Proyect and Current Energy Situation in the Basque Country

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Abstract.

Due to the importance that energy occupies within society as a driver for competitiveness in industry, richness generation, and improvement of the technological development Ibrough new investments, the EU and its different Member States have created a legal ftamework aimed at controlling and reducing energy intensity, reducing the dependency from external countries and facilitating the introduction of indigenous energies for enhancing fmal energy supply.

The Autonomous Region of the Basque Country is characterised for its enormous dependence on outside energy sources for the supply of a demand with high industrial penetration. Due to this, strategic energy plans have been developed since the 80's. These programmes try to guarantee energy supply in the best conditions of security, quality, economic cost and environmental impacto

Several factors have been taken inlo account within these plans, as, for example:

- ✓ Social concems about environment conservation and social welfare
- ✓ Studies of energy efficiency and savings
- ✓ The contribution of renewable energies
- ✓ The contribution of new combined ciele gas fired plants and also combined heat and power (CHP)

Keywords

Energy strategy, 2001 energy balance, renewable energy

1. Introduetion

In order to study the development of the renewable energy sources in the Basque Country, it is necessary to outline the situation and prospects of the Basque Autonomous Community both in Spain and in Europe.

To start with, it is advisable to offer an overview of the current legislation and to review the energy models, both national and European, taken as a reference.

So the paper explains briefly actual European and Spanish legal frameworks [1,2,3]. It also exposes the energy policy in Denmark through its "Energy 2000" plan, because Denmark constitutes a referent for energy .planning in the Basque Country due to its traditional implementation of active energy policies.

2. Energy Plan 2005 in the Basque Country

The Basque Energy Plan for 2005 fixes the new objectives, progrnms and investments for the period 1996-2005 using as a reference what was achieved in the 1991-1995, the updating ofprospective energy needs, the increasing competence in the field and the analysis of energy possibilities.

The paper outlines this plan concentrating in the objectives stated for the different renewable energy sources.

3. Energy Plan 2010 in the Basque Country

The changing power scene forces periodically to make a reflection exercise on the power policy. In the Power Strategy of Euskadi 2005 the necessity settled down to make in a 2001 global revision of same and a new exposition to horizon 2010. The 14 of November of 2001, the Basque Parliament approved adopted to make a revision of the É2005 Strategy and a new exposition of the power strategy to of year 2010. In answer to this mandate, the present document gathers the strategy in power matter of the Basque Government to year 2010, describing to the historical antecedents in this matter and the situation of base in 2000, defining the objectives in the matter of efficient use of the energy and development of the renewable energies and power

infrastructures, and determining the lines of performance to reach the noticeable goals.

4. Horizon 2010. Energy, Technology and sustainable development in Euskadi

The departure position in 2001 with respect to the power infrastructures on which it counts at the present time and other foreseeable of electrical generation to cut-means term, along with the set of investments anticipated for the natural gas, would locate to Euskadi in a superb position to confront the future of the power supplying in conditions of security, quality and competitiveness. The necessity of new power infrastructures in the long term will come conditional by the evolution of the power necessities, the changes in the markets of the energy and the advances in the technological-power development, among other factors. The exposition of the new Basque power strategy to 2010 is going away to focus with priority in two ideas: the intensification of the power efficiency and the involution of the renewable energies, in terms of sustainable power development.

At the present time, the great existing potential of power saving is admitted of unanimous way. Nevertheless, on the contrary that with the renewable ones, has not existed an important investing effort in the western world in the last years in these technologies. In the future the efficiency technologies they will be most effective to fulfill the objectives of economic growth and the environmental commitments. The possibilities that offers are superb if European objectives in the matter of efficiency consider.

The renewable energies also will have to play a more and more important role. To obtain a level of advantage of renewable the native resources, like the established one like objective in the European Union, can be considered very ambitious, due to the existing territorial limitations. The development of all the possibilities had to help to obtain it.

The efforts of innovation and technological development in the power field to mean-long term must be focused based on the objectives established in both areas of performance. To enterprise level, the production, commercialization and implantation of these technologies will offer opportunities that the Basque industry must continue taking advantage of.

5. Energy in Euskadi in the 2000

The Basque territory is equipped with limited natural power resources if we compared them with the demanded ones, due to a HD of population and the geomorfológicas characteristics of the country. This is reflected far below in a production of primary energy to the power consumption, and leads to the necessity to concern energy. The strong implantation of a power intensive industry in the Basque territory brings like consequence consumptions of energy per capita superior to the average of our surroundings, in spite of the great effort made in measures of efficiency, reflected in a reduction of the industrial power consumptions. On the other hand, Euskadi comprises of the state economic-power market. The markets are changing of important way in the last years, with the process of liberalization of the different power sectors. The transformation of the concerned energy has constituted an industry that has had an excellent weight within the Basque economic activity. The most remarkable elements are the sector of the refining of petróleo5 and the one of the generation eléctrica6. The incorporation of new gasistas and electrical infrastructures tends to reinforce the improvement of the power supply in general and the Basoue in individual. The advantage of renewable energies, that is growing gradually, is based mainly on the use of residual biomass like fuel for industrial processes, on the one hand, and in the hydroelectric generation in a hundred of small facilities and two of greater size. Of special relevance it is the approval of the Sectorial Territorial Plan of the Aeolian Energy and the beginning and of several facilities of advantage of biogás of garbage dump.

Directives of the Plan E-2005 (1996-2005):

- Attainment of a competitive power system, territorial balance and environmentally.
- Control and reduction of the consumption improving the quality of life.
- Diminution of the environmental impact derived from the power consumption.
- Involution of the use of the native power resources
- Involution of the power diversification of types, origins and systems of supplying.
- Improvement of the guarantee and quality of the power provision.

Main power objectives:

- Control of the power consumption by means of efficiency programs that allow to a saving and the improvement of the power intensity
- To harness the use of the native resources: by means of the advantage of the renewable energies and to impel the efforts in exploration to improve the level of self-supplying of conventional energies.
- To impel the consumption of cleaner energies, reinforcing in addition provision infrastructures, transports and distribution
- To reach a rate of native electrical generation incorporating new facilities of co-generation, renewable energies and thermal power stations outposts.

- To reduce the environmental impact due to the polluting atmospheric emissions derived from the Basque power consumption.
- To promote investments in the power sector, like element tractor of the economy

6. Evolution of the Power demand in Euskadi

The demand or gross power consumption in Euskadi was located in 2000 in 6,7 Mtep, which supposes a growth of 21% in period 1995-2000, inferior in five points to the one of the economic activity in the same period. The final consumption of energy (that includes the final consuming sectors, and excludes the consumption in the electrical generation and other types of power transformation) rises to 5.0 Mtep.

From 1995, after two years in which the demand was reduced, other three of high growth of the consumption 1995-2000 average increase was of annual 3.8%.

The derivatives of petroleum, the natural gas and the external electrical provision are the energies that participate mainly in the gross consumption, representing between the three 87% of the total. The derivatives of petroleum represent a 50% of the total demand of energy. The participation of the natural gas in the demand, that tends to increase, is of 21%. On the other hand, the electrical imports represent a 16% of the demand, with annual variations that depend on the thermoelectrial generation.

The renewable energies participate with a 4% in the demand, and have grown a 24% in the period. The solid propellants are the only type of energy for which the consumption in the period has diminished, happening their participation from 14% to 8%.

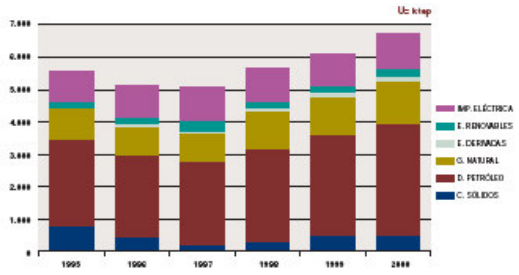


Fig.1.Evolución in the demand by type of installation in the CAPV

7. Power self-supplying

The production of primary energy in Euskadi - in other years favored by the operation of diverse important natural gas deposits in the Cantabrian Coast -, is centered nowadays in the renewable energies, emphasizing the advantage of the biomass in the sector Basque stationer and the hydroelectric energy. The power self-supplying in 2000 has reached the 342 ktep, which supposes 5.1% of the demand. This amount is far from reached 33% in 1989.

The greater or smaller natural gas availability as native primary resource has had a fundamental importance in the structure of production of primary energy in Euskadi. The natural gas production in the last years very has been limited.

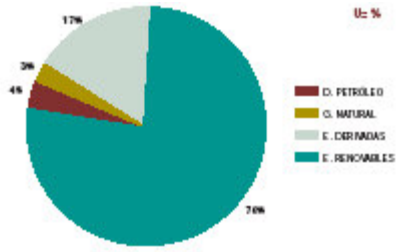


Fig.2.Estructura of native production 2000 in the CAPV

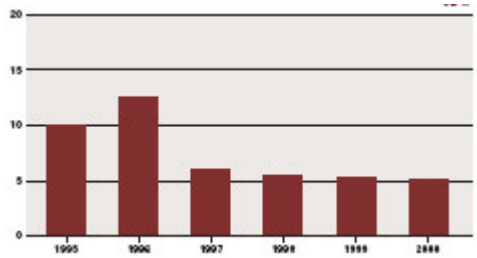


Fig.3.Evolución of the rate of power self-supplying 1995-2000 in CAPV

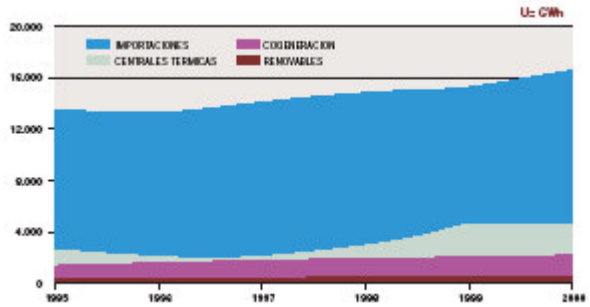


Fig.4.Evolución of the demand and electrical provision 1995-2000 by type of installation in CAPV

8. Energy renewable

Traditionally, the level of advantage of renewable the power resources in Euskadi been basically has bound to the use of the residual biomass in the industrial subsector stationer (crusts, black licor) and to the recovery of small jumps like minihidraúlicas facilities for the electrical generation. To long it del period 1995-2000 other types of renewable resources like biogás of garbage dump have been gotten up, the solar energy and the Aeolian energy. The advantage of this type of energy was located in the 263 ktep in the 2000, increasing to a 24% in the last five years. Of the total, a 82% correspond to residual biomass taken advantage of in the sectors the paper and the wood, in addition to in the domestic sector, a 11% to electrical energy generated in the hydroelectric power stations and a 2% to the Aeolian park of Elgea, start up in 2000.

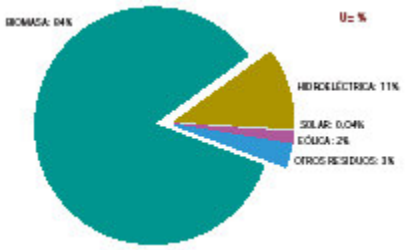


Fig.5.Estructura of advantage of the renewable energy in 2000

9. Power consumption in the historical territories

The structure of the final consumption is not the same one in the three Historical Territories. The derivatives of petroleum suppose in all the cases the greater consumption with participation between 39% and 42%, but whereas in It plowed the natural gas occupies the second place, in Gipuzkoa and Bizkaia it occupies the electrical energy. The industrial subsectors of greater consumption in Plowed are the one of iron and steel industry and smelting and the one of the glass. The natural gas supposes more of 50% of the used energy in the Industry in It plowed. In Gipuzkoa it emphasizes the coal consumption of the Thermal power station of Passages. The industrial consumption in Gipuzkoa is centered in the subsector of the iron and steel industry and the paper, being the electrical energy the most used reaching 43% of the total. The industrial consumption in Bizkaia is distributed between the different subsectors and energies in greater measurement than in the other territories. The gross demand of energy in Bizkaia reaches 55% of the total of Euskadi, which supposes a high percentage that it is due to the strong presence of the sector of the power transformation in this territory.

The final consumption of energy by inhabitant varies between the 2.0 tep/año in Bizkaia until the 3.0 tep/año in Plowed. Limiting itself only the residential sector, the effect of the different climatic conditions since the consumption is of 0.36 tep/año by inhabitant in Plowed and of 0,25- 0.26 is observed tep/año by inhabitant for Gipuzkoa and Bizkaia.

Finally, the paper outlines the actual (year 2001) energy balance in the Basque Country and compares this situation with the objectives of the Energy Plan 2005.

10. Main challenges of world-wide the power system

- World-wide the power system, in spite of the sufficiency of power resources existing, is not prepared to less facilitate an economic growth of the developed countries in economic conditions and of security, and compatibility with the world-wide objectives of sustainable development.

- In spite of the improvement of international infrastructures, not yet it exists a universal access to the different forms from energy and technologies that allow to an efficient use of the energy and the advantage of the local renewable resources, mainly in the poorest countries, for political and economic reasons

- The negative environmental impacts of the energy at local, regional and world-wide level are great conditioners of future, as much for the developed countries as those that are developing.

- The decided impulse to the innovation programs and power efficiency, the massive implantation of systems of advantage of the renewable energies and the incorporation of power technologies outposts, can be the keys of a sustainable development of the power sector mundi

11. Economic Tendencies and Sectorial Basque

A set of factors exists that will to a great extent affect to the provision and the power consumption Basque future. Had fundamentally to the institutional policies of saving, co-generation, renewable and substitution of other fossil fuels by gas natural15, has been obtained an important degree of diversification in the present Basque power supply, and a diminution of the power intensity and the power dependency of petroleum. So that these tendencies continue, it is necessary to intensify the

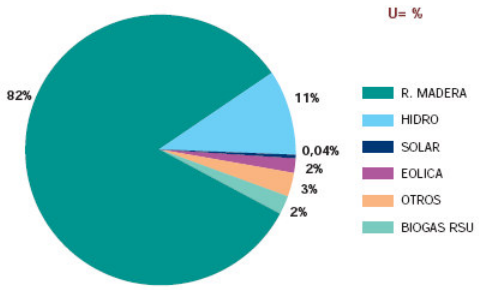
policies of power efficiency, to promote of determined form the generalization of the advantage of the renewable energies and to assure the supplying the different energies in economic conditions, of quality and continuity to satisfy the future Basque power necesities.

The level of development of the renewable energies in our surroundings also will affect to a great extent the Basque power supply. The future degree of commercial implantation of the emergent renewable energies will be different according to type from technology, and will be influenced by its world-wide evolution in addition to by the local policies of promotion. The related factors that have incidence for their generalization are the level of technological development, the acquisition costs, the potential of effective applications - limited by the conditions and territorial-and limitations the regulating frame. Thus, a regulating frame stable of the locations of Aeolian parks, the continuous technological advances, the diminution of the investment costs and an availability of sufficient resources (although fit, due to the power characteristics of the territory) will be the keys so that this energy is developed to mean-long term in Euskadi.

The facilities of advantage of the biomasa and remainders in their different types for the electrical generation will depend fundamentally on the yield of the same ones, where the cost of the resource (including its transport) and their availability is elements key. The implantation of the renewable energies in small facilities has a great potential, butit also has limitations. The adoption of criteria of power quality in buildings and houses and other measures will foment the use of the thermal solar energy, that is the renewable energy of greater potential to mean-long term. So that a greater development of the renewable energies of small scale takes place is necessary a reduction of the present costs of investment of the equipment, as well as good conditions of the sale price of the produced electrical energy in the connected facilities to network (photovoltaic and mainly Aeolian).

Finally, the Basque power supply also is in favor conditional of the availability of necessary infrastructures for a sufficient, safe and competitive supplying power. In this sense, from the institutional point of view the bases for the improvement and materialization of the Basque power projects of strategic nature during this decade are established, some of considered them of high-priority character by the European Commission, and who will make possible a fortification of the future conditions of provision.

12. The renewable energies in Euskadi in 2000



13. Maximum advantage of resources minihidraúlicos

The hydroelectric energy is the renewable energy that is more in an advanced technological state. The production of electricity by means of this type of energy has more than 100 years of history and, therefore, it is possible to be considered sufficiently developed. This type of energy participates in significant way in the advantage of the renewable ones, as much at level of the European Union (25%) like of the Spanish State (40%).

13. A promising future for the aeolian energy in euskadi

The Aeolian energy is having during the last years a spectacular development. It is necessary to emphasize the high growth that it is having in Germany, where the

TIPO DE INSTALACIÓN	SITUACIÓN 2000	ACTUACIONES 2001-2010	OBJETIVO 2010	INVERSIÓN 2001-2010
Parques eólicos (P>10.000 kW)	24.400	474.100	498.500	398
Miniparques eólicos (P<10.000 kW)	–	125.000	125.000	120
Aerogeneradores aislados	15	96	111	0,42
Total	**24.415**	**599.196**	**623.611**	**518,6**

installed power is of around 10,000 MW. At level of the Spanish State, the Aeolian energy is also having a great development, with than 4,000 MW more installed.

14. A great takeoff of the solar energy in Euskadi

TIPO DE INSTALACIÓN	SITUACIÓN 2000	ACTUACIONES 2001-2010	OBJETIVO 2010	INVERSIÓN 2001-2010
Hidráulica (> 10.000 kW)	113.000	–	113.000	–
Minihidráulica (10-10.000 kW)	54.000	8.100	62.100	18,3
Microhidráulica (< 10 kW)	–	10	10	0,1
Total	**167.000**	**8.100**	**175.100**	**18,4**

15. Objectives and general strategies the 2010 in renewable energies

The 977.800 tep objective is to reach tep of total advantage of the renewable resources, which will mean near 12% of the Basque power necessities in the 2010.

For it they are tried to incorporate throughout period 2001-2010 other 714,500 tep additional; that is to say, to multiply by three the level of resources that at the moment is taking advantage of. New electrical generation of renewable origin will be gotten up of form important to reach the 1000 MW in 2010. The electrical provision by means of renewable would allow to supply by example the electrical necessities of all the Basque houses. The direct investments that need in renewable energies for the period will be of 1,083 million _.

TIPO DE RECURSO	SITUACIÓN 2000	ACTUACIONES 2001-2010	OBJETIVO 2010	INVERSIÓN 2001-2010
Global				
Aprovechamiento total	263.300	714.500	977.800	1.083
Por tipo de recurso				
Hidroelectrica	27.800	4.900	32.700	18
Eolica	4.500	133.800	138.300	519
Solar	100	10.700	10.800	135
Biomasa	230.900	564.200	795.100	306
Olas	-	900	900	15

TIPO DE RECURSO	SITUACIÓN 2000	ACTUACIONES 2001-2010	OBJETIVO 2010
Hidroelectrica	167,0	8,1	175,1
Eolica	24,4	599,2	623,6
Solar	0,2	10,5	10,7
Biomasa	30,0	160,7	190,7
Olas	-	5,0	5,0
Total	221,6	783,5	1005,1

INDICADORES ESTRATEGICOS	SITUACIÓN 2000	OBJETIVO 2010
Renovables s/ demanda energetica	4%	12%
Generacion electrica s/ demanda electrica	2%	15%

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