

Energy policy of the European Union: Impact of the renewable energies and perspectives for the year 2020

Redondo Gil, C.¹; Esquibel, L.A.; Alonso Sánchez, A.M. and Velasco, F.J.²

¹Department of Electrical Engineering &
Systems Engineering and Automatic Control
School of Industrial and Computer Engineering, University of León. 24071-León (Spain).

Phone.: +34 987 291786 carlos.redondo.gil@unileon.es

² Department of Electronic Electronic Technology &
Systems Engineering and Automatic Control, University of Cantabria. 39005-Cantabria (Spain).

Abstract

In order to fight against the climatic change the European Union (EU) adopted at the beginning of 2007¹ a historical decision: The 27 countries members of the European Union (EU) will have to cover, with obligatory character, a 20 % of their power consumption with renewable sources in 2020. Previously the people in charge of the competent portfolios in energy policies of the countries members had decided that the bio-fuel have, with strictly obligatory character, a 10 % of the fuel market.

KEY WORDS

Energetic policy of the EU. Policy of R+D+i. Macroeconomic indicators: employment, investment and foreign commerce.

1. Introduction.

The EU in the emulation to design an Energy Common Policy linked to the fight against global heating like unilateral target the reduction of CO₂ emission of 20 % in 2020 on the levels of 1990, fixing in addition, for 2050, a target of reduction of a minimum of 60 % and until of 80 %. The final target is to avoid that the average temperature of the planet does not increase any more of 2 centigrade degrees with respect to the pre-industrial levels.

The target is to define and to adopt a new economic model of high energy efficiency and low emission of gases of greenhouse effect based on the efficient use of renewable, the obligatory one use that in 2020 20% of the power consumption in Europe comes from renewable sources, and the power saving (the second target is to reduce a 20% the consumption of energy in 2020 on the current tendency).

The nuclear energy and the clean coal will occupy, as well, a strategic place, on the one hand the atomic energy will compute at the time of calculating the reduction of CO₂ emissions, and by other all the thermal power stations of coal that settle from 2020 will have to apply technologies of capture and carbon kidnapping. It is foreseen that the coal duplicates its importance in the production of electrical energy before 2030 being as well the source that more CO₂ emits.

2. Current situation: Non-fulfilment of the 2010 targets.

The target to guarantee the production of 20% of the energy in 2020 is formulated when there is practically impossible the fulfillment of the targets established for 2010 in the Board 2001/77/CE that proposes for this year that 12% of the energy consumption should come from renewable sources; Spain could be the only exception if moderates the power demand and maintains the rate of current growth. At level of all European Union and ideally, 10% will be reached.

On the other hand the target to reduce the level of CO₂ emission in a 20% for 2020 respect to 1990 levels requires designing additional measurements that complement of efficient way policies developed up until today.

Data of the European Union²: In 2001 emissions diminished a 2,3% with respect to those of 1990. Realistic forecast until 2010, reduction of 4,7%. Target of reduction in the period 2008 - 2010 with respect to 1990: 8%. (Countries with a positive contribution: Luxembourg, Germany, the United Kingdom, Finland, Sweden and France).

Data relative to Spain, emission of greenhouse 2001 between 32,1% and 38% (Magazine Worldwatch) higher than of 1990. Commitment for the period, not to increase them over 15%, in 2004 2008-2012 were overcoming in more than 40% those of year 1990³, forecast of the Government: increase between 28 and 48% in 2010 concerned 1990⁴, which represents between 27 and 69 Millions of Tons of CO₂ in excess on the limit of assigned emission.

3. Investment in Research, Development and Innovation (R+D+i): programs of the European Union.

The Scientific Research, the Technological Development and the Innovation are critical elements, as much in the

¹ European Council of March 8 and 9, 2007

² 3th Annual Report on gas emission of hothouse. European commission (December, 2002).

³ Worldwatch (Spanish Edition).

⁴ European Commission and ONU, 01/04/2002.

subject of the Renewable Energies as in the design and development of technologies that allow the sustainable development of the fossil fuels, in particular the CO₂ capture and kidnapping. In this field and until 2015 there are foreseen the development of different projects from demonstration (15 before 2015) between which emphasizes the project of the City of the Energy in Spain⁵.

In any case, where a greater guarantee of success is anticipated is in the ambience of the Renewable Energies.

The R+D+i will allow to reduce the costs of all the technologies, and very especially of the photovoltaic one, which, according to the Commission, already costs today 650 €/MWh, a 60 % less than in 1990; on the other hand, to generate a wind-MWh costs 65€ and one generated with biomasses ranges between the 20€ and the 180€

With this target the funds increase destined to R+D+i in energy, as much of the Seventh Program Framework (of 574 annual millions it passes to 886 annual millions, two third parts of which are for renewable and power efficiency) as the Program of Intelligent Energy (from 50 to 100 annual millions), in both cases between 2007 and 2013.

On the other hand, the Commission will cooperate with the member countries so that the Structural Funds and of Cohesion also they benefit the development of the Renewable Energies and the linked technologies, and will present the First Strategic Plan of Power Technology in the first months of 2008.

4. Cost forecast of the proposed targets.

The cost of reaching the target of 20% will depend on the oil price in the international markets, since in the cost - benefit calculation - excluded the external costs⁶ - what more weighs there are 250 million annual tons of crude oil that the clean energies, for being indigenous, will avoid to matter in 2020 (the OPEC considers as target to maintain the price of the barrel over 60 dollars)⁷.

With a scene of low prices of the barrel (48 dollars), the considered annual cost is 18.000 million annual euros,

⁵ EUROPE PRESS, Madrid, on September 21, 2007. Spain will count, I project of the Department of Industry, Tourism and Commerce of the Government of Spain, with an experimental plant of apprehension of CO₂ with head office in El Bierzo (León) in 2009, according to the agreements signed by the Foundation ' City of the Energy ' with the companies Foster Wheeler Energy (Fwesa) and Praxair so that these take part in his construction. The cost of construction and putting in service of this plant, which will begin his operation in the middle of 2009, will rise up to 70 million euros, and his starting will allow the achievement of scientific essays and the acquisition of the experience necessary for the construction of plants of industrial size. The joint collaboration will allow to advance in the progress of the energy and environmental efficiency of the coal combustion, a factor that the European Union considers to be essential to have twelve plants of demonstration of commercial size in the year 2015.

⁶ Redondo Gil, C.; Legislation in the field of the Renewable Energies: regulation and control of the external technological economies associated with the renewable energies. The XIVth Meeting of Groups of Investigation of Electrical Engineering. Polytechnical University of Catalonia Barcelona, April, 2004.

⁷ Pampillón, R., September 30, 2007. Faculty and Research. Institute of Enterprise.

but with the barrel placed in the prices reached in 2006 (78 dollars), the annual cost descends to 10.600 millions, approximately 20 euros by European citizen and year. Both numbers can reduce other 2.000 annual millions with a good election of the renewable mix. To these estimations it is necessary to add the price of the ton of CO₂ avoided. With the ton to 25 euros and a considered saving of 700 million tons in 2020, the saving reaches 200.000 million euros this year.

The crude Brent overcame for the first time the last week of September of 2007 81 dollars.

Unfortunately, a greater weakening of the dollar could still shoot plus the oil price. As the price of the crude oil raises, greater it is the probability that the growth of the world economy is reduced. The price of the barrel type West Texas also has overcome a new historical barrier, quoting to beginning of October of 2007 to 84 dollars that supposes an increase of 165 % in dollars and 98 % in euros, from the beginning of 2003.

In view of this information, the Commission concludes that adding the savings of imports (with the oil to 78 dollars) and of CO₂ emissions, the costs would be covered to reached the fixed target of renewable power contribution.

5. Macroeconomic indicators: Investment, employment and foreign commerce.

5.1. Investment.

In the course of the year 2007 the index S&P which groups 30 companies related to the energy produced with renewable sources has revalued 38,6%. The new sector includes traditional companies in the energy sector, case of Iberdrola that has been consolidated like a referring one in the generation of wind, and new companies that coming from other sectors such as the real estate one (Motebalito or Urbas Guadahermosa) or that of the feeding (Ebro Puleva, with the project across its branch Dosbio, of three plants of production of biofuel, or SOS Cuetara) have modified their business strategies and have seen in the renewable energies an efficient area of diversification.

In any case the companies are conscious of the risks linked to their new lines of development, (1) some of the new methods of energy production are not profitable in if same and they need from subsidy, (2) on the other hand is necessary to consider the potential risks derived from the regulation and the normative development.

The second line is the derived from the option to invest in specialized investment funds, up to the moment a sector of limited dimension in general constituted by companies of small size. At the present moment there are 15 funds of variable rent related to actions of companies linked in the fight against the climatic change registered in the National Commission of the Stock Market.

The funds of renewable energy have revalued from January to August, 2007 an average of 14% as opposed to 7,13% of the funds of global rent.

5.2. Employment.

Another important linked aspect is the creation of jobs. The European Commission calculates that, at present, 300.000 persons are directly used by the sector and thinks that, in 2020, this number might increase in other 650.000 direct jobs.

5.3. Foreign commerce.

Approximately half of this employment would be orientated to the exportation, so that, even registering a potential reduction in the rate of the internal growth, the external demand would be enough to maintain and to increase the employment.

This situation is already a reality in the wind technology: in Germany, half of 60.000 jobs of the industry are faced to foreign markets, and Denmark - which sector has suffered an important internal sudden braking - it has managed to support its 20.000 employments thanks to the foreign market.

The European Commission emphasizes the foreign dynamism of the sector, especially Germany and Spain. The European industry is provided with more than 85 top companies which joint value overcomes 50.000 million dollars having itself duplicated in last three years. The wind one, once again, is the reference: the European manufacturers win 80 % of the world-wide market.

6. Energy sectors.

6.1. Electricity.

To reach the targets of 2020, it is necessary to increase the support to the renewable energies emphasizing the sector of the electricity production going on from the current quota of 15% to 34%.

By power sources, hydroelectric generation, both big and small generation, keeps on being the one that more reaches port, with 67% of the whole. The European Commission thinks that the big hydraulics has a limited growth, and does not treat it in its analysis.

In relation to the minihydraulics is to emphasize the administrative barriers, especially in the related thing to the environmental permissions, and the disparity of existing potential, emphasizing in it the new countries of the East Europe (Slovenia and Poland), where it grows to a rhythm of 8%, whereas in the rest of Europe it does to 3,8%.

The 60% of the wind world market is in the EU, and if until a few years ago it was concentrating on three countries, Denmark, Germany and Spain (in 2002 the 80% of the world capacity settled on Germany and Spain), now there are other countries that emphasized like the United Kingdom, Portugal and Italy. The development of the sector has already overcome the expectations foreseen to beginning of the decade - the wind is a third of the new entire capacity - being reached in 2005 the target foreseen in the White Book of 1997 for 2010, 40.000 MW. The current target is to have 75.000 MW installed in this date and to generate between 4%

and 6% of the communitarian electricity, including in this forecast with the wind navy.

The biomass - that there contributes 2% of the entire electricity - progresses very positively, although not in Spain: growing to 7% per year, in 2003 it raised 13% and in 2005 it reached 23%.

The forest biomass and the agricultural residues are the most important, with Finland, Sweden and Germany occupying the first positions of the ranking of countries; it is followed by the biogas and the organic fraction of the solid urban residues, where it emphasizes Sweden - that it applies the biogas to the transport, with a park of 779 buses and more than 4.500 vehicles - and the big potential of the small plants of gasification.

The photovoltaic lot has grown to an average per year of 70% during the last five years, going on from 127 MWp in 2000 to 1.794 MWp when 2005 finishing. It is to emphasize that 86% of this capacity is concentrated in Germany.

The European Commission emphasizes Spain so much for being the second European market, as for having approved the Technical Code of the Building, the first European norm that forces to incorporate the solar technologies - both thermal and photovoltaic - into the buildings.

The geothermal also has its reference, because it is the fourth source of renewable electricity in the world ambience and it is important in Italy, which has 790 MW installed, 95% of the electrical capacity of the whole EU (the thermal one promotes 6.589,8 MWt).

6.2. Transport.

In the first trimester of 2007, the ministers' summit with competences in Energy matter of the member countries decided that in 2020 10% of the fuel market of automotion of each State will have to be covered obligatorily with biodiesel.

It is constituted in the only energy subsector that obtains an own target in addition to the general, which will determine the energy renewable combination that chooses every country, since these have freedom whenever the minimal target of biodiesel is reached.

This greater institutional support to the subsector of the transport is derived from two facts of special relevancy: (1) the transport has a dependency on 98% of the derivatives of the crude oil and the clean fuels are the only viable option to reduce it.

10 % demanded is equivalent to 31 million tep, which 19 them can contribute the ethanol, 10 the biodiesel and 2 the biodiesel of the second generation (BTL), and (2) the transport emits more than a third of the entire CO₂ and it is the sector in which more the emission will grow, concretely, three times more than in the rest, coming up to 77 million tons in 2020; the biodiesel can go so far as to reduce the emission between 35% and 50% with regard to its equivalent fossils.

This information refers about economically to the current biodiesel produced in Europe by means of the most

efficient methods of production; the reductions can be major (even of 90%) if the best available skills are applied and for the future biodiesel.

In any case, although the fixed target is far below than 15% claimed by the industry, it is necessary to improve the policies, both community and national, to reach it and to increase the penetration of the biodiesel and bioethanol (1,6% of the market of diesel oil and 0,4% of the gasoline respectively according to official information). Only Sweden - where the biogas also has certain weight - and Germany - country that accumulates two thirds of the European consumption they advance to an acceptable rhythm; it is more, although the Board 2003/30/CE fixes a target of 5,75% of the market of fuels in 2010, the national targets are much less ambitious and they will only allow, ideally, that the EU should reach 1,4% at the end of the decade.

The development of proper instructions in the ambience of the transport needs from equal way to design policy efficient of sustainable radles in better substantial in the quality regulations of the fuels, the competitiveness of the biodiesel of the second generation, the improvement of the reserves of the petroleum companies towards the bioethanol or the introduction of measurements that guarantee the sustainable of the biodiesel.

6.3. Thermal uses.

The heating and the refrigeration approximately suppose 50% of the final consumption of energy of the EU, but only 9% of the same one is covered by renewable sources. In this sense is to emphasize the absence of communitarian regulation, except for exceptions to promote these uses, although there have been approved two instructions that bear relation to them: the 2004/8/CE, of promotion of the cogeneration, and the 2002/91/CE of power efficiency in the buildings.

The biomass for domestic thermal heating, the geothermal and the lot are the most appropriate technologies to develop in this ambience. To cover the target of 2010, the thermal uses should duplicate their contribution going on from 40 Mtep to 80 Mtep.

Remarkable examples head Sweden that is provided with approximately 185.000 facilities of geothermal heating, the half of the whole Europe, if this model one was making the saving of imports extensive to all the member countries it would reach 15 Mtep. Of equal way, to extend to the rest of Europe the use that the thermal lot has in Germany and Austria would suppose a saving of 12 Mtep.

Only the development of a good practices code will allow to reach the proposed targets.

Conclusions.

Need to plan the energy policies in the long term to a minimum of 10 years before, being even advisable that, in certain sectors, establish programs of performance to 50 years.

Establishment of three axes of action:

(a) Design of a global strategic Plan agreed by the totality of the member countries promoting the programs of Joint Action (JA) and encouraging strategic projects assumed like proper for the EU to the margin of individual programs of the member countries.

(b) Incorporation of the renewable energies in the energy mix.

(c) Need to design policies and performances of R+D+i that guarantee the optimization of the technological processes linked to the Renewable Energies guaranteeing their competitiveness opposite to other energy sources.

References.

Board 2001/77/CE

Board 2004/8/CE, promotion of the cogeneration.

Board 2002/91/CE, Energy Efficiency in buildings.

Board 2003/30/CE