

Energy Consultancy Royal Thai Embassy



ENERGY CONSULTANCY Royal Thai Embassy

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Spain's Renewable Energy: Outlook and Business Opportunities



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1. EXECUTIVE OVERVIEW

This study reviews the current situation of the electricity sector and specifically renewable energy sources (RES) in Spain, as well as future trends and opportunities for Thai companies in the sector.

The renewable energy sector in Spain is in full growth. Various factors such as high pollution, energy dependence and the increased demand for energy associated with the country's progress have been the triggers for the government's decision in recent years to invest in incentive measures for clean energies and thus diversify the energy matrix to a greater extent. Proof of this is the PNIEC 2030, an energy roadmap established in 2020, whose main goal is to achieve 74% of the energy matrix from clean sources by 2030 and to achieve carbon neutrality by 2050.

Spain currently has an installed power in RES-E of 112,846 MW, including all the systems on both the mainland and the islands, which represents 46.7% of the country's energy matrix. Within the different types, wind energy stands out, which today represents almost 44% of RES-E, with a net installed power of 27,636 MW, hydroelectric energy with an installed power of 17,093 MW and solar energy with an installed power of 17,025 MW and a representation of 27% of RES-E.

Despite the progress of RES-E, there are still several barriers that hinder its full progress. The problems arising from the lack of PPA (Power Purchase Agreement) contracts that facilitate access to financing are aspects that need to be improved in order to achieve a leading position in green energy projects.

The decarbonisation of the country and electrification are the main objectives set by the government for the medium to long-term future. It is not only important to develop renewable energies for energy generation, but also to change the model in the transport sector, which emits more than 25% of the CO₂ emissions in the country and in Europe. Therefore, the development of electric vehicle technology and recharging points together with energy storage are key points.

In this sense, hydrogen is positioned as one of the great advances towards renewable gases, being able to take advantage of the discharges of renewable energies to produce 100% green hydrogen. The Government has published the hydrogen roadmap, which is committed to the development of renewable hydrogen that will encourage the creation of innovative industrial value chains in our country, technological knowledge and the generation of sustainable employment, contributing to the reactivation towards a green economy with high added value.

In conclusion, a favourable future is identified for the development of RES-E in Spain, especially for solar, wind and renewable gas energies. The incentive measures taken by the different governments, and its geographical and climatic conditions, offer favourable future prospects.

2. CURRENT CONTEXT – SPAIN

2.1. NEXT GENERATION Funds

The context of the crisis caused by the COVID-19 pandemic in 2020 left a series of consequences in most economic sectors, with the exception of the country's essential sectors, reducing activity to a minimum with the corresponding effects.

In July 2020, the European Council agreed on an exceptional temporary recovery instrument known as <u>Next Generation EU</u> with €750 billion (in 2018 prices) for all Member States. The Recovery Fund ensures a coordinated European response with Member States to address the economic and social consequences of the pandemic.

The funds can be used to grant repayable loans of up to €360 billion and non-repayable transfers of up to €390 billion.

The two largest Next Generation EU instruments are the following:

- The Recovery and Resilience Facility (RRF), the centrepiece of the Recovery Fund, is endowed with €723.8 billion. It aims to support investment and reforms in Member States to achieve a sustainable and resilient recovery, while promoting the EU's green and digital priorities.
- The Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU) Fund is endowed with €50.6 billion. REACT-EU funds operate like structural funds, but with greater flexibility and agility in their implementation. REACT-EU will promote the green, digital and resilient recovery of the economy.

Next Generation EU will also contribute additional funds to other European programmes or funds, such as the European Agricultural Fund for Rural Development (EAFRD) and the Just Transition Fund (FTJ), of which Spain will receive 720 and 450 million euros, respectively.

The following tables show the budget allocation for each type of fund in both Europe and Spain.

Funds	Endowment € Bill
RRF (Grants)	338.000
RRF (Loans)	385.800
ReactEU	50.600
Just Transition Funds (JTF)	10.900
RescEU	2.000
Horizon Europe	5.400
InvestEU	6.100
Rural Development	8.100

Table 1. Next Generation Europe Funds



Table 2. Next Generation Funds for Spain

Funds	Endowment € Mill
RRF (Grants)	312.500
RRF (Loans)	360.000
ReactEU	47.500
Just Transition Funds (JTF)	10.000
Rural Development	7.500
Horizon Europe	5.000
InvestEU	312.500
RescEU	1.900

Part of these Next Generation funds are linked to the *Plan de Recuperación, Transformación y Resiliencia (PRTR)*. This plan is Spain's strategy for channelling the funds earmarked by Europe to repair the damage caused by the COVID-19 crisis and, through reforms and investments, build a more sustainable future.

The PERTE are large strategic projects that require collaboration between administrations, companies, and research centres. The main lines of action are:

- Electric and connected vehicles
- Renewable energy, renewable hydrogen and storage
- Agri-food
- Circular economy
- Cutting-edge health

2.2. Energy outlook

In Spain, the energy and climate policy framework is determined by the international context and European Union (EU) policy.

The national energy system is characterised by a high energy dependency, which reached 73% in 2019, well above the EU average (54%), given the predominance of fossil fuels. On the positive side, it has different gas and oil suppliers in Europe. With regard to the internal market, the electricity interconnection target for Member States is set at 15% by 2030.

The Government of Spain has partnered with REN21 (Renewable Energy Agency for the 21st Century) to organise the next International Renewable Energy Conference (IREC) in Madrid from 21-23 February 2023, through the Instituto de Diversificación y Ahorro de Energía (IDAE), an entity attached to the Ministerio para la Transición Ecológica y el Reto Demográfico (MITECO).

IREC is a series of high-level policy conferences focused on sustainable energy transition that acts as a common platform for leaders from governments, the private sector and civil society to jointly address the drive for renewable energy.

On the other hand, Spain's *Plan de Recuperación, Transformación y Resiliencia* establishes that 40% of funds must contribute to the fight against climate change and that 100% of funding must comply with the principle of 'no significant damage to the environment'.

To date, more than €10 billion has been earmarked for actions directly related to the energy transition.



The peninsular installed electricity power, as of 31 December 2021, is 107,505 MW, with a 58.6% share of renewable technologies.



Figure 2-1. Evolution of peninsular renewable and non-renewable electricity generation (%). Source: Red Eléctrica Española. Year: 2022.

The evolution of peninsular renewable and non-renewable electricity generation (%) is shown in the graph below.

- Renewables: hydraulic, wind, solar photovoltaic, solar thermal, other renewables, and renewable waste.
- Non-renewables: nuclear, coal, fuel/gas, combined cycle, cogeneration, non-renewable waste, and pumpedstorage turbine.



Figure 2-2. Evolution of peninsular renewable and non-renewable electricity generation (%). Source: Red Eléctrica Española. Year: 2022.

2.3. Ukrainian crisis

In the energy area, since the second half of 2021, Europe has been suffering an energy price crisis unlike any other in the history of the European integration project, both in terms of its duration and its impact on domestic economies, the competitiveness of companies and industry in global markets and economic growth in the medium and long term.

This situation has been aggravated by Russia's invasion of Ukraine on 24 February 2022, which has abruptly pushed up the price of natural gas on the main European organised markets and

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the price of electricity on wholesale markets to unprecedented levels. By way of illustration, on 8 March 2022, the average price of electricity on the daily market in Spain rose to 544.98 €/MWh, reaching its maximum hourly value of 700 €/MWh on the same day at peak consumption in the evening (20th hour), when the average price of electricity since the liberalisation of generation in 1998 is around 45 €/MWh, i.e. more than ten times higher.

These recent rises are closely linked to the "contagion effect" on the electricity market due to the high prices of natural gas resulting from the price formation mechanism in place in accordance with the principles laid down in European regulations. In fact, on 7 March 2022, the Iberian gas market (MIBGAS) recorded a record closing price of 214.36 €/MWh for the product with next day delivery (D+1), i.e. again ten times higher than the natural gas measure since MIBGAS came into operation.

In this context of energy, economic, climate and social emergency, on 8 March 2022 the European Commission published a Communication with guidelines for regulating prices in exceptional circumstances to mitigate the impact of this price increase on consumers.

		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	JAN	50,51	33,62	51,60	35,65	71,49	49,98	61,99	41,10	60,17	201,72	151,00
Q1	FEB	45,04	17,12	42,57	27,50	51,74	54,88	54,01	35,87	28,49	200,22	151,00
	MAR	25,89	26,67	43,12	27,79	43,14	40,13	48,75	27,70	45,39	283,31	151,00
	APR	18,17	26,44	45,34	24,11	43,69	42,67	50,41	17,65	65,02	191,52	122,79
Q2	May	43,45	42,41	45,12	25,77	47,11	54,92	48,39	21,25	67,12	173,00	122,79
	JUN	40,87	50,95	54,73	38,90	50,22	58,46	47,19	30,62	83,30	150,00	122,79
	JUL	51,16	48,21	59,55	40,53	48,63	61,88	51,46	34,64	92,42	150,00	128,34
Q3	AGO	48,09	49,91	55,59	41,16	47,46	64,33	44,96	36,20	105,94	150,00	128,34
	SEP	50,20	58,89	51,88	43,59	49,15	71,27	42,11	41,96	156,14	150,00	128,34
	ост	51,50	55,06	49,90	52,83	56,78	65,09	47,16	36,56	199,90	150,50	140,07
Q4	NOV	41,81	46,80	51,53	55,73	59,19	61,97	42,19	41,94	193,43	150,50	140,07
	DES	63,64	47,47	51,64	60,49	57,94	61,81	33,80	41,97	239,16	150,50	140,07
Yearl	y average	44,19	41,96	50,21	39,50	52,21	57,28	47,70	33,95	111,37	175,11	135,55

Figure 2-3. Evolution of the OMIE prices. Source: OMIE. Year: 2022.

Supply shortages in Europe pushed the reference gas price at the Dutch TTF to an all-time high in March, above €350/MWh.

Dutch TTF Gas Futu	res					
CONTRACT		LAST	TIME[GMT]		% CHANGE	VOLUME
MAR22		135.700	2/24/2022 3:05 PM		52.659	44555
INTRADAY 3 MONTHS 1YEAR 2 YEARS					LAST UPDATE TIME: 02-24-20	22 4:25 PM GMT
175						
150					WEDNES	SDAY FEB 23
25					2022 SERIES	S 1: 88.891
100			~~	m = and	7000	-
75			\sim			\sim
80						
23						
Maik 21	MAY 21	JUL 21	SEP 21	NOV 21	JAN 22	

Figure 2-4. Evolution of the TTF futures market. Source: ICE ENDEX. Year: 2022.

The MIBGAS market also recorded record highs on the back of geopolitical tensions.



Figure 2-5. Evolution of the OMIP futures market. Source: OMIP. Year: 2022.

The EU currently imports 90 % of the gas it consumes, and Russia provides more than 40 % of the gas consumed in the EU. In addition, 27% of oil imports and 46% of coal imports also come from Russia. To be more precise, the Czech Republic, Hungary, Slovakia and Latvia depend 100% on supplies from Russia, while Spain, Portugal and Ireland cover practically all their demand from Algeria, Norway, Nigeria, Qatar and Trinidad and Tobago, among others.

As highlighted by the European Commission in its Communication of 23 March, the Russian invasion of Ukraine is adding supply concerns to the pre-existing difficult situation, exacerbating energy price volatility, which is fuelling inflation, damaging the European economy and impacting on its recovery from the COVID-19 crisis. This serious situation of a geopolitical nature no longer only has strong repercussions from a strictly economic and price signal point of view, but takes on additional relevance from a security of supply perspective, whose additional risks need to be anticipated and decisively addressed.

This situation has prompted the EU to design a plan called REPowerEU: Joint Action for More Affordable, Secure and Sustainable Energy, which aims to make energy more affordable, secure and sustainable:

- Diversify gas supply by increasing imports of liquefied natural gas and pipeline imports from non-Russian suppliers, and increasing the share of biomethane and hydrogen.
- Establish further actions to increase green energy production, diversify supplies and reduce demand with a particular focus on gas, which has a significant influence on the electricity market.
- Reduce retail prices through re-regulation by optimising the design of the electricity market and support particularly exposed companies.
- Re-storage of gas across the EU and realisation of new hydrogen compatible infrastructure.
- Eliminate dependence on fossil fuels by 2030 through energy efficiency, deployment of heat pump installations, increased wind and solar power and adoption of renewable hydrogen.

At European level, as markets are being unified, the causes/effects and objectives and measures are the same for Spain as for the rest of the EU countries.



3. DEFINITION OF THE ELECTRICITY SECTOR

3.1. Spanish electricity system

The Spanish electricity system covers both the Spanish mainland and the non-mainland systems of the Canary Islands, Balearic Islands, Ceuta and Melilla, guaranteeing the security and continuity of the electricity supply all time.

The strong emergence of renewable energies and other forms of distributed generation is affecting not only the composition of the generation mix, but also the price of electricity and the development of investment in the sector. The new ways of generating and distributing electricity are now operating in a market designed a few decades ago around a very different energy model.

In Spain, as in all EU countries, the energy sector was liberalised in search of greater competition. In the Spanish case, this process began in 1997 with the enactment of the Electricity Sector Law 54/1997, reformulated by *Decreto 24/2013*.

This restructuring of the electricity sector meant the transition from a vertical structure, where all activities were grouped together, to another organisation where generation, transmission, distribution and retailing operate independently.

Electricity generation and trading are carried out in competition in the new electricity market, while transmission and distribution remain as monopoly activities regulated by the government.

The following is a description of the functioning of the energy market, and of the main agents that make it up.

3.2. Electricity market structure

The Spanish electricity sector is made up of a set of companies and organisations that make it possible consumers to access electricity. The basic regulation that currently governs the structure and operation of the sector is Law 24/2013, of 26 December, on the Electricity Sector.

The supply of electricity is defined as the delivery of energy through the transmission and distribution networks for an economic consideration under the conditions of regularity and quality that are required.

The Comisión Nacional de los Mercados y la Competencia (CNMC) is responsible for regulating the operating rules of the organised markets, taking into account the energy policy guidelines set by the Ministerio para la Transición Ecológica y el Reto Demográfico (MITECO).

The main activities for the supply of electricity are:

3.2.1. Generation activity

Generation is the production of electrical energy. Electricity producers are those natural or legal persons whose function is to generate electricity, as well as to construct, operate and maintain the production facilities.



Figure 3-1. Evolution of the number of generators in the electricity market. Source: CNMC. Year: 2019.

Since 1998, generating plants have had to change their economic operating regime and no longer have their energy production secured on the basis of centralised dispatch, but must compete daily on the wholesale markets to try to have their hourly bids for electricity sales accepted. If they do not succeed, they cannot send their production to the grid the following day. The Iberian Electricity Market Operator (OMIE) is the body responsible for brokering the purchase and sale electricity from generators and traders in the daily electricity market, jointly for Spain and Portugal. On the other hand, the purchase and sale of wholesale electricity for future time periods is managed by the OMIP body, although many contracts of this type are also made directly between market agents.

Generation activity is liberalised.

The generation fleet in Spain is increasingly renewable. In 2021, installed capacity stood at 112,846 MW, 56.6% of which belonged to renewable technologies.

Wind power accounted for 23.3% of total production in Spain, leading the national generation mix for the first time since 2013. Solar photovoltaic leads the increase in production with a growth of 36.7% and has also registered the highest historical production and participation in the country's mix with 8% of the total.

To look at the companies currently operating in the generation sector, we look at the National Classification of Economic Activities (CNAE – Spanish acronym). The CNAE is a classification system that allows companies and establishments to be grouped into homogeneous categories at national level. Its code is a mandatory requirement to formalise registration and will form part of the identification of companies in their communications with the administration.

The purpose is to have a uniform and global criterion for statistical purposes. In the European sphere, it has been drawn up based on the NACE-Rev2 approval regulation (replacing CNAE-93).

CNAE	Description
3515	Production of hydroelectric energy
3516	Production of electrical energy from conventional thermal sources
3517	Nuclear electricity production
3518	Production of electricity from wind energy
3519	Production of electrical energy of other types

Table 3. Types of generation National Classification of Economic Activities (CNAE)

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Therefore, the main companies that have more turnover for the CNAE that we are focus on are: (3519) Production of electrical energy of other types and (3518) Production of electrical energy from wind energy:

CNAE	3519	CNAE	3518
Position	Company	Position	Company
1	IBERDROLA ENERGIA ESPAÑA	1	GE WIND ENERGY SL
	SOCIEDAD ANONIMA.		
2	SIEMENS GAMESA RENEWABLE ENERGY	2	NATURGY RENOVABLES SLU
	EOLICA SL		
3	REPSOL GENERACION ELECTRICA, SA	3	CORPORACION ACCIONA EOLICA SL
4	GAS Y ELECTRICIDAD GENERACION SA	4	EDP RENOVABLES ESPAÑA SLU
5	AUDAX RENOVABLES S.A.	5	ENERGIAS RENOVABLES
			MEDITERRANEAS SA

Table 4. F	Ranking of	generation	companies	by turnover
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Tables 8 and 9 in section 4 of this document show the winning companies in the renewable energy auction.

3.2.2. Transport activity

The purpose of transmission is the transmission of electrical energy through the grid for the purpose of supplying the various consumers and also for international exchanges.

The transmission company Red Eléctrica de España (REE) is responsible for the transmission of electricity between the large generation and consumption centres via 220 and 400 kV high voltage lines, and its investments and operating and maintenance costs are paid for by the government.



Figure 3-2. Map of main distributors. Source: Red Eléctrica Española, Year: 2002.

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3.2.3. Distribution activity

The purpose of distribution is the transmission of energy from the transmission grid or, in the case of other distribution grids or from generation connected to the distribution grid itself, to the points of consumption or other distribution grids under the quality conditions established for the ultimate purpose of supplying it to consumers. Distributors are those trading companies or cooperative societies of consumers and users whose function is to distribute electricity, as well as to build, maintain and operate the distribution facilities designed to deliver the energy to the points of consumption, among other functions. According to the CNMC, there are currently 333 distributors in Spain¹.

The ranking of distribution companies by turnover is shown in the table below.

Position	Company
1	EDISTRIBUCION REDES DIGITALES SL.
2	I-DE REDES ELECTRICAS INTELIGENTES SOCIEDAD ANONIMA
3	ENGIE ESPAÑA SL
4	IBERDROLA ENERGIA ESPAÑA SOCIEDAD ANONIMA.
5	UFD DISTRIBUCION ELECTRICIDAD SA.





Figure 3-3. Map of main distributors. Source: PROFIELECTRA S.L.. Year: 2022.

3.2.4. Retailing activity

The activity of retailing is carried out by electricity retailing companies (trading companies or cooperatives), accessing transmission or distribution networks, whose function is to sell electricity to consumers, to other subjects to carry out international exchange operations in accordance with current regulations. According to the CNMC, there are currently a total of 489 active entities engaged in the retailing of electricity in Spain². The retailing activity is liberalised.

¹ https://sede.cnmc.gob.es/listado/censo/1

² https://sede.cnmc.gob.es/listado/censo/2

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Figure 3-4. Evolution of the number of retailers in the electricity market. Source: CNMC. Year: 2022.

The top five energy retailers that supplied the highest volume of energy in 2020 were:

Position	Company
1	ENDESA Group
2	IBERDROLA Group
3	NATURGY Group
4	EDP Group
5	FORTIA ENERGIA S.L.

Table 6	. Ranking	of	retailers	by	energy volume
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On the other hand, we can distinguish between retailers by the type of energy they sell. Guarantees of origin (GdO in Spanish) allow a retailer to prove that the energy it sells is "green", coming from renewable energy sources.

The CNMC is the body that regulates the Guarantees of Origin market, and these serve as an incentive for new renewable generation. Not all retailers have 100% green energy, some buy for certain customers who ask for it and others do not buy these certificates at all.

The top 5 retailers that are 100% green are as follows:

Table 7. Ranking o	f retailers b	oy energy vo	lume with 2	100% green	energy
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Position	Company	Volume kWh
1	ACCIONA GREEN ENERGY DEVELOPMENTS S.L.	6.373.238
2	REPSOL COMERCIALIZADORA DE ELECTRICIDAD Y GAS, S.L.U.	4.081.819
3	ALDRO ENERGÍA Y SOLUCIONES., S.L.U.	2.845.755
4	FENIE ENERGIA S.A.	2.786.286
5	NEXUS ENERGÍA S.A.	2.527.686

3.2.5. New legal concepts

The *Real Decreto-Ley 23/2020* establishes new legal figures to be developed in the coming years that will be key to the effective energy transition towards a system based on renewable energies.

- Holders of storage assets: natural or legal persons that have facilities where the end use of electricity is shifted to a later time than when it was generated or that perform the conversion of electrical energy to another form of energy that can be stored for subsequent reconversion of this energy into electrical energy.
- Independent aggregators: participants in the electricity generation market that provide aggregation services and that are not related to customer supply, where aggregation is understood as an activity carried out for natural or legal persons that combine multiple consumption or electricity generated from consumers, producers or storage facilities for sale or purchase from the electricity generation market.
- Renewable energy communities: legal entities based on open and voluntary participation, autonomous and effectively controlled for partners or members which are located in the immediate vicinity of renewable installations owned and developed by these legal entities, the partners or members of which are natural persons, SMEs or local authorities including municipalities and whose primary purpose is to provide environmental, economic or social benefits to their partners or members or in the local areas where they operate rather than financial gain. Agents acting on behalf of any subject for the purposes of their participation in the production market and the collection and payment of tolls, charges, prices and regulated remuneration shall be considered as representatives.



4. SUPPLY - COMPETITOR ANALYSIS

4.1. Market size

Renewable peninsular electricity generation in 2021 reached an all-time high, generating 46.7% of electricity, up 2.7% compared to the previous year.

The figure below shows the evolution of peninsular renewable electricity generation (GWh) from 2017 to the 2021 forecast just published by Red Eléctrica Española.



Figure 4-1. Evolution of peninsular renewable electricity generation (GWh). Source: Red Eléctrica Española. Year: 2022.

The installed power of solar energy amounts to 17,025 MW and represents 15.8% of the total installed power and 27% of the share of renewable energies.

Wind energy accounts for 25.7% of total installed power, with a power of 27,636 MW and 44% of renewable technologies.

4.2. Tender process

In Spain, renewable energy auction is organised by the Ministerio para la Transición Ecológica y el Reto Demográfico, in which the different companies dedicated to this field receive an economic right or remuneration. This remuneration is based on the number of megawatts awarded.

Real Decreto 960/2020, de 3 de noviembre, of 3 November, which regulates the economic regime for renewable energies for electricity production facilities, establishes a remuneration framework for electricity generation from renewable energy sources, different from the specific remuneration regime, based on the long-term recognition of a price for the energy.

PNIEC envisages the installation of 90 GW of renewables so that 74% of Spain's electricity generation will come from these sources, which will contribute to reducing one out of every three tonnes of greenhouse gases currently emitted. According to MITECO, the REER auctions are a key part of the strategy to achieve these objectives by 2030. The renewable auction calendar aims to secure PNIEC targets by 2025.



Figure 4-2. Evolution and forecast of renewable auctions power. Source: MITECO. Year: 2020.

Projects awarded in the auctions must offer their energy in the wholesale market, but will be remunerated by the **Renewable Energy Economic Regime (REER).** The REER pays each project the price it bid with a 5% exposure to spot market prices. Each project has 12 years to deliver all the energy allocated to the REER with the possibility of disengaging from the remuneration system from the ninth year if it has already delivered all the energy allocated.



Renewable auctions and PNIEC targets - Spain

Figure 4-3. Renewables auction and PNIEC targets. Source: AleaSoft Energy Forecasting with data from REE and MITECO. Year: 2021.

The organisations participating in the auction are:

- OMIE, the entity administering the auction.
- CNMC, the supervisory body of the auction.

The System Operator, which is responsible for the settlement of the energy sold, is also involved.

The scope of application is wind and photovoltaic installations located on the Spanish mainland. They can be both new and existing installations and hybridisation of technologies is permitted. GRUPOTREBOL

In the case of having a storage system, it must be used exclusively for the storage of the energy produced by said installation.

A product quota of 3,300 MW of installed power and four minimum product reserves per technology and specificity are established:

- 700 MW of photovoltaic
- 300 MW for distributed generation FTV with local character
- 600 MW of photovoltaic and wind of accelerated availability 30/09/2022.
- 1,500 MW of wind

Installations awarded the local distributed generation reserve must comply with the following conditions:

- Connection to the distribution grid with voltage equal or less than 45 kV.
- Power equal or less than 5 MW.
- Maximum power of the installation limited according to the number of inhabitants registered in the municipalities that are totally or partially located at a distance less than 30 km from the centre of the installation (1kW/inhabitant).

To ensure citizen participation, the holder must have one of the following legal forms:

- Local cooperative.
- Local administration.
- Capital Company with local character (At least 25% of the share capital or 25% of the financing necessary to implement the renewable project held by a minimum of four local participants.

The following image shows part of the BOE where the results of the second auction for the allocation of the Renewable Energy Economic Regime (REER) were published. 3124 MW.

BOLETÍN OFICIAL DEL ESTADO								
Úm. 255 Lunes 25 de octubre de 2021 Sec. III. Pág. 129							II. Pág. 129451	
ANEXO I Relación de ofertas adjudicatarias de la segunda subasta para la asignación del régimen económico de energías renovables al amparo de lo dispuesto en la Orden TED/1161/2020, de 4 de diciembre								
Nombre adjudicatario	CIF Adjudicatario	Tecnologia	Subgrupo según artículo 2 del Real Decreto 413/2014	Reserva minima por especificidad	Código de la unidad de adjudicación	Precio de adjudicación (euros/MWh)	Potencia adjudicada (kW)	
ABEI ENERGY & INFRASTRUCTURE S.L.	B87307278	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00032	29,67	23.400	
BRUC ENERGY, S.L.	B88465034	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00038	30,37	30.000	
BRUC ENERGY, S.L.	B88465034	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00039	30,38	35.000	
BRUC ENERGY, S.L.	B88465034	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00040	30,39	35.000	
EDP RENOVABLES ESPAÑA, SLU.	B91115196	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00064	32,99	20.910	
EDP RENOVABLES ESPAÑA, SLU.	B91115196	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00065	32,99	38.950	
ENGIE ESPAÑA, S.L.U.	B82508441	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00043	32,00	22.300	
FOTO-GENERACION TALIA, S.L.U.	B02621225	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00079	34,88	10.500	
IGNIS DESARROLLO S.L.	B87973327	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00042	31,83	27.500	
IGNIS DESARROLLO S.L.	B87973327	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00046	32,70	29.110	
IGNIS DESARROLLO S.L.	B87973327	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00047	32,87	59.500	
IGNIS DESARROLLO S.L.	B87973327	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00074	34,35	28.000	
NATURGY RENOVABLES S.L.U.	B84160423	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00034	29,75	38.100	
NATURGY RENOVABLES S.L.U.	B84160423	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00045	32,44	140.000	
NATURGY RENOVABLES S.L.U.	B84160423	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00081	34,90	43.300	
NEARCO RENOVABLES.	B88006671	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00019	28,01	10.775	
NEARCO RENOVABLES.	B88006671	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00020	28,14	10.775	
NEARCO RENOVABLES.	B88006671	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00021	28,27	10.775	
NEARCO RENOVABLES.	B88006671	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00022	28,40	10.775	
NEARCO RENOVABLES.	B88006671	Fotovoltaica	b.1.1	Instalaciones de tecnología fotovoltaica.	UA_21_10_00023	28,53	10.775	

Figure 4-4. Order TED/1161/2020. Source: BOE. Year: 2020.

4.3. List of solar energy projects

The projects awarded in the two auctions held during 2021, on 26 January and 19 October, are shown in the list below and add up to more than **3,599 MW of installed power.**

Table 8	Awardees	of	nhotovoltaic	nroie	ects in	the	2021	auctions
I able o.	Awaruces	UI.	photovoltaic	ρισιο	ects III	uie	2021	auctions.

Name of awardee	Technology	Subgroup*	Power award (kW)
AKUO RENOVABLES, S.L	Photovoltaic	b.1.1	81.200
ALTER ENERSUN, S.A.	Photovoltaic	b.1.1	8.220
CANADIAN SOLAR SPAIN, S.L	Photovoltaic	b.1.1	14.000
DESARROLLOS RENOVABLES EOLICOS Y SOLARES, S.L.	Photovoltaic	b.1.1	17.000
DOMINION ENERGY, S.L.U.	Photovoltaic	b.1.1	45.920
EDP RENOVABLES ESPAÑA, S.L.U.	Photovoltaic	b.1.1	143.400
ELAWAN ENERGY, S.L	Photovoltaic	b.1.1	175.000
ENEL GREEN POWER ESPAÑA, S.L.	Photovoltaic	b.1.1	50.000
ENERGY INVESTMENT AND CONSULTANCY, S.L.U.	Photovoltaic	b.1.1	30
ENGIE ESPAÑA, S.L.U.	Photovoltaic	b.1.1	85.090
FALCK RENEWABLES POWER 2, S.L.U	Photovoltaic	b.1.1	20.000
FALCK RENEWABLES POWER 3, S.L.U	Photovoltaic	b.1.1	20.000
GARNACHA SOLAR, S.L.	Photovoltaic	b.1.1	150.000
HANWHA ENERGY CORPORATION EUROPE, S.L.U.	Photovoltaic	b.1.1	86.000
BERENOVA PROMOCIONES, S.A	Photovoltaic	b.1.1	243.000
IGNIS DESARROLLO, S.L.	Photovoltaic	b.1.1	125.000
LIGHTSOURCE RENEWABLE ENERGY SP. DEVELOP. S.L.	Photovoltaic	b.1.1	5.044
NATURGY RENOVABLES S.L.U	Photovoltaic	b.1.1	196.680
NRG PARK 2017 II, S.L.	Photovoltaic	b.1.1	10.000
PARQUE EOLICO ESCEPAR	Photovoltaic	b.1.1	28.800
PARQUE EOLICO PERALEJO	Photovoltaic	b.1.1	20.800
PLANTA FOTOVOLTAICA PIRÁMIDES II, S.L.	Photovoltaic	b.1.1	1.000
Q-ENERGY TOROZOS, S.L.	Photovoltaic	b.1.1	20.000
RIOS RENOVABLES, S.L.U.	Photovoltaic	b.1.1	30
SOLAR BOLARQUE, S.L	Photovoltaic	b.1.1	40.000
SOLARIA PROMOCIÓN Y DESARROLLO FOTOVOLTAICO,	Photovoltaic	b.1.1	180.000
	Photovoltaic	h 1 1	
A-ELIO ENERGY, S.L.	Photovoltaic	U.I.I b 1 1	313.030
	Photovoltaic	D.1.1 h 1 1	23.400
END DENOVABLES ESDAÑA SILL	Photovoltaic	D.1.1 h 1 1	50 860
EDF RENOVABLES ESPANA, SLO.	Photovoltaic	D.1.1 h 1 1	22 200
	Photovoltaic	D.1.1 h 1 1	10 500
IGNIS DESARBOLLOS I	Photovoltaic	D.1.1 h 1 1	144 110
	Photovoltaic	D.1.1 h 1 1	221 400
NATURGT RENOVABLES S.L.U.	Photovoltaic	U.I.I b 1 1	221.400
	Photovoltaic	D.1.1 b 1 1	25.000
TOTAL ENERGIES RENEWABLES IDERICA S.L.U.	Photovoltaic	D.1.1 h 1 1	55.000
REDUL DESARROLLOS FOTOVOLTAICOS ESPAINA, S.L.	Photovoltaic	U.I.I h 1 1	0.000
	Photovoltaic	U.I.I h 1 1	3.200
ENERLAND GENERALION SULAR 18 SL.		D.1.1 b 1 1	2.500
	PhotoVoltalC	D.1.1	13.950
GREEN CAPITAL DEVELOPMENT 160, S.L.U	Photovoltaic	D.1.1	98.000

* Subgroup according to article 2 of Real Decreto 413/2014

There is currently **an installed power of 16,286 MW** in operation in 62,000 projects.

4.4. List of wind energy projects

The projects awarded in the two 2021 wind power auctions have a total **installed power of more than 2,558 MW**. The following list shows the power awarded by successful bidder.

Name of awardee	Technology	Subgroup*	Power award (kW)
CAPITAL ENERGY, S.L.U.	Wind energy	b.2.1	405.000
ELAWAN ENERGY, S.L.	Wind energy	b.2.1	105.000
ENERFÍN SOCIEDAD DE ENERGÍA, S.L.U.	Wind energy	b.2.1	40.000
EURUS DESAROLLOS RENOVABLES, S.L.U.	Wind energy	b.2.1	14.000
GREEN CAPITAL POWER, S.L.U.	Wind energy	b.2.1	216.664
GREENALIA WIND POWER, S.L.U. B	Wind energy	b.2.1	134.300
NATURGY RENOVABLES, S.L.U	Wind energy	b.2.1	37.950
AV PAXAREIRAS, S.L.U.	Wind energy	b.2.1	17.600
GREEN CAPITAL DEVELOPMENT 103, S.L.U	Wind energy	b.2.1	150.000
GREEN CAPITAL DEVELOPMENT 119, S.L.U	Wind energy	b.2.1	150.000
GREEN CAPITAL DEVELOPMENT 141, S.L.U	Wind energy	b.2.1	100.000
GREEN CAPITAL DEVELOPMENT 142, S.L.U	Wind energy	b.2.1	100.000
GREEN CAPITAL DEVELOPMENT 66, S.L.U	Wind energy	b.2.1	150.000
GREEN CAPITAL DEVELOPMENT 81, S.L.U	Wind energy	b.2.1	150.000
GREEN CAPITAL DEVELOPMENT 97, S.L.U	Wind energy	b.2.1	150.000
GREEN CAPITAL DEVELOPMENT XXI, S.L.U	Wind energy	b.2.1	150.000
GREEN CAPITAL DEVELOPMENT XXXV, S.L.U	Wind energy	b.2.1	150.000
LA RASA ENERGY, S.L.U	Wind energy	b.2.1	200.000
REPSOL RENOVABLES S.L.U.	Wind energy	b.2.1	138.000

* Subgroup according to the article 2 of the Real Decreto 413/2014

There is currently an **installed power of 28,258 MW** in operation in more than 1,400 projects.

4.5. Imports and exports

The main companies and countries importing solar panels are the following:

Table 10.	Main	countries	and	companies	importing	solar	panels
10010 101			~~~~~	companies		00.0	paneio

Country	Companies
China	Tongwei, Long, Jinko Solar, Aiko, JA Solar, Trina Solar
Canada	Canadian Solar
EE.UU.	First Solar, SunPower
Germany	Hanwha Q-Cells
Taiwan	Urec

In the case of wind generators, imports come from the following countries:

 Table 11. Main countries and companies importing wind turbine generators

Country	Companies
Denmark	Vestas Wind Systems A/S
China	Goldwind, Envision, Zhejiang Yunda Wind Power, Mingyang, HZ Windpower
Germany	Nordex SE, VENSYS Energy AG
EE.UU.	General Electric Renewable Energy

In Spain, exports are from Siemens Gamesa, a leading wind turbine manufacturer.

The tariff codes in Spain are the integrated tariff codes of the European Community (TARIC). The TARIC is made up of the tariff nomenclature (composed of chapters, headings and subheadings) and the tariff duties (the charge assigned to each of the headings and subheadings).

Table 12. List of duty codes

duty codes	Description
8541 42	Unassembled photovoltaic cells in modules and panels
8541 43	Photovoltaic cells assembled into modules or panels
8502 31	Wind-powered generator sets



5. DEMAND

5.1. National energy consumption

The demand for electricity in Spain is gradually recovering after the impact of the COVID-19 pandemic. Thus, in 2021, **electricity demand reached 256,387 GWh**, 2.5% higher than in the previous year. Adjusted for the effects of working hours and temperature, the estimated annual rate of change in demand is the same (+2.5%).



Figure 5-1. Demand by Autonomous Community and variation with respect to the previous year. Source: Red Eléctrica Española. Year: 2022.

Renewable technologies produced 46.7% of all electricity generated in Spain in 2021, recording their highest share of the generation mix since records have been kept.

Wind power accounted for 23.3% of total production in Spain, leading the national generation mix for the first time since 2013. Solar photovoltaic leads the increase in production with a growth of 36.7% and has also registered a record high in production and participation in the country's mix with 8% of the total.

For its part, CO2eq. emission-free production also reached an all-time high, accounting for 68.2 % of total electricity generation.

The generation fleet in Spain is increasingly renewable. In 2021, **installed power will stand at 112,846 MW, 56.6%** of which will belong to renewable technologies.



Figure 5-2. Installed power by Autonomous Community (As of 31 December 2021). Source: Red Eléctrica Española. Year: 2022.

On the other hand, coal recorded the lowest historical production in 2021 and the lowest share in the national generation structure (1.9% of the total).



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The electricity labelling of the generic retailer is shown, applicable to each of the retailers that have registered energy sales in 2021 that have not participated in the Guarantees of Origin System.

These calculations include the contribution of each of the electricity generation sources in the energy marketed and their environmental impact in terms of CO_2 emissions and high-level radioactive waste, as well as a letter from "A" to "G" indicating the corresponding rating.

This labelling, in accordance with the standardised model specified in the Resolution of 30 November 2021 of the National Markets and Competition Commission on the format of the CNMC's electricity labelling, is as follows:



Figure 5-4. 2021 Electricity labelling of the generic retailer. Source: CNMC. Year: 2022.

5.2. Electricity consumption in transport

After the electricity generation sector, the sector that emits the most CO2 emissions in Spain is transport. It is estimated that in the European Union it represents 25% of total greenhouse gas emissions. Electricity consumption in 2019 was 339 ktoe.

One of the main barriers to decarbonisation is the insufficient development of electric charging infrastructures. On the other hand, Spain has an extensive network of 11,400 service stations distributed throughout the country.

To promote modal shift, it is vital to increase the public transport network, making it more efficient and not forgetting the most depopulated rural areas. In addition, with the increase of electric charging infrastructures, the renewal of private vehicles to low-emission hybrids or electric vehicles would increase.

The PNIEC foresees a reduction of 27 Mt CO2eq by 2030 and expects to achieve a fleet of passenger cars and light commercial vehicles without direct CO2 emissions by 2050.



5.3. Electricity consumption industry

In 2019, electricity consumption in industry was 6,528 ktoe, 32% of total electricity demand.

In the industry sector, all emission improvements are achieved in the combustion processes, as the process part shows a slight increase. Mitigation amounts to 7 Mt CO2eq and is a consequence of planned changes in the fuels used in the combustion processes as well as the continuation of energy efficiency improvements.

In the longer term, towards 2050, the decarbonisation of industry will require new technological advances that will come from I+i+c policies, advances that are contemplated in the Long-Term Low Emission Strategy 2050.

6. THE WHOLESALE MARKET

6.1. Price formation in the wholesale market (spot market)

The daily market is organised in accordance with the provisions of Ley 54/1997 and Ley 24/2013 (Electricity Sector Law). Its operating rules are set out in the Operating Rules of the Production Market³. It is managed by OMIE, a private entity whose main function is to carry out the management of the market and guarantee that the contracting on the market is carried out under conditions of transparency, objectivity, and independence⁴.

The day-ahead market is held the day before the day the energy is delivered, where buyers and sellers exchange energy for each of the hours of the following day. Thus, in this market there are actually 24 different products (energy in each of the 24 hours of the next day)⁵. It is schematically depicted in Figure 6-1.

Sellers (generators, importers, traders, other intermediaries) submit sell offers and buyers (traders, final consumers, exporters, traders, other intermediaries) submit buy offers to OMIE for each hour of the following day.

With these bids, OMIE constructs the supply and demand curves for each hour of the following day. The crossing of the supply and demand curves results in the market price for each hour of the next day and identifies the "matched" bids (the sell and buy bids that become firm commitments to deliver energy).



Figure 6-1. Diagram of OMIE's daily market operation. Source: Energy and Society. Year: 2022.

Reference Code: 22028P_Consultancy Energy Royal Thai Embassy

³ Resolution of the General Secretariat for Energy of 24/05/2006 (more information in OMIE).

⁴ Since 2007, the daily market has been formally integrated into the structure of the Iberian Electricity Market (MIBEL) by virtue of the agreements between the Spanish and Portuguese governments for the progressive development of a single electricity market in Spain and Portugal. This means that Spanish and Portuguese agents make their offers on the same market.

⁵ The fact that the energy is not storable means that in reality the product is "energy at a specific instant". However, this "exact" definition would result in an infinite number of products, which in practice is not possible. In the Spanish case, this compromise takes the form of establishing the hour as the minimum time unit of exchange, so that the number of products is limited to 24 (each of the hours of the day).

In general, there are two types of markets depending on how the price is formed in the market:

- "Pay as bid" markets, in which a generator receives exactly the price he has bid.
- Marginalist markets, in which all married generators receive the same price, which is determined by the intersection of the supply and demand curves.

Despite the differences in how the price is formed, economic theory shows that in both types of markets (pay as bid and marginalist) the same results (i.e. same prices and quantities) are obtained as long as they function properly.

In Spain, the day-ahead market belongs to the marginalist type. In this type of market, a generator's bid represents the amount of energy it is willing to sell above a certain minimum price. Thus, a generator's competitive bids reflect:

- On the quantity side, the physical constraints to which their installation is subject (e.g. available power, the minimum power at which the plant must operate to be stable and secure or technical minimum, the availability of fuel or producible hydro, the speed with which they can increase their output between one hour and the next, etc.). It is important to note that the Market Rules oblige generation facilities to bid all their available power throughout the entire market sequence.
- As for the price offered, it reflects the opportunity cost of generating electricity:
- The costs it would avoid incurring if it chose not to produce (e.g., plant start-up costs, variable O&M costs associated with production, etc.).
- The income foregone from production (e.g., for a thermal power plant, generating means forgoing the right to resell fuel and CO2 emission rights to a third party; for a hydroelectric power plant with a reservoir, using the hydroelectric output "now" means forgoing the right to use the same water at a future time when the expected market price will be higher), i.e., the opportunity cost.

It is important to note that opportunity cost is not the same as variable cost. Under rational and efficient behaviour, generators' bids should not reflect their variable costs but their opportunity costs.

In fact, that agents construct their bids on the basis of their opportunity costs is what makes the market an efficient allocation mechanism. (i.e. optimal use of available resources). This efficient allocation would not be achieved if bids reflected variable costs.

It may not be acceptable for a regulator to have a certain number of hours per year where a) not all consumers are supplied and b) the market price is very high. In this case, and with the objective of reducing (or even eliminating) the number of hours per year where there is a capacity deficit and very high prices, the regulator may choose to introduce capacity payments.

Capacity payments are regulated revenues received by all generators and are determined on the basis of the fixed cost of a peaking plant.

Aggregation of offers:

Once sellers have submitted their bids to the market for each hour of the next day, OMIE aggregates and sorts them by ascending price, resulting in the market supply curve for each hour (Figure 6-2).

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This curve reflects the steps that correspond to plant bids for the same technology. In view of this, it is important to stress again that sellers' bids reflect their opportunity costs, and not their total or variable costs, hence:

- Flow hydro or nuclear power plants, despite their high fixed costs, appear at the lower end of the curve as their opportunity cost is very low.
- Regulated hydro plants appear at the high end of the curve, as their opportunity cost is very high (they have the option of reserving water for production at a future point in time when the market price is high).



Figure 6-2. The electricity supply curve of the market. Source: Energy and Society. Year: 2022.

For a thermal generator, the cost of fuel is a variable cost. If the generator can resell that fuel to a third party, then consuming that fuel has an opportunity cost that it must incorporate in its offer to the electricity market. This opportunity cost is not the price at which the fuel was purchased, but the price at which it can resell it (if there is a market for the fuel, the price of the fuel in that market at the time it is consumed to produce electricity).

The electricity market in Spain, as in other countries, is organised in a sequence of markets in which generation and demand exchange energy and reserves for different time periods.

The market price for hour h of day D is determined by the intersection of the electricity supply and demand curve of the market for that hour. This price determines the matched sell and buy bids and offers (i.e. the energy that will ultimately be exchanged at the market price). In each hour, all matched sell (buy) bids receive (pay) the market price.

The figure below shows an example of the daily supply and demand cassation carried out by OMIE for each hour of the following day.



Since July 2007, the daily market managed by OMIE has been developed for the entire Iberian market (mainland Spain and Portugal). This means that both Portuguese and Spanish production and consumption units participate in the same daily (and intraday) market. The cassation method described above is fully valid, resulting, in general, in a single price for the whole Iberian system and an energy flow between both countries.

Since 13 May 2013, the MIBEL daily market has been price-coupled with the central-northern European market. This means that MIBEL uses the same algorithm to resolve the cassation ("Euphemia") and that the Spain-France interconnection capacity, commercially available according to the System Operators (REE and RTE), is implicitly allocated in that market.

6.2. Price formation in forward wholesale electricity markets

time

The electricity market in Spain, as in other countries, is organised in a sequence of successive markets in which generation and demand exchange energy for different time periods.



Figure 6-4. Sequence of markets in the Iberian electricity market. Source: Energia y Sociedad. Year: 2022

Electricity forward markets are a set of markets in which, years, months, weeks or days in advance of the physical delivery of energy, contracts for the purchase and sale of electricity with delivery times longer than 24 hours (weeks, months, quarters, years, etc.) are exchanged.

Arriving the day before the dispatch of the plants/physical delivery of the energy (D-1), the agents exchange energy for the D-day.

In the very short term (within 24 hours prior to the moment of physical delivery of the energy), there are other markets in which agents (generators, traders, etc.) can adjust their contractual positions and in which generators (and in some cases also demand) offer several technical management services to the system.

6.3. Costs associated with transmission and distribution lines

It is also necessary to consider the costs of the transmission and distribution line tolls, which include the costs of operation and maintenance of the networks. The cost of these networks is regulated by the Comisión Nacional de los Mercados y la Competencia. (CNMC).

In accordance with the principles of efficiency and transparency, the methodology for transmission and distribution tolls established in Circular 3/2020 consists of defining a structure for access tolls to transmission and distribution networks, as well as explicit rules for assigning retribution for transmission and distribution activities in an objective, transparent, non-discriminatory manner and following criteria of efficiency in the use of the networks.

The prices of the access tolls to the transmission networks and of the market and system operator's remuneration are established annually. The updated values for 2022 can be found in the Resolution of 16 December 2021 and Order TED/1484/2021 respectively.

7. OUTLOOK FOR THE SECTOR

Renewable electricity generation in 2030 is expected to account for 74% of the total, increasing the installed capacity in the electricity system by more than 50,000 MW between 2020 and 2030, from 110,756 MW⁶ to 160,837 MW in 2030.

The National Integrated Energy and Climate Plan (PNIEC) expects to achieve the following targets:

- 40,633 MW of wind power capacity in 2025, out of a total capacity of 133,802 MW (30.4%). This means an installation rate of 2,637 MW per year, between 2021 and 2025. On the other hand, generation will be 92,926 GWh, or 30.2% of total generation.
- 50,333 MW of wind power capacity in 2030, out of a total capacity of 160,837 MW (31.4%). This implies an installation rate of 1,980 MW per year between 2026 and 2030. Electricity generation by wind power should reach 119,520 GWh in 2030, representing 34.5% of total generation in Spain.
- Increase in storage technologies with an additional power of 6 GW, providing greater management capacity to generation.
- Increase in renewable self-consumption facilitated by new legislation that streamlines the activity, eliminates tolls and charges, reduces costs and allows simplified economic compensation for surpluses injected into the grid.
- Boosting flexibility and demand management, allowing greater integration of renewable generation into the system and contributing to security of supply.
- In the transport sector, a reduction of 27 Mt CO2-eq, 28% of renewables in transport via electrification and biofuels, through a modal shift from conventional combustion vehicles to collective public transport, shared transport and non-emitting modes, and as a result of the delimitation of low-emission zones in cities with more than 50,000 inhabitants as of 2023, in which access to the most emitting and polluting vehicles will be limited.
- Promotion of renewable gases such as biogas, biomethane, hydrogen and others to generate electricity and cover energy demand in industrial processes.
- Use of potential renewable discharges for conversion into hydrogen, since there is the possibility of storing this fuel, as well as mixing it with natural gas in the transport network, which implies taking advantage of the potential for coupling the gas and electricity sectors for joint demand management of both sectors.

⁶ Source: Red Eléctrica Española.

8. INTERNATIONALISATION STRATEGY

Internationalisation allows any company to have more opportunities to grow and learn from new markets and diversify strategies.

The main benefits of internationalised companies are:

- **Greater competitiveness** compared to companies already established in the country and/or business.
- **Economic diversification** with the possibility of financial balance in the face of episodes of crisis, promoting more productive areas or areas with stronger economies in each period.
- Higher productivity rates by improving production, logistics and management.

In order to create an internationalisation strategy, the following aspects must be taken into account:

- Internal analysis: Carry out an internal evaluation of the company and its business areas to find out its strengths and weaknesses. Analyse aspects for improvement, identify operations that could be outsourced, optimise and streamline business processes, specify requirements for internationalisation or find international markets in accordance with our strategic objective. The objective is to establish a roadmap to develop a long-term strategy for our international customers.
- Internal implementation focused on international business: Once the two previous points have been analysed, the company can introduce changes within the company to prepare it for its internationalisation process.
- **Intermediary service**: Commercial relations with suppliers and customers are vital for any business, but they take on greater importance in internationalisation processes.
- **Technological innovation**: Innovation focused on products/services allows companies to offer added value to their customers quickly, reinventing their products, adding new features, as well as discovering new ideas for the development of new products.
- **Strategies**: Defining the strategy for internationalisation involves focusing on the company's core competencies. An effective internationalisation strategy may involve internal reorganisation, so defining and implementing it is important to minimise tangible and intangible losses.
- **Measuring results**: It is necessary to have a scorecard with key indicators to know if the objectives are being met, and to be able to act in the event that this is not the case.

Spain has established itself in recent years as a leading destination for attracting foreign direct investment. Forecasts for the performance of foreign investment in Spain for 2023 are positive, according to the latest edition of the Barometer of the Business Climate in Spain from the Foreign Investor's Perspective. Indeed, the COVID-19 pandemic and subsequent economic crisis have clearly affected the forecasts of foreign investors in Spain for 2023, although companies foresee a clear improvement in 2022 that will not yet reach pre-pandemic results.

Potential investors are increasingly interested in developing projects with a greater technological component, in more innovative sectors that involve new processes or products

and reinforce national actions in areas such as electric mobility, digitalisation and energy transition.

The Spanish renewable sector has become a major attraction for foreign investment for several reasons. In addition to the already well-known many hours of sunshine and the security of the Spanish Electricity Grid, other key opportunities have been added, such as: the new regulatory framework for renewable energies established in 2018 and the clear decarbonisation objectives set out by the Government in the Plan Nacional Integrado de Energía y Clima (PNIEC) approved in 2021.

Therefore, more than 50% of photovoltaic projects are in the hands of foreign investment. This investment has been spread throughout the entire value chain, although it is undergoing an evolution. Initially focused on large-scale plants, it is now also including self-consumption.

The strategies applied by companies investing in the renewable energy sector in Spain do not follow a specific pattern and are based on the company's own situation in terms of competitive advantages, financial situation, and size of the company. From what we can observe, the strategies most used in internationalisation in Spain come through different ways:

- Joint Ventures: Some companies internationalise in Spain through a strategic business partnership that helps to increase financial, productive and technological capacity. Normally the strategic alliance is made with a small local company, which has the advantage of knowing the local market in depth.
- **Multinational strategy:** This applies to multinational companies that, through subsidiaries located in Spain with their respective assets, undertake strategies, decisions and action plans aimed at investing and developing business in the renewables sector.

8.1. Types of strategies

Internationalisation strategies are the different alternative routes that exist to be able to compete in international markets. We can distinguish at least three main types of strategy: exporting, licensing and direct investment abroad.

8.1.1. Export

Exporting is the strategic way in which a company positions its goods and/or services to supply the market in a territory other than the country of origin. It is distinguished by the fact that the creation of added value takes place only in the country of origin, not in the country of destination.

It is lower risk as it usually avoids the fixed costs of doing business in other countries; it is normally used as a first entry route into the destination countries. However, disadvantages include transport costs, tariff issues and loyalty in negotiations with other companies.

There are two types of export: indirect and direct.

- Indirect export: also known as passive export, it uses intermediaries who manage sales in the country of destination. Its main disadvantage is the lack of control over marketing strategies and the lack of contact with the end consumer.
- Direct export: it uses its own means to sell abroad, thus maintaining contact with the end consumer from the sale of the product or service.



8.1.2. Licensing

Licensing is the transfer of rights to foreign companies in exchange for a financial consideration. In this case, the original company does not provide capital.

The company that adopts this internationalisation strategy gains access to the advantages and capabilities of the local partner, given that the latter knows the local market better, but at the same time cedes its own technological skills, both in terms of design and marketing.

There are different forms of licensing:

- Distribution agreements
- Management contracts
- Franchising
- Manufacturing contracts
- Assignment of patents

8.1.3. Direct Investment

Direct investment is the provision of capital abroad. It allows more opportunities for profitability and value creation, but it must be taken into account: whether the investment is intended to be made jointly (joint venture) or alone (own subsidiary), and whether the investment will be carried out by acquiring a company already operating in the target country or by establishing a new subsidiary.

As a summary, a table with the advantages and disadvantages of the different internationalisation strategies is shown.

Types of Internalization	Advantages	Disadvantages
Export	 Avoid factory costs at destination Cost advantages 	 Transport costs Tariff barriers
Licensing	 Knowledge of the target market with less risk Experience in proven business Technical assistance and business follow-up. 	 Difficult to achieve quality standards in all international units Risk of loss of control over service or sale
Direct Investment	 Local partners benefit from market knowledge Share economic risk and costs 	 When the company shares investment: The originating company may lose control over the know-how. Does not provide full control over subsidiaries When the company does not share investment: Costly alternative High risks due to unfamiliarity with the new market

Table 13. Advantages and	disadvantages of	f types of internalization



8.2. Risks of internationalisation

As mentioned in the previous section, there can be difficulties when internationalising the company. The most common are:

- Logistical risk with the transport of goods and its associated cost.
- Strategic risk of adapting planning to the country where it is going to be introduced.
- Country risk, taking into account cultural, political and currency aspects.



8.2.1. Logistical risk

Logistical risk is mainly based on logistical obstacles, such as coordination costs and cultural problems. One of the biggest difficulties in logistics is miscommunication and misinterpretation of information. From this malpractice come all the situations that complicate the logistics operation, whether by air, sea or land.

Logistics in Spain is becoming increasingly important in global business management, among other factors, due to the unstoppable increase in e-commerce. The recovery after the Covid-19 pandemic has been slow and this circumstance produced consequent phenomena such as the container crisis. Despite this, the logistics business is not only improving but also expanding its prospects in the medium and long term.

This improvement in the national logistics business is mainly due to two variables. On the one hand, the country has one of the most open economies in the Eurozone. It also enjoys a very privileged geographical location for international trade. Thanks to its geographical situation, it takes advantage of the most important maritime transport routes for goods, which go around the world.

These and other factors have enabled the development of the Spanish logistics sector, making it one of the 20 countries with the highest logistics development worldwide, according to the World Bank's Logistics Performance Index (LPI).

The greatest risks in the Spanish logistics situation are:

- Customs: Due to the high level of control on exports and imports, the documentation process and the necessary paperwork to be submitted to customs hinder the dynamism of the supply chain, creating bottlenecks.
- Infrastructures: The assessment by users and experts of the roads, rail infrastructures, ports and warehouses of the Spanish logistics network is not positive. This is why the government must invest in improving key communication points, such as the Mediterranean corridor.
- Technology: The lack of technology is a very common cause of logistics problems in Spain. The implementation of technology makes it possible to anticipate possible problems. Thanks to the development of software, radars, sensors, GPS, and all the technological advances in itself, logistics companies can plan, execute, monitor and



provide feedback on routine work in a timely manner, increasing the productivity of the business.

8.2.2. Strategic Risk

Strategic risk is defined as the current and future impact on income and capital that could arise from adverse business decisions, improper implementation of decisions, or lack of responsiveness to industry changes.

It is necessary to carry out strategic planning through a strategic plan in which the organisation's goals are defined, setting out the planning to be followed in order to achieve them. This strategic plan must plan the objectives, strategies, budget and implementation to be carried out in order to achieve the organisation's short- and long-term goals.

The changing situation in recent years means that the world today is different from two years ago, which has increased the risk in the environment in which companies operate. Changes are rapid and disruptive, such as the pandemic, which has affected the labour market and the supply chain, among others. Another example is the war in Ukraine, which is causing procurement problems, rising raw material costs and increasing supply chain problems.

For this reason, administrative bodies and company managers need to have a good integration of risk into strategic planning and decision-making processes in order to be able to respond dynamically to external factors. The best risk management solution must be adapted to the information and analysis of situations that occur in real time.

8.2.3. Country risk

The term country risk refers to the aggregate assessment of the dangers that a particular country presents for international business. Currently, some companies use the spread between the yield of a country's bonds and US treasury bills or bonds as an indicator of country risk.

In the case of Spain, the situation is alarming. In the bond market, the risk premium offered to investors for Spanish 10-year bonds compared to their German counterparts (bonds of the issuer that is taken as the benchmark for European countries) has widened to 134 basis points for the first time since May 2020.

A rise in the risk premium affects a country's economy, affecting first and foremost the country's banks, which leads to a chain reaction that will affect bank users and the population as a whole.

The consequences of a rise in the risk premium are as follows:

- Higher interest rates, which will reduce investment due to the higher cost of debt and will result in lower household incomes.
- Higher unemployment due to the uncertainty generated by the state of the economy.
- Reduced investment, leading to reduced economic activity and less money circulating within a country.
- Lower income of the states due to the slowdown of the economy in investments and reduction of jobs.
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The current and future situation in the world economy does not hold many signs of improvement, due to the high level of inflation which, together with high unemployment data, could lead to an unprecedented stagflation. That is why the FED and the ECB are raising interest rates, with the largest increases since 1994. The rise in interest rates together with the problems mentioned above could be the beginning of an economic recession, which could be worse in Spain and the euro zone with a debt crisis.

8.2.4. General rules:

- If country risk is high and cultural distance is wide, strategies with a lower level of resource commitment will be preferable.
- As market size increases, direct investment is preferable.
- If transport costs are high and the exchange rate is unfavourable, production in the target market is preferable.
- If the target countries are largely protectionist, it is best to produce there.
- When there is a high endowment of resources and capacities, it is justified to have one's own presence in the target countries, since it is possible to have greater control. Otherwise, it is preferable to form alliances or joint ventures with local partners.

8.3. Examples of foreign companies investing in renewable energies in Spain

Hanwha Energy, a division of Hanwha Group, one of the world's leading Fortune Global 500 companies specialising in solar energy innovation, is launching Imagina Energía, which will become the first group 100% solar energy retailer in Europe. In its strategic plan for Spain, the company will invest close to 1.5 billion euros in self-consumption facilities, current projects under development and the construction of large photovoltaic plants in the coming years, together with its retail energy business.

As the main differentiation, Imagina Energía's self-consumption customers will not have to make any prior investment and will obtain a direct discount on their bill from day one, together with guaranteed long-term savings. All on the same bill. To achieve this, Imagina Energía and the Hanwha Group will own all the photovoltaic self-consumption installations.

Esparity Solar, the Spanish subsidiary of the British investment group Esparity, plans to invest between 320 and 380 million euros in nine solar plants in Spain. Five of them will be located in different towns in the Valencian Community (four 50 MW and one 36 MW), two in Andalusia (both 50MW), one in Castilla la Mancha (100 MW) and another in Navarre (150 MW). The latter, the largest, will be located in Cordovilla, Navarre, and will require an investment of approximately 100 million euros.

According to James Sibony, CEO of Esparity Solar, the company's commitment "is to decarbonise the environment by favouring the transition, where photovoltaic solar energy is the most economical technology, while respecting the environment and the ecosystem of the area". The company is headquartered in London and its shareholders include international investors with experience in the sector, as part of the partners of the Australian renewable energy company Esco Pacific, which has installed more than 700 MW in that country and is owned by Shell. Its long-term plans in Spain include the study of projects to reach 2.6 GW in solar plants. GRUPOTREBOL

Verbund acquires a portfolio of more than 4.5 GW in renewables. The Austrian electricity supplier Verbund has finally bought 100% of a portfolio of solar and wind projects that Q-Energy had put up for sale in our country with the aim of making cash and accelerating its investments in the renewable sector. In total, the company is left with a package of 4,582 MW. The acquired assets are divided into a photovoltaic portfolio of 82 MW that is already operational and a wind and photovoltaic platform of 4.5 GW, of which 2,100 MW are at an advanced stage of development and the remaining 2,400 MW are greenfield projects.

The French fund **Ardian** has created a joint venture with Enagás with the aim of promoting green hydrogen generation. Enagás, Snam and GRTgaz are joining forces in a joint investment initiative to promote clean hydrogen projects. Hy24 combines Ardian's expertise in infrastructure and asset management and FiveT's knowledge of the hydrogen value chain, coupled with the TSOs' role in energy network management and hydrogen technology.

Through the Clean H2 Infra Fund investment, Enagás, Snam and GRTgaz aim to foster the clean hydrogen industry and have a positive impact on the use and development of hydrogen transportation networks.

Vestas has installed more than 2,600 wind turbines in Spain. Its main line of business is the development, manufacture, sale and maintenance of wind power technology to generate electricity.

8.4. Analysis of the environment

Spain's environment is analysed by conducting a PEST by examining which variables are relevant for Thai companies.

As an environmental advantage, Thailand joined the World Trade Organisation (WTO) in 1995, the first member of the Association of Southeast Asian Nations (ASEAN) to join.

8.4.1. Political factors

The political factors affecting Spain are summarised below:

There is political instability given that there are no State pacts that allow for solidity in general plans and projects in both strategy and budgets. Even so, the European integration of the electricity market and the energy transition provide security in the sector.

In the general state budgets, the government intends to invest 5.6% in research and development compared to last year, an ideal situation for the progress of new companies in the technological field, in addition to the aid that is being received from Europe, the Next Generation funds. These funds, which are a recovery plan after the pandemic, are of particular importance for SMEs focused on mobility and renewable energies, training, digitalisation, industrial projects and financing entrepreneurship.

Traditionally, Spanish energy policy has depended on the political party in power. However, the European context means that in the coming years the energy strategy will be shared by all political sensitivities, so the ultimate decision-maker on renewable energy issues is the Spanish State under the guidelines established by the European Union.

The Integrated National Energy and Climate Plan 2021-2030 (PNIEC) has been created with the aim of facilitating and updating compliance with the main binding objectives for the EU in 2030

and establishes guarantees for the continuity of the Plan beyond 2030 through the development of a Long-Term Low Emissions Strategy (2050).

In this regard, it is worth highlighting the "Estrategia a Largo Plazo para una Economía Española Moderna, Competitiva y Climáticamente Neutra en 2050" (ELP 2050). This document responds to Spain's commitments as a Member State of the European Union and to the Paris Agreement and sets out the path to achieve climate neutrality no later than 2050, identifying the opportunities offered by this transition in terms of the economy and job creation. The ELP 2050 is in line with the increased international climate ambition led by the European Union, which aims to be the first emission-neutral continent by 2050. The European Commission is committed to increasing the European emissions reduction target for 2030 from at least 40% compared to 1990 to a minimum of 55%. This decision is backed by Spain: the Spanish Prime Minister, Pedro Sánchez, signed a declaration together with the presidents and prime ministers of 11 other member states to call for this increased ambition.

The document identifies the economic and employment generation opportunities that the decarbonisation process offers, and points out that Spain can occupy a leading position in new segments of the value chain such as those associated with the circular economy or digitalisation, which can play a decisive role in the reactivation of the Spanish economy in line with the EU recovery instruments. The investment derived from the Recovery and Resilience Funds will be geared towards accelerating the ecological transition, using this Strategy as a guide.

The package of measures included in the Strategy will have a positive impact on employment generation, estimated to increase by 1.6% in 2050 compared to a scenario that does not take into account its implementation. This would generate approximately 300,000 net jobs per year over this period.

Furthermore, total cumulative investments over the period 2031-2050 are estimated to reach 500 billion euros, of which 300 billion euros are considered to be associated with the implementation of this Strategy. 250 billion mobilised by the implementation of the PNIEC from 2021 to 2030. The additional annual investments will be around 1% of GDP, in line with the figures presented by the European Long-Term Strategy 2050.

Similarly, the legal framework in Spain is changing and adapting to the new market situation with the aim of facilitating technological implementation and the entry of new figures within the electricity sector, making it more participatory and agile.

8.4.2. Economic factors

Foreign investment in Spain has always played an important role, in many cases avoiding the strangulation that our lack of own capital resources would have caused. It can be said, without fear of exaggeration, that Spain's economic and social development would not have been possible without the contribution of foreign investment.

Foreign investment has been important both quantitatively and qualitatively and has manifested in all areas but especially in internationalisation, knowledge transfer, R&D&I; the increase in our exports, turnover and assets located in Spain; the improvement of competitiveness; training, development and human resource management policies and the creation and maintenance of jobs (1.3 million jobs, 7% of the total at present).

Historical evolution

The intensity of investment in Spain has undergone many historical variations up to its current position as a preferential recipient country for Foreign Direct Investment (FDI), due to the political, economic and social circumstances that have taken place in our territory. Although interest in investing in Spain began in the mid-19th century in the mining and railway sectors, all experts agree in highlighting two major milestones in the analysis of its evolution:

The Stabilisation Plan in the 1960s, which is considered to be the beginning of Spanish economic openness. The Development Plans derived from this opening-up established industrial centres in Spain, at the same time as the economy grew and the presence of foreign companies began to be notable. Entry into the European Economic Community in the mid-1980s (now the EU) was the starting signal for the massive attraction of foreign capital.

Spain as a recipient of FDI today

The evolution between 2011 and 2012 of the global Foreign Direct Investment (FDI) flow reflects a decrease of 18%, even more pronounced in the case of developed countries, where the decrease exceeds 32%.

Spain received a total of **28,785 million euros** in foreign investment in 2021, with the Community of Madrid being the region that leads in attracting funds from abroad, with 20,943 million, 73% of the total. This is reflected in the latest data made public on Monday by the Secretary of State for Trade of the Ministry of Industry, Trade and Tourism, relating to the year 2021.

These 28,785 million that Spain has attracted in foreign investment in the year as a whole represent an increase of 17.7% over the same period last year, due to the better performance of investment in the last quarter of 2021, a period in which it reached 14,170 million euros. In contrast to this boost in the final stretch of the year, Spain only attracted a total of 3,871 million euros during the first quarter of 2021, while between April and June investment rose slightly to 4,445 million euros and in the third quarter it exceeded 6,298 million euros.

By autonomous region

In cumulative terms - between January and December - the Community of Madrid attracted the highest volume of investment with 20,943 million, representing an increase of 14.5% over the same period last year.

It is followed by Catalonia, with a total of 2,968 million after falling by 4.8% compared to 2020; the Basque Country, with 1,537 million; Andalusia, with 965 million; Valencia (856 million); the Balearic Islands (334 million); Galicia (222 million); Castilla-La Mancha (187 million); Castilla y León (134 million); and Aragon (177 million).

Below 100 million in foreign investment are Navarre, with 98 million, followed by the Region of Murcia (96 million); the Canary Islands (87 million); La Rioja (70 million), Asturias (41 million); Cantabria (24 million); Extremadura (9 million) and Ceuta and Melilla (605,000 euros).

By sectors

The sector that attracted the most foreign investment in 2021 was '**supply of electricity, gas, steam and air**', with 5,801 million, after soaring more than 300% in one year. It is followed by investments in 'specialised construction activities', with 5,007 million; 'programming, consulting and related activities', with 1,694 million and 'retail trade, except motor vehicles', with 1,138 million.

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In terms of the country of origin of the investment, Luxembourg stands out, with 8,690 million, followed by France (6,710 million); Netherlands (2,973 million); United Kingdom (2,480 million); United States (1,637 million) and Germany (1,021 million).

Likewise, the increase in the price of electricity due to the rise in gas prices and the instability caused by the war between Russia and Ukraine has accelerated the need to reduce Spain's energy dependence, boosting the renewable energy market and, in particular, self-consumption.

On the other hand, **GDP growth in Spain has been revised down to 4.1% in 2022 and 3.3% in 2023 from the 5.5% and 4.9%, respectively, forecasted three months ago.** The main reason is the impact which is already being felt of the invasion of Ukraine, the sanctions imposed on the Russian economy and price rises, above all of fuel and electricity, over the last few months.

Spanish debt continued climbing in 2021 and did so strongly because of the income protection policies that remained active throughout the year. However, nominal GDP growth outpaced debt growth, with an increase of 7% compared to 6.1% for debt. As a result, although general government debt increased by almost 82 billion euros, Spain's debt ratio fell by 1.3 points to 118.7% of GDP. This figure has improved all forecasts, including that of the IMF, which has published a debt estimate for Spain of 120.4% of GDP.



The jump in debt due to the pandemic

Graphic: El Confidencial - Source: Bank of Spain and INE

Figure 8-1. The jump in debt due to the pandemic. Source: El Conficencial. Data from Banco de España and INE. Year: 2022.

The growth of the Spanish economy was driven by inflation, which contributed almost two percentage points to nominal GDP growth. These two points make the difference between a slight increase or decrease in public debt. In this case, inflation played in favour of general government, reducing indebtedness, something that will continue to happen over the coming months. If the GDP deflator is discounted, real growth alone would have pushed debt back up to 121% of GDP.



	2019	2020	2021	2022	2023
United States	2.3	3.7	5.6	4.2	3.1
Eurozone	1.6	-6,5	5.1	3.7	2.7
China	6.0	2.3	8.1	5.2	5.2
World	2.9	-3,2	6.1	4.4	3.7

Table 14. Gross domestic product (annual average, %)

Forecast closing date: January 14, 2022. Source: BBVA Research & FMI.

Inflation is reducing the purchasing power of families, which will have negative effects on consumption. The rise in prices no longer affects just energy and some foods, but also most goods and services. This can be seen from the figures for core inflation, which hit 3.5% in March. Households disposable income is expected to fall in real terms by 1.2% in 2022, compared with the growth of 1.9% forecast three months ago, as a result of the expected increase in the CPI, which will rise from 3.5% to 7% on average this year.

Table 15. Inflation (annual average, %)

	2019	2020	2021	2022	2023
United States	1.8	1.2	4.7	4.8	2.9
Eurozone	1.2	0.3	2.6	3.0	1.5
China	2.9	2.5	0.9	2.6	3.0
World	3.6	3.6	4.3	4.8	3.9

Forecast closing date: January 14, 2022. Source: BBVA Research & FMI.

These INE data show very starkly that price rises are even higher than the most pessimistic economists were expecting. Price rises are becoming more generalised, but the main culprit is once again energy, which accounts for almost 75% of the contribution to the rise in the CPI. Although the INE does not break down the rise in prices by product in the advance inflation figure, in the published note it does specify that the rise is mainly due to the increase in electricity and fuel prices.



In total, the volume of debt accumulated by public administrations at the end of the year exceeded 1.4 trillion euros, according to the advance debt data published by the Bank of Spain. This is the highest level of debt ever recorded in Spain due to the great effort made by public administrations to sustain the economy in the face of the crisis caused by covid. In these almost two years of pandemic, public debt has soared by almost 240,000 million euros, an increase of 20%. The debt-to-GDP ratio, which in 2019 stood at 95.5% of GDP, has shot up by 23 points, which shows the great budgetary effort made in these two years to minimise the recession and stimulate recovery.

8.4.3. Social factors

Spain has a population of 47 million inhabitants, although it is expected to decrease due to a declining birth rate. At the same time, economic and social inequalities are increasing. It is above the European average in terms of the number of university graduates, which is related to the fact that 53.9% of workers are overqualified for their jobs, and the recovery of youth employment is growing more slowly.

Regarding the energy sector, Spain is the second country in the European Union with the greatest increase in renewable energy production. Spanish society is increasingly aware of climate change and the need to transform the energy model.

Investment in renewable energy generates jobs. The supply of skilled labour must respond to this need. The urgent need to reduce carbon emissions makes it essential to develop renewable energy technologies. In addition, renewable energies bring other potential benefits. One of these is the provision of electricity in areas that are not connected to a central grid or where the grid is unreliable and back-up systems are needed. Renewable energies can also enable economic development in developing areas, as in many cases their good geographical location allows them to take advantage of the potential energy (such as countries located in low latitudes with high solar radiation).

On the other hand, renewables address growing concerns about energy prices and future energy security in a context of rapidly increasing global energy demand, driven mainly by rising living standards in developing and emerging countries. Renewable energies offer economic opportunities. Some of these technologies are already competitive at market prices. Decentralised electricity generation, for example, can leverage small-scale private investment. Investment in renewables also offers ample scope for generating employment opportunities, an issue that is of central importance in many countries' public policies. The development of projects, construction and installation of renewable energy technologies has considerable employment potential.

The renewables value chain consists of four main elements: equipment manufacturing and distribution, project development, construction and installation, and operation and maintenance (Figure 5). Employment patterns in the manufacturing and distribution of renewable energy technologies are very similar to those in other capital goods industries. However, employment patterns in project development and in construction and installation are quite different, since in these technologies work is project-dependent, so that a relatively constant flow of projects is required for continuity of employment. On the other hand, employment patterns in the area of operation and maintenance are more stable. It should be noted that, in general, total employment tends to increase from time to time when large installations have to be manufactured.

8.4.4. Technological factors

The Spanish economy sees industry as a strategic sector and wants to reach the European target of 20% of GDP. In the general state budgets for 2022, the budgets for industry and energy are increased by 5.1% compared to the previous year.

Energy policy aims to promote efficiency and energy transition, adapting the system and markets to the development of new clean technologies. Within this framework, the aim is to ensure a just transition in areas that still maintain a high level of economic dependence on non-renewable fuels, such as those associated with the coal mining industry.

Incentives facilitating the development of innovation in the renewables sector

The Ministerio para la Transición Ecológica y el Reto Demográfico has published aid for the implementation of various Incentive Programmes for the self-consumption of renewable energies, as well as for the implementation of renewable thermal systems in the residential sector, within the framework of the Recovery, Transformation and Resilience Plan.

The purpose of this aid is to promote the deployment and integration of renewable energies, both thermal and electrical, in the different consumer sectors, to encourage greater control of consumption through the development of storage systems for renewable energy sources, thereby contributing to the "decarbonisation" of different sectors of the economy, as well as to the achievement of the objectives set by the PNIEC 2021-2030 and the Energy Storage Strategy.

Introduction

The energy production sector in Spain is currently regulated by Ley 54/1997 on the electricity sector and Real Decreto 2818/1998, which implements it. This Law is the transposition into Spanish law of Directive 96/92/EC of the European Parliament and of the Council, of 19 December, on common rules for the internal electricity market and is the rule that regulates the basis for the liberalised energy market and allows producers of electricity from renewable energy sources to have guaranteed access to the grid and that the technical and economic conditions between producers and distributors are clearly defined.

Ley 54/1997 considers the development of renewable energies to be one of its objectives and established the commitment to draw up a "Plan de Fomento de las Energías Renovables", which was approved by the Council of Ministers on 30 December 1999. In this Plan, the objective is to achieve, for each of the renewable energy areas, a development to cover, as a whole, at least 12% of primary energy consumption by the year 2010.

The "Plan de Fomento de las Energías Renovables" recognises that, despite the immense potential for renewable energies, it is necessary to promote their development by means of economic, fiscal and regulatory incentives in order to achieve these objectives. Chapter 7 of the Plan is dedicated to proposing a series of measures to this end, but not all of them have been developed.

This section sets out the public aid and subsidies applicable to the use of renewable energy sources that currently exist in Spain.

The special electricity production regime

Real Decreto 2818/98, of 23 December 1998, implementing Ley 54/1997, on electricity production by installations supplied by renewable energy resources or sources, waste and cogeneration, develops the special regime for electricity production in Spain, which aims to achieve the objectives of improving energy efficiency, reducing energy consumption and protecting the environment. To this end, with respect to renewable sources, it establishes a premium for electricity production facilities with an installed capacity of 50 MW or less. The incentive established has no time limit because it is necessary to internalise their environmental benefits and because, due to their special characteristics and technological level, their higher costs do not allow them to compete in a free market.

The electricity production facilities that use renewable energies as their primary energy source, are the following:

- Installations using only solar energy as their primary energy source.
- Installations using only wind energy as their primary energy source.
- Hydroelectric power plants with a capacity not exceeding 10 MW.
- Hydroelectric power plants with a capacity greater than 10 MW and less than 50 MW.
- Plants that use primary biomass as their main fuel, understood as the set of plants with a growth period of less than one year that can be used directly or after a transformation process to produce energy (natural resources and energy plantations). The main fuel is understood to be that which accounts for at least 90 per cent of the primary energy used, measured by the lower calorific value.
- Plants using secondary biomass as their main fuel, understood as all waste from a first use of biomass, mainly manure, sludge from waste water treatment, agricultural and forestry waste, biofuels and biogas. The main fuel is understood to be that which accounts for at least 90 per cent of the primary energy used, measured by the lower calorific value.
- Plants using primary or secondary biomass as fuel together with conventional fuels, provided that the latter do not account for more than 50 per cent of the primary energy input, measured in terms of lower calorific value.
- Mixed plants using more than one of the groups set out in Article 2(b) of RD 2818/1998 as primary energy.

RD 2818/1998 establishes a premium for each of these types of installations. The premiums must be updated annually by the Ministry of Industry and Energy on the basis of a series of parameters and reviewed every four years. Specifically, the first review of premiums and prices was applied in 2003, based on the evolution of market prices, the share of these facilities in covering demand and their impact on the technical management of the system.

Fiscal measures

The current corporate tax regulations provide for a 10% deduction for environmental protection activities. On this basis, investments made in new tangible assets intended for the use of renewable energy sources, due to their contribution to the reduction of polluting emissions, are entitled to a deduction from the gross tax liability of 10% of the amount thereof, thanks to the amendment introduced by Ley 24/2001, of 27 December, on Tax, Administrative and Social Order Measures, to Ley 43/1995, on Corporate Income Tax. This deduction is only applicable to

the use of renewable energy sources consisting of installations and equipment for the following purposes among those discussed in this document:

- Use of energy from the sun for its transformation into heat and electricity
- The use of biomass from waste from agricultural and forestry industries and energy crops as fuel for conversion into gas or electricity.

Public aid, subsidies and other incentives

1. Programa Nacional de Energía

Through the "Programa Nacional de Energía", included in the "Programa de Fomento de la Investigación Técnica 2000-2003" (PROFIT), the Ministry of Science and Technology grants aid to projects or actions that contribute to the objectives of reducing the environmental impact of energy generation through the development of more efficient and less polluting systems. In the last open call, the projects presented had to respond to the following modalities:

- a) Industrial research projects.
- b) Technical feasibility studies prior to industrial research activities.
- c) Pre-competitive development projects.
- d) Technological demonstration projectss
- e) Actions favouring participation in the EUREKA, IBEROEKA programmes, Programa Marco de la Comunidad Europea for research, technological demonstration and development actions, and other international programmes for cooperation in scientific research and technological development.

The categories in which projects related to renewable energy sources dealt with in this document can be included are the following:

- Strategic action on more efficient and less polluting energy systems (wind, solar thermal, solar photovoltaic, biomass).
- Other actions, such as the integration of renewable energies.

Companies, groups and associations of companies, public research bodies, private non-profit research and development centres, public law entities and technology centres are eligible for these grants.

More information on this and the following calls of the Programme can be found on the website of the Ministry of Science and Technology (<u>www.mcyt.es</u>).

2. <u>ICO-IDAE financing facility for renewable energy and energy efficiency projects</u>

The ICO-IDAE financing line provides loans for investment projects in renewable energies and energy efficiency carried out by Spanish companies. Investment projects in new fixed assets aimed at harnessing renewable energy sources, including the thermal application of biomass in buildings, or improving energy efficiency, as well as installations and equipment and the necessary expenses for their start-up (engineering, insurance, transport, etc.) are eligible for this financing. The maximum amount that can be financed is 70% of the net investment project.

3. <u>Thermal Solar Line and Photovoltaic Solar Line</u>

Among other measures, the Plan de Fomento de las Energías Renovables foresees the provision of public funds for the financing of certain aids, including "subsidies for investment in equipment for the capture or transformation of renewable energies". On this basis, the IDAE has an aid programme for low-temperature thermal solar energy and another for the support of photovoltaic solar energy, which are called annually by the Council of Ministers. In the Solar Thermal Line, eligible projects include all investments in investments in thermal energy installations, including, but not limited to, the following:

- Sanitary Hot Water (SHW) applications;
- Swimming pool air conditioning,
- Heating and air conditioning applications;

As regards the Photovoltaic Solar Line, the eligible projects are all investments in installations for the use of solar energy for electricity generation, with a module field power of between 100 Wp and 100 KWp, among which the following are considered, by way of example and without limitation:

- Installations connected to the grid.
- Isolated installations with and without accumulation.
- Special installations.

The beneficiaries of the aid may be natural or legal persons of a private or public nature, groups of companies, non-profit organisations and local corporations. The installations must be carried out by a company accredited by the IDAE.

The last call for applications for this aid was in 2002, the regulatory bases of which were approved by the IDAE's General Resolution of 12 March 2002, published in the Official State Gazette of 27 March 2002.

4. <u>Subsidies from the Autonomous Communities and local authorities</u>

In addition to state aid, all the Autonomous Communities grant subsidies for the promotion of renewable energies. Every year or every two years, each Autonomous Community publishes a series of subsidies for renewable energy installations, which normally include the thermal application of biomass and, in particular, its application in buildings. The amount of this aid varies according to the area within the range of 10 to 40 % of the investment.

In some Autonomous Communities, the importance of biomass thermal applications has led to the development of specific action programmes for the promotion of these installations. The Autonomous Communities of Andalusia and Castile-La Mancha stand out in this respect.

There are also specific lines of aid in many Spanish municipalities, such as those aimed at replacing old coal-fired boilers with cleaner energy sources, where biomass installations have an important market.

5. Other incentives: los certificados R.E.C.S.

There are other types of incentives such as the called "green certificates", although they are not yet sufficiently well known in Spain.

The R.E.C.S. certificate (Renewable Energy Certificate System) is a reliable and economical voluntary certification system that aims to promote renewable energy sources internationally.

Under this system, an independent body issues a certificate for each KW/h produced, after verifying that it comes from renewable sources. This KW/h can be bought and sold on the electricity market. The certificates issued provide evidence that part of the energy produced by a given electricity company comes from renewable sources.

In Spain, pilot tests of certificate issuance have been carried out until last year, as in other European countries, and the system will start operating shortly. Currently participating in the system are AENOR, as the representative body in international forums, Red Eléctrica de España, which is the body that issues the certificates, and the electricity companies Endesa Energía, Iberdrola Generación and Unión Fenosa Generación.

Incentives to facilitate foreign investment in Spain

Spain is the European country with the greatest solar resource and is among the countries with the greatest wind resource, which means that renewable energies are already, to date, the most economical way of generating electricity in our country, as demonstrated by the recent renewable generation auctions held in 2021. In fact, the outlook for the deployment of renewable generation in the coming years means that future markets are already forecasting that electricity prices in Spain will be more competitive than in France or Germany by 2023. This translates into greater competitiveness of the productive fabric, an improvement in household economies, as well as significant savings in national accounts and in the trade balance.



9. **OPPORTUNITIES**

9.1. Green Hydrogen

Green hydrogen is projected as one of the most promising energy sources for a sustainable future. Hydrogen is a very abundant element on the planet, but it does not exist in its pure state, so to produce it, its molecules must be separated through the process of electrolysis.

It was in 2019, during the celebration of COP25 in Madrid, when different countries, governments and institutions set a date for total decarbonisation, which aims to achieve the complete elimination of CO_2 emissions. This common goal was embodied in the European Green Pact, which aims to achieve climate neutrality by 2050.

The European Green Pact aims to "transform the EU economy into a fully sustainable one, leading to a change in the social and economic model of the European Union" and identifies four key sectors that will need to be decarbonised to ensure the achievement of the headline target: energy production and use, residential sector, transport and industry. These are sectors that demand a large amount of energy resources, in a continuous and prolonged manner over time, and in which hydrogen has great potential, as great versatility has been identified in this energy vector, capable of satisfying future (and present) production, storage and distribution needs.

Spain has been identified as one of the great potential distributors of renewable hydrogen thanks to its geographical position and meteorological conditions. In this sense, our country occupies tenth place in the world ranking of renewable energy capacity. Our solar and wind potential will allow us to produce the cheapest renewable hydrogen in Europe, and we not only have the capacity for self-supply, but also for export. Furthermore, we have a specialised business and industrial productive fabric (3.6% of the world's scientific production related to hydrogen is developed in Spain) that covers the entire hydrogen value chain (production, storage, transport, distribution, and use) and technological and industrial development capabilities in the sector.

The development of the hydrogen sector offers us the possibility of having "made in Spain" technology. To this end, it will be necessary to promote public-private collaboration, which will allow us to continue improving technology transfer, from R&D to the market; to establish an R&D plan oriented towards objectives and results; and to foster technology clusters that favour collaboration among agents to materialize a first generation of products.

On the other hand, Spain could lead the way in equipment manufacturing by supporting these business investments in manufacturing capabilities, helping our companies, large and small, to gain a competitive advantage in the sector.

9.2. Biogas plants

Rural Spain, so often reviled and forgotten by industrial or transport policies, has a new ally to increase its **energy self-sufficiency**. By taking advantage of different types of organic waste, subjecting them to a process of **anaerobic digestion** - without the presence of oxygen - can be obtained **biogas**. It is an interesting energy resource, as well as renewable, due to its multiple possibilities for self-generation and potential in rural areas. It also provides added economic value and **promotes energy savings** by linking generation to consumption.

Biogas is nothing more than methane, together with other elements such as carbon dioxide (depending on the waste), which has a calorific value greater than 50% of that of natural gas. Its production is its great virtue; it makes it possible to reuse livestock and agro-industrial waste, sewage sludge and household waste to obtain energy, avoiding waste, in a local and affordable way. According to the European Biogas Association, in 2019 there were 18,943 biogas production facilities in the European Union (193 TWh, 4% more than the previous year). The use could be anything; own electricity generation or thermal energy for heating. All of this with waste that is often not used because it is thought to be inert, making biogas an important strategy in the development and implementation of the circular economy.

The production of electricity from agricultural and livestock waste is testimonial, but the sector hopes to reactivate itself to produce renewable natural gas that could be injected into the grid.

9.3. Solar energy at night

The obvious and classic problem with solar energy is that it can only be generated during the day, and photovoltaic panels cannot store the surplus light they collect for later use. Of course, there is the option of using it to recharge batteries, but this makes the cost higher that it is not a sustainable solution. This is why many researchers have been working for years on systems that can store the sun's heat so that it can be returned at night in the form of electricity.



Figure 9-1. Scheme of solar energy at night.

The physical principle is radiative cooling; a hot body emits infrared light, losing heat. And while the concept sounds simple, designing a system that produces electricity with competitive energy efficiency is less so. This is what a team of engineers at Stanford University has recently achieved: using current technologies that combine radiative cooling with a little help from thermoelectric generation, the panels built by the researchers can produce 2.2 watts per square metre, which multiplies previous results by 120 without using an external power source. According to the authors, this solution could be used in isolated regions in developing countries and could even allow the waste heat generated by cars to be converted into electricity. All in all, efforts along these lines suggest that in the not-too-distant future, solar farms could be able to operate both during the day and at night.



9.4. Integrating wind and solar

If wind and solar plants are inevitably limited by the availability of the natural factors, wind and sun, an obvious way to optimise their performance is to make a two-in-one, so as to increase the possibilities of harvesting one or the other form of energy at any given time. In fact, a three-in-one is what German startup Sinn Power is proposing: wave, sun and wind energy, all in one system.



Figure 9-2. Wind and solar energy integration prototype.

The concept, which is already being tested off the coast of Greece, consists of a floating modular platform that can be expanded as needed. Each module contains four wave energy converters and can be equipped with photovoltaic panels and four small wind turbines. According to the inventors of the first hybrid floating ocean platform, the system is ideal for islands and coastal areas. However, while the idea has attracted a great deal of attention, experts point out that wave and tidal energy have been under experimentation for decades and have yet to take off, and there are also questions about the environmental impact and the strength of structures and materials under real-world conditions.

10. OUTLOOK FOR SPAIN

After two years marked by the effects of the pandemic, the conflict in Ukraine is a new source of uncertainty for the Spanish economy. Logistical problems and the rising cost of raw materials and energy are palpable both in the activity of companies and in the day-to-day lives of citizens. The European Union's joint response to this new challenge, as in the fight against COVID-19, will be key to sustaining economic growth.

Table 16. Spain's forecasts published in June 2022

	GDP (Increase in %)	Unemployment rate	Deficit (to GDP)	Inflation	Public debt (to GDP)	Intern demand	Extern demand
Government	4,30%	12,80%	5,00%	7,80%	117,7%	3,50%	-0,32%
Banco de España	4,10%	13,00%	4,60%	7,50%	114,90%	3,30%	1%
IMF	4,00%	13,40%	5,00%	7,20%	116,40%		

Last June, the government lowered its growth forecasts from 7% to 4.3%. Previously, the Bank of Spain and the International Monetary Fund had revised theirs downwards to 4.1% and 4.0%, respectively. On inflation, the IMF⁷ expects it to stand at 7,2 per cent this year and 2,3 per cent next year. This forecast is more optimistic than that of the Bank of Spain (7.5% in 2022 and 2% in 2023).

The current economic context poses challenges of a dual nature: some immediate, which require an agile response to ensure business continuity (price volatility or disruption of the supply chain); and others with more prolonged effects over time, which require a medium- and longterm strategy to ensure sustained growth over time, digitisation, sustainability.

The data is updated quarterly as shown in the Instituto Nacional de Estadística, INE, publications 8 .

10.1. Outlook of regions

Spain is organised into 17 Autonomous Communities, each consisting of one or more provinces, plus the Autonomous Cities of Ceuta and Melilla in North Africa; the total number of provinces is 50.

Each Region exercises the powers attributed to it by the Constitution and specified in the Statutes of Autonomy. These Statutes also contain the institutional regulation of the Community, which usually consists of: a legislative Assembly elected by universal suffrage which enacts the legislation applicable in the Community; a Government with executive and administrative functions, headed by a President elected by the Assembly who is the highest representative of the Community; and a High Court of Justice which holds judicial power in the territory of the Community. In each Community there is also a Government Delegate appointed by the Central Government, who locally directs the State Administration and coordinates it with that of the Community.

⁷ <u>https://sdw.ecb.europa.eu/reports.do?node=1000003181</u> 8

https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736164439&menu=ultiDatos&idp =1254735576581

The Communities are financially autonomous and receive allocations from the general State budget.

Table 17. GDP by Regio	ons (M€)
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Regions	2018	2019	2020
ANDALUCIA	160.581	165.001	150.557
ARAGÓN	36.869	38.084	35.290
ASTURIAS	23.225	23.706	21.475
CANTABRIA	13.743	14.169	12.867
CEUTA	1.720	1.770	1.642
CASTILLAS Y LEÓN	58.545	59.852	55.401
CASTILLAS LA MANCHA	41.479	42.490	39.573
CANARIAS	45.830	47.483	39.163
CATALUNYA	229.098	237.505	212.931
EXTREMADURA	20.090	20.517	19.386
GALICIA	62.428	64.349	59.105
ISLAS BALEARES	32.741	34.172	26.789
REGIÓN DE MURCIA	31.094	32.287	29.940
COMUNIDAD DE MADRID	230.813	241.040	216.527
MELILLA	1.578	1.622	1.509
NAVARRA	20.065	20.901	19.265
PAÍS VASCO	71.925	74.051	66.558
LA RIOJA	8.602	8.844	8.129
COMUNITAT VALENCIANA	111.742	115.407	104.724

As we can see in the table above, not all regions of Spain have the same weight in the national economy. This economic inequality is due to the disparity in technical and economic development, with the regions of Catalunya, the Comunidad de Madrid, Valencia and the País Vasco being the most developed in terms of surface area. This translates into unequal economic growth that extends to foreign investment, with Catalunya and the Comunidad de Madrid being the two main poles of attraction for foreign companies.

10.1.1. Renewable Energy Development by Regions

The importance of renewable energies in the different regions of Spain is not related to their economic weight. If we analyse the distribution of renewable energy production by region, we can see that there has been an uneven development to the benefit of less developed areas. The autonomous regions with renewable energy production above the national average in the period 2007-2021 were Andalucía, Aragon, Castilla La Mancha, Castilla y León, Galicia, La Rioja and Navarra. This is because they are regions with an excellent renewable resource, large tracts of land and governments that have focused on exploiting its potential.

Castilla y León is the region with the greatest weight of renewable generation, due to the important contribution of hydroelectric energy. For example, renewable energy generation stood at 86.9% in 2020, according to REE data. Renewable generation was also very important

in Galicia (75.7%) and Aragon (68.3%), regions that share this incidence of hydropower in the energy mix.

On the other hand, the regions that are showing the worst evolution in their energy transition with a lower increase in the weight of renewable generation were Cantabria, Islas Baleares, País Vasco, the Comunitat Valenciana, Comunidad de Madrid, Ceuta and Melilla.

10.1.2. Interest points about some regions of Spain

In the following ranking of points of interest in 4 autonomous communities, we have based our criteria on including the regions with the most economic development and foreign investment (Cataluña, Comunidad de Madrid, Comunidad de Valencia and the País Vasco) as well as the autonomous community with the most installed power in the country (Castilla y Leon).

Catalunya

Perspectives

Catalan GDP would have posted a year-on-year increase of 7% in the first quarter of 2022, according to AIReF's estimates. This growth would be six tenths of a percentage point above the national average, driven by the dynamism of tourism activity and the foreign sector up to February, although the latter remains under high uncertainty due to the conflict in Ukraine.

Catalunya boasts one of the largest reductions in the number of unemployed in annual terms (-105,500). On the other hand, the rise in inflation, a phenomenon plaguing the global economy, was also felt in Catalunya: the rate of change in the CPI closed the year at 9.5%, three tenths of a percentage point lower than the national average.

1. Industrial economy and specialised talent

Catalan industry accounts for 20.7% of Catalunya's gross value added (according to IDESCAT data), a figure that is already above the European Commission's target of 20% by 2020. Industry is characterised by its diversification, with the main branches being food and beverages, motor vehicles, chemicals, pharmaceuticals, and telecommunications.

Traditional industrial production, together with emerging sectors and industry-related services (such as ICT, finance, health and logistics), now account for 50% of Catalan GDP.

The number of companies headquartered in Catalunya increased in 2018 for the fourth consecutive year, reaching 618,366 (according to INE data). This dynamism and diversification translate into the existence of a wide network of suppliers ready to operate in any business sector. Furthermore, an excellent education system in Catalunya guarantees the availability of highly qualified labour, both nationally and internationally.

2. Technology and startup hub

Catalunya is one of Europe's main ICT centres and is a magnet for foreign investment in the technology sector. Barcelona is considered the fourth most technological city in the world and the most prepared for the technological future, and the fifth European city in terms of attracting technological investment.

The number of ICT companies has grown by 27% since 2013, and Catalunya is home to 22.3% of all companies in the sector in Spain. Prestigious multinationals have located their technology and R&D hubs in Catalunya, such as King, Amazon, HP, Nestlé and Roche. In addition, Barcelona hosts world-leading technology events such as the Mobile World Congress, the 4YFN and the Smart City Expo World Congress, and has been chosen to host the world's largest audiovisual show (Integrated Systems Europe) in 2021.

Barcelona is also the benchmark ecosystem in southern Europe for startups, with more than 1,300 startups that are mainly active in the Industry 4.0 (17%), life sciences (13%) and mobile technologies (11%) sectors. The region's international technological attractiveness is reflected in the fact that 26% of employees and 15% of startup founders are foreigners.

3. Strategic position in Southern Europe

Catalunya is an open commercial economy, specialising in international trade and with an efficient combination of powerful infrastructures. It is the only place in southern Europe to have an international port and airport within a radius of just 12 km, as well as duty-free logistics zones with warehousing capacity.

It is the largest intermodal logistics centre in the south of the continent because it also has a high-speed rail and motorway network seamlessly connected to the rest of the European road system.

Barcelona connects 400 million consumers in Europe and North Africa in less than 48 hours. Geography has played a favourable role for the Catalan economy. Its location on the Mediterranean and its close links with Latin America have made it a prime location for distributing goods and services to major markets. Catalunya is the most exporting autonomous community in Spain (71,624 million euros in 2018) and concentrates 33.3% of Spanish exporting companies.

4. Talent and education

Catalunya's university system is made up of 12 public and private universities, 5 international schools and 5 campuses of excellence. According to The Times, it is the third best university system in Europe. Barcelona is also home to IESE, ESADE and EADA, business schools considered among the most prestigious in the world.

Barcelona and Catalunya also stand out for their open and multicultural character and their ability to attract international talent. The Catalan capital is considered the fourth most attractive city in the world to work in and is home to a large number of skilled workers in technological and scientific areas.

5. Business orientation and investor services

Catalunya has a strong industrial tradition and a powerful network of business associations and clusters for business cooperation and increased competitiveness. The government of Catalunya supports all business initiatives with business-friendly policies to promote business and entrepreneurship. Not for nothing has Catalunya been recognised by the fDi Magazine of the Finantial Times as the best region to invest in Southern Europe in 2018 and 2019.

Catalonia Trade & Investment, the Catalan Government's investment attraction agency, offers free, personalised advice to international companies that are considering setting up in Catalunya

as a location in Europe. A multidisciplinary team offers tailor-made services such as business location search, visas, international mobility or supplier identification, among others.

Comunitat Valenciana

1. Interesting location

The Comunitat Valenciana has a privileged geostrategic location, in the centre of the Western Mediterranean Arc. This gives it rapid access to both the national and European markets and makes it a true logistics hub in Southern Europe. It has excellent connections with an extensive network of motorways and high-quality railways and powerful infrastructures that make it the ideal platform for setting up businesses with projection.

2. Human Capital

The existence of 9 universities - 4 private and 5 public, which in turn have 5 science parks - is a favourable environment for the training of human capital. The great added value of the Comunitat Valenciana is to have highly competitive professionals in academic as well as salary terms, the latter thanks to the latest state labour reform, which has contributed to the flexibilization of labour conditions and costs.

3. Industrial tissue with an international vocation

With a clear orientation towards international markets and a degree of openness to foreign trade of 52%, higher than the Spanish average (50%), the Comunitat Valenciana is one of the top three exporting regions in Spain. Its industrial fabric is characterised by the predominance of small and medium-sized companies, the high spatial and sectoral concentration of activities, and its clear export orientation, elements that highlight the region's notable business dynamism. We have a powerful network of suppliers and related industries, highly competitive, with excellent conditions for internal and external growth and recognised international prestige. In addition, the region is home to consolidated and internationalised clusters such as the ceramics, agrochemical, habitat, and footwear sectors.

4. Support for R&D&I

R&D&I is one of the fundamental tools for boosting the region's economy. The Comunitat Valenciana is committed to innovation policies in R&D&I that help companies to gain in productivity, competitiveness, and excellence. This effort is reflected in the strong institutional support for innovative projects, as well as in the creation of the different networks that operate in the field of R&D&I: the Network of Technology Institutes, the Network of Scientific Research Centres, and the universities' own research centres. In addition, in the Valencia Region, investors will find a solid network of accelerators, incubators and coworking spaces that will contribute to the development of their investment project.

Comunidad de Madrid

Perspectives

According to AIReF's estimates, Madrid's GDP would have increased by 6.8% in the first quarter of 2022 in year-on-year terms. The recovery continues to progress in a region that led the way in company start-ups in 2021 and which also saw one of the biggest increases in activity in the first quarter of this year (62,700 more active workers). For its part, the rate of change of the CPI closed the year with an increase of 9%, eight tenths of a percentage point below national inflation.

1. Dynamic and thriving economy

The Comunidad de Madrid is chosen by foreign companies for being an economy in constant growth that offers multiple business opportunities. Madrid's economy has grown by 3.7% in 2018 and by 3.9% on average over the last 10 years. It also represents more than 19% of the Spanish economy in terms of GDP.

With a population of more than 6 million people and an average per capita income of more than 34,000 Euros, Madrid is the third European region with the highest purchasing power. Consequently, it is an ideal market for launching new business projects.

2. Human Capital

Madrid has qualified, flexible and cost-competitive professionals in Western Europe. The 12 universities, 6 public and 6 private, make up the higher education network. Madrid has the highest concentration of students in Spain and one of the highest in Europe, bringing together students from all other regions of the country.

3. Excellent location

The Comunidad de Madrid is an excellent centre for controlling the Iberian (Spain and Portugal), European and North African markets. Regions with high consumption potential and in continuous growth. From Madrid it is possible to access a potential market of 1.3 billion people: EU (500 million), Mediterranean (450 million) and Latin America (600 million).

Spain is the second largest investor in Latin America, just behind the USA; 90% of Spanish multinationals operating in this area have their headquarters in Madrid.

Madrid is the centre of the radial system of roads and railways, which connects the Iberian Peninsula and the rest of Europe by land.

4. Leading centre for scientific and technological development

Madrid is one of the leaders in scientific research and technological innovation in Spain and is the second European region in number of workers in high-tech sectors (Eurostat, 2017). It is also the Spanish region that invests the most in R&D (27% of the total).

The region's 12 universities work closely with the business world and scientific research.

Moreover, the region has an excellent network of technology and science parks, called Madrid Network, comprising 11 sectoral clusters and 6 technology parks, as well as a network of research institutes, currently comprising eight.

5. Service providers

Madrid's main economic sector is the services sector, which generates almost 80% of the regional GDP. The Madrid Region is also the first in Spain in terms of the number of professionals working in this sector, with 2.4 million employees (17% of the national total). This translates into better access to professional services in terms of availability and prices.



País Vasco

1. Competitiveness cluster

The País Vasco has a solid industrial base, a sector that represents more than 24% of GDP, making it an attractive competitiveness pole in which there is a firm commitment to Industry 4.0.

Currently, in view of the new scenarios created by the so-called fourth industrial revolution, a shared vision of industrial development has been defined to promote a competitive industrial ecosystem in all its dimensions. Faced with this new scenario, the País Vasco has focused its efforts on Smart Specialisation, identifying those areas in which to concentrate human and economic R&D&I resources; three areas have been identified as strategic: Advanced Manufacturing 4.0, Energy and Bio-health.

2. Technology, innovation and future

The commitment to innovation is the hallmark of the País Vasco, a commitment that has brought it recognition and resources at European level. In addition to being the autonomous community that allocates the highest percentage of its GDP to R&D, 1.88%, its scientific-technological and business capabilities have placed it at the level of highly innovative European countries.

The País Vasco is currently involved in the Science, Technology and Innovation Plan 2020 to improve the welfare, sustainable economic growth and employment of Basque society through the development of a research and innovation policy based on smart specialisation and the improvement of the Science, Technology and Innovation system, aligned with the European Horizon 2020 programme.

3. Human Capital

48.9% of people aged between 30 and 34 have higher education, a percentage higher than the average for the European Union (37.9%) and Spain (42.3%). With a public university, which concentrates eight out of every ten students, 3 private universities, almost a hundred vocational training centres, 5 international schools, more than a dozen official language schools, the first Gastronomic University in the world (Basque Culinary Center), Digipen (Institute of Technology Europe Bilbao) and the Machine Tool Institute (IMH), the País Vasco is the autonomous community with the most educational technology in its classrooms.

4. Vocational training

In the País Vasco, where economic activity revolves around industry, Vocational Training forms a fundamental pillar in the preparation and qualification of people who are going to enter the labour market. 65% of jobs in Basque companies require a vocational training qualification, 70% in the case of the industrial sector. Vocational Training in the País Vasco is committed to innovation in learning, in methodologies and even in the type of classrooms and centres, and to vocational training that supports small and medium-sized enterprises.

5. Well-connected region

The region of País Vasco is strategically located in the centre of the European Atlantic Axis. This location, as a transit area between the markets of mainland Spain and the rest of Europe, makes this Community the nucleus of an area of influence.

Its location and a network of first-rate logistics and transport infrastructures, perfectly coordinated and interconnected with each other and with the major European networks, make

the País Vasco an irreplaceable Multimodal Logistics Platform for the transport of goods and people in Southwest Europe. The País Vasco is the gateway to Europe as a logistics hub for the European Atlantic axis and the rest of the world, especially Latin America, where there is a significant presence of Basque companies and institutions.

6. Fiscal and financial autonomy

The País Vasco has regulatory and management capacity thanks to its own financial system. The País Vasco enjoys a high level of self-government in such important areas as health, education, security, housing and finance, an autonomy that stems from the Statute of Gernika, one of the fundamental pillars of its self-government.

Another of the fundamental pillars of Basque self-government is the 'Economic Agreement', the financial support of the Autonomous Community that grants Basque institutions autonomy to collect and administer citizens' taxes according to their own budgets and the agreements signed with the Spanish central Administration. All these circumstances have enabled the creation of its own bodies such as EITB - Basque Radio and Television; the Ertzaintza, the autonomous police force with more than 7,000 officers, and full powers in road and water infrastructures, economic and industrial promotion, and land planning and training.

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11. WHAT ARE THE BEST INVESTMENT OPPORTUNITIES?



11.1. Situation of technologies



During the year 2021 there has been an increase of 7.2% in renewable installed capacity compared to the previous year. The increase in renewable installed capacity was due to the increase in solar photovoltaic capacity, which accounted for 80.4% of the new capacity. Wind power contributed an additional 839 MW to the new renewable capacity, maintaining its position as the leading technology in the national generation park.



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Figure 11-4. Structure of installed capacity by type of plant by regions. Source: Red Eléctrica Española. Year: 2022.

As shown in *Figure 2-2*, most of the country's installed capacity is based mainly on hydroelectric, combined cycle and wind power production. The latter is the one that has been gaining more importance in recent years, becoming the generation technology with the greatest installed capacity in the country as a whole.

From the point of view of the autonomous communities, most of the renewable installed capacity is located in Castilla y León, Andalucía, Castilla-La Mancha and Galicia, which together account for 56.7% of the renewable installed capacity of the national electricity system. The largest increase in renewable installed capacity was recorded in the Balearic Islands, which ended 2021 with a growth of 31.1% due to the 44.2% increase in photovoltaic solar installed capacity compared to the previous year. Castilla y León was once again the region with the highest installed renewable capacity in Spain, reaching a total of 11,908 MW of green power, which represents 95.4% of its generation capacity. Wind power is the technology with the greatest presence in the region, accounting for 51.1% of the total, and photovoltaic is the one that has registered the greatest increase, increasing its generation capacity by 20.5% compared to 2020. In 2021, Andalucía has consolidated its position as the region with the second highest installed renewable capacity with 8,609 MW, meaning that half of Andalusia's generation fleet is already renewable (51.3%). In third place is Castilla-La Mancha, which in 2021 overtook Galicia by increasing its renewable installed capacity by 17.5% to 8,140 MW. Wind power is the technology with the largest production capacity in Castilla-La Mancha, with a share of 38.6% of the total. Solar photovoltaic is the technology that has most increased its presence in the generation park in La Mancha, 53.3 % more than the previous year.

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A large increase in solar power capacity can be seen in the regions of Extremadura, Castilla-La Mancha, Andalucía, and Murcia. This increase may be due to the large areas of land with no activity and the lower price of land in these regions, which has favoured different investors opting to install large photovoltaic parks. Similarly, we find areas with less industrial development as those with the most wind power installed at the moment. This development prior to the rest of the Spanish regions may be due to the strategy of becoming energy exporters in the domestic market.



Figure 11-5. Annual evolution of structure of production by technology. Source: Red Eléctrica Española. Year: 2022.

The contribution of renewables to national electricity generation in 2021 has set a new record high, reaching a share of 46.7% of electricity generation, 2.7 percentage points higher than the previous peak in 2020, when renewables accounted for 44% of the national energy mix.

Wind continues to be the most important renewable technology in the national generation mix, accounting for 23.3% of total production, the highest annual share recorded to date. In addition, wind was the leading technology in the generation structure for the first time since statistical records have been kept, ahead of nuclear, which accounted for 20.8% of the national total. Production from wind power continued to grow for the fifth consecutive year, with a variation in 2021 of 10.2% compared to 2020. A total of 60,496 GWh were produced with this technology, also reaching a new historical record for wind power production.



During 2021, photovoltaic solar installations have been the technology that has most increased its national installed capacity, incorporating almost 3,500 MW to the national generation park, which has meant an increase of 29.9% compared to the previous year. This momentum has allowed its electricity production during 2021 to experience an increase of 36.9%, reaching 20,954 GWh, which represents a new annual generation record and a new record share in the national mix with 8.1%.



Figure 11-6. Structure of production by type of plant by regions. Source: Red Eléctrica Española. Year: 2022.

In order to achieve the decarbonisation targets by 2030, energy from renewable sources must be developed. The government's intention is to reach 74% of renewable production in the energy sector.

It is interesting to note the impact of nuclear production, as it accounts for approximately 21% of the total energy generated. The government's intention, in relation to nuclear power, is to close nuclear power plants by 2030, which could cause a supply shock by exponentially increasing the capacity of renewable energies in order to maintain the production that will be lost as a result of the closure. The situation is complicated by the fact that the Spanish electricity grid is not currently prepared to increase the connection of more power installed in the system.

This possible loss of nuclear power capacity could lead to regions such as Catalonia and Extremadura, among others, freeing up large grid connection capacity for other renewable technologies.

Renewable Generation Ratio/ Renewable generation (%) and renewable generation (GWh)



Figure 11-7. Renewable generation ratio by regions. Source: Red Eléctrica Española. Year: 2022.



Figure 11-8. Installed renewable power by technology. Source: Red Eléctrica de España (REE). Year: 2022.



11.2. Photovoltaic energy

In the last 3 years, the installed solar photovoltaic capacity in Spain has tripled, from 4,767 MW at the beginning of 2019 to a total of 15,190 MW by the end of 2021. This increase in installations has had an impact on the Spanish electricity generation mix, which in just two years has gone from 3.55% photovoltaic solar energy in 2019 to 8.05% solar energy in 2021. Forecasts indicate that capacity will continue to increase sharply in 2022.



Figure 11-9. Evolution of installed solar photovoltaic capacity in Spain up to 2022. Source: Red Eléctrica de España (REE). Year: 2022.



Figure 11-10. Evolution of the percentage of solar energy generated in Spain until 2022. Source: Red Eléctrica de España (REE). Year: 2022.

With the elimination of the "sun tax" at the end of 2018, the profitability of self-consumption installations increased. We can see the effect that the elimination of the tax had by looking at the previous graphs, as the first large increase in installed capacity occurred just the year after its repeal.

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The government has budgeted up to 900 million in subsidies for self-consumption installations. In the case of solar energy, subsidies for individuals can mean a saving of 40% of the installation costs or even 50% in the case of collective self-consumption.



Figure 11-11. Distribution of solar panels by CCAA. Source: Expansión; emovili. Year: 2022.

Advantages and disadvantages

Financing

In Spain there is a political commitment to public financing of this technology with aid and subsidies for self-consumption and solar energy storage within the "Next Generation EU" Recovery Plan, as well as a tradition of private banks financing these projects.

Low cost

The operating and maintenance costs of photovoltaic plants are considered to be low. In fact, they are almost negligible compared to the costs of other systems. The efficiency improvements in this industry in recent years are impressive and these improvements are expected to continue in the future.

Abundance of resources

Spain is one of the EU countries with the greatest potential for solar energy productivity. Most of the country has an irradiation of between 1600 KW/m2 and 1950 KW/m2, making it the country with the best solar radiation in Europe. hours of sunshine and for longer periods of time.

Experience and stability of the transmission grid

The Spanish electricity grid supervisor and operator (REE) has extensive experience in renewable energies, with a very stable electricity transmission and distribution grid.

Consumption curve

In Spain, the consumption curve is more parallel to the solar energy production curve than in neighbouring countries, due to the relatively small amount of industry, the great importance of tourism and the daytime use of electrical appliances such as air conditioners.

Few interconnections with Europe via France

Spain is an energy island; remuneration for generation does not depend on the volatility of prices in other neighbouring countries.

Irregularity of generation

Technology totally dependent on climatic effects. It is not a constant and regular source of generation. For example, on cloudy and rainy days, the efficiency of solar energy collection decreases considerably.

Low energy production efficiency

Due to the fact that it is not yet a fully developed technology with a long way to go, of all the solar irradiation that reaches the photovoltaic modules, only a quarter is transformed into electricity due to the low efficiency of the modules.

Investment examples

• GAC invests 400 million euros in photovoltaic plants in Spain

Independent alternative asset manager Green Arrow Capital (GAC) has announced the acquisition of a package of ready-to-build solar PV plants in Spain with a total capacity of 508 megawatts.

GAC has reached an agreement with the previous owner, Progressum Energy Developments (PED), to which it will pay more than 400 million euros for a portfolio that will help it strengthen its position in the international renewable energy and storage market.

Top 3 communities

Extremadura, Andalucía and Castilla-La Mancha

All three communities are in a race to attract heavy investment to leverage their large landholdings and abundant solar radiation to become drivers of the country's ecological transition.



Incentives

Below you will find the current subsidies that the state transfers to the communities:

• FOR RENEWABLE ENERGIES IN SELF-CONSUMPTION, STORAGE, AND THERMAL ENERGY IN THE RESIDENTIAL SECTOR (RD 477/2021. PRTR)

This subsidy is part of a set of incentive programmes for the implementation of facilities linked to self-consumption and storage, with renewable energy sources (RES), as well as the implementation of renewable thermal systems in the residential sector, within the framework of the Plan de Recuperación, Transformación y Resiliencia (PRTR):

- Incentive programme 1: Implementation of self-consumption installations, with renewable energy sources, in the services sector, with or without storage.
- Incentive programme 2: Implementation of self-consumption installations, with renewable energy sources, in other productive sectors of the economy, with or without storage.
- Incentive programme 3: Incorporation of storage in self-consumption installations, with renewable energy sources, already existing in the services sector and other productive sectors.
- Incentive programme 4: Implementation of self-consumption installations, with renewable energy sources, in the residential sector, public administrations and the third sector, with or without storage.
- Incentive programme 5: Incorporation of storage in self-consumption installations, with renewable energy sources, already existing in the residential sector, public administrations and the third sector.
- Incentive programme 6: Implementation of thermal renewable energy installations in the residential sector.

How to access the subsidies of the 1-5 programmes in the different autonomous communities: <u>https://www.idae.es/ayudas-y-financiacion/para-energias-renovables-en-autoconsumo-almacenamiento-y-termicas-sector/estado-de-las-convocatorias-por-comunidad-autonoma-rd-4772021-autoconsumo-y-almacenamiento</u>

How to access the subsidies of programme 6 in the different autonomous communities: <u>https://www.idae.es/ayudas-y-financiacion/para-energias-renovables-en-autoconsumo-almacenamiento-y-termicas-sector/estado-de-las-convocatorias-por-comunidad-autonoma-rd-4772021-climatizacion-renovable-residencial</u>

11.3. Wind energy

Spain is one of the countries in the world with the highest installed capacity. With 1,265 wind farms (21,419 wind turbines), installed in 1,037 municipalities, wind energy is the main source of energy in Spain, being the technology that contributes most to the Spanish electricity mix, as marked in the National Integrated Energy and Climate Plan (PNIEC) and where by 2030 they want wind power to double and 74% of all electricity generation to be renewable.

Low cost

Wind energy has experienced a huge technological breakthrough and a radical reduction in deployment costs. In the last ten years, the price of onshore wind turbines has fallen by 37% and lithium batteries for energy storage by 85%.



Technological development

The potential of wind energy has increased considerably thanks to the associated technological development. Today's turbines are much more efficient than those of two decades ago.

Low maintenance

Wind turbines are low maintenance and labour costs after installation are minimal.

Requires storage systems

Wind energy is produced when the wind is blowing; thus, it is necessary to store the energy in batteries in order to have electricity when there is no wind. Batteries are expensive and contain toxic materials, which are an ecological problem.

Investment examples

• UK's Ventient Energy buys 443 MW of wind and solar projects in Spain

British renewable energy producer Ventient Energy announced at the end of December the acquisition of a package of projects in Castilla y León totalling 443 megawatts of capacity. Coming from a company specialising in wind energy, the particularity of this operation is that more than half of its new production will come from hybrid photovoltaic.

Specifically, the purchase agreement consists of 203 megawatts of onshore wind power and the future construction of 240 megawatts of hybrid solar photovoltaic power, which will be installed in the same locations where the company has wind power production.

Top 3 communities

The three autonomous communities with the greatest presence of wind power are: Castilla León, Aragón and Castilla La Mancha.

All three are in a race to attract heavy investment to take advantage of their vast lands and abundant wind power to become the driving force behind the country's ecological transition.

11.4. Storage systems

Energy storage has a key role to play in the transition towards a carbon-neutral economy. By balancing power grids and saving surplus energy, it represents a concrete means of improving energy efficiency and integrating more renewable energy sources into electricity systems.

A variety of technologies to store electricity are developing at a fast pace and are increasingly becoming more market competitive, but there are significant challenges in terms of limited access to grids and excessive fees

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The "Study on energy storage – Contribution to the security of the electricity supply in Europe⁹", published by the European Commission in May 2020, found that:

- the main energy storage reservoir in the EU is currently, and by, far pumped hydro storage. As their prices plummet, new batteries projects are rising
- lithium-ion batteries represent most of electrochemical storage projects. The recycling of such systems should be strongly taken into consideration, as well as their effective lifetime
- in the EU, the segment of operational electrochemical facilities is led by UK and Germany
- behind-the-meter storage is still growing. It is quite heterogeneous, depending on local markets and countries: as a new market, it is still driven by political aspects and/or subsidies

Advantages and disadvantages

Electric battery technology has undergone major developments and costs are being significantly reduced. However, there is still a need to increase the lifespan of batteries and to favour the reuse and recycling of their components, as well as to further develop technology and reduce battery costs.

Fortunately, electric batteries are not the only form of energy storage. In large-scale storage situations, today's renewable energy sources can be combined with mechanical, thermal, and chemical storage systems.

Energy storage technologies

Currently, mechanical, thermal and chemical storage systems are the main technologies that allow energy to be efficiently transformed and stored and are key to the energy transition.

Lithium batteries

Lithium batteries are the primary method of energy storage today because lithium has a high electrochemical potential and can store large amounts of energy. According to the Global Battery Alliance (GBA), by 2030, the use of lithium batteries will enable a 30% reduction in carbon emissions. Currently, the study and innovation in this energy storage system is at its maximum for its impact on renewables, although its high cost means that its application has not been implemented on a large scale.

Hydraulic pumping storage

The pumping system is configured in hydroelectric power plants - such as Salto de Chira. It consists of storing water and at times when there is not enough wind or solar energy, taking advantage of the difference in level of the reservoir to release water to drive turbines that will generate energy, which is also renewable.

Compressed Air Energy Storage

⁹ <u>https://op.europa.eu/en/publication-detail/-/publication/a6eba083-932e-11ea-aac4-01aa75ed71a1/language-en?WT.mc_id=Searchresult&WT.ria_c=37085&WT.ria_f=3608&WT.ria_ev=search</u>

Compressed air energy storage or CAES (Compressed Air Energy Storage) takes place in underground reservoirs, some natural and some man-made, such as abandoned mines, mineral solution cavities or aquifers. Compressed air is stored in these spaces, which will be expanded at times of peak demand by driving a generator.

<u>Hydrogen</u>

Experts describe green hydrogen as the fuel of the future, as it allows electricity to be generated from renewables. In its favour is the fact that it can be stored in large containers for a long period of time, which is the main drawback of lithium batteries at present.

Incentives

Below you will find the current subsidies that the state transfers to the communities:

• FIRST CALL FOR PROPOSALS FOR INNOVATIVE ENERGY STORAGE R&D PROJECTS UNDER THE PRTR FRAMEWORK

The purpose of this call for proposals is to promote the technological development of energy storage technologies and encourage their deployment. This call is part of component 8 "Electricity infrastructures, promotion of smart grids and deployment of flexibility and storage" of the Plan de Recuperación, Transformación y Resiliencia, and specifically in its investment 1 (C8.I1), Deployment of energy storage.

The call will be technology neutral; any technology will be eligible, as long as it is at the required level of technological maturity, as well as meeting the other conditions of the call.

https://www.idae.es/ayudas-y-financiacion/primera-convocatoria-para-proyectos-de-id-dealmacenamiento-energetico-dentro

11.5. Hydrogen

Renewable hydrogen is a key sustainable solution for the decarbonisation of the economy. Renewable hydrogen is part of the solution to achieve climate neutrality by 2050 and develop innovative industrial value chains in Spain and the EU, as well as a high value-added green economy.

Renewable hydrogen is set to be a valuable energy vector for end-uses where it is the most efficient solution in the process of its decarbonisation, such as hydrogen-intensive industry and high-temperature processes, long-distance heavy-duty transport processes, long-distance heavy transport, maritime transport, rail transport or aviation. Moreover, its quality as an energy vector gives it great potential as an instrument for energy storage and sectoral integration.

Types of hydrogen

In terms of the raw material required and the CO₂ emissions generated to obtain it, hydrogen is generally classified into the following types:

- Renewable hydrogen or green hydrogen: hydrogen generated from renewable electricity, using water as a raw material, through a process of electrolysis. Likewise,

hydrogen obtained by biogas reforming or biochemical conversion of biomass, provided that the sustainability requirements are met, shall be renewable.

- Blue hydrogen: hydrogen obtained in a similar way to grey hydrogen, but to which capture techniques are applied, storage techniques (CCUS: Carbon Capture, Utilization and Storage) are applied to it, which reduces CO₂ emissions by up to 95%.
- Grey hydrogen: hydrogen produced from natural gas or other light hydrocarbons such as methane or liquefied petroleum gases by means of liquefied petroleum gases through reforming processes. Currently, 99% of the hydrogen consumed in Spain is of this type.

In addition to the above, there are other types of hydrogen with a very diverse environmental impact, such as black or brown hydrogen, whose raw material is coal, nuclear energy or electricity from the grid, which are not included in the above classification as it is difficult to quantify their environmental impact.

Advantages and disadvantages

Of all the elements, hydrogen is the one with the smallest atom, so it is very easy for it to escape by diffusion through the walls of the tank.

High energy consumption

To store it, it must be liquefied. The melting temperature is very low, so a lot of energy must be consumed. Consumption is estimated at 60 kWh/kg hydrogen

Transmission grid

There is no network of pipelines strong enough. Those who use it have their own water supply tanks.

Top 3 communities

País Vasco, Catalunya and Navarra

The three autonomous communities are part of the largest collaborative project on green hydrogen at national level, the Ebro Hydrogen Corridor. The Ebro Hydrogen Corridor is a project that seeks to enhance inter-territorial coordination between the regional initiatives already underway in north-eastern Spain. It brings together the Basque Hydrogen Corridor (BH2C), the Hydrogen Valley of Catalonia (H2ValleyCat), the Hydrogen Valley of Aragon "GetHyGA Initiative" and the Navarra Green Hydrogen Agenda.

The three autonomous communities are part of the largest collaborative project on green hydrogen at national level, the Corredor del Hidrógeno del Ebro. The Corredor del Hidrógeno del Ebro is a project that seeks to enhance inter-territorial coordination between the regional initiatives already underway in north-eastern Spain. It brings together the Basque Hydrogen Corridor (BH2C), the Hydrogen Valley of Catalonia (H2ValleyCat), the Valle del Hidrógeno de Aragón "GetHyGA Initiative" and the Agenda Navarra del Hidrógeno Verde.

Incentives

Below you will find the current subsidies that the state transfers to the communities:


• H2 PIONEERS PROGRAMME. GRANTS FOR PIONEERING AND UNIQUE RENEWABLE HYDROGEN PROJECTS

The objective of the H2 PIONEERS Programme is to promote the deployment of commercial applications of integral projects that include production, distribution and consumption of renewable hydrogen in the same territorial location. The eligible actions are:

- Renewable H2 production and distribution facility
- Industrial uses
- Heavy mobility uses
- Innovative stationary applications

https://www.idae.es/ayudas-y-financiacion/programa-h2-pioneros-ayudas-para-proyectospioneros-y-singulares-de-hidrogeno

• SUPPORT PROGRAMMES FOR THE INNOVATIVE RENEWABLE HYDROGEN VALUE CHAIN IN THE FRAMEWORK OF THE RECOVERY, TRANSFORMATION AND RESILIENCE PLAN

Together with the programme of incentives for pioneering and unique renewable hydrogen projects, it is one of the first two lines of aid for the promotion of renewable hydrogen approved by the Ministerio para la Transición Ecológica y el Reto Demográfico (MITECO) within the Proyecto Estratégico para la Recuperación y Transformación Económica de Energías Renovables, Hidrógeno Renovable y Almacenamiento.

https://www.idae.es/ayudas-y-financiacion/programas-de-ayuda-la-cadena-de-valorinnovadora-del-hidrogeno-renovable-en

The Boletín Oficial del Estado (BOE) has published on 22 February 2022 the extracts of the first calls for the following Programmes:

- Programme 1: Capabilities, technological advances in testing and manufacturing lines <u>https://sede.idae.gob.es/lang/modulo/?refbol=tramites-servicios&refsec=cadena-valor-hidrogeno-renovable&idarticulo=146956</u>
- Programme 2: Design, demonstration and validation of new hydrogen vehicles <u>https://sede.idae.gob.es/lang/modulo/?refbol=tramites-servicios&refsec=cadena-valor-hidrogeno-renovable&idarticulo=146957</u>
- Programme 3: Large-scale electrolysis demonstrators, innovative projects for renewable hydrogen production <u>https://sede.idae.gob.es/lang/modulo/?refbol=tramites-servicios&refsec=cadena-</u> valor-hidrogeno-renovable&idarticulo=146958
- Programme 4: Basic fundamental research challenges, innovative pilots and training in key enabling technologies within the value chain <u>https://sede.idae.gob.es/lang/modulo/?refbol=tramites-servicios&refsec=cadena-valor-hidrogeno-renovable&idarticulo=146959</u>



11.6. Electric vehicle

Electrification of transport is key to the decarbonisation of the economy by 2050. The transport sector is responsible for 35% of national greenhouse gas emissions, as well as for the deterioration of air quality and noise levels in towns and cities.

The solution for the decarbonisation of the sector is electric mobility, as it eliminates combustion in the different means of transport by replacing fossil fuels with electricity. The contribution of electric mobility to decarbonisation is such that we can say that without electric mobility, there is no energy transition.

The introduction of electric vehicles will mean a substantial change in our society's mobility models, as well as a great opportunity to improve the overall efficiency of the electricity system, reduce CO_2 emissions and reduce our dependence on foreign energy.

Below, we discuss different opportunities and/or approaches that Thai companies can focus on to generate EV-related business:

Recharge points

Electric vehicle charging can take place in the private environment, at charging points in the home or work car park, and in the public environment.

In the public environment, charging can take place in urban public areas - such as public car parks, hotels, shopping centres or public roads - and in interurban corridors. In the case of interurban corridors, there is a tendency for these to be concentrated in areas known as recharging hubs.

There are different types of recharging depending on the power, taking into account that the higher the power, the shorter the recharging times and the higher the infrastructure costs. The average mobility need in Spain is 40 km per day, which means 6 kWh of energy per day.

- 1) Basic charging point (7.4 kW). System cost: 500 1,500 €.
- 2) Semi-fast charging point (22 kW). System cost: From 2,500 €.
- 3) Fast charging point (40 50 kW). System cost: 20,000-30,000 €.
- 4) Super-fast charging point (100 150 kW). System cost: More than 100,000 €.

Export of electric vehicles/materials.

In Spain, there are subsidies for the purchase of electric vehicles and benefits for their users, which will lead to a strong increase in the demand for this type of vehicle in the coming years. It is for this reason that Thai companies may be interested in exporting to Spain materials or operating parts for both the electric vehicle and possible components of the recharging points.

Restrictions on imports of electrical and electronic equipment and batteries

The import of these products is regulated by several regulations:

- Real Decreto 219/2013 regulating restrictions on the use of certain hazardous substances in electrical and electronic equipment.
- Real Decreto 110/2015 regulating waste electrical and electronic equipment.



- Real Decreto 106/2008 on batteries and accumulators and the environmental management of their waste.
- Real Decreto 27/2021, which amends the two previous decrees and assigns the SOIVRE Inspection Service as the authority responsible for carrying out various controls on imports of EEE and PPAA.

Electro station and Photovoltaic station

An electro station is an on-street installation in which there is a set of electric vehicles recharging points. Electro station offers a service equivalent to that of a petrol station, recharging electric cars. As the electro station is intended to be the equivalent of a petrol station, its chargers provide fast or ultra-fast charging. In other words, it aims to recharge in the shortest possible time.

A photovoltaic station is also a charging station but the electricity does not come from the grid, but is generated by a photovoltaic installation associated to the photovoltaic station, usually the photovoltaic installation is installed on the structures of the photovoltaic station itself.

The standard cost of an electro-polling station is approximately 40,000 € whereas a photovoltaic station costs around 55,000 €, as it includes a photovoltaic installation.

Bi-directional management

A photovoltaic station can have bi-directional management, so the electricity generated is used to recharge plugged-in electric vehicles and, when they do not need it - because they are already charged or because there is no car connected at the time - it is used for any other equipment located next to them.

It can also incorporate a state-of-the-art technological component: a bi-directional recharging system that allows solar energy to be stored in the batteries, either those of the electric vehicles themselves or those of other batteries fitted in the equipment.

Investment examples

• Agreement between Wallbox and Svea Solar for charging electric cars with solar energy

Collaboration agreement between Wallbox and Svea Solar to recharge electric cars with solar energy. The two companies have reached an understanding to promote Wallbox's products, which will be sold together with Svea Solar's solar offer, to complement the energy ecosystem of users' homes and enable more citizens to have an electric vehicle more easily and with more support. The agreement will take effect in Spain, the Netherlands, Sweden, Germany and Belgium. Thus, Wallbox, a company founded in 2015 in Barcelona, becomes the main solution for charging electric vehicles for the consumption offer of this Swedish company, which has 900 employees in the countries mentioned above.

11.7. Importation of materials and components

Another option to consider within the investment possibilities is in materials and components.

The different renewable technologies that exist in the sector, more or less developed, have one thing in common, which is the need for materials and components such as turbines, plates, inverters, batteries, etc.

The investment or sale of this type is necessary to be able to cover all the installed power needs, as in many cases there is a lack of material to be able to meet the energy targets.

Top 3 communities

Comunidad de Madrid, Catalunya and Comunitat Valenciana

In Spain, there are a total of 11,517 public access charging points throughout the country. The list by Autonomous Region is headed by Catalunya, with 3,282 charging points, followed by the Comunidad de Madrid, with 1,408, and with the Comunitat Valenciana at the same level, with 1,405.

The Comunidad de Madrid tops the list of regions with the highest number of registered electric vehicles, with a total of 5,817, followed by Catalunya, with 3,261, and the Comunitat Valenciana, with 1,108.

Incentives

The MOVES III Plan is a programme of direct aid granted by the central government to the autonomous communities to encourage the purchase of electric vehicles (cars, vans, motorbikes and quadricycles) and the installation of the necessary infrastructure for recharging them.

The Instituto para la Diversificación y Ahorro de la Energía (IDAE) has drawn up this map with the calls for tenders opened by the autonomous communities and the body that manages them:

https://www.idae.es/ayudas-y-financiacion/para-movilidad-y-vehiculos/programa-movesiii/convocatorias-de-las-comunidades-autonomas

12. INVESTMENT AID AND INCENTIVES IN SPAIN¹⁰

In order to promote investment, employment, competitiveness and economic growth, the State and other public administrations have been developing an extensive system of aid and incentives, placing special emphasis on the promotion of permanent employment, regional investment and research, development and technological innovation (R&D&I).

Moreover, given that Spain is a Member State of the European Union, potential investors can also access European aid programmes, which makes investment in Spain even more attractive. In this respect, it should also be borne in mind the particular importance that the "Next Generation EU" programme will have in the coming years, as an exceptional funding mechanism aimed at supporting the recovery of Member States from the consequences of the COVID-19 pandemic, of which Spain will be one of the main recipients. In this context, and within the framework of the **Plan de Recuperación, Transformación y Resiliencia** that is tool for obtaining this fund, the Plan de Recuperación, Transformación y Resiliencia is a country project that outlines the roadmap for the modernisation of the Spanish economy, the recovery of economic growth and job creation, for the solid, inclusive and resilient economic reconstruction after the COVID crisis, and to respond to the challenges of the next decade.

The measures included in the Plan de Recuperación, Transformación y Resiliencia have three objectives: to boost the recovery of the economy after the pandemic, to transform the foundations on which the Spanish productive system is based and to prepare our economy to face any shocks that may arise with greater guarantees.

One of the key and most innovative elements through which these measures will be implemented are the so-called Strategic Projects for the Recovery and Transformation of the Economy, better known by their acronym PERTE.

Calls for the Plan de Recuperación, Transformación y Resiliencia grants: https://planderecuperacion.gob.es/como-acceder-a-los-fondos/convocatorias

Some of the aid and incentives, which are of interest to Thai investment, go through the following channels:

1) State incentives for specific industry sectors

The State Administration provides financial aid and tax benefits for activities carried out in certain sectors considered to be priority sectors (such as mining, industry, technological development, research, and development, etc.) due to their growth potential and their impact on the national economy as a whole. In addition, the Autonomous Communities grant similar incentives for most of these sectors. Financial aid includes non-refundable and partially refundable subsidies, as well as interest rate subsidies on loans obtained by the beneficiaries, or combinations of the above.

¹⁰ Incentives and Aids. Search Engine

https://www.investinspain.org/en/incentives-and-aids-search

2) Incentives for investment in specific regions

Regional incentives are financial aid granted by the Spanish State to productive investment projects carried out in previously determined regions of our territory, with the aim of promoting the development of business activity in these areas. The aim is to alleviate existing interterritorial imbalances and to strengthen the endogenous development potential of certain regions with lower growth. The State Administration grants this type of incentive in accordance with the delimitation of eligible areas and the maximum intensities established by the European Commission for regional state aid. The functions relating to regional incentives are attributed to the Directorate General for European Funds, which reports to the General Secretariat for European Funds, a new body created with the rank of sub-secretariat within the State Secretariat for Budgets and Expenditure of the Ministry of Finance.

Region	Million euros	Percentage
Andalucía	535,63	16,90%
Aragón	138,15	4,36%
Canarias	142,18	4,49%
Cantabria	42,53	1,34%
Castilla y León	292,52	9,23%
Castilla-La Mancha	213,61	6,74%
Catalunya	388,05	12,24%
Ceuta	4,96	0,16%
Comunidad Foral de Navarra	67,16	2,12%
Comunidad de Madrid	300,82	9,49%
Comunitat Valenciana	258,01	8,14%
Extremadura	144,89	4,57%
Galicia	164,28	5,18%
Illes Balears	70,97	2,24%
La Rioja	26,45	0,83%
Melilla	5,04	0,16%
País Vasco	156,69	4,94%
Principado de Asturias	141,29	4,46%
Región de Murcia	76,67	2,42%
Total	3.169,90	

Table 18. Distribution of the Plan de Recuperación, Transformación y Resiliencia funds by region.

Detailed funds by region can be found in Annex 1.

Thus, the different regions have the same incentives controlled by the Spanish State, which vary in percentage due to their different characteristics.

3) Aid and incentives from the European Union (NEXT GENERATION UE)

Under the difficult context of the COVID-19 pandemic, the European Council issued an agreement for the approval of a set of extraordinary measures aimed at promoting the recovery of the economy of the European Union and its member states.

This agreement approved the creation of the European Recovery Instrument Next Generation EU (NextGen), through which to mobilise up to 750,000 million euros during the period 2021 to

2023, of which 390,000 million euros will be articulated as non-refundable financial transfers in favour of the Member States.

12.1. Strategic Projects for Economic Recovery and Transformation (PERTE)

PERTEs are strategic projects with a great capacity to boost economic growth, employment and the competitiveness of the Spanish economy, with a high degree of public-private collaboration and transversal to the different administrations.

They are a new figure conceived as a mechanism for promoting and coordinating high-priority, particularly complex projects or those in which there is a clear market failure, significant externalities or insufficient initiative or investment capacity on the part of the private sector. Its objective is to contribute to the agile and efficient management of funds and to strengthen those projects that clearly contribute to the transformation of the Spanish economy.

The investments foreseen in this PERTE will directly mobilise more than 16.3 billion euros, with the potential to generate more than 280,000 jobs. Specifically, the 3,558 million euros of the Recovery, Transformation and Resilience Plan allocated to transformative measures as a central part of the PERTE will generate a GDP impact of more than 12,300 million euros, and a gross value added of almost 11,000 million euros.

The PERTE's of interest for the activities of potential Thai companies are:

12.1.1. PERTE for the development of electric and connected vehicles

Its central axis is the creation of the necessary ecosystem for the development and manufacture of electric and connected vehicles by boosting the automotive industry (with strong traction on other economic sectors), in order to respond to the new sustainable and connected mobility and the generation of new activities¹¹.

12.1.2. PERTE for renewable energies, renewable hydrogen and storage

The Recovery, Transformation and Resilience Plan (PRTR) establishes that almost 40% of investments will be earmarked for the ecological transition. The aim of this PERTE is to underpin the areas associated with the energy transition in which Spain is well positioned, such as renewable energies, power electronics, storage and renewable hydrogen, and to strengthen those with less presence.

The transition towards a carbon neutral economy is an opportunity in environmental, social and economic terms, and among other advantages, it also allows reducing dependence on foreign energy. The aim of this PERTE is to underpin the areas associated with the energy transition in which Spain is well positioned, such as renewable energies, power electronics, storage and renewable hydrogen, and to strengthen those with a lower presence¹².

Reference Code: 22028P_Consultancy Energy Royal Thai Embassy

¹¹ See annex electric car-

https://www.lamoncloa.gob.es/consejodeministros/resumenes/Paginas/2021/130721-cministros.aspx ¹² See annex renewable energies and green hydrogen <u>https://planderecuperacion.gob.es/sites/default/files/2021-12/PERTE_Energias%20renovables_14122021.pdf</u>

https://www.lamoncloa.gob.es/consejodeministros/resumenes/Paginas/2021/141221-rp_cministros.aspx https://planderecuperacion.gob.es/sites/default/files/2021-12/PERTE_Energias%20renovables_14122021.pdf

13. GREEN TAXONOMY

An economic activity can contribute significantly and in different ways to the environmental objective of transition to a circular economy. It can, for example, increase the durability, repairability, reparability, upgradability and reusability of products, or it can reduce resource use through design and choice of materials, facilitating retrofitting, dismantling and deconstruction in the buildings and construction sector, in particular to reduce the use of building materials and promote their reuse. It can also make a substantial contribution to the environmental objective of transition to a circular economy by developing product-as-a-service business models and circular value chains, with the aim of keeping products, components and materials at their highest level of utility and value for as long as possible. Any reduction of the content of hazardous substances in materials and products throughout their life cycle, including their substitution by safer alternatives, should at least be in conformity with Union law.

The EU Taxonomy is a tool to help investors, companies, issuers and project promoters navigate the transition to a low-carbon, resilient and resource-efficient economy.

The Taxonomy sets performance thresholds (referred to as 'technical screening criteria') for economic activities which:

- make a substantive contribution to one of six environmental objectives
- do no significant harm (DNSH) to the other five, where relevant
- meet minimum safeguards (e.g., OECD Guidelines on Multinational Enterprises and the UN Guiding Principles on Business and Human Rights)

The performance thresholds help companies, project promoters and issuers access green financing to improve their environmental performance, as well as helping to identify which activities are already environmentally friendly. In doing so, it will help to grow low-carbon sectors and decarbonise high-carbon ones.



Figure 13-1. Environmental objectives. Source: EU. Year: 2020.

The different phases for the accreditation of green taxonomy are as follows:

Phase 1. Verification and DNSH criteria

Carrying out a preliminary review of the project requiring financing in order to be able to make an initial assessment, as well as a visit to the facilities. With this basic data, it will be possible to verification and establishment of the DNSH criteria necessary for the correct preparation of the report.

Phase 2. Due diligence

Make due diligence on the company's process controls and identify, prevent, mitigate and explain how they address these actual and potential adverse impacts on their own operations, their supply chain and other business relationships.

Phase 3. Calculation of investment alignment

Analysing the previous phases, the alignment of the investment will be calculated in order to determine the classification of the sustainable activity and determine the degree of taxation of the project.

Phase 4. Preparation of the report

A final report will be elaborated with all the requirements and previous study in order to comply with the criteria of taxonomy criteria and achieve the company's objective of obtaining financing for its project.

Phase 5. Subsidies

The European Union has approved a public aid package of 2.018 billion euros in order to be able to outline a strategy for the recovery of COVID-19 and transformation towards a greener, more digital and resilient Europe.

In addition, there are other types of financial support that can help companies to make the necessary investment to achieve their goals.

The actions to be carried out will be:

- Study of possible calls for proposals to access
- Study of needs and requirements
- Support in the subsidy application process.

14. PRACTICAL INFORMATION

14.1. Types of penetration in Spain

Currently, there are a full liberalisation of foreign investment and exchange controls, in line with EU regulations, without prejudice to the extraordinary measure introduced by the final provision of Real Decreto-Ley 8/2020, of 17 March, on extraordinary urgent measures to address the economic and social impact of COVID-19 and complemented by Real Decreto-Ley 11/2020, of 31 March, adopting additional urgent measures in the social and economic sphere to deal with COVID-19, both approved by the Spanish Government on the occasion of the global pandemic of COVID-19, consisting of the suspension of the liberalisation regime for foreign investment in Spain.

In line with the above, Real Decreto-Ley 34/2020, of 17 November, on urgent measures to support business solvency and the energy sector, and on tax matters, has extended the regime of suspension of foreign investments in Spain to investments from the European Union or the European Free Trade Association and has modified certain aspects of the pre-existing regime of suspension of the liberalisation regime for the rest of foreign direct investments.

In terms of ways of doing business or setting up in Spain, various alternatives are analysed: incorporating a company; opening a branch; forming a joint venture with another or other established entrepreneurs; acquiring real estate; buying and selling businesses; investing in venture capital entities; or distribution, agency, commission, or franchising agreements.

As discussed above, we detail the steps required to carry out the following types of investments:

- 1. Incorporation of a company public or private limited company and opening of a branch in Spain
- 2. Acquisition of shares/participations in an existing Spanish company.
- 3. Acquisition of businesses, through the sale/purchase or global transfer of assets and liabilities.

The following points are based on the report published by ICEX "Guia de negocios en España 2020¹³".

Tax identification number (N.I.F.)

The Spanish applicable legislation currently establishes that all legal entities with economic or professional interests in Spain or with a relevant involvement for tax purposes must have a N.I.F. (Spanish tax identification number). The N.I.F. must be applied for whenever a foreign investor makes a direct investment in Spain or is a partner or administrator of an entity resident in Spain or of a branch or permanent establishment located in Spain of a foreign entity. Form 036 for obtaining the N.I.F. of the foreign entity (census declaration of registration, modification and deregistration in the Census of Entrepreneurs, Professionals and Withholders, box 120), which must be signed by the legal representative appearing on the certificate or the company's attorney-in-fact.

First step: assignment of the representative's instrumental N.I.E. through **form 030** on the same day.

Reference Code: 22028P_Consultancy Energy Royal Thai Embassy

¹³ <u>https://www.investinspain.org/es/publicaciones/Guia-de-negocios-en-Espana</u>



Second step: one or two days later, the N.I.F. of the foreign entity may be obtained through **form 036**.

14.1.1. Formation of a company

The most common corporate forms under Spanish commercial law are the public limited company (S.A.) and the limited liability company (S.L.).

Table 19. Economic needs for the formation of a company

	S.A.	S.L.
Minimum share capital	60.000 €	3.000€
Disbursement on formation	Minimum of 25% and the share premium, if any	In its entirety.

Spanish law does not require a minimum number of shareholders or partners to incorporate a company, although sole proprietorships must be subject to a special publicity regime.

Shareholders and partners may be natural or legal persons and of any nationality or residence.

Legal procedures

The formation of a public limited company or a private limited company by the ordinary procedure generally takes between 6 and 8 weeks.

The ordinary incorporation formalities and the costs incurred are similar for both types of company and are detailed below:

- 1. Negative certification of denomination
- 2. Application for a provisional N.I.F. number
- 3. Opening a bank account
- 4. Act of manifestations of title
- 5. *Execution of the deed in the presence of a notary*
- 6. Application for registration in the Registro Mercantil of the company's registered office
- 7. Timeline for qualification and entry in the Registro Mercantil
- 8. Application for a definitive N.I.F. number
- 9. Census formalities for tax and labour purposes

14.1.2. Subsidiary opening

In general terms, the requirements, formalities and costs related to the opening of a branch in Spain of a foreign company are very similar to those for the incorporation of a subsidiary (as a company). The most important legal steps and costs are summarised below.

The most important legal steps and costs are summarised below, highlighting the main differences with respect to the incorporation of a subsidiary.



Legal procedures

- 1. Negative certification of denomination
- 2. Obtaining the Tax Identification Number (N.I.F.) and appointment of a representative of the parent company before the Spanish tax authorities.
- 3. Act of manifestations of title
- 4. Execution of public deed of opening of branch before a Spanish notary public.
- 5. Application for entry in the Registro Mercantil
- 6. Census formalities for tax and labour purposes

Registration of the branch for Business Tax purposes: Follow the same procedures as in the case of a company.

14.1.3. Other ways to operate in Spain

14.1.3.1. Forms of business cooperation

One of the most frequent forms of business cooperation is the joint venture. The Spanish legal system does not expressly regulate this figure, so we would be in the presence of an atypical contract that finds its basis in the principle of the autonomy of the will provided for in Article 1255 of the Código Civil.

Under current legislation the following are the main ways in which a joint venture may be developed to enable transactions to be carried out between one or more parties:

- 1) Through a Temporary Business Association
- 2) As an Economic Interest Grouping
- 3) Through Joint Venture Accounts
- 4) Through Participative Loans

1) Temporary Joint Ventures (U.T.E.S)

In accordance with Spanish legislation, U.T.E.s are systems of collaboration between companies for a certain, determined or undetermined period of time for the development or execution of a work, service or supply. U.T.E.s allow several companies to operate jointly in a common project. This form of association is very common in large engineering and construction projects, which does not mean that it cannot be used in other business sectors.

2) Economic Interest Groupings (E.I.I.G.S)

The purpose of setting up A.I.E.s is to facilitate the development or improve the results of the activity of their members. A.I.E.s cannot act on behalf of their members or replace them in their operations. Therefore, A.I.E.s are typically used for the provision of ancillary services such as centralised purchasing or sales, centralised management of information or administrative services, etc., within the context of a wider association or group of companies.

3) Joint Ventures through Limited Liability Companies or Limited Liability Companies

A significant number of joint ventures use corporations and limited liability companies as a vehicle, and we recommend reviewing the references elsewhere in this Guide to the formation,



basic characteristics and particularities of the corporate bodies of corporations and limited liability companies.

14.1.3.2. Acquisition of shares in a public limited company or of shares in an existing limited liability company

It is necessary for the seller/buyer of the shares to have a Spanish N.I.E./N.I.F. or D.N.I., once the acquisition is made, the title of ownership of the shares or holdings being transferred is obtained.

The Financial Transaction Tax should be considered. The **Financial Transaction Tax (Tobin Tax)** provides for a 0.2% tax on certain acquisitions of shares in Spanish listed companies whose market capitalisation exceeds 1,000 million euros, regardless of the residence of the agents involved in the transactions; it does not affect the primary market, transactions necessary for the operation of market infrastructures or corporate restructuring, transactions between companies in the same group and temporary transfers.

14.1.3.3. Business acquisition

As an alternative to the purchase and sale of shares or holdings in Spanish companies, the investment in Spain could also take the form of a business acquisition, either through a contract for the purchase and sale of assets and liabilities of Spanish companies, or through a global transfer of the assets and liabilities of a company.

14.2. Sector regulatory and operational framework

The regulation of the renewable energy sector in Spain follows a scheme based mainly on these six norms:

- Real Decreto 1955/2000, of 1 December, which regulates the activities of transmission, distribution, commercialisation, supply and authorisation procedures for electricity installations.
- Real Decreto ley 9/2013, which establishes urgent measures to guarantee the financial stability of the electricity sector.
- Ley 24/2013 on the electricity sector, which established the bases for the regulation of the economic regime for renewables.
- Real Decreto 413/2014, which regulates the activity of electricity production from renewable energy sources, cogeneration, and waste.
- Real Decreto 244/2019, which regulates photovoltaic self-consumption to incentivise solar energy production.
- RD Ley 23/2020 which establishes new legal figures to be developed in the coming years and which will be key to the effective energy transition towards a system based on renewable energies.



14.3. Institutional framework of the electricity sector and binding bodies



Red Eléctrica de España, S.A. (REE)

System operator: Main function to guarantee the continuity and security of the electricity supply and the correct coordination of the production and transmission system.



OMI-POLO ESPAÑOL, S.A. (OMIE)

This is the one in which, through a bid-matching process, transactions for the purchase and sale of electricity with physical delivery for the following day are established.



Comisión Nacional de Mercados y Competencia (CNMC)

It manages free competition in the market while identifying possible infringements. It enforces the regulations provided by the ministry while regulating the management of market players through monitoring tools. It is currently gaining more legislative power.



Ministerio para la Transición Ecológica y el Reto Demográfico (MITECO)

It generates the legislation that regulates the sector.

It is closely linked to the vision of the political party in power, which can "aggressively" change the regulations governing the market.

14.4. Associations

14.4.1. Asociación Productores de Energías Renovables – APPA renovables

The Association of Renewable Energy Companies (APPA) brings together companies and entities whose purpose is the use of renewable energy sources in all their forms. Established in 1987, APPA is the reference association for the renewable energy sector in Spain.

APPA's main objectives include defending the interests of the sector, providing specific information on a constant basis on renewable energies and offering legal advice and criteria for action to its members. APPA is represented before national, European and international organisations. APPA's main activity is lobbying the authorities and organised social groups with an impact on the renewable energy sector. APPA makes public opinion aware of the benefits of energy generation with clean energies, as the only way to evolve towards an environmentally and economically sustainable energy system.

https://www.appa.es/

14.4.2. Asociación Empresarial Eólica – AEE

AEE is the voice of the wind energy sector in Spain with the aim of promoting the growth of this sustainable, strategic, and beneficial technology.

With more than 250 member companies, the Spanish Wind Energy Association (AEE) represents more than 90% of the sector in Spain, including developers, wind turbine and component manufacturers, national and regional associations, organisations linked to the sector, lawyers, financial institutions and insurers, among others. AEE's main objective is to promote the growth of wind energy through its interests, research, communication and education. https://aeeolica.org/

14.4.3. Asociación española de cogeneración

The Spanish Cogeneration Association (ACOGEN) is made up of 111 industrial cogeneration groups, three large industrial sectors (ASPAPEL, FIAB and ASCER) and 34 service companies and suppliers of capital goods. ACOGEN's members represent more than 4,500 MW of cogeneration installed capacity in Spain.

Its objective is to promote and support cogeneration throughout Spain and in the areas where necessary, defending the interests of existing installations and promoting the construction of new plants, all based on the essential characteristics of this technology. https://www.acogen.es/index.php

14.4.4. Asociación de Empresas de Energía eléctrica – AELEC

The Asociación de Empresas de Energía Eléctrica, AELEC, focuses its activity on the dissemination, disclosure and promotion of the technical and regulated aspects of electricity activities, particularly in distribution. It also works to position itself as a key player in helping to develop an appropriate energy transition in Spain. Its partners are EDP, ENDESA, IBERDROLA and VIESGO.

https://aelec.es/

14.4.5. Asociación española del hidrogeno

The Spanish Hydrogen Association (AeH2) is the voice of the hydrogen sector in Spain. It represents nearly 300 members from the entire hydrogen value chain, including renewable energy promoters, equipment and component manufacturers, engineering and EPC, Oil & Gas, industrial gases, transport, organisations linked to the sector, etc. Its members include the most active companies, institutions and researchers in Spain in these technologies, who are active in hydrogen and fuel cells and who are convinced that these technologies have great economic potential.

The AeH2, positioned as a reference agent in the hydrogen sector, has been working since its foundation, in 2002, to foster, promote and drive the technological and industrial development of hydrogen technologies in our country, and to ensure that their positive impact has a positive impact on Spanish society and the Spanish economy. https://www.aeh2.org/

14.4.6. European Biogas Association

The EUROPEAN BIOGAS PARTNERSHIP is a European partnership accelerating the deployment of renewable gases in Europe. It drives the transition to an efficient circular economy by creating green jobs and local development.

https://www.europeanbiogas.eu/

14.5. Energy sector fairs

The main energy-related trade fairs are held at IFEM, the Madrid exhibition centre.

6 genera	International Energy and Environment Fair Next edition: 21-23 February 2023 <u>https://www.ifema.es/genera</u>
ADVANCED	Advanced Factories 2023 Next edition: 18-20 April 2023 <u>https://www.ifema.es/foro-ciudades</u>

14.6. Relevant bodies



Invest in Spain/ICEX

GOBIERNK DE ESINAÑO

Entity that develops a programme to support foreign companies up to 200,000 euros for investments with a high degree of R&D through a competitive concurrence procedure.

Ministerio de Ciencia, Innovación y Universidades

INNOVACIÓN INNOVACIÓN

The Ministry of Science, Innovation and Universities is responsible for scientific and technical research, development and innovation, with a variety of R&D-focused programmes.



Generalitat de Catalunya

ACCIÓ accompanies the company in its process of competitive differentiation and continuous search for new business opportunities.

It is the public agency for the competitiveness of Catalan companies, attached to the Department of Enterprise and Employment of the Generalitat de Catalunya.

14.7. Specialised publications

14.7.1. Specialised publications of renewable energies

Some of the main magazines and newspapers, both physical and digital, are:

- El Periódico de la Energía (https://elperiodicodelaenergia.com/)
- Energías Renovables. (https://www.energias-renovables.com/)
- Energía de Hoy (https://energiadehoy.com/)
- Diario Renovables (https://www.diariorenovables.com/)

14.7.2. Specialised economic publications

Some of the main business newspapers are:

- El economista (https://www.eleconomista.es/)
- Expansión (https://www.expansion.com/)
- Cinco días (<u>https://cincodias.elpais.com/</u>)



15. ANNEX 1. DISTRIBUTION OF THE PLAN DE RECUPERACIÓN, TRANSFORMACIÓN Y RESILIENCIA FUNDS BY REGION.

Andalucía

Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-		Andalucia
		Million
	2021	
C4	Actions in areas of socio-economic influence of National Parks	14,17
C4	Transfers to Autonomous Regions for direct actions in National Parks	19,77
C4	Actions in Biosphere Reserves	9,12
C4.I2	Correction of electrical lines	11,65
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	70.74
14	management.	/9,/4
CE 11	Improving supply and reducing losses in small and medium-sized	12.6
C3.11	municipalities	12,0
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	34,68
C12.I3	Regulatory support for waste	80,39
C1.I2	MOVES II (2020)	17,95
C1.I2	MOVES III	71,35
C2.I4	PREE (2020)	51,22
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	5,67
C7.I1	Renewable air-conditioning in households	17,07
C7.I1	Self-consumption installations	72,44
C7.I1	Thermal renewables	22,48
C8.I1	Large-scale and behind-the-counter storage	15,34
	Total components MITECO	535,63

Figure 15-12. Andalucía PRTR funding. Source: MITECO. Year: June 2021.

Aragón

Territorial distribution of Plan Posuporación Transformación y Posilioneia (PTP) 2020		Aragón
Territorial		Million
	2021	euros
C4	Actions in areas of socio-economic influence of National Parks	2,39
C4	Transfers to Autonomous Regions for direct actions in National Parks	3,71
C4	Actions in Biosphere Reserves	0,95
C4.I2	Correction of electrical lines	5,76
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	12 01
14	management.	45,61
C5 I1	Improving supply and reducing losses in small and medium-sized	5 /0
0.11	municipalities	5,49
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	2,9
C12.I3	Regulatory support for waste	15,39
C1.I2	MOVES II (2020)	5,31
C1.I2	MOVES III	11,21
C2.I4	PREE (2020)	8,94
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	3,7
C7.I1	Renewable air-conditioning in households	2,98
C7.I1	Self-consumption installations	15,88
C7.I1	Thermal renewables	5,64
C8.I1	Large-scale and behind-the-counter storage	4,08
	Total components MITECO	120 15
		100,10

Figure 15-13. Aragón PRTR funding. Source: MITECO. Year: June 2021.

Canarias

		Canarias
Territorial d	listribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021	Million
		euros
C4	Actions in areas of socio-economic influence of National Parks	6,95
C4	Transfers to Autonomous Regions for direct actions in National Parks	11,64
C4	Actions in Biosphere Reserves	5,59
C4.I2	Correction of electrical lines	0,5
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	10.75
14	management.	10,75
C5.I1	Improving supply and reducing losses in small and medium-sized municipalities	5,74
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	11,6
C12.I3	Regulatory support for waste	24,69
C1.I2	MOVES II (2020)	4,7
C1.I2	MOVES III	18,34
C2.I4	PREE (2020)	13,1
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	0,92
C7.I1	Renewable air-conditioning in households	4,37
C7.I1	Self-consumption installations	15,62
C7.I1	Thermal renewables	4,53
C8.I1	Large-scale and behind-the-counter storage	3,12

Total components MITECO

142,18

Figure 15-14. Canarias PRTR funding. Source: MITECO. Year: June 2021.



Cantabria

Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-		Cantabria
		Million
	2021	euros
C4	Actions in areas of socio-economic influence of National Parks	1,39
C4	Transfers to Autonomous Regions for direct actions in National Parks	1,92
C4	Actions in Biosphere Reserves	0,22
C4.I2	Correction of electrical lines	0,36
C4.I2 + I3	Biodiversity conservation. Ecosystem restoration. Sustainable forest	E 47
+ 14	management.	5,47
	Improving supply and reducing losses in small and medium-sized	5 4 5
C5.I1	municipalities	5,45
C12.I3	Regulatory support for waste	6,87
C1.I2	MOVES II (2020)	1,24
C1.I2	MOVES III	4,91
C2.I4	PREE (2020)	3,93
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	0,93
C7.I1	Renewable air-conditioning in households	1,31
C7.I1	Self-consumption installations	5,47
C7.I1	Thermal renewables	1,69
C8.I1	Large-scale and behind-the-counter storage	1,38
	·	-

Total components MITECO

42,53

Figure 15-15. Cantabria PRTR funding. Source: MITECO. Year: June 2021.



Castilla y León

		Castilla y
Territorial	distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-	León
	2021	Million
		euros
C4	Actions in areas of socio-economic influence of National Parks	3,92
C4	Transfers to Autonomous Regions for direct actions in National Parks	5,49
C4	Actions in Biosphere Reserves	9,23
C4.I2	Correction of electrical lines	13,77
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	
14	management.	80,03
	Improving supply and reducing losses in small and medium-sized	
C5.I1	municipalities	7,98
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	5,49
C12.I3	Regulatory support for waste	24,37
C1.I2	MOVES II (2020)	5,13
C1.I2	MOVES III	20,19
C2.I4	PREE (2020)	17,22
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	10,95
C7.I1	Renewable air-conditioning in households	5,74
C7.I1	Self-consumption installations	26,14
C7.I1	Thermal renewables	8,43
C8.I1	Large-scale and behind-the-counter storage	6,3
C10.I1	Just Transition Investment	42,13
	Total components MITECO	292,52

Figure 15-16. Castilla y León PRTR funding. Source: MITECO. Year: June 2021.



Castilla - La Mancha

		Castilla La
Territorial	distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-	Mancha
	2021	Million
		euros
C4	Actions in areas of socio-economic influence of National Parks	4,87
C4	Transfers to Autonomous Regions for direct actions in National Parks	7,53
C4	Actions in Biosphere Reserves	2,6
C4.I2	Correction of electrical lines	9,36
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	61 16
14	management.	01,10
C5.I1	Improving supply and reducing losses in small and medium-sized	10.88
	municipalities	10,00
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	15,9
C12.I3	Regulatory support for waste	22,95
C1.I2	MOVES II (2020)	4,34
C1.I2	MOVES III	17,24
C2.I4	PREE (2020)	13,07
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	5,59
C7.I1	Renewable air-conditioning in households	4,35
C7.I1	Self-consumption installations	21,61
C7.I1	Thermal renewables	7,18
C8.I1	Large-scale and behind-the-counter storage	4,99
	Total components MITECO	213,61

Figure 9-17. Castilla – La Mancha PRTR funding. Source: MITECO. Year: June 2021.

Catalunya

		Catalunya
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Million
		euros
C4	Actions in areas of socio-economic influence of National Parks	2,44
C4	Transfers to Autonomous Regions for direct actions in National Parks	3,77
C4	Actions in Biosphere Reserves	1,88
C4.I2	Correction of electrical lines	3,63
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	22.20
14	management.	55,50
C5 I1	Improving supply and reducing losses in small and medium-sized	10.08
0.11	municipalities	10,08
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	2,17
C12.I3	Regulatory support for waste	47,07
C1.I2	MOVES II (2020)	21,12
C1.I2	MOVES III	65,59
C2.I4	PREE (2020)	48,86
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	5,78
C7.I1	Renewable air-conditioning in households	16,29
C7.I1	Self-consumption installations	77,72
C7.I1	Thermal renewables	27,31
C8.I1	Large-scale and behind-the-counter storage	20,98

Total components MITECO 388,05

Figure 9-18. Catalunya PRTR funding. Source: MITECO. Year: June 2021.

Ceuta

		Ceuta
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Million
		euros
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	1
14	management.	Ŧ
C12.I3	Regulatory support for waste	1,76
C1.I2	MOVES II (2020)	0,18
C1.I2	MOVES III	0,71
C2.I4	PREE (2020)	0,41
C7.I1	Renewable air-conditioning in households	0,14
C7.I1	Self-consumption installations	0,5
C7.I1	Thermal renewables	0,15
C8.I1	Large-scale and behind-the-counter storage	0,1

Total components MITECO

Figure 9-19. Ceuta PRTR funding. Source: MITECO. Year: June 2021.

4,96



Comunidad Foral de Navarra

		Navarra
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Million
		euros
C4	Actions in Biosphere Reserves	0,86
C4.I2	Correction of electrical lines	1,31
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	0.62
14	management.	9,02
CE 11	Improving supply and reducing losses in small and medium-sized	2 1 5
C5.11	municipalities	3,15
C12.I3	Regulatory support for waste	5,22
C1.I2	MOVES II (2020)	2,22
C1.I2	MOVES III	5,57
C2.I4	PREE (2020)	22,13
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	1,71
C7.I1	Renewable air-conditioning in households	1,37
C7.I1	Self-consumption installations	8,36
C7.I1	Thermal renewables	3,14
C8.I1	Large-scale and behind-the-counter storage	2,5
	Total components MITECO	67,16

Figure 9-20. Comunidad de Navarra PRTR funding. Source: MITECO. Year: June 2021.

Comunidad de Madrid

Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-		Madrid
		Million
	2021	
C4	Actions in areas of socio-economic influence of National Parks	2,33
C4	Transfers to Autonomous Regions for direct actions in National Parks	3,28
C4	Actions in Biosphere Reserves	1,56
C4.I2	Correction of electrical lines	0,76
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	8.0
14	management.	8,9
	Improving supply and reducing losses in small and medium-sized	2.0
C5.I1	municipalities	2,9
C12.I3	Regulatory support for waste	46,17
C1.I2	MOVES II (2020)	21,65
C1.I2	MOVES III	57,15
C2.I4	PREE (2020)	40,97
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	1,05
C7.I1	Renewable air-conditioning in households	13,66
C7.I1	Self-consumption installations	62,01
C7.I1	Thermal renewables	22,81
C8.I1	Large-scale and behind-the-counter storage	15,63

Total components MITECO

300,82

Figure 9-21. Comunidad de Madrid PRTR funding. Source: MITECO. Year: June 2021.



Comunitat Valenciana

		Comunitat
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Valenciana
		Million euros
C4	Actions in Biosphere Reserves	0,99
C4.I2	Correction of electrical lines	2,32
C4.I2 + I3	Biodiversity conservation. Ecosystem restoration. Sustainable forest	25.52
+ 14	management.	25,55
C5.I1	Improving supply and reducing losses in small and medium-sized municipalities	7,02
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	3,57
C12.I3	Regulatory support for waste	44
C1.I2	MOVES II (2020)	14,6
C1.I2	MOVES III	42,63
C2.I4	PREE (2020)	32,96
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	3,18
C7.I1	Renewable air-conditioning in households	10,99
C7.I1	Self-consumption installations	45,29
C7.I1	Thermal renewables	13,91
C8.I1	Large-scale and behind-the-counter storage	11,03

Total components MITECO

258,01

Figure 9-22. Comunitat Valenciana PRTR funding. Source: MITECO. Year: June 2021.

Extremadura

Tarritorial distribution of Plan Posuporación, Transformación y Posilionsia (PTP) 2020-2021		Extremadura
Territorial		
C4	Actions in areas of socio-economic influence of National Parks	3,95
C4	Transfers to Autonomous Regions for direct actions in National Parks	5,63
C4	Actions in Biosphere Reserves	3,19
C4.I2	Correction of electrical lines	6,15
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	
14	management.	44,54
C5.I1	Improving supply and reducing losses in small and medium-sized municipalities	8,59
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	19,61
C12.I3	Regulatory support for waste	14,1
C1.I2	MOVES II (2020)	2,27
C1.I2	MOVES III	8,97
C2.I4	PREE (2020)	7,05
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	2,74
C7.I1	Renewable air-conditioning in households	2,35
C7.I1	Self-consumption installations	10,35
C7.I1	Thermal renewables	3,21
C8.I1	Large-scale and behind-the-counter storage	2,18

Total components MITECO	144,89

Figure 9-23. Extremadura PRTR funding. Source: MITECO. Year: June 2021.

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Energy Consultancy Royal Thai Embassy

Galicia

		Galicia
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Million
		euros
C4	Actions in areas of socio-economic influence of National Parks	1,66
C4	Transfers to Autonomous Regions for direct actions in National Parks	2,81
C4	Actions in Biosphere Reserves	6,44
C4.I2	Correction of electrical lines	0,98
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	22.2
14	management.	22,7
C5 I1	Improving supply and reducing losses in small and medium-sized	6.8
	municipalities	0,8
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	2,52
C12.I3	Regulatory support for waste	22,53
C1.I2	MOVES II (2020)	5,75
C1.I2	MOVES III	22,78
C2.I4	PREE (2020)	17,57
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	3,8
C7.I1	Renewable air-conditioning in households	5,86
C7.I1	Self-consumption installations	26,87
C7.I1	Thermal renewables	8,78
C8.I1	Large-scale and behind-the-counter storage	6,44

Total components MITECO 164,28

Figure 9-24. Galicia PRTR funding. Source: MITECO. Year: June 2021.



Illes Balears

Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Illes
		Balears
		Million
		euros
C4	Actions in areas of socio-economic influence of National Parks	3,89
C4	Transfers to Autonomous Regions for direct actions in National Parks	5,56
C4	Actions in Biosphere Reserves	0,76
C4.I2	Correction of electrical lines	0,86
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	4 10
14	management.	4,19
C5 I1	Improving supply and reducing losses in small and medium-sized	2.66
	municipalities	2,00
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	0,76
C12.I3	Regulatory support for waste	15,88
C1.I2	MOVES II (2020)	2,53
C1.I2	MOVES III	9,88
C2.I4	PREE (2020)	7,13
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	0,53
C7.I1	Renewable air-conditioning in households	2,38
C7.I1	Self-consumption installations	9,08
C7.I1	Thermal renewables	2,94
C8.I1	Large-scale and behind-the-counter storage	1,94

Total components MITECO

70,97

Figure 9-25. Illes Balears PRTR funding. Source: MITECO. Year: June 2021.



La Rioja

		La Rioja
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Million
		euros
C4	Actions in Biosphere Reserves	1,04
C4.I2	Correction of electrical lines	0,28
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	E 21
14	management.	5,51
	Improving supply and reducing losses in small and medium-sized	2 17
C5.I1	municipalities	2,17
C12.I3	Regulatory support for waste	4
C1.I2	MOVES II (2020)	0,67
C1.I2	MOVES III	2,7
C2.I4	PREE (2020)	2,16
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	0,87
C7.I1	Renewable air-conditioning in households	0,72
C7.I1	Self-consumption installations	4,04
C7.I1	Thermal renewables	1,45
C8.I1	Large-scale and behind-the-counter storage	1,07
		· · · · · · · · · · · · · · · · · · ·

Total components MITECO

26,45

Figure 9-26. La Rioja PRTR funding. Source: MITECO. Year: June 2021.

Melilla

		Melilla
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Million
		euros
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	
14	management.	1
C12.I3	Regulatory support for waste	1,89
C1.I2	MOVES II (2020)	0,18
C1.I2	MOVES III	0,73
C2.I4	PREE (2020)	0,41
C7.I1	Renewable air-conditioning in households	0,14
C7.I1	Self-consumption installations	0,47
C7.I1	Thermal renewables	0,14
C8.I1	Large-scale and behind-the-counter storage	0,09

Total components MITECO

5,04

Figure 9-27. Melilla PRTR funding. Source: MITECO. Year: June 2021.

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País Vasco

		Pais Vasco
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Million
		euros
C4	Actions in Biosphere Reserves	0,76
C4.I2	Correction of electrical lines	0,35
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	6 95
14	management.	0,85
	Improving supply and reducing losses in small and medium-sized	1 09
C5.I1	municipalities	4,08
C5.I1	Drainage and wastewater treatment plan for agglomerations <5Khab	0,79
C12.I3	Regulatory support for waste	13,53
C1.I2	MOVES II (2020)	4,64
C1.I2	MOVES III	18,72
C2.I4	PREE (2020)	59,25
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	1,61
C7.I1	Renewable air-conditioning in households	4,92
C7.I1	Self-consumption installations	24,99
C7.I1	Thermal renewables	8,94
C8.I1	Large-scale and behind-the-counter storage	7,26

Total components MITECO

156,69

Figure 9-28. País Vasco PRTR funding. Source: MITECO. Year: June 2021.

Principado de Asturias

		Asturias
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Million
		euros
C4	Actions in areas of socio-economic influence of National Parks	2,07
C4	Transfers to Autonomous Regions for direct actions in National Parks	2,88
C4	Actions in Biosphere Reserves	4,82
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	11 2
14	management.	11,5
	Improving supply and reducing losses in small and medium-sized	2 2 2
C5.I1	municipalities	2,32
C12.I3	Regulatory support for waste	10,17
C1.I2	MOVES II (2020)	2,18
C1.I2	MOVES III	8,59
C2.I4	PREE (2020)	47,6
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	0,84
C7.I1	Renewable air-conditioning in households	2,53
C7.I1	Self-consumption installations	9,69
C7.I1	Thermal renewables	2,77
C8.I1	Large-scale and behind-the-counter storage	2,31
C10.I1	Just Transition Investment	31,22

Total components MITECO

141,29

Figure 9-29. Principado de Asturias PRTR funding. Source: MITECO. Year: June 2021.



Región de Murcia

		Murcia
Territorial distribution of Plan Recuperación, Transformación y Resiliencia (PTR) 2020-2021		Million
		euros
C4.I2	Correction of electrical lines	1,94
C4.I2 + I3 +	Biodiversity conservation. Ecosystem restoration. Sustainable forest	
14	management.	8,73
	Improving supply and reducing losses in small and medium-sized	
C5.I1	municipalities	2,08
C12.I3	Regulatory support for waste	15,27
C1.I2	MOVES II (2020)	3,17
C1.I2	MOVES III	12,74
C2.I4	PREE (2020)	8,55
C2.I4	Regeneration and Demographic Challenge Programme (PREE 5.000)	0,16
C7.I1	Renewable air-conditioning in households	2,85
C7.I1	Self-consumption installations	13,45
C7.I1	Thermal renewables	4,48
C8.I1	Large-scale and behind-the-counter storage	3,25

Total components MITECO

Figure 9-30. Región de Murcia PRTR funding. Source: MITECO. Year: June 2021.

76,67