2020

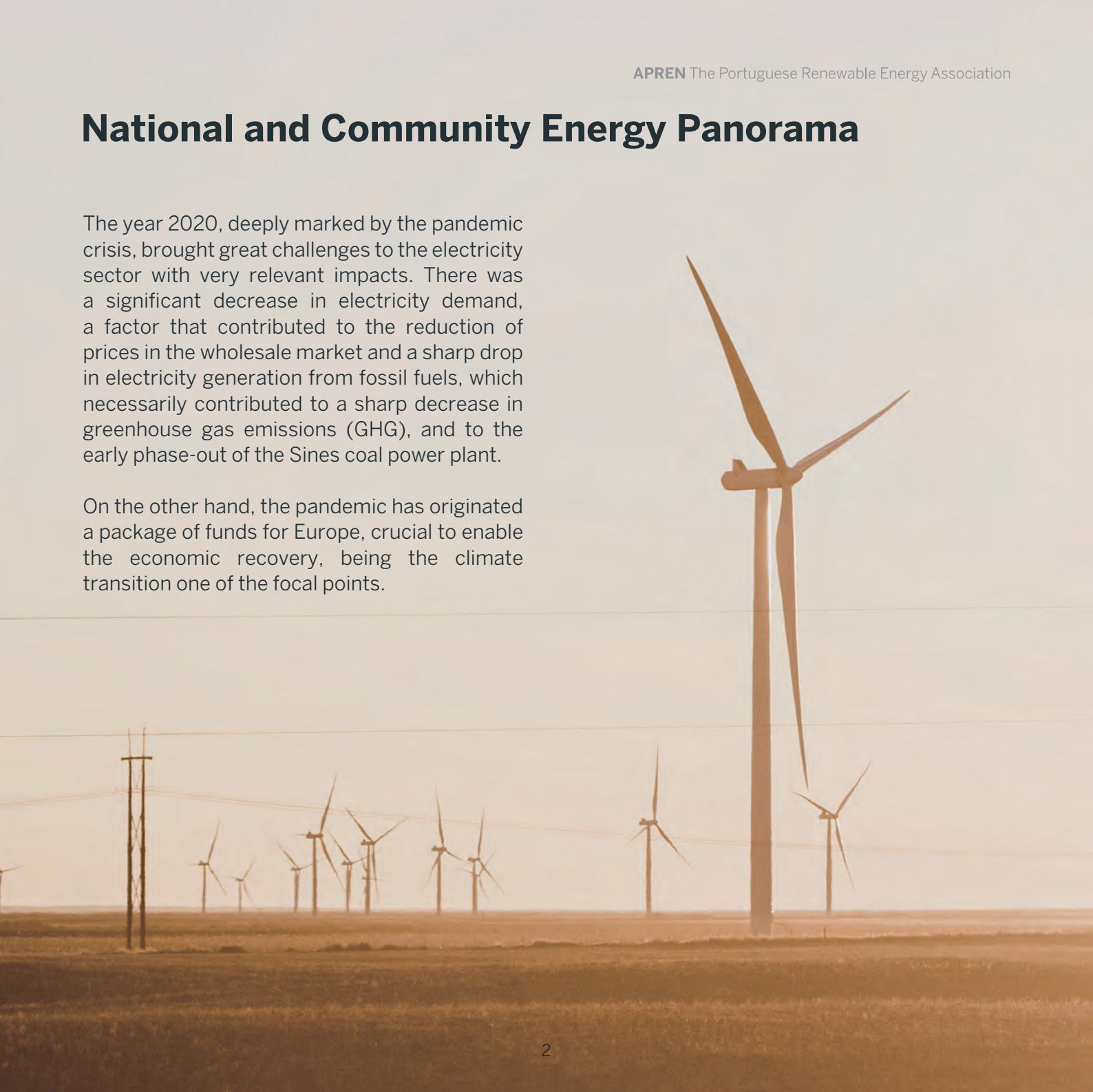
Renewable Electricity Magazine

APREN Associação de Energias Renováveis

National and Community Energy Panorama

The year 2020, deeply marked by the pandemic crisis, brought great challenges to the electricity sector with very relevant impacts. There was a significant decrease in electricity demand, a factor that contributed to the reduction of prices in the wholesale market and a sharp drop in electricity generation from fossil fuels, which necessarily contributed to a sharp decrease in greenhouse gas emissions (GHG), and to the early phase-out of the Sines coal power plant.

On the other hand, the pandemic has originated a package of funds for Europe, crucial to enable the economic recovery, being the climate transition one of the focal points.



National and Community Energy Panorama

Despite the serious health damage that COVID-19 has caused worldwide, 2020 was a year of new opportunities, with a clear push for renewable electricity, both at national and European levels.

THE FOLLOWING POINTS STOOD OUT:

1

Early in the year, on January 15, the European Parliament voted and approved the European Green Deal, an agreement that draws up an action plan to leverage the efficient use of resources, in the transition to a clean and circular economy and the biodiversity restoration linked to pollution reduction. The agreement also promotes the necessary investments and available financial tools to achieve carbon neutrality in Europe by 2050.

2

At the European level, emphasis is also given to the European Climate Law proposed on March 4, with the aim of enshrining in the law the objective of climate neutrality by 2050 for the European economy and society, established in the European Green Deal.

3

In Portugal, on July 10, the National Energy and Climate Plan (NECP) for 2030 was approved. The document had already been submitted to the EC in December 2019 and is in line with the Portuguese Carbon Neutrality Roadmap for 2050, which establishes the long-term national commitment and strategy towards the country's carbon neutrality in 2050. The NECP sets the following goals for Portugal:

47%
of renewable energy sources (RES) incorporation in the gross final energy consumption

80%
of renewable energy sources incorporation in the electricity (RES-E) demand

49%
of renewable energy sources incorporation in heating and cooling (RES-H&C)

20%
of renewable energy sources incorporation in transports (RES -T)

National and Community Energy Panorama

In this sense, it is imperative to assess the path traced by the country to date, which poses a great challenge ahead, as in 2020 there was a renewable incorporation rate in electricity of only 55 %, considering the normalization in accordance with the Directive 2009/28/EC, when Portugal had set a target of 60 % for this year (**Figure 1**).

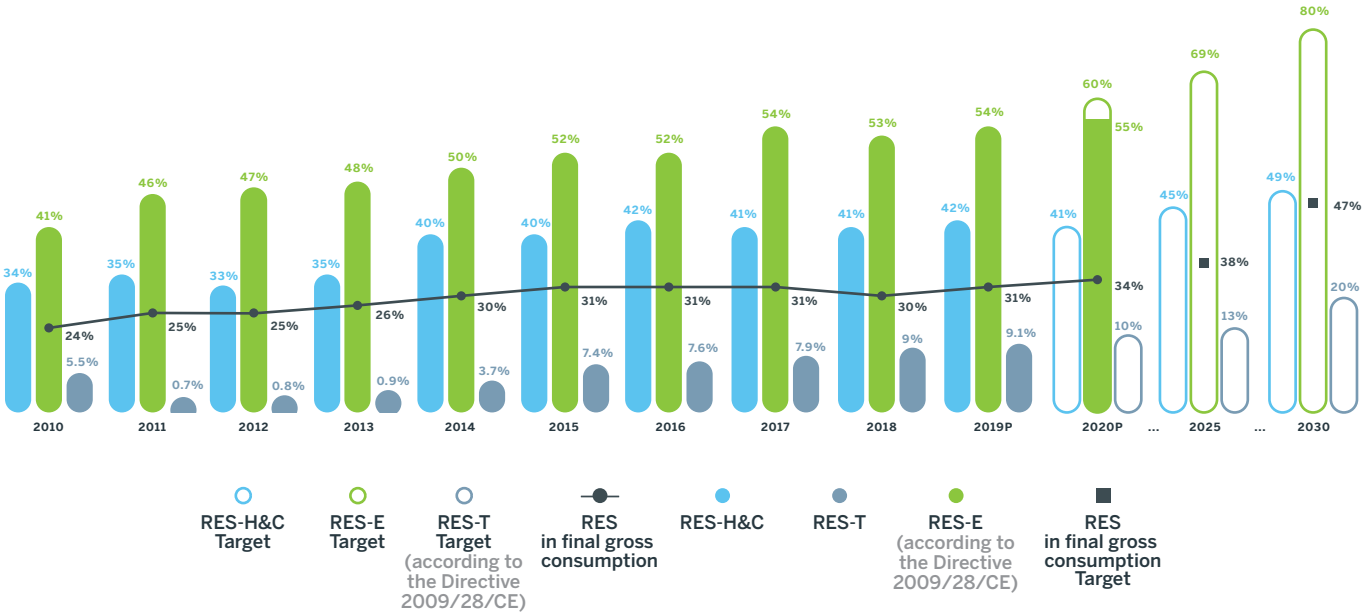


Figure 1

RES-E demand normalized in accordance with Directive 2009/28/EC ; RES-H&C; RES-T RES incorporation in the gross final energy consumption. PNAER[1] and NECP targets.

Source: DGEG; Analysis APREN.

[1] PNAER - National Action Plan for Renewable Energy

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4

On August 14, Portugal also approved the National Strategy for Hydrogen (EN-H_2), which provides for the installation of 2 to 2.5 GW of electrolysers by 2030, for the production of hydrogen using electricity generated from RES, i.e. green hydrogen. An investment of around €9 billion is planned to achieve these goals, with more than 80 % coming from the private sector.

5

Also in August, the solar photovoltaic (PV) capacity auction was held, where 670 MW were awarded, of which 483 MW for projects with storage. In similarity to what happened in 2019, there was a high level of competitiveness to guarantee a connection point to the Public Service Electricity Network (PSEN) and generate electricity from RES in the Portuguese market.

6

As mentioned above, to react to the COVID-19 crisis, the European Union came forward with a quite robust package of funds. Of the €750 billion for the Next Generation EU, 30 % is earmarked for decarbonisation.
Considering this value and the opportunity it represents for the development of the renewable sector in Europe, Portugal announced its Recovery and Resilience Plan - Recuperar Portugal 2021-2026, which allocates around €3.2 billion in direct investment to reforms for the climate, focusing on mobility, decarbonisation, bioeconomy, energy efficiency and renewable energy.

Impact of the renewable sector on energy dependency and the national economy

In what energy dependency is concerned, it should be noted that from 2017 onwards there is a clear downward trend, with great emphasis on the decrease recorded for 2020, of 66 %, which is very close to the NECP target for 2030. It is necessary to consider that 2020 was an atypical year that combined a series of factors that led to a reduction in fossil fuel imports, especially due to an 8 % drop in electricity demand.

As shown in **Figure 2**, the energy dependency rate presents a great intra-annual variability, which is explained by the variability of renewable resources, namely hydro. As an example, the year 2014 registered the minimum energy dependency rate of the last 15 years, of only 71 %. In this same year, an average hydro productivity index of 1.27 and a renewable incorporation in the electricity generation of 63 % were recorded.

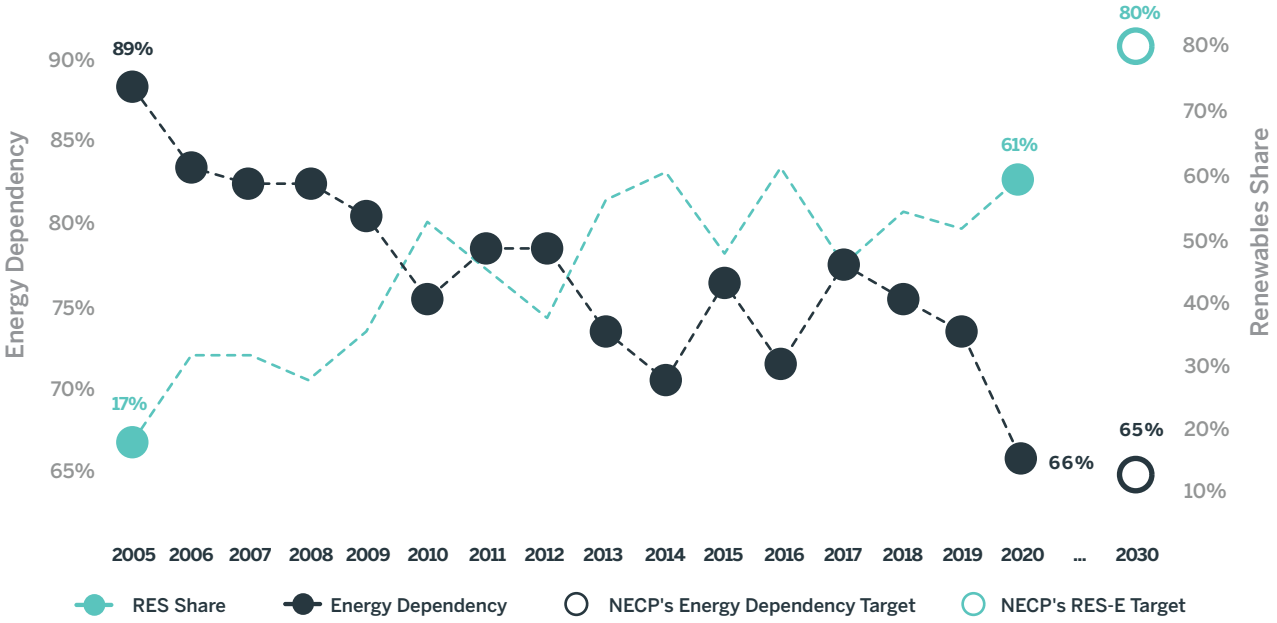


Figure 2

Energy dependency and renewable incorporation in electricity generation by 2020 and NECP target for 2030.
Source: DGEG; APREN Analysis (Estimate APREN 2020).

Impact of the renewable sector on energy dependency and the national economy

The positive impact that the integration of more renewable electricity in the national energy system has on the country's capacity for greater energy independence is evident, thus making its growing development and investment urgent.

Regarding the contribution to the Gross Domestic Product (GDP) of the renewable electricity sector, the data from 2018 to 2020 (**Figure 3**) result from projections of the study "Impact of electricity from renewable sources". Despite the values presented, a stagnation of this sector is expected for 2020, due to the impact of the COVID-19 pandemic.

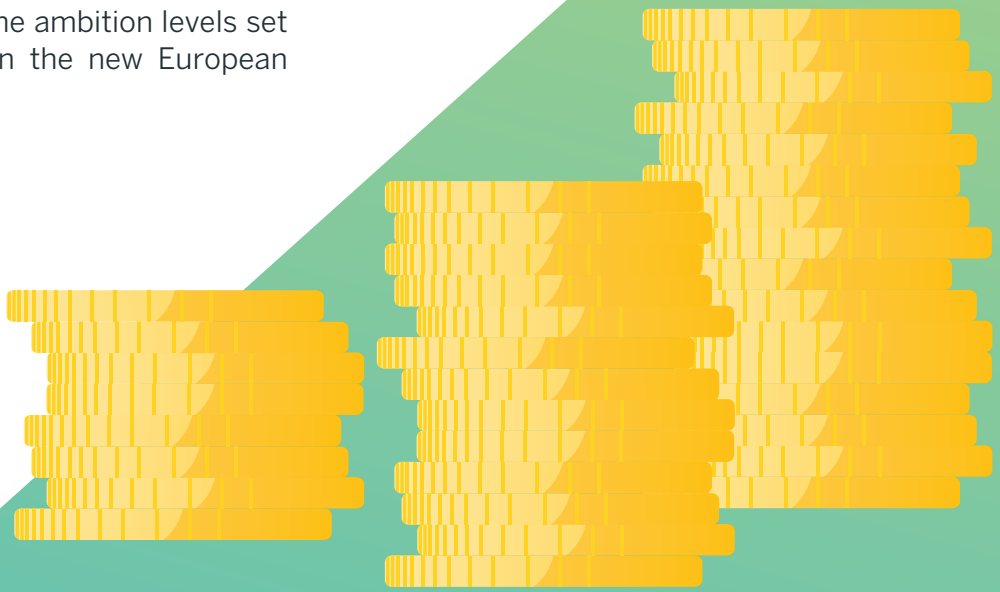
Figure 3

Gross Value Added (GVA) and employment generated in the renewable electricity sector.
Source: Deloitte 2014, 2019; INE

Impact of the renewable sector on energy dependency and the national economy

Although the renewable electricity sector was not one of the most affected by the adjacent economic crisis, companies in the sector had their projects postponed, with direct repercussions throughout the associated value chain.

Nevertheless, investment in electricity production from RES has resulted in the sector's significant contribution to generating wealth for the country in the last 10 years. The sector has contributed between 1.4 % and 1.8 % to the GDP, expecting a gradual increase in the future with the achievement of the ambition levels set in the NECP 2030 and in the new European targets.



Electricity in 2020

In 2020, only 139 MW of new renewable capacity was installed, resulting in a cumulative total of 14.5 GW of renewable installed capacity in Portugal. It represents an increase of only 0.9 % compared to 2019, in a sector that has seen an average annual growth, in capacity, of around 6 %, since 2000. The increase in renewable capacity was especially visible between 2004 and 2011, with the entry into operation of several wind farms. On the other hand, fossil fuel capacity generation has been decreasing since 2011.

Despite the numerous developments in the sector and the international reputation of the incorporation of renewable electricity in Portugal, there is a warning for the slowdown in capacity progress over the last 9 years (average annual growth of 3.6 %), partly as a result of the implementation period of the TROIKA memorandum, which imposed a review of the regulatory framework of SRP (Special Regime Production). In addition, the political and fiscal instability of recent years has also affected the sector. It has imposed and suggested new contributions and taxes to the renewable sector, the retroactive review of the remuneration regime and the absence of a clear market design for renewable electricity generation. All these factors have generated greater investment risk in the sector, with negative consequences due to increased capital and financing costs. 2019 and 2020 were years of change, with new strategies for the energy sector, the NECP 2030 and the EN-H2, and important legislative revisions, which allowed the launch of the solar PV capacity auctions. However, the lack of an annual calendar for the auctions and of clarity in the amount of power to be allocated via the PSEN reinforcement agreements has caused some instability in the sector.

On the other hand, there has been an overload on official entities, still operating under the old paradigm of the sector, resulting in a lack of flexibility and responsiveness to high demands. The pandemic in 2020 resulted in a temporary stoppage of administrative services, thus worsening the situation.

Electricity in 2020

This scenario contributes to a reduced new installed capacity in 2020, of which 124 MW were from solar PV, divided into 41 MW of decentralized and 83 MW of centralized. With regards to the wind sector, there were no capacity additions compared to 2019. Comparing the real values with the NECP capacity starting points for 2020, it is possible to conclude that a renewable installed capacity of 14.8 GW was expected, instead of the current 14.6 GW. Portugal fell short of the expectations. This issue is of the utmost importance, given the ambition and need to implement the energy transition.

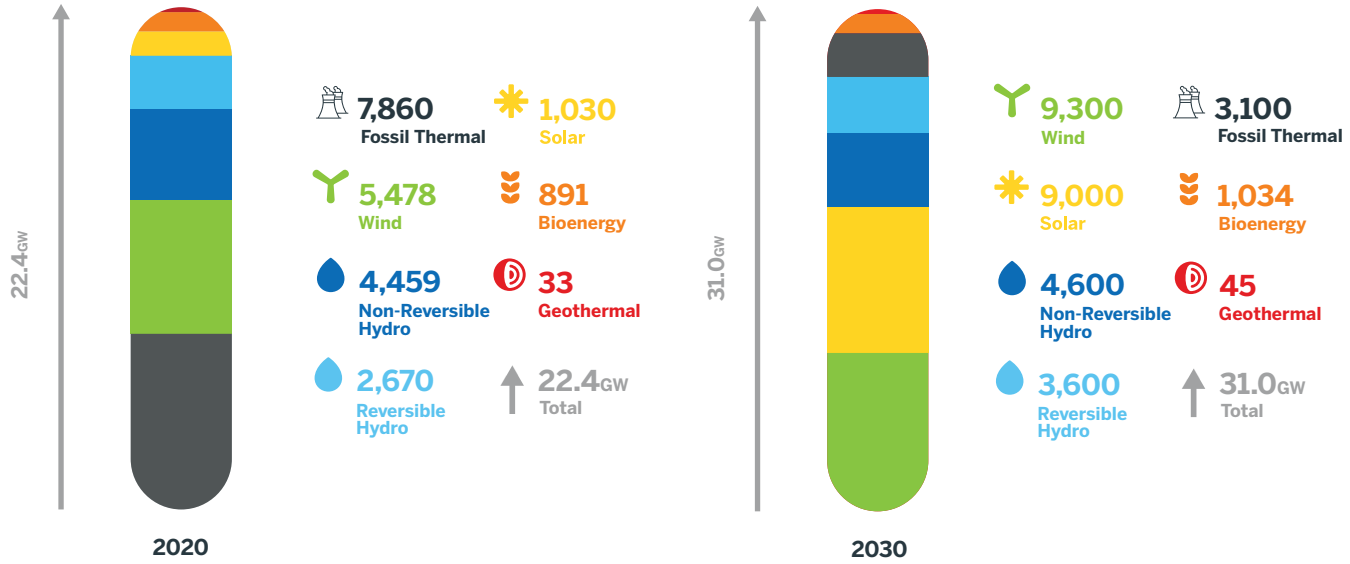


Figure 4

Portuguese installed capacity for Electricity Production and targets for 2030.

Source: DGEG, NECP, Analysis APREN.

Electricity in 2020

By 2030, a sharp growth in solar PV electricity is expected, divided between large-scale units and small-scale distributed units, combined with an increase in wind energy with a relevant contribution from the repowering of existing power plants, desirably with increased of the grid injection capacity. This evolution will be accompanied by a slight increase in hydropower, associated with reversible power plants that will reinforce the pumping capacity, which is fundamental for the security of supply and the balance of the electricity system. Also noteworthy is the forecast of 45 MW of geothermal capacity, calculated by the already installed capacity of 33 MW plus the expected power for the period (2020-2024), to be installed in the islands of S. Miguel and Santa Maria in Azores, of 11.5 MW.

With regards to the share of renewable electricity generation in Portugal in 2020, it recorded 60.8 %, in non-normalized real values, which corresponds to a generation of 30.9 TWh of electricity (the highest value in the last 5 years). It was mostly supported by hydro technology, which represented 27.3 %, necessarily related to the increase in the hydro productivity index. Also noteworthy is the increase in solar PV generation, which in 2020 was 1.3 TWh, 20 % more than in 2019 (1.1 TWh) and a reduction in wind generation from 13.6 TWh in 2019 to 12.2 TWh in 2020, a 10 % decrease.

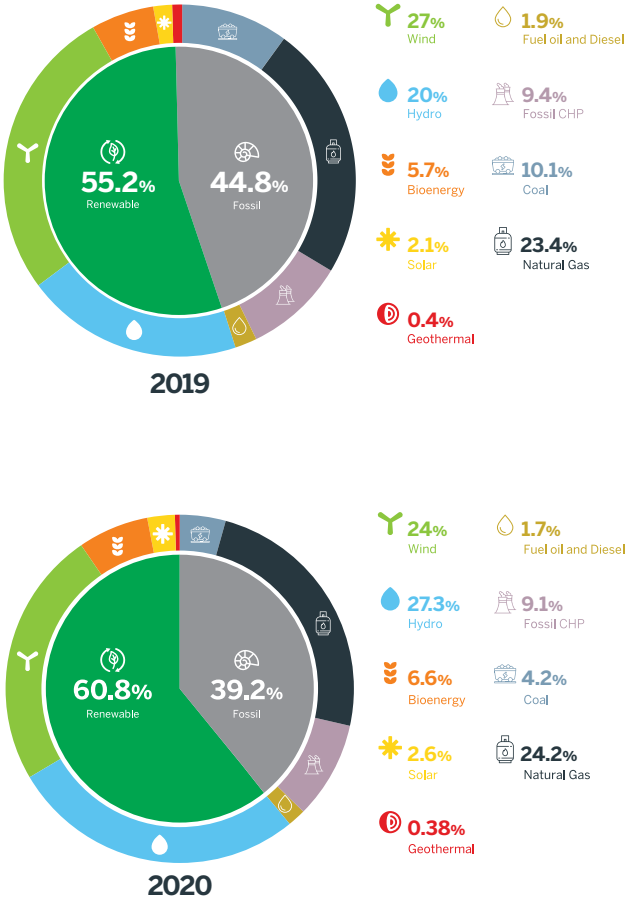


Figure 5

Portugal's electricity generation mix in 2019 (above) and 2020 (bellow).

Source: REN, EDA e EEM; Analysis APREN.

Electricity Market

In 2020 there was an hourly average price on the Iberian Electricity Market (MIBEL) of €34.1/MWh, which represents not only a 28.8 % reduction compared to 2019, but also the lowest annual average price ever recorded on MIBEL. This very significant reduction in the electricity price is essentially due to the impact of the drop in demand, because of the COVID-19 pandemic, in parallel with an average year in terms of renewable generation in the system.

This price reduction in the electricity market was transversal to the entire European market. As a general rule, a positive impact of renewable generation is identified, which contributes to a reduction in the wholesale price of electricity, particularly more explicit in the 2014-2017 period in Figure 6, since 2018 was an atypical year for the entire European market, and in 2019 there was a return to the trend of the mentioned period.

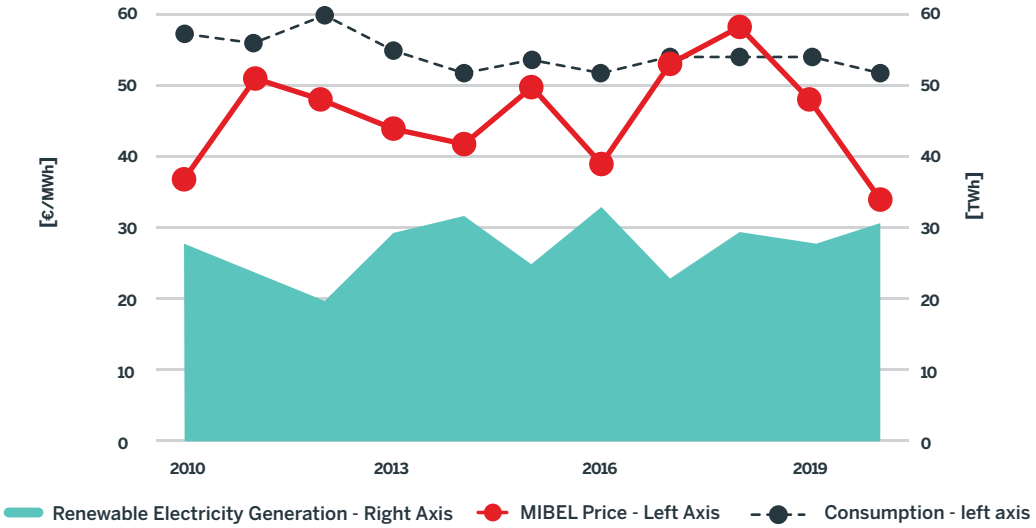


Figure 6

Electricity price on MIBEL in Portugal, renewable electricity generation and electricity consumption.

Source: OMIE, REN, EDA e EEM, Analysis APREN.

Electricity Market

Specifically, for 2020, considering the 689 non-consecutive hours in which renewable generation was sufficient to supply the electricity consumption of Mainland Portugal, these were characterized by an average price on the MIBEL of €30.4/MWh, below the yearly average.

Also with a substantial impact on the formation of electricity prices, the markets for coal, natural gas and CO_2 emission allowances in the European Emissions Trading System (EU-ETS) stand out in Figure 7. From the evolution of these variables, we can firstly depict a relationship between the reduction in the price of coal in the first half of the decade and the reduction in the MIBEL price (**Figure 6**). During this period, Portugal was still very dependent on electricity generation from coal-fired power plants.

Secondly, the substantial increase in the CO_2 price since 2017 is still visible, which has reduced the competitiveness of coal power plants in the market. In 2020, there was an average price of €24.7/tCO_2, 0.6 % lower than the one recorded in 2019. It should be noted that this slight price reduction, contrary to the rise that had been taking place in recent years, is also related to the pandemic, since in March and April, there was low market demand for allowances. The price rise of the last three years resulted from the last revision of the EU-ETS in April 2018, which redefined the emission limit, downwards, the values acceptable for the sectors covered, in order to create a scarcity scenario and, thus, enabling the achievement of the European targets for 2030.

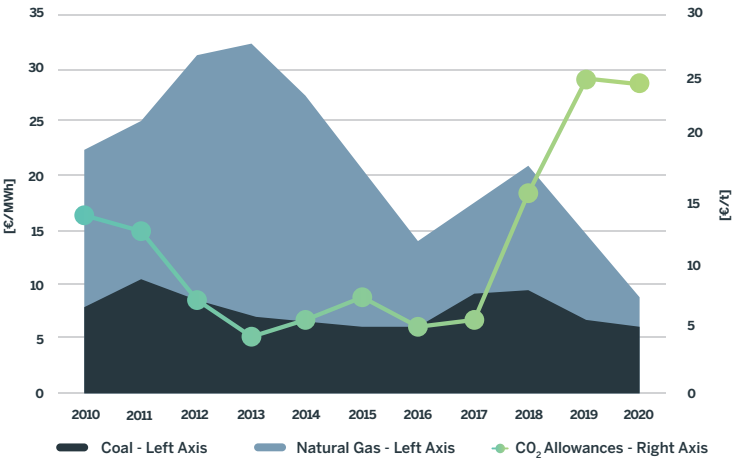


Figure 7

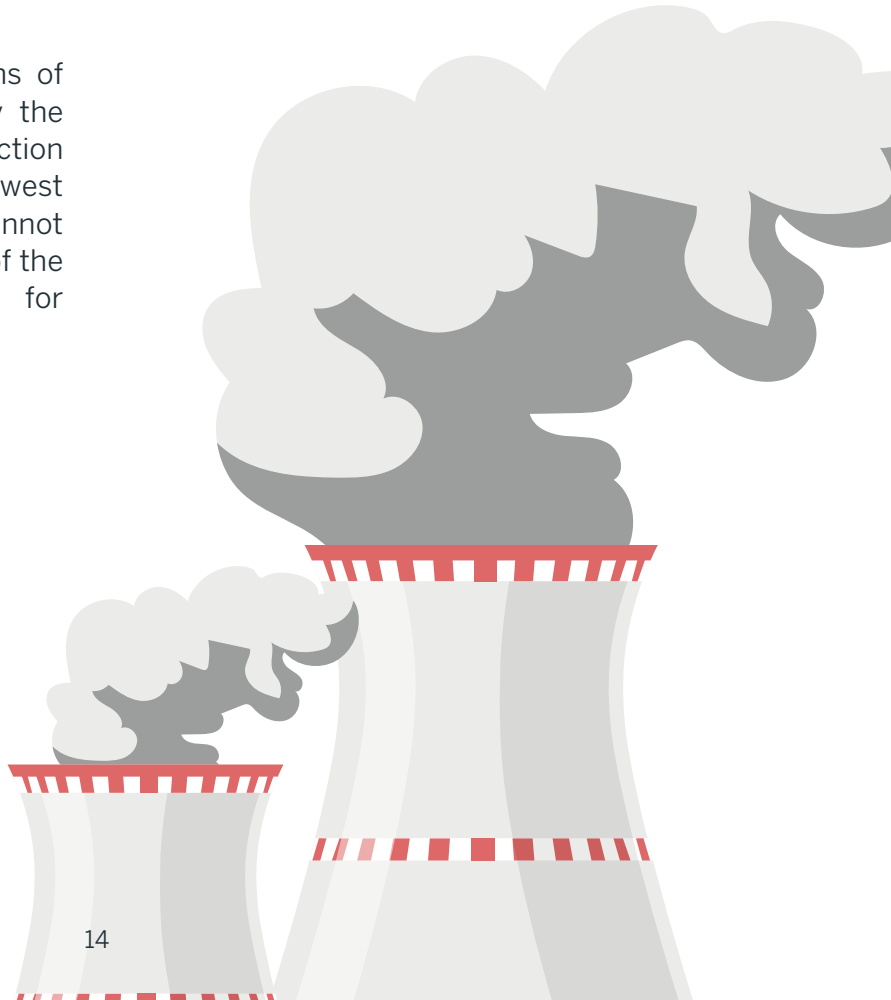
Commodities Prices: Coal, Natural Gas and CO_2 allowances.

Source: DGEG, The World Bank, SendeCO2, Analysis APREN.

Carbon emissions

In 2020, the electricity-producing sector was responsible for the emission of 8.0 $MtCO_2eq$, which represents an improvement (25 %) compared to 2019, essentially resulting from the 58 % drop in electricity generation by national coal-fired thermoelectric plants, compared to 2019, creasing the early phase-out situation of these same plants.

These emissions translate into 160 grams of CO_2 emitted for each kWh produced by the electricity sector, also showing a reduction compared to the previous year, being the lowest value of the decade from which we cannot dissociate from the pandemic, since part of the national business sector had stopped for several months.



Carbon emissions

The relationship between the sector's emissions and the renewable electricity generation is inverse, as shown in the graphic in Figure 8, in which maximum emissions are identified for 2012 and 2017 (very dry years), both characterized by a hydro productivity index of 0.47 and wind productivity indexes of 1.04 and 0.96, respectively. In fact, the greater the share of RES in the national electricity system, the lower the sector's emissions will be, and the greater will be the total emissions avoided by the renewable power plants, a figure that amounted to 17.1 $MtCO_2eq$ in 2020.

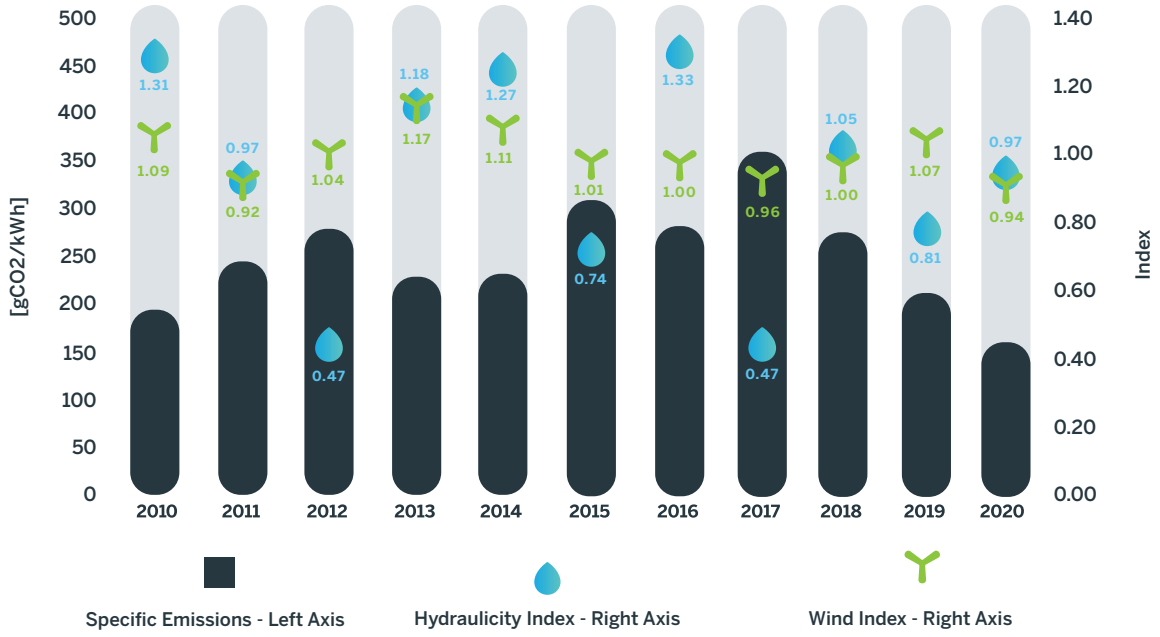


Figure 8

Specific CO_2 emissions, hydro productivity index and wind productivity index.

Source: ERSE, REN.

Portuguese International Trade

In 2020, Portugal recorded an import balance of 1.5 TWh, a result of electricity imports in the amount of 6.4 TWh and exports 4.9 TWh, thus maintaining the import trend of last year, although with a considerable decrease in the import balance. It should be noted that in the 2016-2018 period, Portugal showed an export trend (**Figure 9**).

This external dependency from the National Electricity System was driven by the entry into operation of the Moroccan Safi coal power plant in December 2018. As this power plant is exempted from environmental taxes applied at the European level, to similar power plants, it sells electricity cheaper and, in turn, more "competitive" in the Iberian wholesale market. In 2019, this situation even reversed the export flow of the Spain-Morocco interconnection.

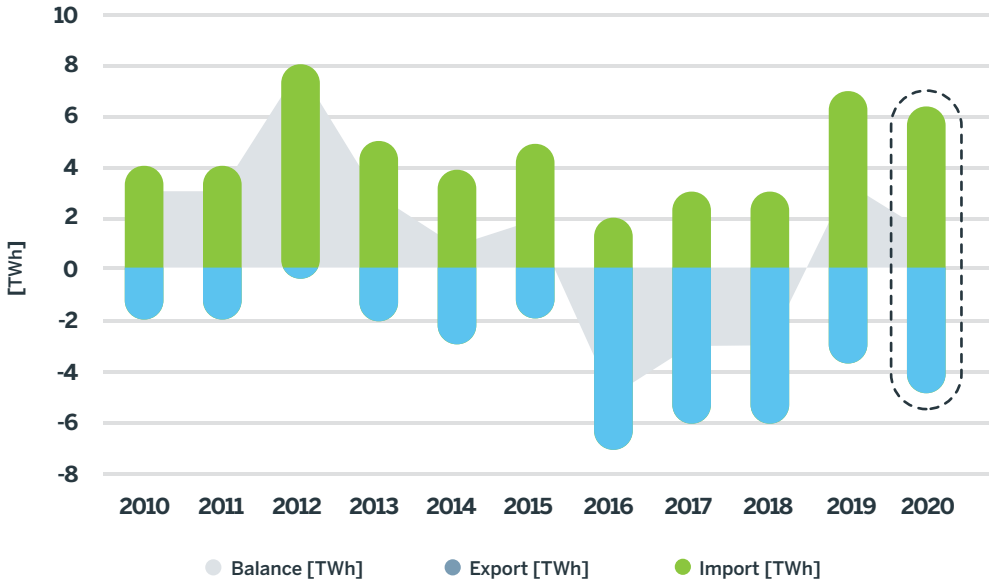


Figure 9

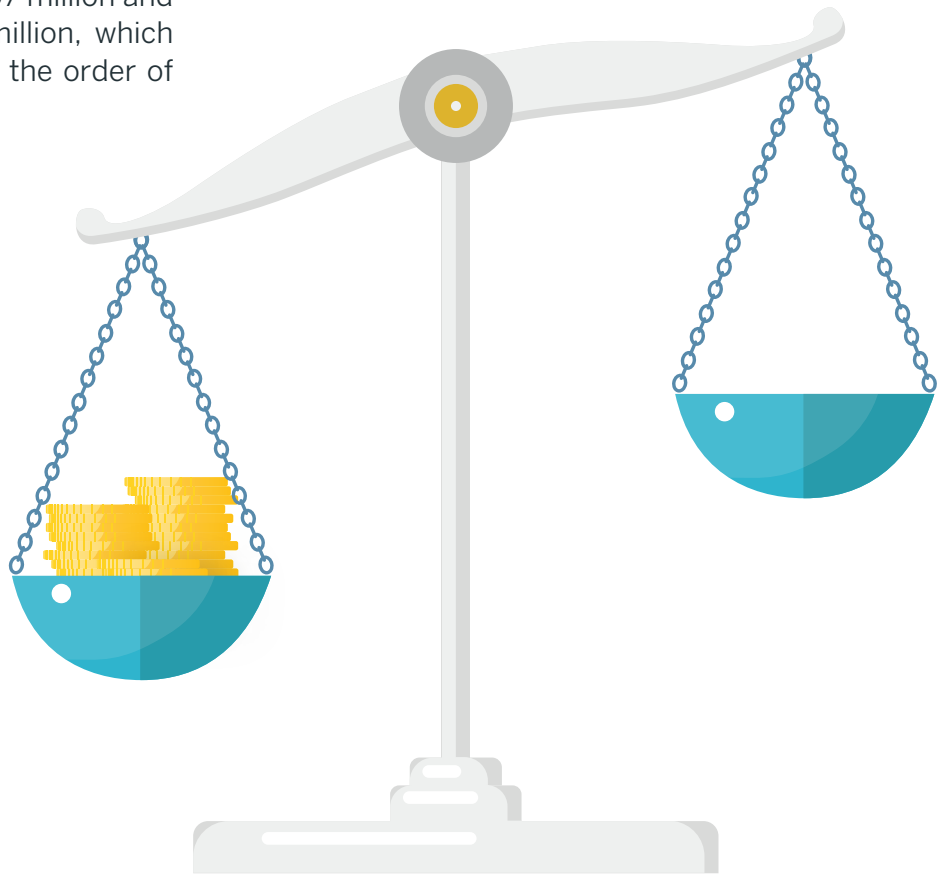
Portuguese international electricity trade between 2010 and 2020.

Source: REN.

Portuguese International Trade

In 2020, this did not happen. But once again, the pandemic and the consequent drop in demand led to a greater competitiveness and availability in the Iberian market, thus contributing to the registered import levels.

Therefore, the year 2020 presented a negative balance in the trade scale of €71 million, resulting from imports in the amount of €307 million and exports in the amount of €236 million, which translates into a cost reduction in the order of 61% compared to 2019.



Portuguese International Trade

Now focusing on the year 2020 (**Figure 10**), the months of January, September, October, and November are to be highlighted. Contrary to most of the year, they registered a remarkable export balance, repercussion of weather conditions favourable to renewable generation, with January still following the same exporting trend as the last months of 2019. These four months represented 58 % of the total electricity exported by Portugal. On the other hand, July was the month with more imports, when the lowest hydro productivity index of the year (0.65) and a wind productivity index of 0.86 were reached, below the annual average.

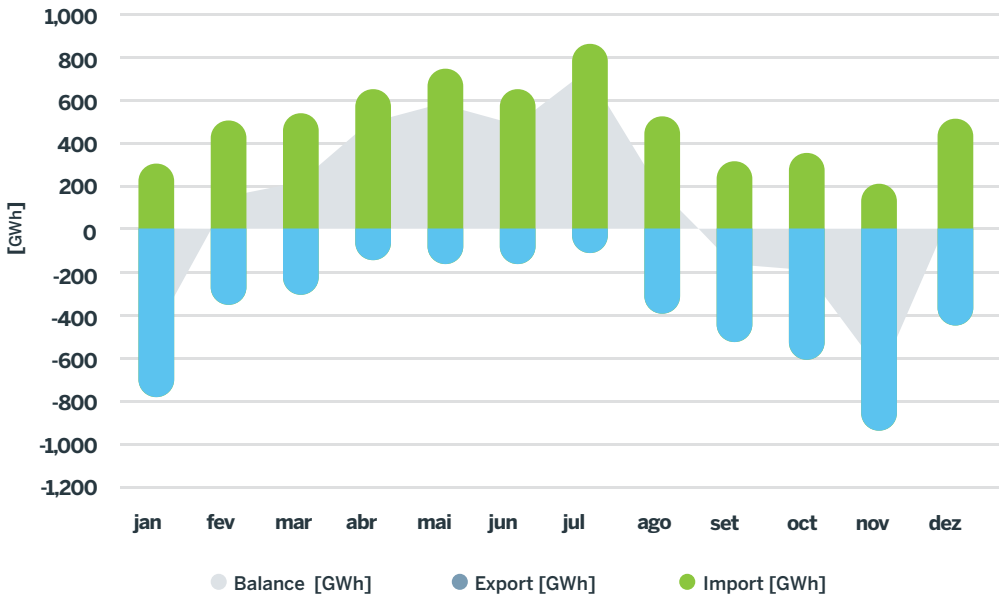


Figure 10

Portuguese international electricity trade in 2020.

Source: REN.

Av. Sidónio Pais, 18, r/c Esq.
1050-215 Lisboa, Portugal
(+351) 213 151 621
apren.pt


aprenpt


apren.pt


apren.pt


aprenpt


aprenpt

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