

RES-e Regions: WP 1: Regional Targets & Strategy

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1. Present status & potentials

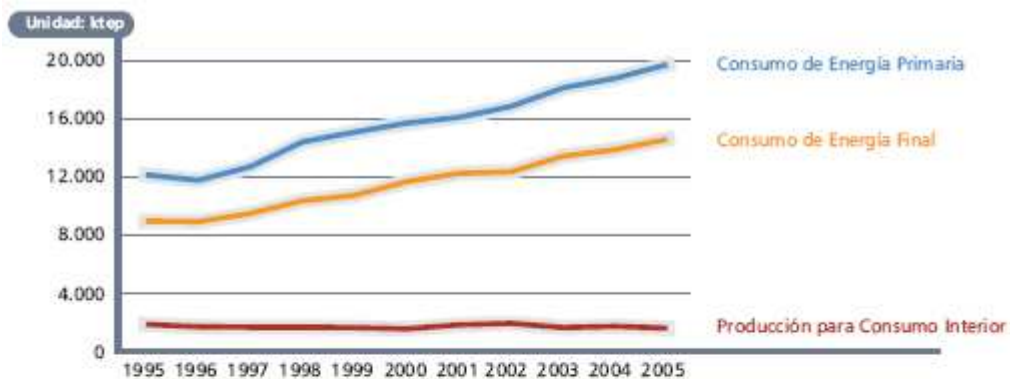
• present market development (status-quo)

The Autonomous Community of Andalusia has undergone a sustained economic growth during recent years, accompanied by an increase of energy needs. In the current world and European context of increases in petroleum products, the tension towards actions for the development and promotion of renewable energies has increased as an environmental and economical solution for the future.

For an adequate implementation of the “sustainable development” model seen in the **Innovation and Modernisation Plan of Andalusia**, as well as the Andalusian Energy Plan, an even more important role for renewable energies is necessary in Andalusia. This foresees greater creation of employment, in the valuing of research and innovation activities in the Andalusian entrepreneurial fields, increase in the economic competition and autochthonous entrepreneurial development, as well as economic and social cohesion. Measures to be developed through the collaboration with social agents, market actors, universities and research centres, and the Andalusian society.

In 2005 the primary energy consumption in the Autonomous Community of Andalusia grew to 19,687,1 ktoe 3.7% which signifies a 5% growth with respect to the previous year. The consumption of renewable energies increased by 3.2%, reaching 1,025.0 ktoe, maintaining the trend of annual growth.

Evolution of the consumption and production of energy



Unidad: ktep	Consumo de Energía Primaria	Consumo de Energía Final	Producción para Consumo Interior
1995 ▶	12.096,0	8.910,7	1.806,5
1996 ▶	11.723,7	8.874,3	1.648,4
1997 ▶	12.657,1	9.444,3	1.614,5
1998 ▶	14.367,0	10.316,7	1.616,9
1999 ▶	15.038,1	10.690,6	1.585,6
2000 ▶	15.658,6	11.631,3	1.504,7
2001 ▶	16.058,1	12.200,3	1.779,5
2002 ▶	16.804,1	12.302,6	1.883,4
2003 ▶	18.083,2	13.387,2	1.588,7
2004 ▶	18.744,8	13.834,8	1.674,6
2005 ▶	19.687,1	14.544,1	1.549,8

- **present policies on national & regional levels, factors that may influence market**

The Electric Sector Law 54/1997 transposes the Community Directive of 96/92/EC of the European Parliament and Council of 19 December 1996 on the common regulations for the internal electricity market to the Spanish legal framework, which declares, among its objectives, the guarantee and quality of supply at the least cost possible, the improvement of the energy efficiency, the reduction of the consumption and the protection of the environment.

This Law establishes the principles of an operating model based on free competition, which in turn encourages the development of installations that produce electricity under the special regime (self-producers or installations that use non consumable renewable energies, biomass, or any other type of biofuel or non renewable residue and whose installed power does not exceed 50 MW). The Law also establishes the objective that the renewable resources should cover, as a minimum, 12% of the total of the primary energy demand in 2010, in line with the objective established for the European Union.

Royal Decree 436/2004, of 12 March, which establishes the methodology for the actualisation and systemisation of the legal and economical system for the production of electricity in special regime. A system has been established based on the free will of the owner of the installation who can opt for one of the following options (Royal Decree 436/2004, Art. 22):

1. To sell his production or surplus of electricity to the distributor, observing a retribution in form of the regulated tariff, unique for all the programming periods, which is defined as a percentage of the average electricity tariff or reference regulated in the Royal Decree 1432/2002.
2. To sell his production or surplus directly in the daily market, observing in this case the price negotiated in the market, plus an incentive for participating in it and a premium. This incentive and premium is also defined generically as a percentage of the average or reference electricity tariff.

A positive aspect of the new regulation is linking the evolution of the renewable energy prices to the average electricity tariff. This new methodology for the calculation of the retribution of the special regime offers security and stability to the sector.

With this Royal Decree, it is intended that in 2010 close to one third of the electricity demand is covered by highly efficient technologies and by renewable energies.

Data of Renewable Energy in Andalusia, 2003-2010

Data updated as of 31 December 2005 (accumulated)	Market	Tariff	Action strategy
Wind energy	9,49 c€/kWh	6,82 c€/kWh	Order of Incentives: Non-refundable investments and interest rate rebates
Biomass Wood biomass –Biomass from the olive oil industry and greenhouse wastes	Market: b.6: 9,49 c€/kWh b.8: 8,76 c€/kWh	Tariff b.6: 6,82 c€/kWh b.8: 6,08 c€/kWh	Order of Incentives: Non-refundable investments and interest rate rebates

Data updated as of 31 December 2005 (accumulated)	Market	Tariff	Action strategy
Photovoltaic solar energy connected to the grid	24,88 c€/kWh	Tariff b.1.1: P <100 kW: 42,37 c€/kWh P >100 kW: Tarifa 22,21 c€/kWh	Order of Incentives: Non-refundable investments and interest rate rebates
Mini-hydraulic energy <10 MW	9,49 c€/kWh	6,82 c€/kWh	Order of Incentives: Non-refundable investments and interest rate rebates
Other renewable energies, Thermosolar	24,88 c€/kWh	22,21 c€/kWh	Order of Incentives: Non-refundable investments and interest rate rebates

The European Union approved the White Paper for a Strategy and a Community Plan of Action in 1997 that placed the participation of renewable energies in 12% of the total energy consumption of 2010. Recently two new objectives have been incorporated for the year 2010 referring to the electricity generation with renewable energy sources (29.4%) and the use of biofuels for transport (5.75%).

These references have been good for the revision of the Plan for the Promotion of Renewable Energies in Spain 2000-2010 (PFER).

Parallely to these exclusive energy considerations, it is necessary to mention the new situation outlined with the entering into effect of the Kyoto Protocol that was materialized in the National Plan of Assignment of Rights of Emission 2005-2007 in Spain, which will influence, without doubt, in the development of renewable energies.

The **Renewable Energy Plan of Spain (PER) 2005-2010** updates the previous Renewable Energy Plan. The PER seeks to establish the bases to promote the increase of the use of the renewable energies in Spain and at the same time to fulfil the European commitments. For this, some new energy objectives have been established, which consider the current situation of energy consumption in Spain and its evolution. It also proposes a set of measures that will facilitate the fulfilment of these commitments. These measures can be summarized in:

- Maintenance of public support for investment in certain technologies.
- Fiscal tax reduction.
- Modification of Law 54/1997 of the Electric Sector to facilitate the existence of co-combustion in generation plants with coal, establishments of higher electricity premiums for biomass energy.
- Modification of the Real Order 436/2004: limit for wind energy 20.000 MW, and for thermoelectric 500 MW.
- Adaptation of regulations and legislation, for example, the new Technical Building Code.
- Transposition to national legislation of the Directive 2001/77/EC for the promotion of renewable energies, relating to electricity generation with renewable energy sources.
- Establishment in the Spanish Electricity Network (REE) of a unique operation centre of the Special Regime, equivalent to that of the Ordinary Regime.
- Development of innovative technologies: marine wind parks, biomass gasification systems, solar thermal systems, integration of solar thermal and photovoltaic installations, production of silicon, etc.
- Improvement of the administrative procedure of projects.
- Subsidies for the mechanisation of the collection and treatment of biomass.

- Development of biomass logistics, bio fuels and used oils.
- Diffusion and training.

- **Potentials for RES-e in 2010**

Energy objectives Renewable Energy Plan 2010

	Year 2010	Primary energy ktoe	
Wind	20.155,0 MW	3.914,0	19,4%
Hydraulic (> 50 MW)	13.521,0 MW	1.979,0	9,8%
Hydraulic (10 - 50 MW)	3.257,0 MW	557,0	2,8%
Hydraulic (< 10 MW)	2.199,0 MW	575,0	2,8%
Solar Thermal	4.900.805,0 m2	376,0	1,9%
Solar Thermoelectric	500,0 MW	509,0	2,5%
Solar Photovoltaic	400,0 MWp	52,0	0,3%
Biomass electric	1.317,0 MW	3.586,0	17,7%
Co-combustion	722,0 MW	1.552,0	7,7%
Biomass Thermal	4.070,0 Ktoe	4.070,0	20,1%
Biogas electricity	235,0 MW	455,0	2,3%
Bio fuels	2.200,0 ktoe	2.200,0	10,9%
RSU	189,0 MW	395,0	2,0%
TOTAL		20.220,0	

* RSU: Solid Urban Wastes

The objective of the Andalusian Energy Plan is to reach a participation quota of 15% from renewable energy sources by 2010, contributing in a positive sense to reaching the participation percentages of the renewable energies in electricity generation.

Andalusian Energy Plan (Electricity generation)	2010
Wind energy	4000 MW
Biomass and Biogas	250 MW
Small hydroelectric < 10 MW	270 MW
High Temperature Solar Thermal	230 MW
PV Grid-Connected	16400 kWp

- **development in the coming years (e.g. changes in national funding schemes)**

Repercussions of the Renewable Energy Plan 2005 – 2010

Parameter	Value for all of the renewable energy areas
Public support (investment subsidies, electricity generation premiums and fiscal exemptions)	8.492,24 millions €
Investments	23.598,64 millions €
Jobs created	94.925 employment positions
CO ₂ emissions avoided	76.983.254 tones 2005 – 2010

Distribution of public subsidies

Subsidies	Value for all of the renewable energy areas
Investment (non-repayable)	681 millions €
Biofuels tax exemptions	2.855 millions €
Electricity energy premiums	4.956 millions €

For the next years, the Spanish tariff system, through a premium system for renewable energies, confirmed by means of Law 54/1997, of 27 November, of the Electric Sector, will be maintained at national level. As well as its Decree for development, the Royal Decree 436/2004, of 12 March, which establishes the methodology for the actualisation and systemisation of the legal and economical system for the production of electricity in special regime, which is actually undergoing revision.

At the Andalusian level, the different scenarios proposed by the Andalusian Plan of Sustainable Energy has its bases in the Andalusian Law of the Promotion of Renewable Energies and Energy Saving and Efficiency.

With respect to the environment, 90% of the emissions produced from the energy sector originate in the generation of electricity, with which the following considerations should be made:

In 2000, the gross electricity generation total in Andalusia and the energy produced outside of the region to cover its electricity deficit reaches 30,272 GWh. In 2006, up to 44.318 GWh of electricity could be generated within Andalusia, which signifies an increase of 46.4%.

Of the gross electricity generated within Andalusia in 2006, 37.346 Gwh will be destined to cover the demand in the region. The rest will be exported to other Autonomous Communities.

The European Union, within the framework of the Kyoto Protocol, has committed itself to reduce by 8%, with respect to the year 1990, the gas emissions which cause the greenhouse effect during the period 2008-2012. The method of reaching this objective by the different Member States, and based on the social-economical levels reached by them, allows a group of countries of the European Union, however, to be able to increase their emissions. Spain is in this group and is allowed an increase of up to 15% of these emissions if needed.

This national obligation should be regionalised with criteria objectives so that the Autonomous Communities remain loyal to their share of responsibility and set up effective programmes and measures to reach the common goal.

Given the competences established in Law 54/1997, of 27 November, the Electric Sector, the authorisation of the large combustion plants for electricity generation is the responsibility of the Spanish Government. For this reason, and in parallel with these authorisations, it should be the Central Government who is responsible for a coherent regionalisation of the variation rates of the emissions

2. Process towards regional RES-e strategy (in the framework of the RES-e project)

- **approach to developing a RES-e strategy in your region, including priorities**

Andalusia offers an extensive programme of the development of renewable energy sources in the framework of the RES-e Regions project.

The technologies that currently offer a greater growth index are: **wind energy**, foreseeing an installed power for the year 2010 of 4.000 MW in Andalusia. The Andalusian Regional Government is promoting this energy through the Orders of Electricity Evacuation Areas (Orden Zona de Evacuación Eléctrica, ZEDE) which considers the planned development of renewable resources and other environmental criteria.

High temperature solar energy is the great novelty. There are currently two new projects which have been signed for Sanlúcar la Mayor and Granada, forecasting an installed power of 230 MW for the year 2010.

Even though its growth potential is still medium-high, especially for the biomass sub-sectors of the olive oil industry and wood (installed power forecasted for 2010 of 250 MW), **biomass energy** offers growth problems. The sector demands greater premiums for this type of energy. There are problems of supplying and derivatives from transport costs. The constitution of a Society for the Valorisation of Biomass has been created by the Andalusian Regional Government.

Photovoltaic energy also offers a considerable potential in Spain, and an increasing growth is expected in Andalusia in the upcoming years.

The Andalusian Regional Government has set up an Order of Incentives: Programme of Incentives for the Sustainable Energy Development of Andalusia 2005-2006 (18th July 2005, BOJA no. 164, of 23 August 2005) for **renewable energies** that includes a wide range of actions, including energy saving and efficiency projects, like the production of renewable energy and cogeneration, transport networks and energy distribution, audits, viability studies and dissemination and informative actions, and integrating subventions, like the Prosol Order. This system offers a unique incentivisation programme for companies, local corporations and other market agents involved.

- **stakeholder dialogue, meetings and event organised, contributions made by different groups; results of RES-e map as well as of the analyses in WP2 & 3**

During the RES-e Regions contracting period, the work of the Andalusian Energy Agency has focused on new technologies and those technologies that are of interest to the Andalusian entrepreneurs and companies of the sector, taking into account, the needs detected in the **Map of Renewable Energies connected to the Grid in Andalusia**, which focuses on solar photovoltaic energy and the biomass sector, as well as the conclusions from the **survey** made to 375 citizens in the Andalusian province where the knowledge of the Andalusian citizens on the different renewable energies was analysed.

The Andalusian Energy Agency has carried out advice to more than 100 people through the hot line of the project and individual meetings, focusing on questions relating to the grid connection of solar photovoltaic installations, financing of new projects, creation of energy agencies, incentive measures and information on renewable energies and energy saving for municipalities.

The Andalusian Energy Agency organised a **"Seminar on Renewable Energies in Andalusia: Opportunities and New Projects"**, that took place last 5th October 2006 in **Aguadulce**, Almería in the framework of the International Fair and Conference on Energy and Water, which counted on the participation of 120 market actors of the sector, among them being professionals, local energy agencies, engineering companies, chambers of commerce, universities, associations, technological platforms and experts of the sector, and in which the situation and perspectives of the renewable energies in Andalusia and in Europe were analysed in three working sessions: Incentives for the use of Renewable Energies, Opportunities and new

projects in the area of high temperature solar energy, and new projects for the production of hydrogen in electrical uses, transport, and fuel for the production of biofuels and hydrogen.

The Andalusian Energy Agency decided to undertake the theme relating to the **"Biomass Market for Electricity Generation Plants in Andalusia"** through an Informative Session that took place on 1st February 2007, counting on the participation of 17 members of this working forum, among which were professionals and private and public market actors, that analysed the commercialisation of biomass, as well as supply contracts of biomass, quality requirements of the fuel, homologation regulations and guarantee of supply, development of projects and the search for new possibilities of biomass, pruning and energy crops.

Considering the analysis made in the Transposition report, the Andalusian Energy Agency decided to elaborate a publication relating to the analysis of the administrative procedure in the "Guide for Photovoltaic Installations connected to the Grid in Andalusia", including, in a detailed manner, both the procedure for setting-up as well as the exploitation conditions of the solar photovoltaic energy installations connected to the grid. The results of this publication form part of the documentation debated in a planners platform that took place on the 26th February 2007 relating to **"Solar Photovoltaic Energy connected to the Grid in Andalusia"**. **This meeting counted on the participation of 15 attendants**, among them planners, promoter associations, electricity companies and experts of the sector. In the first working session the administrative procedure of grid connection, the solar photovoltaic energy contracts, grid connection, municipal licenses, repercussions of the Technical Building Code were debated; in the second working session the retribution and financing of solar photovoltaic energy was debated, as well as the new draft of premiums, the situation in Spain and Germany and other European countries, the participation of financial entities in photovoltaic projects and the subsidies and fiscal incentives system, as well as future perspectives of this technology.

Taking into consideration the **survey** realised to the Andalusian municipal experts, the Andalusian Energy Agency elaborated a **Guide on Renewable Energies connected to the Grid in Municipalities**, including the energy optimisation plans in municipalities together with the legal framework and the incentives for the implementation of renewable energies, as well as a comparative analysis of the investments by technology type and practical information for the implementation of renewable energy projects by municipalities.

In accordance with the main conclusions extracted from the analysis of renewable energies connected to the grid in Andalusian municipalities, the Andalusian Energy Agency decided to carry out **two courses of 40 hours each one**, with an assistance of 56 municipal experts, that undertook both questions of energy saving, certification, public lighting and inventory as well as information on renewable energies, including modules of those energies that are not so well-known by the municipal experts as is the case of biomass and small hydro. Additionally, a **working session** was carried out relating to the municipal energy management tools and renewable energies and energy efficiency, with an assistance of 29 municipal experts and engineering companies that work in this sector, con una asistencia de 29 técnicos municipales e ingenierías que trabajan en este sector.

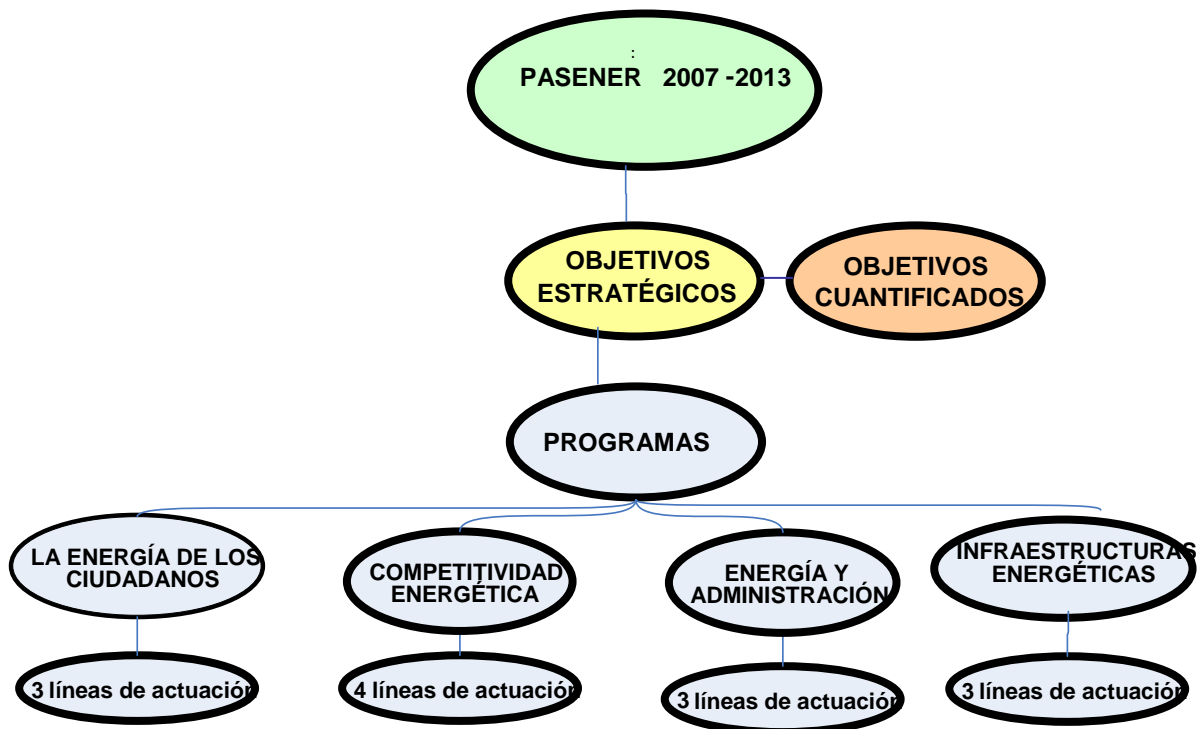
In addition, **five personalised advice** have been carried out by experts of the Andalusian Energy Agency in 3 regions and 2 town halls, concerning the realisation of new renewable energy projects to be implemented in these 49 municipalities.

3. Measures & time-table

The main measures elaborated by the Andalusian Energy Agency for the development of renewable energy sources connected to the electricity grid are:

Design and management of a **Programme of Incentives for the Sustainable Development of Energy of Andalusia** that has counted on a budget of 160 million euros for years 2006 and 2007.

The Andalusian Energy Agency is currently in the elaboration phase of of the new **Andalusian Plan of Sustainable Energy 2007-2013 (PASANER-Plan Andaluz de Sostenibilidad Energética 2007-2013)**, whose basic structure is as follows.



In order to simplify the procedure and establish the administrative procedure applicable, the Andalusian Regional Government is preparing a **"Decree on the administrative procedure applicable to the solar photovoltaic energy installations installed in the Autonomous Community of Andalusia"** which will clarify the system applicable for the both stand alone and grid-connected installations.

4. Targets proposed for the region

The **Andalusian Energy Agency** approved the *"Declaration - European Regions for Energy Efficiency and Renewable Energy Sources"* in the meeting of the Governing Board of the Andalusian Energy Agency held last 7th March 2006. The Declaration was signed by the General Manager of the Agency and Member of the Governing Board, Mr. Francisco Bas Jiménez.

The Governing Board of the Andalusian Energy Agency is made up of the following members:

- Ms. Isabel de Haro Aramberri, General Secretary of Industrial and Energy Development and President of the Andalusian Energy Agency
- Mr. Eduardo Clavijo Fernández-Palacios, General Manager of Economical-Financial Information Systems, Regional Ministry of Economics and Finance
- Mr. Jesús Nieto González & Jacinto Cañete Rolloso, General Manager of Industry, Energy and Mines, Regional Ministry of Innovation, Science and Enterprise
- Mr. Alejandro Martín de la Cruz, Deputy Minister of the Regional Ministry of Governing
- Mr. Ignacio Pozuelo Meño, General Manager of Planning, Regional Ministry of Public Works and Transport
- Mr. Jesús Huerta Almendro, General Manager of Financing, Planning and Infrastructures, Regional Ministry of Health
- Mr. Tomás Martínez Jiménez, General Manager of Irrigated lands and Structures, Regional Ministry of Agriculture and Fishery
- Mr. Juan Espadas Cejas, Deputy Minister of the Regional Ministry of Environment
- Mr. Francisco Bas Jiménez, General Manager of the Andalusian Energy Agency

The objectives included in the Declaration by the Autonomous Community of Andalusia are the following:

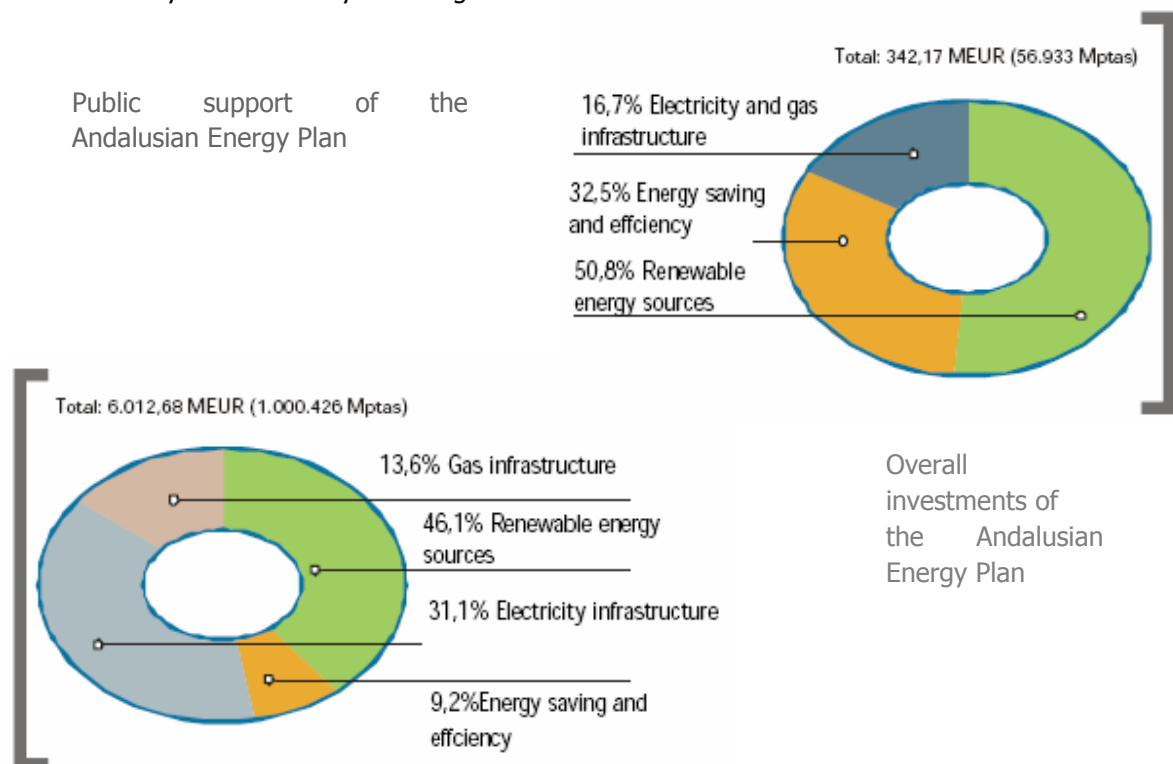
- 15 % of primary energy demanded in Andalusia should come from renewable energy sources in 2010
- primary energy saving of 7.5% over the tendencial consumption for 2010
- obligatory incorporation of low temperature solar energy installations for hot clean water production in buildings belonging to the Andalusian Regional Government

5. Costs & Benefits

• costs of possible measures

The fulfilment of the objectives established in the Andalusian Energy Plan are subject to the mobilisation of important public and private energy resources.

The investments foreseen for the private sector are basic at the time of fulfilling the objectives that define the energy infrastructure of the Energy Plan, for which these amounts have been discussed with the sector and decided as a result of a consensus. The private sector is essential at the time of undertaking many of the activities foreseen in the Energy Plan, and in some of them, like the activity that concerns the electric or gas infrastructure, the private sector is in many cases the only financing source.



• benefits to your region (employment, CO₂ & other environmental benefits, innovation ...)

Environmental benefits: The Andalusian Energy Plan proposes an electricity system in which, in spite of a strong increase in generation, the emissions in absolute value of SO₂ NO_x and CO₂ derived from the Andalusian demand will decrease with respect to the year 2000 by 70,6%, 12,9% and 22,6% respectively, as a consequence of the use of natural gas in the generation of electricity and the use of renewable energy sources. These percentages for 2010 are 76,0%, 14,5% and 28,4% respectively.

One of the benefits associated with the promotion and development of renewable energy sources is without doubt the creation of employment, mainly due to the labour of these sources being more intensive than conventional ones. In the majority of situations, the employment positions generated are local, geographically situated in rural areas with high unemployment levels, which contributes to land cohesion and to a balanced growth of the regions.

Benefits regarding employment: According to the predictions of the use of renewable energy sources established by the Andalusian Energy Plan for 2006, the generation of 14.288 employment positions have been estimated, not including the positions related to high temperature solar thermal, (12.421 of which correspond to tasks of construction and installation and 1.867 to operation and maintenance). The new employment positions aimed at construction and installation would rise to 9.428 in the period 2007-2010, and a further 1.884 positions related to operation and maintenance would be created. Between 2001 and 2010 a total of 25.600 new employment positions would be created. When adding to this number an estimate of the staff necessary for the development of high temperature solar thermal plants in Andalusia, 26.244 new employment positions would be created. Totalling the potential employment associated with energy crops and the obtaining of agricultural and forestry wastes, the number could be elevated to 66.244 new employment positions in the period 2001-2010.

• 6 Conclusions

With the recent creation of the Andalusian Energy Agency (Agencia Andaluza de la Energía) by the Andalusian Regional Government (Junta de Andalucía), a new stage in the autonomous energy policy has been initiated, offering a definite promotion of the implementation in Andalusia of this new energy model, in the framework of a European policy aimed at reaching 12% of the European consumption using renewable energy sources by the year 2010.

The Andalusian Regional Government is working in several initiatives for the promotion of the renewable energies in the Autonomous Community of Andalusia. Currently, the proposal of the new **Andalusian Law of Energy Efficiency and Renewable Energies** has been approved.

The ultimate aim of the Law of Renewable Energies and Energy Saving and Efficiency is to obtain a quality sustainable energy system. The objectives of the Law are to promote the use of renewable energies, promote energy saving and efficiency, from its production until its consumption, as well to putting in order the rational use of energetic resources in the Autonomous Community of Andalusia, under the principle of collective solidarity in the use of energy. The law establishes the principle of the primacy of renewable energies: the goods and rights necessary for its generation, transport, distribution and use being declared of public utility or social interest. **According to the rules**, the principles and articles in the law that deal with the promotion of renewable energies as well as the rational use of energy will be developed.

The Andalusian Law of Energy Efficiency and Renewable Energies considers, among others, the following essential measures related to renewables:

- Programme for the Promotion of Renewable Energies

- Programme of Biofuels

- Programme for the promotion of Agroenergy crops

- Measures for the Promotion of solar installations in buildings and installations of public use and service

- Renewable energies in isolated locations.

The signing of important national agreements in the renewable energy area; the recent creation of a public-private mixed society for the valorisation of biomass in Andalusia; the new Programme of Incentives for the development of sustainable energy in Andalusia 2005-2006. The programme incentivates a wide range of actions, including energy saving and efficiency action programmes, initiatives of renewable energy production and cogeneration, audits, viability studies and dissemination and informative actions.