Technology Collaboration Programme
by iea

International Energy Agency
Photovoltaic Power Systems Programme

Task 1 Strategic PV Analysis and Outreach

PVPS

National Survey Report of PV Power Applications in SPAIN

2023

UNEF
Unión Española Fotovoltaica

What is IEA PVPS TCP?

The International Energy Agency (IEA), founded in 1974, is an autonomous body within the framework of the Organization for Economic Cooperation and Development (OECD). The Technology Collaboration Programme (TCP) was created with a belief that the future of energy security and sustainability starts with global collaboration. The programme is made up of 6.000 experts across government, academia, and industry dedicated to advancing common research and the application of specific energy technologies.

The IEA Photovoltaic Power Systems Programme (IEA PVPS) is one of the TCP's within the IEA and was established in 1993. The mission of the programme is to "enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems." In order to achieve this, the Programme's participants have undertaken a variety of joint research projects in PV power systems applications. The overall programme is headed by an Executive Committee, comprised of one delegate from each country or organisation member, which designates distinct 'Tasks,' that may be research projects or activity areas.

The 25 IEA PVPS participating countries are Australia, Austria, Belgium, Canada, China, Denmark, Finland, France, Germany, Israel, Italy, Japan, Korea, Malaysia, Morocco, the Netherlands, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, Thailand, Turkiye, and the United States of America. The European Commission, Solar Power Europe and the Solar Energy Research Institute of Singapore are also members.

Visit us at: www.iea-pvps.org

What is IEA PVPS Task 1?

The objective of Task 1 of the IEA Photovoltaic Power Systems Programme is to promote and facilitate the exchange and dissemination of information on the technical, economic, environmental and social aspects of PV power systems. Task 1 activities support the broader PVPS objectives: to contribute to cost reduction of PV power applications, to increase awareness of the potential and value of PV power systems, to foster the removal of both technical and non-technical barriers and to enhance technology co-operation. An important deliverable of Task 1 is the annual "Trends in photovoltaic applications" report. In parallel, National Survey Reports are produced annually by each Task 1 participant. This document is the country National Survey Report for the year 2023. Information from this document will be used as input to the annual Trends in photovoltaic applications report.

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COVER PICTURE

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1 INSTALLATION DATA

The PV power systems market is defined as the market of all nationally installed (terrestrial) PV applications with a PV capacity of 40 W or more. A PV system consists of modules, inverters, batteries and all installation and control components for modules, inverters and batteries. Other applications such as small mobile devices are not considered in this report.

For the purposes of this report, PV installations are included in the 2023 statistics if the PV modules were installed and connected to the grid between 1 January and 31 December 2023, although commissioning may have taken place at a later date.

1.1 Applications for Photovoltaics

Spanish PV is characterized by:

- **Dominance of Grid-Connected PV**: The importance of grid-connected PV in Spain is significantly greater than that of self-consumption PV. This is reflected in the higher installed capacity in 2023, the larger cumulative capacity, and its key role in Spain's strategic energy plans—standing out compared to other European countries. Spain is a high-PV-penetration country. At the end of 2023 the cumulated PV was 39.4 GW, of it 9.3 GW had been installed this year. This is a considerable size relative to the Spanish generation mix being the number 1 technology by installed power. The national energy plan recognizes this importance and projects utility-scale PV capacity to reach 57ac GW by 2030, which is three times the estimated rooftop capacity (19GWac).
- **High PV Penetration**: Spain is a leader in PV penetration. By the end of 2023, the cumulative PV capacity reached 39.4 GW, with 9.3GW installed in that year alone. PV is the leading technology by installed capacity in the Spanish energy mix, as acknowledged in the country's strategic plans.
- **Dominance of Industrial Sector in Self-Consumption:** Within the self-consumption segment, the industrial sector is the most significant. In 2023, 1.2 GW of industrial self-consumption PV was installed out of a total of 2GW installed for self-consumption overall.
- **Low penetration of emergent PV:** Currently emerging PV is underdeveloped: in Spain:
    a. Floating PV is limited, as installations are only allowed on privately owned waters.
    b. AgriPV is mostly limited to experimental projects or those linked to subsidies.
    c. BIPV adoption remains low due to high costs and lack of incentives.

1.2 Total photovoltaic power installed

- Centralized: any PV installation which only injects electricity and is not associated with a consumer (no self-consumption). This data was provided by the TSO. The PV data on the TSO's website combines centralized installations with large decentralized ones. Therefore, the accurate figure for centralized installations was shared directly and confidentially with UNEF by the TSO.

- Decentralized: any PV installation which is embedded into a customer's premises (self-consumption). UNEF collected this data through an extensive consultation with manufacturers, distributors, and the largest installers.
- Offgrid: UNEF collected this data through an extensive consultation with manufacturers, distributors, and the largest installers.
- Residential: < 10 kW
- Commercial: 10-50 kW
- Industrial: > 50 kW

Table 1: Annual PV power installed during calendar year 2023

	Installed PV capacity in 2023 [MW]	AC or DC
Decentralized	2019.6	DC
Centralized	7280	DC
Off-grid	27.6	DC
Total	9328	DC

Table 2: PV power installed during calendar year 2023

			Installed PV capacity [MW]	Installed PV capacity [MW]	AC or DC
Grid-connected	BAPV	Residential	2019.6	446.4	DC
		Commercial		349.2	DC
		Industrial		1224	DC
	BIPV	Residential	(optional)	(optional)	DC
		Commercial		(optional)	DC
		Industrial		(optional)	DC
	Utility-scale	Ground-mounted	7280	(optional)	DC
		Floating		(optional)	DC
		Agricultural		(optional)	DC
Off-grid		Residential	27.6	(optional)	DC
		Other		(optional)	DC
		Hybrid systems		(optional)	DC
Total			9328		DC

Table 3: Data collection process

If data are reported in AC, please mention a conversion coefficient to estimate DC installations.	120%, based on experts' opinions
Is the collection process done by an official body or a private company/Association?	The SelfConsumption data is collected by a private association. The utility scale data is collected by the TSO
Link to official statistics (if this exists)	https://www.ree.es/es/datos/generacion/potencia-instalada
	The TSO data includes a small percentage of self-consumption. The number we are providing represents the actual grid-connected capacity, as shared confidentially with UNEF by the TSO.

Table 4: The cumulative installed PV power in 4 sub-markets

Year	Off-grid [MW] (including large hybrids)	Grid-connected distributed [MW] (BAPV, BIPV)	Grid-connected centralized [MW] (Ground, floating, agricultural…)	Total [MW]
2010				4.595
2011				5.080
2012				5.439
2013				5.566
2014		26	5.614	5.641
2015		85	5.627	5.712
2016		151	5.633	5.784
2017		298	5.636	5.964
2018		581	5.733	6.314
2019	55,1	1.132	10.505	11.636
2020	7,2	1.847	14.006	15.853
2021	14,4	3.290	18.224	21.515
2022	30,1	6.299	23.837	30.136
2023	86	8.346	31.117	39.463

Note: Table 4 contains DC data

Table 5: Other PV market information

	2022
Number of PV systems in operation in your country	In 2023, an estimated 542.130 residential self-consumption installations (<10 kW) were put into operation. It is important to note that this figure represents an estimation.
Decommissioned PV systems during the year [MW]	
Repowered PV systems during the year [MW]	

Table 6: PV power and the broader national energy market

	Data	Year
Total power generation capacities [GW]	134,9 (AC data)	2023
Total renewable power generation capacities (including hydropower) [GW]	86,8 (AC data includes Pumped-storage hydroelectricity and PV self-consumption)	2023
Total electricity demand [TWh]	254,1	2023
New power generation capacities installed [GW]	8,5 (AC data includes Pumped-storage hydroelectricity and PV self-consumption)	2023
New renewable power generation capacities (including hydropower) [GW]	8,5 (AC data includes Pumped-storage hydroelectricity and PV self-consumption)	2023
Estimated total PV electricity production (including self-consumed PV electricity) in [TWh]	46,6	2023
Total PV electricity production as a % of total electricity consumption	18,34%	2023
Average yield of PV installations (in kWh/kWp)	1350 (utility scale plants)	2023

1.3 Key enablers of PV development

Table 7: Information on key enablers.

	Description	Annual Volume	Total Volume	Source
Decentralized storage systems In [MW, MWh or #]	Most configurations are between 1 MWh/MW and 3 MWh/MW	495 MWh	1823 MWh	UNEF
Residential Heat Pumps [#]				
Electric cars [#]	Only PEV not PHEV	56.862	150.307	DGT
Electric buses and trucks [#]		867	1667	DGT
Other (up to you)				

2 COMPETITIVENESS OF PV ELECTRICITY

2.1 Module prices

Table 8: Typical module prices

Year	Lowest price of a standard module crystalline silicon	Highest price of a standard module crystalline silicon	Typical price of a standard module crystalline silicon
2023	0,18 average price	0,23 average price	0,19-0,22 range of all known prices

2.2 System prices

Table 9: Turnkey PV system prices of different typical PV systems

Category/Size	Typical applications and brief details	Current prices [€/W]
Residential BAPV 5-10 kW	Grid-connected, roof-mounted, distributed PV systems installed to produce electricity to grid-connected households. Typically roof-mounted systems on villas and single-family homes.	1,4 average price
Small commercial BAPV 10-100 kW	Grid-connected, roof-mounted, distributed PV systems installed to produce electricity to grid-connected commercial buildings, such as public buildings, multi-family houses, agriculture barns, grocery stores etc.	1,02 average price

Large commercial BAPV 100-250 kW	Grid-connected, roof-mounted, distributed PV systems installed to produce electricity to grid-connected large commercial buildings, such as public buildings, multi-family houses, agriculture barns, grocery stores etc.	0,8 average price
Industrial BAPV >250 kW	Grid-connected, roof-mounted, distributed PV systems installed to produce electricity to grid-connected industrial buildings, warehouses, etc.	0,73 average price
Small centralized PV 1-20 MW	Grid-connected, ground-mounted, centralized PV systems that work as central power station. The electricity generated in this type of facility is not tied to a specific customer and the purpose is to produce electricity for sale.	0,89-0,90 range of all known prices
Large centralized PV >20 MW	Grid-connected, ground-mounted, centralized PV systems that work as central power station. The electricity generated in this type of facility is not tied to a specific customer and the purpose is to produce electricity for sale.	0,70-0,71 range of all known prices

Table 10: National trends in system prices for different applications

Year	Residential BAPV Grid-connected, roof-mounted, distributed PV system 5-10 kW **[€/W]**	Small commercial BAPV Grid-connected, roof-mounted, distributed PV systems 10-100 kW **[€//W]**	Large commercial BAPV Grid-connected, roof-mounted, distributed PV systems 100-250 kW **[€/W]**	Centralized PV Grid-connected, ground-mounted, centralized PV systems 10-50 MW **[€/W]**
2023	1,4 average price	1,02 average price	0,8 average price	0.59-0.90 range of all known prices

2.3 Cost breakdown of PV installations

The cost breakdown of a typical 5-10 kW roof-mounted, grid-connect, distributed PV system on a residential single-family house and a typical >10 MW Grid-connected, ground-mounted, centralized PV systems at the end of 2023 is presented in Table 11 and Table 12, respectively.

The cost structure presented is from the customer's point of view. I.e. it does not reflect the installer companies' overall costs and revenues. The “average” category in Table 11 and Table 12 represents the average cost for each cost category and is the average of the typical cost structure. The average cost is taking the whole system into account and summarizes the average end price to customer. The “low” and “high” categories are the lowest and highest cost that has been reported within each segment. These costs are individual posts, i.e. summarizing these costs do not give an accurate system price.

Table 11: Cost breakdown for a grid-connected roof-mounted, distributed residential PV system of 5-10 kW

Table 11 presents data from two surveys conducted six months apart among a representative sample of installers.

Inverter data includes transformer cost

Cost category	Average [€/W]	Low [€/W]	High [€/W]
Hardware			
Module	0,2	0,15	0,22
Inverter	0,043	0,04	0,045
Mounting material	0,1	0,08	0,116
Other electronics (cables, etc.)	0,29	0,264	0,32
Subtotal Hardware	**0,633**		
Soft costs			
Planning	There is no granular data, total planing+instalation cost= 0,04	There is no granular data, total planing+instalation cost= 0,03	There is no granular data, total planing+instalation cost= 0,05
Installation work	There is no granular data, total planing+instalation cost= 0,04	There is no granular data, total planing+instalation cost= 0,03	There is no granular data, total planing+instalation cost= 0,05
Shipping and travel expenses to customer	Included in the hardware costs		
Permits and commissioning (i.e. cost for electrician, etc.)	0,05	0.03	0.06
Project margin	Internalized in other costs		
Subtotal Soft costs	**0,09**		
Total (excluding VAT)	**0,72**		
Average VAT			
Total (including VAT)			

Table 12: Cost breakdown for a grid-connected, ground-mounted, centralized PV systems of >10 MW

Table 12 presents data from two surveys conducted four months apart among a representative sample of installers.

Inverter data includes transformer cost

Cost category	Average [€/W]	Low [€/W]	High [€/W]
Hardware			
Module	0,223	0,215	0,23
Inverter	0,043	0,04	0.045
Mounting material	0,12	0,115	0,125
Other electronics (cables, etc.)	0,37	0,35	0,391
Subtotal Hardware			
Soft costs			
Planning	There is no granular data, total planing+installation work cost= 0,05	There is no granular data, total planing+installation work cost= 0,03	There is no granular data, total planing+installation work cost= 0,07
Installation work	There is no granular data, total planing+installation work cost= 0,05	There is no granular data, total planing+installation work cost= 0,03	There is no granular data, total planing+installation work cost= 0,07
Shipping and travel expenses to customer	Included in the hardware costs		
Permits and commissioning (i.e. cost for electrician, etc.)	0,058	0,055	0,06
Project margin	Internalized in other costs		
Subtotal Soft costs	**0.108**		
Total (excluding VAT)	**0,885**		
Average VAT			
Total (including VAT)			

2.4 Financial Parameters and specific financing programs

Table 13 indicates the average cost of capital for a PV system in Spain..

Table 13: PV financing information in 2023

Different market segments	Loan rate [%]
Average rate of loans – residential installations	7% -8%
Average rate of loans – commercial installations	4.5% - 6%
Average cost of capital – industrial and ground-mounted installations	3% - 5%

2.5 Specific investments programs

In Spain, utilities, independent retailers, and large-scale self-consumption installers have developed acquisition or leasing programs aimed at facilitating rooftop PV installations. Under these programs, the company bears the initial investment costs and manages the construction of the PV system (or subcontracts it to a third party). The customer repays the investment through a monthly fee. Once the full repayment is completed, ownership of the installation transfers to the customer. Until that point, the installer or the entity financing the project retains legal ownership.

There are several types of financial support to promote photovoltaic self-consumption in Spain, including national and regional subsidies, tax deductions, and specific programs for energy communities. The main types of support include:

1. National Grants from IDAE: The Institute for Diversification and Saving of Energy (IDAE) administers national-level programs, including grants for innovative renewable energy projects. These programs target both individual and collective self-consumption initiatives and often include provisions for energy storage systems. One of the key features is the focus on projects that integrate vulnerable consumers, ensuring broader access to renewable energy benefits. The IDAE offers comprehensive financial coverage, which can include design and construction costs, engineering fees, interim financing, and VAT. Additionally, the grants support innovative models such as collective self-consumption projects with shared storage, enhancing energy resilience and efficiency at a community level.

2. Tax Deductions on Personal Income Tax (IRPF): Spain offers significant tax deductions for individuals who invest in self-consumption photovoltaic systems. These deductions apply to the costs associated with installing solar panels, as well as complementary energy efficiency measures like heat pumps and electric radiators. The tax benefits vary by autonomous community, with some regions offering higher deduction rates or additional incentives. For example, improvements aimed at reducing the heating and cooling demand of a property or increasing its energy rating may qualify for deductions of up to 60%. These deductions help reduce the overall tax burden for homeowners and incentivize investments in sustainable energy solutions.

3. Regional Subsidies: Each autonomous community in Spain has its own set of subsidies and grant programs tailored to the local context. These regional programs support a variety of projects, including residential solar installations, business-oriented energy efficiency improvements, and public sector initiatives. Some regions offer specific

incentives for the integration of energy storage solutions, which enhance the capacity and reliability of photovoltaic systems. Examples include grants for infrastructure development in Galicia, support for renewable energy investments in the Basque Country, and efficiency improvements in tourist accommodations in the Canary Islands. These regional subsidies often complement national grants, providing additional financial support and making it easier for consumers and businesses to invest in renewable energy.

4. Next Generation EU Grant Extensions: Spain has extended several funding programs under the Next Generation EU recovery plan, which aims to accelerate the green transition. These extensions include financial support for the installation of renewable energy systems, particularly in public buildings, small and medium-sized enterprises (SMEs), and residential communities. The programs focus on boosting the adoption of self-consumption technologies, such as solar panels and energy storage, while also promoting broader energy efficiency measures. The extended timelines and expanded eligibility criteria under these grants allow more stakeholders to access funding, thereby increasing the overall impact of the renewable energy transition across the country.

2.6 Merchant PV / PPA / CPPA

All large-scale solar capacity commissioned in 2023 was developed entirely without public subsidies. The expansion of PV capacity has predominantly been driven by Power Purchase Agreements (PPAs), renewable energy auctions, and merchant projects. In the current market environment, the stability provided by PPAs has become more crucial than ever.

For the fifth consecutive year, Spain maintained its position as the most active renewable PPA market in Europe in 2023, both in terms of contracted volume and the number of agreements signed. According to industry reports, Spain secured over 4.67 GW of renewable energy through PPAs in 2023, with photovoltaic projects capturing the largest market share. Regarding prices, solar Power Purchase Agreement (PPA) prices have demonstrated a downward trend in recent years. In the first quarter of 2024, the average PPA price for solar energy was €38.50 per megawatt-hour (MWh), positioning Spain as the most cost-effective market for solar PPAs in Europe.

Wholesale electricity prices saw a significant surge throughout 2023. According to data from OMIE (the Spanish electricity market operator), the average daily wholesale market price in 2023 reached €87.5/MWh, with peak prices climbing to €220/MWh and occasional drops to 0€. In 2024, average prices decreased to €53.91/MWh. Notably, the market experienced a minimum price of -€2/MWh in June and a peak of €181.26/MWh in February.

2.7 Additional Country information

(Cost of power not cost of energy)

Table 14: Country information

Retail electricity prices for a household [€/W]	0,0279

Retail electricity prices for a commercial company [€/W]	0,0401
Retail electricity prices for an industrial company [€/W]	-
Liberalization of the electricity sector	The electricity sector was liberalized in 1997. Retail was separated from distribution network ownership in 2009.

3 POLICY FRAMEWORK

This chapter describes the support policies aiming directly or indirectly to drive the development of PV. Direct support policies have a direct influence on PV development by incentivizing or simplifying or defining adequate policies. Indirect support policies change the regulatory environment in a way that can push PV development.

Table 15: Summary of PV support measures

Category	Residential			Commercial + Industrial			Centralized		
Measures in 2023	**Legacy**	**On-going**	**New**	**Legacy**	**On-going**	**New**	**Legacy**	**On-going**	**New**
Feed-in tariffs	No	No	-	No	No	-	No	-	-
Feed-in premium (above market price)	No	No	-	No	No	-	Yes, but only 6 GW of PV power are under this scheme	-	-
Capital subsidies	Yes, but capital subsidies ended in december 2023 in most regions.	Yes, capital subsidies ended in december 2023 in most regions.	No	Yes, but capital subsidies ended in december 2023 in most regions.	Yes, capital subsidies ended in december 2023 in most regions.	-	No	-	-
Green certificates	No	No	No						
Renewable portfolio standards with/without PV requirements	No	No	No	No	No	No	No	-	-
Income tax credits		-	-		-	-	No	-	-

Self-consumption		Yes	Yes		Yes			Yes	-
Net-metering	No	-	-	No	-	-	No	-	-
Net-billing	Yes	Yes	-	Yes	Yes	-	Yes	Yes	-
Collective self-consumption and delocalized net-metering		Yes	Yes		Yes	Yes			
Sustainable building requirements	Yes	Yes	-	Yes	Yes	-	No	-	-
BIPV incentives	No	-	-	No	-	-	No	-	-
Merchant PV facilitating measures	No	-	-	No	-	-	No	-	-
Other (specify)	Energy saving certificates	Energy saving certificates	-	Energy saving certificates	Energy saving certificates	-	No	-	-

3.1 National targets for PV

The targets for photovoltaic (PV) energy in Spain are outlined in the "Integrated National Energy and Climate Plan" (PNIEC). The 2023 update of the PNIEC, published in September 2024, sets the following targets for 2025 and 2030:

- Total PV target for 2025: 46,5 GWn
- Total PV target for 2030: 76,3 GWn
- Self-consumption PV target for 2030: 19 GWn
- Centralized PV target for 2030: 57,3 GWn

3.2 Direct support policies for PV installations

A limited **feed-in premium scheme** remained in place for some legacy projects, particularly for centralized solar installations. Approximately 6 GW of PV capacity were still benefiting from this premium scheme.

3.2.1 Mandatory solar

In Spain, while there is no nationwide mandate requiring the installation of photovoltaic (PV) systems on residential buildings or car parks, certain regional and municipal regulations have been implemented to promote solar energy integration. This is the case of Balearic Island, whereas the Balearic Islands´ Renewable Energy Law (2019) have enacted legislation requiring new large car parks to install solar panels, aiming to enhance renewable energy adoption and reduce carbon emissions.

The European Union's Directive (EU) 2024/1275 mandates the installation of photovoltaic (PV) systems on new buildings as part of its strategy to enhance renewable energy adoption and improve energy efficiency. The directive requires that all new public and non-residential buildings with a useful floor area of over 250 m² must include solar installations by December 31, 2026. By 2030, this obligation will extend to all new residential buildings, contingent upon economic and technical feasibility.

In Spain, the transposition of this directive into national law is underway, requiring updates to existing building codes and regulations. This initiative aims to accelerate the integration of solar PV in public, commercial, and residential construction projects, aligning with Spain's broader targets for renewable energy expansion and supporting the country's transition to a sustainable energy system.

3.2.2 BIPV development measures

The are no specific support policies in Spain for BIPV

3.2.3 Merchant PV development measures

In Spain, the development of merchant photovoltaic (PV) projects—those not relying on traditional subsidies or long-term **Power Purchase Agreements** (PPAs)—has been primarily driven by the country's **marginal pricing system**. This market mechanism, where the most expensive technology sets the reference price in the wholesale market, has made PV projects highly attractive due to their low production costs, allowing them to benefit from elevated market prices.

Merchant PV projects have benefited from fiscal incentives such as **accelerated depreciation** and reduced taxes under updated regulatory frameworks (by updating RD-L 23/2020). Additionally, guarantee funds, supported by initiatives like InvestEU, provide financial backing to de-risk investments in merchant projects, encouraging greater private sector participation.

3.3 Self-consumption measures

Table 16: Summary of self-consumption regulations for small private PV systems in 2023

PV self-consumption	1	Right to self-consume	Self-consumption is fully recognized under Spanish regulations, including both individual and collective frameworks.
	2	Revenues from self-consumed PV	Self-consumed electricity allows users to save on their electricity bills by avoiding retail electricity prices, which are typically higher than the cost of self-generation. There is no direct remuneration for self-consumed energy as it is considered savings.
	3	Charges to finance Transmission, Distribution grids & Renewable Levies	Charges for grid access (peajes) and other system costs apply. However, self-consumed electricity is generally exempt from these charges for on-site consumption.

Excess PV electricity	4	Revenues from excess PV electricity injected into the grid	Revenues are based on compensation schemes, typically linked to market prices or bilateral agreements with retailers. The simplified compensation mechanism (compensación simplificada) allows small prosumers to receive direct bill credits for excess energy
	5	Maximum timeframe for compensation of fluxes	The timeframe for compensation is monthly, aligning with standard billing periods for electricity
	6	Geographical compensation (virtual self-consumption or metering)	Virtual self-consumption and collective metering are permitted under certain conditions, allowing energy sharing across multiple properties within the same local grid area
Other characteristics	7	Regulatory scheme duration	Not limited by regulation
	8	Third party ownership accepted	Yes, third-party ownership models, including leasing and PPA arrangements, are allowed and increasingly common, especially in the commercial sector.
	9	Grid codes and/or additional taxes/fees impacting the revenues of the prosumer	Specific grid codes apply to ensure system stability, and additional taxes (such as the Special Electricity Tax) may impact the profitability of prosumers. Recent reforms have sought to reduce fiscal burdens on self-consumption projects
	10	Regulations on enablers of self-consumption (storage, DSM…)	Regulations now explicitly support battery storage and demand-side management (DSM) systems, with incentives available for installations that include energy storage solutions
	11	PV system size limitations	The maximum allowed capacity for self-consumption installations is typically up to 100 kW for simplified compensation, with larger systems requiring additional regulatory approvals.
	12	Electricity system limitations	Network access permits are mandatory for rooftop PV installations exceeding 15 kW if they export surplus electricity to the grid.
	13	Additional features	

3.3.1 Description of support measures

The primary support mechanisms for self-consumption PV installations in Spain during 2023 were regional capital subsidies (phased out by year-end) and income tax credits. New initiatives focused more on encouraging self-consumption and prosumer participation rather than reintroducing discontinued schemes like feed-in tariffs.

Capital subsidies *for PV installations were available in the residential and commercial sectors throughout most of 2023. However, these subsidies were phased out by December 2023 in*

most regions. The subsidies covered both the installation of PV systems and, in some cases, included support for battery storage solutions.

Various regional programs provided **income tax credits** for investments in PV systems, particularly for residential projects. Notable regions with active tax credit schemes in 2023 included Murcia, Valencia, and Navarra. These credits were aimed at incentivizing private investments in renewable energy.

Several **pilot projects** and demonstration programs were active in 2023, focusing on innovative applications of PV technologies, such as collective self-consumption and delocalized net-metering. These programs were supported by the IDAE and other regional bodies, with continued funding into 2024.

3.3.2 Support measures for self-consumption

Spain has implemented various support measures to encourage the adoption of self-consumption solar PV systems:

- Capital Subsidies: The Spanish government, through programs like the Next Generation EU funds, has provided subsidies to offset the initial costs of installing solar self-consumption. These subsidies have been available for residential, commercial, and industrial sectors, though many concluded by December 2023.
- Tax Incentives: Homeowners and businesses investing in solar installations can benefit from deductions in the Personal Income Tax (IRPF). These deductions vary by region and are designed to make solar investments more financially attractive.
- Net Billing and Self-Consumption Frameworks: Spain has established favorable regulations for self-consumption, allowing surplus energy generated by solar PV systems to be fed back into the grid, with owners receiving compensation. This framework promotes the economic viability of solar installations.

3.4 Collective self-consumption, community solar and similar measures

3.4.1 National Aid for Energy Communities

The Institute for the Diversification and Saving of Energy (IDAE) has announced the new call for proposals on its website under the national "CE Implementa" program, an incentive scheme aimed at supporting unique pilot projects for energy communities. The first call was launched in 2022, and the Fifth and Sixth Calls are currently open for applications.

In 2024, this programme open two new calls: The fifth call target small projects with an investment up to 1.000.000€; The sixth call aimed to bigger projects, with investments over 1.000.000€.

3.4.2 Regional Aid for Energy Communities

In 2024, five autonomous communities introduced subsidy programs and aid schemes to support energy communities and collective self-consumption projects:

- Canary Islands: Grants to support the creation and operation of energy communities, application period ran from September to November 2024 (now closed);
- Navarre: financial aid for energy communities focused on the energy transition, with applications open from May to June 2024;
- Catalonia: SOLARCOOP program provided aid for cooperatives and citizen associations to develop energy community models, available from May to June 2024
- Galicia: Grants for energy planning for local entities and energy communities (IN418E), application period was from January to May 2024.
- Valencian Community: Support for renewable energy communities and collective self-consumption installations, applications accepted from May to June 2024.

3.5 Tenders, auctions & similar schemes

3.5.1 Renewable Energy Economic Regime (REER auctions)

In 2020 the Renewable Energy Economic Regime (REER) was introduced in the Spanish market. This regime is an auction-based scheme based on the recognition of a long-term price for the energy generated.

In January 2021, the first auction was held, offering 3.000 MWac in a mixed scheme between technology-neutral and specific auctions with a quota of 1.000 MW for photovoltaic, another 1.000 MW for wind power and 1.000 MW technologically neutral. In this auction, 2.034 MW were allocated to photovoltaic, at an average price of 24.5 €/MWh. Projects were to be developed and operative by 2023.

In October 2021 the second REER auction offered 3.300 MWac of new capacity. This auction defined quotas of 700MW for PV, 600 MW for “accelerated availability” (photovoltaic and wind) and 300 MW for local distributed photovoltaic. In addition to these quotas, 200 MW were allocated on a technology-neutral basis and without conditions. In this second auction, 838 MW was allocated to the PV quota, 22 MW to PV from the “accelerated availability” quota, and 6 MW to local distributed PV. The average price for solar PV was 31.6 €/MWh.

In October 2022, the third auction was held, offering 500 MWac, of which 140MW were allocated to local distributed PV. Out of a total of 140MW, only 31 MW were awarded to 6 companies. The average price awarded in PV was 53.87 €/MWh, significantly higher than that of the two previous auctions, due to the evolution and prospects of electricity market prices and electricity futures prices.

Finally, in November 2022, the fourth REER auction offered 1.500MWac for wind power and 1.800 MW for solar PV. With a reserve price of around €45.12/MWh, the photovoltaic quota ended empty. This may hap happened due to the high reserve price set by the government (45,12 EUR/MWh), was well below the sector's expectations (60 EUR/MWh), added to elevated merchant prices and high inflation rates.

No new tenders were conducted in 2023.

3.6 Other utility-scale measures including, floating and agricultural PV

3.6.1 Innovative Renewable Energy Program

In 2024, the Institute for the Diversification and Saving of Energy (IDAE) has launched the Innovative Renewable Energy Program, providing financial aid for projects focused on

renewable energy innovation, energy storage, and the implementation of renewable thermal systems. This initiative is part of the Recovery, Transformation, and Resilience Plan, funded by the European Union's NextGenerationEU funds

The objective of the Innovative Renewable Energy Program is to drive forward the decarbonization and energy transition in Spain by promoting innovation in renewable energy technologies and storage solutions, as well as supporting the implementation of renewable thermal systems. The program aims to enhance energy efficiency, foster sustainable practices, and integrate advanced renewable technologies, contributing to the broader goals of the European Union's Recovery, Transformation, and Resilience Plan.

The program provides funding for the following eligible actions:

- Innovative projects for collective self-consumption with integrated energy storage, including initiatives that involve vulnerable consumers.
- Installations of renewable heat pumps aimed at increasing energy efficiency in heating and cooling systems.
- Agrovoltaic systems incorporating energy storage solutions, combining agricultural use with solar energy production.
- Floating photovoltaic systems installed in artificial water bodies, paired with storage capabilities to enhance energy generation and grid stability.
- Integration of renewable energy and storage technologies within existing infrastructure, focusing on maximizing the use of clean energy sources.

3.7 Social Policies

In Spain, several measures have been implemented in 2023 and 2024 to combat energy poverty and provide support to vulnerable consumers

3.7.1 Social Electricity Bonus

Launched in 2017, this program offers discounts on electricity bills for vulnerable consumers:

- Vulnerable consumers: 65% discount.
- Severely vulnerable consumers: 80% discount.
- Low-income working households: 40% discount.

These categories and discounts have been extended until June 30, 2024.

3.7.2 Thermal Social Bonus

Introduced in 2018, this bonus is aimed at covering heating, hot water, and cooking expenses. It is granted annually to recipients of the Social Electricity Bonus.

3.7.3 Ban on Supply Disconnections

Implemented as an emergency measure during the COVID-19 pandemic in 2020, the ban on cutting off electricity (also natural gas, and water supplies) for vulnerable consumers, severely vulnerable consumers, or those at risk of social exclusion has been extended several times, with the current extension lasting until December 31, 2024.

3.7.4 Regional Aid Programs

Several autonomous communities have launched specific programs to tackle energy poverty:

- Catalonia: Since 2021, Catalonia has offered direct subsidies for energy efficiency improvements and solar photovoltaic (PV) installations in low-income households. The "SOLARCOOP" initiative, launched in 2022, supports cooperatives in developing

community solar projects, promoting collective self-consumption for vulnerable consumers. These programs are ongoing.

- Andalusia: The "Plan de Pobreza Energética" was introduced in 2022, providing financial aid for upgrading electric heating systems and installing solar panels. Educational programs were also initiated to raise awareness about efficient electricity use. These initiatives are currently active.
- Galicia: The "IN418E" grant program began in 2021, aiding local entities and energy communities in implementing renewable electricity projects, including collective PV systems. The program is designed to reduce electricity costs for public buildings and rural households and is still in operation.
- Valencian Community: In 2022, the Valencian Community launched a program supporting renewable energy communities with grants covering up to 50% of installation costs for shared PV systems in residential buildings. The aim is to lower electricity expenses for low-income families through collective self-consumption. This program remains active.
- Basque Country: The Basque Country has provided subsidies for renewable electricity installations and energy-efficient home upgrades for vulnerable households since 2021. In 2023, the program expanded to include support for energy storage systems, enhancing resilience against electricity price fluctuations. These initiatives are ongoing.

3.8 Retroactive measures applied to PV

In 2024, new taxes on photovoltaic (PV) energy have been introduced, affecting both ongoing projects and projects under development.

- **Aragón**: In May 2024, a new law was approved in Aragón establishing environmental taxes on wind farms and photovoltaic (PV) parks, as well as amending the existing environmental tax on high-voltage electricity transmission facilities. This is a new, extraordinary, and specific tax that environmentally taxes PV installations, despite lacking a clear justification. Additionally, by taxing the total surface area of photovoltaic plants instead of the area covered by the panels, the law penalizes projects that include environmental measures such as ecological corridors, which contradicts the goals of sustainability and the energy transition.

- **Basque Country:** The Basque Country has enacted the Energy Transition and Climate Change Law, which imposes a retroactive tax on renewable energy projects with a capacity of 5 MW or more. The law mandates an annual fee for renewable installations, including wind farms and photovoltaic (PV) solar parks. This fee is based on the assessment of visual and environmental impacts on the natural surroundings.

- **La Rioja**: La Rioja introduced a tax on photovoltaic (PV) energy by 2025, alongside a moratorium on new authorizations for electric power installations. This measure affects projects currently under review and is expected to cause a slowdown in the sector by discouraging future investments.

- **Canary Islands:** A new law has been enacted requiring mandatory local participation for new renewable energy projects. This legislation mandates that developers must

demonstrate at least 20% local ownership (by residents or businesses in the municipality where the plant will be located) for new renewable generation projects exceeding 2 MW. If the 20% local participation target is not met by residents or businesses within the municipality, the opportunity must be extended to the entire island's inhabitants or companies.

3.9 Indirect policy issues

3.9.1 Rural electrification measures

There are not any rural electrification measure currently going on in Spain.

3.9.2 Support for electricity storage and demand response measures

In 2023, Spain has implemented several subventions and support measures to develop storage:

Grants for Innovative Energy Storage Projects:

Storage Hybridized with Renewable Energy:

In December 2022, the Institute for Energy Diversification and Saving (IDAE) launched the first call for grants for innovative energy storage projects hybridized with renewable energy generation facilities. This call, part of the Recovery, Transformation, and Resilience Plan, aims to promote projects that integrate storage with renewable generation to enhance system management and stability.

Independent Electric Storage and Thermal Storage:

In July 2023, Order TED/807/2023 was approved, establishing the regulatory framework for granting aid to innovative projects for independent energy storage and thermal storage. This initiative, also part of the Recovery, Transformation, and Resilience Plan, seeks to promote storage technologies that operate autonomously or in thermal applications, contributing to the flexibility and efficiency of the energy system.

National Integrated Energy and Climate Plan (NECP) 2023–2030:

In September 2024, the Spanish government approved the updated PNIEC, which sets ambitious targets for renewable energy integration and energy storage development. The plan includes the installation of 22.5 GW of storage capacity by 2030, covering batteries and pumped storage systems, to ensure grid stability and security of supply.

Energy Storage Strategy:

The Ministry for the Ecological Transition and the Demographic Challenge has developed an Energy Storage Strategy identifying challenges and opportunities in this sector. The strategy outlines measures to ensure the effective deployment of storage, assesses system needs, and sets targets to support the decarbonization of the energy system.

3.9.3 Support for encouraging social acceptance of PV systems

There are not any policy encouraging social acceptance of PV systems.

3.9.4 Other support measures

The European Commission (EC) has presented 2 measures that will have an impact on the photovoltaic industry in Spain: The Net-Zero Industry Act (as a response to the US Inflation Reduction Act) and the REPower EU (as a response to the energy dependence).

The Net-Zero Industry Act proposal aims to boost the production capacity of renewable energy technologies in Europe. This proposal seeks to facilitate financial, administrative and regulatory support for the rapid deployment of clean technologies in Europe. The proposal sets targets for different technology sectors, including a 40% scaling-up effort in solar photovoltaics. In addition, it creates the figure of zero balance resilience projects, aimed at achieving the targets set and improving the technological and industrial resilience of the supply chain. The proposal also includes measures to accelerate the project pipeline, establishes CO2 injection capacity targets and offers regulatory, financial, market access and skilled labour support.

Also, the EC launched the REPowerEU Plan to curb price volatility and the dependence on Russian fossil fuels. The plan proposes measures on energy savings, supply diversification and increasing renewable energy by 2030. Solar PV is presented as a key tool to meet the targets set by the REPower EU Plan, increasing technology deployment rates by 20%.

This roadmap aims to accelerate the deployment of renewable energies, surpassing the target previously set by the "Fit for 55" package by increasing the share of renewable energy sources in the EU energy mix from 40% to 45%. The Plan creates specific programs designed to boost the development of the photovoltaic industry, including:

- The EU Solar Energy Strategy, proposing to double solar PV capacity by 2030.
- The rooftop solar initiative where a legal obligation is imposed to install solar panels on new public, commercial and residential buildings.
- A recommendation to simplify and shorten permitting processes, as well as an amendment to the Renewable Energy Sources Directive to recognize renewable energy sources as being in the public interest.

In the context of implementing the REPower Plan, the EU Solar Strategy identifies the barriers and challenges to the development of solar energy and seeks to increase photovoltaic capacity by 43%. The Solar Strategy sets a target of installing 400 GWdc (320 GWac) by 2025, reaching 750 GWdc (600 GWac).

In order to achieve part of the objectives of the Solar Strategy Communication, the European Commission (EC) proposed the European Solar Roof Initiative. This initiative aims to increase renewable energy shares and streamline procedures for rooftop solar installations. It also makes it mandatory to install solar systems on all new public and commercial buildings larger than 250 m², starting in 2026. This obligation would be extended in 2027 to all buildings with more than 250 m², and in 2029 to all new residential buildings.

In line with the EC Solar Strategy Communication, the European Parliament approved in March 2023 a proposal to reform the Energy Performance of Buildings Directive, which includes a proposal on solar roofs. Specifically, the solar rooftop amendment tabled by the European Parliament sets a target of generating 19 TWh of rooftop solar power in the first year, equivalent to an increase in capacity from 16 to 19 GW. By 2025, the aim is to reach a rooftop solar power generation of 58 TWh, i.e. a capacity of 50.7 to 58 GW.

3.10 Financing and cost of support measures

Specific remuneration regime is financed through charges in the electricity tariff, only a few MW remain under this remuneration regime (RECORE).

Grant subsidies are partially financed thanks to the European Regional Development Fund of the EU. Local taxes exemptions are financed by the municipalities.

3.11 Grid integration policies

3.11.1 Grid connection policies

In Spain, Royal Decree 1183/2020, dated December 29, governs access to and connection with electricity transmission and distribution networks. According to this decree:

Developers of generation projects are responsible for financing the specific infrastructure required to connect their installations to the grid, including such as evacuation lines and conection to substations.

The development, maintenance, and operation of the overall electricity grid are funded by end consumers through regulated access tariffs (tolls) and system charges, as established in Law 24/2013.

The price for the use of distribution networks is determined by the network access toll, which is approved by the Government. In order to be able to request access to the distribution networks, a connection point must first be available under the technical conditions established by regulation.

3.11.2 Grid access policies

The right of third party access to the transmission and distribution networks is one of the guiding principles of the liberalization of the Spanish electricity market.

Access to the transport grid is granted by the TSO to all subjects that are considered as suppliers: producers, system operator, market operator, distributors, energy traders, consumers and system load managers. The TSO can only denny access if the grid doesn´t have enough capacity.

The price for the use of transmission networks is determined by a toll annually approved by the Government.

4 INDUSTRY

4.1 Production of feedstocks, ingots and wafers (crystalline silicon industry)

Table 17: Silicon feedstock, ingot and wafer producer's production information for 2023

Manufacturers (or total national production)	Process & technology	Total Production	Product destination	Price
-	Silicon feedstock [Tonnes]	0		
-	sc-Si ingots. [Tonnes]	0		
-	mc-Si ingots [Tonnes]	0		
-	sc-Si wafers [MW]	0		
-	mc-Si wafers [MW]	0		

4.2 Production of photovoltaic cells and modules (including TF and CPV)

Module manufacturing is defined as the industry where the process of the production of PV modules (the encapsulation) is done. A company may also be involved in the production of ingots, wafers or the processing of cells, in addition to fabricating the modules with frames, junction boxes etc. The manufacturing of modules may only be counted to a country if the encapsulation takes place in that country.

For **Waffle based modules manufactures**, all the Spanish manufacturers integrate overseas-made cells.

Escelco: produced 6MW in 2022, with a production capacity of 70MW/yr.

Exiom: will build a factory with 500 MW/yr of production capacity.

Other module related producers:

Abora Solar: Hybrid solar panels that (photovoltaic and thermal)

Aurinka: Silicon wafers for photovoltaic modules (75MW/y capacity)

BSQ Solar: Concentrator photovoltaic (CPV) modules

Ferroglobe: Produces metallurgical-grade silicon, a raw material for photovoltaic manufacturing.

Iberian Solar: Manufactures monocrystalline and polycrystalline photovoltaic modules.

Mondragón Assembly: Automated production lines for photovoltaic module manufacturing but does not produce modules themselves.

Onyx Solar: Specializes in photovoltaic glass for building-integrated photovoltaics (BIPV).

Total PV cell and module manufacture together with production capacity information is summarised in Table below.

Table 18: PV cell and module production and production capacity information for 2022

Cell/Module manufacturer (or total national production)	Technology (sc-Si, mc-Si, a-Si, CdTe, CIGS)	Total Production [MW]		Maximum production capacity [MW/yr]	
		Cell	Module	Cell	Module
Wafer-based PV manufactures					
Escelco	Mono-cristaline	0	5,6	0	70
Escelco	Poly-cristaline	0	0,48	0	0
Etc.					
Thin film manufacturers					
-		0	0	0	0
Cells for concentration					
BSQ Solar*		0	0,11148	0	2,5
Totals		0	**6,19148**	**0**	**72,5**

* The BSQ Solar data is from 2020 the have not agreed to disclose their productions this year

The cells are purchased in the international markets.

4.3 Manufacturers and suppliers of other components

Trackers manufacturers:

- Braux
- BSQ Solar
- Trina (Nclave)
- Praxia
- PVH
- Soltec
- Stansol
- STI Norland
- Solar steel
- Axial

Structures:

- Alusín solar
- Braux
- Csolar
- Gonvarri solar
- Imedexsa
- INSO Aluminios
- Isigenere
- Magon
- Nclave
- Praxia
- PVH
- Solarstem
- Soltec
- Stansol
- STI Norland
- Sunfer Energy

Inverters:

- Power electronics: Among top 4~7 global players, central inverters.
- Ingeteam: string inverters.
- Gamesa: big player in Spain focused in central inverters
- Jema energy: central inverters.
- Zigor: focused in isolated installations.

5 PV IN THE ECONOMY

This chapter aims to provide information on the benefits of PV for the economy.

5.1 Labour places

Table 19: Estimated PV-related full-time labour places in 2023

Market category	Number of full-time labour places
Research and development (Engineering Firms and Installers)	31.177
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D (Manufacturers)	19.667
Distributors of PV products and installations (distributors and other)	26.309
Other (energy producers)	43.851
Total	**121.004**

Data provided include direct and indirect jobs.

5.2 Business value

Table 20: Rough estimation of the value of the PV business in 2023 (VAT is excluded)

Sub-market	Capacity installed [MW]	Average price [€/W]	Value	Sub-market
Off-grid	27.6	1.7 €/Wp	a = 27.6 *1.7 * 1 *000 000*	*46.920.000€*
Grid-connected distributed	2019.6	1.2 €/Wp	b= 2019.6 *1.2 * 1 000 000	2.423.520.000€
Grid-connected centralized	7280	0.6 €/Wp	c= 72890 * 0.6 * 1 000 000	43.734.000.000€
Value of PV business in 2023				46.204.440.000€

6 INTEREST FROM ELECTRICITY STAKEHOLDERS

6.1 Structure of the electricity system

This is the electricity industry landscape in Spain:

- Structure – Since the liberalization of the energy market, activities must be formally separated. By law, it is mandatory to separate regulated activities (system operation, market operation, transmission and distribution) and liberalized activities (production, commercialization and energy recharge services). EU Directives claim for the separation of property model as the most effective way to promote investments in infrastructure in a non-discriminatory manner, fair access to the network for new operators and market transparency
- Companies working with both liberalized and regulated activities must formally create independent societies that should not share name, logo nor finances. Vertically integrated companies under the same society are formally banned.
- Retailers and network businesses – "Red electrica" (The transmitter and TSO) does not take part in the production or retail business. Some distribution companies also take part in the retail business but, as said before, the two business need to be formally separated among the company.
- Ownership – private – public (state owned or municipal): The generators, retailer and distributors are mostly privately-owned company. On the other hand, Spanish TSO "Red electrical" is 20% state-owned and 80% privately-owned
- Electricity market regulator -The Spanish regulator is the National Commission of Markets and Competency (CNMC)

6.2 Interest from electricity utility businesses

Regulatory instability has been the primary obstacle to the development of photovoltaics. However, since 2018, political stability has brought about a notable surge in installed capacity. Despite this progress, the photovoltaic (PV) industry now faces new challenges, including lengthy and overlapping administrative processes, suboptimal auction designs for renewable development, and a shortage of skilled professionals in the sector. These factors have resulted in bottlenecks that hinder the industry's continued growth.

Conversely, the development of ground-mounted PV plants has been driven by two key factors: the use of Power Purchase Agreements (PPAs) for long-term projects and the advantages that infra-marginal technologies have gained from high spot market prices, facilitated by the marginalist market system.

Additionally, the rise in electricity prices—driven by the international energy crisis, the war in Ukraine, and inflation—has encouraged many companies and private consumers to adopt photovoltaic self-consumption systems. This trend has been further reinforced by supportive government policies, as previously mentioned.

6.3 Interest from municipalities and local governments

Many municipalities are showing interest for creating energy communities. Energy communities are collective initiatives where individuals, households, or organizations come together to collectively generate, manage, and consume energy. They empower citizens to actively participate in the clean energy transition. Municipalities are interested in developing energy communities because they contribute to local energy resilience, reduce dependence on centralized energy systems, and create opportunities for local job creation. They also enhance public acceptance of renewable energy projects and make it easier to attract private investments. Moreover, they enable municipalities to meet their sustainability goals, engage

their communities in decision-making processes, and empower citizens to shape their energy future.

Usually, local governments are in favour of PV developments, because they can notably increase their incomes via taxes, create jobs and mobilize the local economy. Nevertheless, we have seen barriers to PV projects there where developers miscommunicate and skip working together with local governments. If developers work in an extractive manner, negative dynamics are generated that feed NIMBYs. Usually fostering communication between the local communities, local governments and developers helps in the development of projects.

Other barriers to develop PV from municipalities in Spain was the building permits. Building permits are administrative authorizations that used to be mandatory for residential self-consumption installations. These building permits for PV self-consumption are not mandatory anymore but many misinformed municipalities are still requesting them. For many industrial self-consumption installations building permits are required slowing down the installation of self-consumption PV.

7 HIGHLIGHTS AND PROSPECTS

7.1 Highlights

In 2023 Spain was the second largest photovoltaic market in Europe in terms of annual installed capacity. Over 9.3 GWdc of new PV capacity was installed. The self-consumption segment decreased by 32%, reaching 2GWdc while 7.2 GWdc new capacity of ground-mounted plants was installed. Ground-mounted new capacity was introduced without any type of aid or regulatory remuneration scheme.

On the policy side, during the last few years Spain has undergone several regulatory changes. In 2020, Royal Decree-law 23/2020, introduced administrative milestones to develop power plants, RD 1183/2020 introduced a new access and connection framework, and RD 960/2020 introduced renewable auctions. These decrees established the regulatory framework for the development of renewables in our country in the coming years.

This changes in the energy sector were reinforced by Law 17/2021 on Climate Change and Energy Transition, which guides the decarbonization policies of all sectors of the economy. For the energy sector, the law establishes the National Integrated Energy and Climate Plan (NECP) as the planning tool that integrates energy and climate change mitigation policy. During the summer of 2024, the NECP energy target for 2030 was updated following the new EU targets.

7.2 Prospects

Regarding ground-mounted plants, the photovoltaic market presents significant growth potential in the coming years, driven by several key factors. First, the planning process indicates substantial expansion, with over 36,705 MW of projects approved and set to be built in the near future. This planned development reflects the industry's robust pipeline and its critical role in transitioning towards a renewable energy future.

However, challenges in the financing landscape could temper this growth. The inadequacy of the marginalist pricing system has created hurdles for securing bankable Power Purchase Agreements (PPAs), and merchant projects face persistent difficulties in accessing financing.

Additionally, there is a paralysis in the broader electrification process, which highlights a significant untapped opportunity. Despite notable advancements, only 62% of electricity generation currently comes from renewable energy sources, leaving ample room for expansion. Furthermore, only 24% of final energy consumption in the economy is derived from electricity, with 52% still reliant on oil-related products. This underscores the need for a more aggressive electrification strategy and a continued shift towards renewables to reduce dependency on fossil fuels and achieve climate targets.

The Self-consumption segment faces a transitional phase as it adapts to evolving market conditions. The end of COVID-era subsidy programs, which provided a significant boost to installations during the pandemic, marks a shift towards a more market-driven approach. While this change may introduce new challenges, it also opens opportunities for the segment to mature and solidify its place as a cost-effective and reliable energy solution.

In this new landscape, the focus has shifted to requesting tax incentives and other policy mechanisms that can sustain growth. These incentives would help offset the financial impact of reduced direct subsidies, maintaining momentum in the adoption of self-consumption systems by both private consumers and businesses.

Additionally, the return to standard market conditions underscores the importance of competitive pricing and efficient installation processes to attract consumers. Self-consumption continues to offer significant savings and energy security, making it a strong value proposition in the transition towards sustainable energy solutions.