December

BULLETIN

2021

Renewable Electricity

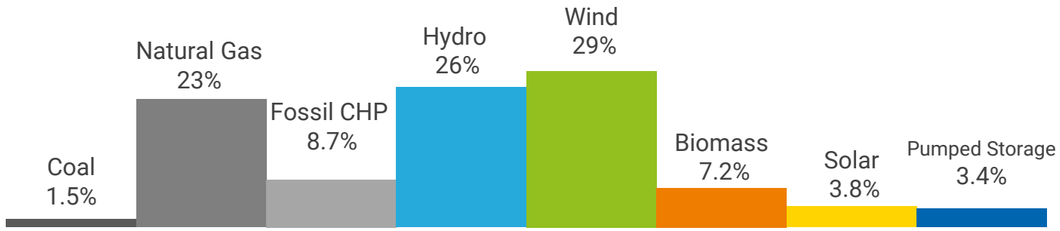
APREN Associação de Energias Renováveis

Executive Summary

Accumulated Generation - December 2021 (Jan-Dec)

Fossil
33.7%
15,748 GWh

Renewables
65.4%
30,588 GWh

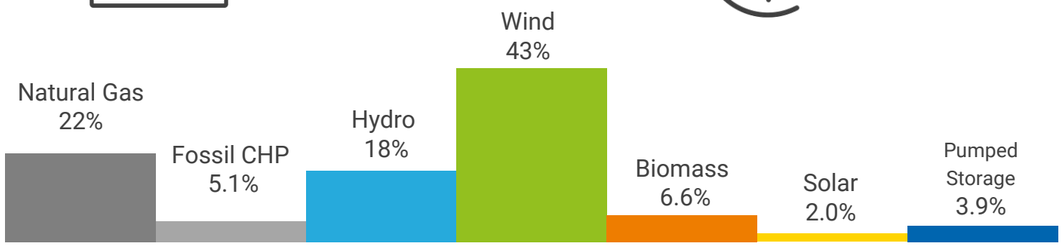


Source: REN, Analysis APREN

Generation - December 2021

Fossil
27.0%
1,176 GWh

Renewables
69.0%
3,001 GWh



Source: REN, Analysis APREN

Electricity sector indicators
(accumulated Jan-Dec)

46,749 GWh
Generation[1]

€ 53.2/tCO$_2$
Price CO$_2$

€ 111/MWh
Price MIBEL PT

6.0 MtCO$_2$eq
CO$_2$ Emissions

4,738 GWh
Import balance

129 gCO$_2$eq/kWh
CO$_2$ Specific emissions

[1]Generation refers to the net production of power plants, considering the production through pumped storage recently released by REN. Pumped storage is not included in the percentage of production from renewable energy sources.
Source: REN, Analysis APREN

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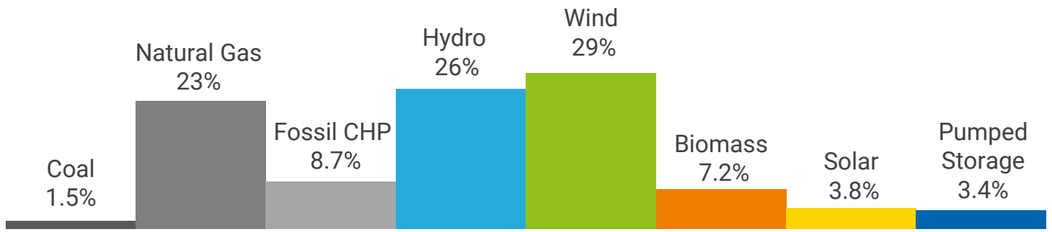
Electricity Generation: Mainland Portugal

Accumulated December 2021 (Jan-Dec)

Fossil
33.7%
15,748 GWh

Renewables
65.4%
30,588 GWh

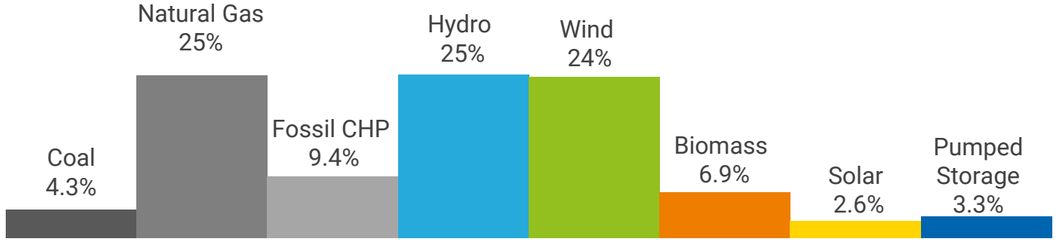


Source: REN, Analysis APREN

Accumulated December 2020 (Jan-Dec)

Fossil
38.3%
19,098 GWh

Renewables
58.6%
28,918 GWh



Source: REN, Analysis APREN

Main indicators

46,749 GWh
Generation[1]

5.5 %
compared to Dec 2020

1.01
Wind Index

65.4 %
Renewable incorporation

6.8 %
compared to Dec 2020

0.93
Hydro Index

51,487 GWh
Consumption[2]

1.4 %
compared to Dec 2020

1.03
Solar Index

[2] Consumption refers to the net production of power plants, bearing in mind the import-export balance.
Source: REN, Analysis APREN

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International Trade

Between 1 January and 31 December 2021, Portugal's electricity system recorded electricity imports equivalent to 8,927 GWh and exports of 4,189 GWh, with Portugal being an importer with a balance of 4,738 GWh.

Source: REN, Analysis APREN

Main interconnection indicators PT-ES

12.6%
Usage
PT-ES

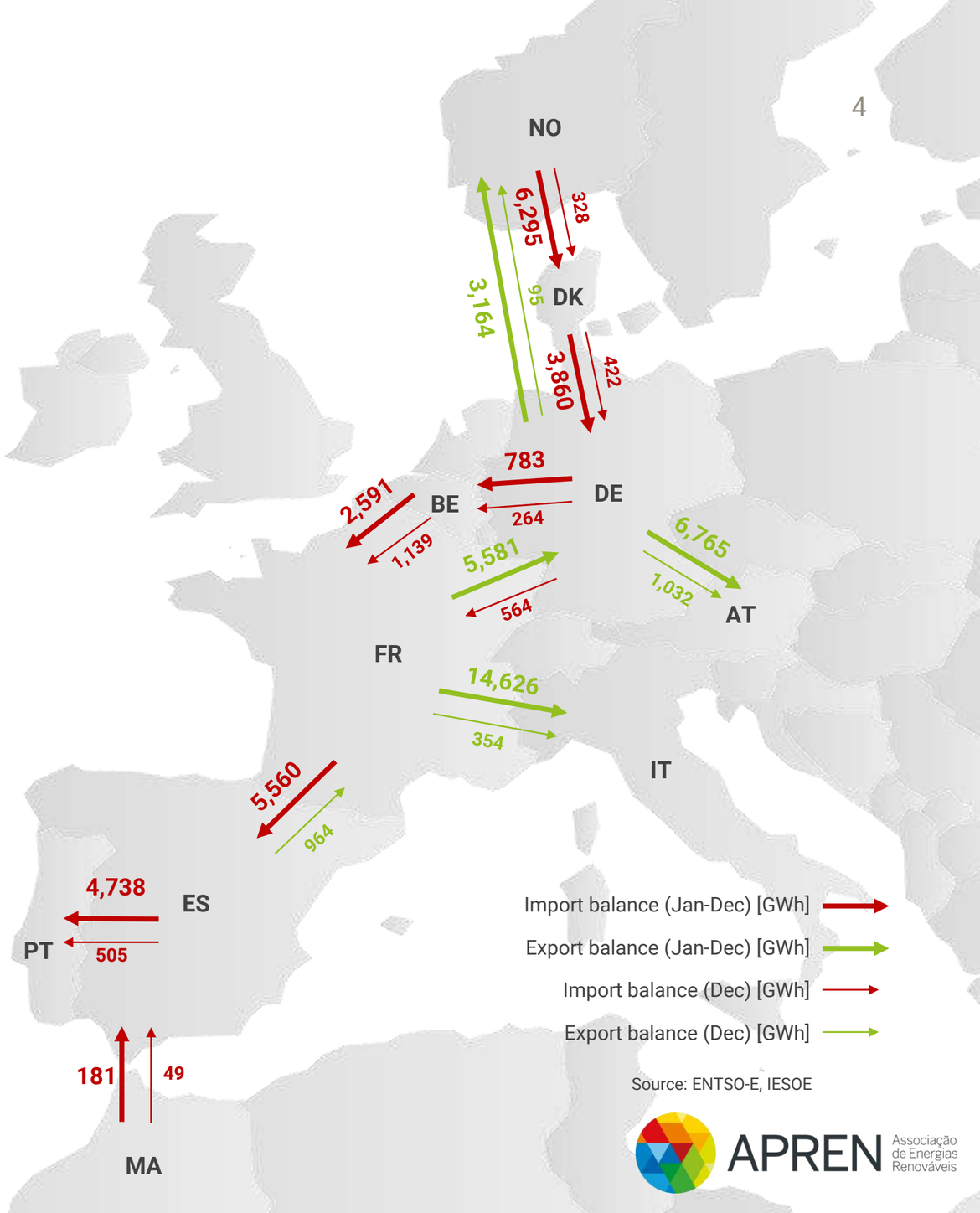
1.3%
Congestion
PT-ES

3.9%
Market split PT-ES

22.1%
Usage
ES-PT

1.3%
Congestion
ES-PT

65.2%
Market split
MIBEL-FR



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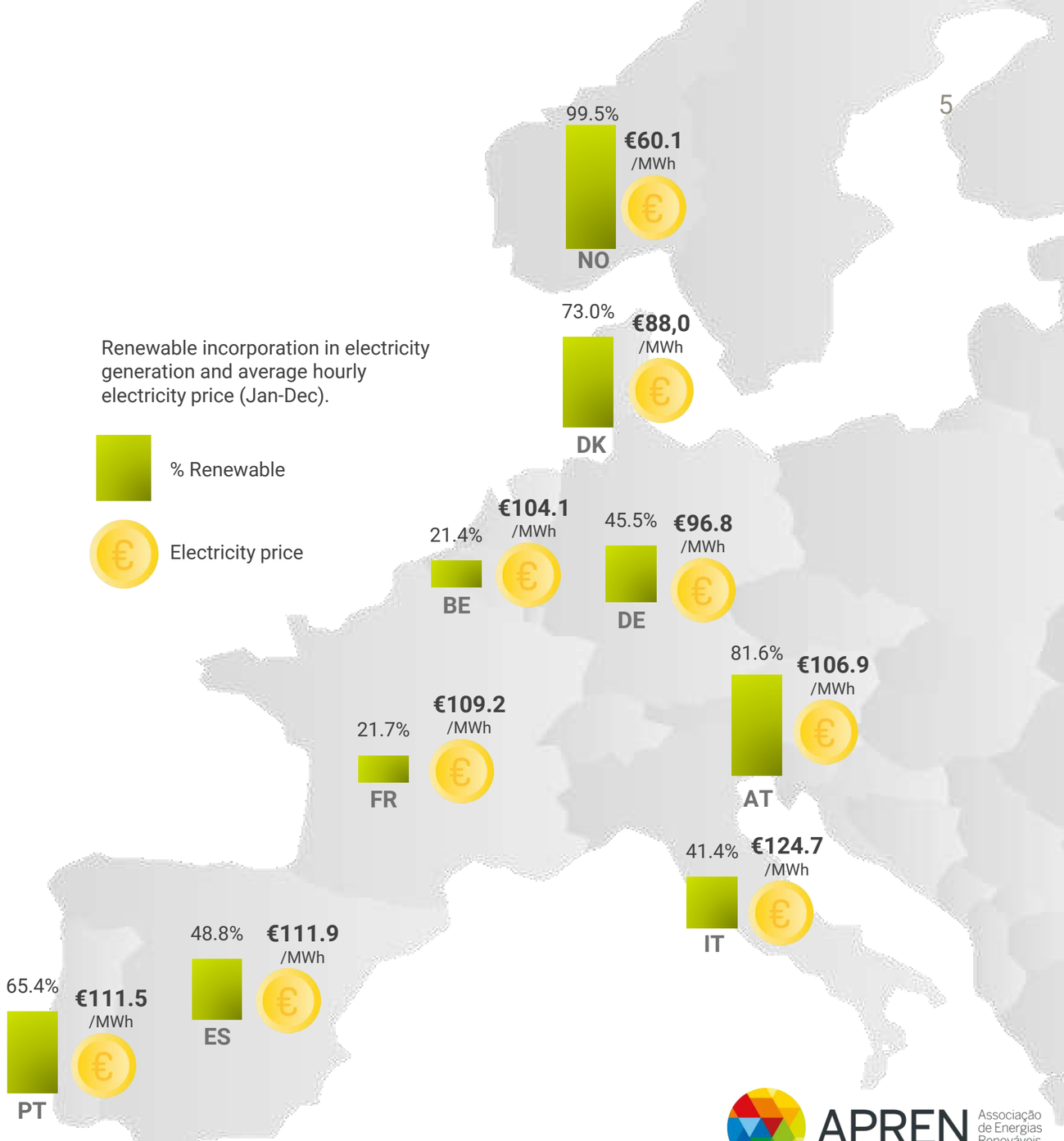
Accumulated Electricity Market - Europe

Between January 1 and December 31, 2021, there was an hourly average price on the Iberian Electricity Market (MIBEL) in Portugal of € 111,47/MWh[3]. Despite the high renewable incorporation in Portugal, the price of electricity in the Iberian spot market has been on the rise, as a result of the upward trend in the price of emission allowances in the European CO_2 allowances market and the rise in natural gas prices. It is in this scenario that Portugal registered the second highest average electricity price, compared to the other countries shown on the right. Portugal was the fourth country with the largest renewable incorporation in electricity generation, behind Norway, Austria and Denmark, which obtained 99.5 %, 81.6 % and 73.0 %, respectively, from RES.

This analysis only took into account the main European markets, in order to have a representative panorama of comparison.

[3] Arithmetic average of hourly prices

Source: ENTSO-E, OMIE, Analysis APREN



Source: REN, Fraunhofer, REE, Terna, National Grid, ENTSO-E, Analysis APREN

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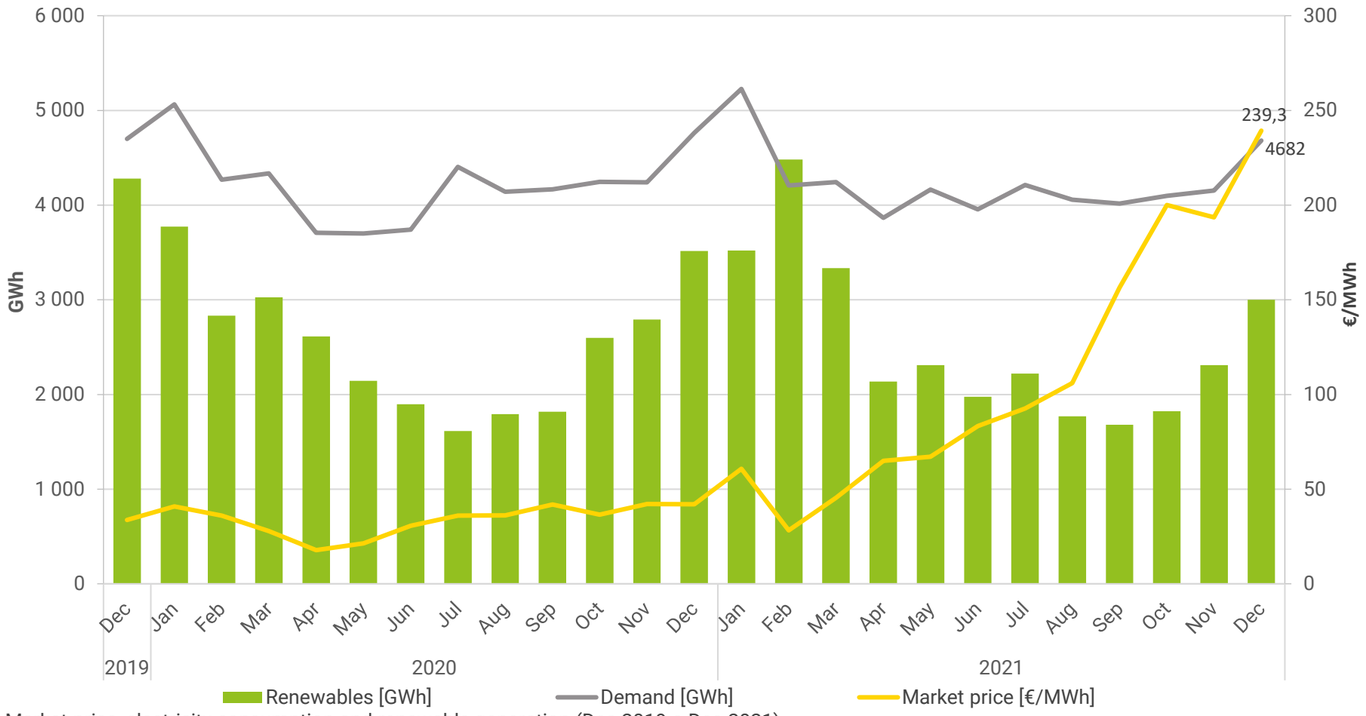
Accumulated Electricity Market - Portugal

During the year 2021, the average hourly price registered in the MIBEL in Portugal (€ 111,47/MWh[3]) represents an increase of more than three times compared to the same period last year.

In the same period, 1,108 non-consecutive hours were recorded in which renewable generation was sufficient to supply the electricity consumption of Mainland Portugal, with an average hourly price on MIBEL of € 44.75/MWh.

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



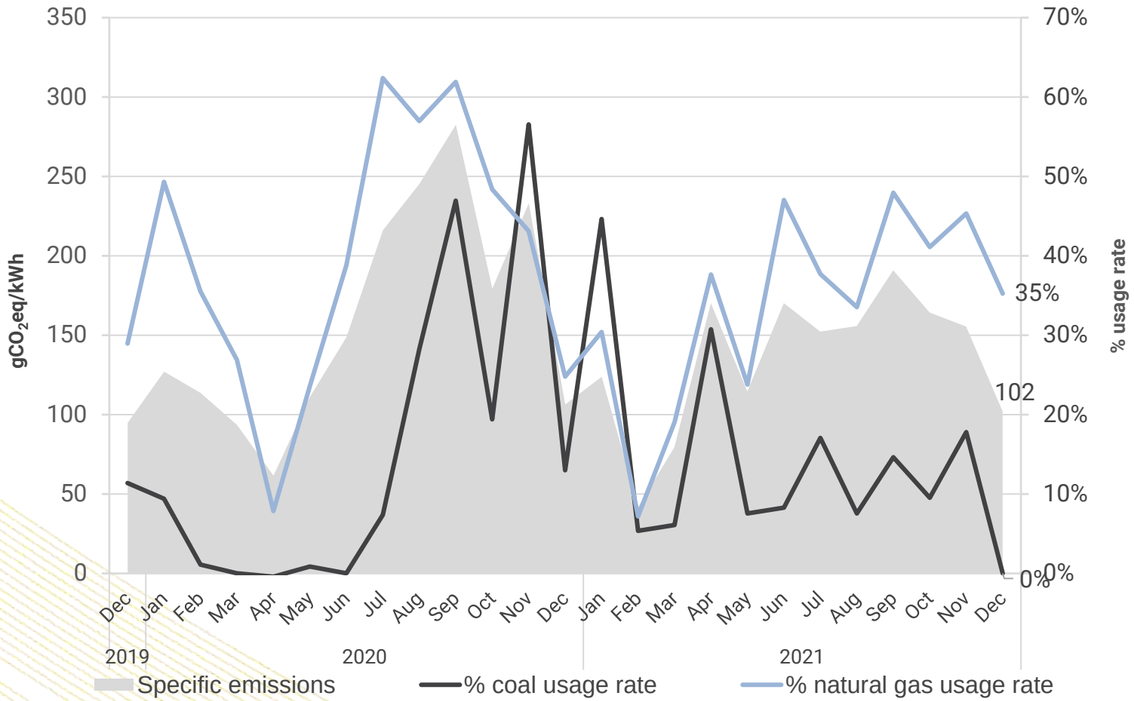
Market price, electricity consumption and renewable generation (Dec-2019 a Dec-2021).
Source: OMIE, REN, Analysis APREN

Power Sector Emissions

Specific emissions reached an annual total of 129 gCO_2eq/kWh, while the total emissions from the electro-producing sector reached 6,0 $MtCO_2eq$, of which 0.4 $MtCO_2eq$ correspond to the month of December.

Since the beginning of the year, the European Emissions Trading System (EU-ETS) has recorded an average price of € 53.2/tCO_2, increasing by more than the double compared to the same period in 2020.

Source: SendeCO2



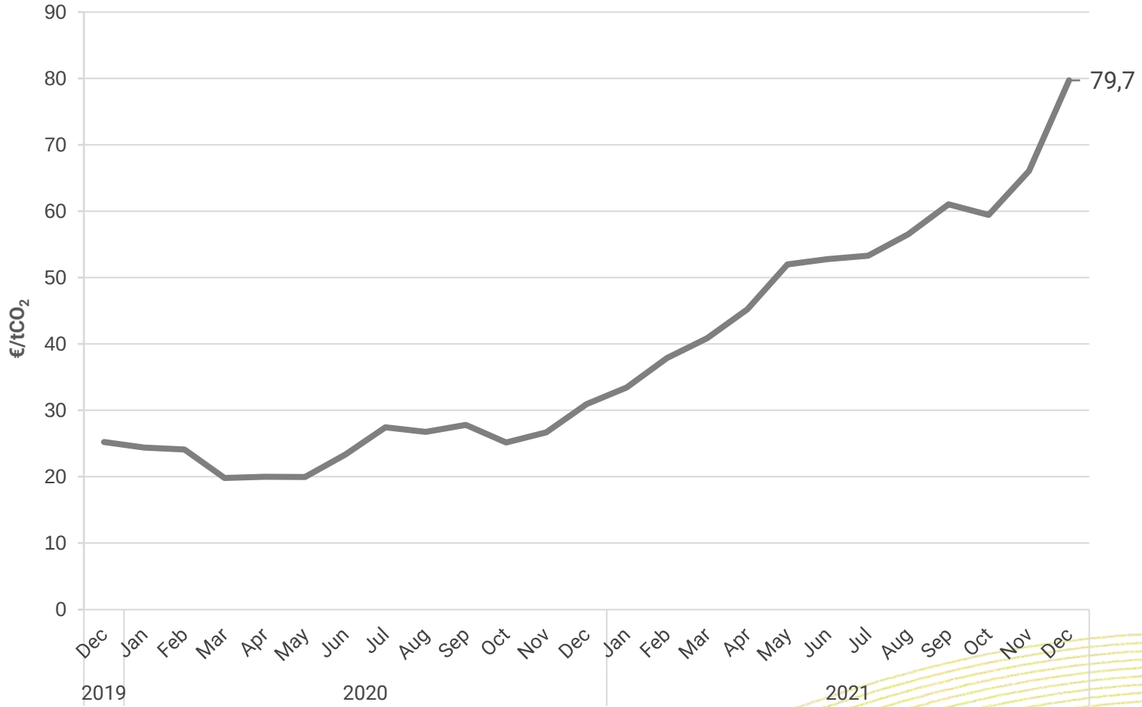
Specific emissions from the electricity sector in mainland Portugal, % use of coal and natural gas power plants from Dec-2019 to Dec-2021.
Source: REN, DGEG, ERSE, Analysis APREN

Sector emissions
6.0
$MtCO_2eq$

25.0 %
compared to Dez 2020

Average allowances price
€50.8
/tCO_2

115 %
compared to Dez/20



CO_2 allowances proce from Dec-2019 to Dec-2021.
Source: SendeCO2.

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Monthly analysis in Portugal: December

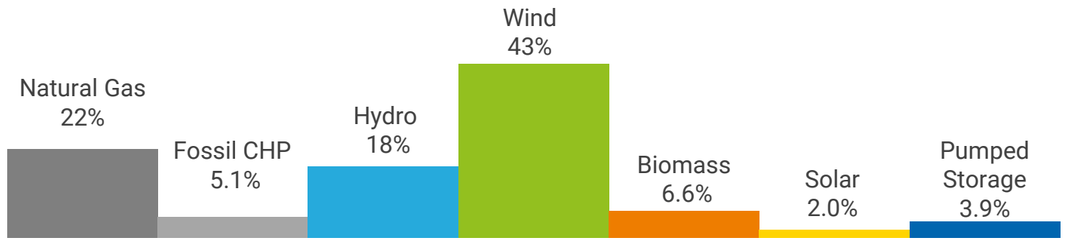
In December, renewable electricity generation accounted for 69.0 % of total electricity generated in Mainland Portugal (4,348 GWh).

As for the December international trade, Mainland Portugal was an importer, recording a balance of 505 GWh, significantly higher than the balance in December 2020 (96 GWh).

Source: REN, Analysis APREN

Fossil
27.0%
1,176 GWh

Renewables
69.0%
3,001 GWh



Source: REN, Analysis APREN

Electricity sector indicators

4,348 GWh — Generation[1]
6.9 % compared to Dec 2020

69.0% — Renewable incorporation
6.3 % compared to Dec 2020

4,853 GWh — Consumption[2]
1.9 % compared to Dec 2020

1.37 — Wind index

0.99 — Solar index

0.42 — Hydraulicity index

35.7% — Dams storage

[2] Consumption refers to the net production of power plants, considering the import-export balance.
Source: REN, Analysis APREN

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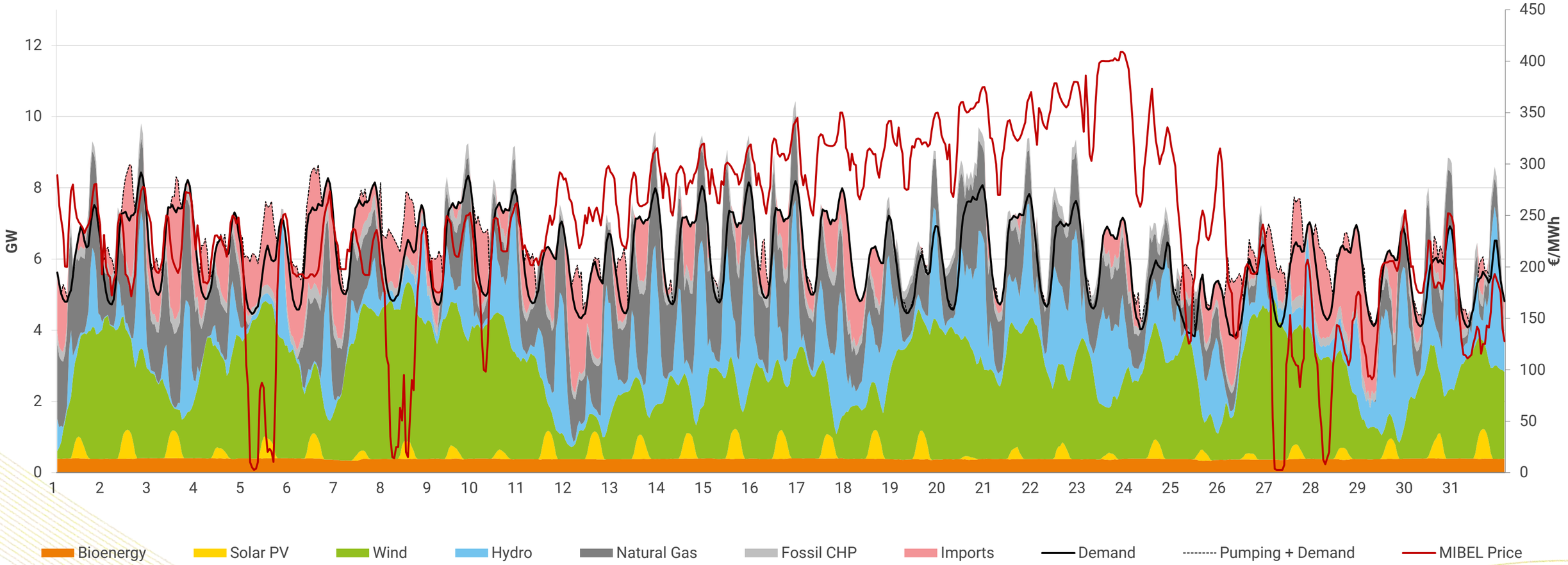
Monthly analysis in Portugal: December

Load diagram from the month of December 2021



Source: REN, Analysis APREN

Monthly Market Analysis: December

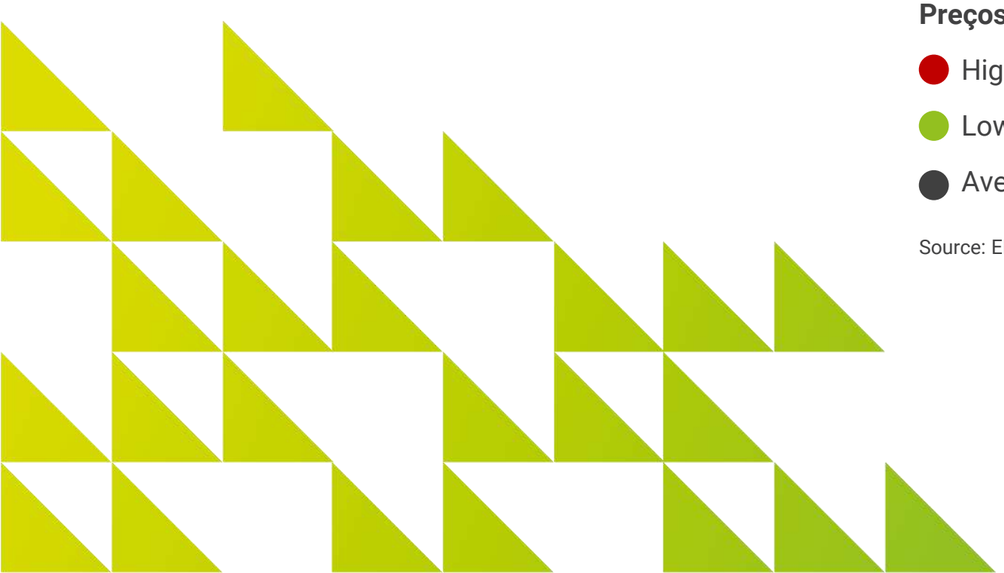
Electricity market in Europe

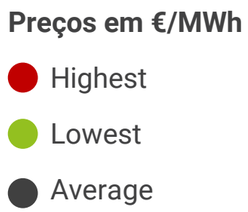
During the month of December 2021, there was an hourly average price on MIBEL in Portugal of € 239.27/MWh, which represents a five times higher increase in the price registered in December 2020. In Portugal, there was a minimum hourly price on the MIBEL of € 2.67/MWh.

Of the countries shown on the right, the lowest price verified was € -40.16/MWh in Belgium. The highest hourly maximum price was recorded in Germany, Austria, Belgium, Denmark and France, reaching € 620.00/MWh.

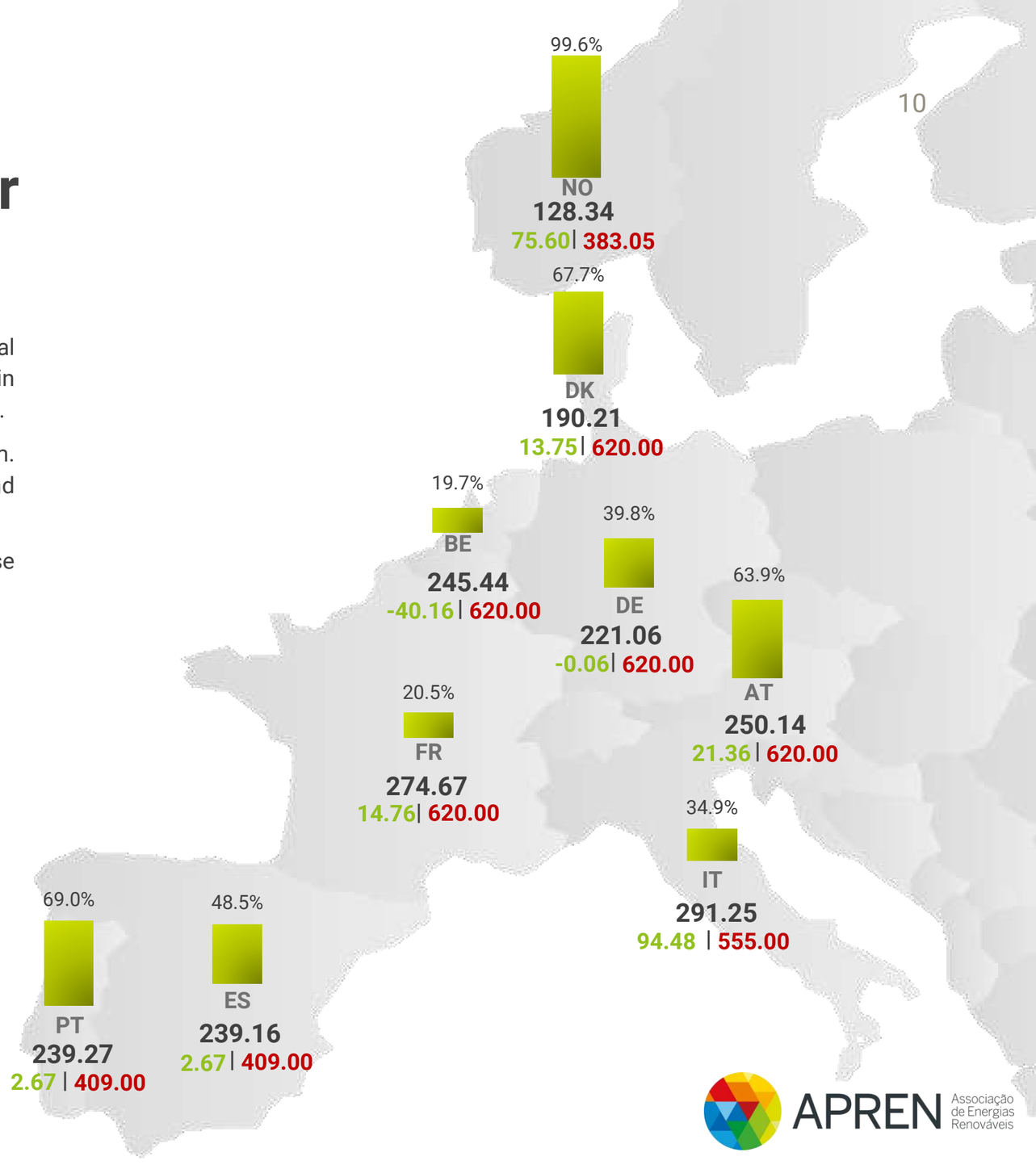
This analysis only took into account European countries with influence in the Portuguese market.

Source: ENTSO-E, IESOE, Analysis APREN





Source: ENTSO-E, IESOE



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Monthly market analysis: December

Electricity market in Portugal

12.7%
Usage
PT-ES

20.3%
Usage
ES-PT

0.0%
Congestion
PT-ES

1.1%
Congestion
ES-PT

1.1%
Market split PT-ES

66.9%
Market split
MIBEL-FR

Environmental Service

The indicators below identify the savings achieved between January 1 and December 31, 2021, in fossil fuels, CO_2 emissions and CO_2 emission allowances, resulting from the incorporation of renewable electricity generation.

This analysis assumes that, in the absence of renewables, production would be ensured firstly by natural gas, followed by coal and finally the use of imports.

Renewables have avoided…

€ 1,979 M
Imported fossil fuels (Jan-Dec)

€ 414 M
Imported fossil fuels (Dec)

11.6 $MtCO_2eq$
CO_2 emissions (Jan-Dec)

0.8 $MtCO_2eq$
CO_2 emissions (Dec)

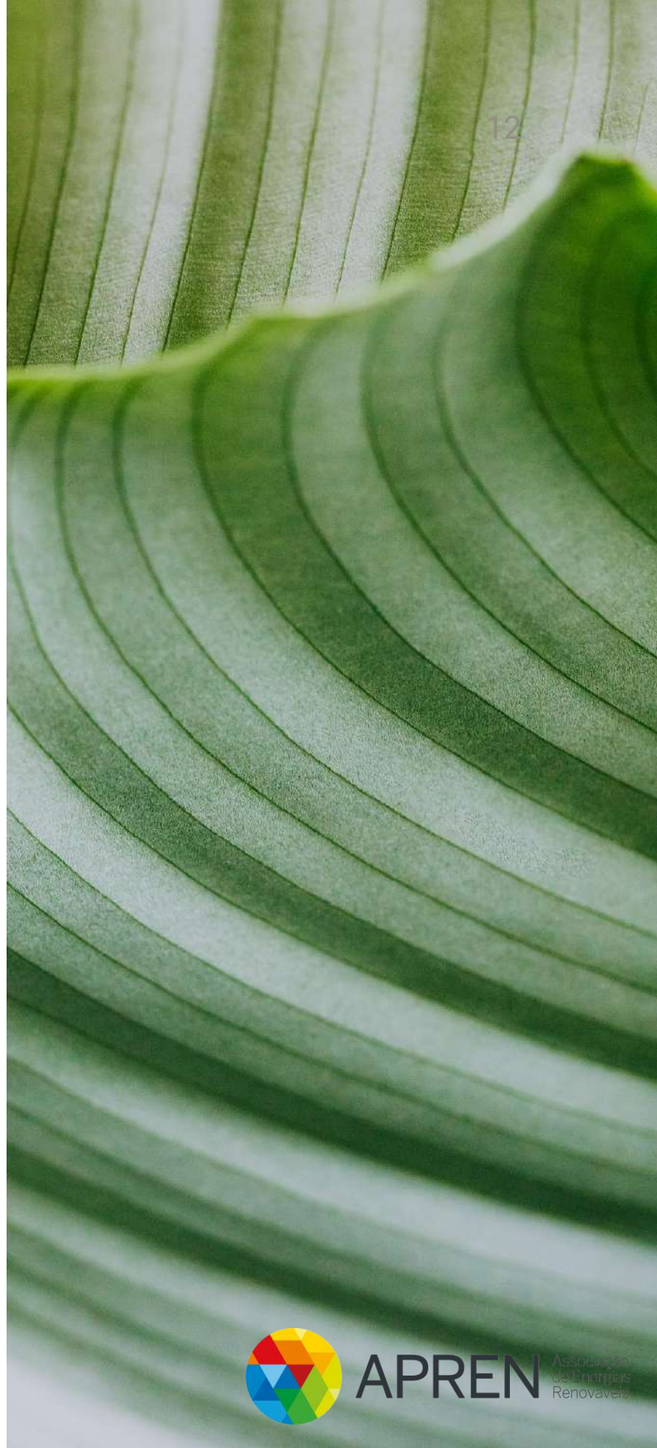
€ 599 M
Imported electricity (Jan-Dec)

€ 286
Imported electricity (Dec)

€ 553 M
CO_2 allowances (Jan-Dec)

€ 53 M
CO_2 allowances (Dec)

Source: REN, SendeCO2, WorldBank, DGEG, ERSE, Analysis APREN.
Note1: To estimate savings on imported fossil fuels, coal prices until November 2019 were considered, due to unavailability of data.
Note2: To estimate savings on CO_2 emissions, regarding coal, the installed capacity of the Pego power plant was considered between January and November, and for December coal was no longer considered, only natural gas and imports.
Note3: For the estimate of savings in imported electricity, the average price in the MIBEL market was considered.



European Policy and Regulation

Decarbonisation of buildings

On December 15, the European Commission (EC) proposed to align the rules for the energy performance of buildings with the European Green Deal and decarbonise the EU's building stock by 2050. This proposal will facilitate the renovation of homes, schools, hospitals, offices and other buildings across Europe to reduce greenhouse gas emissions and energy bills.

Renewable gases

On December 15, the EC addopted a set of legislative proposals (one regulation and one directive) meant to descarbonise the gas market, facilitating the acceptance of renewable and low-carbon gases, including hydrogen, and ensuring energy security for all the citizens of Europe.

TEN-E Regulation

Also on December 15, new EU rules for cross-border energy infrastructure and future Projects of Common Interest (PCIs) were agreed in principle, following the political agreement reached by Council, European Parliament and Commission negotiators at their previous trilogue meeting. Based on the Commission proposal for renewing the Trans-European network for Energy (TEN-E) Regulation, tabled in December 2020, the agreement backs the main thrust of the Commission approach, namely, to modernise the existing regulation and to fully align it with the Green Deal objectives.

European Policy and Regulation

Methodology for renewable cooling

On December 14, and by means of a Delegated Act, the EC addopted new methodology rules, for calculating the quantity of renewable cooling and district cooling that can be counted towards EU renewable energy targets.

State Aid

On December 21, the EC endorsed the new guidelines on State aid for climate, environmental protection and energy (CEEAG), which will be formally adopted in January 2022 and will be applicable from that moment on. The new rules create a flexible, fit-for--purpose enabling framework to help Member States provide the necessary support to reach the European Green Deal objectives in a targeted and cost-effective manner.

National Policy and Regulation

Industry Decarbonisation

On December 9, the Dispatch No. 12047-A/2021 was published, creating the Coordinating Committee for The Decarbonisation of Industry initiatives under the Recovery and Resilience Programme. The investment is structured in four initiatives, one of which is the incorporation of renewable energy sources and energy storage.

On December 29, the Ordinance No. 325-A/2021 was published, approving the Regulation of the Incentive System “Descarbonização da Indústria".

Environmental Fund

On December 15, the Decree-Law No. 114/2021 was published, amending the Environmental Fund and the organic of the General Secretariat of the Ministry of the Environment.

On December 23, the Dispatch No. 12564-C/2021 was published, amending the Dispatch No. 1897/2021, where the Environmental Fund budget for 2021 was approved.

Tariffs and Prices 2022

On December 15, the Directive No. 15/2021 was published by the Energy Services Regulatory Entity (ERSE), approving the Tariffs and prices for electricity and other services in 2022 and Parameters for the regulatory period 2022-2025.

National Policy and Regulation

Stable Climate as Common Heritage of Mankind

On December 16, it was published the Resolution of the Assembly of the Republic No. 324/2021, which recommends that the Government, in the framework of climate diplomacy, promote the necessary steps for the United Nations to recognise the Stable Climate as a Common Heritage of Mankind.

CO_2 Addition Rate

On December 23, the Ordinace No. 315/2021 was published, suspending the updating of the add-on rate on CO_2 emissions, while remaining at the value of € 23,921/tCO_2 until the 31st of March, 2022.

Climate Law

On December 31, th Law No. 98/2021 was published, that lays the foundations for climate policy.

European Barometer

Renewable gases

The EC has adopted a set of legislative proposals to decarbonise the gas market, facilitating the acceptance of renewable and low-carbon gases, including hydrogen, and ensuring energy security for the whole of Europe.

State Aid

The EC has adopted the new Guidelines on State aid for climate and environmental and energy protection (CEEAG), which will be formally adopted in January 2022 and will apply from that date on.

Renewable Energy Development Platform

The EC has launched a new website to facilitate statistical transfers of renewable energy between EU countries. This platform provides an overview of excess, or surplus, statistics in the 27 EU countries and presents a "matching mechanism", which shows options for potential agreements for statistical transfers and associated conditions such as volumes and price.

National Barometer

Industry Decarbonisation

Dispatch No. 12047-A/2021 was published, which creates the Coordinating Committee for The Decarbonisation of Industry initiatives, under the Recovery and PRR Programme.

Ordinance No. 325-A/2021 was published, which approves the Regulation of the Incentive System "Decarbonization of Industry".

Climate Law

Law No. 98/2021 was published, which lays the foundations for climate policy.

Tariffs and Prices 2022

ERSE published the Directive No. 15/2021, approving tariffs and prices for electricity and other services in 2022 and Parameters for the regulatory period 2022-2025.

Regulatory Reserve Band Market

ERSE published the Directive No. 14/2021, which creates the Regulatory Reserve Band market by the TSO. Following the publication referred to, ERSE published the Directive No. 16/2021 approving the implementation of the Regulatory Reserve Band Market.

CO_2 Addition Rate

Ordinance No. 315/2021 was published, suspending the updating of the addition rate CO_2 emissions, keeping the amount of € 23.921/tCO2 until March 31, 2022.

APREN Associação de Energias Renováveis

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