



Renewable Energies in Madrid

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Supervised

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MADRID INVESTMENT SUPPORT



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Executive Summary

The sector of Renewable Energies (RE) is becoming **strategically important on a world scale**. Within the European Union (EU) the new framework of the Commission, supported by the European Council on 9 March 2007, establishes the commitment **for 2020 that 20% of primary energy consumption will use RE, and that the use of biofuels will have increased by 10%**.

Spain is bound by these commitments, but in addition it has **great potential in sources of renewable energy**. Spain is the **second world leader in terms of installed power in Wind Energy** and manufactures almost a **fourth of the world's turbines**; it is also the **third in the production of Photovoltaic Solar Energy modules**. Within the EU it is the main producer of bioethanol, and in terms of installed power it is in second place in wind and photovoltaic solar energy and in third place for hydraulics. In remaining forms of energy, i.e. biomass and biogas, solar thermal energy and biodiesel, it is in fourth or fifth place.

The most important international companies from the renewable energy sector are located in Madrid, from where they manage their operations all over the world. These include Gamesa, **the world leader in wind energy**, with 30% of its turnover in EE.UU. and China, the main **traditional energy companies** that have gone into renewable energy such as Endesa, Unión FENOSA, and Repsol YPF, which are present in Europe and Latin America, and 8 of the **top 10 engineering company groups**, Ineco-Tifsa, the Tycsa Group, Iberdrola Ingenieria, Eptisa, Proyntec, Ghesa, Intensa, and Acciona. Other important companies specialising in RE, such as BP Solar Renovables, Electrón, and Sercom, and in capital goods ABB, Siemens, and GE, also have their headquarters in Madrid.

Madrid is the decision-making centre of the energy sector. Here we can find the headquarters of the **CNE** (Comisión Nacional de la Energía or National Energy Commission), together with important institutions for **the development of energy policy and the granting of aid**, such as the General Energy Secretariat of the Ministry of Industry, Tourism, and Commerce, the **IDAE** (Energy Saving and Diversification Institute), and the CDTI (Centre for Industrial Technological Development). It has numerous research centres such as **CIEMAT**, **CENER** and **IES** and also 15 universities that carry out research programmes in collaboration with companies and institutions, as well as guaranteeing highly-qualified human resources.

In 2005 renewable energies accounted for 16% of electricity production and some 6% of primary energy consumption. The objectives of the **2005-2010 Renewable Energy Plan** (Plan de Energías Renovables, **PER**) were for **12.1% of primary energy and 30.3% of electricity production** to be supplied by RE. The objectives involve an **investment of some 23,600 million € with public aid to the value of 8,500 million**. The sector receives different types of aid (bonuses for electricity production, investment support, and tax benefits) from the Central Government and that of the Autonomous Regions and the Town Councils.

Madrid is clearly an **importer of energy resources**; it only produces 3% of what it consumes, but of this percentage 75% refers to RE. **The RE sector is a priority** for the Madrid Town Council. The **“2004-2012 Energy Plan of the Region of Madrid”** assumes the commitment of doubling the annual production of RE by 2012.

As well as the **firm support of the Town Council for the RE sector**, **Madrid** also offers important **advantages for the establishing of new investors** at a national and international level. It has excellent **infrastructures and industrial, technological, and scientific parks**, which specialise in providing services to technological companies, as well as communication infrastructures, financial services, and all kind of other services.

Introducción

The Sector of Renewable Energies (Energías Renovables, RE) described in this report will concentrate on the following energy types:

| | |
|---------------------------|--------------------|
| Wind Energy | Biomass and Biogas |
| Photovoltaic Solar Energy | Biofuels |
| Solar Thermal Energy | Hydraulics |

In relation to **Solar Thermoelectric Energy**, Spain is carrying out an intense research activity, with a number of ongoing projects that will be mentioned in the trends section.

Other types of renewable energies not included in this list are tide-driven energy, because of their small volume in experimental or pre-commercial phases, and the geothermal energy which has extremely few installations in Spain.

This document gives an overall view of the sector that consists of the following points:

Characteristics of the sector: main figures of the sector, a regulatory environment, supply and its main players, the demand from the various segments, and investment and aids in R+D+I.

Trends and prospects: objectives established for 2010 in the 2005-2010 Renewable Energy Plan (Plan de Energías Renovables, PER) and measures proposed by the plan, together with other factors that will influence future demand in the sector.

Advantages of investing in Madrid within the sector

Bibliography used

Legal and institutional framework: a list of the main dispositions regulating the sector and links of interest where they can be found.

List of Companies in the sector linked to their Web sites

madrid

Sector Overview

The Spanish energy sector is very dependent on foreign sources, about 80% in the case of primary energy, 99.5% in the case of petroleum, and 97.1% in the case of gas.

The consumption of primary energy in 2005 reached 145,512 ktep, of which 50% refers to oil products. Renewable energies were 6% of the total.

| THE PRIMARY ENERGY SECTOR IN SPAIN 2005. Main Figures | | | | | |
|---|-------------------|-------------|--------------------|-------------|--------------|
| Sources of Energy | Production (ktep) | % Prod. | Consumption (ktep) | % Cons. | Coverage |
| Petroleum | 144 | 0.5% | 71,785 | 49.3% | 0.2% |
| Natural Gas | 146 | 0.5% | 29,120 | 20.0% | 0.5% |
| Coal | 6,630 | 21.8% | 21,183 | 14.6% | 31.3% |
| Nuclear | 14,995 | 49.2% | 14,995 | 10.3% | 100.0% |
| Hydraulic | 1,679 | 5.5% | 1,679 | 1.2% | 100.0% |
| Other Renewables | 6,866 | 22.5% | 6,866 | 4.7% | 100.0% |
| Electricity Balance | | 0.0% | -116 | -0.1% | |
| Total Energías | 30,459 | 100% | 145,512 | 100% | 20.9% |

Source: SGE (Mityc)/IDAE y Boletín Estadístico de Hidrocarburos de EnerClub.

Spain has considerable potential in renewable resources and has firmly commitment with them. The promotion of renewable energies is not only a response to economic strategies, but also socially and environmentally. For this reason, REs receive various types of aid from both the central government and from regional and local governments (premium for electricity production, investment support, and tax advantages).

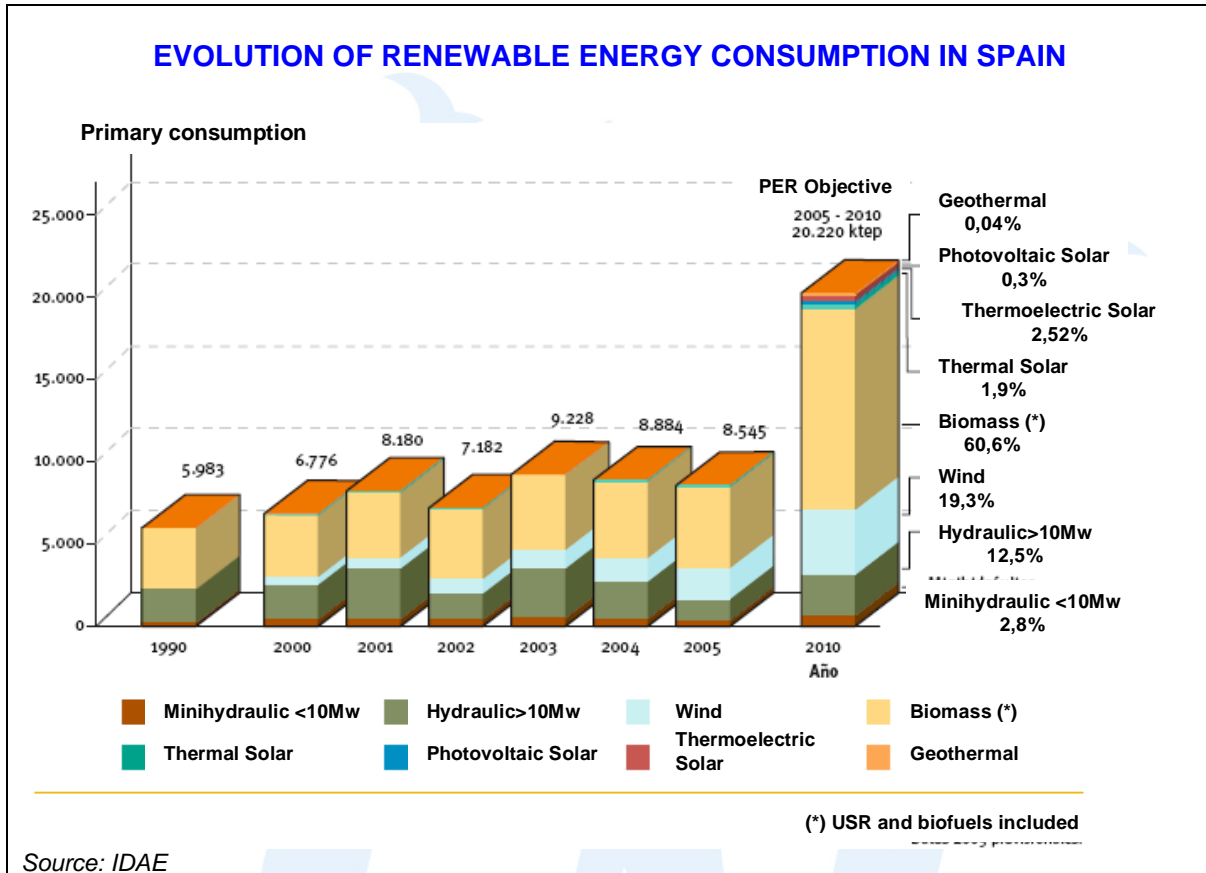
In 2005 the production of Renewable Energies reached 27% of the total amount of primary energy and 16% of the total electricity production ("Regimen Especial" or Special Regime includes all types of renewable energies plus co-generation and self-supply). Hydraulic energy represents over 8% of primary energy production with 40% of the total of RE

| THE ELECTRICITY SECTOR IN SPAIN IN 2006. Main Figures | | | | | |
|---|----------------------|------------------|---------------|------------------------|-----------------------------|
| Sources of Production | Power Installed (Mw) | Production (Gwh) | % Prod. | % Consumption coverage | Estimated Consumption (Gwh) |
| Ordinary Regime | 61,732 | 235,647 | 82.3% | 81.0% | 204,831 |
| Coal | 11,934 | 69,463 | 24.3% | 24.0% | 60,691 |
| Combined Cycle | 16,376 | 66,986 | 23.4% | 24.0% | 60,691 |
| Nuclear | 7,716 | 60,184 | 21.0% | 22.0% | 55,633 |
| Petroleum/Gas | 9,048 | 14,253 | 5.0% | 2.0% | 5,058 |
| Hydraulic | 16,658 | 24,761 | 8.6% | 9.0% | 22,759 |
| Special Regime | 20,604 | 50,755 | 17.7% | 19.0% | 48,047 |
| Wind | 11,239 | 23,372 | 8.2% | 9.0% | 22,759 |
| Others | 9,365 | 27,383 | 9.6% | 10.0% | 25,288 |
| Total Electricity | 82,336 | 286,402 | 100.0% | 100.0% | 252,878 |

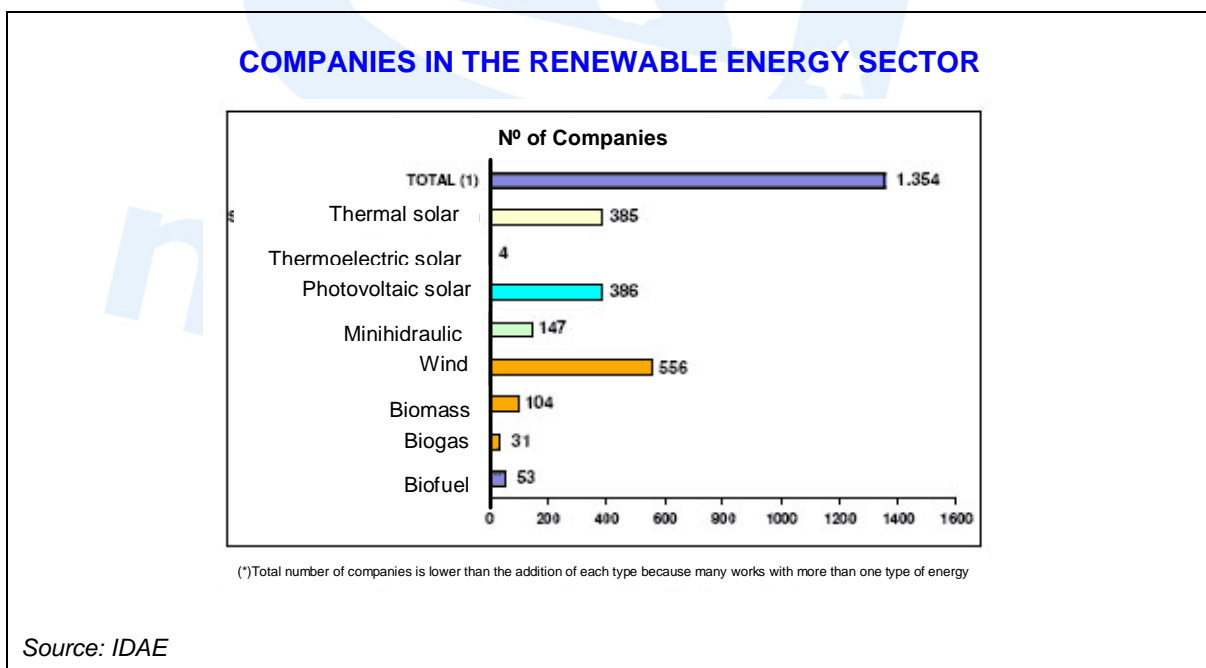
Source: REE. "El Sistema Eléctrico Español". Avance Informe 2006(The Spanish Electricity System)

Electricity consumption in 2006 reached 252.678 Gwh, 2.5% more than in 2005. REs accounted for just fewer than 19% of the total...

According to provisional data from the [IDAE](#) (Energy Saving and Diversification Institute), the consumption of RE in 2005 was 8.545 ktep. Biomass represented almost half (47%) and wind and hydraulic energy (up to 50 Mw) 20% each. Biogas, biofuels, and USW (Urban Solid Waste) account for some 12%.



In all over 1,350 companies are operating in the Renewable Energy sector, over half of which do so with solar energy (thermal or photovoltaic), and over 40% with wind energy.



The sector is undergoing an active process of mergers and acquisitions. The traditional large energy groups such as Endesa, Iberdrola, Unión FENOSA, etc., are penetrating the renewable energy sector strongly by means of acquisitions. In late 2005 Unión FENOSA acquires the wind park promoters Wind Ibérica and Sersa. Acciona purchased Corporación Eólica and Gas Natural Dersa, and Electricidad de Portugal bought DESA. In 2006 Iberdrola purchased Naturener and Gamesa. The Globalisation and the investment of construction companies in the electric sector represent a tendency that also affects renewable energies as the large groups of the traditional energy sector become interested in them. These groups tend to invest in almost all segments of renewable energy.

A process of concentration will occur in the sales. The number of companies continues to grow however, with a multitude of small specialised companies. For example, on the most mature and concentrated market, the wind energy, there were 250 companies in 2000, whereas in 2005 this figure has more than doubled.

The renewable energy sector employs almost 200,000 people.

Regulatory Environment

The **Energy sector in Spain has been liberalised, but it is subject to regulation.** The regulating body is the [National Energy Commission](#) (Comisión Nacional de la Energía, CNE), a public body with its own legal personality attached to the Ministry of Industry, Tourism, and Commerce (Ministerio de Industria, Turismo y Comercio, Mityc). Its aims are to ensure efficient competition in energy systems (the electricity and oil markets, both liquid and gaseous elements), and the objectivity and transparency of the market. The CNE watches the functioning of the market to guarantee a fair play for all players involved, including the consumers.

The Renewable Energy sector is regulated according to European Union directives which are inspired by the following guidelines:

The White Paper (1977): this document defines a strategy and an action plan for promoting RE that establishes an RE consumption objective for 2010 of 12% of gross consumption:

- An increase in the electricity production of Renewable Energies of 4.13% in 1995 to 23.5% in 2010
- The duplication of heat production by RE
- A 2% market share for liquid biofuels..

Directive 2001/77/EC The electricity generated from RE will mean 22% of the gross electricity consumption by 2010. In order to achieve this, the member states will publish a report every 5 years with the RE electricity consumption objectives for the next 10 years and another report every 2 years with the degree of compliance with these objectives. Every 2 years the EC will assess compliance with national objectives and consistency with overall objectives, and may propose compulsory objectives

Moreover, the member states will guarantee the transport and distribution of renewable electricity, and may set up priority access to the network by establishing connection regulations with objective, transparent, and non-discriminatory criteria.

Directive 2003/30/EC.- Increasing the use of biofuels or other renewable fuels for transport: the progressive introduction of bioethanol and biodiesel in the energy consumption of the transport sector, the objective being that biofuels represent 2% in 2005 and 5.75% in 2010.

The national objectives set by each country should lead to compliance with the overall objective of the EU. However, according to preliminary reports the results are insufficient and only 18% or 19% of the Plans for Encouraging Renewable Energies (Planes de Fomento de las Energías Renovables, PFER) would be reached. Progress is very uneven between the member states.

Therefore the EU has proposed a new energy policy. On 10 January 2007 a series of global measures were presented that have been designed to combat climatic change, and to ensure energy safety and the competitiveness of the EU. These measures were ratified by the European Council on 9 March.

Within this new framework the EU assumes the commitment of ensuring by 2020 that 25% of the primary energy consumed is renewable, and of increasing to 10% the consumption of biofuels for transport. This new framework is structured around three axes:

1. **Promoting an internal European Energy market**, encouraging competition and transborder electricity commerce.
2. **Increase in Energy Efficiency**
3. **The Renewable Energy Roadmap** in order to use energies that produce small amounts of gas emission. In 2007 the Commission will put forward some legislative proposals, whose objectives will be legally binding. Nevertheless states may adopt the combination of RE best suited to their country. They must draw up national action plans with specific objectives and measures and sectorial objectives for the following sectors of RE: electricity, biofuels, heating, and cooling. The main measures will concentrate on the following aspects:

Electricity: **a new legal framework to promote programmes using RE.**

Biofuels: The follow-up of the directive issued in 2003, production incentives, tax exemptions, and the obligation to use biofuels as an alternative to gas-oil and petrol.

Support for new technologies to make renewable energy sources cheaper: a new European Energy Technology Strategic Plan will be presented in spring 2008, and the amount spent annually on energy research will be increased by at least half the present amount; the Council approved to provide over 1,200 million euros for R+D within the sector between now and 2013.

As far as Spanish legislation is concerned, the development of the RE market is subject to the following regulatory framework:

Law 54/1997 The liberalisation of the electricity market establishes a **special RE system** (< 50 Mw) guaranteeing access to the network and a Premium for renewable energies.

Royal Decree, RD 436/2004 A special system for electricity production, which establishes two sales options with the possibility of an annual change.

RD 1432/2002.- To the distribution company at a regulated price (average % of the electricity price rate). Also, on the market: rock bottom price (calculated on a timetable basis) + bonus (average % of the electricity price rate) + incentives + supplements.

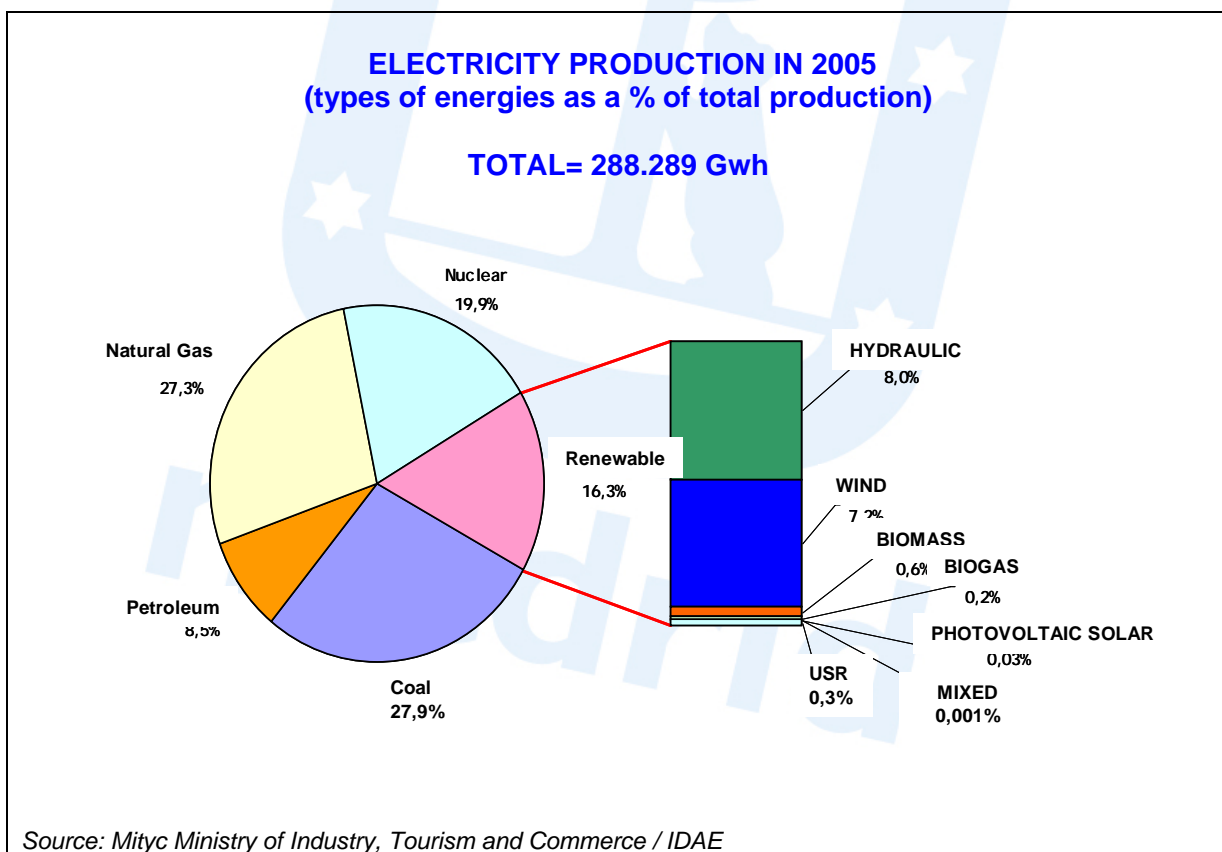
The decree also makes it compulsory to issue forecasts and penalties for deviation, together with a guaranteed premium system, the obligation of the distributor to accept the energy, payment related to the average or reference price, and incentives to encourage participation on the electricity market without retroactivity for future reviews.

Law 24/2005.- Reforms for encouraging productivity, making possible: premiums > 90% for installations using biomass and biomass combustion in thermal plants belonging to the “Sistema Ordinario” (co-fuel). (modifies Law 54/1997) posibilita: primas > 90% para las instalaciones que utilicen biomasa y combustión de biomasa en plantas térmicas del régimen ordinario (co-combustion)

For the achieving of the objectives in relation to RE, since the year 2000 five-year plans have been approved. The one currently in force is the **2005-2010 Plan for Encouraging Renewable Energies (Plan de Fomento de las Energías Renovables, PFER)**, which establishes soft financing so as to encourage Renewable Energies (RE) and Electricity Energy (EE).

The Supply

La producción de Energías Renovables en el 2005 alcanzó más del 16% del total de producción de energía eléctrica (casi 47.000 Gwh), frente a casi el 20% en el 2004. Este retroceso se debe a la baja hidraulicidad del año 2005, ya que la energía hidráulica es la que representa el 8% de la producción total, y casi la mitad del total de EERR.



In 2005 the wind energy sector was consolidated with 7% of the total EE produced; Spain is currently the second world leader. The capacity installed in recent years has developed into over 1,300 new annual Mw.

Electric energy based on RE has increased its production by 26% and its installed power by 40% over the last five years. The growth figures are much higher than those for non-hydraulic energies, as the production of the latter has been affected by the low rainfall of recent years, although power has increased by 13%.

Nevertheless, Spain continues to support hydraulic energy. Since 1999 some 40 new Mw per year have been put into operation in power stations of 10 Mw or less; the mini-hydraulic energy (<10Mw) accounts only for 17% of the production and 10% of the installed power, but 70 or 80 further Mw/year are expected to be operating by 2010.

Non-hydraulic energies grew 34% in production and 32% in installed power. Energy production from biomass increased annually by an average of 46%, wind energy by 35%, and photovoltaic solar energy by 34% (in the latter case starting from very low levels of 18 Gwh/year).

The PER is above all looking toward photovoltaic solar energy and biomass for the production of EE, with growth objectives of over 50% for each in both production and installed power.

Regarding thermal production based on renewable energies, biomass represents 60% of the total. The production of biofuels must be emphasised; this has grown almost 40% per year over the last five years, and the PER proposes the objective of increasing production by 60%, in such a way that by 2010 it will be rather more than half of that of biomass, and over 30% of the total.

| PRODUCTION OF THERMAL ENERGY BY SOURCE OF RENEWABLE ENERGY | | | | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 1990 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2010 |
| BIOMASS | 3.584 | 3.340 | 3.356 | 3.361 | 3.388 | 3.428 | 3.444 | 4.070 |
| BIOGAS | — | 25 | 25 | 28 | 28 | 28 | 36 | — |
| BIOFUELS | — | 51 | 51 | 121 | 184 | 228 | 265 | 2.200 |
| THERMAL SOLAR | 22 | 31 | 36 | 41 | 47 | 53 | 62 | 376 |
| GEOTHERMAL | 3 | 8 | 8 | 8 | 8 | 8 | 8 | — |
| TOTAL | 3.608 | 3.455 | 3.476 | 3.558 | 3.655 | 3.745 | 3.815 | 6.645 |

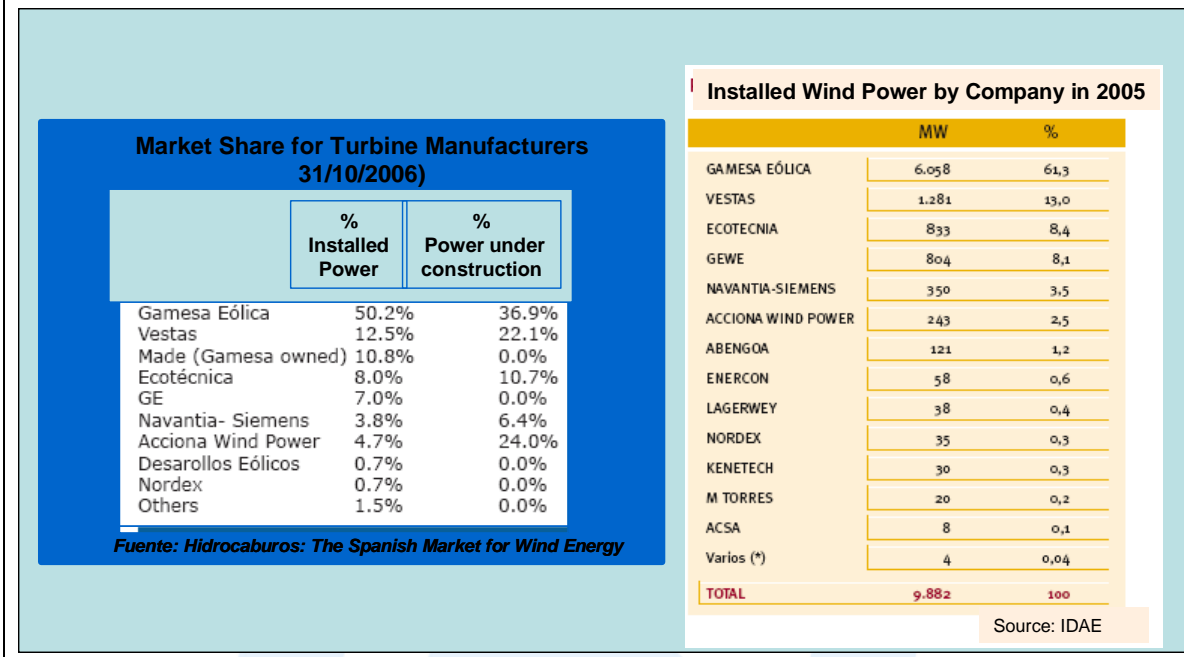
| POWER AND PRODUCTION OF BYSOURCE OF | | | | | | | | |
|-------------------------------------|---------------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|
| | 1990 ^(*) | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2010 |
| HYDRAULIC (>10 Mw) | | | | | | | | |
| Power (Mw) | 16.553 | 16.379 | 16.399 | 16.399 | 16.399 | 16.418 | 16.432 | 16.778 |
| Production (Gwh/year) | 23.481 | 27.381 | 39.090 | 22.228 | 38.512 | 29.537 | 19.024 | 31.494 |
| HYDRAULIC (<10 Mw) | | | | | | | | |
| Power (Mw) | 612 | 1.588 | 1.630 | 1.666 | 1.704 | 1.749 | 1.788 | 2.199 |
| Production (Gwh/year) | 2.140 | 4.424 | 4.768 | 4.240 | 5.407 | 5.040 | 3.977 | 6.692 |
| WIND | | | | | | | | |
| Power (Mw) | 7 | 2.292 | 3.276 | 4.892 | 6.236 | 8.319 | 9.912 | 20.155 |
| Production (Gwh/year) | 13 | 4.689 | 6.933 | 9.605 | 12.065 | 16.080 | 20.924 | 45.511 |
| BIOMASS | | | | | | | | |
| Power (Mw) | 106 | 150 | 173 | 288 | 331 | 344 | 354 | 2.039 |
| Production (Gwh/year) | 616 | 242 | 564 | 1.012 | 1.293 | 1.315 | 1.596 | 14.015 |
| BIOGAS | | | | | | | | |
| Power (Mw) | — | 50 | 55 | 73 | 125 | 141 | 152 | 235 |
| Production (Gwh/year) | — | 159 | 189 | 222 | 299 | 571 | 583 | 1.417 |
| USR | | | | | | | | |
| Power (Mw) | 27 | 107 | 157 | 163 | 163 | 189 | 189 | 189 |
| Production (Gwh/year) | 139 | 541 | 659 | 724 | 837 | 670 | 898 | 1.223 |
| PHOTOVOLTAIC SOLAR | | | | | | | | |
| Power (Mw) | 3 | 12 | 16 | 20 | 27 | 37 | 52 | 400 |
| Production (Gwh/year) | 6 | 18 | 23 | 30 | 40 | 56 | 78 | 609 |
| THERMAL SOLAR | | | | | | | | |
| Power (Mw) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 500 |
| Production (Gwh/year) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.298 |
| TOTAL | | | | | | | | |
| Power (Mw) | 17.308 | 20.579 | 21.707 | 23.501 | 24.985 | 27.196 | 28.878 | 42.494 |
| Production (Gwh/year) | 26.395 | 37.454 | 52.227 | 38.061 | 58.453 | 53.270 | 47.080 | 102.259 |

Source: IDAE (2005 provisional data, 2010 PER objective)

Wind energy

Spain is the second country in the world in terms of installed power, with 25.3% of the market share. 23.6% of the world's turbines are manufactured in Spain. There are over 500 companies, two of which are among the 10 largest in the world in the wind sector.

TOP COMPANIES IN THE WIND SECTOR



Photovoltaic Solar Energy

Spain is a top world centre for the photovoltaic industry. It is also a European leader in the production of solar modules and third in the world. Spain has a solid manufacturing and export basis that includes not only manufacturers of cells and photovoltaic panels, but also manufacturers of current inverters and system components.

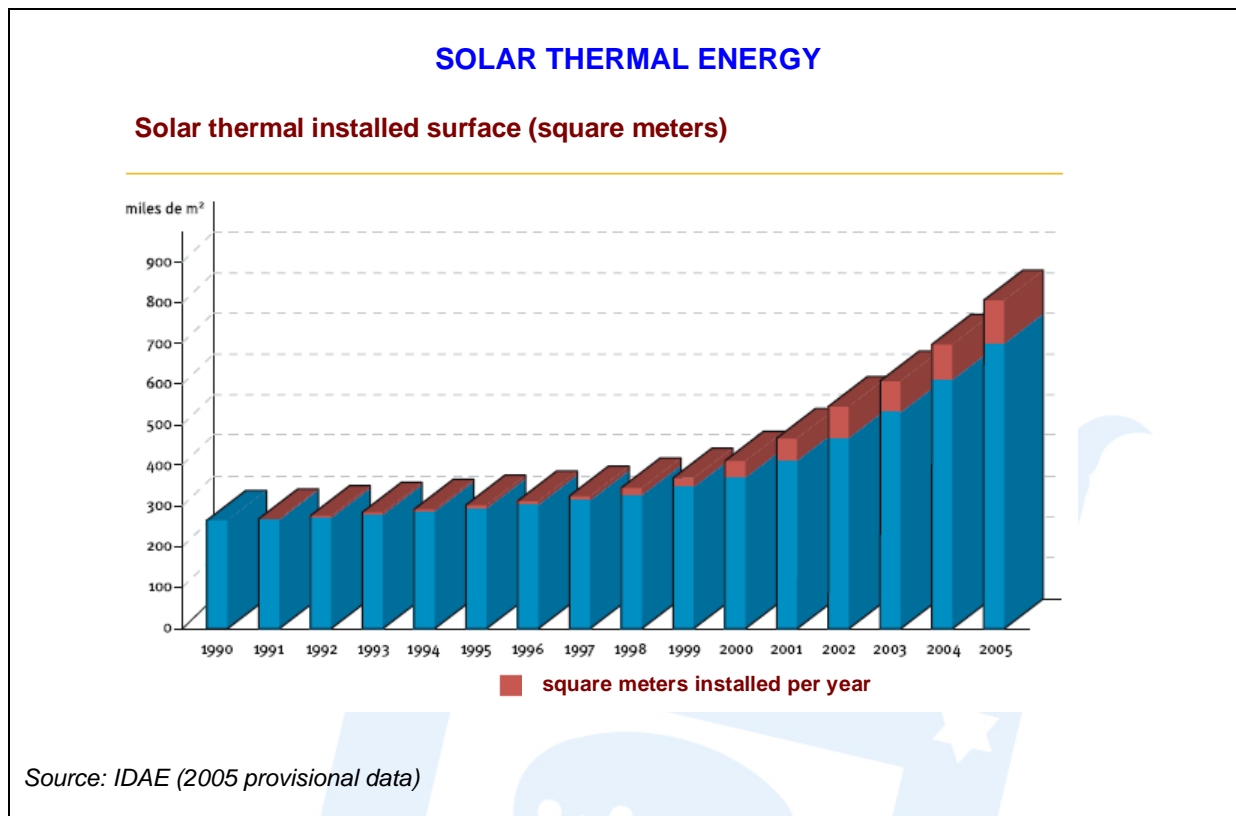
The current tendency is very favourable towards solar parks, which obtain a far superior performance to that of other static systems and are an attractive option for private investors. They are also of interest for individual installations given the new building regulations.

The Almeria Solar Platform (Plataforma Solar de Almería, PSA), which is owned by the CIEMAT, the Energy Research Centre with its headquarters in Madrid, is the largest European centre for testing solar concentration industrial technological applications.

Thermal Solar Energy

Important service companies such as Abengoa, ACS, and Iberdrola (the second electricity company in Spain), plan to invest around one billion dollars over the next three years in the construction of solar energy stations. Each of these stations will generate sufficient energy to supply 50,000 homes.

Since the year 2000 rapid growth has occurred in the installed capacity, with over 80,000 new m2 annually. The installation of 211,000 additional m2 is the very ambitious objective for 2006.



Madrid accounts for 13% of the installed power in Spain in solar energy, 6% thermal and 6% photovoltaic; this is considerably lower than its potential.

Biomass

Biomass for thermal uses has remained stagnant in recent years at around 3,400 Ktep per year. The average annual installed power for electricity in recent years has increased by 19% and production by 46%. A moderate growth in biomass is planned and a strong decision for the use of biomass in electricity (3% and 42% of annual average growth by 2010, according to the PER).

Biogas

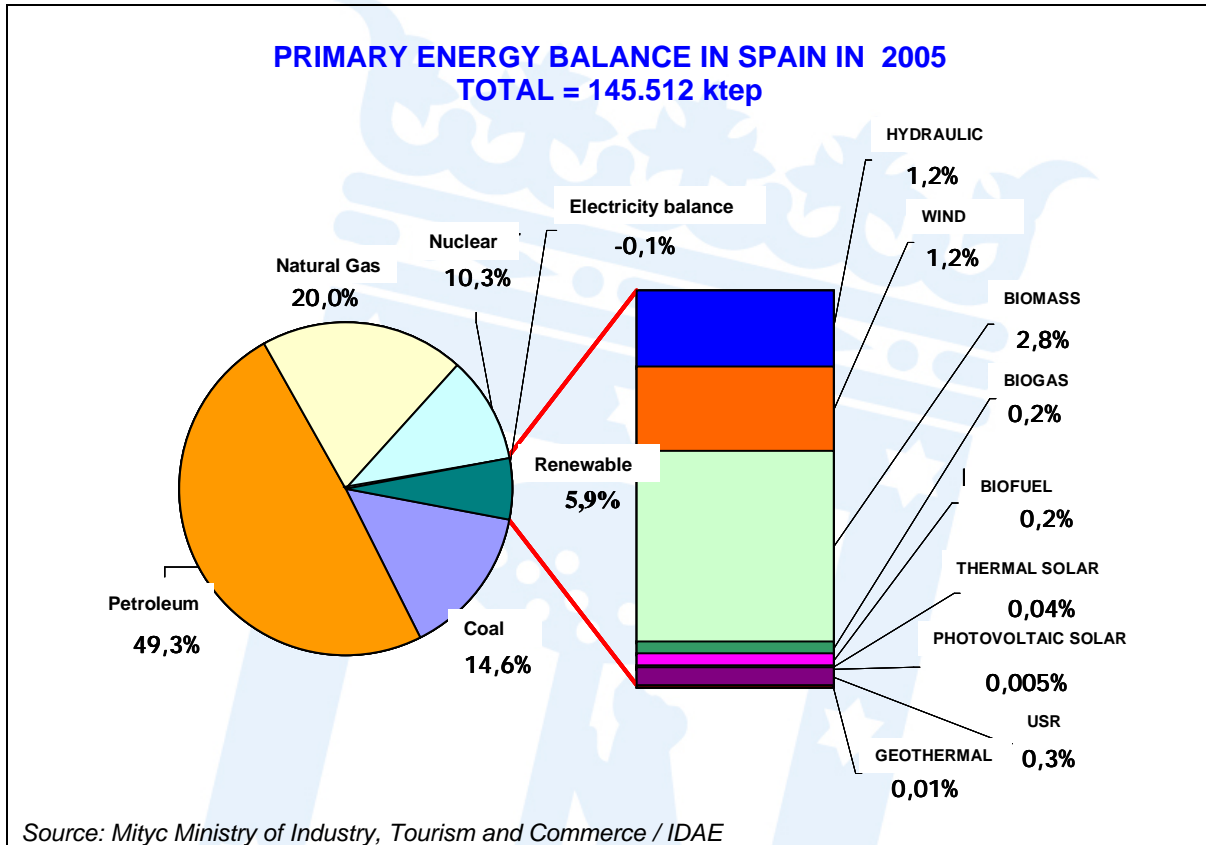
The production of biogas has increased by an annual average of 30% since the year 2000; it generated 583 Gwh of electricity in 2005. 80% of the increase over this period corresponds to the organic processing of urban solid waste and 20% to the treatment of black water, industrial waste, and stockbreeding waste. Madrid holds 37% of the installed power in Spain for the production of this type of energy..

Biofuels

Towards the end of 2005 nine installations were in operation with a production capacity of 346,000 tons (t) for bioethanol and biodiesel equivalent to 265 ktep. The production of biofuels is currently incipient in Madrid, with the Alcalá de Henares biodiesel plant having a production capacity of 5,000 tons (t)/year. A project exists to build a new plant at Villaverde for the production of bioethanol and biodiesel from oleaginous crops.

The sector has a favourable tax rating (type zero) for biofuels.

The Demand



Although non-hydraulic renewable energies continue to grow at a satisfactory rate (9% en 2005), the low rainfall, already mentioned, and the increase in primary energy consumption (3%) explain the lower proportion of renewable energies in covering demand, compared with 16% of the production.

Biomass represents half of the renewable primary energy consumption in 2005, which reached 4,127 ktep.

| CONSUMPTION OF RENEWABLE ENERGY IN SPAIN (Ktep) | | | | | | | | |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| ENERGY SOURCE | 1990 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2010 |
| MINIHYDRAULIC (< 10 Mw) | 184 | 380 | 410 | 365 | 465 | 433 | 342 | 575 |
| HYDRAULIC (>10 Mw) | 2.019 | 2.155 | 3.118 | 1.624 | 3.067 | 2.292 | 1.337 | 2.536 |
| WIND | 1 | 403 | 596 | 826 | 1.037 | 1.383 | 1.799 | 3.914 |
| BIOMASS | 3.753 | 3.443 | 3.598 | 3.794 | 3.942 | 3.991 | 4.127 | 9.208 |
| BIOGAS | - | 76 | 85 | 99 | 123 | 210 | 221 | 455 |
| BIOFUELS | - | 51 | 51 | 121 | 184 | 228 | 265 | 2.200 |
| USR | - | 227 | 276 | 304 | 351 | 281 | 377 | 395 |
| THERMAL SOLAR | 22 | 31 | 36 | 41 | 47 | 53 | 62 | 376 |
| PHOTOVOLTAIC SOLAR | 0 | 2 | 2 | 3 | 3 | 5 | 7 | 52 |
| THERMOELECTRIC SOLAR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 509 |
| GEOHERMAL | 3 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| TOTAL | 5.983 | 6.776 | 8.180 | 7.182 | 9.228 | 8.884 | 8.545 | 20.228 |

Source: IDAE (2005 provisional data)

The energy consumption of Madrid is around 10% of the national total. Although its contribution to the GDP exceeds 17%, its economy is highly concentrated in the service sector and it is the Spanish region that is most efficient as far as energy is concerned.

Madrid is net importer of energy resources, with its energy production being only 3% of consumption. However, 75% of this production consists of renewable energies, of which biogas and biomass are particularly relevant with the energy exploitation of USW.

In 2005 the Autonomous Region of Madrid consumed 90 ktep of biogas, 28% of the national total, and 80 ktep of biomass, some 2%

Research, Development and innovation

On a national scale the main sources of finance for the technological sectors are coordinated by means of the National Plan for Scientific Research, Development, and Technological Innovation (2004-2007), which includes a number of different programmes. The most outstanding of these was the programme known as PROFIT (Programa de Fomento de la Investigación Técnica or Programme to Encourage Technical Research). The aid programme is structured around subsidies, refundable preferential loans, and a combination of both systems. It is available to companies in particular and also institutions and research centres in a series of diverse sectors.

The CDTI (Centro para el Desarrollo Tecnológico Industrial or Centre for Industrial Technological Development) finances R+D+I technology projects in various sectors, either with funds of its own or by facilitating access to financing by third parties (financing by banks by means of the Line for Financing Technological Innovation and Subsidies from the R+D Framework Programme of the EU). It may finance as much as 70% of the project in the form of 0% loans and long-term repayment. The CDTI is the body that manages programmes such as Ingenio 2010, which further develops the programmes of the national R+D+I plan and CENIT, in order to encourage collaboration between companies, universities, and public research centres and scientific and technological parks, by means of the creation of Strategic National Consortiums for Technological Research.

The IDAE together with the Autonomous Regions manages the funds and measures assigned by the PER for 2005-2010. Each Autonomous Region signs a collaboration

agreement including the financial contributions of each party and the package of measures to be carried out. In 2006 the Secretariat General for Energy (SGE) of the Mityc contributed 215 million euros, and the Autonomous Regions a further 66 million euros, of which 2.16 million (10%) were allocated to Madrid and administered by the Autonomous Regions through the IMADE (Instituto Madrileño de Desarrollo or Madrid Development Institute).

In 2006 the IDAE financing lines for SMEs (companies with less than 250 employees and a turnover of less than 50 million €) reached a total amount of 30 million euros address to photovoltaic and thermal solar energy, cogeneration, and biomass. This financing is up to 100% with a maximum of 1.5 million euros to pay back over 11 years at a Euribor interest rate of +0.30.

The IDAE also helps to finance projects by participating directly in the Temporary Union of Companies (Unión Temporal de Empresas, UTE), Groups of Economic Interest (Agrupaciones de Interés Económico, AIE) or public limited companies, as well as seeking financing by third parties and participating in agreements. It also gives advice on savings, energy efficiency, renewable energies, pre-diagnosis, feasibility studies, etc.

On an international level the action contemplated in the VI Framework Programme of the European Union 2007-2013 allows access to aid by participating in international consortiums for R+D+I projects. It has a budget of 50,521 million euros.

Within this framework the Europe Smart Energy programme (Energía - Inteligente Europa, EIE), of the EU Energy Commission plans to promote renewable energy projects; it has a budget of 730 million euros within the European Competitiveness and Innovation Programme for 2007-2013. This programme aims to eliminate barriers in the use of RE, but it does not finance technological projects like CONCERTO or CIVITAS.

Other international programmes include EUREKA and IBEROEKA, which without funds of their own give the projects that have been backed a seal of quality that facilitates access to sources of public financing in the respective countries. In Spain this is done basically through PROFIT. EUREKA promotes strategic projects to carry out R+D projects based on technologies (cluster) or areas of application (umbrella). IBEROEKA is a programme of technological cooperation with Latin American companies, the administration of which corresponds to the Latin American Network of Administering Bodies; in Spain the latter is the responsibility of the CDTI.

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Trends & Outlook

The need to adapt the energy sector to environmental challenges and to ensure supply, together with the commitments acquired with the EU and the Kyoto Protocol, have encouraged the approval of a new Renewable Energy Plan (Plan de Energías Renovables, PER) for the 2005 – 2010 period. The objectives of this Plan for 2010 are:

1. 12,1% of the primary energy consumption will be provided by RE.
2. Electricity production with RE will be 30.3% of the gross electricity consumption, almost 103,000 Gwh out of a total production of 333,400 Gwh.
3. Biofuels will contribute 5.83% of the petrol + diesel consumption for transport.

By energy types the objective is for the production of wind energy to be almost 45% of the production of renewable energies for electricity use and 30% of the primary energy produced by renewable energies. This would exceed hydraulic energy which would be 39% of production, of which 35% would be mini-hydraulic, and 24% primary electricity energy.

For biomass there is an ambitious proposal to exceed 9,000 ktep in the production of primary energy, which would be 45% of the total for renewable energies, 30% of electricity, and over 90% of thermal energy.

Wind energy, hydraulic, and biomass would be over 90% of primary energy for electricity.

All these objectives represent an investment of 23,598.64 million € with 8,492.24 million € in public aid.

The sector expects to generate some 95,000 net jobs in this period in compliance with the Plan.

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| RENEWABLE ENERGY PLAN IN SPAIN (PER 2005-2010). OBJECTIVES | | | | | | | | | |
|--|------------------------|------------------|-----------------------|----------------------------|------------------|-----------------------|------------------------|------------------|-----------------------|
| | 2004 Figures | | | Growth Objective 2005-2010 | | | Objective 2010 | | |
| | Power (Mw) | Production (Gwh) | Primary Energy (Ktep) | Power (Mw) | Production (Gwh) | Primary Energy (Ktep) | Power (Mw) | Production (Gwh) | Primary Energy (Ktep) |
| ELECTRICITY GENERATION | | | | | | | | | |
| HYDRAULIC (>50 Mw) | 13.521 | 25.014 | 1.979 | 0 | 0 | 0 | 13.521 | 25.014 | 1.979 |
| HYDRAULIC (>10 Mw and <10 Mw) | 2.897 | 5.794 | 498 | 360 | 687 | 59 | 3.257 | 6.480 | 557 |
| MINIHYDRAULIC (< 10 Mw) | 1.749 | 5.421 | 466 | 450 | 1.271 | 109 | 2.199 | 6.692 | 575 |
| BIOMASS | | | | | | | | | |
| Biomass Plants | 344 | 2.193 | 680 | 1.695 | 11.823 | 4.458 | 2.039 | 14.015 | 5.138 |
| Co- combustion | 344 | 2.193 | 680 | 973 | 6.787 | 2.905 | 1.317 | 8.980 | 3.586 |
| USR | 0 | 0 | 0 | 722 | 5.036 | 1.552 | 722 | 5.036 | 1.552 |
| WIND | 0 | 0 | 0 | 722 | 5.036 | 1.552 | 722 | 5.036 | 1.552 |
| PHOTOVOLTAIC SOLAR | 189 | 1.223 | 395 | 0 | 0 | 0 | 189 | 1.223 | 395 |
| BIOGAS | 8.155 | 19.571 | 1.683 | 12.000 | 25.940 | 2.231 | 20.155 | 45.511 | 3.914 |
| THERMOELECTRIC SOLAR | 37 | 56 | 5 | 363 | 553 | 48 | 400 | 609 | 52 |
| TOTAL ELECTRICITY | 141 | 825 | 267 | 94 | 592 | 188 | 235 | 1.417 | 455 |
| | — | — | — | 500 | 1.298 | 509 | 500 | 1.298 | 509 |
| | 27.032 | 60.096 | 5.973 | 15.462 | 42.163 | 7.602 | 42.494 | 102.259 | 13.574 |
| THERMAL ENERGY | | | | | | | | | |
| | m² Solar t. baja temp. | | (ktep) | m² Solar t. baja temp. | | (ktep) | m² Solar t. baja temp. | | (ktep) |
| BIOMASS | | | 3.487 | | | 583 | | | 4.070 |
| THERMAL SOLAR | 700.805 | | 51 | 4.200.000 | | 325 | 4.900.805 | | 376 |
| TOTAL THERMAL | | | 3.538 | | | 907 | | | 4.445 |
| BIOFUELS (TRANSPORT) | | | | | | | | | |
| TOTAL BIOFUELS | | | 228 | | | 1.972 | | | 2.200 |
| TOTAL RENEWABLE ENERGIES | | | | | | | | | |
| | | | 9.739 | | | 10.481 | | | 20.220 |
| Primary Energy Consumption (Ktep) | | | | | | | | | |
| | | | 141.567 | | | | | | 167.100 |
| Renewable Energy(Primary Energy (%)) | | | | | | | | | |
| | | | 6,9% | | | | | | 12,1% |

Source: IDAE

These objectives entail a total production of an annual average of some 10,500 ktep, of over 42,000 Gwh of electricity production, and a 15,500 Mw of increase in power, with important growth in all types of energies as can be seen in the table below.

During the first year of the coming into force of the plan, over 70% of the planned objectives have been complied with regarding the consumption of primary energy and installed power, as well as 88% of the investment. The EE areas were those that came closest to the targets. Regarding the public aid between 70% and 77% of those proposed by the PER have been awarded. These results are very satisfactory if we take into account that the PER was not approved until August 2005.

The table below shows the growth objectives and the measures proposed by the 2005-2010 PER in order to achieve them.

| OBJETIVES & MEASUREMENTS PLANNED FOR THE 2005-2010 PER | |
|--|--|
| <u>Wind</u> | <p>Objective 2005-2010: to almost double the capacity.</p> <p>Measures:</p> <ul style="list-style-type: none"> • Development of transport networks and checking the Planning of the Gas and Electricity Sectors • Development of wind park coordination centres to group together installations from the same company or territory • Extending of the application of incentives to transform old wind-powered generators. <p>Regulation: Improvement of the regulations on connection, access to the network, and operating conditions</p> |
| <u>Hydraulics</u> | <p>Objective 2005-2010: Increasing the mini-hydraulic power by 810 Mw (15% in total)</p> <p>Measures:</p> <ul style="list-style-type: none"> • Improving the hydroelectric exploitation of ecological flows • Encouraging public tenders on state infrastructure <p>Regulation: New Royal Decree (RD) on access to the network and operating conditions.</p> |
| <u>Solar Thermal</u> | <p>Objective 2005-2010: A surface increase of 4.2 million m² (6 times the current figure)</p> <p>Measures: Dissemination and citizen training campaigns</p> <p>Regulation</p> <ul style="list-style-type: none"> • Coming into effect of the “Código de Edificación Técnica” (Technical Building Code) <p>Support for the Municipal Solar Ordinances</p> |
| <u>Solar Photo Voltaic</u> | <p>Objective 2005-2010: 52 Mwp (Mega watts peak) in 2005 at 400 Mwp (670% in total)</p> <p>Regulation: Coming into effect of the Technical Building Code</p> |
| <u>Solar Thermo Electric</u> | <p>Objective 2005-2010: From 0 Mw in 2004 to 500 Mw.</p> <p>Measures</p> <ul style="list-style-type: none"> • Specific premium for this technology in RD (Royal Decree) 436/2004 • Support for demonstration projects (up to 200 Mw) <p>Public support to the investment for the first projects</p> |
| <u>Biomass</u> | <p>2005-2010 objective: Increase of 1,695 Mw for electricity and 583 ktep for thermal. (6 times the biomass for electricity, a 43% annual average, and 3% annually and an 18% total for thermal biomass).</p> <p>Measures:</p> <ul style="list-style-type: none"> • Support for co-combustion technology • Subsidizing 30% of the investment in equipment for domestic use • Aid programme for the purchase of machinery for collection, treatment, and transport <p>Regulation: Modifying the Woodland Law for greater availability of forestry waste</p> |
| <u>Biofuels</u> | <p>2005-2010 objective: Increase of 2,000 ktep (almost 8 times current production)</p> <p>Measures:</p> <ul style="list-style-type: none"> • Extension of fuels tax exemption for at least the first 10 years of the life of a project. • Development of all the possibilities offered by the Common Agricultural Policy (CAP), especially aid for energy crops • Developing logistics for collecting used vegetable oils <p>Development and selection of new oleaginous species adapted to the agricultural characteristics of Spain</p> |

Among the legislative measures proposed the drawing up of the Technical Building Code point out, which came into force on 17 March 2006. The Code consists on twelve basic documents, the twelfth of which (DB-HE) is devoted exclusively to energy saving. It establishes and regulates, among other things, the introduction of solar thermal energy to produce hot water in homes and of photovoltaic energy in public buildings and offices. The effects of the application of the new Code will begin to be observed as from 2008. Likewise, the two additional Decrees will complete the transposition of Directive 2002/91/EC, that corresponding to the revision of Regulations of Thermal Installations in Buildings (Reglamentos de Instalaciones Térmicas de los Edificios, RITE), and that establishing the Energy Certificate for Buildings.

Among the research projects those concerning Thermoelectric Solar Energy stand out during 2007 the PS10 tower centre. It will start to operate connected to the electricity network; it will be the first commercial station of its kind in the world. Some 20 projects exist in the promotion phase, with technologies of cylinder-parabolic and tower manifolds, which as a whole will represent installed power of over 1,000 Mw.

Research Into Photovoltaic concentration will materialise in the setting up of a pioneering centre in Puertollano in 2008.

In wind energy, desalinisation projects to exploit the wind energy generated on floating platforms opposite the Mediterranean coast and R+D projects to produce clean hydrogen from a renewable energy source such as wind.

Both the Autonomous Regions and the town councils are issuing regulations designed to promote energy saving and the use of REs. The Madrid Town Council has approved 5 municipal ordinances regarding the installations of solar collectors for thermal uses.

After 2010 the New European Framework should help to ensure an increase in RE research and production projects in all sectors: electricity, heating / cooling, and biofuels. The ambitious objectives of the Plan are that by 2020 the 25% of the primary energy consumed in the European Union will be renewable, and an increase of 10% in the consumption of biofuels should take place.



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Advantages to invest in Madrid

Madrid Meeting Point for Companies and Institutions

Madrid is where we can find the headquarters of large companies in the traditional energy sector which have entered the renewable sector, such as Endesa, Unión FENOSA, and Repsol YPF, together with top international capital goods companies such as ABB, General Electric, Alstom, and Siemens.

From Madrid companies such as Endesa Cogeneración y Renovables (ECYR) direct their international operations in Portugal, Colombia, and Mexico, with an installed power of 156 Mw.

Eight of the 10 leading groups of engineering companies also have their headquarters in Madrid: INECO-TIFSA, GRUPO TYCSA, IBERDROLA INGENIERIA Y CONSTRUCCIÓN, EPTISA, PROYNTEC, GHESA, INTECSA, and ACCIONA. Besides the large companies, a multitude of small specialised engineering companies also are present in the city Anta, Americana de Proyectos, Dalkia, Initec, Getecsa, Ghesa, Proyectos Medioambientales, Typsa, etc.

Many of the top companies of the sector in Spain have branches in Madrid, and there are almost 100 companies registered in the IDAE that have their headquarters in the Region of Madrid; of these almost 75% are established in the capital. Many of them operate in the combined areas of solar and wind energy, while others specialise in biomass, biogas, and USW; the great majority are engineering companies that operate on the national and international market from Madrid.

Iberdrola, the leading company in the electricity sector, has offices operating in Madrid. It is present in the RE sector in Italy, the United Kingdom, France, Germany, Poland, Portugal, Greece, and Brazil

The world leader in the wind sector, the company Games, which is branching out to include other fields, is present in Madrid, as it is in 15 countries of Europe and America and also China. It operates wind parks and markets its own wind-powered generators. In 2006 as much as 30% of its income was generated in China and the United States.

Other companies such as BP Solar Renovables, Enertron, and Soluciones Energéticas also have their headquarters in Madrid.

BP Solar, one of the leading companies in the world of renewable energies, has chosen Madrid for the development of a new line of technology concerning photovoltaic cells. This has attracted 28 million euros and 100 new jobs to the Region of Madrid. The city is currently one of the candidates for hosting one of the two world centres for excellence in the manufacture of these cells, which would involve an investment by BP Solar of 400 million euros during the period 2006-2010 within the Region

In the field of collaboration between companies and administration, Repsol YPF is leading a project subsidised by the CDTI for the research and identification of new raw materials and technological processes for the production of biofuels. It has signed an agreement with the company Acciona in order to produce over one million tons per year before 2009

Madrid is the decision-making centre of the sector. The headquarters of the CNE are located here, together with important institutions for the development of energy policies, such as IDAE , and research policies such as CDTI (Centro para el Desarrollo Tecnológico Industrial or Centre for the Industrial and technological Development) , CIEMAT (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas or Centre for Energy, Environmental, and Technological Research), CENER

(Centro Nacional de Energías renovables or National Centre for Renewable Energies), and the IES (Instituto de Energía Solar or Solar Energy Institute). The Spasolab of INTA (Instituto Nacional de Técnica Aeroespacial or the Aerospace Technique National Institute) is the body responsible on a European level for the certification of photovoltaic solar cells for spatial use.

Over half of the investments made in R+D+I correspond to companies installed in Madrid.

There are important Scientific Parks (Parques Científicos, PC) in Madrid, in which in principle a university participates, either as a promoting agent for the project or by contributing its stock of knowledge in the form of research centres and institutes. That of Tres Cantos is currently in operation; it is sponsored by the “Autónoma and Complutense” public universities. The TecnoAlcalá Park, in which the “Alcalá de Henares” University participates, is also operative and the Leganés Tecnológico Park is planned for 2007. This park aims to be emblematic and the largest in Europe with 2.8 million square metres, which will include a Scientific Park (directed by the “Universidad Carlos III”), an industrial technological park, and a commercial tertiary park.

In Madrid easy access is possible to a varied offer of trained human resources. Madrid has the largest number of universities of all Autonomous Regions in Spain, with 15 universities and 50 research centres, together with prestigious business schools: IESE, ESADE, ICAI, EOI, IE, etc.

Madrid firm commitment with renewable energies

The Renewable Energies is a priority sector for the Regional Government. The Autonomous Region of Madrid has committed to double the annual production of renewable energies up to 406 ktep by 2012. Along these lines the “2004-2012 Region of Madrid Energy Plan” has been drawn up in order to take advantage of renewable resources and encourage energy saving and efficiency respecting at the same time the environment. In order to achieve these goals a total investment of 774 M€ have been budgeted and aid of 100 M€ is assigned. The installed power will be around 342 Mw plus 300 Mwp. The Plan estimates the creation of 5,000 net jobs.

The fields that the plan mainly concentrates on are: solar energy, wind energy, USW and biomass and the energy proceeding from solid waste and sludge from water treatment plants.

The Plan anticipates three types of action for the development of RE sources:

1. Aid for viability and demonstration studies.
2. Aid for the promotion of technology and R+D.
3. Subsidies for the installations.

The following can be mentioned among the main actions planned for all types of energy:

Solar Energy:

New Legislation is going to be introduced for the promotion and use of photovoltaic solar energy in public and private buildings and offices, as well as municipal ordinances on the obligation to install low-temperature solar collectors in newly-constructed buildings.

Photovoltaic solar: aid for financing or subsidising the solar installations to a value up to 25% of the planned investment

Solar thermal: 10% subsidies of the investment planned in installations.

Madrid also puts its faith in research into less developed solar energy, such as Solar Thermoelectric energy. This is by means of a project to create a consortium among technological centres and universities for a viability study of a prototype station, and an emblematic project for the construction of a high-temperature heliothermal power station for electricity production. The Region will contribute with 20M€ for the feasibility studies of a total estimated investment of 50M€.

Biomass and Biofuels

The creation of the Complete Programme for Research and Technological Development (Investigación y Desarrollo Tecnológico, IDT), which is developed in three areas: direct thermal use, biofuels, and agro-electricity.

- Viability studies: biodiesel and bioethanol installation plants based on oleaginous crops (thistles and sunflowers) and heating demonstration projects for domestic use and in greenhouses.
- The carrying out of preliminary projects at three agro-electricity stations and the installation of a palletising plant to complement the current composting one.
- The use of centralised supply fleets so as to promote the use of biofuels.

This programme is subsidised for 50% of the planned investment in the construction of thermal biomass stations, and for 30% in the case of electrical biomass, together with 12 M€ to encourage the use of biomass and biofuels.

The Madrid Town Council is strongly supporting Energy Efficiency and Renewable Energies, especially by means of projects for managing USW.

The Technological Park of Valdemingómez is a point of reference all over Europe. The Madrid Town Council has been working since 1978 on the project of transforming the land of the Autocampo dump site within the Environmental Complex of Valdemingómez. This complex contemplates waste treatment centres, a dump site for inert matter, sludge treatment plants, and water generating stations, as well as training research and landscape recovery centres. The complex includes:

- Plants for the energy exploitation of biogas: three plants for generating electricity, one of them uses the biogas produced by the dump site. The Energy Assessment Plant of Las Lomas and the Degasification Plant obtains a net electricity production of almost 270,000 Gwh/year. The others are two new biomethanisation plants that are expected to start operation in 2007, with a treatment capacity of 470,000 tons of organic material that can be transformed into 283,000 Gwh/year of electricity energy.

- An "Environmental Technology Centre": the transformations of the buildings adjacent to the dump site, which will have a conference hall, offices, a library, etc.
- An "Environmental Education Centre", which will have a permanent exhibition and activities for schoolchildren, plus an interesting educational offer for university students, professional people, and the general public.
- A Forestry Park of some 100 hectares: the recovery of the landscape of the whole area of the Valdemingómez dump site, where over 50,000 trees from autochthonous species have been planted.

All this constitutes the Valdemingómez Technological Park. If all this energy produced were sent into the electricity network, this energy production could maintain the street lighting system of the city of Madrid for more than 3 years. It could also supply energy to some 400,000 citizens, or supply fuel for 400 city transport buses of the Municipal Transport Company (Empresa Municipal de Transportes, EMT) for one year.

The 2007 objective is that the contribution of clean electricity from the USW processing represents the 4.23% of the total energy consumption of the city of Madrid.

The Municipal Transport Company (Empresa Municipal de Transportes, EMT) has been using clean energies, natural gas, hydrogen, and electricity in its fleet of vehicles for years. The use of bioethanol is planned. Of the 2,015 buses that currently make up the EMT's fleet of vehicles, 238 operate on biodiesel, 174 on compressed natural gas, 20 are electronic and diesel hybrids and 3 run on hydrogen. They all account for over 20% of the total fleet.

Madrid is one of the few cities that have issued regulations making it compulsory to include solar installations in buildings. The Town Council has issued five ordinances; one of them makes it compulsory the installation of solar collectors in new houses.

All this demonstrates the firm support given by the Madrid Town Council to investments for the promotion of renewable energies and energy saving and efficiency in the form of economic aid and subsidies.

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Legal Framework

Directive 2005/89/EC of the European Parliament and Council of 18 January 2006 on ways of ensuring the supply of electricity and the investment in infrastructure

Directive 2003/54/EC of the European Parliament and Council of 26 June 2003 on common standards for the domestic market on electricity, revokes Directive 96/92/EC.

Royal Decree 1454/2005 of 2 December, which modifies certain dispositions concerning the electric sector

Directive 2001/77/EC: Electricity generated from RE

Directive 2003/30/EC on encouraging the use of biofuels and other renewable fuels for transport: the progressive introduction of bioethanol and biodiesel in the energy consumption of the transport system

Law 54/1997 of 27/11/97 on the Regulation of the Electricity Sector. Regulation of activities designed to supply electric energy. Official State Bulletin 285/1997 of 28/11/1997

Law 24/2005 on reforms for boosting productivity; it modifies the previous law (54/1997) to make it possible to award bonuses for the use of biomass.

Law 38/2003 of 17 November on general subsidies.

Royal Decree 436/2004 of 12/03/04 which establishes the methodology for the updating and systematisation of the special legal and economic system of the production of electric energy. Official State Bulletin No. 75 of 27 March 2004.

Correction of errors in Royal Decree 436/2004 of 12/03/04. Official State Bulletin No. 85 of 8 April 2004.

"Better Buildings". Summary of European regulations on energy saving in buildings. DG TREN of the European Commission

Royal Decree 1663/2000 of 29 September on the connection of photovoltaic installations to the low voltage network.

ICT Order 4112 2005 of 30 December on the system applicable for making both international exchanges and exchanges within the EC involving electric energy.

Royal Decree 314/2006 of 17 March which approves the Technical Code of Building

Decree 50/1999 of 11 March from the Presidency and Territorial Administration Council, which modifies Decree 107/98 of 4 June adopting temporary measures in procedures to authorise installations producing electricity from wind energy. Official Bulletin of the Principality of Asturias (B.O.P.A.) of 9 April 1999.

Para ampliar esta información se ofrecemos algunos links de interés:

[CNE](#)

[IDAE](#)

[APPA](#)

[UE](#)

| Institutional Framework |
|---|
| <p><u>AEE</u> Asociación Empresarial Eólica It represents the economic, industrial, and business interests of the wind sector in the field of renewable energies. It includes all kinds of companies: manufacturers, promoters, suppliers, finance companies, etc.</p> |
| <p><u>AEDIE</u> Asociación para la Investigación y Diagnósis de la Energía. It carries out energy audits and energy optimisation projects, as well as research into and the demonstration of renewable energies.</p> |
| <p><u>AEH2</u> Asociación Española del Hidrógeno Its objective is to promote the development of hydrogen technologies and to encourage its use in industrial and commercial applications</p> |
| <p><u>APPA</u> Asociación de Productores de Energías Renovables It groups together over 350 companies operating in the sector of renewable energies. They aim to raise public awareness, to engage in dialogue with public and private entities, and to coordinate training and research activities with educational institutions.</p> |
| <p><u>ASIF</u> Asociación de la Industria Fotovoltaica Its objective is to develop the photovoltaic sector by collaborating with the authorities responsible at both state and regional level. It carries out studies, issues publications, and organises conferences and events.</p> |
| <p><u>CDTI</u> Centro para el Desarrollo Tecnológico Industrial A Public Business Entity dependent on the Mityc, the objective of which is to contribute towards improving the technological level of Spanish companies. It provides financing of its own or from third parties for the carrying out of R+D projects. It supports technological promotion projects in order to exploit technologies developed by the companies themselves, through their network of international offices and Iberokea projects.</p> |
| <p><u>CENER</u> Centro Nacional de Energías renovables It is part of the CENER-CIEMAT Foundation and is a national technological centre devoted to the research, development, and encouragement of renewable energies in Spain. It collaborates in R+D+I applied research projects with companies and provides various services to the sector: certification and test laboratories, the designing, operating and diagnosing of equipment and installations, the assessment of potential and viability studies, etc..</p> |
| <p><u>CNE</u> Comisión Nacional de la Energía A public body with its own legal personality attached to the Mityc. Its objectives are to ensure effective competence in energy systems (electricity and hydrocarbon market, both liquid and gaseous) and the objectivity and transparency of operation.</p> |
| <p><u>CIEMAT</u> Centro Investigaciones Energéticas. Medioambientales y Tecnológicas A public research body attached to the Ministry of Education and Science, which carries out research and technological development projects; it serves to represent Spain on international forums and to give advice to public administrations</p> |
| <p><u>ENERCLUB</u> Club Español de la Energía 7,000 associated professionals and 150 energy or similar companies; it collaborates with Spanish universities and associations and international bodies. They organise events, issue publications, and provide training through the Spanish Institute of Energy.</p> |
| <p><u>IMADE</u> Instituto Madrileño de Desarrollo It comes from the Region of Madrid and promotes the creation of Centres of Enterprise and Centres of Business and Technological Services.</p> |
| <p><u>IDAE</u> Instituto para la Diversificación y Ahorro Energético. Its objective is to promote energy efficiency and the rational use of energy in Spain, and also the diversification of sources of energy and the increasing use of renewable energy. It gives technical advice and administers aid to the sector through its Central Administration.</p> |

IES Instituto de Energía Solar

The objective of the Solar Institute of the Madrid Polytechnic University (Instituto de Energía Solar de la Universidad Politécnica de Madrid, IES-UPM) is to research into aspects associated with the development of photovoltaic solar electricity through various programmes or lines of research.

SGC Secretaría General de la Energía

Department with competence on the subject of energy of the Ministry of Industry, Tourism, and Commerce (Mityc).

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APPA (Renewable Energy Manufacturers Association): Web site

ASIF (Photo Voltaic Manufacturing Association): Web site

CNE (National Energy Commission): Web site

CIEMAT (Energy research Centre; Environment and Technologies): Web site

CENER (Renewable Energy National Centre): Web site

Portals and E-magazines: todosolar.com, biocarburante.com, solyclima.com, solarweb.es, mundoenergía.com, energiasrenovables.com

Web sites of companies in the sector.

“Actualidad Económica” Magazine: “The 5,000 Largest Spanish Companies”. 2006 edition.

Main Companies

| | |
|---|---|
| <u>abb power technology s.a</u> | <u>general electric (ge) ge wind energy</u> |
| <u>abengoa</u> | <u>iberdrola energías renovables</u> |
| <u>abengoa bioenergía</u> | <u>isofoton</u> |
| <u>acciona</u> | <u>kenetech corporation</u> |
| <u>acsa</u> | <u>made tecnología renovables</u> |
| <u>abo wind españa s.a.</u> | <u>m.torres</u> |
| <u>alstom power service, sa</u> | <u>naturener</u> |
| <u>atersa</u> | <u>navantia</u> |
| <u>bp solar españa</u> | <u>nordex</u> |
| <u>cepsa</u> | <u>sersa</u> |
| <u>dersa</u> | <u>siemens</u> |
| <u>desa</u> | <u>repower systems</u> |
| <u>ecotecnia</u> | <u>repsol ypf</u> |
| <u>elecnor</u> | <u>shell windenergy, bv</u> |
| <u>endesa cogeneracion y renovables</u> | <u>soluciones energéticas</u> |
| <u>enercon</u> | <u>taim –tfg</u> |
| <u>enertron</u> | <u>total españa</u> |
| <u>eufer</u> | <u>vestas</u> |
| <u>gamesa</u> | <u>wind ibérica</u> |

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Other companies established in the Capital

| | |
|--|--|
| <u>abasol</u> | <u>ghesa ingeniería y tecnología, s.a.</u> |
| <u>americana de proyectos, s.a.</u> | <u>gm electricidad comunicación y servicios</u> |
| <u>anta consultoría de gestión</u> | <u>helios energías renovables s.l.</u> |
| <u>areva t&d iberica , s.a</u> | <u>ibersolar energía, s.a.</u> |
| <u>arup</u> | <u>in-comergy s.l</u> |
| <u>asesolar</u> | <u>ingelco ingeniería e instalaciones sl</u> |
| <u>besel, sa</u> | <u>ingennio sl</u> |
| <u>carring, s.a.</u> | <u>inghelios, s.l</u> |
| <u>calordom</u> | <u>ingypro, ingeniería y proyectos</u> |
| <u>cci s.l.</u> | <u>invarig ingeniería, s.l.</u> |
| <u>cgc gestión de biomasa s.l</u> | <u>inycia consultores s.l</u> |
| <u>círculo solar</u> | <u>iseinsolar instalaciones y proyectos s.l.</u> |
| <u>dalkia energía y servicios, s.a.</u> | <u>isoltel21</u> |
| <u>egl</u> | <u>latitud 0 grados, s.l.</u> |
| <u>ehiso energía</u> | <u>lm glasfiber</u> |
| <u>empresa nacional de ingeniería y tecnología</u> | <u>nac 3 s.a.</u> |
| <u>enelta</u> | <u>neo energía, s.l.</u> |
| <u>energi e2 renovables ibéricas, slu</u> | <u>olivento, sl</u> |
| <u>energía activa, s.l.</u> | <u>proyectos medio ambientales, s.a.</u> |
| <u>eólica del zenete, s.l</u> | <u>solar storm spain</u> |
| <u>ereda, sl</u> | <u>suntechnics sistemas de energía, s.l.u</u> |
| <u>eulen s.a.</u> | <u>tecnic y proyectos, s.a.</u> |
| <u>europone solar, s.a.</u> | <u>tricol sma</u> |
| <u>europolar, s.l</u> | <u>viasolar</u> |
| <u>factorverde s.l.</u> | <u>viensol</u> |
| <u>gamon innovacion s.l</u> | <u>voith turbo, sa</u> |
| <u>getecsa - ingeniería, s.l.</u> | <u>xcg consultores, s.a.</u> |