The Spanish Electricity System

2020

RED ELÉCTRICA DE ESPAÑA

Glossary of terms
https://www.ree.es/en/glossary

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Table of contents

Presentation

Red Eléctrica de España (REE), as the sole transmission agent and operator of the Spanish electricity system, presents its latest edition of the Spanish Electricity System Report, which the Company has been publishing annually ever since it was established as Transmission System Operator (TSO) in 1985. This publication provides an overview of the main operational performance indicators and statistical ratios, as well as their evolution over recent years, regarding the Spanish electricity system in 2020, a year in which the energy sector was marked by the COVID-19 pandemic.

The information contained in this report is intended to be used as a management and reference tool in the current energy transition context, in which the electricity system is paramount and where Red Eléctrica, as a key facilitator of this transition, is entrusted the mission of achieving the objectives set out in the European Green Deal and in the Integrated National Energy and Climate Plan (NECP).

The success of this energy transition will be underpinned by the connection of renewable resources to the transmission grid at the necessary pace. One example has been the high-level of connection of renewable resources in the last two years. During 2020, our power generation fleet incorporated almost 4,800 MW of installed renewable power capacity. Once again, this year's report includes the 'European Landscape' chapter with information from the ENTSO-E Transparency Platform with data that meets the criteria of Regulation (EU) No 543/2013.

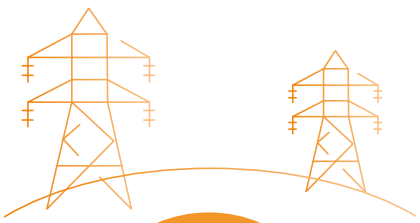
The report is supplemented by Excel files that expand on the information and allow the data to be viewed online or downloaded. Furthermore the 'Renewable Energy in the Spanish Electricity System' report published on the corporate website provides a greater depth of information on renewable energy generation and consumption. This information can be found in the REData section of the corporate website: www.ree.es/en, together with other publications and statistical series that Red Eléctrica periodically makes available to the general public for their consultation and use.

As part of its continued effort to improve, Red Eléctrica's aim is to offer a quality service for all users and for this reason a contact form has been made available in the REData section of the corporate website, as a channel through which suggestions and observations may be submitted.

Executive Summary

In 2020, the demand for electrical energy in Spain suffered its second consecutive drop since 2014.

The demand for electricity in Spain in 2020 showed a decrease of 5.5% compared to the previous year, reaching a demand total of 249,991 GWh, influenced by the various containment measures taken during the COVID-19 pandemic.



-5.5 %
COMPARED TO 2019

DEMAND FOR ELECTRICITY IN SPAIN

249,991 GWh

The demand for electricity in Spain during 2020 showed a decrease of 5.5% with respect to the previous year, reaching a demand total of 249,991 GWh, this being the second consecutive drop in demand since 2014.

The evolution of the peninsular electricity system demand, which represents just over 94% of total Spanish demand, was 5.0% lower than the previous year, with a total of 236,697 GWh, a fall in demand that is 0.4% higher than the maximum demand reached in 2008, and at levels slightly higher than those recorded 15 years ago. After having factored in the effects of seasonal and working patterns, there is a negative variation of 5.0% compared to the previous year.

By large sectors of activity, according to the Red Eléctrica Index (IRE) that collects data on the electricity demand of large consumers, shows that the following sectors experienced a negative variation compared to the previous year: the industry sector fell by 6.6%, the services sector registered a significant impact with a drop of 10.4% and the grouping of other sectors of activity decreased by 4.2%.

The composition of the working calendar and the evolution of temperatures had an opposite impact on the evolution of the Red Eléctrica Index, although of equal magnitude, such that they offset each other.

By geographical areas, all the autonomous communities experienced negative variations due to the pandemic, noteworthy were the two communities whose consumption was most dependent upon tourism: the Balearic Islands and the Canary Islands with -19.2% and -10.5%, respectively.

The maximum hourly demand was recorded on 20 January between 8:00 and 9:00 p.m., with a total of 39,997 MWh, a decrease of 0.3% compared to the maximum recorded the previous year.

INSTALLED POWER CAPACITY IN SPAIN

110,839 MW

OF WHICH

54 %

CORRESPONDS TO RENEWABLE ENERGY FACILITIES

The installed power capacity of the power generation fleet in Spain increased by 0.7%, closing 2020 with 110,839 MW. Of the total installed power capacity, 54% corresponds to renewable energy facilities, which have overtaken non-renewable technologies for the second consecutive year since statistical records began.

MAXIMUM RENEWABLE ENERGY GENERATION ON THE MAINLAND

45.5 %

of the total electricity generation mix in 2020

In terms of electricity generation, there was a maximum in peninsular renewable generation with a 45.5% share of the total electricity generated due to the increase in hydroelectric and solar photovoltaic power production, which were 23.9% and 68.5% higher than the previous year, respectively.

The share of non-renewable generation stood at 54.5% of the peninsular total, a decrease of 6.6 percentage points compared to the previous year, when non-renewable generation represented 61.1%. This decrease in non-renewable generation on the Spanish mainland is mainly due to the lower production of combined cycle power stations, which generated 25% less than in 2019, and coal-fired power stations, which accounted for only 2% of the mix, the lowest value since records began.

In 2020, the all-time minimum of CO_2 equivalent emissions associated with national electricity generation was registered, 36 million tonnes, 27.8% less than in 2019 and 67.5% below the emissions recorded in 2007.

The volume of scheduled energy exchanges between Spain and other countries registered a 5.4% increase with respect to the previous year. Exports grew by 23.4% to 13,507 GWh, and imports dropped to 16,807 GWh (-5.7%). Therefore, for the fifth consecutive year, a net import balance was recorded regarding the scheduled energy exchanges, registering a value of 3,300 GWh, 52% lower than in 2019.

By **interconnection**, Spain was, for yet another year, a net importer with France and for the second consecutive year as a net exporter with Portugal. The cross-border connection with France recorded an import balance of 5,248 GWh (-45.9% with respect to 2019) and the balance with Portugal had an export balance of 1,455 GWh, compared to 3,395 GWh in 2019. With Andorra the balance was once again as an exporter, with 208 GWh, and it was also as exporter with Morocco, with a value of 298 GWh, compared to the 774 GWh imported last year.

The **electricity transmission grid** continued to be bolstered in 2020 with the commissioning of 116 kilometres of line circuit and 93 substation bays, bringing the total length of circuits in the national grid to 44,553 kilometres and 6,176 substation bays by the end of the year. In turn, transformer capacity increased by 1,430 MVA, bringing the installed transformer capacity nationwide to 93,895 MVA.

In 2020, noteworthy was the 132 kV submarine-underground link between Ciudadela and Cala Mesquida, which is 55 kilometres in length and connects the islands of Majorca and Menorca. This link significantly improves the security of supply on the island of Menorca, which is no longer electrically isolated.

The **service quality indicators** for 2020 remain below the maximum thresholds established in Royal Decree 1955/2000.

The Energy Not Supplied (ENS) in 2020 corresponding to the peninsular system was 95 MWh (47 MWh in 2019) and the Average Interruption Time (AIT) was 0.21 minutes (0.10 minutes in 2019).

In the electricity system of the Balearic Islands, these indicators showed a slight improvement over the previous year, with ENS closing the year at 4 MWh (1 MWh in 2019) and an AIT of 0.47 minutes (0.09 minutes in 2019). In the case of the electricity system of the Canary Islands, these indicators worsened, closing 2020 with an ENS of 65 MWh and an AIT of 4.29 minutes

Regarding **the grid availability index** (which measures the capacity or possibility of use of the different elements of the transmission grid by the system) corresponding to the peninsular system was 98.57%, slightly better than the 98.24% recorded in 2019, and in the Balearic Islands and Canary Islands electricity systems, these indicators stood at 98.66% (97.35% in 2019) and 99.17% (98.90% in 2019), respectively.

The **average final price of energy** in the electricity market was 40.38 euros/MWh, 24.4% lower than the price in 2019.

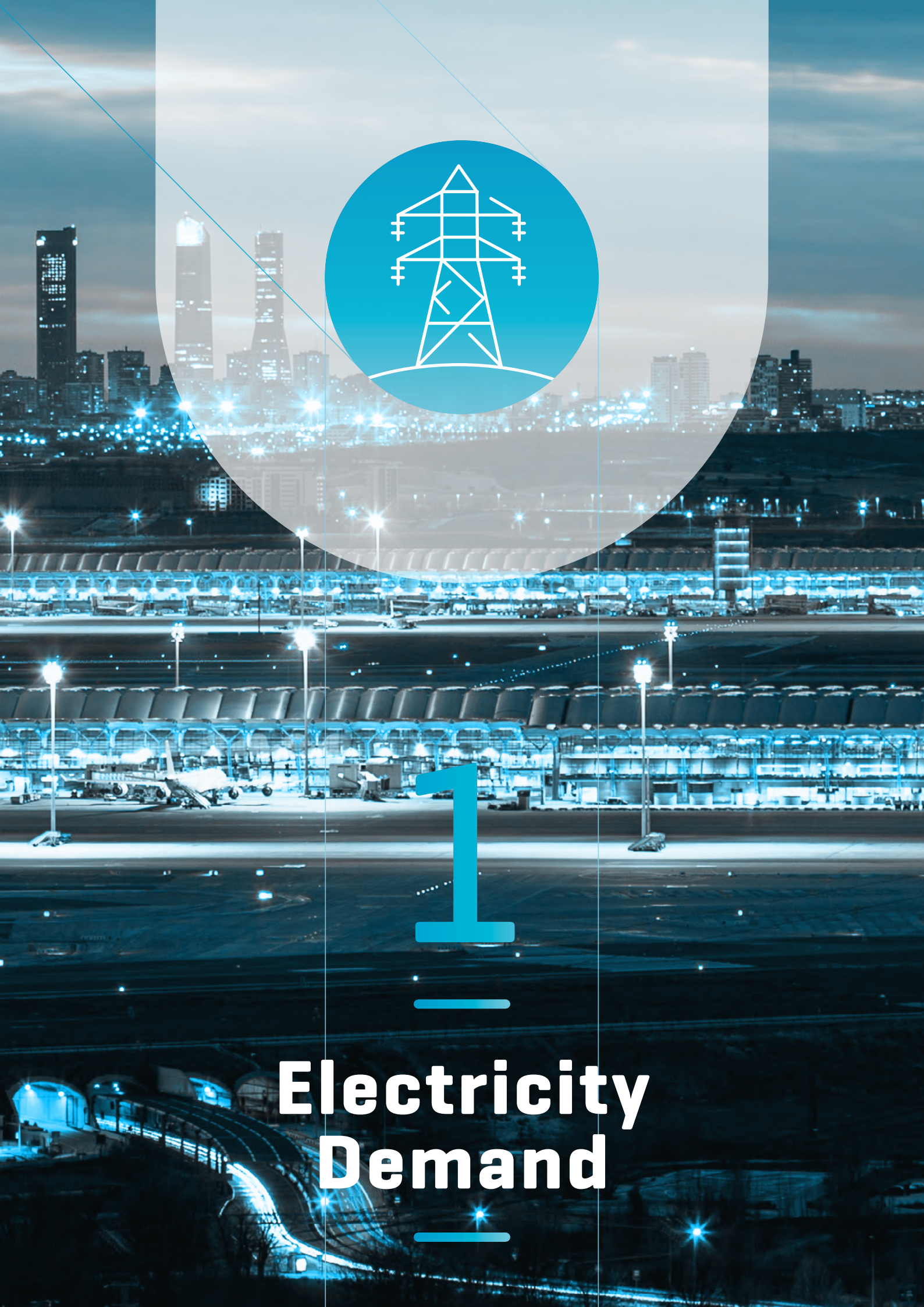
The **combined price of the day-ahead and intraday market** represented 87.15%, system ancillary services 6.29%, capacity payments 6.51% and the remaining 0.05% for the Interruptibility service (also known as 'Interruptible Load Programme') [1].

If the impact of the price on the net demand served is compared with that of last year, we can observe a reduction of 27.5% in the day-ahead and intraday market, 97.3% in the interruptibility service, 0.4% in capacity payments, while ancillary services increased 72.8%. The decrease in the price of the interruptibility service was a result of the price reductions achieved in the auction and due to the fact that it was only active in the first half of the year.

At a **European level**, despite the fact that electricity demand in all ENTSO-E European member states fell by 3.9% in 2020, mainly due to the COVID-19 pandemic, the drive for electricity generation from renewable sources continued.

Within the **scope of innovation and technology**, the activity of Red Eléctrica de España in 2020 was strategically focused on areas of impact and technological verticals driven by Elewit, the technology and transformation platform of the Red Eléctrica Group whose objective is to take full advantage of the possibilities technology offers and boost collaboration with the innovation ecosystem to maximise Red Eléctrica's contribution, as a key player in the electricity system, to the energy transition and the decarbonisation of the economy. In total, 123 innovation projects were undertaken.

(1) Demand-side management tool to ensure a quality electricity supply at all times. With this service, large electricity consumers (industries) commit to reducing their electricity consumption when the system requires it, and they are remunerated for this service. The service is activated by REE in accordance with technical (system security) or economic (lower cost for the system) criteria.



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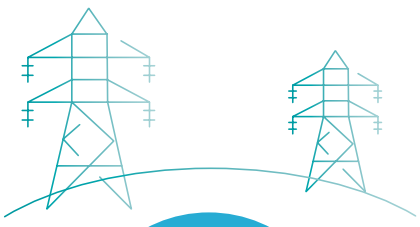
Electricity Demand

The demand for electricity in the Spanish mainland system was 5% lower than in the previous year, with a total demand of 236,697 GWh, a decrease of over 0.4 percentage points compared to the total registered during the 2009 crisis.

The demand for electricity in the whole of Spain during 2020 showed a decrease of 5.5% with respect to the previous year, reaching a total of 249,991 GWh.



-5.5 %
COMPARED TO 2019

ELECTRICITY DEMAND IN SPAIN

249,991 GWh

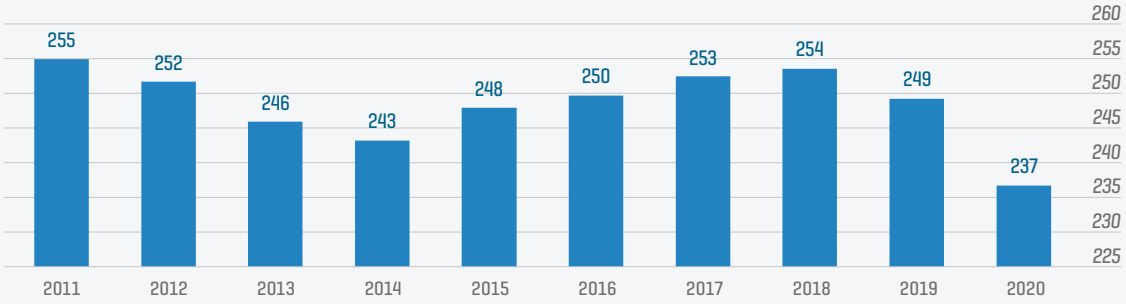
The demand for electricity in Spain during 2020 showed a decrease of 5.5% with respect to the previous year, reaching a total demand of 249,991 GWh, influenced by the various containment measures taken during the COVID-19 pandemic.

With regard to the evolution of the peninsular electricity system, which represents just over 94% of total Spanish demand, closed the year with a value 5.0% lower than the previous year, with a total demand of 236,697 GWh, a decrease of over 0.4 percentage points compared to the total registered during the 2009 crisis, and a demand level similar to that registered in 2004.

In 2020, the COVID-19 pandemic had an impact of the evolution of the demand.

Evolution of the peninsular electricity demand over the last 10 years

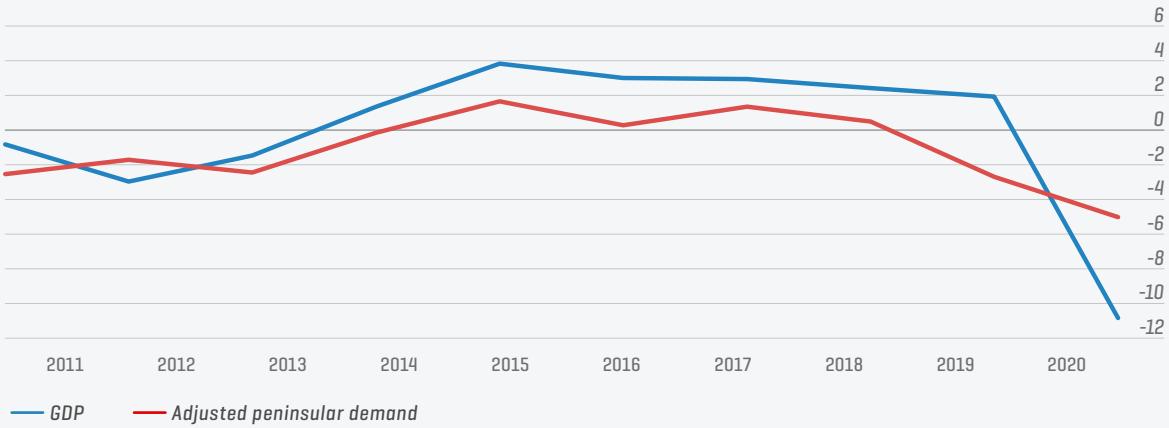
TWh



From the point of view of economic activity, and also as a consequence of the economic crisis caused by the pandemic, there was a negative variation of 10.8% in the Gross Domestic Product (GDP) compared to the previous year.

Annual variation of the peninsular electricity demand and Spanish GDP

% year-on-year



Regarding electricity demand, this decline in economic activity, considering the low elasticity values that have been recorded since the start of the economic recovery, resulted in an elasticity of 0.5 between electricity demand and GDP, a higher value than the elasticity observed in recent years. After factoring in the influence of seasonal and working patterns in 2020, overall demand nationwide registered a negative variation of 5.0%. compared to the previous year.

The decline in economic activity has resulted in an elasticity of 0.5 between electricity demand and GDP, an increase on the low elasticities recorded since the start of the economic recovery.

VARIATION IN PENINSLAR DEMAND

-5.0 %

after having factored in the influence of seasonal and working patterns

Components of the annual variation in peninsular electricity demand

% variation year-on-year

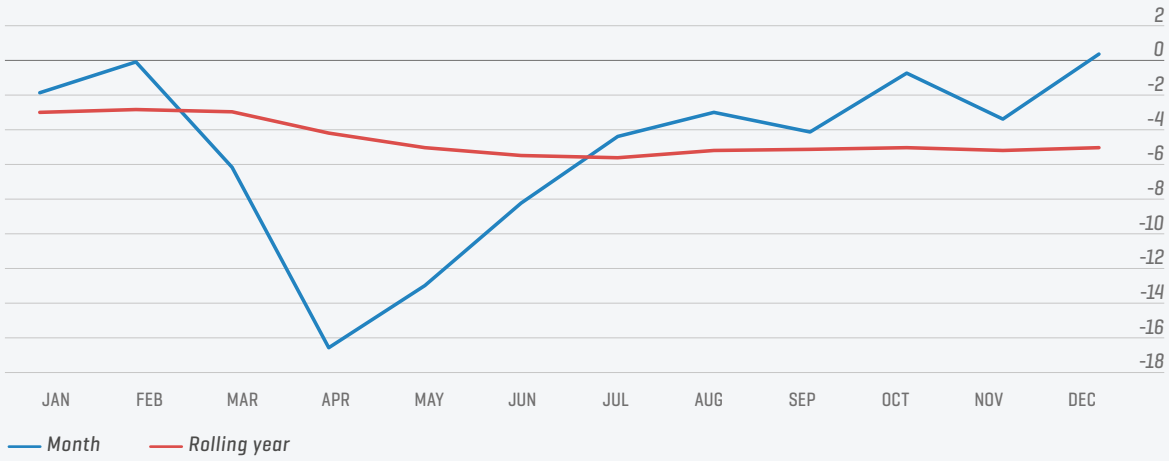
	Δ Demand at substation busbars	Working Patterns	Temperature	Adjusted value
2011	-2.0	1.4	-0.9	-2.5
2012	-1.3	-0.3	0.7	-1.7
2013	-2.3	0.4	-0.3	-2.4
2014	-1.1	0.0	-1.0	-0.1
2015	2.0	-0.1	0.4	1.7
2016	0.7	0.3	0.1	0.3
2017	1.1	-0.1	-0.2	1.4
2018	0.4	-0.3	0.2	0.5
2019	-1.7	0.7	0.2	-2.7
2020	**-5.0**	**-0.1**	**0.1**	**-5.0**

The decline in economic activity has resulted in an elasticity of 0.5 between electricity demand and GDP, an increase on the low elasticities recorded since the start of the economic recovery.

As for the trend, from March onwards, with the outbreak of the pandemic and the introduction of containment measures and the closure of non-essential activities during the first nine days of April, there was a sharp drop in the trend which continued until the end of May. In this period there were maximum falls in adjusted demand of 16.7% in April and 13.1% in May. From June onwards, with the easing of lockdown measures and despite the successive waves of the pandemic at the end of the summer and autumn, there is a reduction in the rate of the downturn in demand which stabilised the rate of decline in the trend, even recording a monthly growth in demand in December.

Monthly variation in the adjusted electricity demand on the Spanish peninsula in 2020

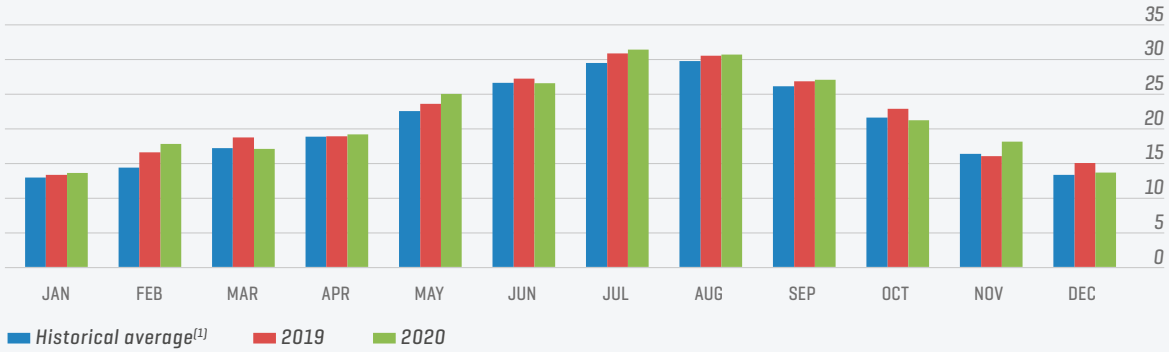
%



Warmer temperatures over the year as a whole made a positive contribution of 0.1 percentage points to demand growth.

Monthly evolution of maximum temperatures

ºC



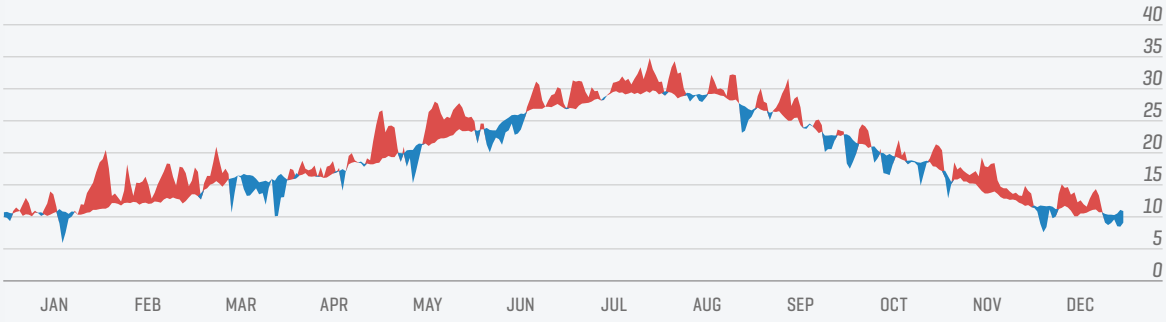
(1) Average monthly temperature for the period 1989-2013.

From the point of view of the influence of temperatures on demand, the whole of 2020 compared to the historical average, shows warmer temperatures in summer and milder temperatures in winter. The daytime temperatures with a cooling effect (Cooling Degree Days) were 21.6% lower than the average values and the daytime temperatures with a heating effect (Heating Degree Days) were 32.5% higher than the average values for the period considered. In other words, over the year as a whole, the number of days with warmer than average temperatures was higher.

Thus, during 2020, temperatures were much higher than the historical average temperature on 27.4% of the days. These days were more concentrated in May and July for the summer months, and in February and November for the winter months. On the other hand, on days with temperatures below the historical average, this situation only occurred on 8.5% of the days in the year, with these days were concentrated mainly in March and June.

Evolution of the daily maximum temperatures compared to the average historical data

ºC



Average monthly temperature for the period 1989-2013.
Source: Prepared by REE using data from the Spanish State Meteorological Agency (AEMET).

Compared to the previous year, 2020 was milder in winter and hotter in summer than in 2019, with 6.4% fewer 'cold days' and 4.1% more 'hot days'. The combined impact of these effects, with a greater influence on consumption on hot days, results in a positive contribution of temperatures to the growth in demand of 0.1 percentage points.

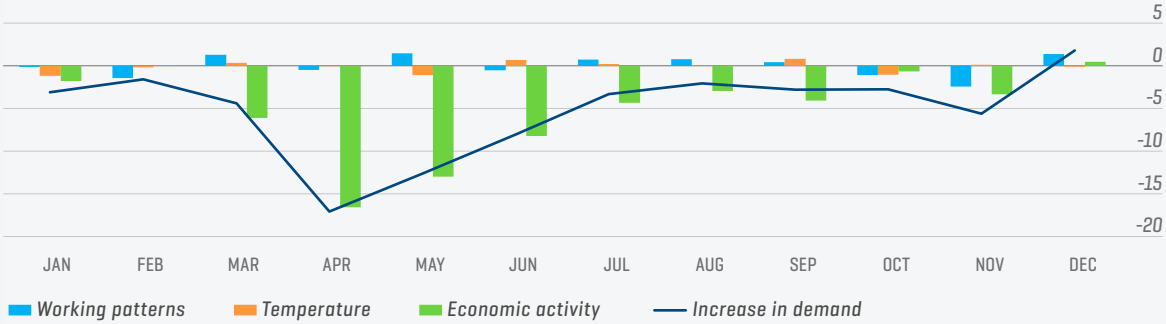
INFLUENCE OF TEMPERATRURE ON THE DEMAND

27.4 %

of the days registered above-average temperatures

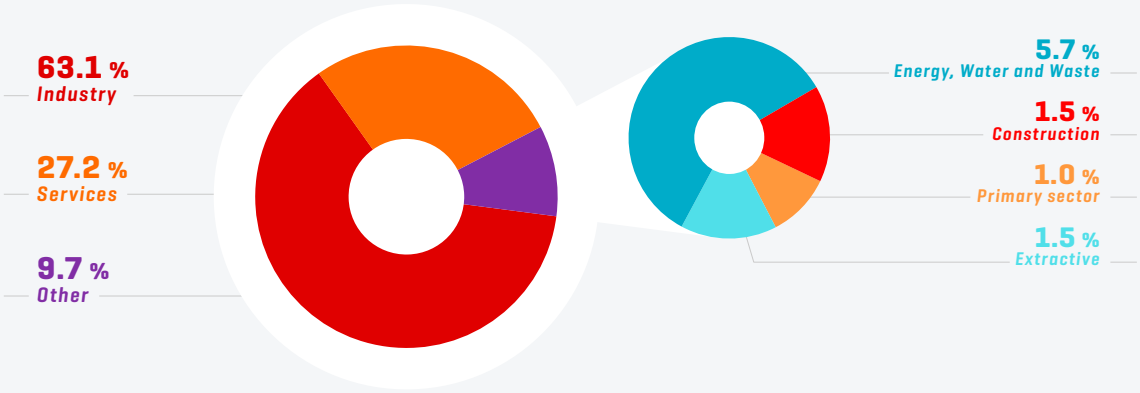
Components associated to growth in monthly demand on the Spanish peninsula 2020

%



Composition of the General IRE by sector

%



In 2020, the evolution of the Red Eléctrica Index (IRE), the electricity consumption index of large power consumers, was not immune to the effects of the pandemic situation experienced since March. This was mainly due to the lockdown periods, limitation of non-essential activities, the easing of lockdown measures and restrictions on mobility and certain activities with the arrival of the second and third waves, to such an extent that previous gains were overshadowed by the impact of the pandemic both on society and the economy.

RED ELÉCTRICA INDEX

-7.3 %

compared to 2019

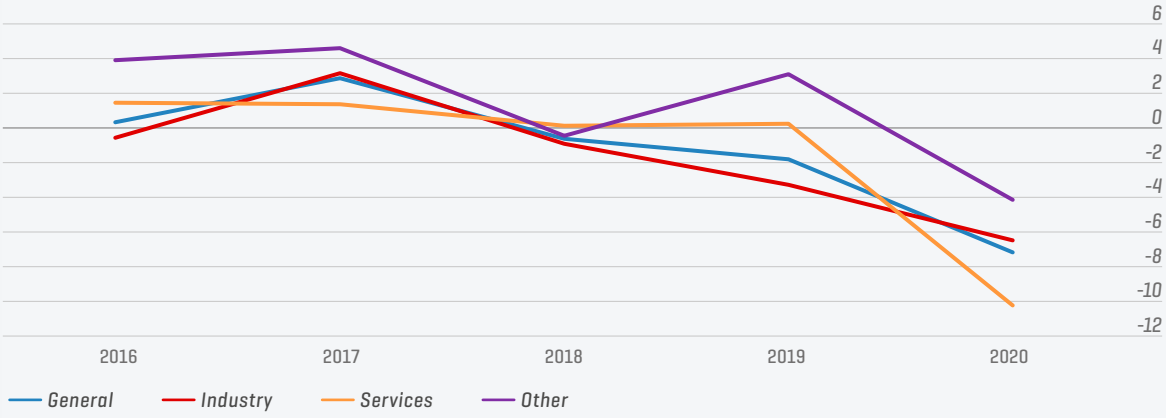
In 2020, the IRE as a whole was 7.3% lower than the previous year, the highest decline since the index started to be used. The index stands at 115.3, which is 2.5% lower than the minimum registered in 2013.

All the main sectors of activity that make up the IRE (industry, services sector and the grouping of other activities), experienced a negative variation compared to the previous year, although with different intensities depending on the sector of activity:

- Industrial activities fell by 6.6%, showing an accelerated decline in consumption over the last two years.
- The services sector registered the biggest impact with a fall of 10.4%.
- The grouping of other sectors of activity has also decreased by 4.2% compared to the previous year, although to a lesser degree than the main sectors.

Annual variation of the IRE

% year-on-year



In 2020, both the composition of the working calendar and the evolution of temperatures had an opposite impact on the evolution of the Red Eléctrica Index, although of equal magnitude, such that they offset each other.

Temperatures had a negative impact on the evolution of the index, with a fall of 0.3 percentage points. Noteworthy are the months of June and October in which temperatures had a negative impact of 2.2 and 2.0 percentage points respectively on the index and which offset the positive contributions made in the other months of the year. Regarding the main IRE sectors, the most significant impact was in the services sector, where temperatures had a negative impact of 0.8 percentage points on the evolution of the index, followed by the industrial sector, a sector in which temperatures had a had a negative impact of 0.1 percentage points.

Temperatures had a negative impact of 0.3 percentage points on the evolution of the index.

IRE: Variation breakdown in 2020

%

	Gross	Working patterns	Temperature	Adjusted value
General	**-7.3**	**0.3**	**-0.3**	**-7.3**
Industry	-6.6	0.3	-0.1	-6.8
Services	-10.4	0.3	-0.8	-9.8
Other	-4.2	0.1	0.1	-4.5

The monthly evolution of the adjusted index was marked by the initial impact of the pandemic and its subsequent evolution. It should be noted, in any event, that the adjusted IRE had been falling at rates of over 2% in the months prior to the start of the pandemic, so that this negative trend was exacerbated by the pandemic. Thus, in March, with the first measures taken to mitigate the impact of COVID-19 and the subsequent decree of the first state of emergency, the adjusted IRE fell by 8.2% with respect to the previous year, but it was in April when it registered a maximum fall of 23.3% as the confinement measures coincided, for a part of the month, with the suspension of non-essential activities in what came to be known as 'economic hibernation'. In the month of May, with lockdown measures still in place but without economic hibernation, the index showed a decrease of 15.5%.

From that month onwards, with the application of measures for the easing of lockdown, the rate of decline in the index began to be slow down, this trend changed altered in October as a result of the second wave of the pandemic and the implementation of the second state of emergency. This brought the rate of decline of the index for the month of December to 1.9%.

With respect to the monthly evolution of the adjusted index corresponding to the two main sectors (industry and services), although the initial impact of the pandemic is similar in both sectors, the progressive recovery of the index in the following months was not at the same rate, as while industry made clear strides towards recovery, the services sector recovered at a substantially lower rate and its corresponding index did not make a full recovery, and this sector was responsible for the significant decrease experienced by the IRE.

INDUSTRY ADJUSTED ANNUAL INDEX

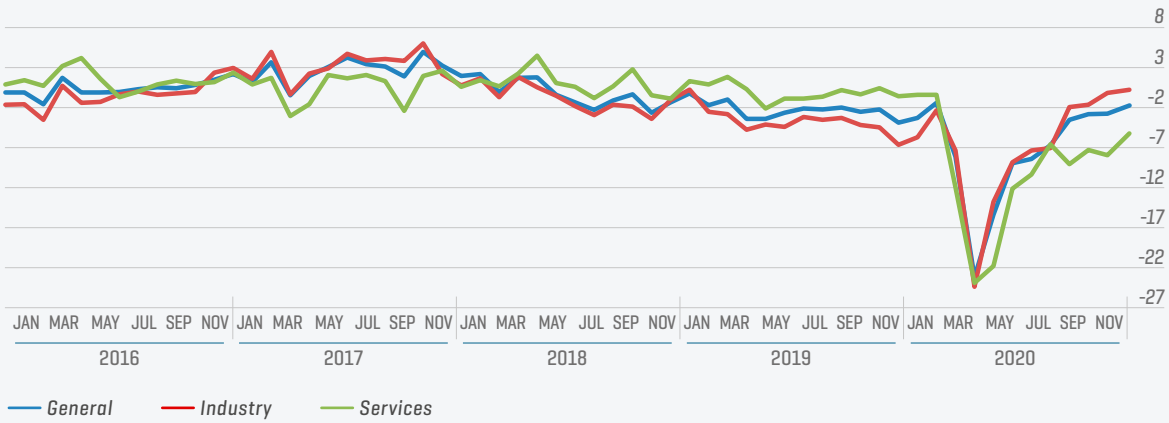
-6.8 %

SERVICES ADJUSTED ANNUAL INDEX

-9.8 %

Monthly evolution of the adjusted IRE

% year-on-year

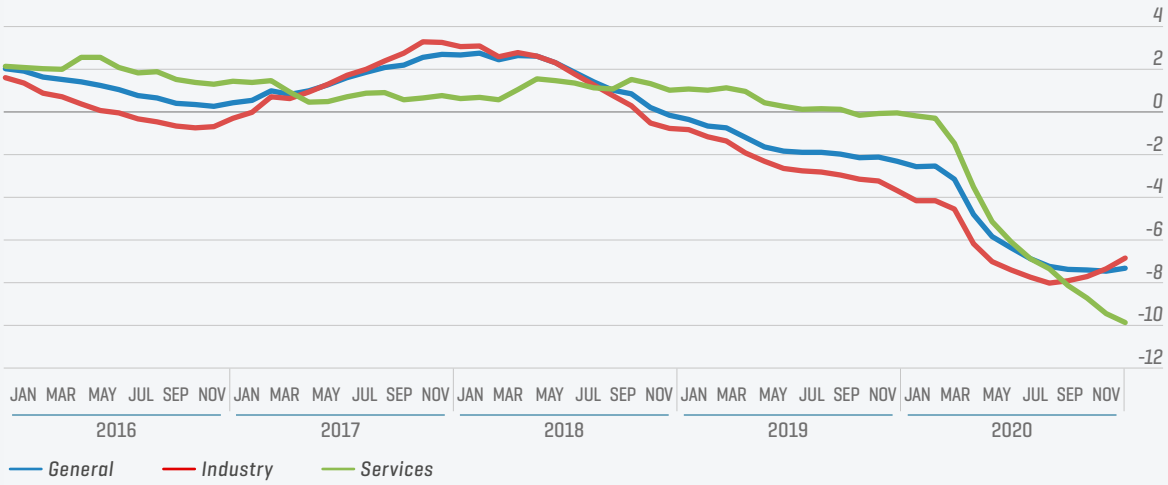


With regard to the IRE trend, it should be noted that in 2019 it was already showing a downward trend with negative records being set throughout the year, influenced by the evolution of the industry sector. This situation was maintained during the first two months of the year until, with the outbreak of the pandemic, the negative trend of the index fell sharply, reaching a minimum value during the summer months. From this moment on, with the more positive evolution of industry, the trend took an upward turn, although at rates that were lower compared to the previous year.

The services sector, much like industry, although with a negative trend, had been registering very similar figures to those of the previous year. The appearance on the scene of the pandemic caused the index of this sector to suffer a negative trend that continued throughout the year and did not show any signs of stabilising, which was due to the fact that this main sector includes sectors whose activity suffered a greater impact due to the various measures taken to contain the pandemic.

Monthly variation of the adjusted IRE

% rolling year



The monthly evolution of the adjusted IRE was marked by the initial impact of the pandemic and its subsequent evolution. The biggest effect on the decline of the IRE was due to the impact of the health crisis on the services sector.

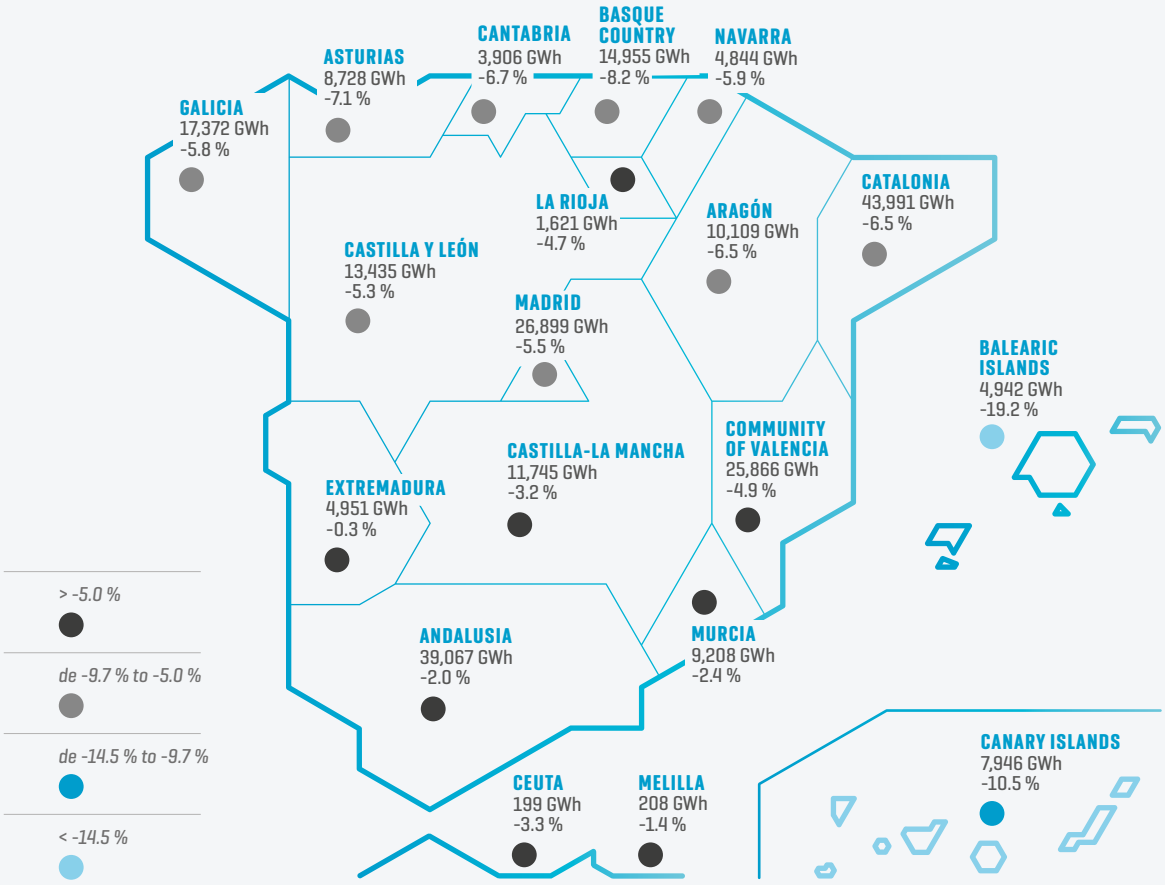
The impact of the pandemic on electricity demand was not uniform throughout the country due to the unique characteristics of each of the autonomous communities. Thus, the largest decreases were recorded in the two regions whose consumption is most influenced by tourism: the Balearic Islands and the Canary Islands, with annual decreases of -19.2% and -10.5% respectively.

At a peninsular level, the smallest decreases were registered in the southern regions: Extremadura, Andalusia and Murcia. A second group of regions located in the central part of the peninsula (except Madrid) showed intermediate decreases ranging from -3.2% in Castilla-La Mancha to -4.9% in the Community of Valencia. The rest of the communities located in the north, including Madrid, reported more pronounced decreases, with a maximum variation of -8.2% being registered in the Basque Country.

The pandemic has led to a widespread fall in electricity demand in all autonomous communities.

Electricity demand per autonomous community and variation compared to the previous year

GWh and %



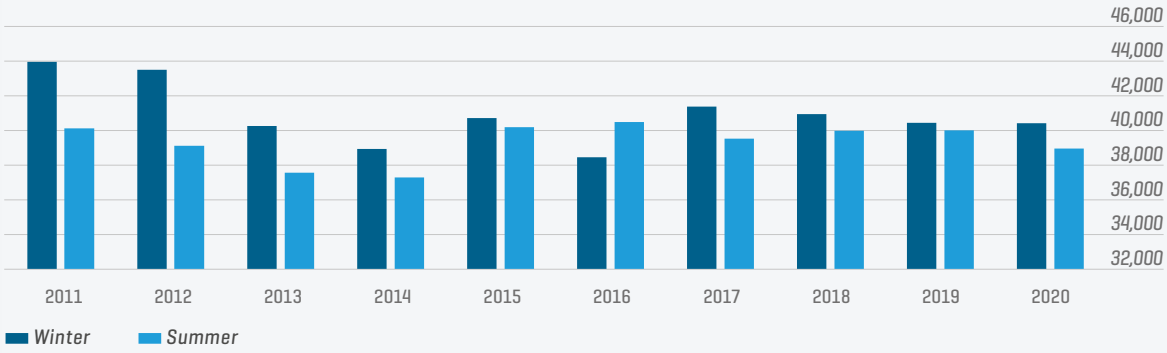
In 2020, both the winter hourly demand peaks (which correspond to the annual maximum), and the summer demand peaks, registered lower values than the previous year, with the particularity that the winter peak occurred before the onset of the pandemic, while the summer peak occurred after the easing of lockdown measures. The maximum for the year was recorded on 20 January between 8:00 and 9:00 p.m. with a total of 39,997 MWh, down 0.3% on the maximum value recorded the previous year.

The summer peak, which took place during the pandemic, occurred on 30 July between 1:00 and 2:00 p.m. with 38,471 MWh, a decrease of 2.3% compared to the 2019 peak.

> The maximum value of the year was recorded on 20 January between 8:00 and 9:00 p.m. with a total of 39,997 MWh (-0.3% compared to 2019).

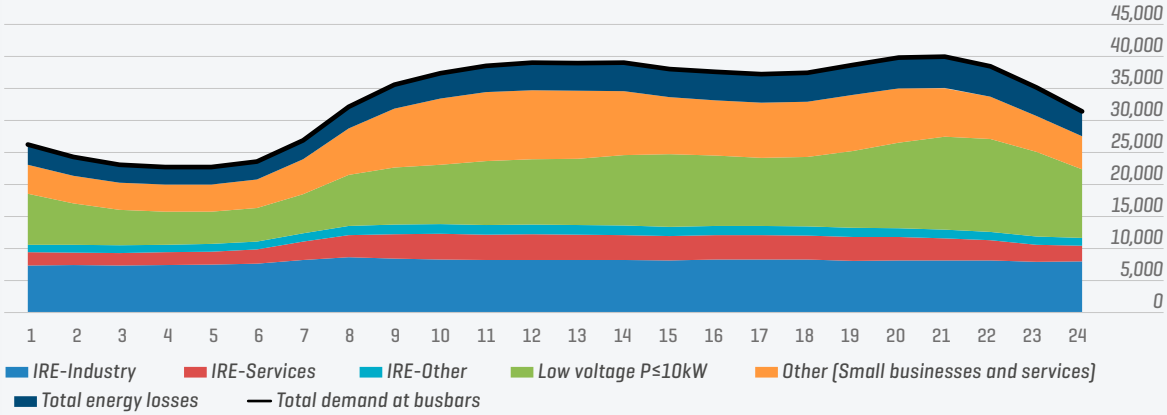
Maximum annual values for instantaneous demand on the Spanish peninsula

MW

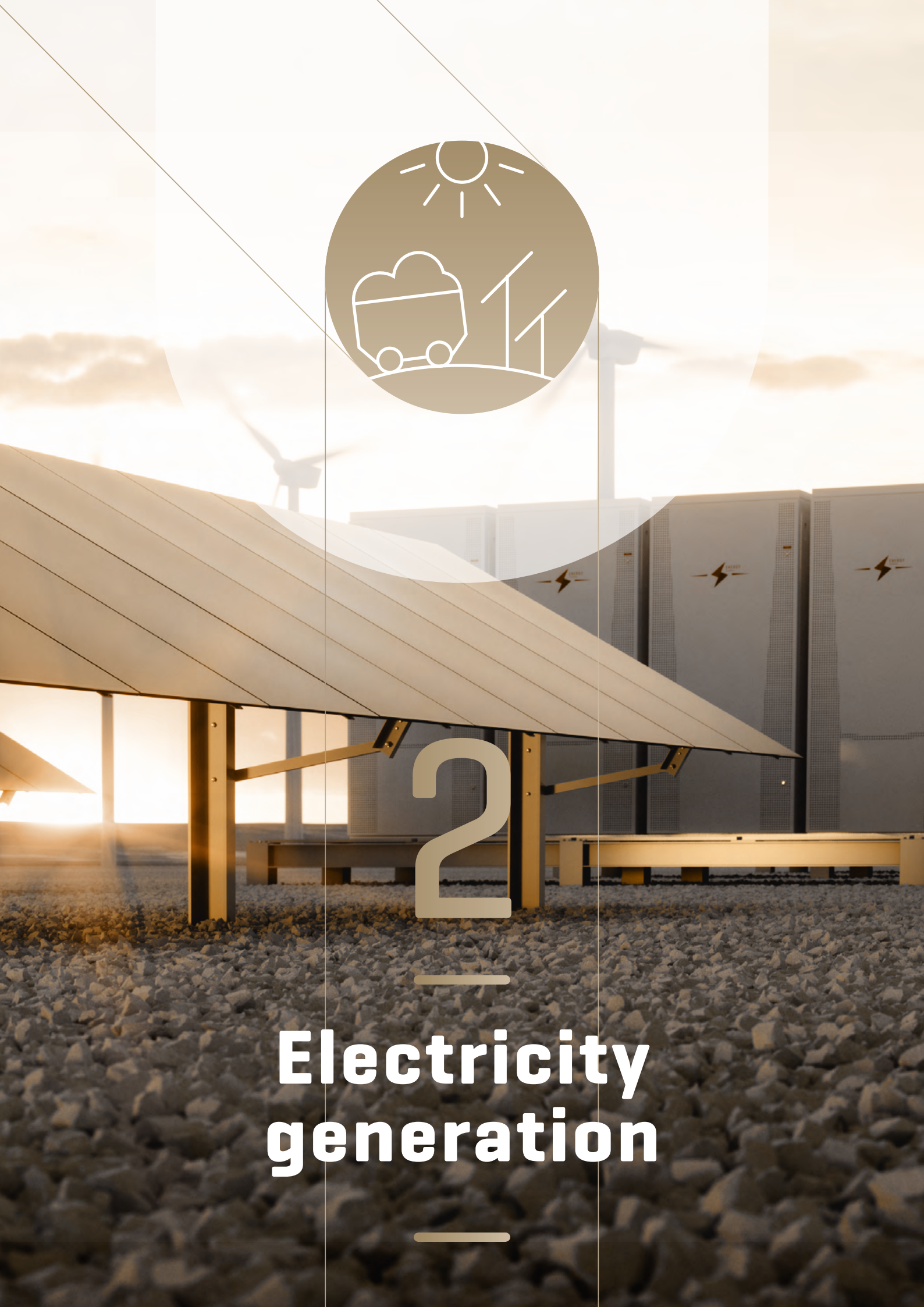


Breakdown of the demand on 20 October 2020

MWh



At the peak time of the day of the year when the maximum hourly demand was registered, the residential sector accounted for 36% of consumption, while consumption in the IRE-Industrial sector accounted for 20%, the large services sector (IRE) 9% and small businesses and services 19%. Throughout the peak day, the greatest impact of the industrial sectors occurred in the early hours of the morning, between 3:00 and 5:00 a.m. reaching total share of 33% of the demand (measured at the power station busbars), while for the large services sector, the hourly period with the greatest impact was between 7:00 a.m. and 7:00 p.m. with a share in the demand of around 10% to 11%.

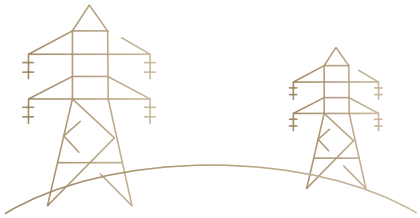


2

Electricity generation

Non-renewable energy reduced its share to 54.4% (61.1% in 2019).

In the overall electrical energy balance on the Spanish peninsula, broken down by the type of energy used, renewable energy increased its share in the peninsular electricity generation mix reaching an all-time high of 45.5% compared to 38.9% in 2019 due to higher hydroelectric and photovoltaic energy generation.



-3.1%
COMPARED TO 2019

ELECTRICITY GENERATION IN THE PENINSULAR SYSTEM

239,465 GWh

The energy landscape in Spain in 2020 was marked by the COVID-19 pandemic. In this context, the generation of electricity in the peninsular system, which represents around 95% of total generation nationwide, fell by 3.1% in 2020, reaching 239,465 GWh. The most significant variations with respect to the previous year were recorded by solar photovoltaic generation, which increased by 68.5%, while coal-fired and combined cycle decreased their production by 55.0% and 25.0%, respectively.

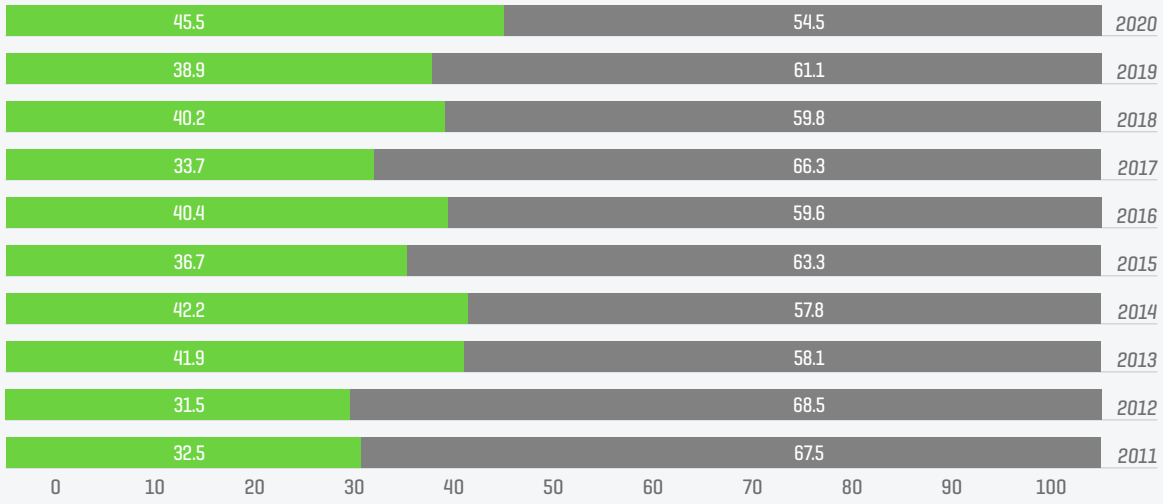
The generation of electricity in the non-peninsular systems (11,868 GWh) fell by 13.5% with respect to the previous year, with a notable increase of 38.2% for combined cycle. On the other hand, noteworthy is the drop in coal-fired generation which was 88% lower compared to the previous year.

In the overall electrical energy balance, broken down by the type of energy used, renewable energy increased its share in the peninsular electricity generation mix, reaching a new all-time high with a share of 45.5% compared to 38.9% in 2019, mainly due significant increase in hydroelectric and solar photovoltaic energy generation. But in contrast, non-renewable energy reduced its share to 54.5% (61.1% in 2019).

In 2020, renewable energy reached a new record for energy generation.

Evolution of renewable and non-renewable electricity generation on the Spanish peninsula

%



Renewables: hydroelectric, wind, solar photovoltaic, solar thermal, renewable waste and other renewables

Non-renewable: pumped storage (net supply), nuclear, coal, fuel/gas, combined cycle, co-generation and non-renewable waste

National electrical energy balance [1]

	Peninsular system		Non-peninsular systems		National total	
	GWh	%2019	GWh	%2019	GWh	%2019
Hydro	30,611	23.9	3	-0.8	30,614	23.8
Hydro-wind	-	-	20	-16.0	20	-16.0
Wind	53,795	1.3	1,104	-3.5	54,899	1.2
Solar photovoltaic	14,912	68.5	376	-5.9	15,289	65.2
Solar thermal	4,538	-12.2	-	-	4,538	-12.2
Other renewables [2]	4,470	23.9	10	-10.0	4,480	23.8
Renewable waste	606	-18.0	120	-20.8	726	-18.4
Renewable generation	**108,933**	**13.3**	**1,633**	**-5.8**	**110,566**	**12.9**
Pumped storage (net supply) [3]	2,748	67.0	-	-	2,748	67.0
Nuclear	55,757	-0.1	-	-	55,757	-0.1
Coal	4,800	-55.0	222	-88.9	5,022	-60.4
Fuel/gas [4]	-	-	4,194	-26.4	4,194	-26.4
Combined cycle [5]	38,357	-25.0	5,666	38.2	44,023	-20.3
Cogeneration	26,974	-8.8	34	-1.8	27,008	-8.8
Non-renewable waste	1,896	-8.5	120	-20.8	2,015	-9.3
Non-renewable generation	**130,532**	**-13.5**	**10,235**	**-14.6**	**140,767**	**-13.6**
Pumped storage consumption	-4,621	52.7	-	-	-4,621	52.7
Peninsula-Balearic Islands link [6]	-1,427	-15.8	1,427	-15.8	0	-
International exchange balance [7]	3,280	-52.2	-	-	3,280	-52.2
Demand (measured at busbars)	**236,697**	**-5.0**	**13,295**	**-13.7**	**249,991**	**-5.5**

(1) Allocation of generation units based on primary fuel. The net production of non-renewable and non-Hydro Management Units (HMU) facilities have their own consumption discounted. In these types of production, negative generation indicates that the electricity consumed for the power station's uses exceeds its gross production.
(2) Includes biogas, biomass, marine and geothermal.
(3) Pure pumped storage (net supply) + estimate of mixed pumped storage (net supply).
(4) The Balearic Islands electricity system includes generation with auxiliary generation units.
(5) Includes operation in open-cycle mode. The Canary Islands electricity system uses diesel as its main fuel.
(6) Positive value: energy input into the system; negative value: energy output from the system.
(7) Positive value: importer balance; negative value: exporter balance. Increment values are not calculated when exchange balances have different signs.

Breakdown of installed power capacity as at 31.12.2020.

National electricity system

	Peninsular system		Non-peninsular systems		National total	
	MW	%20/19	MW	%20/19	MW	%20/19
Hydro	17,096	0.0	2	0.0	17,098	0.0
Hydro-wind	-	-	11	0.0	11	0.0
Wind	27,031	7.1	455	4.8	27,485	7.0
Solar photovoltaic	11,443	34.1	271	8.9	11,714	33.4
Solar thermal	2,304	0.0	-	-	2,304	0.0
Other renewables	1,084	4.7	6	0.0	1,090	4.6
Renewable waste	119	0.0	38	0.0	157	0.0
Renewable	**59,077**	**8.7**	**782**	**5.8**	**59,860**	**8.7**
Pumped storage (net supply)	3,331	0.0	-	-	3,331	0.0
Nuclear	7,117	0.0	-	-	7,117	0.0
Coal	5,492	-40.4	241	-48.5	5,733	-40.8
Fuel/gas	8	-	2,401	0.0	2,409	0.0
Combined cycle	24,562	0.0	1,688	0.0	26,250	0.0
Cogeneration	5,661	-0.3	50	0.0	5,711	-0.3
Non-renewable waste	390	-2.4	38	0.0	428	-2.2
Non-renewable	**46,561**	**-7.5**	**4,419**	**-4.9**	**50,980**	**-7.2**
Total	**105,638**	**0.9**	**5,201**	**-3.4**	**110,839**	**0.7**

(1) Includes biogas, biomass, marine-hydro and geothermal.

TOTAL INSTALLED POWER CAPACITY NATIONWIDE

110,839 MW

OF WHICH

54 %

CORRESPONDS TO RENEWABLE ENERGY FACILITIES

As at 31 December 2020, the power generation fleet of the peninsular system had increased by 0.9% with respect to the previous year and had reached an all-time record with an installed power capacity of 105,638.

In recent years, Red Eléctrica de España has successfully faced the challenge of integrating a large quota of new renewable power capacity, as a result of the 2017 renewable auctions carried out by the Ministry of Ecological Transition and the Demographic Challenge (MITERD). In 2019, installed renewable power capacity in the peninsular electricity system increased by 6.4 GW. Similarly, in 2020, renewable installed power capacity increased by an additional 4.7 GW, bringing the total of installed renewable power capacity up to 59.1 GW in the peninsular electricity system, which in turn represents a total installed power capacity of 56%. The integration of this new renewable capacity, mostly wind and solar photovoltaic, represents a strong boost to the energy transition and furthermore complies with the integration road set out in Integrated National Energy and Climate Plan (NECP), with a 2030 horizon.

The power generation fleet on the mainland is increasingly renewable due to the increase in 2020 of installed wind power capacity, 7.1%, solar photovoltaic, 34.1% and other renewables, 4.7%, compared to 2019.

On the other hand, installed non-renewable power capacity in the peninsular system decreased by 7.5%, as a result of the 40.4% reduction in installed coal-fired power capacity due to the definitive closure of the Compostilla II, Guardo, La Robla, Meirama and Teruel thermal power stations, representing a decrease of 3,723 MW of installed non-renewable power capacity on the mainland.

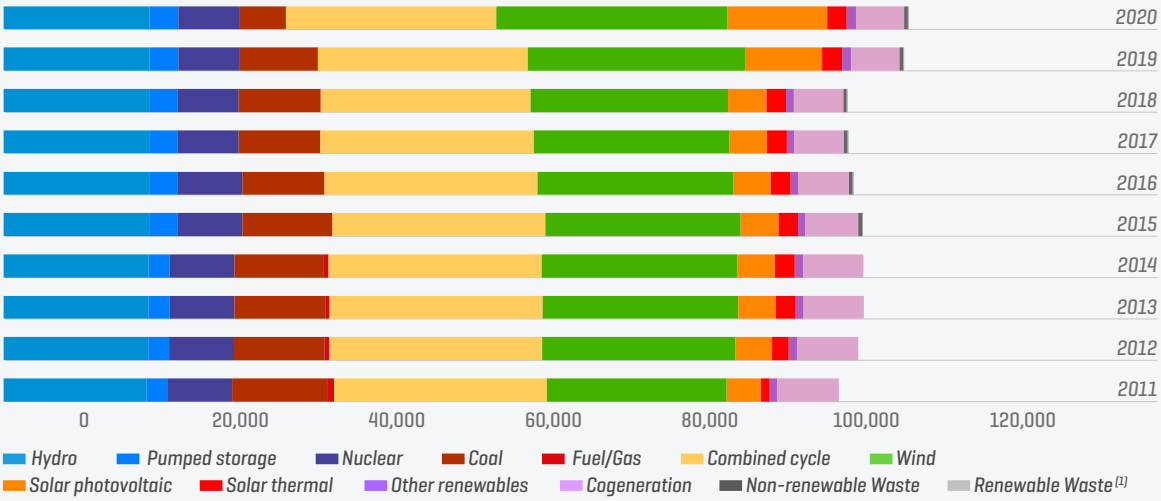
In non-peninsular systems, there was a 3.4% reduction in installed power capacity at the close of 2020. This decrease is mainly explained by the definite decommissioning of generating units 1 and 2 of the Alcudia thermal coal-fired power station in the Balearic Islands, representing a reduction of 227 MW.

In Spain as a whole, which includes the peninsular and non-peninsular systems, installed power capacity increased by 0.7% compared to the previous year, closing 2020 at 110,839 MW. Renewable energy facilities account for 54% of the total installed power capacity nationwide.

The peninsular electricity system is transitioning towards a sustainable energy model.

Evolution of the structure of installed power capacity on the Spanish peninsula

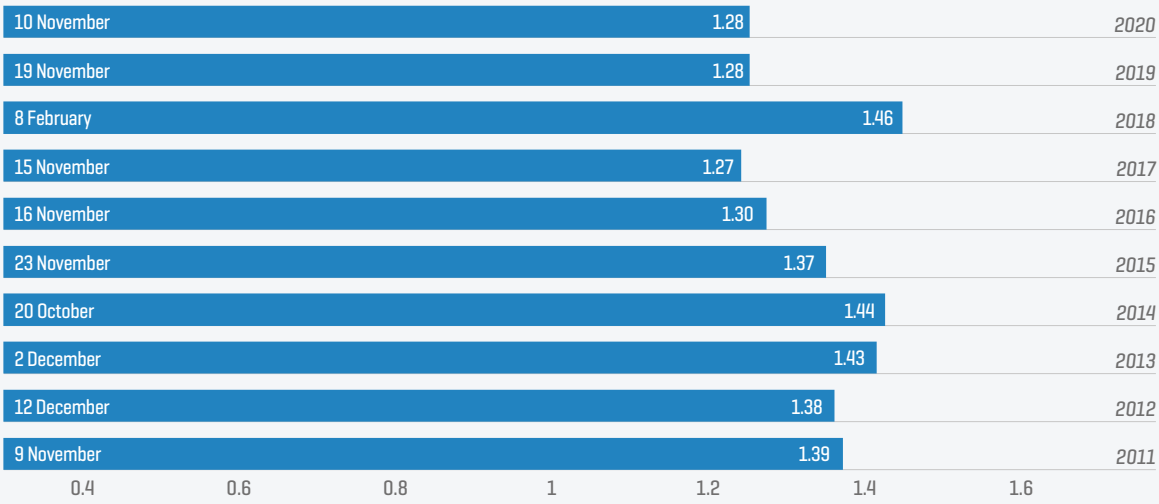
MW



(1) Power capacity included in other renewables and cogeneration until 31/12/2014.
Source: National Commission of Markets and Competition (CNMC) until 2014 regarding: non-Hydro Management Units (HMU), wind, solar photovoltaic, solar thermal, other renewables, cogeneration and waste.

The minimum coverage index for the Spanish peninsula, defined as the minimum value of the ratio between the power available in the system and the peak power demanded from the system, stood at 1.28 in 2020.

Evolution of the minimum coverage ratio for the Spanish peninsula



MinCR = Min (Pa/Pd)
MinCR: Minimum Coverage Ratio
Pa: Power available in the system.
Pd: Peak power demanded from the system.

The contribution of renewable energy to peninsular electricity generation in 2020 set a new record high, reaching a share of 45.5% of electricity generation, 3.3 percentage points higher than the previous high registered in 2014, when renewables accounted for 42.2% of the energy mix. This higher share of peninsular renewable generation in 2020 is mainly due to the increase in hydro and solar photovoltaic production, up 23.9% and 68.5% respectively, compared to the previous year, as a result of weather conditions and the increase in installed power capacity in the peninsular system.

This significant growth in the share of renewables in the peninsular generation mix was counterbalanced by a reduction in the share of the various technologies that use fossil fuels as a primary energy source. The share of non-renewable generation stood at 54.5% of the peninsular total, a decrease of 6.6 percentage points compared to the previous year, when the non-renewable share was 61.1%. This decrease in non-renewable generation on the mainland is mainly due to the lower production of combined cycle power stations, which generated 25% less than in 2019, and coal-fired power stations, which accounted for only 2% of the mix, the lowest value since records began.

Maximum renewable generation in the mainland system was due to the increased contribution of hydro and solar photovoltaic energy.

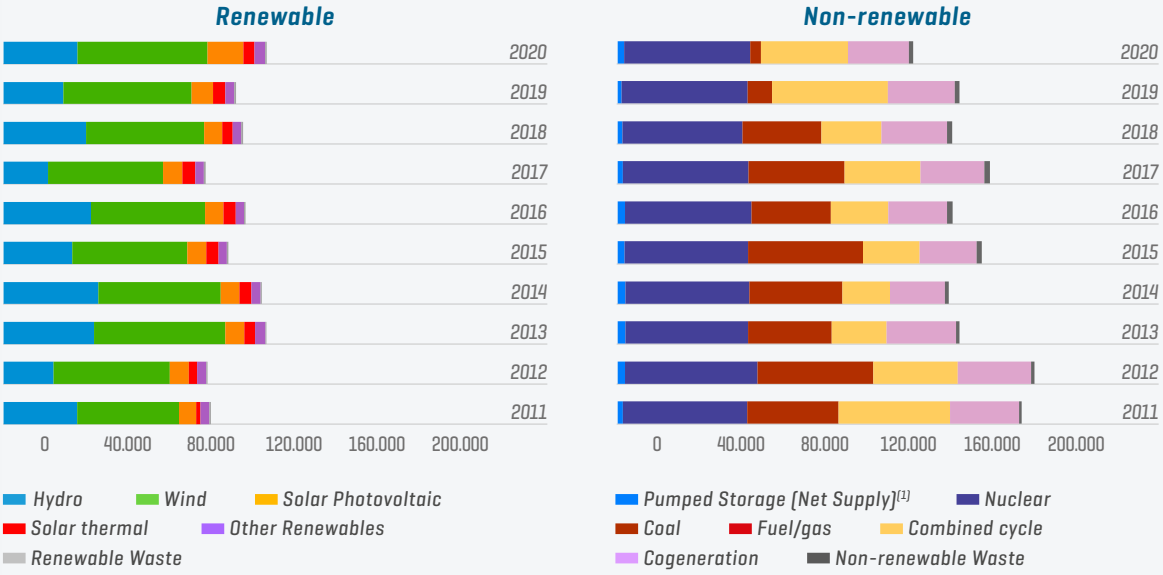
RENEWABLE ENERGY GENERATION REPRESENTED

45.5 %

OF TOTAL PENINSULAR GENERATION MIX IN 2020

Evolution of renewable and non-renewable electricity production on the Spanish peninsula

GWh



The net production of non-renewable and non-Hydro Management Units (HMU) facilities have their own consumption discounted. In these types of production, negative generation indicates that the electricity consumed for the power station's uses exceeds its gross production.

(1) Pure pumped storage (net supply) + estimate of mixed pumped storage (net supply).

Peninsular renewable production in 2020 increased by 13.3% compared to the previous year, reaching 108,933 GWh and setting a new all-time maximum record for annual peninsular renewable production, higher than the previous maximum recorded in 2013. During all the months of 2020 (except November), renewable generation was higher than the previous year, coinciding with the increase in hydro, wind and solar photovoltaic production. From the second half of the year onwards, the greatest increases in renewable energy took place, increasing by 53.8% in October and registering the highest values to date for renewable generation for the months of July, August, September, October and December.

> For the fifth consecutive year, wind remained the second largest source of electricity generation.

Peninsular wind power production in 2020 stood at 53,795 GWh, 1.3% higher than the previous year. This increase occurred mainly in the final two quarters of the year, when this technology generated 18% and 4.5% more than in the same periods in 2019, registering a 52.4% increase in wind power production in October compared to the same month in 2019.

Additionally, July, September, October and December saw the highest monthly wind power production values to date during those months.

As a result, wind power continues to be the most relevant renewable technology in the peninsular system, as in 2020 its production accounted for 49.4% of total renewable energy. renewable energy.

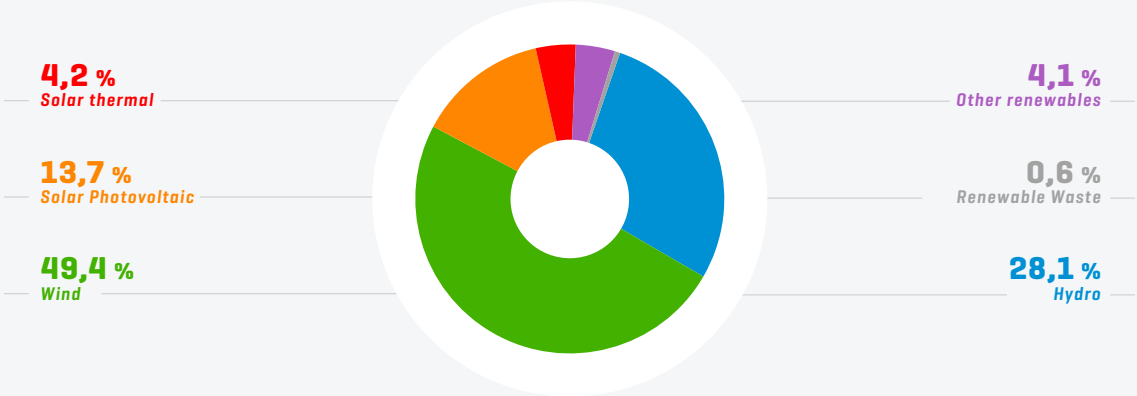
The 7.1% increase in installed wind power capacity in the mainland system contributed to helping break several all-time records in 2020. On Monday 28 December 2020 at 2:20 p.m., a new historical record was reached in terms of wind power generation capacity was reached in the peninsular electricity system, with a value of 19,588 MW. On the same day between 2:00 and 3:00 p.m. hourly wind power energy broke the record with a value of 19,377 MWh.

In line with previous years, noteworthy is the important contribution of wind power generation in the annual generation mix which, with a share of 22.5% of production, is in second place for the fifth consecutive year within the technologies that make up the power generation fleet, second only to nuclear energy. Furthermore, the annual share of wind power in the peninsular generation mix in 2020 was the highest recorded to date.

Wind power production was the leading technology in the peninsular generation mix in the months of March (27.5%), May (22.7%), October (28.4%) and December (32.4%).

Annual generation mix of renewable energy in the peninsular system in 2020

%



The enormous variability of wind power generation is evident as can be seen in the graph of maximum and minimum daily coverage of renewable hydro, wind and solar technologies. During 2020, daily wind power production had a share in the generation mix that ranged from a minimum of 4% on 1 January to a maximum of 52.7% on 1 March.

DAILY MAXIMUM AND MINIMUM

VALUES OF WIND POWER IN THE PENINSULAR GENERATION MIX

MAXIMUM

52.7 %

1 March

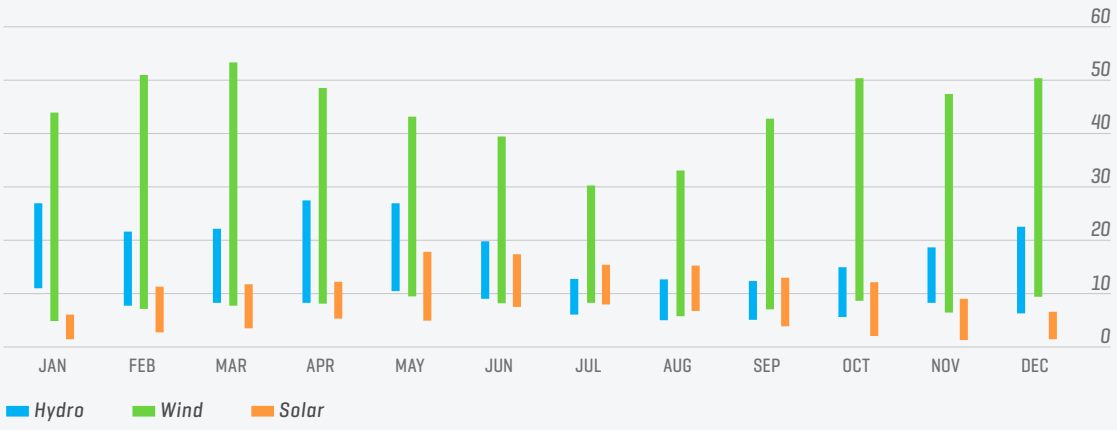
MINIMUM

4.0 %

1 January

Maximum and minimum daily coverage on the mainland in 2020 using hydro, wind and solar

%



Peninsular hydroelectric generation in 2020 fell to 30,611 GWh, a 23.9% decrease compared to the previous year, as a result of it being a year with less rainfall. Its contribution to the peninsular generation mix was 12.8%, a share that was quite similar to the share this technology had in the 2004 mix. In 2020, the total amount generated by hydroelectric power stations made this technology the fourth largest source of generation, whereas the previous year it was the fifth, with a 10% share of the total generation on the Spanish peninsula.

The comparative graph for peninsular hydroelectric generation 2019-2020 shows how during all the months of 2020, except November and December, hydroelectric production was higher than that generated in 2019. The months in which hydroelectric production registered the greatest increases were January, with a growth of 75.3%, and October, with generation 68.7% higher than in the same period of the previous year.

+23.9 %
COMPARED TO 2019

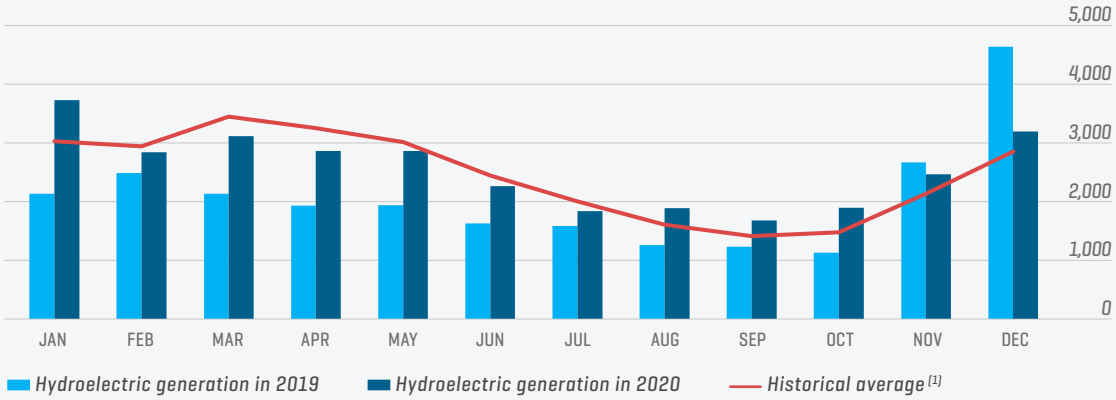
PENINSULAR HYDROELECTRIC GENERATION

30,611 GWh

In 2020, hydroelectric power stations on the mainland increased their production compared to the previous year.

Peninsular hydroelectric generation 2019-2020 compared to average generation

GWh

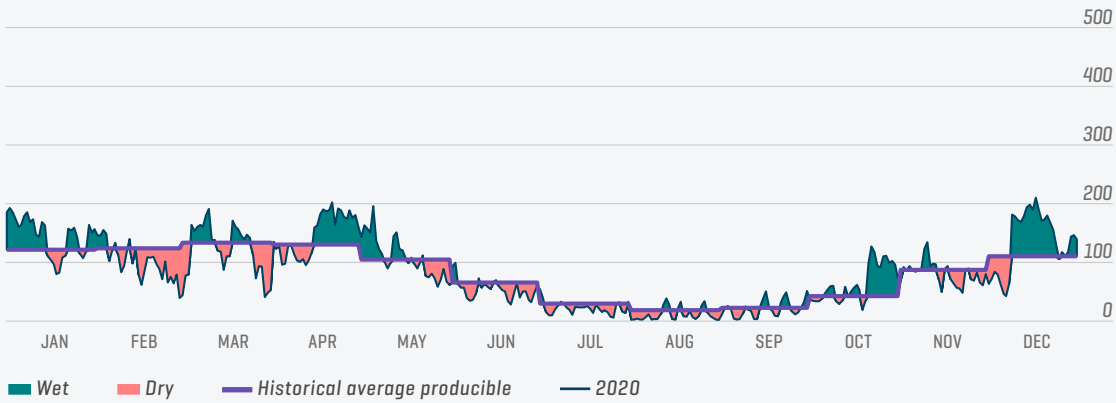


(1) Average monthly hydroelectric generation for the last 20 years.

The increase in hydroelectric generation was in line with the producible hydroelectric energy (maximum amount of electricity that theoretically could be produced considering the water reserves available), which in 2020 reached a value of 30,578 GWh, 17.6% less than that recorded in 2019 and 2.8% more than the annual historical average value. Therefore, we can consider that 2019 as a whole was a dry year as the producible hydroelectric index, defined as the quotient between producible energy and average producible energy, registered a value of 1.03.

Daily producible hydroelectric energy during 2020 compared to the historical average producible

GWh



Hydroelectric reserves during 2020 as a whole registered values above the statistical average

2020 as a whole was a normal year overall in terms of rainfall. It started with a wet January with above-average rainfall, which contrasted with an extremely dry February. The rest of the year had an overall very wet spring, a normal summer, a dry autumn and the final months of the year were normal.

Hydroelectric reserves were above the statistical average (calculated using the values of the last 20 years) for the whole of 2020. The period between April and July is particularly noteworthy, when reserves registered the highest increases and had the highest fill rates, 67.3% in April and 70% in May, values that were around 16 percentage points higher than in the same months of the previous year.

However, hydroelectric reserves fell during the last few months of the year, and as at 31 December 2020 the volume of water in Spain's hydroelectric reservoirs stood at 50.8% of their fill capacity, a value very similar to that of the previous year.

In 2020, the solar photovoltaic power plants of the peninsular system increased their installed power capacity by 34.1%, becoming the fourth largest source within the peninsular generation fleet, accounting for 10.8% of the total, compared to the fifth position held by this technology in 2019.

Solar photovoltaic production in 2020 increased by 68.5%, reaching 14,912 GWh, which represents a new annual generation record. The annual share of this technology in the peninsular generation mix also registered a maximum value with a share of 6.2%, ranking it ahead of coal for the first time since records began.

During all the months of 2020, solar photovoltaic production was higher than in the previous year, reaching 95.8% more in June than in the same month of 2019 and reaching the highest share in the generation mix since records began with a value of 9.6%. In addition, during the month of July, solar photovoltaic produced the highest monthly amount ever recorded with 1,863 GWh.

Regarding daily production, on Sunday, 3 May 2020, solar photovoltaic production reached the highest share in the peninsular generation mix with 12.3% and on Sunday, 21 June 2020, the maximum value for solar photovoltaic production reached an all-time high of 66,526 MWh.

In terms of hourly generation, on Sunday, 3 May 2020, between 2:00 and 3:00 p.m. solar photovoltaic production in the peninsular system represented 26.9% of all generation, and on Sunday 16 August 2020 between 1:00 and 2:00 p.m., hourly solar photovoltaic energy broke the all-time record with a value of 6,958 MWh.

On the same day, 16 August, a new all-time high of instantaneous photovoltaic power generation in the peninsular electricity system was reached, with 7,282 MW recorded at 1:54 p.m.

In 2020, solar photovoltaic energy generation reached new production peaks.

Lastly, on Sunday 3 May 2020 at 3:46 p.m., a new all-time high was reached in the coverage of demand using photovoltaic generation in the peninsular electricity system with a value of 30.9%.

With regard to solar thermal generation on the Spanish peninsula, in 2020, a total of 4,538 GWh was generated with this technology, 12.2% less than the previous year, and it contributed 1.9% to the total generation on the peninsula.

With regard to 'other renewables' (biogas, biomass, marine hydro and geothermal) in 2020 their production increased by 23.9% and reached a new record high of 4,470 GWh of annual generation, 3.4% higher than the previous record set in 2013. Its share in the peninsular generation mix was also the highest ever recorded with a value of 1.9%.

+68.5 %
COMPARED TO 2019

SOLAR PHOTOVOLTAIC PRODUCTION

14,912 GWh

Non-renewable energy in the peninsular system registered a total generation of 130,532 GWh in 2020, 13.5% lower than in 2019. This decrease in non-renewable generation resulted in a fall of 6.6 percentage points in its contribution to total peninsular generation, reaching a share of 54.5% in 2020, compared to 61.1% in 2019.

Among non-renewable energy technologies, nuclear generated a total of 55,757 GWh in 2020, 0.1% less than the previous year. This drop occurred mainly during the second quarter of the year, when nuclear production fell by 18.6%, coinciding with the scheduled shutdown for overhaul and refuelling of the Almaraz, Ascó 1 and Trillo power stations. In May, nuclear power stations produced 22.6% less and in June the decrease was 22.1%.

Despite this lower production, nuclear power was, for the tenth consecutive year, the leading source of generation on the Spanish peninsula (in 2013 it shared the lead with wind power). In 2020, its share in the peninsula's generation mix stood at 23.3% (22.6% in 2019). The utilisation ratio (ratio between actual production and what could have produced if the power stations had operated at their rated power during the entire time they were available) stood at 97%.

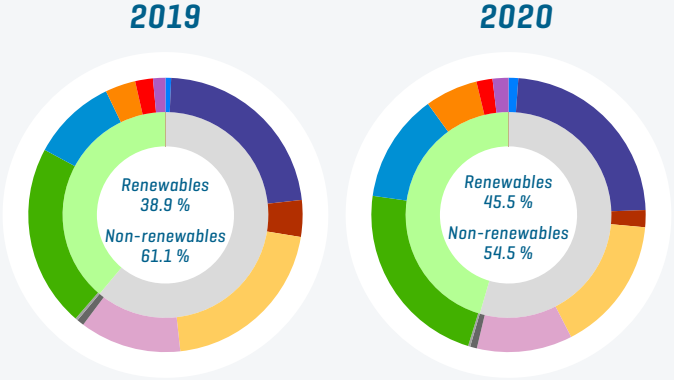
Nuclear power stations were the facilities with the highest number of hours of energy production, 8,116 hours out of the 8,784 hours in the year. Furthermore, 33.3% of the electricity generated in 2020 was emission-free thanks to nuclear power.

The fall in non-renewable generation was due to a lower output from combined cycle power stations.

Annual peninsular electricity generation mix in 2019 and 2020

%

	2019	2020
Wind	21.5 %	22.5 %
Hydro	10.0 %	12.8 %
Solar photovoltaic	3.6 %	6.2 %
Solar thermal	2.1 %	1.9 %
Other renewables	1.5 %	1.9 %
Renewable waste	0.3 %	0.3 %
Pumped storage (net supply) [1]	0.7 %	1.1 %
Nuclear	22.6 %	23.3 %
Coal	4.3 %	2.0 %
Combined cycle	20.7 %	16.0 %
Cogeneration	12.0 %	11.3 %
Non-renewable waste	0.8 %	0.8 %



(1) Pure pumped storage (net supply) + estimate of mixed pumped storage (net supply).

Generation from coal-fired power stations fell to all-time lows.

Regarding the peninsular coal-fired power stations, in 2020 their installed power capacity was reduced by 40.4%, due to the definitive closure, after the drafting of the decommissioning reports for the following power station: in August, the 1,056 MW Teruel plant, located in Teruel, in October the 1,005 MW Compostilla II plant located in León and the 557 MW Meirama plant located in La Coruña, in November the 619 MW La Robla plant located in León and in December the 486 MW Guardo plant located in Palencia.

As a result, coal represented just 5.2% of the peninsular installed power capacity at the end of 2020, becoming the seventh source of generation, compared to the share it had in 2019 of 8.8%, when it was ranked fourth in the overall installed power capacity on the Spanish mainland.

The peninsular coal-fired power stations in 2020 generated just 4,800 GWh, which represented a drop of 55% compared to the previous year. In line with the energy transition, this technology has been reducing its production, and in 2020 it reached the lowest value recorded since 1990.

This decline was particularly significant in the first quarter of the year, when coal-fired production was 64.7% lower than in the same quarter of 2019 and registered the largest fall of the year in January with a 71.7% drop in production. In addition, in December 2020, coal recorded the lowest monthly production registered to date with only 222 GWh.

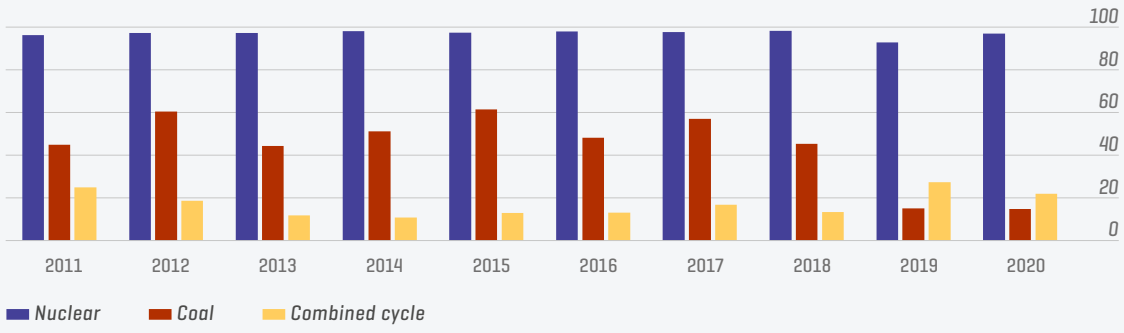
The decarbonisation challenges set by the European Union in order to reduce CO_2 emissions have meant that coal-fired production, which is more polluting than other technologies, has reduced its share in the energy mix to represent just 2% of total generation in 2020, compared to 4.3% in 2019. This technology was the seventh largest source of energy in the generation mix, behind solar photovoltaic for the first time since records began.

Between 1 and 2 May 2020, noteworthy is the fact that the mainland electricity system did not utilise any coal-fired generation for a consecutive period of 26.5 hours. As a direct consequence, 1 May was also the day in the year with the lowest emissions associated with peninsular electricity production, with a total of 38,751 tCO_2 equivalent.

The coal utilisation coefficient has also decreased, as in 2020 it stood at 14.6%, a very similar value to that registered the previous year (14.8%).

Utilisation coefficient of peninsular thermal power stations [1]

GWh



[1] The utilisation coefficient is the quotient between actual production and the available production or maximum production that the power station could achieve by operating at its rated power during the entire time they are available.

In 2020, combined cycle power stations reduced their output by 25%.

In line with the rest of the non-renewable technologies, combined cycle generation fell by 25% in 2020. Its annual production was 38,357 GWh, which is similar to the amount produced in 2012. Throughout the whole of 2020, except in January, combined cycle production was lower than in 2019. In the month of March, combined cycle power stations recorded the lowest monthly generation in 2020 and in October these plants produced half as much as they did in the same month of the previous year.

As a result of this lower production, combined cycle has reduced its contribution to the generation mix by 4.7 points, reaching a share of 16.0% in the peninsular generation mix in 2020 (20.7% in 2019). Despite this lower share, combined cycle power stations were the third largest source of generation in the energy mix for the second consecutive year.

The utilisation coefficient in 2020 stood at 21.8 % (27.1 % in 2019).

Electricity generation in all the non-peninsular systems decreased.

Annual electricity production in non-peninsular systems as a whole in 2020 stood at 11,868 GWh, 13.5% less than the previous year. A lower volume of generation was recorded in all non-peninsular systems, although the Balearic Islands' system was the one that recorded the largest decrease with 20.5%. By system, it dropped 10.5% in the Canary Islands, while in Ceuta and Melilla it fell by 3.3% and 1.4%, respectively.

The electricity produced in the Balearic Islands' system fell again for the third consecutive year, totalling 3,515 GWh in 2020, 20.5% less than the previous year, representing the lowest amount of electricity generation on the Balearic Islands since records began in 2007.

In January 2020, the definitive closure of generation units 1 and 2 of the 227 MW Alcudia coal-fired power station in Majorca took place after the drafting of the decommissioning report. In addition, in accordance with Order TEC/1258/2019, as of 1 January 2020, the operation of the Alcudia coal-fired plant has been limited to 1,500 hours/year.

The closure of generation units 1 and 2 of the Alcudia power station and the limitation of the operating hours of generation units 3 and 4 have brought about a major change in the generation mix of the Balearic Islands' electricity system, as during the first eight months of 2020, no electricity was produced with coal in the Balearic Islands' system.

As a result, coal-fired production in the Balearic Islands in 2020 fell by 88.9%, reaching an all-time low of 222 GWh. The share of coal in the Balearic Islands' generation mix was just 6.3%, while in 2019 this technology was responsible for almost half of the production of this island electricity system, with a share of 45.2%. For the first time since 2007, coal has ceased to be the main source of generation in the Balearic Islands, occupying third position in the generation mix on the Islands.

Diesel engines and gas turbines have also registered the lowest production levels since records began with a value of 282 GWh and 211 GWh, respectively. Despite the 39.1% reduction in generation using diesel engines, this technology now ranks second in the Balearic Islands' generation mix with an 8% share, compared to 10.5% in 2019.

Gas-fired turbines generated 52.3% less than in 2019, but continue to be the fourth source of production in the Islands' generation mix with a 6% share compared to 10% in 2019. On the other hand, combined cycle power stations in the Balearic Islands electricity system generated 130.8% more in 2020 than in 2019, recording its highest generation since 2007. This technology was the leading source of generation in the generation mix of the Balearic Islands, as it increased its share to 68.6%, which represents a rise of 45 percentage points compared to the previous year.

In application of Order TEC/1172/2018, of 5 November, which redefines the isolated electricity systems of the non-peninsular territory of the Balearic Islands and modifies the methodology for calculating the purchase and selling price of the energy in the dispatching of generation for non-peninsular territories. As of 1 December 2018, the two electricity subsystems of the Balearic Islands, Majorca-Minorca and Ibiza-Formentera, became one single system.

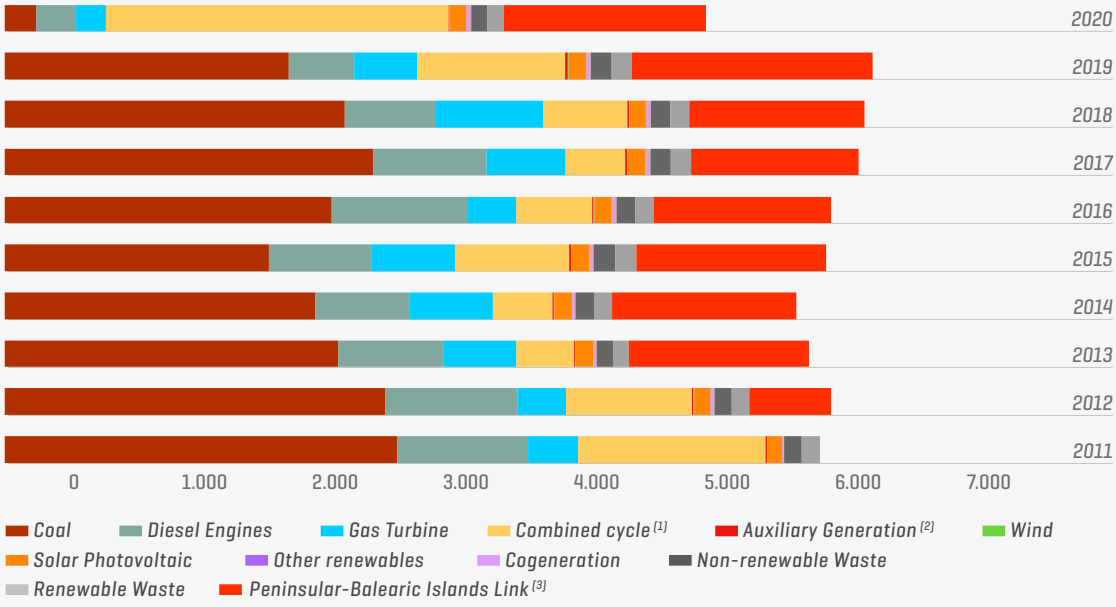
In June 2020, the new Majorca-Menorca submarine link was brought into service. This allowed the energy transferred from the mainland to the Balearic Islands to cover 28.9% of the demand on the Islands in 2020, reaching peaks of up to 42% of hourly consumption, representing a savings of around 18% in the costs of covering the demand of the Balearic Islands' electricity system.

This increase in the amount of energy transferred via the link with the mainland to cover demand on the Balearic Islands occurred, above all, during the summer period and reached an all-time high of 32.3% in August.

The energy transferred from the mainland system in 2020 covered 28.9% of the Balearic Islands' demand.

Evolution of the electricity demand coverage on the Balearic Islands

GWh



The net production of non-renewable and non-Hydro Management Units (HMU) facilities have their own consumption discounted. In these types of production, negative generation indicates that the electricity consumed for the power station's uses exceeds its gross production.

(1) Includes operation in open cycle mode.

(2) Emergency generators installed temporarily in specific zones to cover a deficit in generation.

(3) Peninsula-Balearic Islands link working at minimum technical level until 31/08/2012.

Maximum share of renewables in the energy mix of the Canary Islands.

The electricity produced in the Canary Islands' system fell to 7,946 GWh in 2020, 10.5% less than the previous year, representing the lowest amount of electricity generation on the Canary Islands since records began in 2007.

The generation coming from power stations that use fossil fuels was reduced by 11.7%, as all the non-renewable technologies, except combined cycle, have produced less during 2020. Annual generation from diesel engines, steam turbines and gas turbines in the Canary Islands fell by 11.9%, 14.5% and 36.6% respectively, registering all-time lows. In contrast, combined cycle power stations generated 6.6% more than in 2019 and were the leading technology in the generation mix with a share of 41%, the highest value recorded to date.

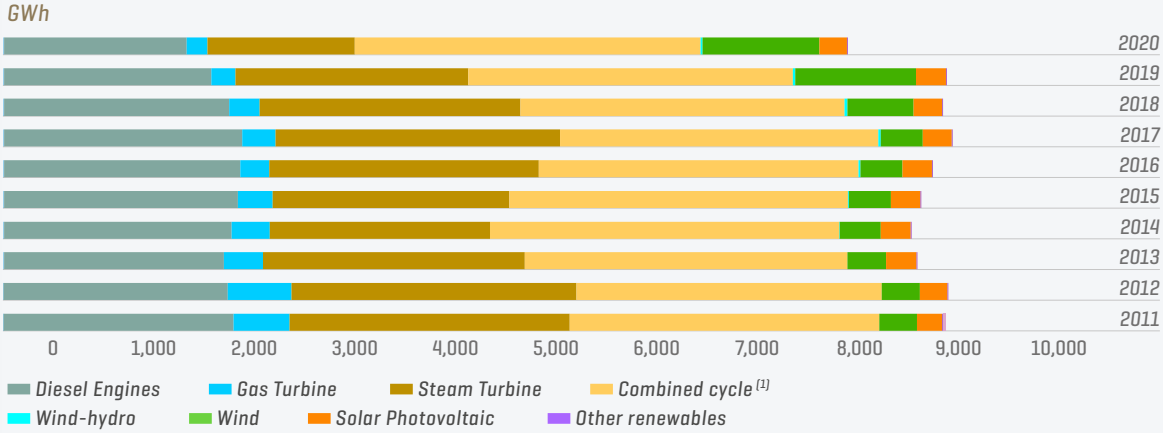
Renewable energy generation in the Canary Islands during 2020 dropped by 4.3%, but the overall share of renewable generation in the generation mix of the Canary Islands reached an all-time high of 17.5% compared to 16.4% in the previous year.

In August 2020, the generation coming from renewable sources achieved its highest monthly production recorded to date totalling 198 MWh and represented 27.7% of the total energy generated that month on the Canary Islands. On Friday 6 March, renewable energy generation reached an all-time high with a total of 9,002 MWh.
The installed wind power capacity on the Canary Islands increased over the last year by 4.8%, and as at 31 December 2020 it represented 14.9% of the renewable power capacity installed on the Canary Islands. As a result, wind power production continued to drive the energy transition in the archipelago and in 2020 reached its highest share in the generation mix of the Canary Islands with 13.8%, compared to the 12.8% share it had in 2019.

In August 2020, the maximum monthly wind power generation was recorded with a value of 166 GWh, 5% higher than the maximum in 2019, as well as the highest share of this technology in the mix with 23.4% of overall generation in the Canary Islands. In addition, on Friday 6 March wind power generation broke the all-time record for daily generation with a value of 8,102 MWh.
Throughout 2020 on the island of Gran Canaria, the all-time maximum records were beaten on several occasions, registering on Tuesday 11 August at 3:30 p.m. the maximum of instantaneous renewable energy with a value of 186.9 MW and at 3:34 p.m. the peak level of wind power with 165.3 MW. On Thursday 13 August at 3:20 a.m. the record for renewable coverage was reached with a value of 52.8%.

On Friday, 6 March at 10:39 a.m. the maximum peak of wind power was registered on the island of Tenerife with a value of 183.2 MW.

Evolution of the electricity demand coverage on the Canary Islands



The net production of non-renewable and non-Hydro Management Units (HMU) facilities have their own consumption discounted. In these types of production, negative generation indicates that the electricity consumed for the power station's uses exceeds its gross production.
(1) Includes operation in open cycle mode. Uses diesel as a primary fuel.

New daily maximum of wind-hydro generation on the island of El Hierro.

Regarding the island of El Hierro, which has an electricity system that is especially relevant because it has the Gorona del Viento wind-hydro power station, the continuous review of its operating criteria made it possible to achieve very high levels of renewable integration. Thus, in the month of July 2020, the monthly integration of renewables in this system reached 85.5%, achieving a share of 41.8% for the year as a whole.

During 2020, the Gorona del Viento hydroelectric power station, with an installed power capacity of 11.3 MW, exceeded its maximum daily production level on several occasions, reaching a new all-time record on Friday 28 August with a generation of 151.2 MWh, 3.4% higher than the previous maximum recorded on 23 August 2019.

The Chira-Soria pumped storage hydroelectric power station project is a key element of the energy transition in the Canary Islands.

Red Eléctrica de España is, in accordance with Law 17/2013, the company responsible for developing energy storage projects through pumped-storage hydroelectric power stations with the main purpose of contribute to ensuring the electricity supply, system security and the integration of non-manageable renewable energy in electrically isolated systems.

The Chira-Soria pumped-storage hydroelectric power station, located on the island of Gran Canaria, has been designed by Red Eléctrica de España and represents the development of a facility capable of maximising the integration of renewable energy

INTEGRATION OF RENEWABLE ENERGY ON THE ISLAND OF EL HIERRO

41.8 %

into the Canary Islands' electricity system by means of the storage of the surplus of non-manageable renewable generation that will occur when the production of this type of energy is high. As a result, the maximum use and efficiency of resources will be obtained.

The new power station will be an infrastructure that will serve society on Gran Canaria, contributing to promote progress on the island by strengthening the water-energy binomial and by integrating the four functions necessary to establish a sustainable and ecological development of the island because it will store energy, desalinate water, care for the territory, use and promote energy that respects the environment. In short, this type of facility, especially in an electrically isolated or weakly interconnected system such as the Canary Islands, enables progress to be made towards a more sustainable and efficient model.

Work is scheduled to begin in 2021, once the Environmental Impact Assessment process has been completed and the authorisations and permits have been issued by the Canary Islands Government. In order to adapt the awarding deadlines for the works to the planned start date, Red Eléctrica, in the third quarter of 2020, proceeded to put out to tender the supply and construction works for the Seawater Desalination Plant.

During 2020, the energy transition process set a new milestone towards reaching an emission-free model by recording the all-time minimum level of CO_2 equivalent emissions associated with national electricity generation: 36 million tonnes of CO_2 equivalent, 27.8% less than in 2019 and 67.5% below the emissions level registered in 2007.

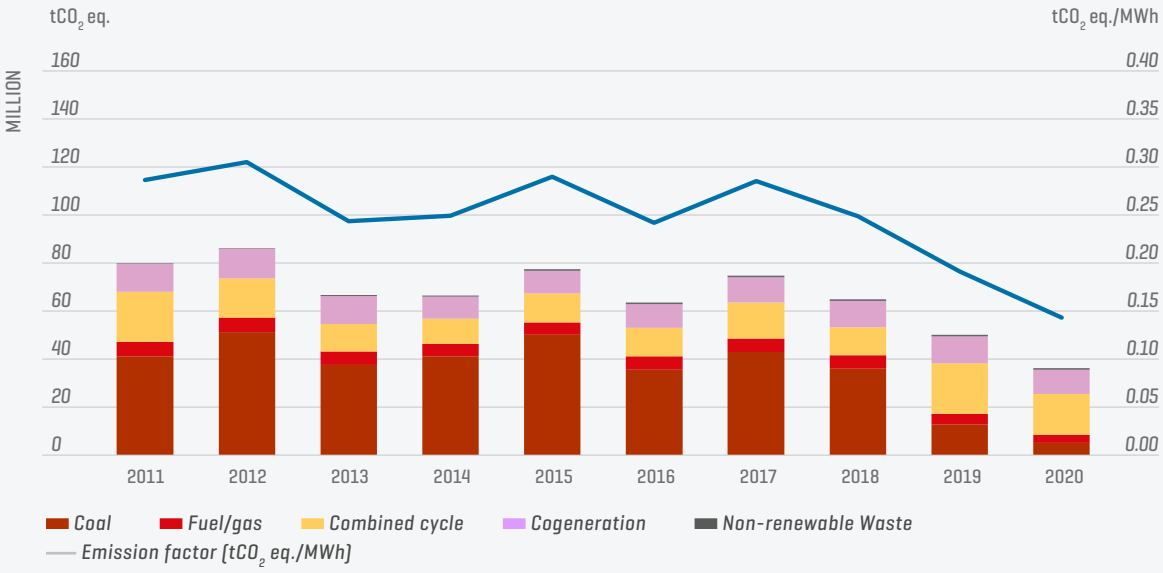
This reduction in emissions is primarily explained by the significant increase in the share of clean energy in the national energy mix. In 2020, 44% of overall national generation came from renewable sources and 67.3% of the national total came from those technologies which produce zero CO_2 equivalent emissions.

In addition, the significant decrease in the output of coal-fired power stations in 2020 meant that CO_2 equivalent emissions associated with this technology were 60.6% lower than in 2019.

With national information available since 2007, April 2020 was the cleanest month in terms of CO_2 emissions since records began, with 2.2 million tonnes of CO_2 equivalent, and 1 May was the day with the lowest emissions associated with national electricity production, with a total of 51,222 tCO_2 equivalent.

In 2020, the all-time minimum record of CO_2 equivalent emissions associated with electricity generation was registered.

Emissions and CO_2eq emission factor associated with national electricity generation [1]



[1] Includes the Spanish Peninsula, the Balearic Islands, the Canary Islands, Ceuta and Melilla.

Among the most relevant aspects of electricity generation per autonomous community during 2020, the following are noteworthy:

- In 2020, Andalusia was the second autonomous community with the second highest installed renewable generation capacity with 8,230 MW as at 31 December 2020, an increase of 11.8% compared to 2019. This increase in renewable installed power capacity is mainly due to the 46% growth in solar photovoltaic. In Andalusia, there significant progress was made regarding decarbonisation: in 2020, coal-fired generation fell by 93.8% to 179 GWh, the lowest figure since 2011, becoming a negligible energy source, generating just 0.6% of the total electricity produced in Andalusia.

- Aragón was the autonomous community with the highest growth in renewable generation with an increase of 48.7% compared to the previous year, driven by the increase in photovoltaic, wind and hydro, which produced 358.9%, 36.4% and 36.1% more than in 2019, respectively.

- This higher renewable generation is due to the fact that Aragón was one of the autonomous communities that most increased its installed renewable power capacity in 2020 (24.5% compared to 2019), which already accounts for 71.7% of all production capacity in the region, with wind as the leading technology in terms of installed power.

- In Asturias, wind power production recorded the highest share in its generation mix since records began, with a 12.4% share of the region's electricity production.

- In 2020, Castilla-La Mancha was the region with the second highest solar photovoltaic generation (the first was Andalusia, which produced 22.7% of Spain's photovoltaic energy). This technology experienced a growth in its generation in Castilla-La Mancha of 56.5% and reached a maximum share in the region's mix by producing 13.4% of the total (in 2019, its share was 8.6%).

- Castilla y León continues to be the autonomous community with the highest renewable energy generation. In 2020, 87% of its production came from renewable sources, with wind power being the leading technology, accounting for 49.4% of the total.

- It is the autonomous region with the highest installed renewable and wind power capacity, as 95.2% of its generation fleet is renewable. In addition, in 2020, the 2,110 MW of coal-fired power capacity installed in this region was decommissioned.

- Catalonia was the region that experienced the greatest increase in hydroelectric generation in 2020, 47.7%, which enabled renewable energy to produce 15.6% more than in 2019 and reach a share of 19.5% of the generation mix in Catalonia.

- In Extremadura, installed solar photovoltaic power capacity became the leading technology for the first time, with a share of 32.9% of the region's overall installed power capacity. It was also the region with the highest share of generation using those technologies which produce zero CO_2 equivalent emissions, reaching 99.7% of its generation mix in 2020.

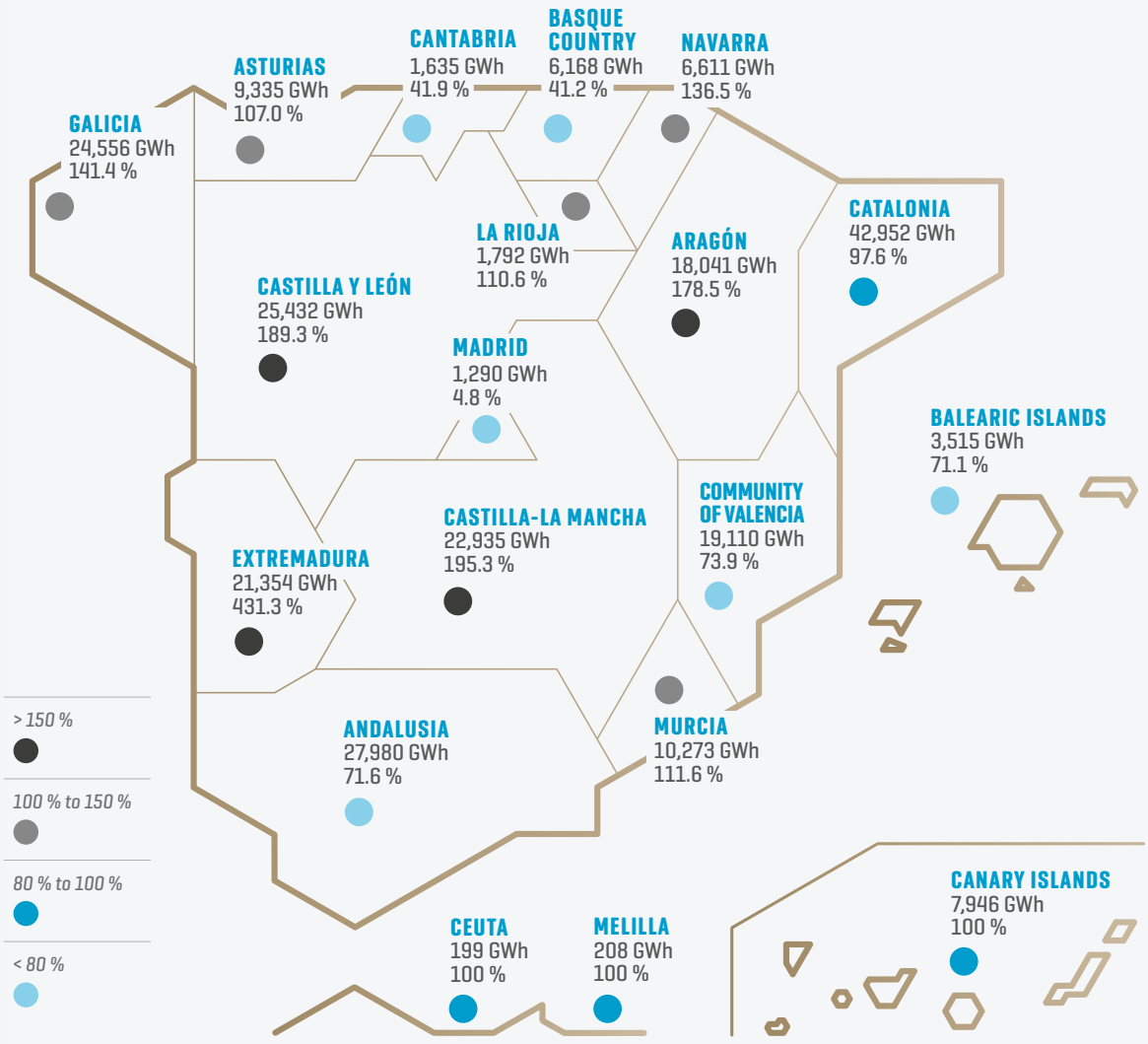
- In Galicia, renewable generation sources produced 75.6% of the mix, the highest share since records began ranking it as the second region in renewable energy generation in 2020.

- In the Balearic Islands, renewables were responsible for 6.7% of the electricity generated in the Balearic Islands' system, surpassing coal for the first time and reaching the highest share in the mix since records began (2007).

- In the Canary Islands, renewables generated 17.5% of the total in 2020, the highest share since records began. Wind also reached its highest share since 2007, producing 13.8% of the Islands' electricity.

Significant progress made by the autonomous communities towards reaching decarbonisation targets.

Electricity generation/Demand ratio (%) and generation (GWh) in 2020 per autonomous community

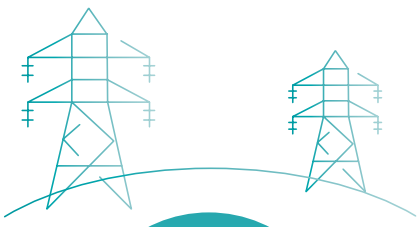


3

Scheduled international electricity exchanges

The scheduled energy imports in Spain were 5.7% lower than in the previous year.

For the fifth consecutive year, Spain's electricity exchange programmes with other countries closed 2020 with an import balance.



-52 %
COMPARED TO 2019

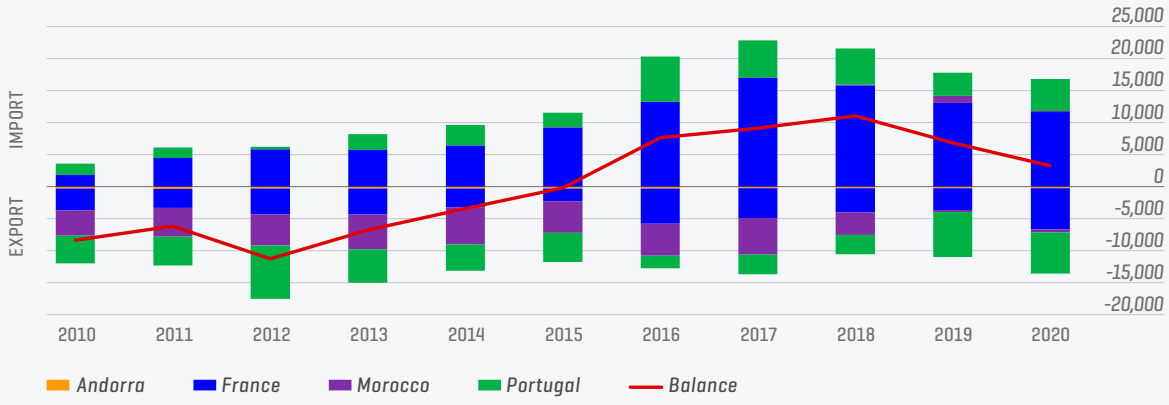
IMPORT BALANCE 2020

3,300 GWh

The total volume of energy scheduled through the interconnections reached 30,314 GWh, 5.4% higher than in 2019. A total of 13,507 GWh was scheduled for export, 23.4% more than the previous year, and a total of 16,807 GWh was scheduled for import, 5.7% less than in 2019. As in the previous year, the net balance is again as an importer, with a value of 3,300 GWh, 52% less than in 2019.

Annual evolution of scheduled international energy exchanges

GWh

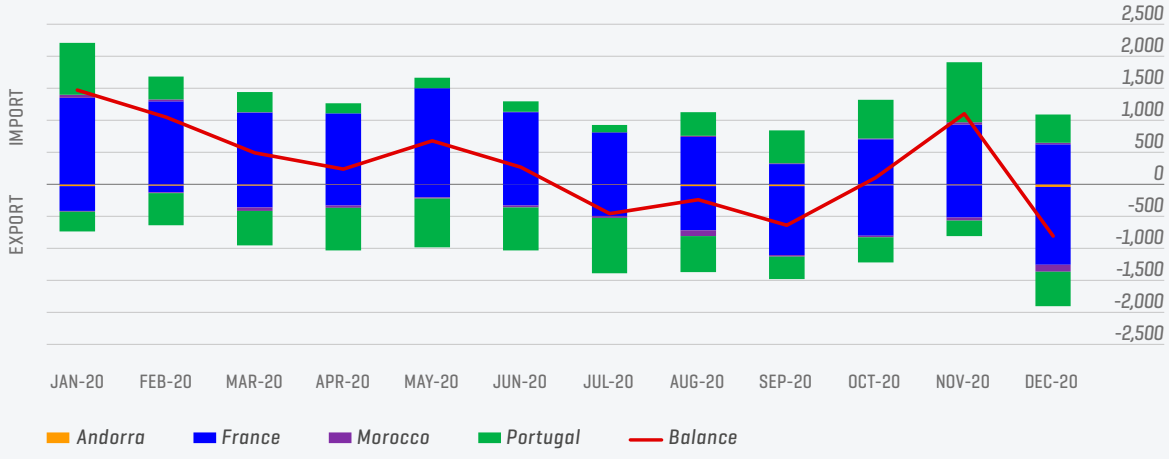


In 2020, the net monthly balance of scheduled energy exchanges in the Spanish cross-border connections was as an importer from January to June and from October to November. In July and August, the net balance was as an exporter due to a higher contribution of the energy exchange export programmes to the Portuguese system.

In September, high prices in France meant a greater contribution from export programmes to the French system, so the net balance was also as an exporter, as well as in December, the month with the highest electricity generation in the year from renewable technologies. The maximum net import balance took place in January (1,475 GWh) and the maximum export balance occurred in December (807 GWh).

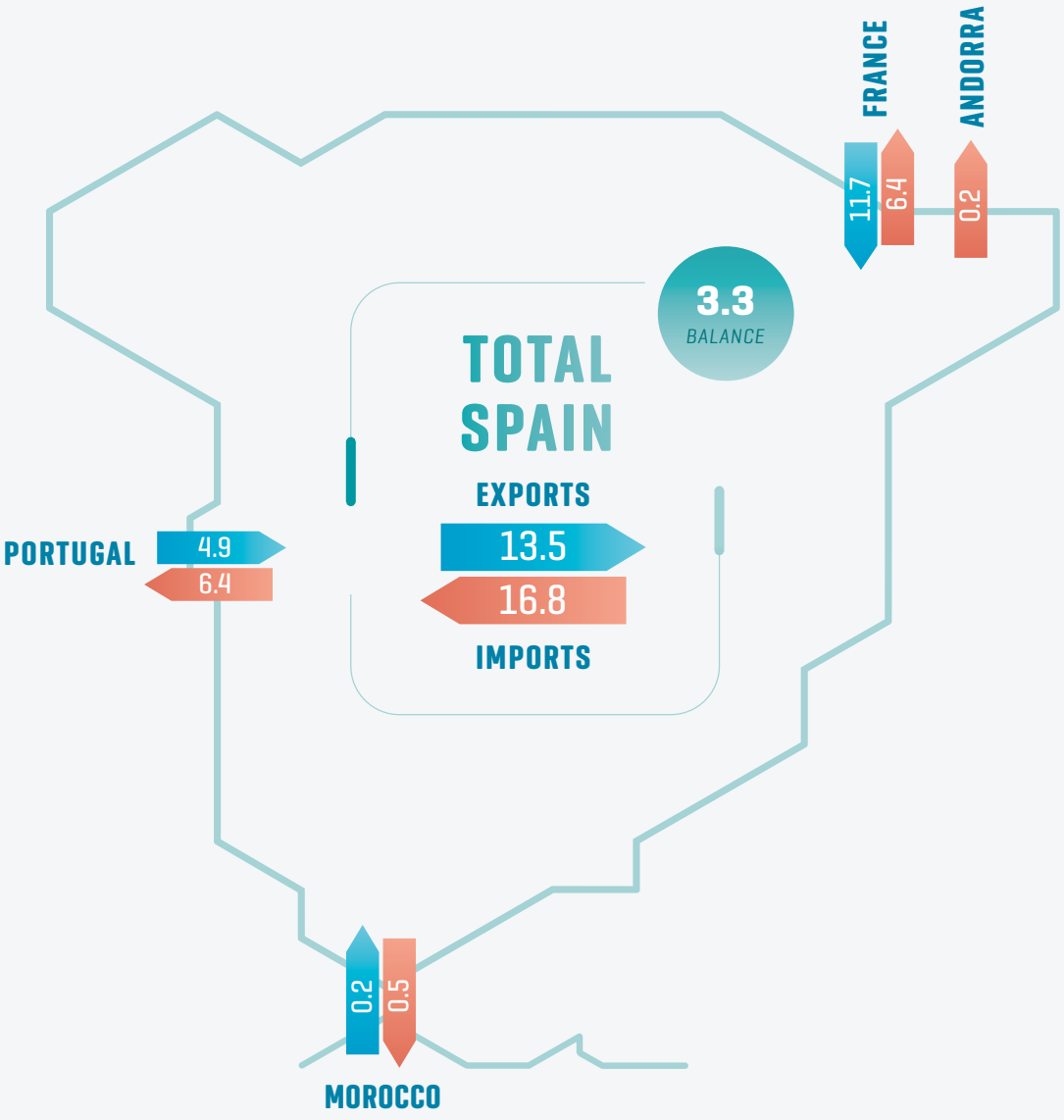
Monthly evolution of scheduled international energy exchanges in 2020

GWh



Scheduled International energy exchanges by interconnection in 2020

TWh



The total volume of scheduled energy exchange through cross-border connections reached 30,314 GWh, 5.4% higher than in 2019.

France

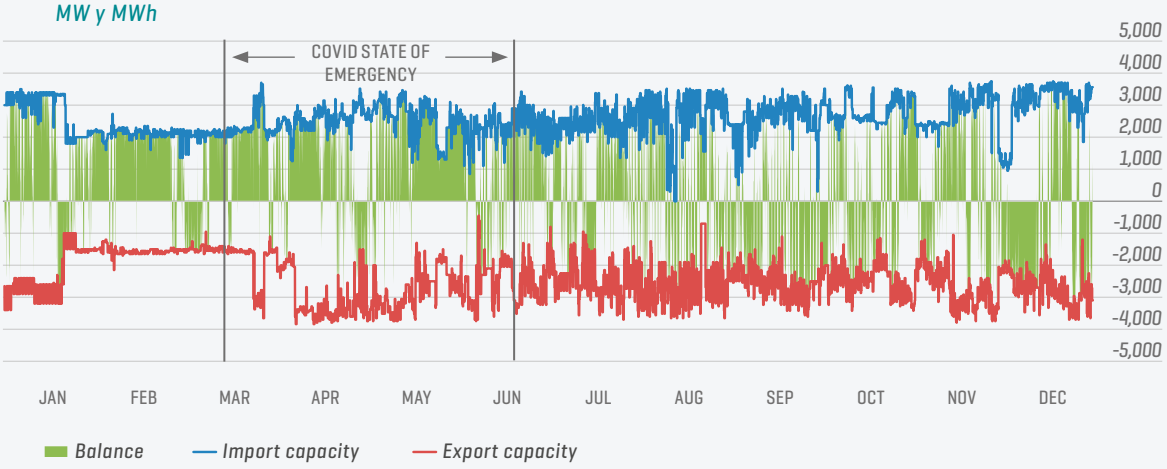
The net annual balance of electricity exchanges through the cross-border connection with France was 5,248 GWh, 45.9% lower than in 2019. Import programmes totalled 11,668 GWh, 11.1% lower than the previous year, and export programmes totalled 6,420 GWh, 88.1% higher than last year. With the exception of September, October and December, the net monthly balances were as an importer in all months.

During 2020, a high utilisation rate of this cross-border connection was registered, most of the time in the direction from France to Spain (62% of the hours), which is lower than the 80% for 2019. In the first few months of the year, before the state of emergency, except for specific values, the balance through this cross-border connection was as an importer as the price in Spain was higher than the price in France. The average rate of exchange capacity utilisation in this period was 85.6%. During the period in which the state of emergency was active, the balance was mainly as an importer. In those months, prices in Spain were low due to lower demand and the possibility of covering most of it with renewable generation, but in France demand also fell and, therefore, so did prices, so that the direction of exchange continued to be from France to Spain, as the demand for electricity in Spain was lower than in France although a reduction in the differences was observed. During this period, the average rate of exchange capacity utilisation was 80.3%. After the state of emergency, a reduction can be observed in the use of the cross-border connection leading to lower congestion levels, except for the last month. The balance in these months were mostly as an exporter. The change in the direction of the balance towards an exporter is generally due to two causes: the excess of renewable energy in the Spanish system or high prices in France, generally due to the high non-availability of its nuclear power stations. This second reason is the one that occurred the most during this period, with France reaching maximum hourly prices close to 200 €/MWh. In recent months, the average rate of exchange capacity has reached 76.4%.

During 2020, a high utilisation rate of this cross-border connection was registered, most of the time in the direction from France to Spain (62% of the hours), which is lower than the 80% for 2019.

Exchange capacity and net balance of scheduled exchanges at the interconnection with France 2020

MW y MWh



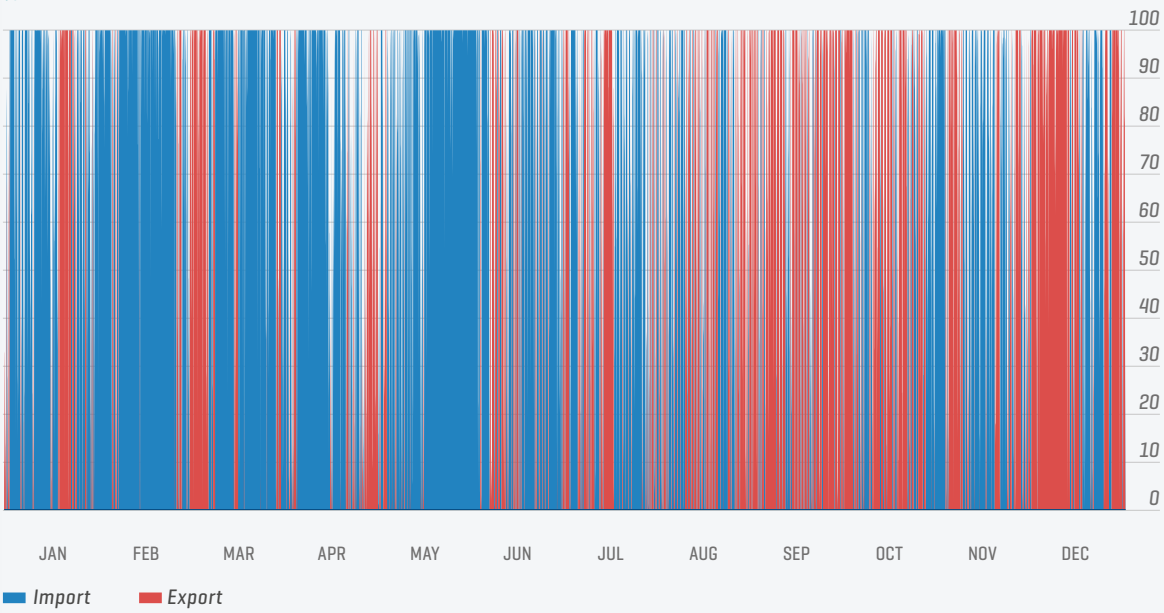
With regard to the use of energy exchange capacity, congestion was registered for 34.1% of the hours in the import direction, while 18.5% of the hours were congested in the export direction. From January to August, the use of the cross-border connection was mainly as an importer (51% of the hours had usage above 85%), with 44% of hours being congested in the import direction. In September, October and December, the use was mainly as an exporter (65.7% of the hours) due to high non-availability of nuclear power in France and high renewable generation in Spain in October and December. In these months there was congestion in the export direction 38.9% of the hours.

After the state of emergency, there was a reduction in the use of the cross-border connection mainly with an export balance, due to the excess of renewables in the Spanish system or high prices in France, due to a high non-availability of its nuclear power stations.

UTILISATION OF THE INTERCONNECTION WITH FRANCE WAS IN THE IMPORT DIRECTION FOR A TOTAL OF 8 MONTHS.

51% *OF THE HOURS WITH A UTILISATION RATE IN EXCESS OF* **85%**

Utilisation rate of exchange capacity in the interconnection with France 2020



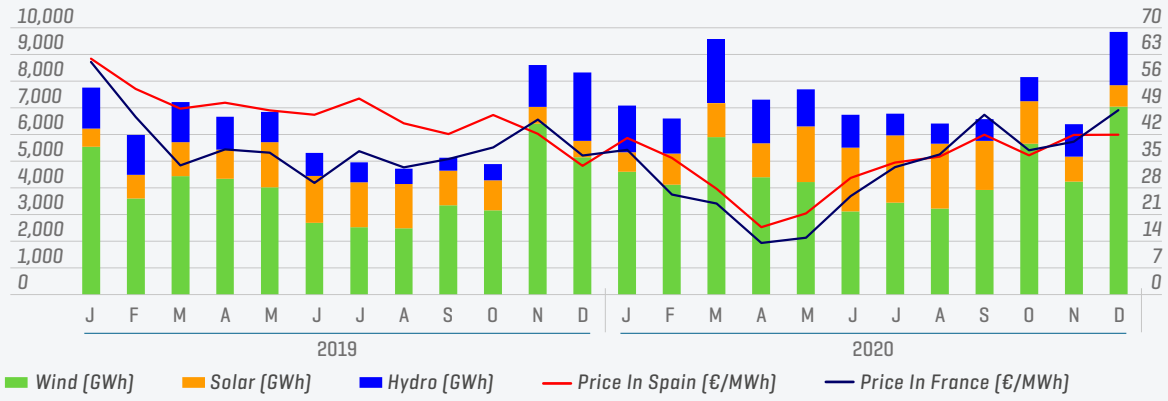
Comparing the evolution of day-ahead market prices in France and Spain with the behaviour of renewable generation in Spain over the last two years, it can be seen that when the latter is high, the price differentials between the two countries are lower. In September, the high non-availability of French nuclear power (the maintenance periods of the nuclear power stations were delayed due to the health crisis, concentrating the non-availability in this month), meant that the price in France was high and therefore the price differences were greater (price in Spain lower than in France).

In December, despite the high percentage of renewable generation in Spain, the situation in France once again caused prices there to increase, making the price difference greater. Greater interconnection capacity would have enabled prices to be closer in value.

The health crisis led to low demand (annual peninsular demand was similar to 2004 levels) and a significant drop in prices in Europe led to a greater convergence of prices being observed, especially as of July.

Renewable generation in Spain and day-ahead market prices

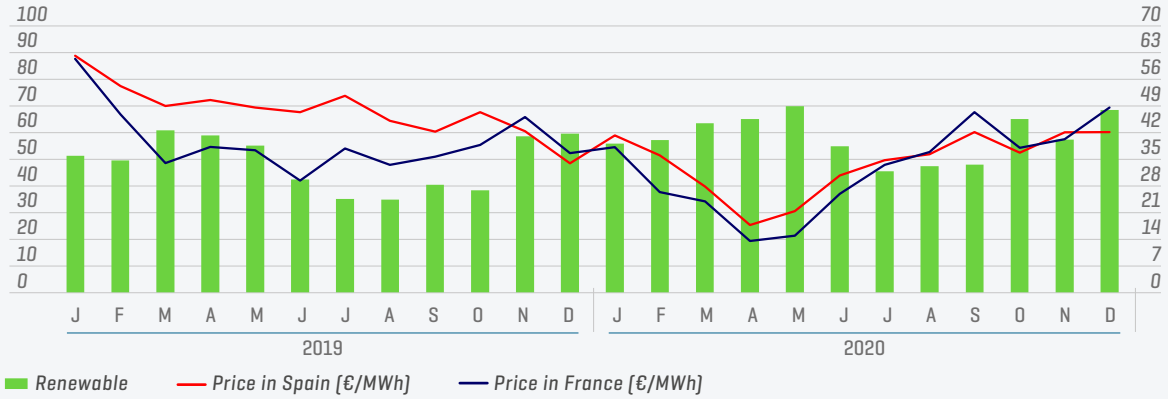
GWh and €/MWh



Wind power production influences day-ahead market prices and has an impact on the direction of exchanges. Thus, in the month of March, the balance of the exchange schedules with France was as an importer when low levels of wind power production were recorded in Spain, while the balance became mostly as an exporter when there were high levels of wind power production.

Percentage of renewable generation in Spain and day-ahead market prices

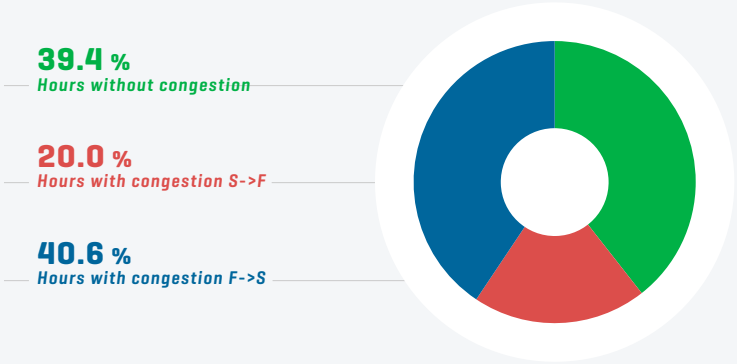
% and €/MWh



With regard to the level of utilisation of exchange capacity in the daily horizon, a high rate of utilisation of this interconnection was recorded, although less than last year. Thus, in 4 out of every 10 hours it was congested in the direction from France to Spain, with an average price difference of 9.3 €/MWh; in 20% of the hours, it was congested in the direction from Spain to France, with an average price difference of 10.3 €/MWh, and in the remaining 39.4% of the hours there was no congestion in this interconnection.

Hours without congestion and with congestion in the interconnection with France in 2020

€/MWh



In 2020, only three full days without congestion on the daily horizon were recorded in the interconnection with France. On 62% of the days, congestion was registered for more than 12 hours, compared to 81% the previous year.

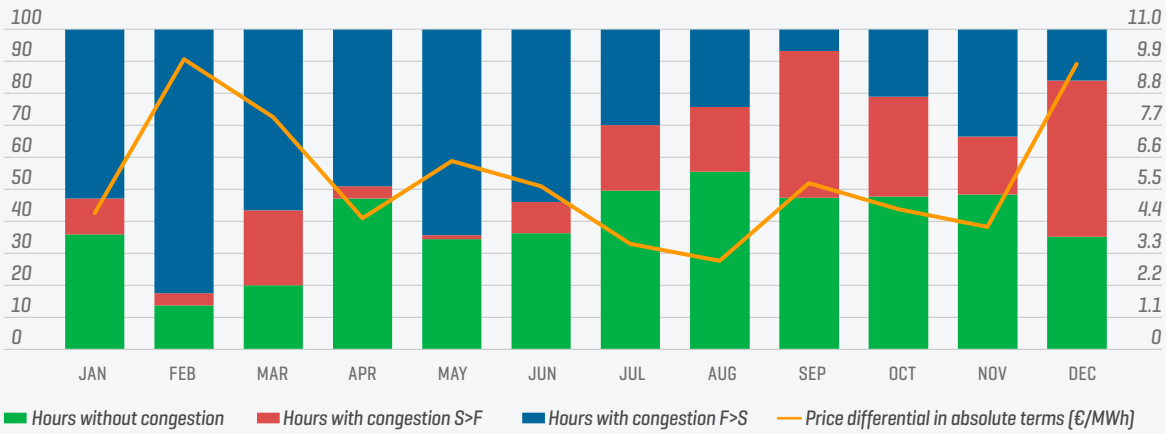
Congestion levels of exchange capacity on the daily horizon were higher in the direction from France to Spain every month, except in September, October and December when prices in Spain were lower than in France.

It was precisely in September and December that the highest percentage of hours with congestion in the direction from Spain to France was recorded. The highest rates of hours without congestion were registered in August (with more than half of the hours) and July (with almost 50% of the hours).

The average price differential in absolute terms in 2020 was equal to 5.9 €/MWh, 42% less than last year.

Hours with and without congestion in the interconnection with France and difference in prices of the day-ahead market in 2020 0

% and €/MWh



Congestion rents generated in 2020 in this interconnection totalled 135.6 million euros (84.1 million in the import direction and 51.5 million in the export direction), with 50% of this total corresponding to the Spanish electricity system. This is 24% less than the revenue generated in 2019.

With regard to the prices resulting from the exchange capacity auctions, the marginal price of the annual capacity auction for 2020 in the direction Spain ▸ France was equal to 3.40 €/MW, which represents a fall of 22% in the price compared to the annual auction for 2019 (4.36 €/MW). In the direction France ▸ Spain, the resulting marginal price was equal to 5.25 €/MW, which represents a drop of 30% compared to the price registered in that direction in the annual auction for 2019 (7.51 €/MW).

The maximum price of allocated capacity in the monthly auctions was registered in February, in the direction France ▸ Spain with a value of 5.00 €/MW, much lower than the 14.05 €/MW for May 2019. In the direction Spain ▸ France the maximum price was reached in January with 6.21 €/MW, half the value registered the previous year.

Cross-border balancing services, managed via the BALIT platform (active only until 3 March), enabled 5.5 GWh of balancing energy to be scheduled for import and 31.8 GWh for export via the interconnections with France.
As of 8 October, exchanges of balancing energy through the cross-border connections with France began via the European platform for the management of balancing energy from replacement reserves (RR), with 6.8 GWh of imports and 5.9 GWh of exports.

In 2020, it was necessary, to a much greater extent than in the previous year, for the Spanish and French electricity system operators to implement coordinated counter-trading actions (exchange programmes in the opposite direction to the existing flow established to guarantee the firmness of commercial programmes when faced with capacity reductions) by the operators of the Spanish and French electricity systems, for a total value of 646 GWh (373 GWh in the import direction), a figure higher than the 551 GWh programmed the previous year, thus setting a new record.

135.6
MILLION EUROS
IN CONGESTION RENTS FOR THE SPAIN – FRANCE INTERCONNECTION

84.1
MILLION EUROS
IN THE IMPORT DIRECTION

51.5
MILLION EUROS
IN THE EXPORT DIRECTION

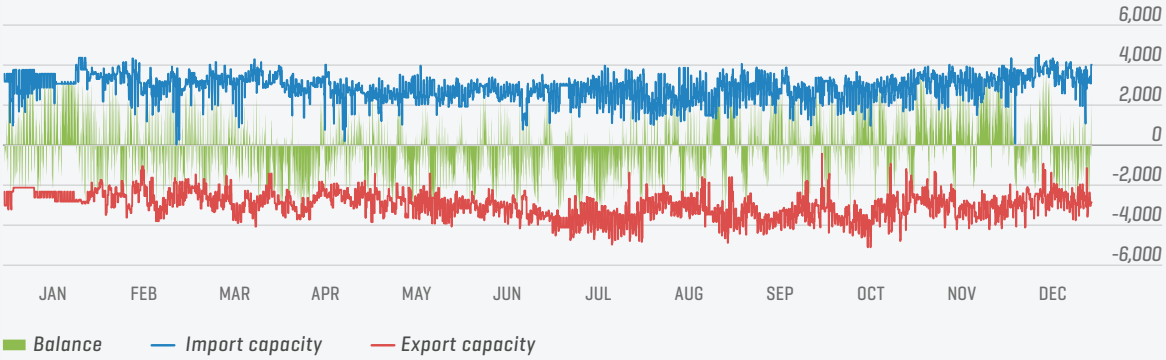
In 2020, it was necessary, to a much greater extent than in the previous year, for the Spanish and French electricity system operators to implement coordinated counter-trading actions, for a total value of 646 GWh (373 GWh in the import direction), a figure higher than the 551 GWh programmed the previous year, thus setting a new record.

Portugal

The net annual balance of scheduled energy exchanges in the interconnection with Portugal was once again as an exporter, with a value of 1,455 GWh, compared to 3,395 GWh in 2019. This is the second consecutive year with an export balance, previously not recorded since 2015. The import programmes totalled 4,942 GWh, with an increase of 35.8% with respect to the previous year, while those for export totalled 6,397 GWh, a value that was 52% lower than last year.

Exchange capacity and net balance of scheduled exchanges in the interconnection with Portugal in 2020

MW and MWh

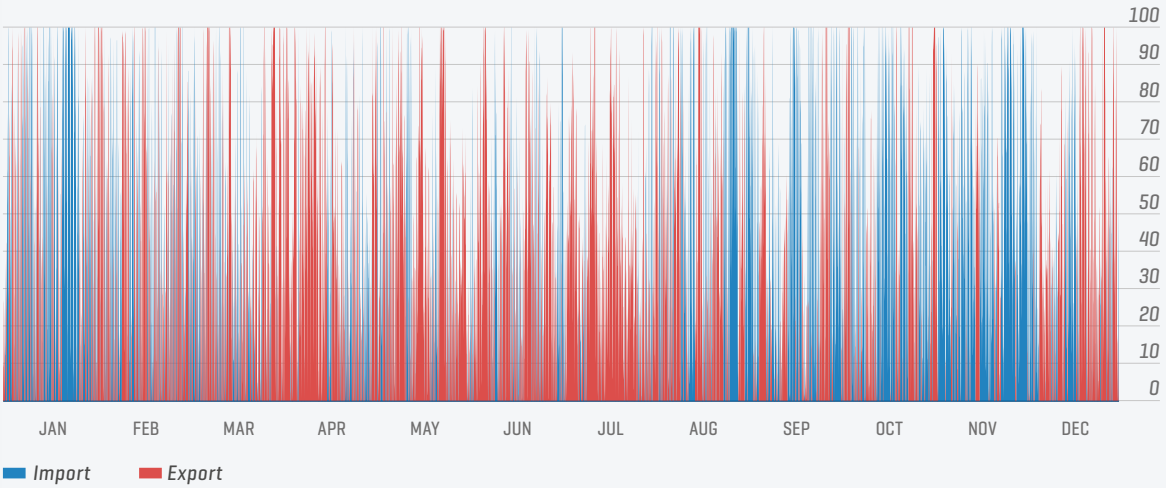


The net balance of programmes was as an exporter for 8 months of the year: from February to August and again in December. In year as a whole 56.6% of the hours registered an export balance, with July being the month with the highest number of hours (602 hours. Portugal reduced the energy exchange export capacity from Spain (Spain ▸ Portugal) by a significant number of hours in order to integrate the maximum amount of wind power production into its own system. November is the month with the highest number of hours with an import balance (562 hours).

Regarding the final use of the exchange capacity, in this interconnection there were no days when there was congestion throughout the whole 24-hour period.

Utilisation rate of exchange capacity in the interconnection with Portugal 2020

%



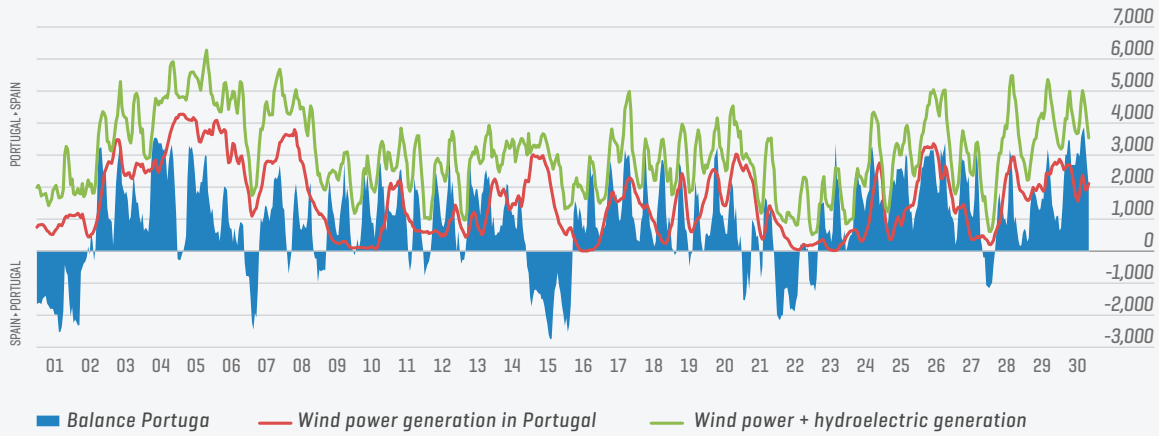
The import balances are largely due to high hydroelectric and wind power generation in Portugal. In 2020, the producible hydroelectric power index was 0.97 and the wind power index was 0.94. November was the month with the highest import balance, although it does not coincide with the month with the highest producible wind power or hydro index in the Portuguese system, partly due to the lower indexes registered in Spain. The months of January and August had the lowest number of coupled hours, while November was the month with the highest recorded price difference.

Both hydroelectric and wind power generation significantly influenced the scheduled balances in the interconnection with Portugal. As an example, it can be seen how in a month with high wind and hydroelectric power production in Portugal (such as November), the balance is as an importer, while in months with low production it is as an exporter, or a with low importer balance.

The import balances in the interconnection with Portugal are largely due to the high hydroelectric and wind power generation in Portugal.

Balance of scheduled exchanges in the interconnection and wind power and hydroelectric generation in Portugal in November 2020

MWh



In the daily horizon, the convergence registered in the interconnection with Portugal in 2020 were high, resulting in a percentage of hours with congestion of slightly over 4% in the day-ahead market. Consequently, prices in one system or the other were very similar, with the hourly price differential in absolute terms being 0.12 €/MWh.

JUST OVER

+4 %

OF THE HOURS HAD CONGESTION

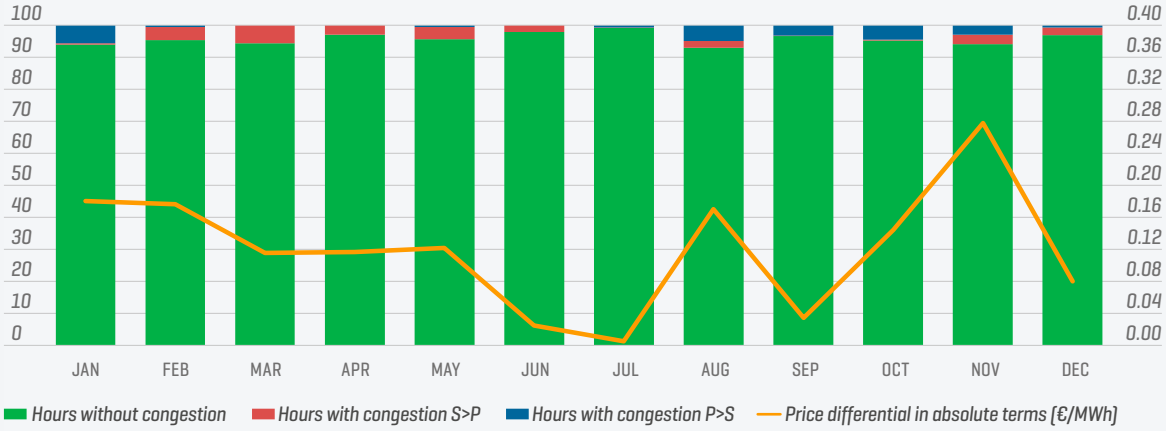
Hours without congestion and with congestion in the interconnection with Portugal in 2020

%

The monthly evolution shows that July was the month with the highest coupling rate, while August saw the highest percentage of hours with congestion, with almost 7% of the hours of the month and a price difference of 0.17 €/MWh. November, with almost 6% of hours with congestion, is the month with the highest price difference: 0.28 €/MWh.

Monthly congestion levels and average difference in prices in the interconnection with Portugal in 2020

% and €/MWh



Congestion rents reached almost 3 million euros, with 49.4% coming from the day-ahead market, 2.6% from the intraday market, 0.2% from replacement reserves (RR) and 47.8% from the auctions (24.4% in the annual, 12.3% in the quarterly and 11.1% in the monthly). 50% of this amount corresponds to the Spanish electricity system.

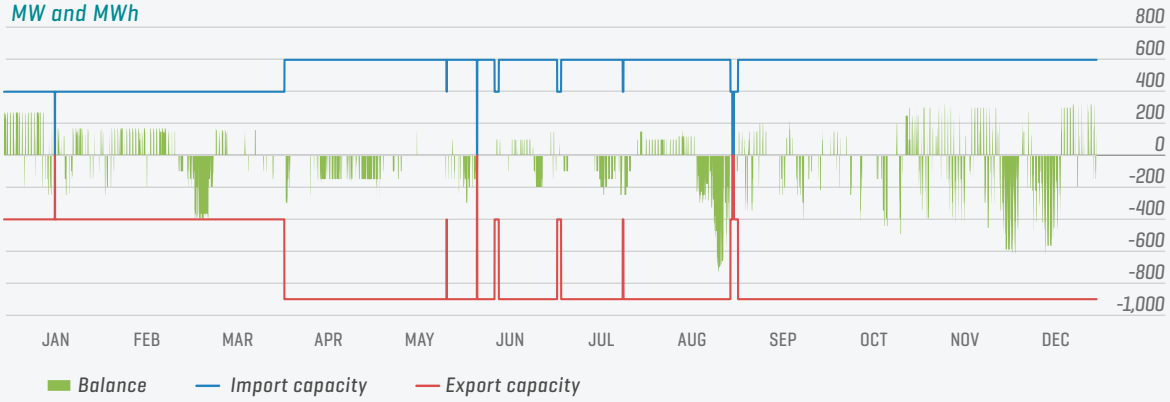
Through the management of cross-border balancing services via the BALIT platform (active only until 3 March), imports of balancing energy of 7.2 GWh and exports for a value of 15 GWh were scheduled at this border. As of 29 September, balancing energy exchanges through this border began, via the European platform for the management of balancing energy from replacement reserves (RR), allocating 84.3 GWh of imports and 150.8 GWh of exports.

In 2020, coordinated counter-trading actions were required for a total value of 14.2 GWh, higher than the 4.8 GWh programmed in the previous year. In the import direction, 98% were programmed in the import direction and the remaining 2% were in the export direction.

Morocco

The annual balance of the scheduled exchanges with Morocco was again as an exporter, with a value of 298 GWh, compared to 774 GWh imported last year. The months of January and February are the only ones with a net balance as an importer, while the rest of the months the net balance is as an exporter. The total volume of energy exchanged was 691 GWh, 48.8% less than last year and the lowest volume since records began.

Exchange capacity and net balance of scheduled exchanges in the interconnection with Morocco in 2020

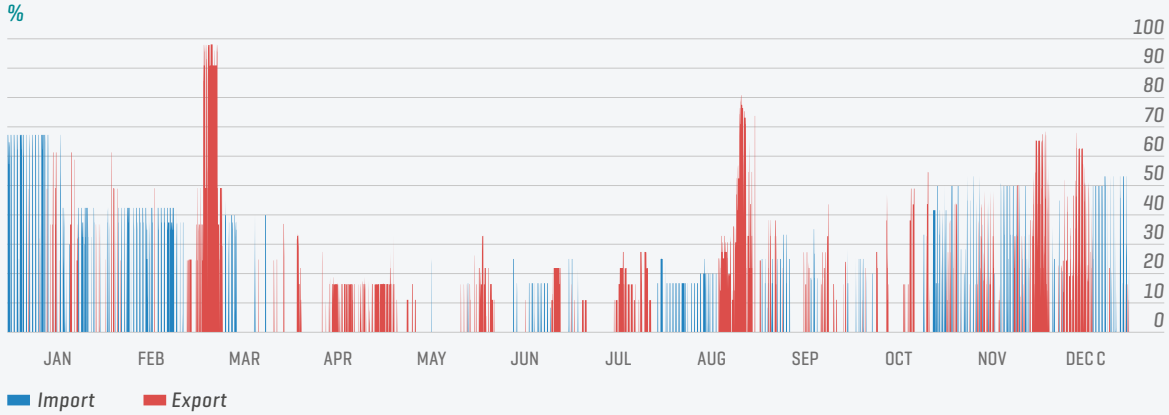


The average utilisation rate of the exchange capacity of this interconnection changed with respect to other years, 24%, up from 5% in the previous year, while imports were 13%, down from 22% in 2019. The interconnection was utilised for only 37.5% of the hours, compared to 54.2% last year.

The average utilisation of the interconnection two-way energy flows (import-export) in 2019 was 27.4% while in 2020 it was 12%. If only days are taken into account when scheduled exchanges were programmed, the average utilisation rate in 2019 was 50.5% while in 2020 it was only 32%.

The graph shown below clearly shows that in 2020 the interconnection with Morocco was not congested at any time (the previous year it was congested for 18 hours in the import direction and 12 hours in the export direction), although in March a utilisation rate of 98.5% was recorded in the export direction (coinciding with a reduction in exchange capacity).

Interconnection capacity utilisation in the interconnection with Morocco in 2020



The reductions in the exchange capacity through this interconnection were due to the non-availability of one of the two links that make up this interconnection that has a significant impact on exchange capacity. Until 3 April, capacity on this interconnection was limited to 400 MW in both directions, as circuit 2 was inoperative. On several days from June to September, capacity was also reduced to 400 MW. For several hours on 18 January, 7 June and 1 September capacity was 0 MW due to the non-availability of both links.

There was a significant reduction in the energy traded through this interconnection, which shows that Morocco is becoming increasingly self-sufficient (since 2017, its solar production has quadrupled and both wind and coal-fired generation have increased by 50%), with a consequent reduction in the energy exchanges scheduled through this interconnection.

Evolution of the volume of scheduled energy at the border with Morocco

A change in the scheduling horizon was also observed. The table shows trading in the day-ahead markets (**DM**) and intraday markets (**IM**), in GWh and the % traded in each market of the total scheduled volume.

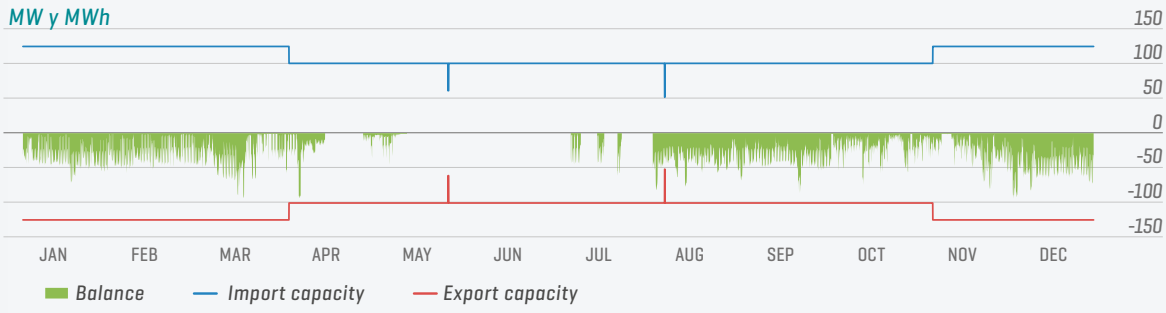
It can be clearly seen how a greater volume of energy has usually been managed in the intraday market, although in the first years shown in the table, the IM vales ranged between 55-60%; in 2018 it changed, with just over 70% of the energy scheduled in the intraday market; in 2019 it was 90% and in 2020 100% was traded in this market.

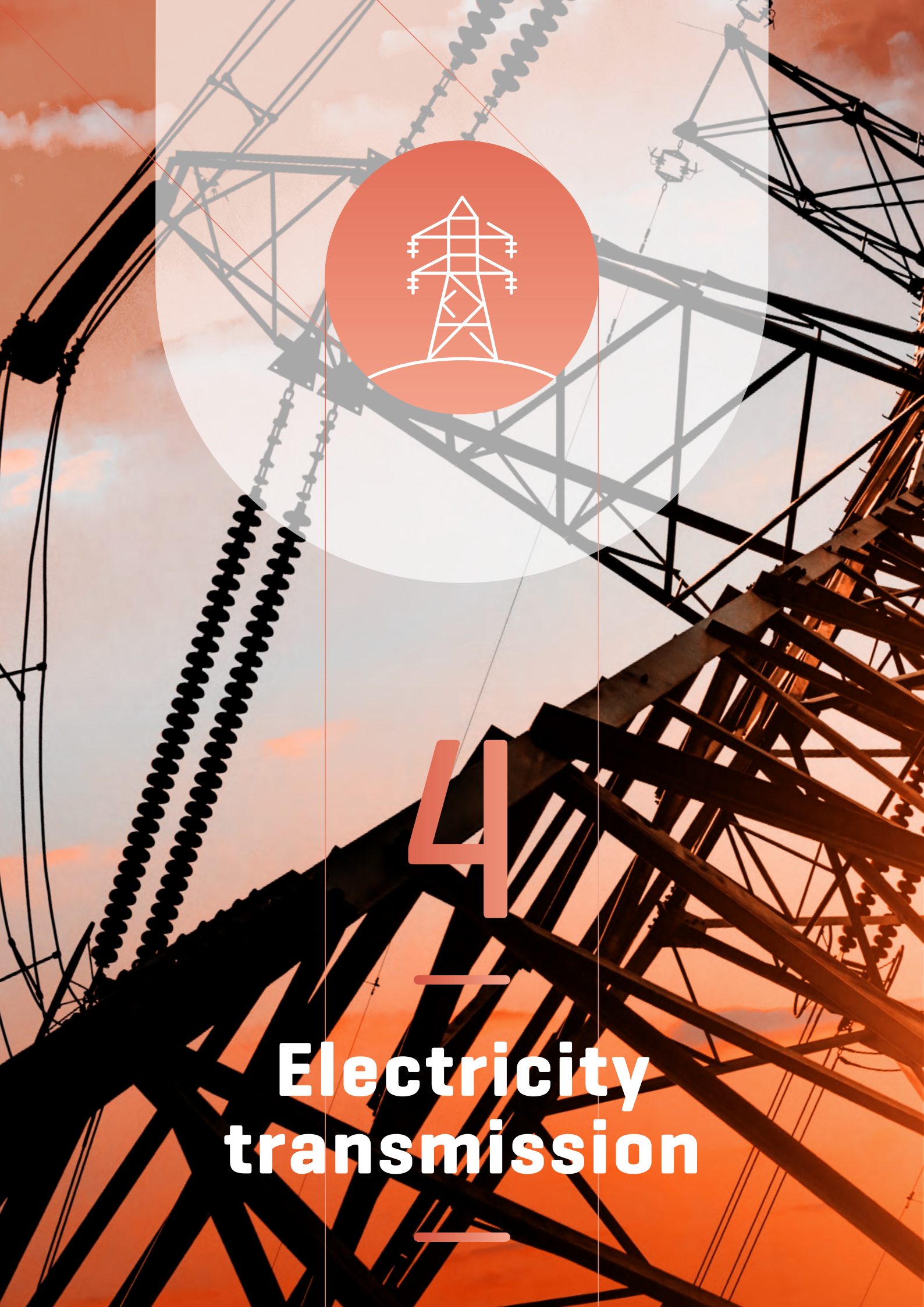
Year	%IM	%DM	DM Contracted	IM Contracted	Scheduled volume
Year 2016	54 %	46 %	2,274	2,678	4,952
Year 2017	58 %	42 %	2,389	3,352	5,747
Year 2018	73 %	27 %	986	2,653	3,640
Year 2019	90 %	9 %	124	1,211	1,351
Year 2020	100 %	0 %	0	691	691

Andorra

The net annual balance of the electricity exchanges scheduled in the interconnection with Andorra was as an exporter, with a value of 196 GWh, which represented a fall of 6.2% with respect to 2019. The average utilisation rate of the exchange capacity of this interconnection in the export direction was 18.5%.

Exchange capacity and net balance of scheduled exchanges in the interconnection with Andorra in 2020





4

Electricity transmission

There were 116 km of line circuits and 93 substation bays commissioned in 2020, bringing the total length of line circuit in the national grid to 44,553 km and there were 6,176 substation bays at the end of the year.

During 2020, transmission grid development was bolstered by the commissioning of facilities that effectively contribute towards driving the energy transition.

TOTAL LENGTH OF LINE CIRCUIT IN THE NATIONAL GRID

44,553 km

INSTALLED TRANSFORMER CAPACITY NATIONWIDE

93,895 MVA

Committed to the energy transition

During 2020, the commitment to the efficient development of the transmission grid was bolstered, by the commissioning of facilities that contribute to the energy transition, the aim of which is to integrate the largest possible amount of renewable generation promote electrification and improve interconnections between systems, thus guaranteeing security of supply and ensuring quality of service.

Despite the health crisis in 2020, the planned pace of commissioning continued 116 new kilometres of line circuit and 93 substation bays were commissioned, bringing the total circuit length of the national grid to 44,553 kilometres and there were 6,176 substation bays by the close of the year. Regarding transformer capacity, this increased by 1,430 MVA, bringing the total installed transformer capacity nationwide to 93,895 MVA.

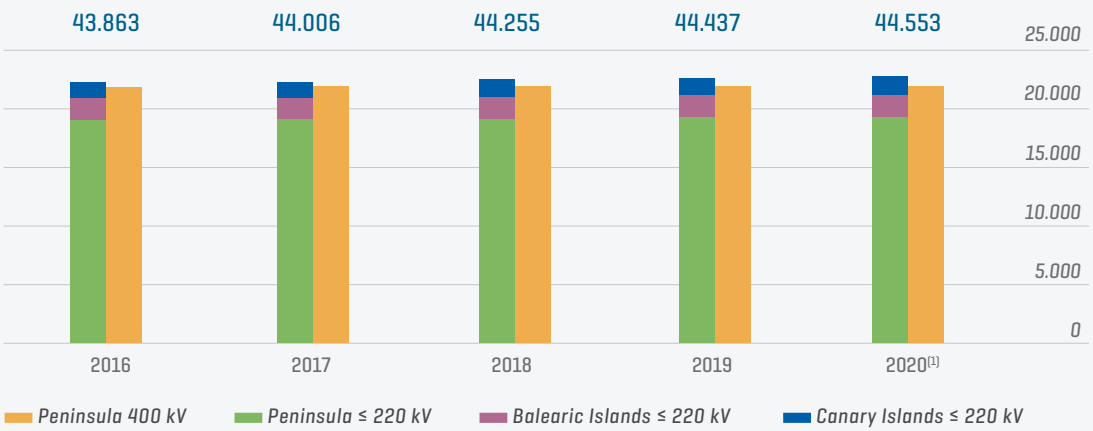
Facilities in the electricity transmission grid in Spain

	400 kV	≤ 220 kV			
	Peninsula	Peninsula	Balearic Islands	Canary Islands	Total
Total lines (km)	**21,753**	**19,310**	**1,929**	**1,561**	**44,553**
Overhead lines (km)	21,636	18,549	1,141	1,235	42,562
Submarine cable (km)	29	236	582	30	877
Underground cable (km)	88	525	206	296	1,115
Transformer capacity (MVA)	**84,864**	**1,563**	**3,838**	**3,630**	**93,895**

Provisional data pending audit (currently underway).
Accumulated data for kilometres of line circuit and for transformer capacity as at 31 December 2020.

Evolution of the electricity transmission grid in Spain

km of circuit



Provisional data pending audit (currently underway).

Among the projects carried out in 2020, the following are noteworthy and are listed according to the geographical area in which the work was carried out:

- **Andalusia:** the power capacity of the 220 kV Atarfe-Olivares line was increased to facilitate the resolution of technical constraints in the area, support the distribution network and enable the evacuation of renewable generation. The new 220 kV Mirabal substation was also commissioned to support the distribution network and the 220 kV Tabernas substation was enlarged to enable the evacuation of renewable generation. Lastly, the dual-node configuration at the 220 kV Guillena substation was brought into service, reducing short-circuit power in the area and increasing system reliability.

- **Aragón:** part of the existing line of a wind farm was incorporated into the transmission grid, connecting it to the 220 kV Escucha-Valdeconejos line to improve support network distribution, favour the evacuation of renewable generation and contribute to the resolution of technical constraints in the area.

- **Balearic Islands:** the 132 kV Ciudadela-Cala Mesquida submarine link connecting the islands of Majorca and Menorca was commissioned. This link significantly improves the security of supply on the island of Menorca, which is no longer electrically isolated. In addition, a reactor was commissioned in the 132 kV Cala Mesquida substation in Majorca and in Ibiza the Ibiza-Torrent 1 circuit, previously operated at 66 kV, was switched to 132 kV to improve the island's security of supply.

- **Canary Islands:** security of supply on the island of Lanzarote was strengthened with the commissioning of the new 66/132 kV substation in Tías and the incoming and outgoing feeder lines of the Macher-Punta Grande 1 and 2 double circuit. The new 66 kV El Escobar substation was also commissioned to facilitate the evacuation of renewable generation in Gran Canaria, as well as the 66 kV Carrizal-El Escobar underground double circuit. Finally, the 220 kV grid in Gran Canaria was strengthened with the commissioning of the new Barranco de Tirajana II substation, which has improved the reliability of the system.

- **Castilla-La Mancha:** the ambitious plan for the integration of renewable energy in the region continued with the increase in the number of substation bays at the 400 kV Villanueva de los Escuderos and the 400 kV Minglanilla substations. Similarly, to facilitate the transit of energy flows through the region, the works to increase the power capacity of the 220 kV Puertollano-Venta Inés and the 220 kV Huelves-Villares del Saz lines were completed. In terms of actions related to reliability and security of supply, the 220 kV Talavera substation was changed to include a one and a half switch configuration.

- **Castilla y León:** construction work continued on the 400 kV Tordesillas-Galapagar-San Sebastián de los Reyes (SUMA) axis, on the section between Segovia and the Community of Madrid, to improve grid meshing between Castilla y León and Madrid. The enlargement of the 220 kV Villamayor substation was brought into service to power the high-speed train.

- **Catalonia:** progress continued to be made in strengthening the transmission grid around the Barcelona metropolitan area, completing the planned development with the commissioning of the 220 kV Guixeres incoming-outgoing feeder lines to support the distribution grid, the 220 kV Trinitat bypass to improve control of short-circuit power and the 220 kV Besós Nuevo-Gramanet A line to strengthen supply in the Besós area.

- **Extremadura:** se ha puesto en servicio una nueva posición para apoyo a distribución en la subestación de Cáceres 220 kV. También se ha puesto en servicio la nueva subestación Cañaveral 400 kV y la entrada-salida de la línea Arañuelo-Jose María Oriol 400 kV para alimentación del eje ferroviario Toledo-Cáceres-Badajoz. Sobre este mismo eje ferroviario, se continúa trabajando para la puesta en servicio de la subestación planificada Carmonita 400 kV que hará entrada-salida en la línea Almaraz CN-San Serván 400 kV. Por otro lado, se ha puesto en servicio un segundo circuito Almaraz CN-Almaraz ET que contribuye a la resolución de restricciones técnicas de la zona. Se continúa avanzando en la tramitación y trabajos del resto de las actuaciones planteadas en la Planificación 2015-2020.

- **Levante:** se ha llevado a cabo la puesta en servicio la ampliación de la subestación de Beniferri 220 kV para mejorar la fiabilidad del sistema y el apoyo a la red de distribución de la zona. En la Región de Murcia se ha puesto en servicio la ampliación de las subestaciones Totana 400 kV y Balsicas 220 kV para la alimentación del tren de alta velocidad.

- **Zona centro:** se ha completado el binudo de Coslada 220 kV y se ha puesto en servicio el desfasador de Galapagar 400 kV, que contribuirá a la resolución de restricciones técnicas de la zona. Finalmente, se ha proseguido avanzando, en cuanto a tramitaciones y trabajos, en el resto de las actuaciones planteadas en la Planificación 2015-2020.

- **Zona norte:** se prosigue en el País Vasco con la construcción el doble circuito Güeñes-Ichaso 400 kV. Dicha actuación forma parte del eje que, pasando por Ichaso, conectará el oeste del País Vasco (eje Abanto-Güeñes) con la red de 400 kV de Navarra (eje Muruarte-Castejón), zona en la que se ha puesto en servicio la ampliación de la subestación La Serna 400 kV para incrementar la evacuación de generación de origen renovable. Se encuentra asimismo en construcción el cable en 220 kV entre Astillero y Cacicedo, que permitirá reforzar de manera importante la seguridad de suministro en toda el área de la ciudad y puerto de Santander.
En Galicia se ha puesto en servicio la entrada -salida Puente Bibey en la L/Conso-Trives 220 kV para contribuir a la resolución de restricciones técnicas de la zona.

SUBMARINE-UNDERGROUND LINK

55 km

between Ciudadela and Cala Mesquida

CONNECTION BETWEEN THE ISLANDS OF MAJORCA AND MENORCA

132 kV

THIS LINK IMPROVES THE SECURITY OF SUPPLY ON THE ISLAND OF MENORCA, WHICH IS NO LONGER ELECTRICALLY ISOLATED.

International cross-border connections

Interconnections continue to be key elements in the energy transition as a crucial element to achieving greater integration of renewable energy and advancing along the road to decarbonisation. The strengthening of interconnections will continue being a priority in the development of the transmission grid for the coming years.

The last interconnection commissioned between Spain and France (Baixas-Santa Llogaia) doubled the electricity exchange capacity between Spain and France (from 1,400 MW to 2,800 MW), which has contributed to strengthening the security of the two electricity systems and to boosting the integration of a greater volume of renewable energy. Construction work on the interconnection was completed in February 2015, coinciding with its official inauguration. Since that date, it operated in technical test mode until 5 October 2015, when it went into commercial operation. However, and despite this increase, the degree of interconnection of our country is still far below the targets set by the European Union of 10% and 15%, for 2020 and 2030, respectively.

EUROPEAN UNION TARGET 2030

15 %

of interconnection capacity compared to the total installed power capacity

The Spanish Integrated National Energy and Climate Plan (NECP) makes this clear and proposes increasing the exchange capacity with Portugal up to 3,000 MW and up to 8,000 MW with France, by means of three new electricity interconnections. The interconnection between Gatika (Spain) and Cubnezais (France) will basically be the first submarine interconnection between Spain and France ('Bay of Biscay' project); and there are two other projects via the Pyrenees[1].

The Integrated National Energy and Climate Plan (NECP) envisages increasing exchange capacity with Portugal to 3,000 MW and with France to 8,000 MW, by means of 3 new electricity interconnections.

(1) The three projects were endorsed by the Heads of State and Government of Portugal, Spain and France, as well as by representatives of the European Commission (EC) and the European Investment Bank (EIB) within the framework of the two Summits on interconnections held in 2015 (Madrid Declarations) and in Lisbon in 2018 (Lisbon Declarations). The three projects have been classified as Projects of Common Interest (PCI) approved by Commission Delegated Regulation (EU) 2020/389 of 31 October 2019 amending Regulation (EU) No 347/2013 of the European Parliament and of the Council as regards the Union's list of Projects of Common Interest. Published in Spain's Official State Gazette (BOE) on 11 March 2020.

Service quality

The service quality indicators for 2020 remain within the acceptable values established in Royal Decree 1955/2000.

The key indicators of global quality according to Royal Decree 1955/2000 are Average Interruption Time (AIT) and Non-Supplied Energy (ENS).

In the peninsular electricity system, 12 supply interruptions were registered in 2020, 71% more than in 2019. This rise is reflected in the increase in the ENS compared to the previous year. (95 MWh in 2020 compared to 47 MWh in 2019). As a result of said ENS, an AIT value of 0.21 minutes was recorded (0.10 minutes in 2019), a result that is well below the reference value of 15 minutes established in article 26.2 of Royal Decree 1955/2000. The main incident occurred at the 220 kV Tarragona facility with an ENS of 41 MWh.

Energy not supplied (ENS) and average interruption time (AIT) of the transmission grid

	ENS (MWh)			AIT (minutes)		
	Peninsula	Balearic Islands	Canary Islands	Peninsula	Balearic Islands	Canary Islands
2016	78	0.3	457	0.16	0.03	27.45
2017	60	33	47	0.13	2.88	2.75
2018	250	38	63	0.52	3.27	3.77
2019	47	1	2,626	0.10	0.09	155.52
2020[1]	**95**	**4**	**65**	**0.21**	**0.47**	**4.29**

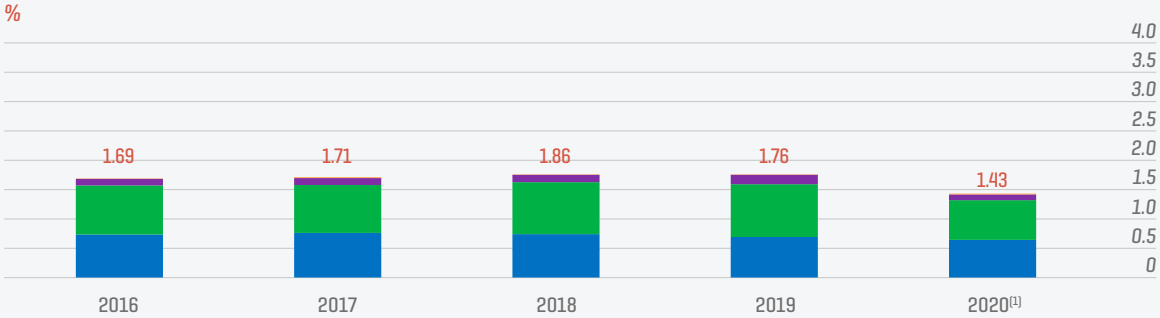
ENS: Energy not supplied. AIT: Average interruption time.
Average Interruption Time (AIT) = Energy Not Supplied (ENS) / Average System Power.
(1) Provisional data pending audit (currently underway).

In the Balearic Islands electricity system, the continuity of supply indicators for 2020 also showed a slight improvement over the previous year. Two supply interruption were recorded, resulting in an ENS of 4 MWh (1 MWh in 2019) and an AIT of 0.47 minutes (0.09 minutes in 2019). The opposite occurred in the Canary Islands electricity system, with an ENS of 65 MWh (corresponding to 3 supply interruptions) and an AIT of 4.29 minutes.

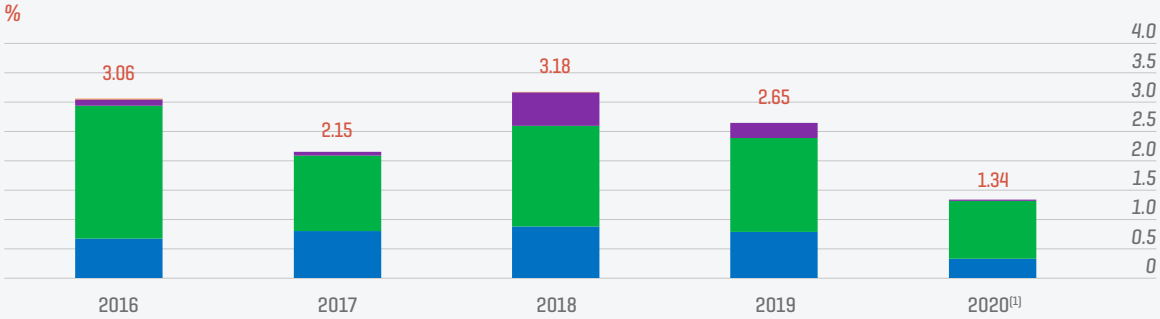
The quality of the transmission grid is also assessed on the basis of the availability of its facilities. Availability measures the capacity or possibility of use by the system of the different elements of the transmission grid, these being the electricity line circuits, transformers and active or reactive power control elements (reactors and capacitors). The availability rate is calculated as the difference between 100 and the non-availability rate of the transmission grid.

The following graphs show the evolution of the non-availability rate indicator over the last five years. The availability rate of the peninsular transmission grid in 2020 reached a value of 98.57%, higher than the 98.24% in 2019. In the Balearic Islands and the Canary Islands systems, the grid availability rate was 98.66% (97.35% in 2019) and 99.17% (98.90% in 2019) respectively. The improvement in these indicators was mainly due to the decrease in scheduled non-availability of facilities as a result of the improvement actions carried out on grid assets.

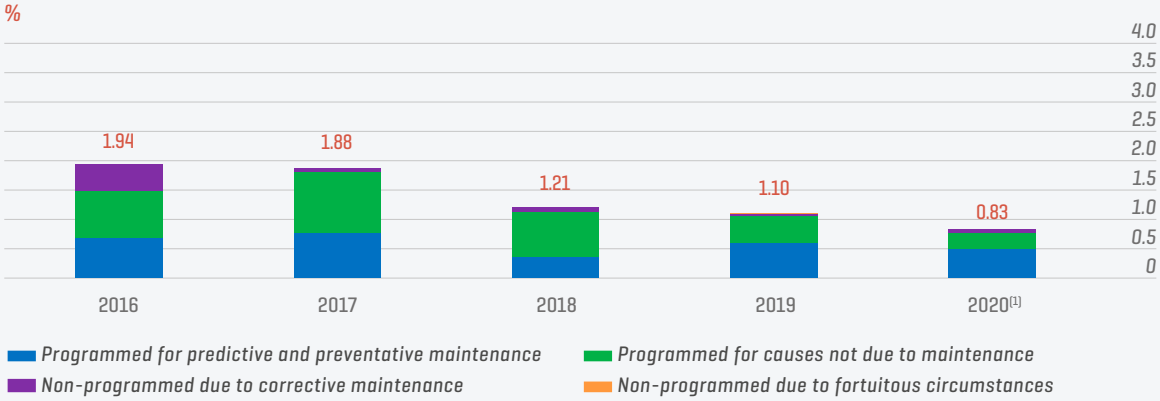
Annual evolution of the non-availability rate of the peninsular transmission grid



Annual evolution of the non-availability rate of the Balearic Islands transmission grid



Annual evolution of the non-availability rate of the Canary Islands transmission grid



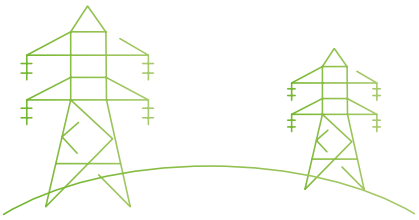
Note: Classification according to RD 1955/2000.
The total non-availability rate of the transmission grid does not include non-availabilities due to force-majeure or third-party actions.
(1) Provisional data pending audit (currently underway).

5

Electricity markets

The pandemic caused prices in European markets to either reach, or almost reach, all-time lows in some months of the year.

The average final price of energy fell by 24.4% compared to the previous year due to the drop in the wholesale market price caused by the health crisis, falling to the lowest value since 2004.



FINAL ENERGY IN THE ELECTRICTY MARKET

-5.2 %

COMPARED TO 2019

IMPACT OF THE DAY-AHEAD AND INTRADAY MARKET IN THE COMPOSITION OF THE FINAL PRICE OF ENERGY COMPARED TO 2019

-27.5 %

During 2020, the total energy managed in the electricity market (reference supply plus free contracting) was 5.2% lower than the previous year.

The average final energy price in the electricity market in 2020 was 40.38 €/MWh, 24.4% lower than the price of the previous year, as a result of the health crisis. This is the lowest price since 2004. Only the first years of the electricity market, with the exception of 2002, recorded lower values.

A month-on-month comparison shows that, with the exception of September and December, prices were lower than in the same months of the previous year. In the first six months of the year the variation with respect to that same month of the previous year was higher than 30%. From March to June, coinciding with the health crisis, prices were very low, with April being the lowest month in history, 2% lower than the previous all-time low registered in March 2001.

The average final price of energy in the electricity market in 2020 reached its lowest level since 2004, as a result of the pandemic.

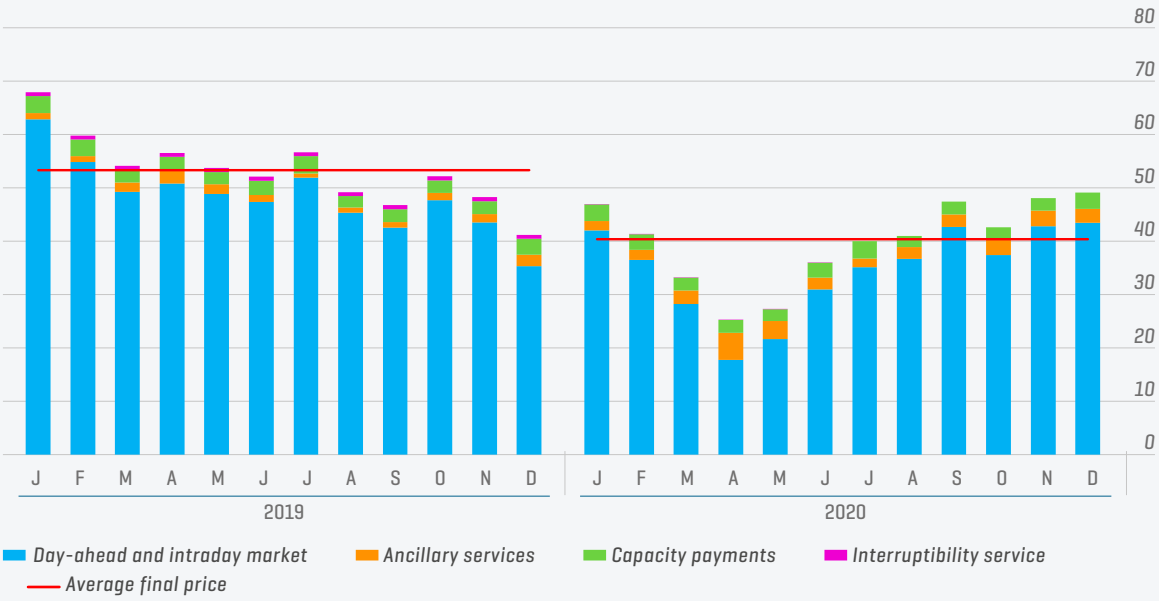
-24.4%
COMPARED TO 2019

AVERAGE FINAL PRICE OF ENERGY IN THE ELECTRICITY MARKET

40.38 €/MWh

Components of the average final price of energy in the electricity market

€/MWh

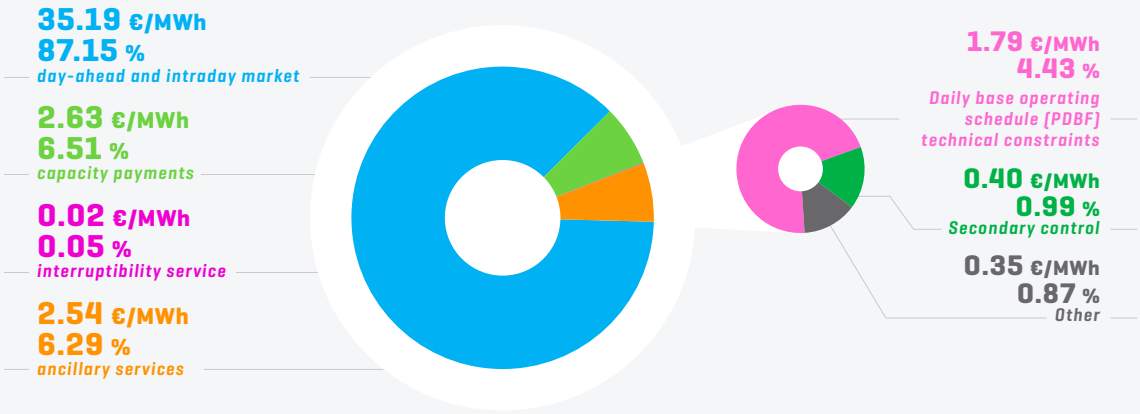


During 2020, the components that made up the price of energy were the following: day-ahead and intraday market price 87.15%, ancillary services 6.29%, capacity payments 6.51% and the remaining 0.05% was the interruptibility service (interruptible load programme)[1].

If a comparison of the impact of the price on the demand served is made with that of last year, a reduction of 27.5% is seen in the day-ahead and intraday market, 97.3% in the interruptibility service, 0.4% in the capacity payments while the ancillary services increased 72.8%. The decrease in the price for the interruptibility service was due to the price reduction obtained in the auction and the fact that it was only active in the first half of 2020.

Components of the average final price of energy

€/MWh



During 2020, the day-ahead and intraday market price component represented 87.15%, system ancillary services 6.29%, capacity payments 6.51% and the remaining 0.05% the interruptibility service.

(1) Demand-side management tool to ensure a quality electricity supply at all times. With this service, large electricity consumers (industries) commit to reducing their electricity consumption when required by the system and they are remunerated for this service. The service is activated by Red Eléctrica de España in accordance with technical (system security) or economic (lower cost for the system) criteria.

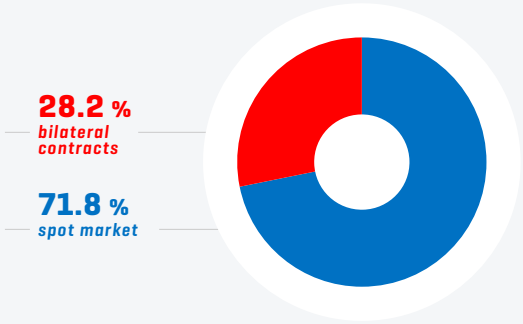
Day-ahead market

Energy in the day-ahead market stood at 236 TWh in 2020 (169 TWh in the spot market without bilateral contracts), a fall of 3.6% compared to 2019. 71.8% of energy was traded in the spot market and the remaining 28.2% through bilateral contracts, the same values as those registered the previous year. These percentages have remained quite similar since 2010.

The share of energy supplied by market traders who are not classified as reference suppliers fell slightly this year, dropping to a market share of 88.2% in 2020, compared to 88.8% in the previous year. The share is very similar to that registered in 2017.

Percentage of energy purchased in the day-ahead market and through bilateral contracts

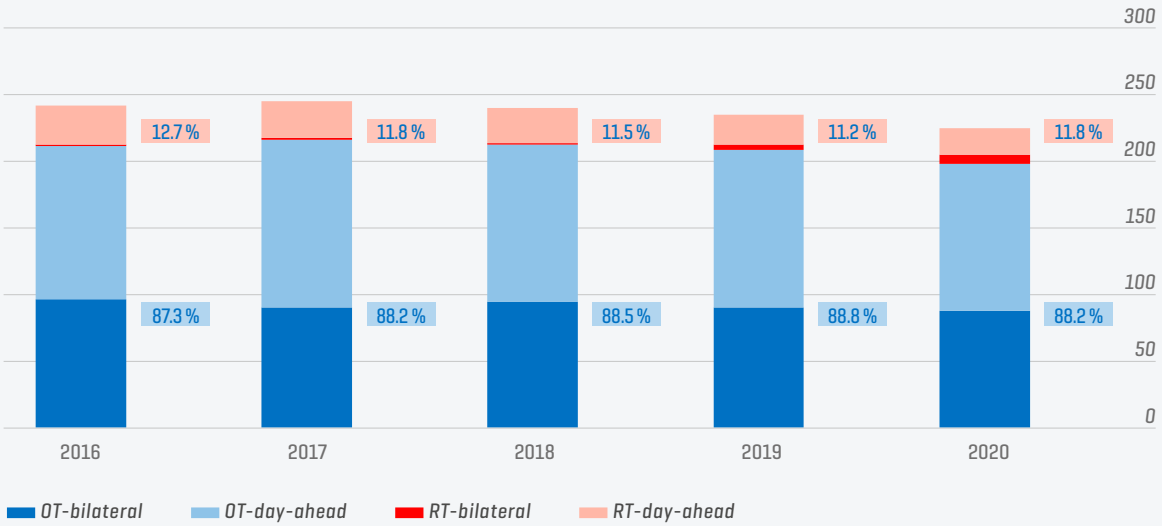
%



The share of energy supplied by market traders who are not classified as reference suppliers fell slightly this year, falling to a market share of 88.2% in 2020, compared to 88.8% in the previous year.

Evolution of purchases in PDBF from Reference Traders (RT) and other traders (OT)

TWh



The arithmetic average price in the day-ahead market in Spain was 33.96 €/MWh, 28.8% lower than the previous year (47.68 €/MWh) and slightly lower than that of Portugal (33.99 €/MWh). This drop in price was mainly due to lower demand as a result of the health crisis that began in March. However, as of May, the price started to rise again to recover its pre-crisis values.

This was the seventh lowest price since the electricity market began and one has to go back to 2004 to find a lower price.

2020 started with lower values than the previous year, but the health crisis brought about a stronger fall in prices, from March onwards, recording the minimum price in April. Since then, prices recovered, eventually reaching those registered in September 2019.

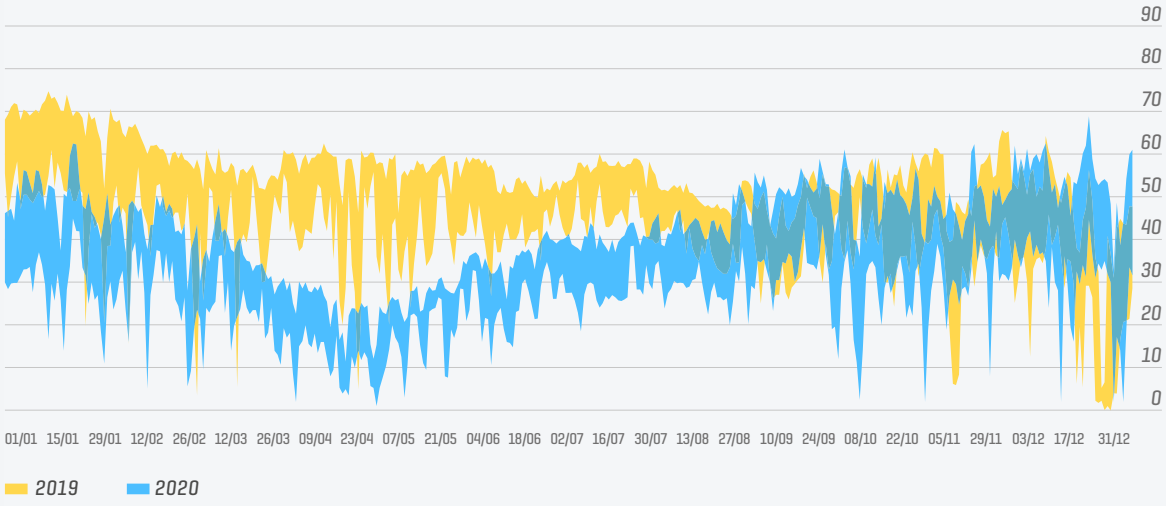
-28.8%
COMPARED TO 2019

ARITHMETIC AVERAGE PRICE IN THE DAY-AHEAD MARKET

33.96 €/MWh

Evolution of maximum and minimum prices in the day-ahead market

€/MWh



The monthly prices in April and May were the lowest prices ever registered for these months. The April price, apart from being the lowest price recorded for that month, was the third lowest price ever recorded since the beginning of the market in 1998, after the lows of February 2014 and March 2001. The price for March 2020 was the seventh lowest ever registered for that month since the market began.

The price recovery trend was confirmed in June, with the day-ahead electricity market price registering an increase of 44% compared to May, although it was 35% lower than the previous year. This was the fifth lowest price for the month of June since 1998.

November and then December registered the highest prices of 2020. A decisive role in the price behaviour was played by the significant drop in demand. The demand associated with Daily Base Operating Schedule (PDBF) fell by 4.3% during the year. By 14 March, demand had fallen by 0.6%, before falling by 10.2% during the state of emergency period. The cumulative reduction over the year was 5.3% as of the start of the state of emergency.

If we take into account the generation mix in the day-ahead market, an important factor in the calculation of the price, it can be seen that the month of January 2020, which has the highest share of coal, had a high price, although the share of renewables is higher than 50%.

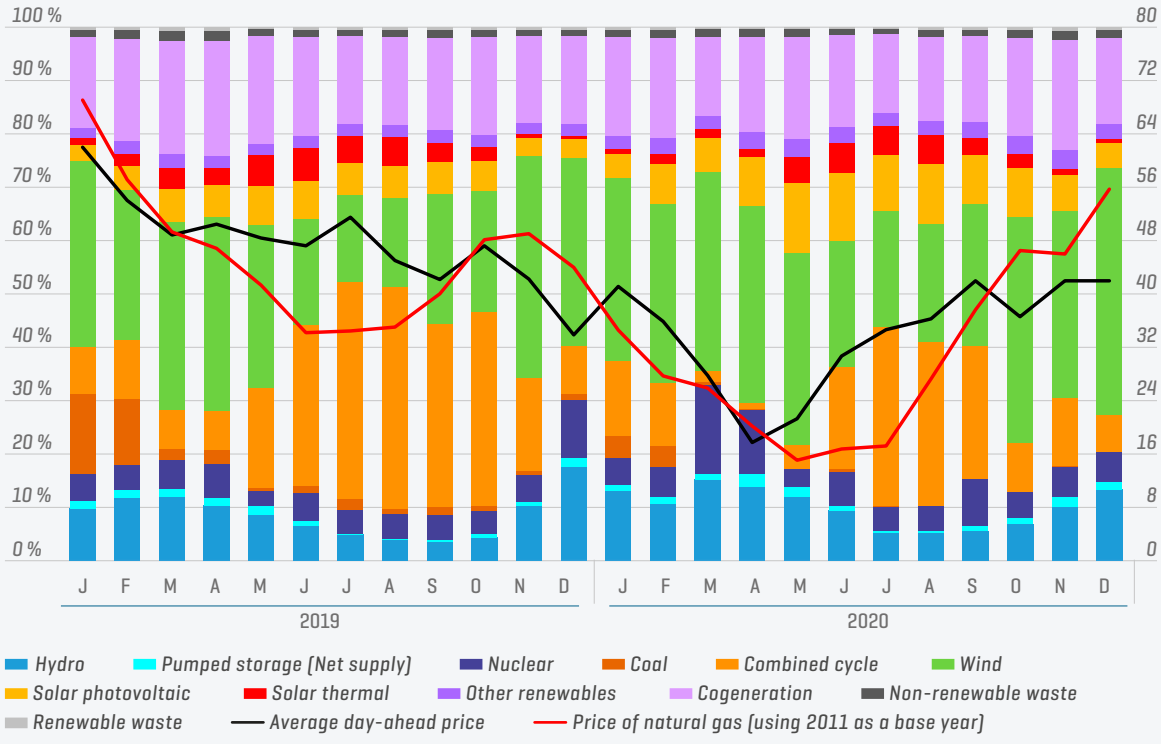
December, which registered the highest price of energy, had one of the highest shares of renewables in the generation mix for the year, with the exception of May.

Another factor influencing the price was the hydroelectric reserves. These were above the historical average throughout the year, with a higher percentage of fill capacity in April and May. In those months, the North and Duero basins registered percentages above 80%, which may explain the low marginal prices offered by hydroelectric power at certain times.

The sharp decrease in the price of fossil fuels also contributed to the reduction in prices. The price of gas had been decreasing significantly since September 2018, although in mid-2019, it rose slightly, reaching values below 1.8 $/mmbtu[2] in May and June, to start rising since then, although without reaching the value registered in January 2019. May registered the lowest price on record. Coal prices also declined during the pandemic but began to register higher prices as of the end of the summer.

Generation structure in the matching process and price of the day-ahead market and of natural gas

% y €/MWh



(2) mmbtu: Metric Million British Thermal Unit

Another element influencing the price reduction would be the decrease in the price of CO_2 emissions: the average value this year - 24.29 €/tonne CO_2 - was 1.7% lower than in the same period the previous year. This drop was largely due to the months of the health crisis. Subsequently, it rose until it reached an all-time high in December (which explains the rise in the price of energy at the end of the year).
In annual terms, hydro increased its share in the generation mix by just over 1 percentage point compared to the previous year, wind by just over 4 points, solar photovoltaic by over 3 percentage points and nuclear by almost 2 percentage points (as much less energy was managed during the pandemic through bilateral contracts), while coal and combined cycle reduced their shares by 2.7 and 7.5 percentage points, respectively.

In general, a high presence of renewables in the matching process, mainly wind and hydro, as they are normally linked to price acceptance (as they set the marginal price), leads to a decrease in the average day-ahead market price.

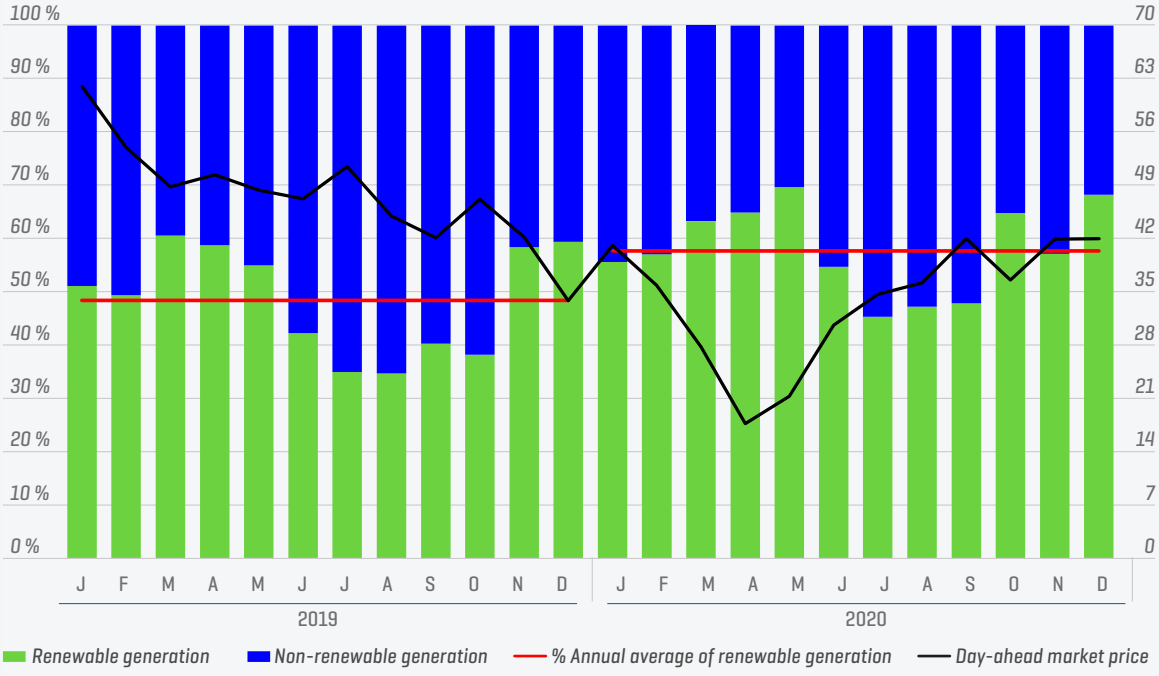
The share of renewable energy in the electricity generation mix in the matching process in 2020 was 57.6%, much higher than the 48.3% in the same period of the previous year.

The share of renewables was higher in all months of 2020 compared to the same period in 2019, except in November. It can be observed that there were many months in which the percentage variation of renewables was much higher, and despite this, prices were not so different. It is clear that fuel prices and demand have a direct influence on prices.

The highest percentage of renewables in the matching process was recorded in the month of May, when the price increased slightly, although it was still low, in fact, it was the lowest price recorded for a month of May. That month, several nuclear plants were undergoing maintenance and servicing. This technology, which enters into the matching process at low prices, was basically replaced by combined cycle.

Generation in Spain and energy prices

% and €/MWh



December also recorded a high percentage of renewables in the matching process, slightly lower than in May, with a slightly higher price than in November. This was due to the increase in the price of fuel and emissions, with the latter registering an all-time high as mentioned above.

If the energy matching process of the generation mix is represented in a graph showing the times of the day in which the day-ahead market price set the annual minimum and maximum values, we can see that these are quite different. At the time in which the minimum price was set, it can be seen how wind power is the technology that has an impact on the marginal price (with a percentage of 41.3%), with renewable energy matched in that hour being nearly 84%. If we look at the mix at the time in which the maximum price was registered, we can see that hydro determined the marginal price, although it is combined cycle that has the highest percentage in the mix (28%). In that hour, renewables represented just 40% of the generation mix. On that day, the greatest energy matched with prices close to the marginal price corresponds to hydro followed by combined cycle.

The maximum daily price was recorded on 17 December (56.87 €/MWh) and the minimum on 1 May (4.63 €/MWh).

A comparison between the Spanish day-ahead market price and the European market prices shows that prices in Italy and Spain are among the highest in Europe. In September and December, the Spanish price is the lowest in Europe, without taking into account Nord Pool.

MAXIMUM PRICE IN THE DAY-AHEAD MARKET

56.87 €/MWh

17 DECEMBER

MINIMUM PRICE IN THE DAY-AHEAD MARKET

4.63 €/MWh

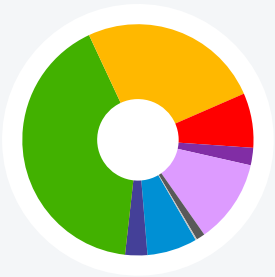
1 MAY

Generation mix in the hours of minimum and maximum price in the day-ahead market (DM) 2020

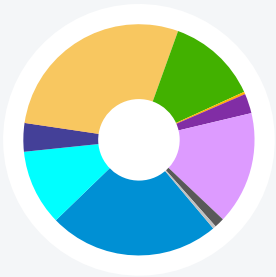
%

	Minimum price	Maximum price
Hydro	7.0 %	23.9 %
Pumped storage (net supply)	0 %	10.6 %
Nuclear	3.1 %	4.0 %
Coal	0 %	0 %
Combined cycle	0 %	28.2 %
Wind	41.3 %	12.7 %
Solar Photovoltaic	25.4 %	0.3 %
Solar Thermal	7.6 %	0 %
Other Renewables	2.4 %	2.7 %
Cogeneration	11.7 %	15.8 %
Non-renewable Waste	1.2 %	1.4 %
Renewable Waste	0.2 %	0.4 %

DM minimum 1-May (4pm)

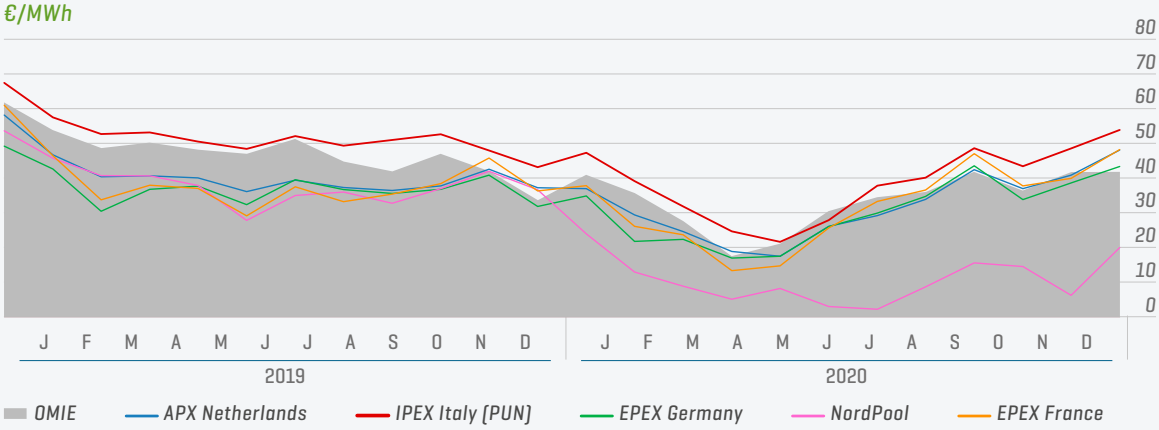


DM maximum 17-Dec (7pm)



European market prices

€/MWh



Intraday market

Energy sales in the intraday market auctions were 29.35 TWh, 8.7% less than in 2019.

The arithmetic average price of the intraday market in 2020 stood at 34.48 €/MWh, higher than the 33.96 €/MWh in the day-ahead market.

Energy sales in the continuous intraday market stood at 5.1 TWh, compared to 3.1 TWh the previous year. The average weighted price in Spain stood at 35.50 €/MWh, fluctuating between 16.66 €/MWh in April and 45.36 €/MWh in December.

-8.7 %
COMPARED TO 2019

ENERGY SALES IN THE INTRADAY MARKET

29.35 TWh

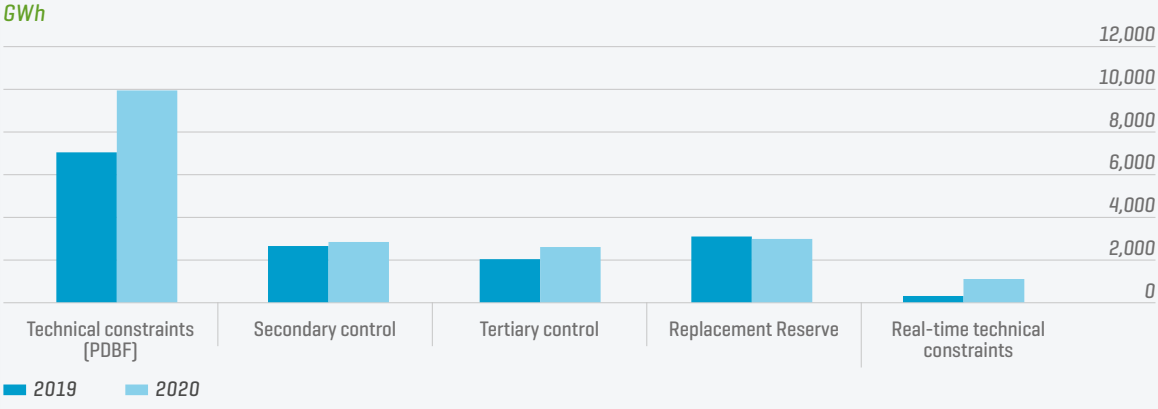
Ancillary services[3]

The energy needs managed through the ancillary services amounted to 19,499 GWh, 28.9% higher than in the previous year, as a result of a sharp increase in scheduled energy due to technical constraints.

Energy due to technical constraints on the Daily Base Operating Schedule (PDBF) increased by 41%, with the volume of energy in this market accounting for just over 51% of the total. Real-time constraints quadrupled, although they represented only 5.6% of the total. Secondary and tertiary control energy increased by 7% and 28%, respectively, while that of replacement reserves (which replaced the former deviation management service in March) decreased slightly.

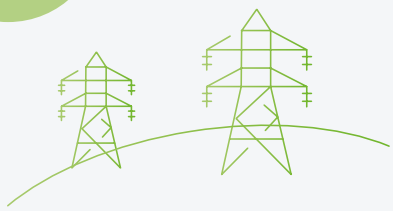
Energy managed in the system ancillary services

GWh



(3) Does not include additional upward power reserve, secondary control, or energy related to cross-border balancing services.

+72.8 %
COMPARED TO 2019



2.54 €/MWh
IMPACT OF ANCILLARY SERVICES ON THE AVERAGE FINAL PRICE OF ENERGY

Cost of ancillary services in M€

	2019	2020
Daily base operating schedule (PDBF) technical constraints	239	423
Real-time technical constraints	10	78
Technical constraints	249	500
Secondary control	92	94
Additional upward power reserve	15	0
Deviations	45	38
Other (*)	-20	-17
Power control factor	-15	-17
Total Ancillary services	**366**	**600**
Δ2020/2019	**63,8%**	

(*) Includes non-fulfilment of balancing energy, deviation balancing and deviations between systems.

The impact of ancillary services on the average final price of energy was 2.54 €/MWh, higher than the 1.47 €/MWh of 2019, which represented 6.3% of the average final price, a much higher percentage than in recent years. The highest price was registered in April, although this was the month in which the lowest average final price was recorded.

During 2020, the cost of ancillary services was 63.8% higher than the previous year.

While low demand and the higher share of renewables in the structure of the matching process lowers the average price of energy, the cost of ancillary services increased in those months. As thermal energy was not matched, it still had to be scheduled for security reasons due to possible technical constraints. In April, ancillary services accounted for 20% of the average final price of energy, when they are usually below 5%. These values have been registered in other months in the past that have had strong renewable generation (April 2013, February 2014).

On our journey towards the energy transition and in a scenario in which there will be more and more renewables and without the possibility of power control, this uptrend towards higher costs for ancillary services will be commonplace.

IN APRIL ANCILLARY SERVICES ACCOUNTED FOR

20 %

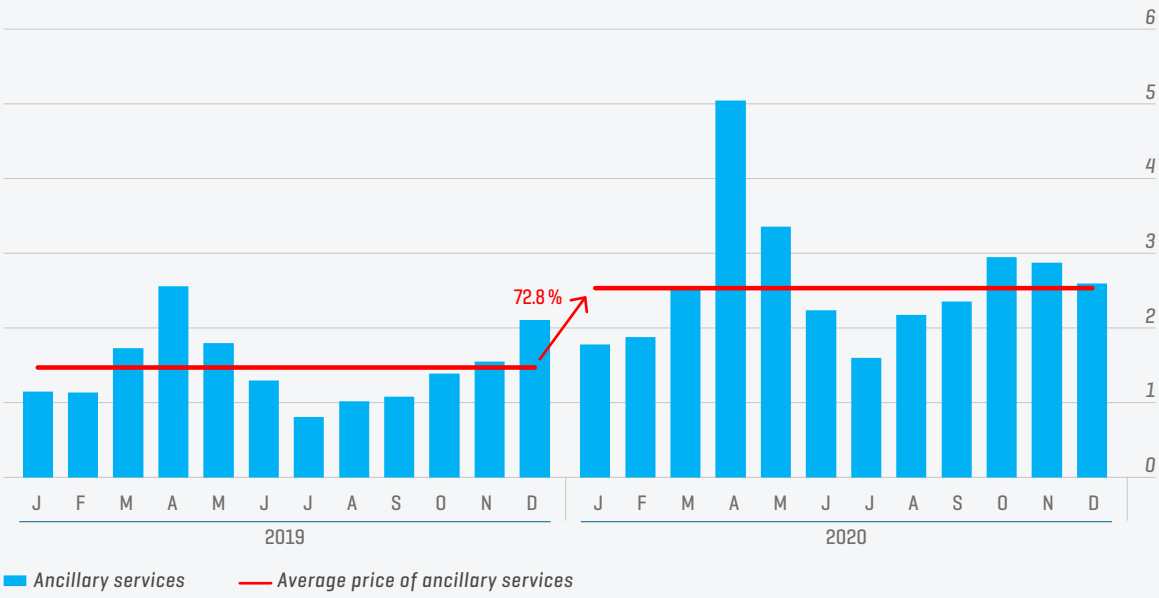
of the average final price

Normally this figure does not reach

5 %

Impact of the ancillary services in the average final price of energy

€/MWh



Constraints of the Daily Base Operating Schedule

The energy scheduled to resolve technical constraints of the Daily Base Operating Schedule (PDBF) was 9,431 GWh of upward energy (39% higher than the previous year) and 548 GWh of downward energy (double that of the previous year). The average value of the price of upward energy was 75.3 €/MWh, 7.5% lower than last year, and that of the price of downward energy was 30.7 €/MWh, 33.3% lower than in 2019. The impact on the average final price of energy was 1.79 €/MWh compared to 0.96 €/MWh the previous year.

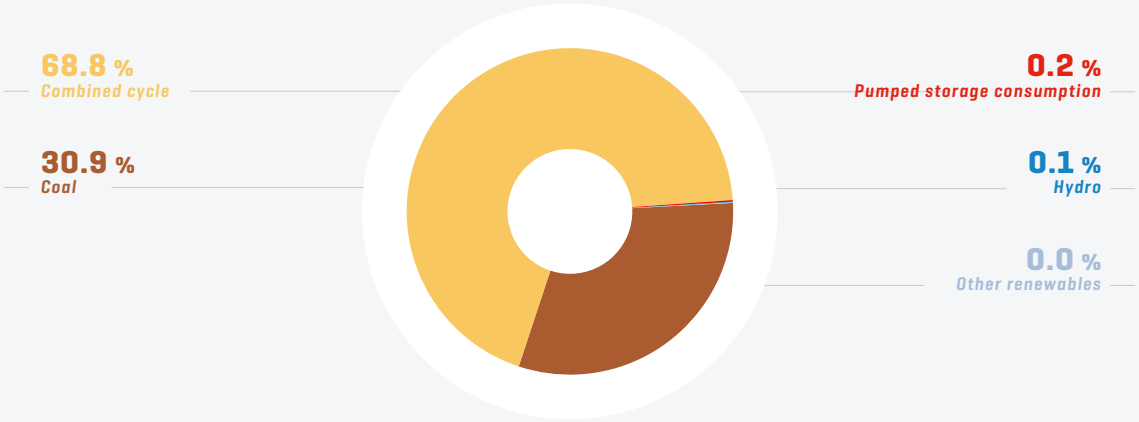
+86.5 %
COMPARED TO 2019

IMPACT ON THE AVERAGE FINAL PRICE OF ENERGY

1.79 €/MWh

Upward energy in phase I

%



The energy scheduled in phase I for resolving technical constraints of the Daily Base Operating Schedule corresponded mainly to combined cycle and coal-fired technologies. The downward energy in phase I was all but negligible.

In the pie chart 'Upward energy scheduled in phase I' the evolution of the last five years of the upward energy programmed for these technologies in the phase I technical constraints of the PDBF can be observed. It can also be seen how 2020, when a lot of renewable energy was matched from March to May, a substantial amount of energy was scheduled through this mechanism.

The energy scheduled in phase I of the PDBF technical constraints corresponded almost entirely to combined cycle (68.9%) and coal (30.9%).

Other ancillary services

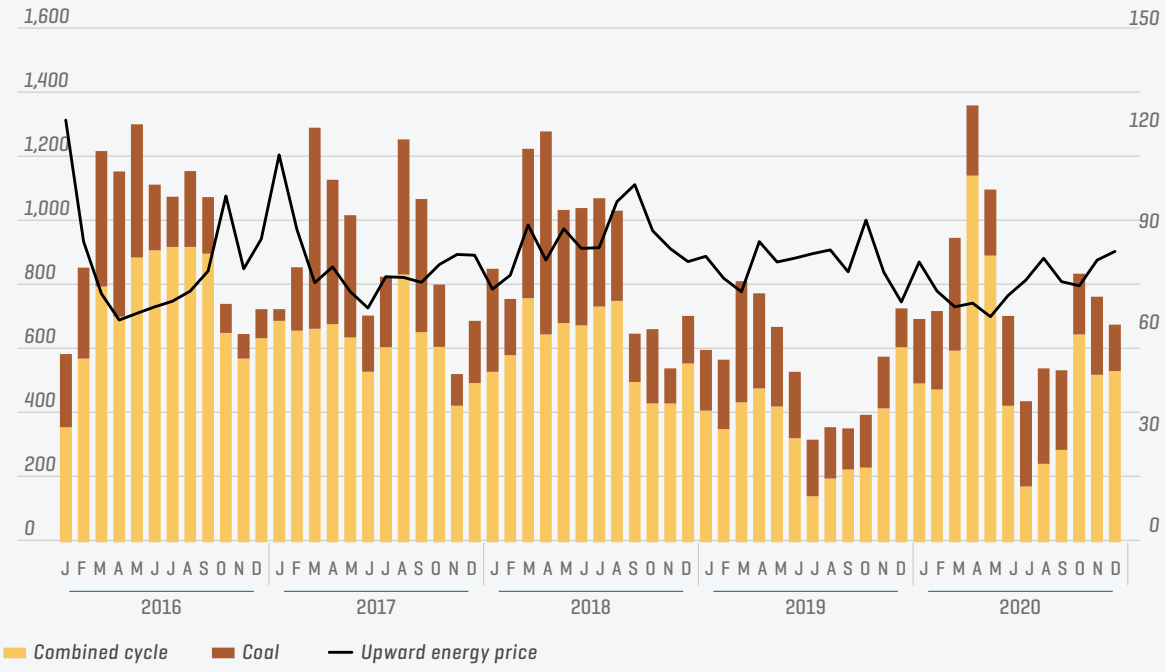
On 3 March, the TERRE Project began to be implemented, a European project of reference in compliance with article 19 of the Electricity Balancing Guideline Regulation for the design and implementation of a common European platform for the exchange of balancing energy with an activation time of 30 minutes (RR - Replacement Reserve). This mechanism replaces the deviation management market in the Spanish electricity system and the cross-border balancing services established in the past with RTE and REN through the BALIT platform.

The balancing markets (secondary control, tertiary control and replacement reserve) had total energy requirements of 2,843 GWh, 2,603 GWh and 2,979 GWh, respectively. Of this total, 58.7% corresponded to upward energy managed and the remaining 41.3% to the downward energy managed.

Implementation of the TERRE project, a European platform for balancing energy exchange with an activation time of 30 minutes.

Upward energy scheduled in phase I from coal and combined cycle and upward energy price

GWh and €/MWh

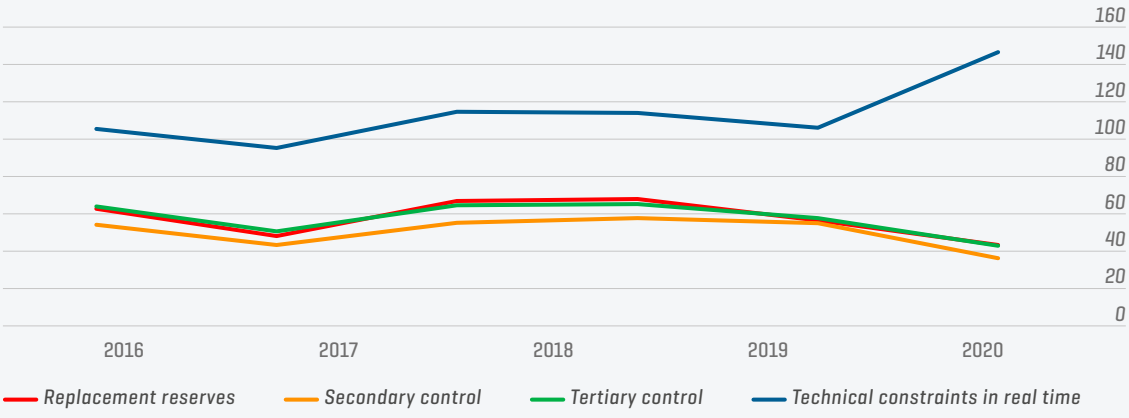


The energy scheduled for technical constraints in real time amounted to 1,094 GWh, four times the value of the previous year. 66.6% corresponded to upward energy and the remaining 33.4% to downward energy.

The average hourly secondary control allocated was 1,086 MW, with an impact of 0.40 €/MWh on the demand served, 8.1% higher than the previous year.

Annual evolution of the weighted average price of balancing energy and for resolution of real-time constraints

€/MWh

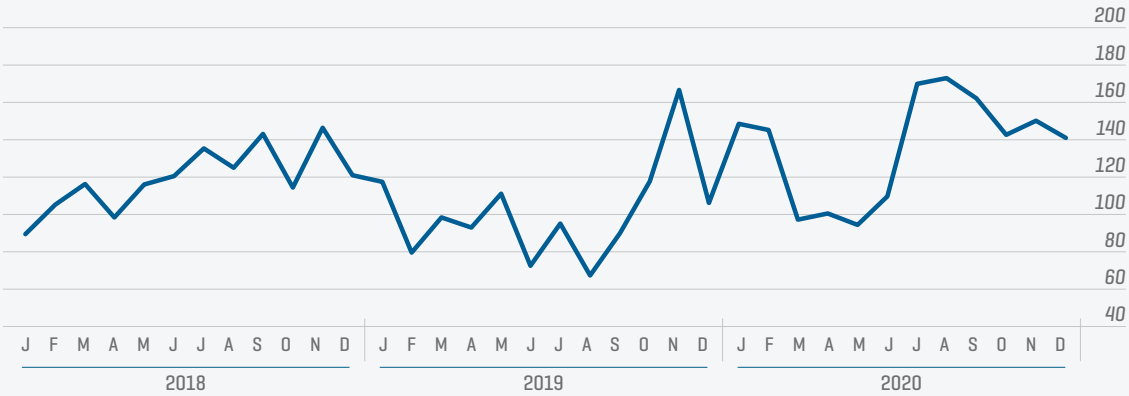


The weighted prices of balancing upward energy (secondary, tertiary and replacement reserve - under a single price mechanism) remained fairly constant, while the price of upward energy for resolving technical constraints in real-time increased considerably throughout 2020.

The graph shows the evolution of the weighted average price of the upward energy scheduled for the resolution of technical constraints in real time, on a monthly basis.

Evolution of the weighted average price of upward energy for the resolution of real-time constraints

€/MWh



Voluntary price for small consumers

The voluntary price for small consumers (VPSC), known as PVPC in Spain, was 14.4% below that of the previous year.

The VPSC is conditioned by the day-ahead market, and for this reason, the highest VPSC value was registered in December, 115.4 €/MWh, while the lowest value was registered in April, 78.4 €/MWh.

Customers who opt for this tariff pay tolls and charges for regulated costs, which are set by the Government at the beginning of each year and have not increased since 2014, and an amount for the energy consumed, which is based on prices in the electricity market during the billing period.

HIGHEST VPSC PRICE

115.4 €/MWh

DECEMBER

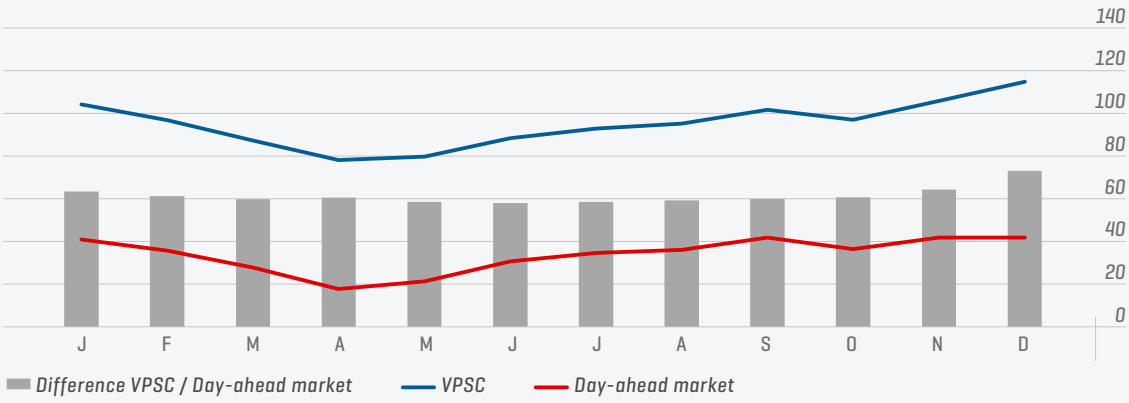
LOWEST VPSC PRICE

78.4 €/MWh

APRIL

Evolution of the VPSC (general tariff 2.0 A) compared to the day-ahead market price

€/MWh



Therefore, in the case of an average household consumer using the regulated tariff 2.0 A with a contracted power of 4.6 kW and a consumption of 3,900 kWh/year, the cost of the bill for all of 2020 would have been 715 euros, 9.7% less than they would have paid for the same consumption in 2019, that is to say, 77 euros less per year.

Of the 715 euros that this customer would have paid for their electricity consumption in 2020, 201 euros would correspond to the purchase of energy in the market (28% of the bill), 361 euros (51%) to the regulated part of tolls and system charges and the rest, 153 euros would correspond to taxes (21%). Thus, although the cost of energy purchased in the electricity market would have decreased by 23.2% with respect to 2019 (compared to a 28.8% decrease in the final price of energy in the day-ahead market), as the rest of the costs did not decrease compared to the previous year, the total billing would only have decreased by 10% (considering the average daily price to eliminate the effect of the leap year).

6

European landscape

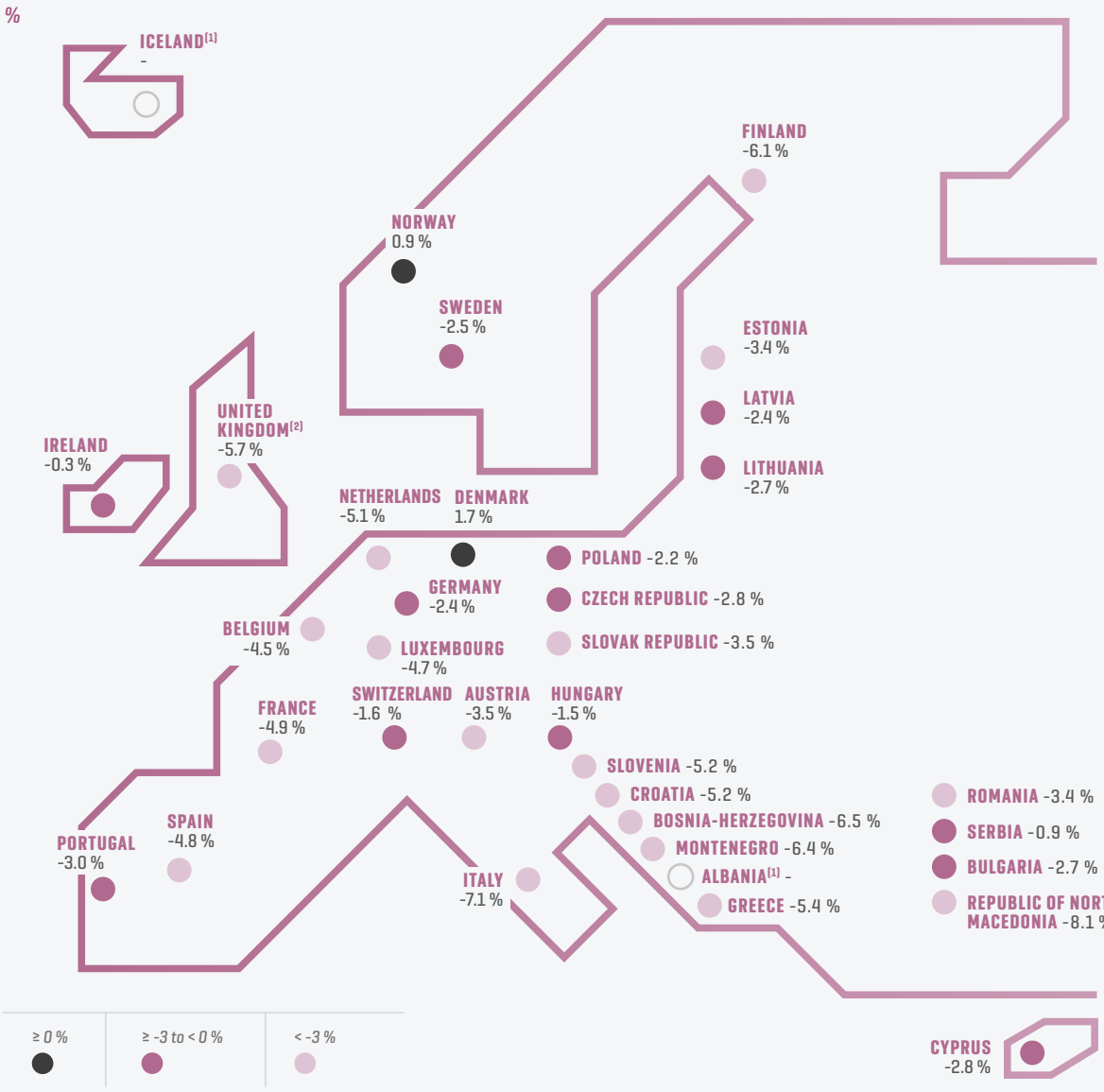
The purpose of this chapter is to establish a comparison between ENTSO-E member states regarding renewable power capacity and generation. Comparisons are based on information that is publicly available on the ENTSO-E Transparency Platform. The information used is governed by Regulation (EU) No 543/2013, which establishes the common and standardised criteria that must be followed by member states when submitting data. For this reason, discrepancies exist with specific data regarding power capacity and generation data published in the Spanish Electricity System and Renewable Energy reports. With regard to power capacity, the data extracted from the aforementioned platform includes generation units with an installed power capacity equal to or greater than 1 MW and refers to power capacity available for System Operation. The differences in generation are due to the use of consolidated measurement data at a national level in the drafting of said reports.

Despite the fact that in 2020, electricity demand in the European ENTSO-E countries as a whole fell by 3.9%, mainly due to the COVID-19 pandemic, electricity generation from renewable sources in these countries has continued to be promoted.

Driving Europe's energy transition

In the ENTSO-E countries as a whole, there was a decrease in electricity demand in 2020, -3.9% compared to the previous year, marked by the effects of the COVID-19 pandemic. There were generalised decreases in the variation of electricity demand by country, while only in Norway and Denmark were there increases. The most significant decreases occurred in important member states such as Italy and the United Kingdom.

Increase in electrical energy demand in ENTSO-E member states 2020/2019



Source: data obtained from the ENTSO-E Transparency Platform as at 26/2/2021. The data is governed by Regulation (EU) No 543/2013, and is obtained from real-time systems and therefore differs from the consolidated data used for the specific case of Spain at national level, which is obtained using a power measurement system.
(1) Data not available.
(2) Includes Northern Ireland.

The share of renewable energy continues to grow

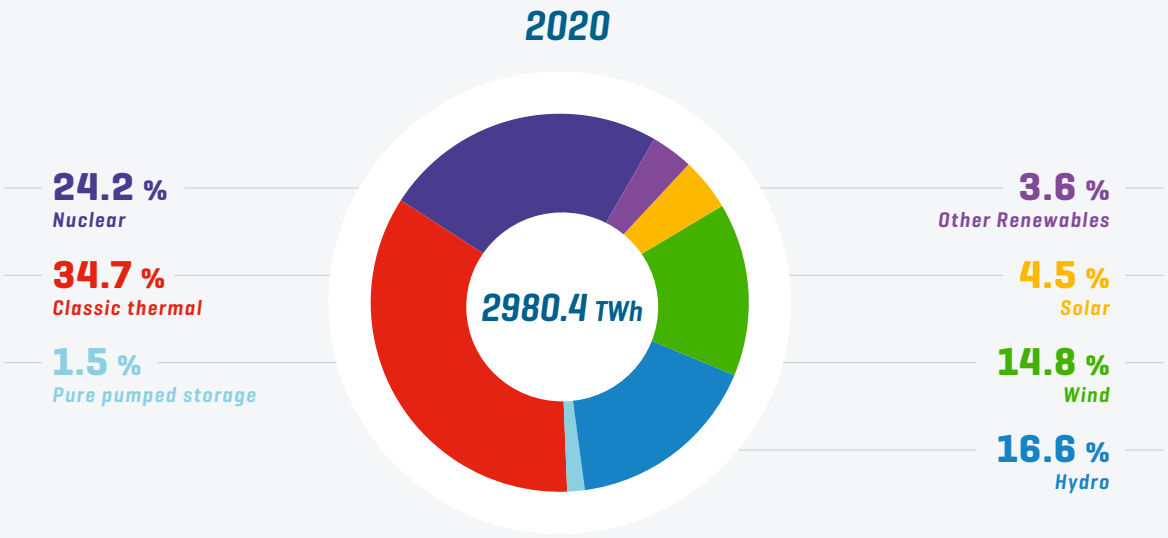
Despite the fall in electricity demand, generation from renewable sources (excluding pumped storage hydroelectric generation) was boosted, representing 39.6% of the energy produced in the ENTSO-E countries as a whole. The energy produced with renewable sources experienced an increase of 9.3% compared to the previous year, with solar energy experiencing the greatest growth compared to other technologies with a rise of 16.1% compared to 2019. In 2020, Spain occupied eleventh position in terms of coverage with renewable energy, being the seventh country in terms of coverage with wind energy and third in terms of coverage with solar energy, both calculated as a percentage of total electricity production.

Origen of the total energy production in ENTSO-E member states

TWh and %

	2019	2020	%20/19
Nuclear	807.9	720.7	-10.8
Classic thermal	1,158.8	1,034.6	-10.7
Pure pumped storage	39.8	45.8	15.1
Hydro	454.5	495.4	9.0
Wind	402.6	442.0	9.8
Solar	114.8	133.3	16.1
Other renewables	106.7	108.5	1.7
Total	3,085.1	2,980.4	-3.4

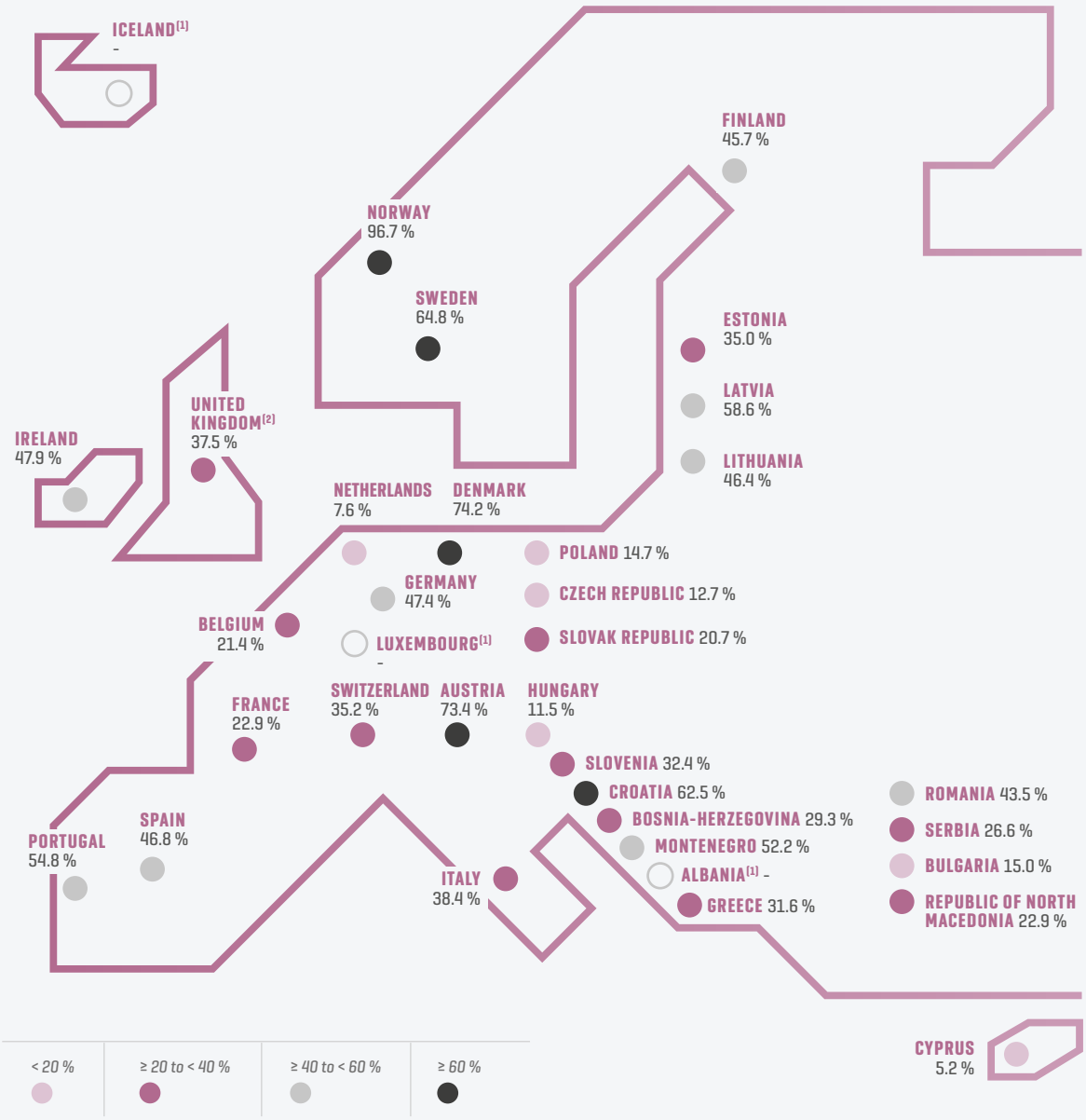
Source: data obtained from the ENTSO-E Transparency Platform as at 26/2/2021. The data is governed by Regulation (EU) No 543/2013 and is obtained from real-time systems and therefore differs from the consolidated data used for the specific case of Spain at national level, which is obtained using a power measurement system.



The following map shows the contribution of renewables to total demand coverage in each of the countries, with the Nordic countries once again standing out in terms of coverage with renewable energy.

Renewable energy structure over total production of in ENTSO-E member

% Renewable/Production



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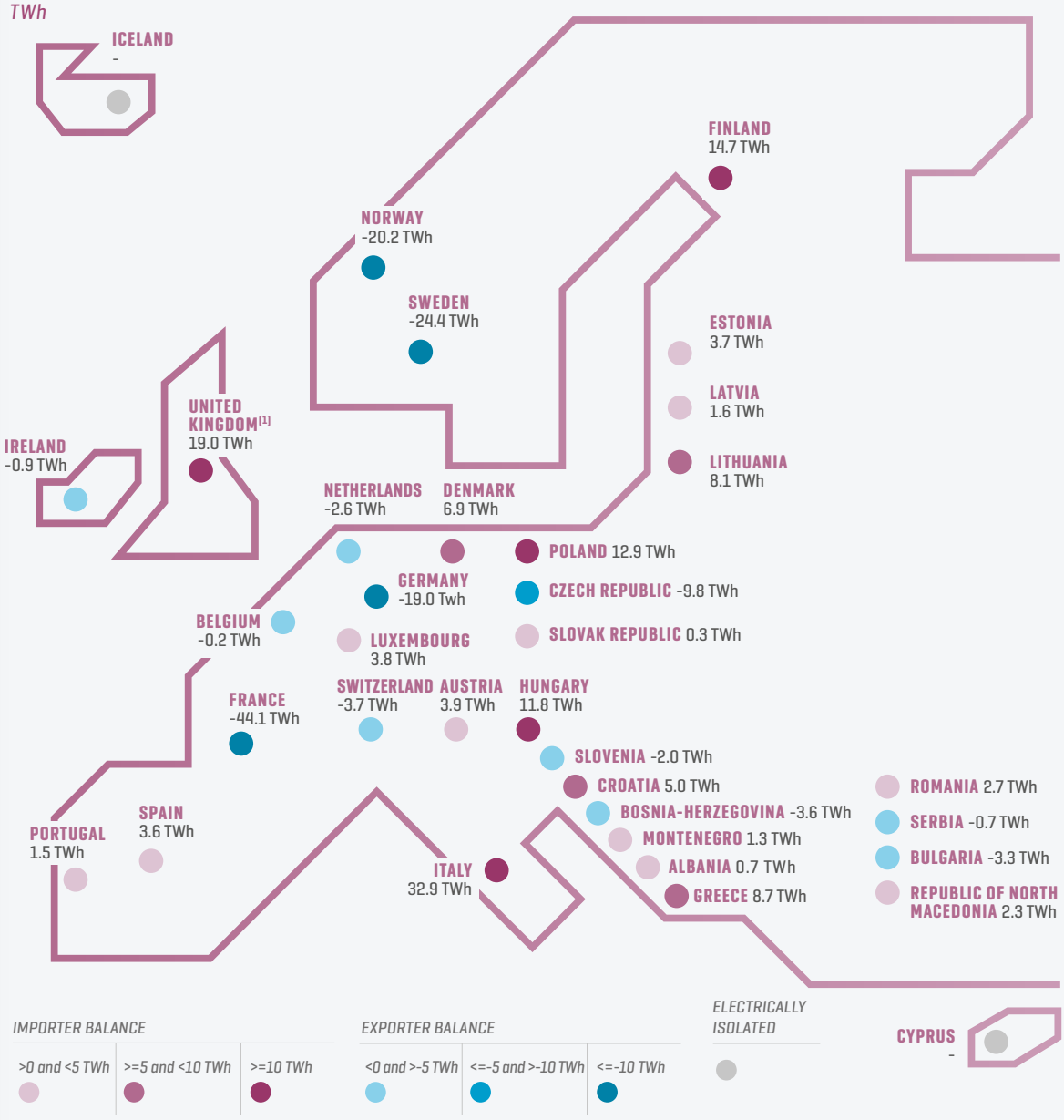
(1) Data not available

(2) Includes Northern Ireland

Energy exchanges in 2020 were mostly as an importer

A country's energy exchanges fluctuate every year, depending on factors such as exchange capacity, market coupling and the influence of energy prices. In 2020, the net balance of electricity exchanges among ENTSO-E countries and with their neighbouring countries (who are non-member states) was as an importer with almost 11 TWh. The largest exporters include France, Sweden, Norway and Germany, with export balances of 44 TWh, 24 TWh, 20 TWh and 19 TWh, respectively.

Balance of energy exchanges among ENTSO-E member states and with neighbouring non-member states



Source: data obtained from the ENTSO-E Transparency Platform as at 26/2/2021. The data is governed by Regulation (EU) No 543/2013, taking into consideration only certain borders and therefore differs from the data used for the specific case of Spain at national level, which considers all borders.
(1) Includes Northern Ireland

7

Innovation applied to the electricity system

In the field of innovation and technological development, the activity of Red Eléctrica de España in 2020 continued to focus strategically on the areas of impact and technological verticals driven by Elewit[1], the technology platform and transformation driver of the Red Eléctrica Group. The objective is to make the most of the possibilities offered by technology and collaboration with the innovation ecosystem to maximise the contribution of Red Eléctrica de España, as a key player in the electricity system, to the energy transition and to the decarbonisation of the economy.

In 2020, innovation and technological development activity continued to focus strategically on areas of impact and technological verticals that maximise Red Eléctrica de España's contribution to the energy transition and to the decarbonisation of the economy.

[1] Elewit is the technology platform of the Red Eléctrica group. https://www.elewit.ventures/en

The following areas of impact are:

Electrification of society

Electrification of transport

Energy efficiency

Self-consumption and distributed generation

Planning integrated with other grids and technologies

Transmission and accessibility of information

Advanced telecommunications services

Applications on IoT networks and sensorisation

Advanced autonomous in-line power supply systems

Development and management of smart assets

Mejora de la gestión de los activos, dImproved asset management, diagnostics and inspection, sensorisation...

Digitalisation of assets with immersive technologies, LIDAR, etc.

Connected worker, improvement of risk prevention as well as assistance and training

New technologies and materials to increase the useful life of assets

Automation and robotisation of processes

Citizen-centric

Smart cities

Alternative uses of infrastructure

Reduction of alternative emissions to SF6, extending of the useful life of assets...

Landscape integration of facilities into the environment and improvement in the sustainability of our processes

Renewable energy and flexibility in the operation of the electricity system

System security through advanced protection, simulation, monitoring and control systems

Improved calculations and forecasts of limits in the planning and simulation processes

Characterisation and prediction of the behaviour of renewable energy

New markets and models for integrating resources that offer greater flexibility for system operation

Cyber security

IoT and Cloud security

Data protection and encryption

Identity management

Automation and improvement of protection processes

Grid security and protocols

The technological verticals of interest are the following: Internet of Things (IoT), industry X.0, networks and platforms of the future, artificial intelligence and advanced analytics, and new communication technologies. Cyber security is also a key technological area.

Internet of Things

We develop advanced digital interconnection of devices, systems and services with the Internet to achieve sustainable and efficient management of assets of our electricity grid and telecommunications network.

Satellites and New Communication Technologies

We are incorporating 5G into our day-to-day business. This new mobile technology allows us to increase the availability of our transmission grid elements and maximise the use of our infrastructure.

AI and Advanced Analytics

We apply AI and advanced analytics to our processes to generate efficiencies and thus increase the availability of our infrastructure, boost the integration of renewables and improve the health and safety of our professionals.

Platform and Networks of the Future

We work on developing solutions based on new networks and existing platforms as a way to accelerate the decarbonisation of the economy and to drive a sustainable future.

Industry X.0.

We apply the robotisation of processes, the use of virtual and augmented reality, digital twin and the use of drones to enhance the development and intelligent management of assets, to be more efficient, sustainable and safer in our field operations.

Cyber security

As an operator of critical infrastructure, we understand cyber security as a key pillar that guarantees our mission: the provision of essential services. Our focus is to enhance the secure and smart development and management of assets, increasing the efficiency and sustainability of our operations.

During 2020, Red Eléctrica de España participated in 123 projects in all the aforementioned areas. These projects are broken down according to their purpose:

- **Improving efficiency:** 32 projects (whose purpose is to improve efficiency in processes and/or systems).
- **Enhancing system security:** 29 projects (aiming to enhance system security, including key measures to protect sensitive information and control access)
- **Improving the sustainable management of our assets:** 14 projects (aimed at improving the sustainable management of our assets, defining strategies and looking for tools that will help position the Company from strategic standpoint).
- **Increasing the availability of Infrastructure:** 14 projects (aimed at optimising the capacity, availability and efficiency of the infrastructure, thus ensuring the system efficiency)
- **Integration of renewables:** 9 projects (aimed at integrating renewable energy, which is one of the major challenges for electricity system operation).
- **Bringing us closer to society:** 8 projects (whose purpose is to bring citizens closer to the reality of the electricity system and to make them aware of the possibilities that technology provides regarding decisions on how and when they use energy and thus enable to them to actively contribute to the overall operation of the system).
- **Health and safety:** 6 projects (whose purpose is the health and safety of people)
- **Other/miscellaneous:** 11 other projects (with a cross-cutting purpose)

The most relevant projects completed in 2020 are briefly described below:

Increase the availability of infrastructure

- **Real-time transmission capacity:** research on the optimal monitoring strategy for the implementation of Dynamic Line Rating (DLR) as a tool to provide greater flexibility and optimised use of the transmission grid. This technology updates the transmission capacity values of the electricity grid lines in real time, thus reducing system costs (especially those associated with technical constraints), optimising grid planning and facilitating the efficient integration of renewables.

- **Non-intrusive system for the verification of the condition of the foundations of facilities:** research and technological drive for the development of a non-intrusive system for the verification of the state and geometry of foundations of high-voltage facilities. The basis for establishing a non-invasive testing methodology has been defined, which makes it possible to ascertain the state of conservation and suitability of foundations already built, with the primary focus of the project being on towers for overhead lines.

Increasing system security

- **Inertia emulation in power converters:** analysis of inertia emulation controls (synthetic inertia) using electronic converters and a grid-forming control structure.

Integration of renewables

- **Self-consumption visualisation platform <1MW:** platform that receives information in real time from the platforms of the inverter manufacturers of self-consumption facilities, allowing information gaps derived from the current regulations to be covered, which do not even contemplate the receipt of information in real time of the power generated by facilities of less than 1 MW, nor the measurement of the energy produced through the meter. This project was carried out in collaboration with the startup FlexiDAO, through Elewit's First Venture Client Programme.

Improving efficiency

- **Smart Disconnector (IDSDI):** development of an integrated solution of sensors, monitoring elements and data/information processing algorithms (monitoring equipment) of a universal nature for any type of disconnector, easy to install and with minimum intervention on the equipment.

- **C3 Construction Knowledge Centre:** this new digital platform will enable the transformation of the Red Eléctrica Group's construction operations in the areas of occupational health and safety, control and monitoring of workers, project control, quality management, control of assets, materials and machinery, and sustainability. In 2020, two minimum viable products were developed to quantify the efficiencies captured by the platform.

Improving the sustainable management of our assets

- **Detection and classification of anomalies in electricity lines through image processing using artificial intelligence:** solution for detecting and classifying anomalies in Red Eléctrica de España's electricity lines, through image processing developed by Sigma Rail's computer vision and artificial intelligence system, as part of Elewit's First Venture Client Programme. This project is part of a key area of the Dalia Project, the development of artificial intelligence models for anomaly detection, which is still ongoing.

- **Digitisation of engineering with additional information based on augmented reality:** mobile application so that any technician in the field does not have to fill in or access paper copies of the protocols and instructions regarding engineering elements, such as tower frames and electrical diagrams, but can do so through an augmented reality application that provides real information on all the components, materials and additional technical information by simply placing their mobile phone over the element. Project carried out in collaboration with the startup Onirix through Elewit's First Venture Client Programme.

- **SF6 repair methodology in GIS:** development of a methodology for the repair of SF6 gas leaks in gas insulated switchgear in substation. The methodology is independent of equipment suppliers and does not require disassembly of GIS compartments or subsequent testing, therefore increasing the availability of the affected equipment.

- **Flexiform transformer:** design of a transformer in which the use of natural esters is economically viable, identifying the key aspects for the development and manufacture of a prototype using these esters. At the same time, and with this knowledge, the suitability for use by the transformers in the current fleet, their state and the budget it would entail were determined. During the project, design improvements for the reduction of noise and leaking were investigated, with the goal of how to facilitate their inclusion in the evaluation of new transformers.

Health and safety

- **Training in local operation with electrical risk using virtual reality:** reduction of the probability of accidents through training in electrical risk environments simulated with virtual reality, having the sensation of touch through haptic gloves. In this way, the training of technicians is optimised, allowing them to observe their knowledge of the process, improve their weak points in a specific and personalised way and enhance the worker's awareness of the risk at the time they carry out the activity in the field. This project has been carried out in collaboration with the startup Neurodigital through Elewit's First Venture Client Programme.

- **Training in working at heights using virtual reality:** reduction of the probability of accidents through training in height environments simulated with virtual reality, with the sensation of touch through haptic gloves. The project also enabled logistical efficiencies by avoiding centralised travel to the place where the training module is given, with the equipment (hardware) travelling to the workplace. Project carried out in collaboration with the startup Neurodigital through Elewit's First Venture Client Programme.

- **Visualisation of electrical risk for the prevention of occupational risks:** software application with augmented reality to visualise electrical risk in the work area. This tool will reduce the probability of incidents/accidents. Project carried out in collaboration with the startup Onirix through Elewit's First Venture Client Programme.

In addition, the most relevant projects initiated during 2020 are briefly described below:

Increasing the availability of the infrastructure

- Citris: real-time inertia calculation of the Lanzarote-Fuerteventura system. The objective is to validate a system that provides continuous, real-time measurement of the inertia of this system, based on the measurements provided by the Phasor Measurement Units currently installed.

- DLR project. Forecasting strategy: in this project, different options will be analysed with the aim of achieving a meteorological forecasting system designed for the electricity line environment. The option of using prediction models based on wind fields developed by Recognised Research Groups will be analysed, as well as the option of prediction models fed directly from information from various data providers.

- Partial Discharge Platform: project to industrialise the minimum viable product already validated in 2020 on the diagnosis of the state of insulation of high-voltage facilities which incorporates artificial intelligence. This diagnosis, which is based on the measurement of partial discharges, their location and criticality, enables the maintenance process to be optimised.

- 5G / RED.es National Plan - call for projects: in the context of the RED. es National Plan, the Red Eléctrica Group is leading four use case studies of 5G technology that will allow their application to be tested on the various activities of Red Eléctrica de España, such as the operation of the transmission grid protection systems if fibre optic sections are replaced by 5G links; the automation of processes within an electricity substation using SO2 and SF6 sensorisation that contribute to the predictive maintenance of transmission assets; and the use of artificial vision to locate possible 'hot spots' or 'leaks'. Drones will also be used to inspect towers with the ability to send information to experts via 5G networks in real time; and as an alternative to the mobile operator's 5G network, a satellite-based system will be tested to communicate between the drone and the technical expert.

Integration of renewables

- Identification of photovoltaic modules: project in collaboration with Hispasat to update the database of photovoltaic module facilities and their installed power capacity based on the analysis of satellite information, which will make it possible to better estimate the impact of self-consumption on system operation.

Increase in system security

- Frequency instability indicator in isolated systems: creation of an indicator that alerts the operator that a specific electricity system is becoming unstable and that preventive measures must therefore be taken (coupling an extra generating unit, limiting renewable production, etc.). An effective implementation of this indicator would guarantee the security of the system by maximising the integration of renewables and minimising the costs associated with the implementation of preventive measures.

- NEWTON electrical calculation software: development of new electrical calculation software with greater capacity to manage large volumes of data, greater flexibility, and superior integration with existing solutions. This project opens the door to processes that were not feasible until now, such as performing massive electrical calculations and applying artificial intelligence to electricity grids.

Improving efficiency

- **Robotisation and automation of construction:** line of work for the application of robotics in the construction of electricity transmission facilities, increasing the efficiency and safety of the work. During 2020, different studies and minimum viable products were carried out in the field of overhead lines, studies that will continue in 2021.

- **DALIA project:** project to develop overhead line maintenance, directly affecting existing technical procedures, information flows and field work execution operations. Its main objectives are to achieve cost efficiency, internalise and systematise knowledge and standardise the detection of anomalies.
  The project comprises of three fundamental areas:

  - Capture of images with a drone specifically designed for line inspection, light, automatic and low-cost but safe.

  - Development of artificial intelligence models for anomaly detection. The industrialisation of the pilot project carried out by the startup Sigma Rail through Elewit's First Venture Client Programme is underway.

  - Development of a platform to manage the entire line inspection process (validate anomalies proposed by the algorithms, generate ad hoc reports, display alarms or manage detection models).

- **EPICS:** the EPICS project (Edge Protection and Intelligent Control Solution), consists of the realisation of a minimum viable product that integrates, in a single hardware and an open software platform, the protection and control functions of a complete substation, thus achieving important efficiencies and opening the possibility of developing new algorithms and automation necessary for the evolution of the electricity system in a more agile and dynamic way. This project is supported by the startup Nearby, a company in which Elewit has a stake, with which it is hoped to be able to define and create the most efficient hardware and software platform suited to the needs of the product.

Health and safety

- **Protected areas:** the objective of this project is to guarantee the occupational health and safety of people and the security of facilities in discharge operations to disconnect a facility from the rest of the electricity grid, eliminating risk situations for operators through the use of blockchain technology. The project is therefore aligned with the Red Eléctrica Group's strategic objective of 'zero' accidents.

8

Regulatory framework

2020 was marked by the outbreak of the COVID-19 pandemic and the resulting health and economic crisis. With regard to the electricity sector, as in general for all sectors, the pandemic disrupted the roadmap of regulatory developments planned for the year, both at European and national level. Even so, despite the difficulties, important regulatory developments for the electricity sector were published throughout 2020.

During 2020, at European level the various proposals that make up the European Green Deal were presented: a cross-cutting package of actions with which the European Union aims to achieve climate neutrality by 2050. Among the main legislative proposals currently in the pipeline are the **proposed European Climate Law and the revision of Regulation 347/2013 on guidelines for trans-European energy infrastructure**.

The European Commission has also proposed, within the framework of the European Climate Law, **to increase the greenhouse gas emissions reduction target to 55% by 2030 from the current target of 40%**, although this increase still needs to be agreed on between the European Council (which supports it) and the European Parliament (which proposes a more ambitious reduction target of 60%).

The European Commission, in addition to presenting legislative proposals, published important strategies with which it intends to guide the sector on the path towards achieving climate neutrality by 2050. Thus, in July it published the **European Union Strategy for Energy System Integration and the EU Hydrogen Strategy** and in November the Offshore Renewable Strategy. The aim of all of them is to develop technologies that make decarbonisation possible, complementing conventional renewable energy in order to ensure supply in the most economically efficient way.

At European level, a number of legislative and strategic proposals were put forward during 2020, that form part of the European Green Deal to achieve climate neutrality by 2050.

At national level, 2020 was also characterised by a regulatory drive for regulations promoting the energy transition. Like the European Union, the Spanish government has proposed a goal of climate neutrality by 2050 in the draft Law on Climate Change and Energy Transition, which is currently being processed in the Congress of Deputies. This objective is also included in the Long-Term Decarbonisation Strategy, approved on 3 November 2020, which is the main long-term energy and climate planning instrument. In the medium term, with specific objectives for the year 2030, noteworthy is the **Integrated National Energy and Climate Plan (NECP)** 2021 - 2030, which was submitted to the European Commission on 31 March 2020. The main objectives it sets out for the 2030 horizon are:

- 23% reduction in greenhouse gas (GHG) emissions compared to 1990.
- 42% renewables in the final use of energy.
- 39.5% improvement in energy efficiency.
- 74% of renewable energy in electricity generation mix.

All these aforementioned documents, together with the **Just Transition Mechanism**, the **National Strategy to Combat Energy Poverty** and the **National Climate Change Adaptation Plan** make up the **Spanish Government's Strategic Energy and Climate Framework**.

During 2020, and similar to what occurred at European level, the Government also approved sectoral strategies such as the **Hydrogen Roadmap: a commitment to renewable hydrogen**, which includes a target of 4 GW of installed power capacity of electrolysers by 2030. At the beginning of 2021, the **Energy Storage Strategy** was presented, which envisages having a storage capacity of around 20 GW in 2030 and reaching 30 GW in 2050, considering both large-scale and distributed energy storage.

In order to achieve these ambitious objectives, the government published important regulations throughout the year that shape a regulatory framework to enable investment in renewable energy and other clean technologies. Of particular relevance is Royal Decree-Law 23/2020, of 3 June, which approves measures in the field of energy and other areas for economic recovery. This introduced new elements such as energy storage, independent aggregators and hybridisation, as well as the creation of a new remuneration framework for renewable energy based on energy price auctions, which was developed during the second half of 2020 with the publication of **Royal Decree-Law 960/2020, of 3 November, which regulates the economic regime for renewable energy for electricity generation facilities.**

The approval of Royal Decree Law 23/2020 also introduced a series of requirements for holders of grid access and connection permits, with the aim of guaranteeing the soundness of the projects associated with these permits. The regulatory framework relating to grid access and connection was pending regulatory development, which took place at the end of 2020 and beginning of 2021: **Royal Decree 1183/2020 of 29 December on access and connection to electricity transmission grids and distribution networks** was published in the Official State Gazette (BOE) on 30 December, while **Circular 1/2021 of the National Markets and Competition Commission was approved on 20 January, establishing the methodology and conditions for access and connection to the transmission grids and distribution networks of electricity generation facilities**. Both regulations establish the criteria, principles and procedures to be applied in order to connect a generation or energy storage facility to the electricity grids, with the Royal Decree also establishing the conditions for demand and distribution.

In addition to promoting the energy transition, the other major area on which the government has focused its regulatory efforts is the fight against the COVID-19 pandemic and its possible effects on the electricity sector and consumers, whom it has sought to protect. In this regard, the publication of Royal Decree-Law 8/2020, of 17 March, on extraordinary urgent measures to address the economic and social impact of COVID-19 and Royal Decree-Law 11/2020, of 31 March, adopting additional urgent measures in a social and economic sphere to address the COVID-19 crisis, should be highlighted.

With regard to what is expected for 2021, it will be the year in which the Climate Change and Energy Transition Act and the new planning of the electricity transmission grid for the period 2021 - 2026 come into force. The new structure of tolls and charges, set out in Royal Decree 148/2021, of 9 March, which establishes the methodology for calculating electricity system fees, and Circular 3/2021, of 17 March, of the National Markets and Competition Commission, which amends Circular 3/2020, of 15 January, which establishes the methodology for calculating electricity transmission and distribution tolls, will also come into force, expected as of 1 June 2021.

In addition, the draft bill creating the National Fund for the Sustainability of the Electricity System (FNSSE) will continue to be processed. The aim of this fund is to assume part of the fixed cost associated with the electricity bill (the so called *'RECORE'* – in other words the specific remuneration regime of renewable energies, cogeneration and waste), which would therefore cease to form part of the regulated costs of the electricity system. The fund would be financed with contributions from all energy supply companies, as well as with revenue from the tax concepts included in Law 15/2012 and from CO_2 auctions, plus additional contributions from EU funds and the General State Budget (both limited to 10% of the fund's annual revenue).

At European level, in addition to continuing with the processing of the aforementioned legislative initiatives, in June, within the framework of the European Green Deal, the 'Fit for 55' package is expected to be published, which will contain a battery of measures to achieve a 55% reduction target of greenhouse gas emissions: it includes proposals such as the revision of the Energy Taxation Directive or the creation of the Carbon Border Adjustment Mechanism regarding CO2 emissions.

Royal Decree-Law 23/2020, of 3 June, approves measures in the field of energy and other areas for economic recovery, including the creation of a new remuneration framework for renewable energy based on energy price auctions.

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