



Renewable Energy Policy Review

Spain

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EREC

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SPAIN

1. General information

Population and geography

Spain has a total area of 506,030 km², with 2,013 km of inland borders and 4,830 km coastal borders (excluding the coastline corresponding to the Balearic and Canary archipelagos and the territories in North Africa). Much of its territory, 198,649 km², is at a height of between 600 and 1,000 m. The highest point in Spain is the Teide, on the Canary archipelago, with an altitude of 3,718 m.

There are 8,109 municipalities.

Spain has a population of 40,202,000 inhabitants, 19.67 million of which are men and 20.53 million women. The majority (23.2%) live in municipalities of between 100,000 and 500,000 inhabitants, while 17.3% live in municipalities of over 500,000 inhabitants.

Political System

Spain is a constitutional monarchy, member of the European Union since 1986. In Spain, the three levels of government exist:

- State
- Autonomous Communities
- Local Corporations

With the approval of the **Spanish Constitution** of 1978, a historical process of decentralization began that led to the creation of the **Autonomous Communities** as an intermediate level of government between the **State** and the **Local Corporations**. There is a central government, headed by a President of the Government and 19 Autonomous Communities (Regions), each of which has its own statutes of autonomy, with extensive powers in areas such as education or health.

The Federal model is without doubt the most similar to the Spanish model. But, there are notable differences between the two conceptions of State. For instance, while on the one hand in the Federal State the original sovereignty responds to each one of its territorial unities, in the Autonomous State the national sovereignty resides over the whole Spanish population --according to Article 1.2 of the Constitution-- the powers of the State. Contrary to what happens with the State members of a federal State, the Autonomous Communities cannot benefit from a law that gives themselves their own Constitutions. They will have Statutes that are not passed by their own regional Parliaments, but which follow a special procedure (which requires a majority of 3/5 at the Parliament), and follow Organic Laws.

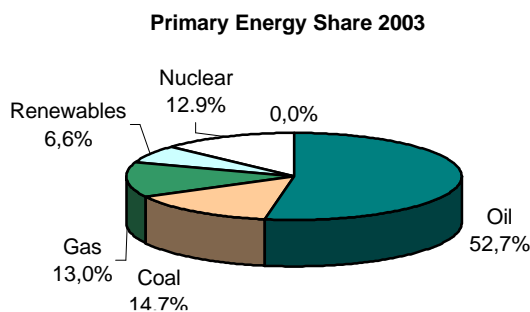
Spain has enjoyed steady economic growth since the mid-1990s, thanks to a sharp decline in interest rates prior to joining the European Monetary Union, sound fiscal policy and wide-ranging structural reforms. Average annual GDP growth was 3.4% per year from 1995 to 1999. Since 1998, inflation has averaged 2.25%, one of the lowest rates in the history of Spain. Unemployment remains high; it was 15% of the labour force at the end of 1999, but has steadily decreased recently. Per capita income has grown sharply in the past decade, and reached US\$ 18,100 in 1999, using current purchasing power parities; yet this was still 19% under the OECD average. (source Energy Policies of IEA Countries Spain 2001)

2 Renewable energy policy

Energy and Renewable energy country Profile

Population	40.04	Millions
Area	504,782	km ²
Total Primary Energy Supply	131.30	Mtoe
Electricity Production	121.495	TWh
Electricity Prod. by source		
Fossil Fuel	64.9	%
Hydro	5.73	%
Nuclear	36.1	%
Other	1.82	%

Source: CIA World Factbook 2001



Source: EUROSTAT

Economic growth and accelerated industrialization associated with EU membership have led to increased Spanish energy demand, up 75% since the mid-1970s.

The majority of Spain's energy needs are met by imported fossil fuels (mainly oil), with nuclear power an important source of national electricity production but constrained from further growth by a moratorium. This relative lack of indigenous energy reserves has shaped Spain's energy policy, which has security of low cost energy supply from a diverse range of domestic resources as its key objective. Spain's indigenous energy reserves are dominated by hard coal and lignite, which accounts for the extensive use of coal to generate electricity in Spain. Other indigenous resources include traditional biomass, used mainly in the domestic sector, and hydro power. Over the last few years, there has been a trend towards electrification in the demand sectors, as the Spanish networks have been improved and updated. There has also been an expansion of electricity generation capacity.

Spain's national target is that renewable energy sources should comprise 12% of all primary energy sources by the year 2010 and that renewable sources should account for 29% of all electricity generated. (source ANALYSIS AND CONCLUSIONS OF MONITORING IN 2002 OF THE PLAN TO PROMOTE RENEWABLE ENERGY, Secretary of State for Energy, Industrial Development and SMEs, October 2003)

Renewable Energy Sources

Renewable energy country profile

Renewable energy technology in 2003 in capacity

	Spain
Population	40,202.000 m
SPV (MWc)	
Grid connected	13.20
Off grid	14.06
Total	27.26
STH (square meter installed)	229.666 m2
Average surface for 1000	5.8 m2
SHP (2001 figure)	162
Biogaz (Mtep)(2002 figure)	168
Wood (Mtep) (2002 figure)	3.89
Wind (MW)	6411

Source Eurobserv'ER 2003/Sun in Action 2/EWEA/ESHA

Renewable energy contributed 6.5% of Spain's total energy supply and 21.9% of total electricity supply in 2001 compared to EU averages of 5,8% and 15.5% respectively. (IEA Renewables Information 2003)

From the energy point of view, the most notable aspect of 2002 has been the behaviour of electricity demand, which for the fourth consecutive year has seen growth above the average recorded for Western European countries. In this regard we can highlight that, under the special regime, renewable energy sources grew by 28.9% in 2002 compared with 2001. The energy produced by the renewable sources under this regime grew in 2002 by 17.8% compared with 2001. This was achieved in spite of the 12.5% reduction in hydro-electric energy due to the low rainfall during the year.

Hydro

Small Hydropower installed capacity increased almost ten times over the period 1990 to 2001, from 162 MW to 1618 MW, showing one of the major increases in the EU-15. In the year 2001, about 3% of the total electrical installed capacity in Spain corresponded to SHP. While the country's electricity generation and hydroelectric generation have increased by 57% and 67% respectively over this period, electricity generation from SHP rose six times from 685 GWh in 1990 to 4 436 GWh in 2001. In 2001, about 19% of hydropower was generated from SHP and it contributed 2% of the country's total electricity generation. *source Report on Small Hydropower Statistics: General Overview of the last decade 1990-2001 ESHA)

Biomass

In the **bio-fuel** sector, Law 53 of 30 December 2002 on Measures of a Fiscal, Administrative and Social Order Nature sets a hydrocarbon tax level of zero percent for bio-fuels until 2012, thus explicitly recognising the environmental and energy advantages of these fuels as compared with conventional fossil fuels.

Waste

The *National Energy Plan* includes a target of 446 ktoe of energy from municipal solid waste in 2000. If this target is to be met, installations will have to be built at a greater rate, because the capacity and generation targets were at less than 40% by the end of 1996. Even if installations under construction are included, production is only just over 50% of the target more than halfway through the plan. Generation estimates from industrial and municipal waste combined were 562 GWh in 1996: substantially up from 1994, when generation was 293 GWh.

Wind

Wind has been one of the government's success stories, and installed capacity has grown from 7 MW in 1990 to over 377 MW in November 1997 - more than double the government's target of 168 MW by 2000. Growth of installed wind capacity has been very rapid in the last few years:

This growth in wind energy is due to a number of factors, including the generous capital and output subsidies in place and the high potential of wind energy in Spain (estimated by the government to be 2.8 GW). Spectacular progress has been achieved by wind energy. In 2001 wind power accounted for 8% of total production from RES. Installed capacity increased by 1,000 MW (60 new wind farms were brought into service in 2001). The total installed capacity at the end of 2003 was 6,202 MW. (source EWEA) Spain is currently second in Europe in installed wind power capacity, Germany being the leader, and Spanish technology in this sector is one of the world leaders. There is significant potential for the continued expansion of wind power. However, expansion may be limited or delayed by the restrictions imposed by current regulations on grid-connection. Expansion may also be limited if legislation regarding favourable buy-back rates is changed in 2003.

Spain installed 1,493 MW of new wind capacity, pulling ahead of the U.S. into second place worldwide in terms of total installed capacity, which reached 4,830 MW at year's end. Spain's wind power generation has soared over the past decade: in 1993 just 52 MW were in place, in Tarifa across the straits of Gibraltar from Morocco. The take-off was triggered by federal requirement that utilities pay a guaranteed premium price for electricity from wind over the first five years of the project—an incentive similar to the one that gave birth to the German wind energy market. State (or "province") governments eager to capitalize on the benefits of wind power have also sought to boost such development locally and required that a large share of the investments (such as manufacturing and construction) remain in the local economy. Large wind power installations are to be found in Galicia, Aragon Navarra, and Castilla. (source American Wind Energy Association, Wind Energy Market Report, Wind Energy Industry Continued to Grow at Fast Pace in 2002 Global Installations Increased by 28%, 2003 <http://www.awea.org/pubs/documents/globalmarket2003.pdf>)

Solar Thermal

The newly installed collector area has risen from nearly 40.000m² in 2000 to more than 51.000m² in 2001. It is assumed that a similar increase has taken place in 2002, but the official data is still not available. Provisional data shows the 2002 market at 70.000– 80.000m². But this development – which should be regarded a big success in comparison to previous growth rates – is still far from reaching the objectives outlined for 2010. To accomplish these objectives, an average of more than 400.000m² need to be newly installed each year between 2001 and 2010.

(source Sun in Action 2)

Solar PV

The new Plan for the Promotion of Renewable Energy during the period 2000-2010, will serve to set a new pace for the development of these energy sources and consolidate Spanish policy on renewable energy, in line with the content of the European Union White Paper.

Concerning photovoltaic solar energy the main measures and incentives included in the new Plan are:

- Public subsidies to R&D projects whose objectives are the improvement of PV technologies and the improvement of production, commercialization and installation processes.
 - Public subsidies to the installation of PV systems, both off-grid and grid-connected systems.
 - Establishment of a new regulation for the connection of PV systems to the grid.
 - Tax benefits for PV installations.

The implementation of this Plan has presented a first important result during the year 2000: the approval of the Royal Decree 1663/2000 which establishes the technical conditions for the connection of photovoltaic systems to the low voltage grid. This is a very important step in order to get a major penetration of photovoltaic installations into energy system. On the other hand, the Royal Decree 2818/1998 which establishes the incentives to photovoltaic solar energy injected to the grid has not modified their contribution during the year 2000, its value remaining at 0,4 euro for installations under 5 kW and 0,2 euro for installations larger than 5 kW. (source IEA Photovoltaic Power Systems, PV technology status and Prospects, 2002). Programmes such as Prosol and Procasol provide capital incentives for the provision of energy to isolated rural communities, hotels and leisure centres in Andalucia and the Canary Islands. Technologies such as PV home systems are eligible for support under these programmes. For example in Andalucia, subsidies of EUR 11.9/Wp for non-grid-connected systems are available and EUR 8.92/Wp for grid-connected installations. Electricity from photovoltaics (PV) has recently increased dramatically in Spain, placing Spain among the leaders in PV exploitation in Europe.

Geothermal

The energy-saving potential of Spain's geothermal resources located in the Canary Island is estimated at around 600 ktoe/yr. However, extremely limited interest has been shown in development of geothermal resources: only two projects producing 0.4 ktoe of heat have been initiated under the renewables portion of the PAEE plan, and no further plants are under construction. This is due to the delays in the construction of the most important of these geothermal plants in Madrid. Unless increased interest in geothermal energy sources is shown, the government's target for 2000 is extremely unlikely to be met

On the electricity market, RES receive a differential premium on production depending on the technology used, with photovoltaic energy being by far the most favoured. Central government gives direct subsidies for innovative and demonstration projects. Most of the autonomous regions also provide direct subsidies for the implementation of RES projects. IDAE (The Institute for Diversification and Saving of Energy) provides reimbursable finance for RES projects.

RE Policy Outlook

A number of national plans and sub-plans for renewable energy had been drawn up during the last decade. Promotion of renewable energy in Spain has been supported by the Spanish government under the PEN, through two Renewable Energy plans (PER 86-88 and PER 89-90) and currently under the *Renewable Energy Programme*, which is one of four sub-plans under the PAEE, itself included in the *National Energy Plan*. The 1986 "First Renewable Energy Plan" ("P.E.R. - 86") presented targets for production from renewable energy and targets for private and public investment in renewable energy systems. This plan was replaced by "P.E.R.-89" which set further targets for investment in, and use of, renewable energy. These plans focused initially on demonstration and application projects.

In 1991, the Spanish government approved a new National Energy Plan (PEN) which includes the 1991-2000 Energy Saving and Efficiency Plan (P.A.E.E.). This set an overall target for energy production from renewable energy resources. The Royal Decree of 1994 provided the bands for renewables and the calculations for the electricity buyback rates. Although this is not a law as such, the decree is unlikely to change, even with the change in Government. The overall objective of the PAEE was to increase renewable energy production to 1.1 Mtoe/year by 2000, increasing renewable electricity production to 4.2 TWh/y and thermal energy to 0.5 Mtoe, comprising 85% increase from biomass, 9% from small hydro, a planned target for solar collector area for 2000 of 400,000 m²/y and installed wind capacity of 168 MW. The target set for primary energy supply was almost reached as the contribution of renewables to TPES in 1999 was 0.92 Mtoe above the 1991 level of 3.4 Mtoe. In power generation the target was exceeded, with the share of non-hydro renewables reaching 2.7% in 1999. During 1991-1999, the power generation capacity of renewables increased by 2,930 MW and renewables replaced other fuels for heating by 0.3 Mtoe during the same period. (source Energy Policies of IEA Countries Spain 2001)

The Plan for the Promotion of Renewable Energy in Spain, approved in December 1999, sets a target of 12% of Spain's energy demand being met from renewable sources by 2010 in line with the EU target defined in the European Commission White Paper for RES. Incentives in Spain include research, promotion programmes and financial aid. The government's strategy to promote increased use of renewables rests on two main approaches: favourable buy-back rates for electricity produced from facilities under 100 MW and financial support via capital subsidies and loans for third party financing under the PAEE plan. EU has set an indicative target for Spain requiring that 29.4% of power corresponding to 76.6 TWh in 2010 be generated by renewables.

(source Energy Policies of IEA Countries Spain 2001)

The instruments

The most important references that have regulated the energy and/or electricity sectors and have given support to the development of RES-E in Spain since 1997 are:

- The Electric Power Act 54/1997 (currently in force) and
- The Renewable Energy Development Plan approved in December 1999, required in the Electricity Sector Act.

Name of Policy	Policy Type	Renewable Energy	Date
Feed-in Tariffs	Feed in	All renewables	
Financing for Renewables and Energy Efficiency	Corporate Loan / Capital		2002
Low interest loans	Consumer Loans	All renewables	
Modification to the Biomass, Waste and Wind Energy Premiums	Feed in	Biomass Offshore wind Onshore wind Waste	2003
Subsidies for Solar Photovoltaic and Solar Thermal Energy	Grants Renewable Energy Industry	Solar photovoltaic	2002

Source IEA 2003

The energy sector is regulated at national level. The 17 Autonomous Communities, which constitute Spain have relevant roles in the development of renewable energy. In particular, administrative procedures and provisions related to the environment, as well as the planning provisions, are developed mostly by the regional authorities. Some Autonomous Communities have, for example, regulated the use of wind energy over their territory.

Responsibility for the promotion of renewable energy lies with the Institute for Energy Diversification and Conservation (IDAE)¹ Renewable energy is also promoted at the regional and local levels, (e.g. the Andalusian government launched a 3 year programme for solar heating systems “the Prosol programme”. IDAE has also launched renewable programmes with the regions of Canarias, Aragon, Valencia and Murcia. The emphasis of the renewables programme of the PAEE is on new electricity generating technologies which reduce dependence on fossil fuels, although use of renewable-based heat is also included. Biofuels for transport are excluded from the plan.

Electricity

The major incentive in the electricity market comes from the regulation of the sector. In November 1997, a new general electricity law 54/1997 came into force, basically aiming to face the liberalisation of the electricity sector with competitiveness.(what do you mean here? To introduce competition into the electricity sector?) The law establishes a special regime for the producers under a maximum of 50 MW power. This applies for producers using cogeneration or other ways of associated electricity production and renewable energy sources.

The law guarantees the access to the grid to producers under the special regime. A prime will be set by the Government, in such a way that feed-in tariff for electricity generated by renewables reaches from 80 to 90% of the average price of the electricity. The legal basis for feed-in tariffs for Electricity by renewable sources of energy and CHP systems is the Royal Decree 2818/1998 of December 23rd 1998. Renewable electricity technologies are granted a fixed premium of between 2.17 cents €/kWh and 3.01 cents €/kWh. Significantly out of this range is Solar PV which obtains an average fixed premium of 27.1 cents €/kWh generated.

Installations of renewable energy under 50 MW will not have the obligation to formulate tenders to the market, but will be able to sell electricity at the final hourly price of the production market, complemented by a prime. In conclusion, a first system for the determination of the feed-in tariff is calculated as the sum of the market price for electricity, plus a prime considered as an incentive to renewable and a reactive energy factor that may be positive or negative. The second system, applicable to producers of electricity from non-consumable renewable energy sources gives a total price that does not depend on the hours of supply.

Solar thermal may benefit from an investment subsidy covering a maximum 50% of total investment. Solar PV may get, as investment subsidy, between 263 and 553 cents €/WP. In both cases, funds are made available on a year by year basis.

¹ a semi-state organisation under the supervision of the Ministry for Industry and Energy

Finally, and concerning financial incentives, the Línea IDAE-ICO provides reduced interest rates for small hydro, biomass, wind and solar PV and solar thermal. 3 to 5 percentage points bonification (up to 70% of the project costs) may be financed. Maximum loans are 6.31 M€ (Source Admire rebus 2003 from deleted table)

Heating

Based on Royal Decree 1751/1998 of 31 July 1998 referring to the Regulation of Thermal Installations in Buildings (RITE), the guidelines of the SAVE Directive referring to the Valuing of Energy Consumption for Heating, Air Conditioning and Hot Water and of Periodic Boiler Inspections, have been incorporated into Spanish legislation.

Although the total installed cogeneration capacity was only 369 MWe at the end of 1990, it was 5 520 MWe at the end of 2001 generating about 11% of electricity. About 4 540 MW of new capacity was installed in 1991-2000, which is two to three times the initial target. Co-generation capacity financed through IDAE's third-party financing was 300 MWe, or 6.7% of the total installed in 1991-2000. In addition, support from IDAE, the so-called "special system", has provided premiums to co-generators. However, high natural gas prices in 2000 and 2001 discouraged installation of new co-generation plants.

Almost all co-generation facilities are run by auto-producers, typically industries. Therefore, the size of the installations is generally small; 16% of the plants have capacity under 1 MWe, 53% 1-5 MWe and 17% 5-10 MWe.

The typical industries to invest in CHP production are ceramics and tiles, food processing, textile, chemical and pulp and paper industries. No large-scale public co-generation plants have been built yet.

The co-generation plants are eligible for premiums if they qualify under the special generation system.

Conditions are put on the electric efficiency but not on the fuel efficiency of the CHP plants. The requirements on electric efficiency depend on the size of the installation, the ratio of own energy consumption to the electricity output to the network, fuel and technology used.

The premium also depends on the installed capacity. In 2001, the premium paid to small co-generators (<10 MWe) was 24 euro cents per MWh for a maximum of 70% of their total annual production. To larger co-generators

(IEA Energy Efficiency Update 2003 Spain)

Transport

For some years the government has maintained its *PREVER Programme* (formerly RENOVE) through the Ministry of Science and Technology. The programme's aim is to encourage the replacement of old cars to achieve environmental improvements and better road safety. In accordance with Royal Decree Law 6/97 of 9 April 1997, the programme applies to automobiles over ten years of age and light industrial vehicles over seven years. It reduces the car registration tax by up to € 721 when scrapping of the old vehicle (priority is given to leaded gasoline vehicles) is guaranteed.

Reduced VAT on tickets for public transport can promote its use. Some public transport, namely all rail and bus transport and travel between the mainland and the Balearic Islands by air and sea, is subject to a reduced VAT rate of 7%. The full 16% VAT rate applies to all other domestic passenger transport by air and sea.

In 2001 IDAE promoted the following projects in the transport sector

- *La Ciudad, sin mi coche* (The City, without my car): the organisers of this event in Spain were IDAE and the Ministry of the Environment. The most significant results, extrapolating from those of the 16 cities that took part, were an 18% reduction in traffic; an 18.7% increase in passengers using public transport; and a 4.3 million litres reduction in fuel consumption.

- *Mejor sin coche* (Better without a car): rational use of private cars and improvement in urban mobility in the city of Gijón (Asturias). Awareness raising project in which members of the public who took part obtained a series of personal advantages, such as discounts for public transport, sports centres and theatres, as well as taxis and shops taking part in the scheme.

- Smile project: its aim was to gather information on best practice in urban mobility so as to offer it to the public in the form of publications, presentations and international conferences.

- Intatme project: IDAE participated in this project led by the Madrid Transport Consortium (Consortio de Transporte de Madrid) with the principal objective of studying new forms of mobility using collective means of transport.

(IEA Energy Efficiency Update 2003 Spain)

Research and Development

			TIME	1980	1985	1990	1995	1999	2000	2001	2002
COUNTRY	PRODUCT	FLOW									
Spain	Million US\$ (2002 prices and exchange rates)	4.1 Solar Heating & Cooling	4,089	1,223	1,722	1,298	1,347	6,062	0.047	0.047	
		4.2 Solar Photo- Electric	0.470	4,983	2,592	2,090	1,634	3,140	2,348	2,385	
		4.3 Solar Thermal-Electric	23,258	8,313	6,767	7,062	5,150	0.662	6,552	6,899	
		Total Solar	27,817	14,519	11,080	10,449	8,130	9,864	8,947	9,331	
		5. Wind	1,435	1,704	1,633	0.848	4,822	2,619	2,068	1,857	
		6. Ocean	0.268	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
		7. Biomass	5,935	2,680	6,389	2,735	1,986	3,736	4,144	4,345	
		8. Geothermal	6,747	2,953	0.165	0.000	0.000	0.000	0.000	0.000	
		9.1 Large Hydro (>10 MW)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
		9.2 Small Hydro (<10 MW)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
		Total Hydro	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
		TOTAL RENEWABLE ENERGY	42,203	21,858	19,267	14,032	14,938	16,219	15,159	15,533	
		TOTAL OTHER TECH./RESEARCH	5,197	12,190	0.000	12,995	7,068	0.566	1,986	1,998	
		TOTAL ENERGY R&D	141,868	87,172	49,327	70,043	52,343	49,884	48,256	47,879	

(Source IEA 2003: National Budget RD&D in OECD Countries – Spain 1980-2002, OECD, IEA)

Spain

In 1998, renewable energy contributed 6.4% to the National Energy Balance with 7.294 ktoe produced
 Electric Power Act 54/1997 (currently in force)
 Renewable Energy Development Plan approved in December 1999, required in the Electricity Sector Act
 R.D 2818/1998 determines the feed-in tariffs system
 in 1999 a *National RES Development Plan 2000-2001*

RE Highlights

Spain — Photovoltaics

Spain has high potential for photovoltaic (PV) energy. PV electricity has been expanding rapidly in particular since 1998 when it started to receive increased financial support through national feed-in tariffs. Financial support by regional authorities is also encouraging PV development in some of Spain's 17 autonomous communities.

Success factors:

- **Political: Support for renewable energy implementation at both national and regional level**

The national Energy Saving and Efficiency Plan (PAEE), 1991–2000, aimed to increase the overall use of renewables by 1.1 mtoe by the year 2000, including an increase in the contribution of non-hydro renewables in electricity generation from 0.5 % in 1990 to 1.4 % in 2000. This support is endorsed and implemented at the regional level. PAEE provided funds for energy projects at national level until 1999, when responsibility for distributing the funds was transferred to each autonomous region. The Plan de Fomento de las Energías Renovables (2000–10) sets out new targets and aims to double renewable energy to 12 % of gross inland energy consumption by 2010. Regional encouragement of PV energy has been particularly strong in the Canary Islands, Andalucía and Castilla la Mancha regions.

- **Legislative: Premium-set tariffs combined with an obligation to purchase provide a stable, commercially favourable market for renewable electricity producers**

- **Financial: State and regional subsidies available**

The PAEE has provided subsidies in the form of capital grants, initially up to ESP 800/Wp (4.8 EURO/Wp) for grid-connected systems and up to ESP 1 600/Wp (EUR 9.6/Wp) for non-grid-connected systems. Since 1996 PAEE has provided subsidies up to ESP 600/Wp (EUR 3.6/Wp) and ESP 1 200/Wp (EUR 7.2/Wp) respectively. Since 1997 only certain regions of Spain have been eligible for grants. In addition to PAEE the autonomous regions have established support for investment and financing of renewable energy projects. Programmes such as Prosol and Procasol in Andalucía and the Canary Islands, provide capital incentives for technologies such as PV home systems. For example in Andalucía, subsidies of EUR 11.9/Wp for non-grid-connected systems are available and EUR 8.92/Wp for grid-connected installations. *Electricity from photovoltaics (PV) has recently increased dramatically in Spain, placing Spain among the leaders in PV exploitation in Europe.*

In 1993: 1.2 GWh In 1999: 17.0 GWh Increase 1993–99: 15.8 GWh, 1 330 %

- **Administration: Local involvement in renewable energy planning combined with collaboration among local, regional and national administrations**

Responsibility for renewable energy sources belongs chiefly to the autonomous communities (the regions). In particular, this allows each region to have authority over the various administrative procedures including planning and environmental impact assessments, to implement renewable energy projects. Successful implementation of PV projects is mostly met where collaboration at all levels of administration (local, regional and national) is achieved.

Spain — Wind energy

Regional Best Practice – Navarre

Spain has high wind energy potential. Wind energy development is expanding considerably, mostly due to financial support through national feed-in tariffs but also because of capital subsidies, in particular at the beginning of a development. Expansion may, however, be held back by lengthy procedures to obtain planning permission. Navarre was one of the first regions to actively support wind developments, opening the way for other Spanish regions. Spain now has successful wind energy developments in many regions.

El Perdon wind farm is one of the projects developed in Navarre by Energia Hidroelectrica de Navarre (EHN). The first phase, of six 500-kW wind turbines, came into operation in 1994 as an initial demonstration. More turbines were installed in 1995–96, and total installed capacity is now 20 MW. Based on its early successes, EHN is now a leading developer of wind energy projects throughout Navarre and other regions.

Success factors:

- **Political: Support for renewable energy implementation at both national and regional level**

The national Energy Saving and Efficiency Plan (PAEE), 1991–2000, aimed to increase the overall use of renewables by 1.1 mtoe by the year 2000, including an increase in the contribution of non-hydro renewables in electricity generation from 0.5 % in 1990 to 1.4 % in 2000. This support is endorsed and implemented at the regional level. PAEE provided funds for energy projects at national level until 1999, when responsibility for distributing the funds was transferred to each autonomous region. Spain has already reached the 2000 renewables target. The Plan de Fomento de las Energías Renovables (2000–10) sets a new target of 12 % share of renewables in gross inland energy consumption by 2010. The regional government of Navarre developed an energy plan in 1996 with the aim that by 2005 all electricity generated in Navarre will come from renewable energy sources, of which about 50 % will be from wind energy.

- **Legislative: Premium-set tariffs combined with an obligation to purchase provide a stable, commercially favourable market for renewable electricity producers**

- **Financial: State and regional subsidies available**

The PAEE provided subsidies in the form of capital grants, up to 30 % of eligible costs of the project. In addition, each autonomous region has established relevant support for investment and project financing. Because of the success of wind energy in Spain, support available through the PAEE was reduced during the PAEE period (1991–2000), both for the systems and regions eligible for capital subsidies, and for the subsidy provided per project. *Spain is rapidly becoming one of the leaders in wind power exploitation in Europe.*

- **Technological and industrial development: A thriving wind manufacturing industry has been established in the region**

Decreasing costs of investment and operation, and the greater maturity of the technology, have greatly helped the development of Spain's wind energy industry. Navarre is a highly industrialised region, and support for new wind energy developments was seen to provide not only environmental benefits but also economic benefits through new employment and general economic development. As a result of the high level of new wind farm developments in Spain, especially Navarre, Gamesa Eolica is now the major manufacturer of turbines in Spain and one of the world market leaders in the sector. The installation of the first phase of the El Perdon wind farm led to the set-up of three factories in Navarre — one for blades, another for towers and a third for turbine assembly. The wind industry in Navarre now provides employment for over 1 000 people in the region. EHN has expanded its operations to other regions of Spain, installing 211 MW new wind capacity during 1999 (total capacity reaching 418 MW in that year). The aim for 2000 was to install a further 480 MW, and to achieve 1 000 MW new capacity each year between 2001 and 2003.

- **Administration: Local involvement in renewable energy planning**

Responsibility for renewable energy sources belongs chiefly to the autonomous communities (the regions). This allows each region to have authority over the various administrative procedures, including planning and environmental impact assessments, when renewable energy projects are implemented. The Navarre regional government actively supported the development of procedures to authorise wind farms in the region. It established the public–private company EHN to develop the region's renewable energy resources. EHN's shareholders include the government, the regional electricity supply company, local industry and the regional bank. In June 1996, the government of Navarre approved EHN's Wind Power Development Plan for the region, with a target to install 575 MW by 2010.

- **Information, education and training: Active promotion of the benefits of renewable energy by wind energy developers**

Wind energy developers, including EHN, actively carry out consultations with a very wide range of interested parties before establishing new projects. Consultees vary widely and include municipal councils, conservationists and mountaineering organisations. There are also ongoing campaigns both by the private developers and by the municipalities to provide information to the general public about the benefits of wind energy and the status of the region's energy plan, to ensure continued public awareness and support.

4. Websites

Name	Description	Website
IDAE		
Europa website	EU Commission website	http://europa.eu.int
European Commission – Directorate General for Transport and Energy		http://europa.eu.int/comm/energy/index_en.html
Managenergy	Information Services for Local and Regional Energy Actors	www.managenergy.net