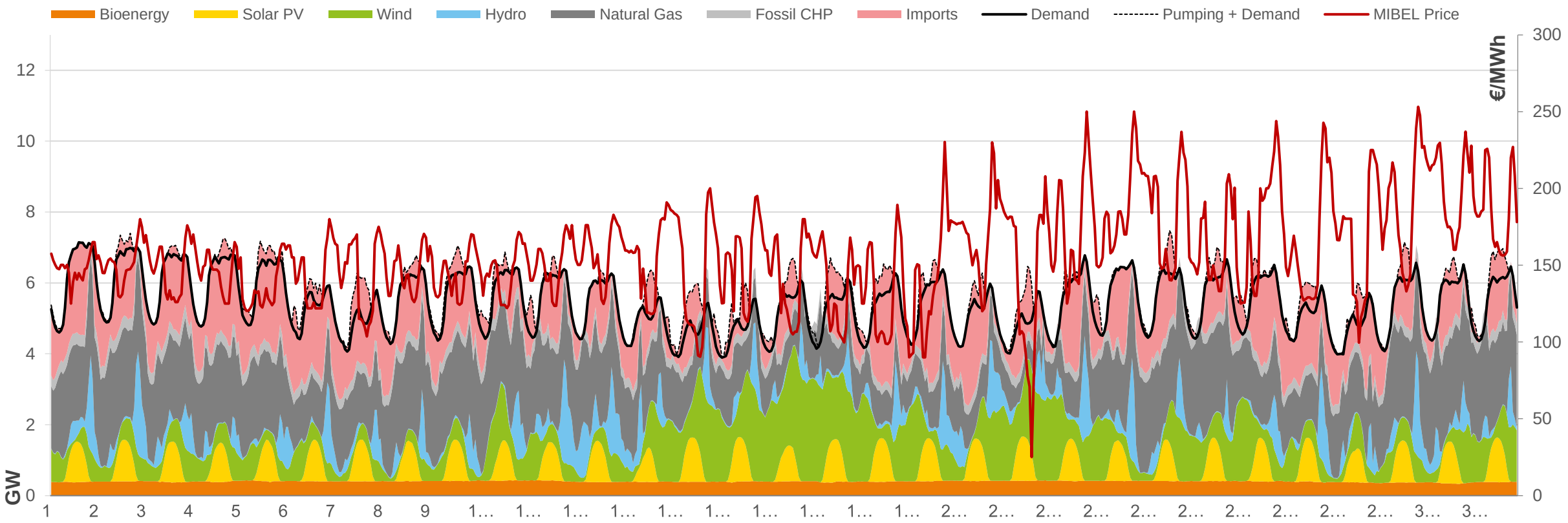
Monthly Analysis in Portugal: August

Load diagram for the month of August 2022



Source: REN, Analysis APREN

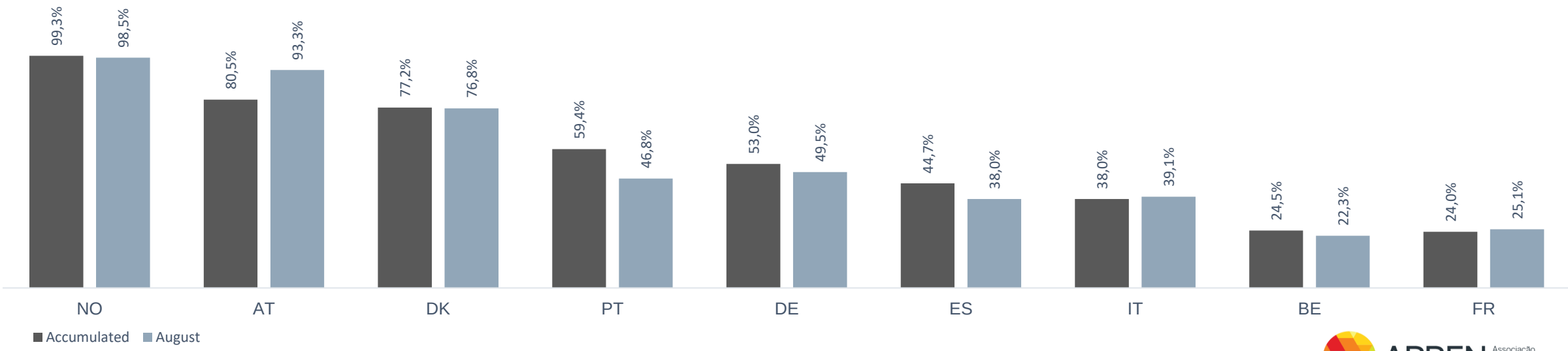
Renewable Electricity

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 August 31, 2022, Portugal was the fourth country with the highest renewable incorporation in electricity generation, behind Norway, Austria and Denmark, which obtained 99.3%, 80.5% and 77.2%, respectively, from RES. From August 1 to 31, Portugal maintained the same renewable incorporation compared to July, placing fifth in the analyzed countries with the largest renewable incorporation in Europe.

Source: OMIE, Analysis APREN



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

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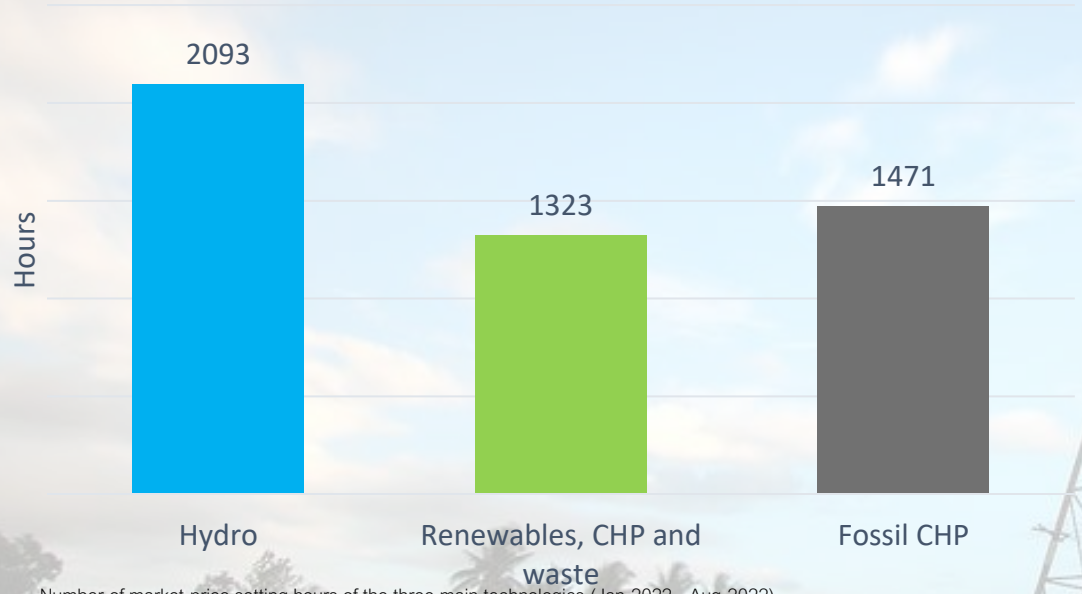
Market Price Setting: Portugal

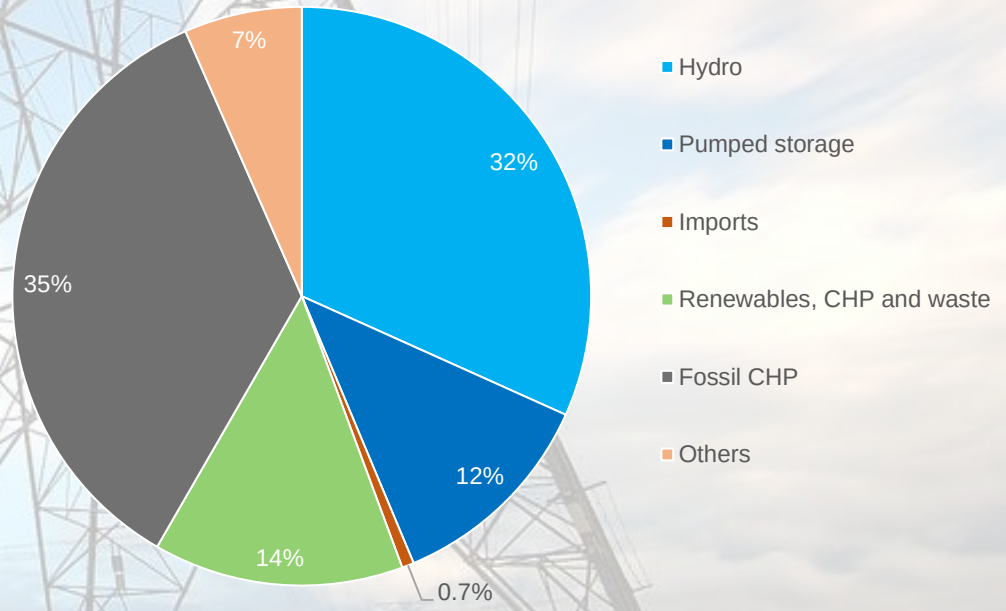
Between January 1 and August 31, hydro was the market price setting technology that recorded the most hours, with 2,093 non-consecutive hours, followed by renewables, cogenaration and waste with 1,323 hours and by thermal generation combined cycle with 1,471 hours.

ACCUMULATED JAN-AUG



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

AUGUST 2022



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

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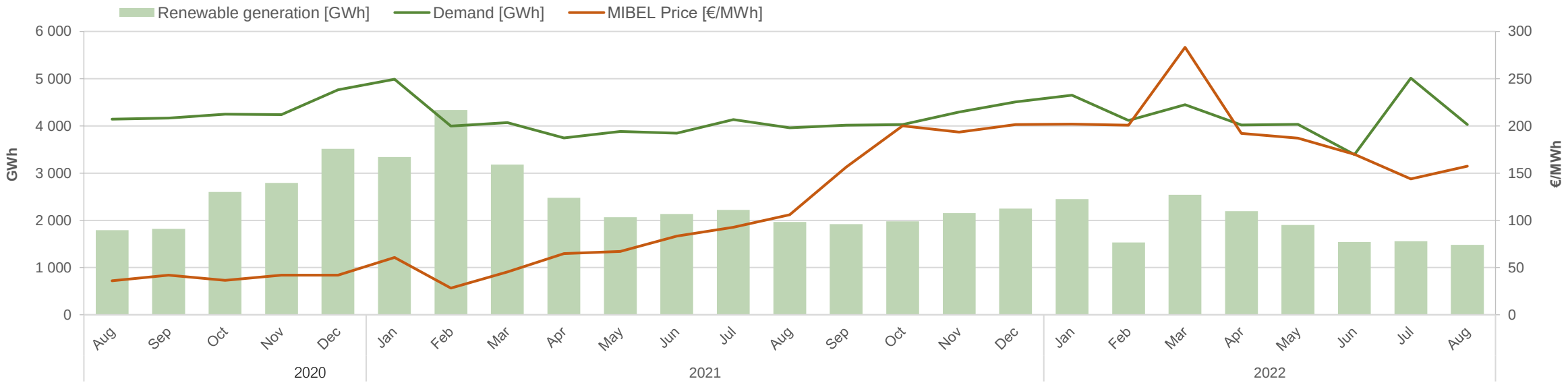
Electricity Market

Portugal

Between January 1 and August 31, the average hourly price recorded in MIBEL in Portugal (192.0 €/MWh[c]) represents an increase of more than three times compared to the same period last year.
In the same period, 57 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 €151.5/MWh. From August 1 to 31, renewable generation was not sufficient to supply consumption for on consecutive hour.

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



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

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Electricity Market

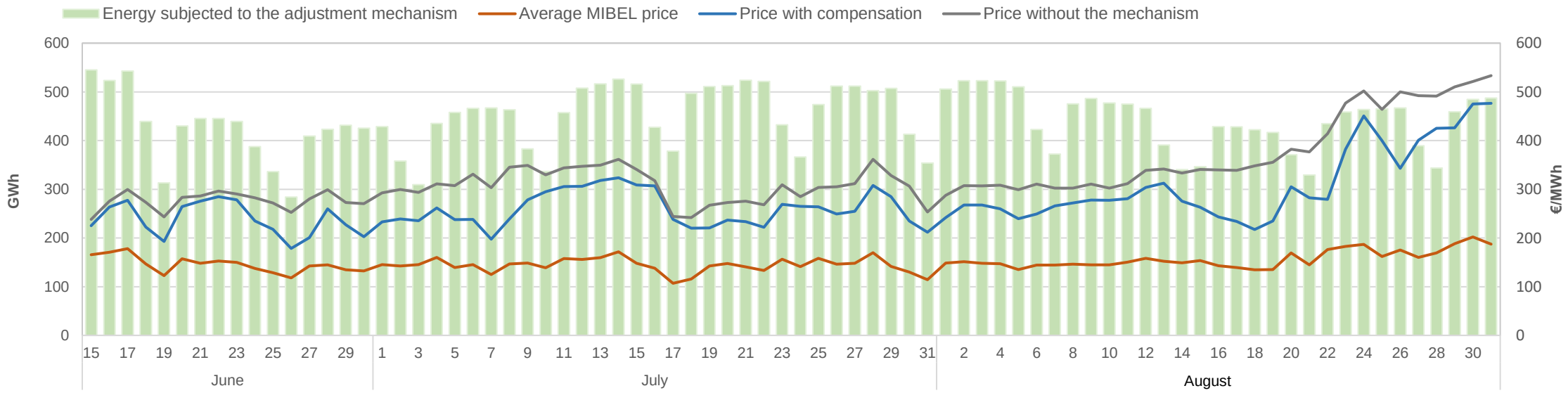
Iberian gas price limit mechanism

The Iberian natural gas price limit mechanism came into force on June 15. Since then and August 31, the mechanism generated savings of €54.5/MWh[c], which amounted to a 16.5% 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 €134.7/MWh[c], and a minimum of €5.62/MWh[c].

In total, 34.6 of the 67.8 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 August 2022, there was a minimum hourly price at MIBEL in Portugal of €25.09/MWh[c], for an hour in which the market price setting was due to thermal generation combined cycle. The maximum hourly price reached €253.07/MWh[c], where market price setting was hydro, due to the reversal of the import-for-export flow in this time period.

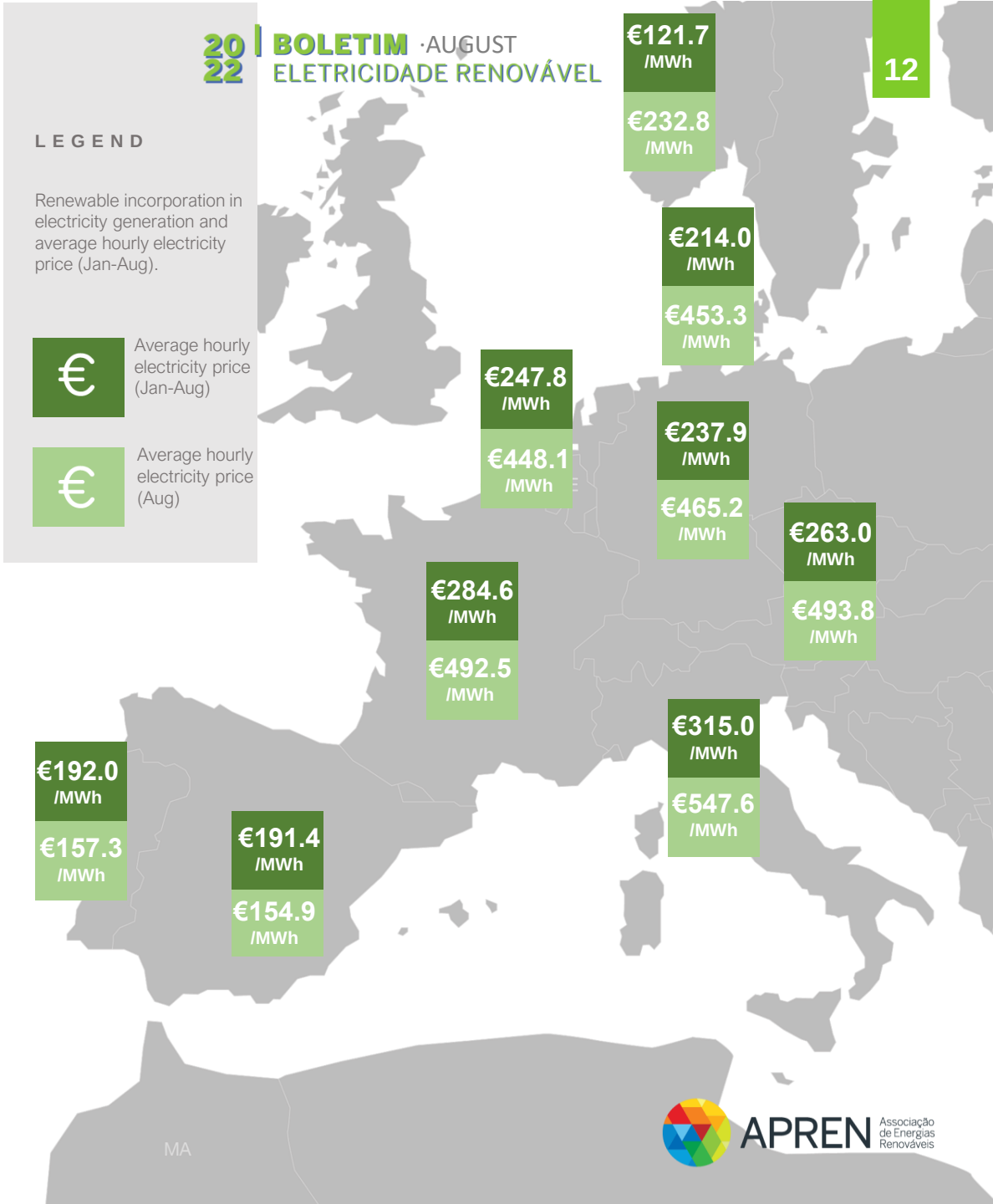
Concerning the prices in Europe, it should be noted that the average values increased in comparison to the previous month, as well as minimum and maximum prices.

PRICES MINIMUM (Aug)

1st	- €37.6 /MWh	BELGIUM
2nd	€13.3 /MWh	GERMANY DENMARK
3rd	€25.9 /MWh	PORTUGAL SPAIN

PRICES MAXIMUM (Aug)

1st	€1021.7 /MWh	FRANCE
2nd	€919.6 /MWh	AUSTRIA
3rd	€871.0 /MWh	GERMANY BELGIUM ITALY



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

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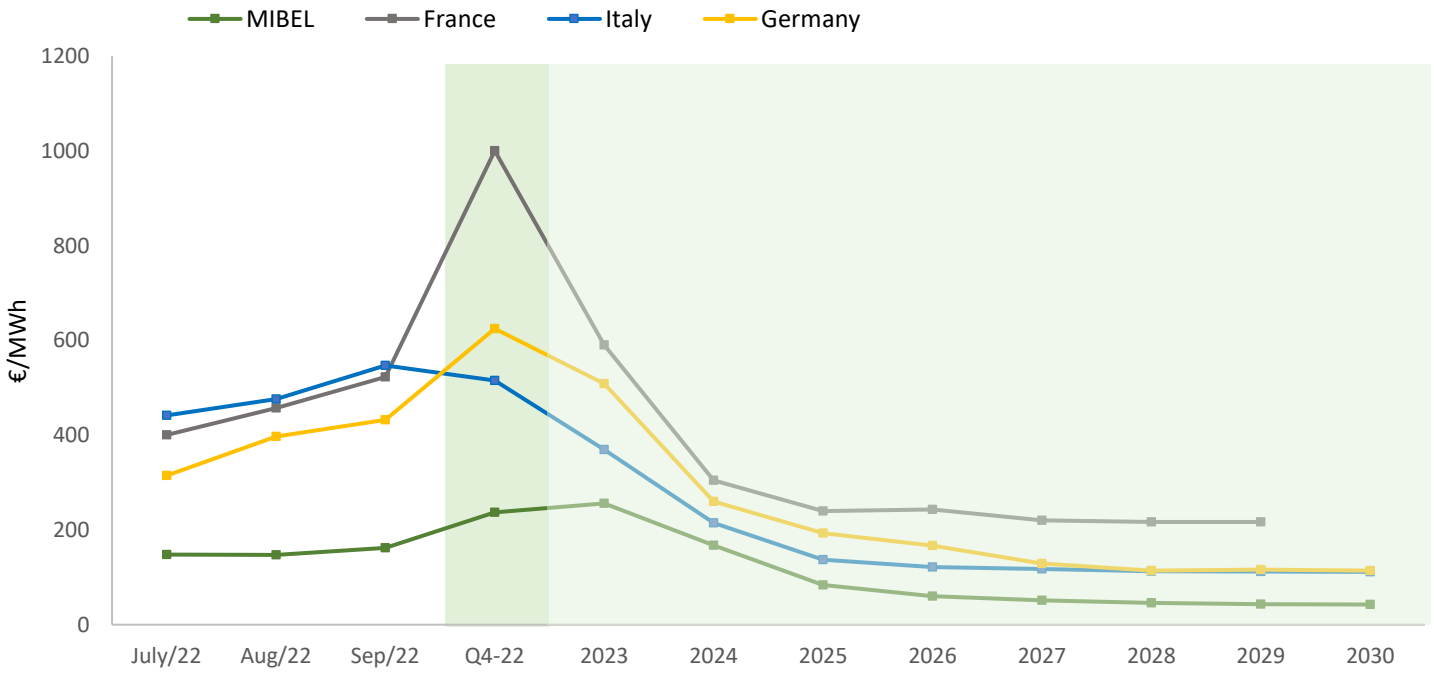
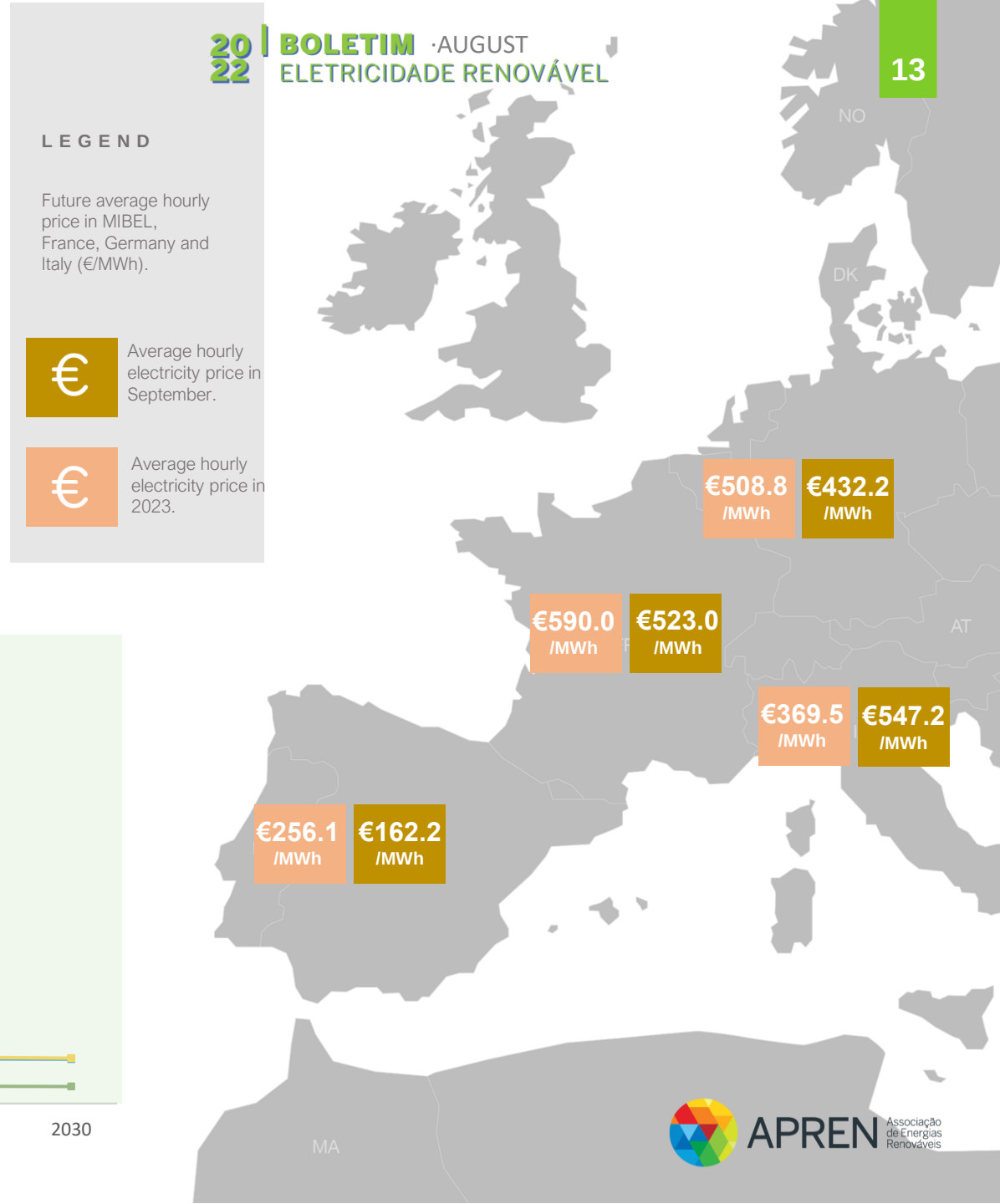
Future Electricity Market

The evolution of the average future hourly price shown here, is calculated on the basis of the contracts for the purchase and sale of electricity[d].
The map on the right shows the price values for the next month (September) 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 September 2.
Source: OMIP, EEX, Analysis APREN





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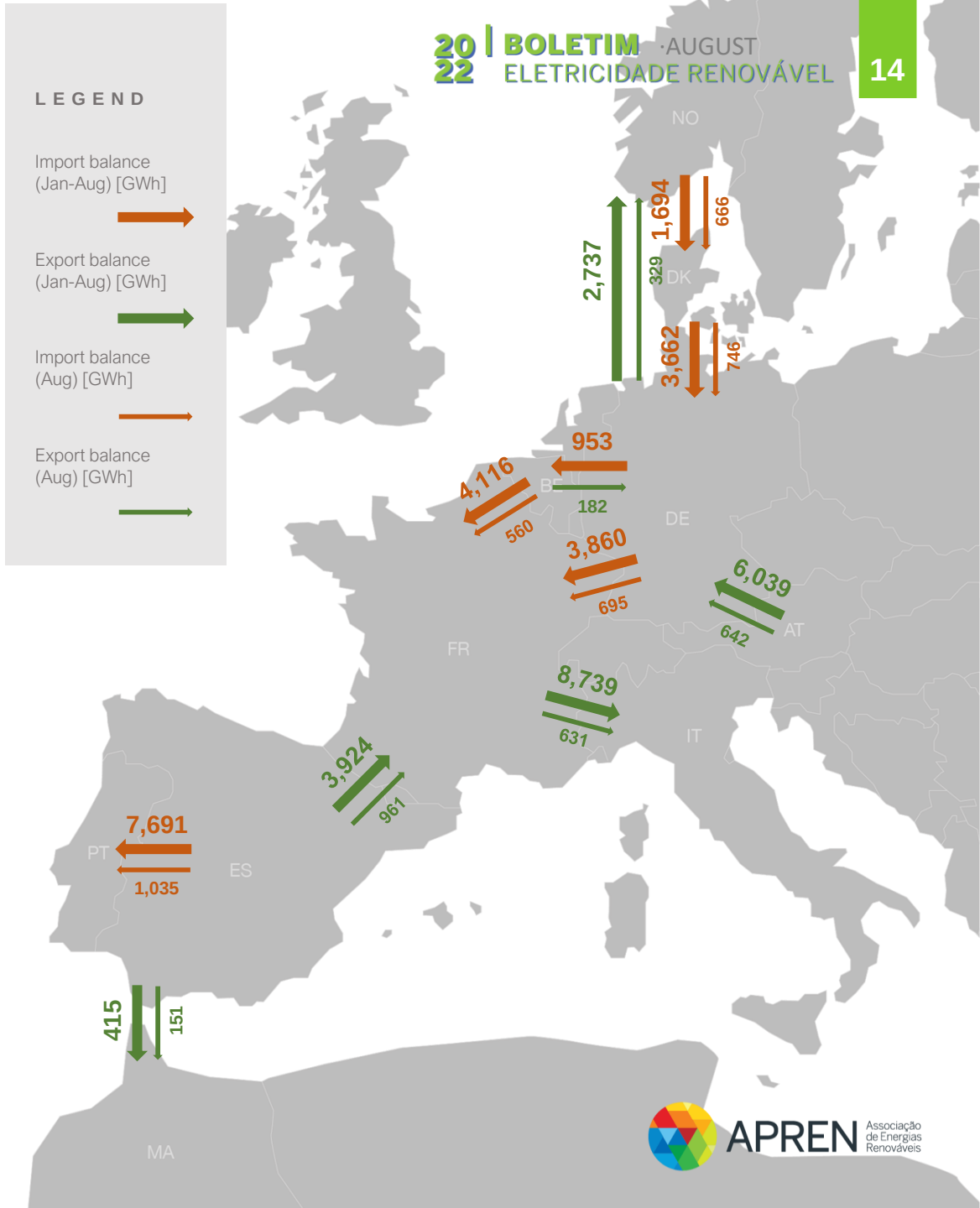
International Trade

Between January 1 and August 31, 2022, the electricity system of Mainland Portugal recorded electricity imports equivalent to 9,101 GWh and exports of 1,410 GWh, with Portugal being an importer with a balance of 7,691 GWh.

MAIN INTERCONNECTION INDICATORS PT-ES

	PT-ES		ES-PT	
USAGE	% 6.4 (Jan-Aug)	% 0.7 (Aug)	% 33.9 (Jan-Aug)	% 22.7 (Aug)
CONGESTION	% 0.5 (Jan-Aug)	% 0.0 (Aug)	% 1.4 (Jan-Aug)	% 0.0 (Aug)
MARKETS SPLIT	PT-ES		MIBEL-FR	
	% 3.6 (Jan-Aug)	% 7.7 (Aug)	% 67.7 (Jan-Aug)	% 99.3 (Aug)

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 August 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.

€203.5/MWh
Accumulated savings (Jan-Aug)

€187.8/MWh
Monthly savings (Aug)

€5,684 M
Accumulated savings (Jan-Aug)

€595 M
Monthly savings (Aug)

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

Note: This analysis uses a program developed by APREN based on Deloitte's calculation method.

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Power sector emissions

Between January 1 and August 31, 2022, specific emissions reached 148 gCO_2eq/kWh, while the total emissions from the electro-producing sector reached 4,1 $MtCO_2eq$.
The European Emissions Trading System (EU-ETS) recorded an average price of €83.6/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

4.1

$MtCO_2eq$

15.1%

in comparison to Aug 2021

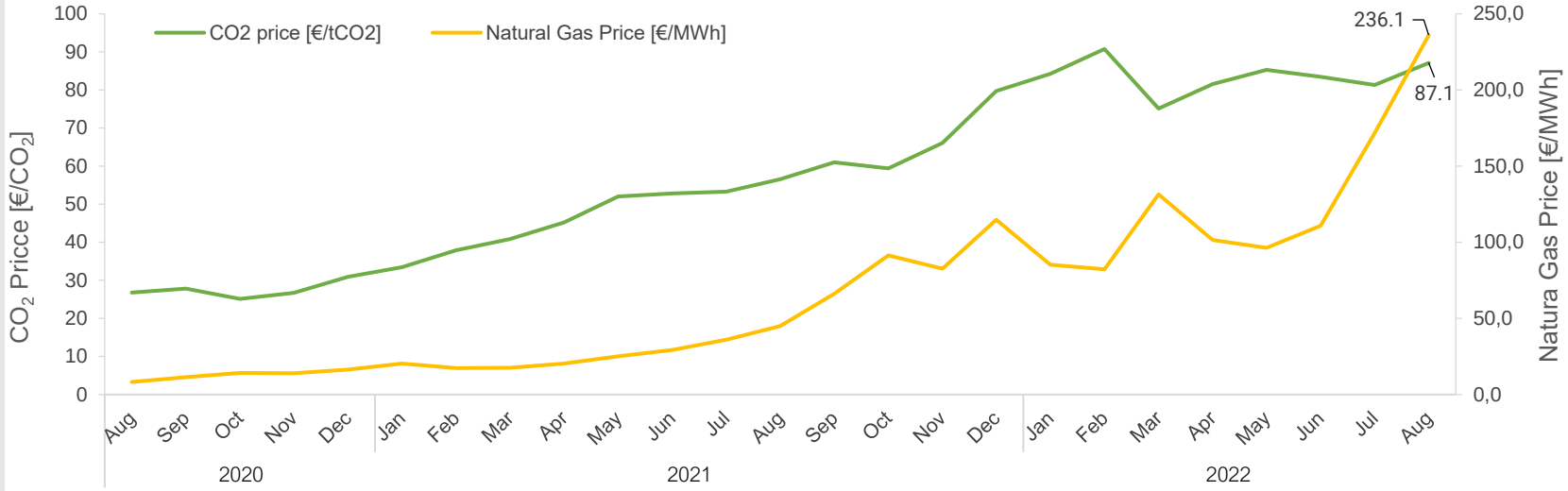
ALLOWANCES AVERAGE PRICE

€83.6

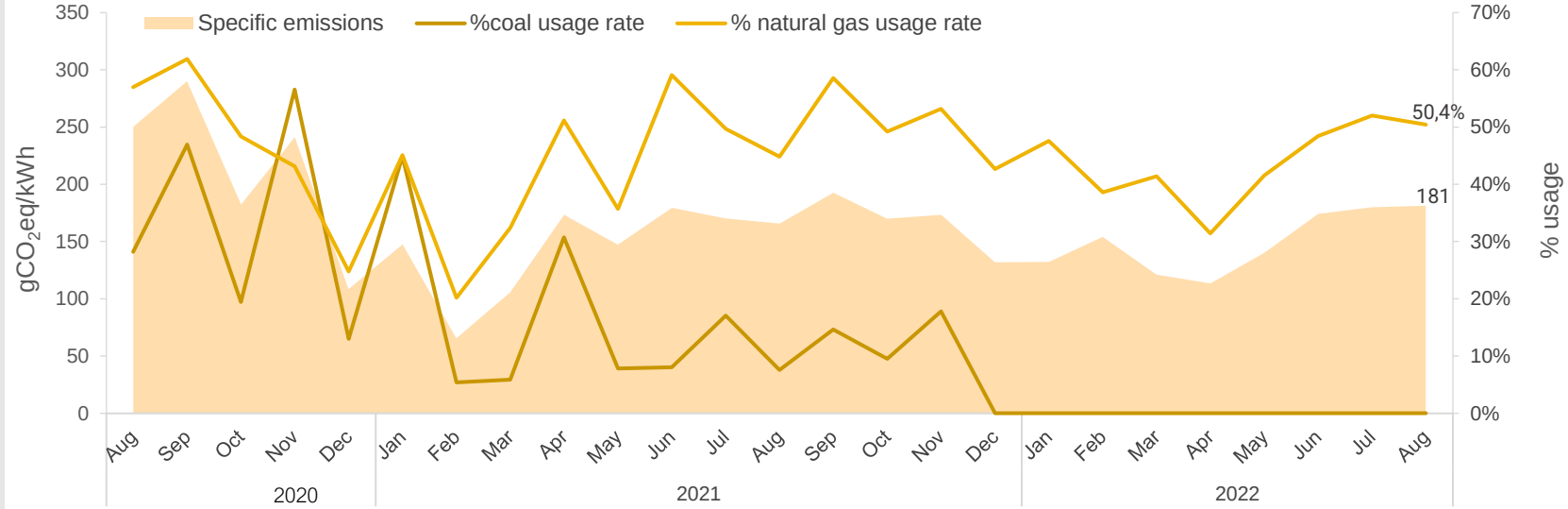
/ tCO_2

80.0%

in comparison to Aug 2021



CO_2 allowances price at EU-ETS and natural gas price in Europe (Aug-2020 to Aug-2022).
Source: SendeCO2, WorldBank.



Market price, electricity consumption and renewable generation (Aug-2020 to Aug-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 August 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:

€3 024 M
Imported natural gas (Jan-Aug)

€658 M
Imported natural gas (Aug)

5.0 $MtCO_2eq$
CO_2 emissions (Jan-Aug)

0.5 $MtCO_2eq$
CO_2 emissions (Aug)

€667 M
Imported electricity (Jan-Aug)

€14 M
Imported electricity (Aug)

€375 M
CO_2 allowances (Jan-Aug)

€45 M
CO_2 allowances (Aug)

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

Reduction of natural gas consumption

On August 9, the plan to reduce European natural gas consumption by 15% between August and March 2023 came into Effect. The plan had been approved on July 26.

Renewable cross-border projects

On August 30, the European Commission established the first list of renewable energy cross-border projects covered by the financial support of the *Connecting Europe Facility* program.

European offshore wind projects

On August 31, eight member countries of the European Union agreed to increase offshore wind power production capacity in the Baltic Sea to 20 GW until 2030, in order to reduce the dependency on Russian energy.

National Barometer

Simplex

On August 4, the Decree-law related to the simplification of the environmental licences and procedures for companies was submitted to public consultation, and will run until September 16.

Impact of out-of-market measures and events

On August 9, Dispatch No. 9838/2022 was published, setting out the parameter corresponding to the impact of the media and out-of-market events recorded within the European Union on the formation of average electricity prices on the wholesale market in Portugal, to be applied between 1 July and 31 December 2022.

Private service lines of electro-power plants

On August 17, Ordinance No. 205-A/2022 was published, with determinations relating to the electrical lines of particular service of electrical power plants.

PDIRD-E

On August 17, the update of the Development and Investment Plan of the National Distribution Network (PDIRD-E) was submitted to public consultation, for the period 2021 to 2025. The consultation no. 111 will run until September 28.

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