

## Castilla y León

### Regional RES-e Map: Electricity from Renewable energy sources (RES-e)



<b>The region</b>	Castilla y León
<b>Number of inhabitants</b>	2.456.500
<b>Size (in km<sup>2</sup>)</b>	94.224
<b>Capital</b>	Valladolid

#### Short description:

Castilla y León is situated in the mid Northwest of Spain, being the most extensive region in Europe, mixing the vast plains with important mountain places such as Gredos, Picos de Europa, Guadarrama or the Cantábrica mountain range. Economically, Castilla y León is based on an industrial sector (as in Valladolid and Burgos) pointing out the motor sector, the ceramic industry in Salamanca, as well as the agro-food sector which produces high quality wine labels such as Ribera de Duero, Bierzo, Tierras de León, Toro wines.

The service sector, mainly tourism, has undergone an outstanding development basing on an exceptional Historical Cultural Heritage and an excellent natural rich, as a consequence of a high number of natural protected areas.

**Share of RES** (total primary energy): 11,4 %

**Share of RES-e** (total electricity): 15,7 %

**Target RES-e:** (national or regional): 12 % (national)

**The partner organisation:** EREN

	Number of plants	Total installed capacity (MW)	Typical installation size	Main present funding mechanism	Short-term perspective (2007)	Mid/long-term perspective (2015)	Main barriers
<b>Biomass</b>	5	6.2	3 MW or 100 KW	Tariffs, Subsidies, own funds and credits.	--	--	Technological development, a shortage electricity price
<b>Solar thermoelectric</b>	--	--	50 MW		Low	Medium	High costs, lack of technological development
<b>Biogas</b>	18	10	500 MW		Medium	Medium	Technological development; underfunding electricity price
<b>Wind</b>	85	1710	20-50 MW	Tariffs, own funds and credits.	High	High	The grid connection
<b>PV</b>	3000	1.8	500-5000 Wp		High	High	Enough electricity price out of the established aims
<b>Hydro &lt;10</b>	200	280	500-1500 KW		Low	Low	Too long administrative procedure and environmental reply
<b>Geothermal electricity</b>	--	--	--	--	--	--	Lack of suitable sites

## Wind

**The past:** From 1998, when the first wind power plant was installed, the applications for potential installations have been increasing reaching more than 40.000 MW in great demand.

From 1998 to 2000, the regional government, Junta de Castilla y León, elaborated a Regional Wind Power Scheme, where the main environmental, technical and socioeconomic factors related with this kind of energy were integrated. The plan was developed in order to implant a methodology to regulate Wind Power development.

**The present:** There are a total of 85 Wind Power plants in

Castilla y León which means 1710 MW of power installed capacity. Furthermore there are 11 plants under construction which represent 212 MW in addition.

**The main barriers & strategies to overcome them:** In a "large scale" development, the main barrier in Castilla y León, as well as in other Spanish regions, is the power evacuation capacity to the grid, especially by the grid transport problems caused when the wind electricity production is much more than customer electric demand.

In order to sort out this problem and let more wind power installations, it is foreseen to develop a *Control Centre* which gives the possibility of controlling more effectively and efficiently the energy production by the system operator.

The main promoters in this sector are Electrical Companies, Financial Entities and private companies with head offices located in Castilla y León.

**Short-term perspectives (until 2007):** It is planned the installation of Wind power plants in order to be up to 700 MW yearly.

**Mid/long-term perspectives (until 2015):** When the installed 6.000 MW will be reached in the Castilla y León region, its subsequent development will be related with the implementation of a new electrical infrastructure and storage systems.



## Biomass

**The past:** Biomass has been historically used in domestic thermal applications. At the same time it has been observed a high level of interest from the Administration and enterprises in the development of electric generation projects.

**The present:**

The current sector situation is:

- Power plants in waste biomass generation industries (wood manufacture industries): currently there are 2 installations with a total of 6 MW.
- Large scale Power plants with not own residues: there are some projects which are going to begin their construction when the economic framework will be available because it is currently being reviewed.
- Small power plants (gasification): three pilot plants with a total of 0,16 MW are being developed in special technological places associated to the Valladolid University.
- Co-combustion power station with a biomass and coal: It is being developed studies to the implementation of these systems in the three power plants in the Castilla y León region which success will depend on the economic framework and the availability of biomass in the influence area of the plants.

**The main barriers & strategies to overcome them:**

Some of the main barriers are the lack of specific machinery, the scarce development of energy crops, the lack of a biomass formal market, the lack of competition in some energy technologies and specially the lack of an administrative



and economic framework which at the electricity prices level makes enough worthwhile projects or the lack of legislation which does not charge the cost of waste management to the price in order to get feasible projects.

**Short-term perspectives (until 2007):** It cannot be made short-term forecasts until the National Government will define the final economic framework for biomass.

**Mid/long-term perspectives (until 2015):** It cannot be made mid/long-term forecasts either, until the National Government will define the final economic framework for biomass.

## Biogas

**The past:** some years ago there was a power plant which worked with a pig urine and faeces digester in Almazán (Soria) which is currently dismantled. During the last years, it has been noticed an important technological development which is on the side of using biogas more than before. Excluding the previous quoted power plant, the use of biogas were exclusively thermal.

### **The present:**

Currently this type of actuations can be considered satisfactory in an urban field (water purification plant and rubbish dumps). It has been carried out the best worthwhile projects related with high biogas productions and it is being studied other lower biogas productions in the region; on the other hand in the rural areas (farms) the development of biogas is being low.

There are 9 thermoelectric power stations installations in Castilla y León in water purification plants and sugar beet industries (5,5 MWe) and 4 use power stations installations in rubbish dumps (2 MWe).

### **The main barriers & strategies to overcome them:**

Some of the barriers, which slow down the development, are the lack of economic feasibility in the energetic use of the biogas produced in small size installations (economic framework in reviewing by the National Government), as well as the scarce technological development concerning about the use of biogas in gas turbines, vehicles, methanol or CO<sub>2</sub> production, purification biogas systems or use of livestock farmer residues.

In this way the development tasks are being leaded toward demonstration projects or in the establishment of more attractive new electrical prices by the National Government.

The main promoters are currently by one hand the Administration (local and regional) and on the other hand there is a potential market among the livestock farmer (pigs mainly) business.

**Short-term perspectives (until 2007):** A culmination of feasible installations will be take place in the current framework.

**Mid/long-term perspectives (until 2015):** It is foreseen a huge technological development based on new small and medium size digester for aisle farms, as well as their advance in alternative biogas uses.



## PV

**The past:** The vast extension of Castilla y León land has been a handicap for the whole electrification in the region. Because of this, the stand-alone photovoltaic systems have been a good option in order to cover this power demand. On the other hand the new photovoltaic framework regulations about the grid access connection have led to its start the last three years.

**The present:** There is still a constant market of stand alone systems with a power of 750 kWp/year. On the other hand the grid-connected PV systems are taking advantage of the vast land available in the region to



introduce this kind of energy quickly, with the only restriction on the kept electricity price fixed by the National Administration.

**The main barriers & strategies to overcome them:** The off-grid PV will remain like a steady market, because of there are some places where the most effective solution for getting electricity will be this technology such as in agriculture and cattle farms, water pumping, communications and television aerials, street lighting and light signals in high sensitive environmental areas.

With regard to grid connections installations, the bonus payment and their continuity in long time as well as the invariability of the maximum power level to receive the most favourable bonus, is carrying the PV through a development of an established market.

It should be outline that the main current barrier to the photovoltaic development market is the lack of raw material (the cells) for the PV modules manufacture, which is making an increase of their prices.

**Short-term perspectives (until 2007):** It is quite difficult to guess the short-term aims because of the scarcity and increment of the photovoltaic modules prices. Anyway the capacity on installation should take into account the urban and environmental development of the rural areas, with an estimation of power which could be reach the 1-2 MWp.

**Mid/long-term perspectives (until 2015):** As it was indicated before, the "Plan de Fomento de las Energías Renovables", currently in reviewing, indicates the national and regional targets for this technology. In this way the forecasts for 2010 in Castilla y León is put at an accumulated total power of 12 MWp.

## Small hydro (< 10 MW)

**The past:** Thanks to the vast land of the Castilla y León region and the fact that some of the most plentiful Spanish rivers flow through the region, their energy uses have been almost only the exclusive way of exploitation of these rivers.

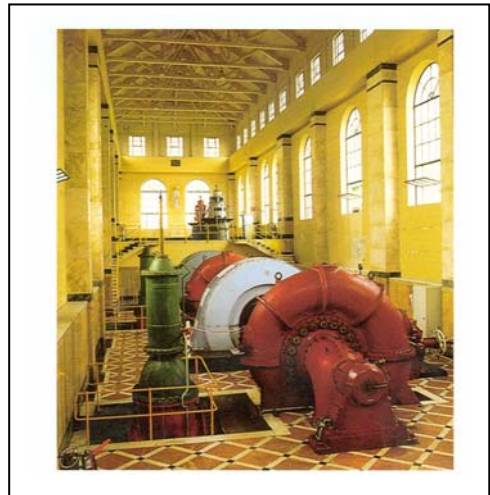
**The present:** Currently, Castilla y León is the first water producer in Spain. However the large scale hydro power plants represent more than the 95 % of this energy production, which means 4200 MW. The small scale hydro power plants have a total power of 300 MW in the region which means more than 200 small hydroelectric power plants working.

**The main barriers & strategies to overcome them:** The main difficulty in the installation of new small hydropower plants is that the best suitable places are already in use. Also it has been showed a social contempt based on environmental claims or very long time administrative procedures, basically as a consequence of the guarantee which implies the use of the water as resource.

At this point this kind of energy is focusing its own development in the restoration or updating old small hydropower plants or in demonstrative small hydroelectric power plants. The main promoters of this kind of projects are electrical companies, small and medium enterprises and some public institutions.

**Short-term perspectives (until 2007):** Power around 10 MW per year.

**Mid/long-term perspectives (until 2015):** It is estimated a total power of 400 MW, which could be develop during the next years.



## Geothermal electricity

**The past:** It has not been found any geothermal resources for a worthwhile exploitation for electric generation in Castilla y León yet.

**The present** It is not foreseen to find any geothermal resources for a profitable exploitation of electricity generation in Castilla y León.

## Solar Thermoelectric

**The past:** At the National level, economic framework has been not enough to develop this kind of projects during the past.

**The present:** Thanks to the past economic framework has been changed, some companies (such as Iberdrola, ACS, Abengoa) have encouraged starting this kind of projects, although with a demonstrative type.

On the other hand there are some different places in our region, with enough sun radiation levels in order to develop this kind of projects.

One of these projects with a total power of 50 MW will be located in Zamora. This project is foreseen to start working not before 2007.



**The main barriers & strategies to overcome them:** The main barrier for the development of this technology which could produce high quantities of energy is currently its high costs. The development of T+D+I projects, as well as the beginning of a massive components manufacture (such as collectors and heliostats) could be reduce the costs being comparable to other renewable technologies costs.

On the other hand the massive production of solar electricity could be very useful to support some peak power demand which it usually takes place during the day (by the high level of activity of industries or at homes) or in the summer (by the increasing population of tourists and the high air conditioning electricity consumption), which could turn out a big encouragement for this technology development.

**Short-term perspectives (until 2007):** If the Zamora project is successfully developed, it will be reaching 50 MW from this kind of technology in Castilla y León.

**Mid/long-term perspectives (until 2015):** If the current costs of investment and exploitation would be reduced and the current incentives would be maintained (which should be modulate according with technology and costs), it could be installed around 500-1500 MW in a long-term.

## Main market actors:

The main market actors are administrations in the sense of they are regulators as well as they are energy consumers; the energy promoters companies, the energy equipment manufacturers, and the households or workers energy consumers which could use renewable energy systems.

In this way is calculated that 450 companies are directly connected with the sector which means around 3.000 employees.

### 1) Most important companies:

- Gamesa Solar: Solar panels production and "with vacant possession" projects.
- Gamesa Eólica: Wind turbine rotor blades and gearboxes manufacturer.
- M - Torres: Wind turbines manufacturer.
- Vestas: Wind turbines manufacturer.
- Biovent: Wind power promoter (Iberdrola group).
- EyRA: Wind power promoter (ACS group).
- ECyR: Wind power & small hydroelectric power promoter (Endesa group).
- Collosa: Wind power promoter and civil engineering.
- Naturener: Wind power & small hydroelectric power promoter.
- ERBISA: Wind power & small hydroelectric power promoter (Viloria group).
- [UF-Energía Especiales-ENEL](#): Wind power promoter ([Unión Fenosa-ENEL group](#)).
- Coiper 2000: Wind turbines towers manufacturer.
- CyL de Composites: Polystyrene nacelles manufacturer for wind turbines.

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|--------------------------|---|
| - LM Composites          | Production of wind turbine rotor blades.                  |
| - Vestas Control Systems | Fabricante de equipos electrónicos para aerogeneradores.  |
| - Svendborg brakes A/S   | Fabricante de frenos industriales y para aerogeneradores. |
| - ENERPAL                | Installation of solar energy                              |
| - ITELSA                 | Installation of solar energy                              |
| - PEVAFERSA              | Installation of solar energy.                             |
| - CARTIF                 | Technological Energy centre.                              |
| - CIDAUT                 | Technological Energy centre.                              |
| - Caja Rural de Soria    | Wind power promoter and biomass power plants promoter.    |
| - Caja España            | Renewable Energy Financier project.                       |
| - Caja Duero             | Renewable Energy Financier project.                       |

## 2) Other institutions:

- EREN – Regional administration
- public awareness, home owners, consumers associations, active citizens
- local administrative authorities (Municipalities, Councils, “Diputaciones”) and the Energy Agencies related with local administration.
- Industrial and Services companies, especially SMEs.
- farmers, regional farmers associations.

## Conclusions:

The renewable energy development in Castilla y León is being quite important compared with the National level of renewable energy standards. However there is an unequal level among the different technologies.

In this way, with a mid-long prediction around 6.000 MW of wind power (the same power as there was in USA at the end of 2003), our region will be a leading at the international level. However the biomass development is quite scarce and the region has not an important forest sector or related industries.

On the other hand the photovoltaic solar energy is being currently specially demanded as a consequence of opening this market to small saver actors in this energy sector. These small saver energy actors are being financed by the Spanish electric consumers through a sale electricity price six times over the reference average price of electricity in Spain.

In an industrial level, the obvious wind power boom has had a good image in the increase of employment. Seven years ago 50 people were working in the wind power sector while it currently has reached the amount of 1.500 employees.

Related to the hydraulic power, the microhydraulic development and the refurbishment of old small hydro stations which have not environmental problems could drive to enhance this kind of energy. This kind of energy is currently in a low level of exploitation, because the best places are already being exploited.

On the whole for electricity production by renewable energies, the tendency is:

### Wind Power:

- The industrial activity will maintain in a long-term perspective. An expansion is considered.
- It will be developed more than 6.000 MW.

- It will be promoted the < 5MW grid-connected installations.

Small hydraulic Power:

- Promotion of the microhydraulic and restoration of old hydroelectric power plants.
- Improvement of the administrative procedures.

Biomass:

- Development of small power plants by means of gasification and biogas uses.
- Introduction of regional companies as suppliers of goods and services in the sector.
- Finalize the process of creation a "biomass market".
- Establish appealing conditions prices without an increment by the residue price.

Solar:

- Raising down prices in the photovoltaic industry.
- Get that Solar Thermoelectric power will be a "commercial" industry.