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Critical review of the "*Study of the effects on employment of public aid to renewable energy sources*" by G. Calzada

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REFERENCE CENTER FOR RENEWABLE ENERGIES AND EMPLOYMENT

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"We have a unique and historic opportunity to transform our societies for the better. This is all the more important at this time of economic crisis, when a Green New Deal can provide the basis for a recovery that both provides decent work and contributes to the fight against climate change."

Guy Ryder, secretary general of ITUC Launch of the trade union statement to the COP14 in Poznan, Poland.

INTRODUCTION

The authors are members of the Reference Center for Renewable Energies and Employment of the Trade Union Institute for Occupational Health and Environmental Protection (ISTAS) a foundation of the Spanish trade union confederation Comisiones Obreras (CC.OO.)[1].

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They have carried out several studies on the negative effects of global warming and greenhouse effect on employment, and research on the positive and negative results of the implementation of renewable energy sources in terms of job creation. Such studies aim at a fair transition from a highly inefficient energy model into a new sustainable, carbon-free energy industry. Their activity is dedicated to a major trade union confederation (CC.OO.).

They collaborate as authors in different publications (available at www.istas.ccoo.es) and have participated actively in the most important international, European and national conferences and events on climate change.

ISTAS and the Reference Center for Renewable Energies and Employment wish to clarify who we are, who we work for and what our perspective is, which we believe are essential aspects in any accurate research that seeks to promote knowledge and expertise. We also try to maintain the precision of our approach on employment studies. Therefore, our work explicitly includes the following steps:

- Identification and analysis of the most significant factors; structuring of such factors and selection of the most representative or influential elements; calculation and design of possible indicators; exact definition of such indicators subject to the purpose and item to be measured; avoiding the use of unclear and ambiguous terms which might lead to misconstruing or subjective interpretation. It is essential to prove their usefulness and clearly state their use, both in follow-up and analysis indicators.

- Identification and verification of available data; assessment of their proficiency, quality, level of degradation; comparativeness and selection of sources and databases. This includes determining the starting and measuring periods and the definition of intervals for data collection and/or reference. It is also essential to accurately describe the systems for collection and data processing: calculation, formulas and factors, hypotheses, options in view of uncertainty,

[1] *Comisiones Obreras (CC.OO.)* is the major trade union in Spain by membership and number of representatives in union elections. Along with *Unión General de Trabajadores (UGT)* it assembles more than 80% of legal workers representatives elected at workplaces.

analysis and way of presenting measurements. It is important to explain clearly the layout of results: absolute/relative values, percentages, rates of variation, single or combined graphic representation models, etc. This ensures the scope of the study and prevents possible imbalances that arise from comparison between countries. It also helps to choose the most appropriate measure units for the presentation of research, and to establish the validity of results.

- Maintaining a constant critical and self-critical approach for a continuous assessment of the relevance and reliability of analytical tools. It is also necessary to seek, update, replace and redefine the information sources and data bases, as well as the indicators used.

I am deeply honored to collaborate with this excellent group of young researchers who always open to knowledge and different opinions, passionate workers devoted to the defense of the environment, of social justice and of humankind.

MANUEL GARÍ RAMOS, BSc in Economics

Director of the Reference Center for Renewable Energies and Employment

Head of ISTAS Environmental Department

May 2009

The **Reference Center for Renewable Energies and Employment** was created in 2006 to promote the renewable energies and contribute to the employment creation in the sector. Its main activities are the monitoring and analysis of renewable energy, generation of employment and professional development.

One of the features of the Center is the international dimension of either north-south cooperation for the renewable energy development, and collaboration with other institutes and organisations, technical or unions in the relevant field.

Within these partnerships established with several institutions highlights the activity related to the study of green jobs.

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1. INTRODUCTION

An article regarding a document elaborated by the University Rey Juan Carlos came out in the March 27 issue of newspaper "*Expansion*"[2]. The document under the title "*Study of the effects on employment of public aid to renewable energy sources*"[3], was written by Gabriel Calzada Álvarez (head researcher), researchers Raquel Merino Jara, Juan Ramón Rallo Julián and consultant José Ignacio García Bielsa.

After an in-depth study of the text we found several argumentations that lack validity, presented in an attempt to dispute the efficiency of renewable energy projects and to discredit the efforts of companies and organizations that have committed to develop clean energy in Spain and the rest of the world.

Our institute, and more specifically our Reference Center for Renewable Energies and Employment, as part of a group of organizations and institutions involved in the development of a new energy model, must and will expose the weaknesses, contradictions and lack of scientific accuracy in most of the assumptions presented in the study.

1.1. Arrangement and structure of the document

Although the issue discussed by the paper concerns the Spanish public opinion, the only known version of the work is published in English which limits the scope of readers and conditions any further dissemination of the document in Spain to translated versions.

The study includes an executive summary: "*Lessons from the Spanish renewables bubble*" and is structured in four main chapters:

1. *The origin of government support to renewable energy sources and the philosophy of green job creation.*
2. *The Spanish renewables bubble*
3. *Job creation in the wind, minihydroelectric and photovoltaic industry*
4. *The economics of artificial job creation: a calculation of the cost of green jobs on the rest of productive activity.*

The main reference material for the document are two research papers developed by US organizations[4] and published in 2006 that aim at studying the economic impact of replacement of carbon-based electricity generation by renewable energies for 2015, with two possible scenarios: reductions of 33% and 66%.

[2] *http://www.expansion.com/2009/03/26/opinion/1238105213.html*

[3] *Study on the effects of public aids to renewable energy sources on employmentremovable (Non official translation).*

[4] The Center for Energy and Economic Development Penn State University.The Economic Impacts of Coal Utilization and Displacement in the Continental United Status, 2015.

1.2. Description of the document

The study is laid out as a long editorial based on inaccurately quoted secondary data and partial facts and figures. The authors favor easy and effective statements occasionally shifting from precise criteria. The paper contains omission errors and misleading terms.

In our view the paper seeks to support certain undisclosed purposes:

- It attempts to impact on US public opinion and media.
- It fosters disapproval of Obama's administration by neglecting the support of renewable energy projects by preceding governments.
- It attempts to discredit social agents that work for a new energy model (including trade unions and environmental organizations) by suggesting political party bias
- The paper also seeks to join (belatedly) the social debate on green economy with inadequate argumentations and from a staunch neoliberal position.
- It questions the technical/energetic efficiency and economic viability of renewable sources which evinces a clear state of opinion against their predominance in the near future.

We seriously question the presumed neutrality of the paper after finding a number of arguments that contradict contemporary social and economic facts.

Although the paper is dated in March 2009, most of the reflections are based upon documents published before 2006. Ideological bias prevails over scientific research principles, which makes this paper attractive for conservative newspaper headlines but short of scientific validity. The annex compiles a series of articles and media quotations where the figures of job creation and unemployment estimates are not supported by any research or study. Those articles include blunt numerical assertions without any substantiation of the method used to calculate them, which is further evidence of political partiality[5].

[5] The author of the study is Gabriel Calzada Álvarez, Ph.D in Economic science, associated professor for the Univeristy "Rey Juan Carlos" and president of the Institute Juan de Mariana, defined as an "independent institution that does not accept funding from political parties and whose apparent goal is to conduct market studies". In fact it represents a sector that staunchly denies climate change. This group often presents works or publishes articles in related press defending the use of nuclear energy and occasionally neoliberal views. A quick browsing of articles by this author suggests a search for big impacts on media (www.juandemariana.org/autor/3/gabriel/calzada/): *The black reality of green jobs* (March 2009); *Was there ever a climate crisis? A meeting of skepticals begins* (March 2009); *¿Nuclear? Yes, maybe* (March 2nd 2009); *Don't let Greenpeace decide for you* (November 23rd 2008); *The Illogical European Socialist Republic* (May 2008); *The curse of being blessed by UNESCO* (February 3rd 2008)

2. WEAKNESSES OF CALZADA'S PAPER

2.1. Lack of scientific / technical accuracy

In terms of technical/scientific accuracy the study lacks an explicit, truthful methodology. This is a significant aspect when dealing with a recently created sector which at the same time represents a strategic branch of the economy.

Lack of previous data and difficulties in research associated with this new sector require either the elaboration of self-managed assessment tools or the cautious application of existing instruments that will have to be modified to fit in the new setting. All research methods must be explained in detail, subjected to critical probes and constantly revised and updated. Calzada's study does not meet these criteria since data and assertions are provided disorderly and without proficiency.

Serious concern rises from the lack of transparency of the data provided in the study, all of them extracted from secondary sources, which neglects their comparativeness. There is no evidence of new research but rather an adaptation of existing data from other studies, most of them from contexts that differ in great extent from circumstances in Spain.

The American study on which Mr. Calzada bases his paper cannot be considered a valid reference due to the following:

- It is based upon inadequate predictions supported by an input-output[6] approach with projections for 2015 and specific adjustments related to the characteristics of a specific region, in this case the United States.
    - Elaborated on linear and constant trends that do not take into account the current economic situation, social dimension and the level of concern about global warming, to mention just one example.

- The American models of economic growth and energy consumption differ from the Spanish situation. These are not easily comparable circumstances and experiences cannot be simply transferred from one scenario to the other.

2.2. Political bias hinders scientific analysis

The study contains contradictory views in the description of the energy market and the role played by the government. There are frequent appeals to the free market as an arbitrator in the evolution of the economy and at the same time government implication is mentioned as the only cause for rising energy prices in Spain. The story overlooks the importance of tariff deficit introduced in 2000 by the conservative government of the People's Party (PP). Tariff deficit allowed the electricity companies (with huge benefits) and the government to freeze electricity prices regardless of the evolution of energy costs. The resulting deficit was refunded to companies by the government (public funds).

Such inappropriate deregulation policy remained in force until the 29th April 2009, when the Ministry of Industrial Affairs and companies reached an agreement to cancel it, but only when the companies have been compensated for most of the tariff deficit that amounts to 16 billion Euros. That amount is the result of a policy that kept prices below costs in an irrational application of market principles that have

[6] Input-output analysis was developed by Wassily Leontief (1905-1999) in 1936. It uses a matrix representation of a nation's (or a region's) economy to predict the effect of changes in one industry on others and by consumers, government, and foreign suppliers on the econonomy.

prevailed in the last years. This was a political decision of neoliberal advocates to favor big companies, privatized industries and their appointed managers which Mr. Calzada fails to analyze with precision.

The study denies the capability and legitimacy of the government to participate and intervene in economic decisions with any proposals beyond corporate arguments. It only considers criteria based on direct and immediate business profitability. Perhaps the best example of this is the idea of "self funded public investment" which can only be achieved by stripping the government of its redistribution powers and limiting its activity to private business management.

2.3. Wrong definition of green jobs

In the study the author presumes that green jobs are only those related to the development of renewable energies, but they cover a much wider category. ILO makes the following definition of green jobs[7]:

> *"Green jobs reduce the environmental impact of enterprises and economic sectors, ultimately to levels that are sustainable. Green jobs are found in many different economic sectors such as energy supply, recycling, agriculture, construction, and transportation. They help:*

- *cut the consumption of energy, raw materials and water through high-efficiency strategies,*
- *de-carbonize the economy and bring down emissions of greenhouse gases,*
- *minimize or avoid all forms of waste and pollution,*
- *protect and restore ecosystems and biodiversity."*

2.4. The document favors immediate benefits over energy efficiency

Reversing renewable sources policies based merely on a business and cost reduction perspective clashes violently against scientific evidence on the need for a change in the forms of energy production in a triple sense:

- Global warming is a tangible fact that might lead, if it is not prevented, to an irreversible climate change and have catastrophic social and economic consequences.
- There exists a world consensus on the limited capability to absorb side effects (CO_2, radiation, wastes) which are already causing considerable environmental damage
- It is clearly evident that fossil fuel resources are limited, less accessible and therefore more expensive.

For any of these three reasons it becomes necessary to introduce changes in the current energy generation trends. Those changes call for a great investment with medium/long terms goals. Obviously any investment, private or public implies a certain level of risk and opportunity costs.

Structural changes required for this transformation do not necessarily match with the dynamics of obtaining immediate profits. Investment in this field seeks medium/long term benefits and not all of them are compatible with direct company profits or financial viability. The return of invested capital occurs in a medium/long term period in the form of jobs, innovation and development, and renewal of the existing industry into a solid and sustainable sector with a broad future perspective.

Aware of the evident short, medium and long term benefits of renewable energies, the EU has committed itself to reach 20% of final energy consumption from renewable sources by the end of 2020. The Spanish government supports such commitment.

[7] Study: Green Jobs, towards sustainable work, in a low-carbon world. OIT. 2008

Considering that the curve of technological development confers an advantage position to most advanced renewable energies, minor renewables necessary for the achievement of local, national and European goals will obviously require bigger support and investments[8].

Public policies must promote and ensure the development of new clean energies to grant environmental sustainability, energy self-sufficiency and future economic viability, as it was done with conventional energies for strategic reasons (although their ownership and benefits eventually ended up in private hands).

2.5. Socioeconomic benefits of investment in renewables are deliberately ignored

Among the fallacies of Calzada's paper there is an evident lack of cost/benefit calculation to determine investment profitability. The document does not explain any elemental investment/jobs ratio that might be used as useful indicators to assess the measures and detect priorities.

It also fails to provide simple data like the 148–billion dollar investment in renewables in 2007 which meant a 60% increase compared to investments in 2006. That increase implied the biggest job creation by any industrial sector in the mentioned period.

The enduring possibilities of fully developed renewable energies in the current unfavorable conditions are undeniable. *Sáenz de Miera* and *Muñoz* state that: *wind power represents a competitive alternative in terms of costs that implies no risks for the electricity sector and economic efficiency. On the opposite it is an economic alternative and a source of added value, industrial development and job creation".*[9]

Data on wind energy in Spain is decisive. 13,522 MW installed in 2007 turn it into the third technology by installed power. Its input to electricity production ranks between 9.5% and 11%, saving 1 billion dollars in oil imports (not including the savings in imports of enriched uranium and savings in expenses of nuclear waste disposal). Spanish exports of this type of energy amounted to 2.5 billion dollars. Spain is the world's third biggest producer of wind power, after the United States and Germany. Wind power energy avoided the emission of 18 million tones of CO_2.

Regarding CO_2 emissions, leaving aside their environmental significance, it is important to consider the reduction of direct economic costs associated with the increase of installed photovoltaic power as expressed by the Association of Renewable Energies Producers (APPA) and the Association of Photovoltaic Industries (ASIF) based upon an by Arthur D. Little.

Given the current financial and economic circumstances, the development of renewable energies and the increase of energy efficiency are powerful weapons to combat the economic crisis, since they reduce the level of dependency on fossil fuels and generate more jobs per unit of investment than any other activity. This fact has been shown by different government studies carried out in OECD and developing countries and has led European Commissioner for Energy Andris Piebalgs to declare recently in Bonn: *"we need a **new energy revolution** to shift away from our fossil fuel dependency. Renewable energy is at the heart of this revolution".*

The authors not only err in their calculation, but also contradict the point of view of contemporary economists who work for many government and international organizations. This does not prove them wrong but it shows their detachment from the evolution of the economic thinking in view of scientific evidence.

[8] Decrees, Energy Plan 2005-2010 and European post-Kyoto goals.
[9] G. Sáenz de Miera y Miguel Ángel Muñoz. Escenarios, retos y mitos de la energía eólica. (Scenarios, challenges and myths of wind power) Soitu.es 23/02/2009

Peter Pochen, a senior specialist of ILO's Policy Integration Department stated at the Poznan conference that renewable energies already create more jobs than fossil sources. Kaveh Zahedi the Climate Change Coordinator at the United Nations Environment Programme, requested in the same meeting new incentives for the development of green jobs and asserted that the current crisis must be regarded as a clear opportunity to activate the reconversion of the current economic model into a green economy: "this is a great challenge and failure to act implies a very high social cost".

The conclusions of UNEP's report "*Green Jobs, towards decent work in a sustainable, low carbon world*" are indisputable: millions of green (environmentally sustainable) jobs have been created in the world, in industrialized as well as in developing countries and emerging economies. One sector of renewable energy alone has created 2.3 million jobs worldwide and the figure could reach 20 million jobs by 2030. Renewable energies already create more jobs than fossil fuels and investments on them are estimated to reach 630 billion dollars by 2030, which means a significant activation of world resources. This year the wind energy sector might generate 2.1 million jobs and solar energy some 6.3 million jobs.

The European Parliament and the European Council adopted on December 9th 2008 Directive 20/20/20, setting climate change reduction goals for the next decade, as well as mandatory national targets to be achieved by Member States through promoting the use of renewable energy in the electricity, transport, heating and cooling sectors in order to reach EU goals of 20% increase in the use of renewables and 20% cut in energy consumption for 2020.

The shift in energy policies is remarkable and has been excellently summarized by UPV/EHU professor Roberto Bermejo[10]. France and the UK, countries that relied heavily on nuclear energy have already submitted their national plans for the development of renewable energies to comply with the Directive. Prime Minister Gordon Brown presented last June an energy plan that practically increases ten times the energy goals of his government for 2020 and represents *the most dramatic change in UK's energy policy since the arrival of nuclear energy*.

France seeks to go from an installed power of 13MW to capture 5.400 MW of solar energy in 2020, but the most important shift has occurred in the electricity sector model which is currently centralized and based mostly on nuclear energy, and provides 75% of the country's energy. The French government expects to introduce a new model in which *"every house, company and community will produce its own electricity."*

In Germany, the conservative government of Premier Angela Merckel increased its job creation estimates for renewable energies from 300.000 to 400.000 jobs for 2020, given the growth in employment generation currently observed in this sector.

The European wind energy sector reported the creation of 154,000 (direct and indirect jobs) in 2007 and expects an increase of 330,000 jobs in 2020. The European photovoltaic sector expects to generate electricity for more than 3 billion people and 10 million jobs.

President Obama plans to double renewable installed power in a three year period and reduce energy consumption in public buildings by 75% in order to achieve *energy independence* to avoid America becoming a hostage to shrinking resources. His policy is aimed at *reversing US dependence on foreign oil and building a new economy that will create millions of jobs*. US administration expects an increase of 460,000 jobs if renewable power is doubled.

[10] Bermejo, Roberto, "El desarrollo de las renovables como política anticrisis" (Development of renewables as a measure to overcome the economic crisis) Daphnia, núm. 48, Primavera 2009.

Roberto Bermejo also mentions in his article a report by the American Solar Energy Society on the efficiency of renewables that employed 9 million workers in 2007. The study presents an optimistic scenario that estimates 37 million jobs in this sector for 2030.[11]

2.6. Lack of knowledge about the Spanish bonus system for renewable energies

The document repeatedly makes a confusing description of the Spanish system of aid to special energy sources.

Regarding the bonus system it repeatedly mentions the low levels of production/year of installed MW for renewable energies compared with oil-based energies. It deliberately omits the fact that bonuses are associated with the production of electricity and not with the total installed power, which means they do not represent any additional cost for taxpayers. These unclear references become even more confusing in a text aimed at readers who are unfamiliar with the Spanish context.

The Spanish government has put into practice a system to support investments in renewable energies by giving bonuses to electricity production based on such sources along with a mandatory purchase of that energy by electricity companies. The system operates on three basic pillars[12]:

1. Predictability: the system grants payment all through the asset's life period.
2. Stability: the legal framework is based upon non-retroactive criteria.
3. Profitability: a sufficient scenario is defined for the development of investments

The ultimate objective of bonuses to the production of renewable energies is the development of an economic sector that will progressively reach higher figures of profitability and independence from bonuses until it achieves full maturity and becomes competitive.

[11] Media reports and specialized studies hint at the fact that renewable energy goals are becoming more ambitious in China, India, Japan, Brazil and Russia –countries with very different conditions and solid conventional energy sources.

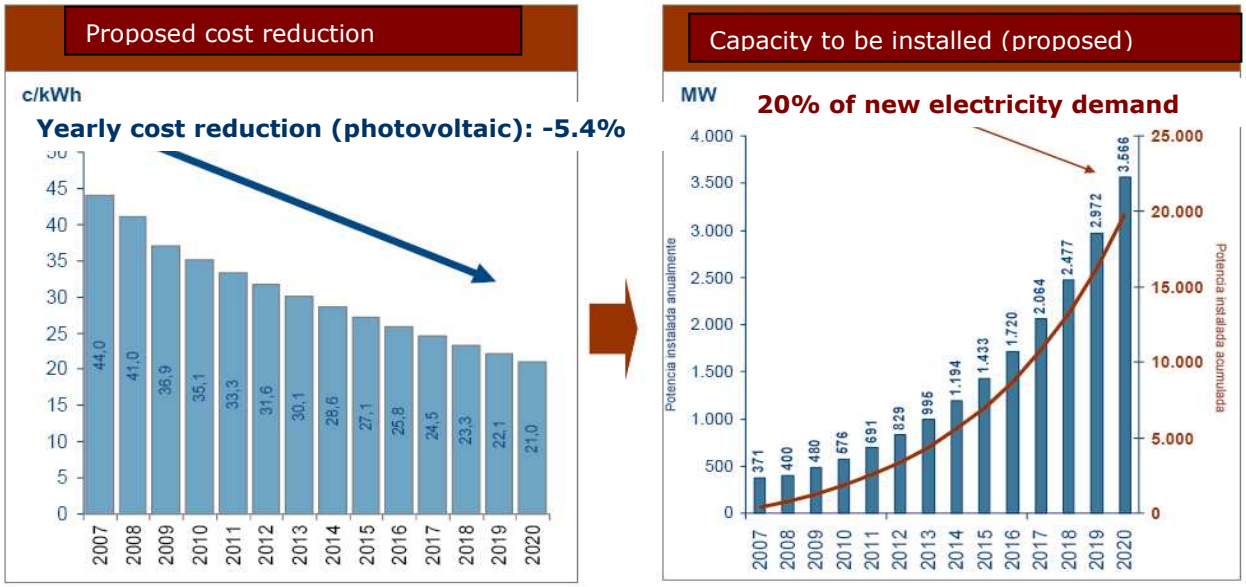
[12] Gonzalo Sáenz de Miera "Energías renovables en España: Objetivos y Regulación" Abril 2006. (Renewable energies in Spain: goals and regulation).

2.7. The study disregards the decreasing trends in renewable energy costs

One of the significant advantages of investment in renewable energies is the progressive reduction of costs and the increase of economic and environmental benefits with the evolution of technologies. This means that after the initial investment and when installation and maintenance costs are paid off. Costs are reduced significantly since in many cases they do not involve fuel expenses.

In the case of photovoltaic energy, ASIF and APPA included in their proposal for 2007 how costs decrease as installed power increases for this technology[13]:

Graphic 1: Evolution of solar photovoltaic energy costs with the increase of installed power (2007-2020).



Source: Association of Renewable Energies Producers (APPA) and the Association of Photovoltaic Industries (ASIF)

The International Energy Agency (IEA)[14] also acknowledges a decreasing trend for wind power costs that will progressively reduce the need of support to become competitive. This energy source will pass from 70-75 €/MWh in 2020 to 60-70 €/MWh in 2030.

In view of a decreasing evolution of costs, conventional energies show an opposite trend that predicts a continuous increase of associated costs.

Factual oil prices estimates for 2030 are of 125 dollars per barrel.

[13] APPA and ASIF press release: Photovoltaic sector expects a 20% yearly grow to equal household electricity generation costs before 2020.
[14] IEA. Energy Technology Perspectives 2050. 2008.

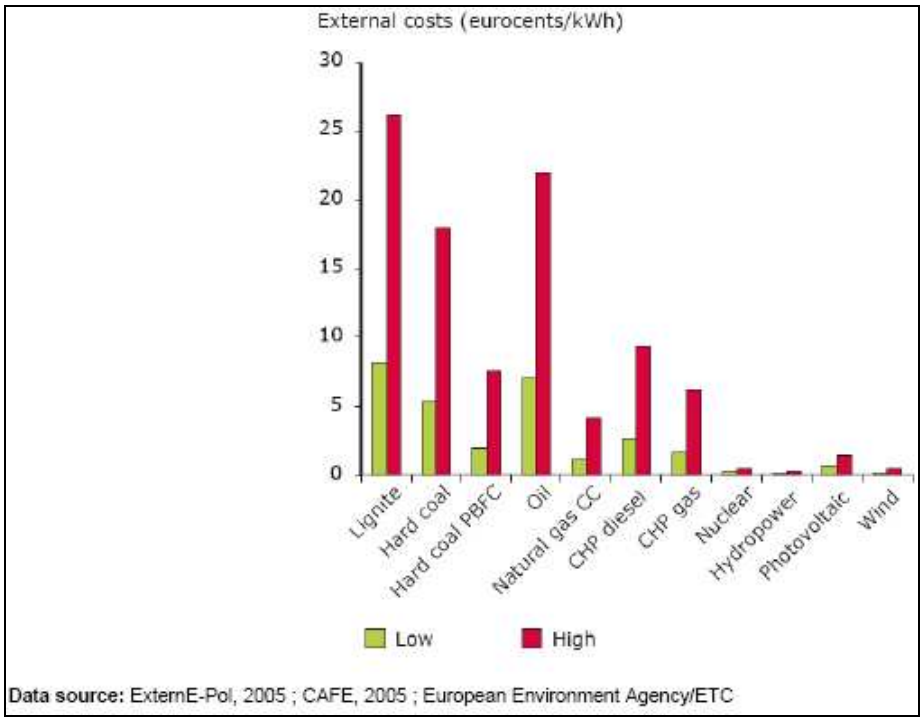
2.8. The study does not take into account the external costs of energy production

External costs derived from environmental effects in the production of electricity are significant in most EU-25 countries, a fact that reflects the prevalence of fossil fuels in electricity generation. The total external costs of electricity production in the EU-25 reached 0.7% and over 2% of GDP in 2003. Consumers, manufacturers and political authorities remain unaware of these prices and fail to reach decisions on how to improve the use of resources.

Externalities of electricity are not reflected in its price but they are ultimately paid by society. Who will pay global warming costs if emissions of SO_2 particles, NOx, VOCs and derived pollutants cause serious damage to human health? Obviously, society will.

The damage caused by climate change associated with greenhouse gases released during energy production also has a considerable cost. Who pays the economic costs of warming? Once again, society does.

Graphic 2: Estimates on average externalities by technology (2005)



SOURCE: European Environmental Agency http://www.eea.europa.eu/es

NOTE: Only partial costs of nuclear energy are included.

Based on the European Environmental Agency estimates, fossil fuel energies (coal, oil and to a lesser degree, natural gas) in a range between 1.1 c€/kWh- for advanced gas technologies- and 26.3 c€/kWh for regular coal plants, represent approximately 55% of total electricity production in 2003.

Most of the external costs originate during the production of electricity (i.e. coal combustion, release of pollutants into the atmosphere, etc.), although a small component is associated with the fuel cycle (mining and fuel transport, for instance). The introduction of advanced technologies (as combined cycles) or pressurized fluidized bed combustion (PFBC) might reduce substantially the external costs of fossil fuel systems.

Renewable sources and nuclear energy show less damage per unit of electricity. However, the external costs of nuclear energy are in a scope of 0.2-0.4 c€/kWh and 70% of them are due to radioactivity,

without considering the costs of serious nuclear accidents. Solar photovoltaic energy has a high cost due largely to its higher energy intensity during the manufacturing phase in the solar cells in a scope between 0.7and 1.4 c€/kWh, but this cost is still considerably lower than the costs for fossil fuels.

Calzada's paper speculates that electricity obtained from coal is cheaper but it fails to consider the external costs associated with CO_2 emissions derived from this form of energy production, just to mention an example. We must bear in mind that emissions from coal fired power stations reached 1,100g (CO_2 equivalents) /kWh, while wind power stations barely reach 36 g/KWh (see table 1).

The following table shows associated CDE (carbon dioxide equivalent) per kWh produced for each form of energy production. The data are indisputably clear:

Table 1: Greenhouse gases emissions associated with conventional and renewable energies.

Sources	Emissions g (CO_2 .equivalent)/kWh
Electricity production	
Coal	1,100
Photovoltaic (p-Si) (1)	189
Photovoltaic (m-Si) (1)	114
Wind (1)	36
Co-generation	
Gas Oil	350
Natural gas	260
Thermic production	
Fuel oil (3)	336
Gas oil C (1)	338
LPG	304
Natural gas (1)	286
Pellets (wood) (2)	37
Solar Thermic (4)	6

(1) Suisse Office of Energy
(2) Joanneum Research, Austria
(3) University of California
(4) University of Sydney

Source: Decree on solar energy. Municipality of Vigo.

The European Environmental Agency has presented data and information from a study on the impact and costs of climate change (Watkiss et al., 2005) in which external costs are estimated at a minimum value of 15 €/t of CO_2 and a higher value of 80 €/t of CO_2, remarking on the possibility of much higher costs[15].

[15] "External costs of electricity production" European Environmental Agency (2005-2007).

2.9. Wind power energy reduces the price of electricity

Data from AEE (Spanish Association of Wind Power Companies) show that the benefits from wind power energy double the amount of bonuses it receives. This sector received bonuses that amounted to 991 million Euros in 2007, but there is a fact that remains intentionally concealed and it is that the wind power sector reduced the price of electricity by 1.198 billion Euros. This means that it cut electricity bills by 207 millions. Electricity bills are 4.5 Euros cheaper for every citizen because of wind power generators.

According to estimates wind power production reduced market prices in Spain by 7.08 €/MWh in 2005, by 12.44 €/MWh in 2006 and by 12.44€ MWh in the period between January 1st and May 31st 2007. In general terms this meant an average reduction of the market price of 11.7%, 8.6% and 25.1%, respectively. AEE estimates based on these values show that thanks to wind power energy the system, and therefore consumers saved 1.746 B€ in 2005, 1.2 B€ in 2006, and 1.348 B€ in the mentioned period of 2007. This saving exceeds by far the bonuses (overcost) received by the sector.

2.10. Renewable energies are not responsible for industrial relocation

The authors hold renewable energies responsible for the increase of energy costs and associate such increase to the relocation of industries with higher levels of energy consumption, supporting the false syllogism: *increase of costs* = *renewables*, hence, *renewables* = *relocation*.

Such formulation is completely groundless and two arguments prove it wrong.

First the authors have not examined the facts about energy costs and the electricity production system in Spain. Among the many oversights and neglected facts we have selected the ones related to the measuring of economic costs of energy:

- Impact of the evolution of oil prices.
- Spain's increasing and inevitable coal imports that amounted to more than 60% of the coal used in 2008.
- Tariff system created by the conservative government (PP) which does not cover generation and access costs determined by the market and has been accumulating tariff deficits since 2000.
- Nuclear waste management costs were estimated in 2.7 billion Euros that electricity companies charged on their bills. Those costs are expected to be covered by the companies as soon as the agreement with the Ministry of Industrial Affairs comes into force.

Secondly, industrial relocation has nothing to do with renewable energy sources. That is a well known fact acknowledged by experts, government officials, employers and unions.

2.11. Renewables do not receive more public funding

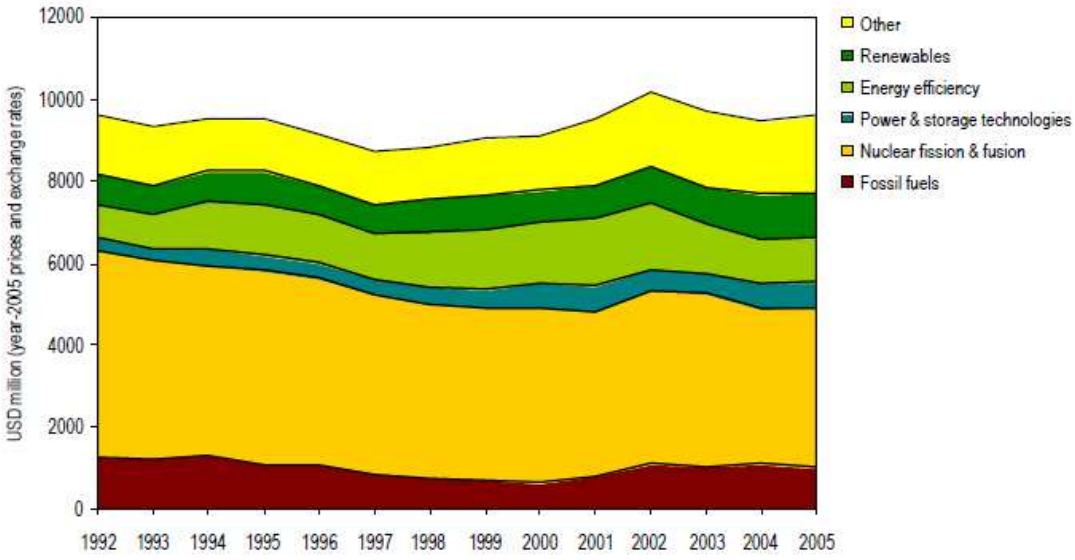
The Spanish Renewable Energy Plan for 2005-2010 defines the development of public funding for that industry and includes a progressive reduction of public aids. Such reduction is an essential requirement for an economic sector expected to be fully independent from public support as soon as business and technical aspects are consolidated.

The position of different employers' organizations is oriented towards such reductions based on this agreement and it even sets reference deadlines.[16]

On the other hand, we must bear in mind that all energy generation technologies, both conventional and renewable have been historically funded for their strategic role in economy.

The National Energy Agency acknowledges that although lately funding has been oriented to the support of renewable energies, historical evidence shows that fossil fuel based energies have received higher net funding.

Graphic 3: Public Energy Research and Development funding in IEA countries (1992-2005)[17]



Note: Among OECD Member states, only Iceland, Mexico, Poland and the Slovak Republic are not IEA Members.
Source: IEA R&D database.

Graphic 3 shows public funds invested in fossil fuels (brown area), fission and fusion nuclear energy (orange) (whose total value exceeds the amount invested in renewables), storing technologies (blue), energy efficiency (light green), renewables (in dark green) and others (yellow).

Table 2 and Graphics 4 allow us to compare European subsidies and aids to different energy sources. Figures are conclusive and unfortunately in Spain the funding of oil sources exceeds by large the amount of subsidies for renewables.

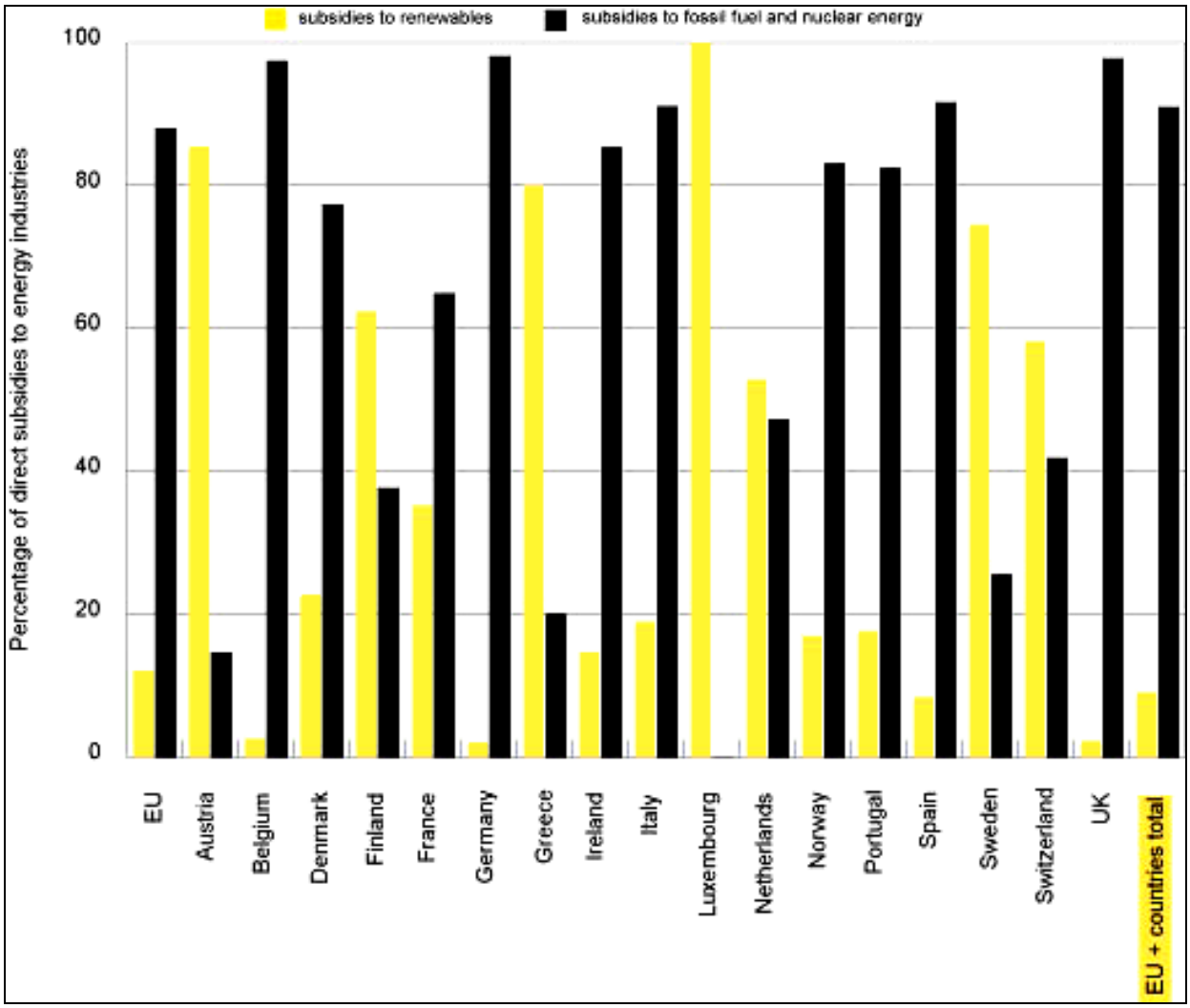
[16] ASIF-APPA Press release 27/11/2007 "El sector fotovoltaico quiere crecer un 20% anual e igualar su coste de generación con el precio doméstico de la luz antes de 2020"
[17] Public Energy Research and Development Funding in IEA Countries. "Their Magnitude, How they Affect Energy Investment and Greenhouse Gas Emissions, and Prospects for Reform Trevor Morgan", United Nations UNFCCC Secretariat Financial and Technical Support Programme ENERGY SUBSIDIES.

Table 2: Yearly subsidies to primary energies in Europe (millions of dollars):

	FOSSIL FUELS	NUCLEAR ENERGY	RENEWABLES
EU	520.7	428.3	131.3
Austria	4.7	1.4	35.7
Belgium	61.6	146.8	5.5
Denmark	368.2	2.8	108.8
Finland	68.7	8.9	129.0
France	280.5	563.3	459.3
Germany	6890.4	314.6	149.3
Greece	1.3	0	5.2
Ireland	32.4	0	5.6
Italy	11.0	147.3	37.1
Luxembourg	0	0	6.9
Netherlands	31.0	48.0	88.4
Norway	20.7	7.6	5.8
Portugal	4.5	3.0	1.6
Spain	705.5	40.0	68.3
Sweden	3.4	15.9	56.5
Switzerland	13.7	61.1	104.0
UK	1217.9	2885.9	94.9
TOTAL	10236.3	4674.8	1493.2

Source: Energy Subsidies in Europe, a report commissioned by Greenpeace
http://archive.greenpeace.org/comms/97/climate/eusub.html

Graphic 4: Percentage of direct subsidies to energy industries



Source: Energy Subsidies in Europe, a report commissioned by Greenpeace
http://archive.greenpeace.org/comms/97/climate/eusub.html

Comments:

- Yellow bars represent public aid to renewables and black bars represent fossil fuels and nuclear energy.
- Direct subsidies include government expenses, tax cuts (uncollected taxes) and funding of development.
- "Unseen" subsidies are not included, e.g.: favorable tax rates for oil and gas exploration. They might be by far more significant than direct subsidies.
- The yearly totals for 1990-1995 are average values. While some governments start to reduce some of their oil and nuclear programs, theses figures show the evident bias against renewables.
- Numbers overestimate the subsidies to renewables. Some governments include waste incineration in that category. Waste incineration should not be considered a renewable source of energy since it generates large volumes of emissions and highly toxic wastes.
- Luxembourg imports 100% of its oil and most of its electricity consumption so it benefits from aid to other European countries.

2.12. The price of electricity in Spain is below the average European price

If we compare the prices of electricity for households and industries in Spain to those of other EU countries, Spain is in both cases below European average.

Table3: Price of electricity (per 100 kWh) for households and industry in the EU, 2005-2007

	Households			Industry		
	2005	2006	2007	2005	2006	2007
EU-27	13.36	13.97	15.28	8.75	9.75	10.70
Euro area (1)	14.70	15.10	16.05	9.49	10.27	11.23
Belgium	14.81	14.42	15.81	9.38	11.72	11.73
Bulgaria	6.44	6.60	6.60	5.16	5.52	5.62
Czech Republic	8.68	9.85	10.67	7.13	8.70	9.30
Denmark	22.78	23.62	25.79	10.86	12.06	10.74
Germany	17.85	18.32	19.49	10.47	11.53	12.72
Estonia	6.78	7.31	7.50	5.57	6.02	6.30
Ireland	14.36	14.90	16.62	10.56	11.48	12.77
Greece	6.88	7.01	7.20	6.97	7.28	7.61
Spain	10.97	11.47	12.25	8.36	8.79	9.87
France	11.94	11.94	12.11	6.91	6.91	7.01
Italy	19.70	21.08	23.29	12.02	13.29	15.26
Cyprus	10.74	14.31	13.76	9.27	13.04	12.26
Latvia	8.28	8.29	6.88	4.82	4.82	5.23
Lithuania	7.18	7.18	7.76	5.88	5.88	6.46
Luxembourg	14.78	16.03	16.84	9.02	9.49	10.54
Hungary	10.64	10.75	12.22	8.86	9.13	9.84
Malta	7.64	9.49	9.87	7.41	7.46	9.42
Netherlands	19.55	20.87	21.80	10.70	11.38	12.25
Austria	14.13	13.40	15.45	9.92	10.35	11.43
Poland	10.64	11.90	11.84	6.78	7.27	7.23
Portugal	13.81	14.10	15.00	7.49	8.58	9.03
Romania	7.79	9.43	10.17	9.15	9.20	10.02
Slovenia	10.33	10.49	10.64	7.33	7.81	8.90
Slovakia	13.38	14.48	15.37	8.37	9.20	11.11
Finland	10.57	10.78	11.60	6.99	6.86	6.89
Sweden	13.97	14.35	17.14	4.68	5.93	6.31
United Kingdom	8.77	10.20	13.16	6.96	9.66	11.44
Croatia	8.48	9.22	9.23	6.76	7.32	7.33
Norway	15.71	15.33	18.56	8.12	8.06	10.58

(1) EA-12.

Source: Eurostat (nrg_pc_204, nrg_pc_205, nrg_pc_202 and nrg_pc_203)

We can certainly assert that energy prices for households in Spain with 12,25 Euros per 100kWh ranked below the EU-27 average of 15,28 and the 16,05 of the Euro zone; price for industrial use in Spain (9,87) was also below the EU-27 average of 10,70 and the Euro zone average of 11,23.

2.13. Cheap energy is not the best way of securing employment

Mr. Calzada also claims in his study that green jobs threaten other sectors such as metallurgy, food processing and beverage, and tobacco industries. Sectors with higher levels of energy consumption will obviously be seriously affected by a progressive increase in energy prices.

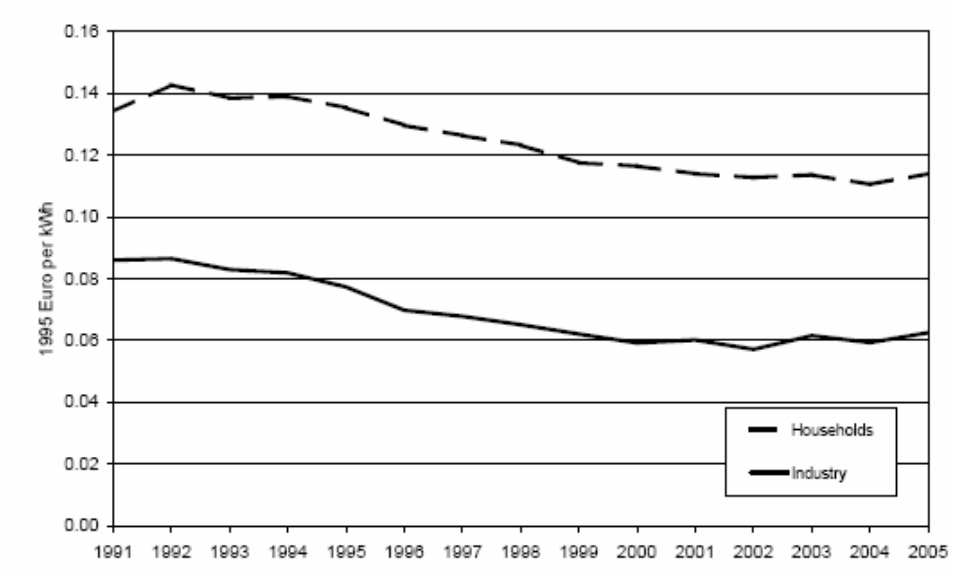
We have already mentioned the fallacies regarding the shortcomings of renewable energies that the study tries to push. The fact that energy is less expensive in Spain than in the rest of EU has also been proven, but the debate on energy prices requires a new approach.

There must be a clear choice between keeping low energy prices for such industries and focusing on energy saving and efficiency which will ensure more independence for electricity prices and stimulate the development of advanced technologies. Could high energy prices bring about a modernization of industry and activate economic resources for research, development and innovation?

The European Environmental Agency considers that the increase of prices could be an additional incentive for final users to cut their energy consumption through a combination of good management practices, purchase of products with higher energy efficiency and reduction of energy demands. Customers can react positively to price rises if conditions are adequate (AIE, 2003).

The growth and development of western economies in the last decades have been based upon relatively easy and cheap access to energy. That model can be updated. Even if we skip the environmental significance, the fact is that new world economic powers have come into play and compete with western consumers. Their growing energy demand will continue to exhaust the available resources which are limited and finite.

Graphic 5: Evolution of electricity prices in EU-15



Source: Eurostat[18].

NOTE: Dashed line shows electricity prices for households and straight line shows industry prices.

The era of cheap energy is coming to end or maybe it has already ended. Whatever expression we use, it is time to act accordingly, cautiously and in the most rational way.

[18] Eurostat for electricity and gas taxes. DG TREN (*Oil bulletin*). European Commission.

3. BENEFITS OF RENEWABLE ENERGIES

3.1. Job creation in the renewables sector

The following tables have been extracted from the study: "Renewable energies and employment generation in Spain. Present and future" carried out by ISTAS[19] and presented in 2008. Data for this study were collected in surveys to companies in 2007 and completed by input from key informants from the renewable sector and public authorities.

Table 4: Jobs in Renewables (2007)

Direct Jobs	OM	BIO	Direct jobs	Activities A	Activities B	Indirect jobs (ratio 1.12)	TOTAL Direct and indirect jobs
89.001	8.528	80.473	89.001	67.374	21.627	99.681	188.682
100%	9,58%	90,42%	100%	75,7%	24,3%		

Source: Own elaboration

Table 4 shows a total of 188,682 renewables jobs of which 67.000 belong to the construction, manufacture, installation, operation and maintenance (category A of activities in table 11) and 22,000 to management, marketing and engineering projects (category B of activities).

We consider direct jobs those generated in companies directly involved in the necessary processes to produce energy from renewable sources.

Indirect jobs amount to 99,000. The direct/indirect jobs ratio for all renewable energies was around 1.12 in 2007.

Rates of relation with indirect jobs vary depending on the type of renewable energy, the industrial phases, the level of expansion for each technology and the full development of production and technologies.

The global coefficient for renewable energies is in the lower range of direct/indirect jobs ratio, so the number of indirect jobs might be even higher.

Summing up data from the main subsectors, wind power reports 32,906 direct jobs. In a study based on a different approach the AEE estimated 37,730 jobs of which 20,781 were indirect jobs.

Regarding solar photovoltaic energy, direct jobs amount to 26,449 if we consider a job loss estimate of 15.000 after the regulatory adjustments introduced in 2007 by industrial associations of this sector (ASIF and APPA)[20]. We must stress the need of investments to promote job security and bear in mind the specific commitment by these associations to reduce dependency on subsidies progressively in a 6 year period to reach full viability in 2015[21].

[19] English and Spanish versions of the executive summary and technical data on the study is available for download at: http://www.istas.net/web/index.asp?idpagina=3371

[20] Joint press release ASIF-APPA 16/2/2009.

[21] Joint press release ASIF-APPA 06/8/2008.

Table 5: Job distribution by subsectors of renewable energy in Spain

Renewable sectors	Number of workers	Value in total renewables %
Wind	32.906	36,97
Minihydraulic	6.661	7,58
Solar Thermic	8.174	9,28
Solar Thermoelectric	968	1,08
Solar Photovoltaic	26.449	29,9
Biomass	4.948	5,65
Biofuel	2.419	2,17
Biogas	2.982	3,45
Others (1)	3.494	3,92
Total Renewables	89.001	100

SOURCE: Own elaboration

ISTAS also carried out an assessment of the situation in three regions with significant development of renewable energies, Catalonia, Navarre and Madrid in 2008[22]; the main results are shown in the following table:

Table 6: Direct jobs in the regions of Catalonia, Madrid and Navarre

Autonomous regions	Direct jobs
Catalonia	6,336
Madrid	14,413
Navarre	4,141

Source: Own elaboration

Jobs created in Catalonia and Madrid do not conform with installed renewable power in those regions, but with activities carried out in national or International projects.

Final results are solid, as well as expected outcomes. The answers of employers when consulted regarding expected medium and long term contracts employers are shown in the next table.

Table 7: Expected regional contracts in the renewable sector

Expected contracts	Navarre	Catalonia	Madrid
Strong / continuous growth	41,5	63,5	48
Steady	52,8	33	45
Continuous decrease	1,9	1,5	5
Strong decrease	1,9	0,5	0
N/A	1,9	1,5	2

Source: Own elaboration

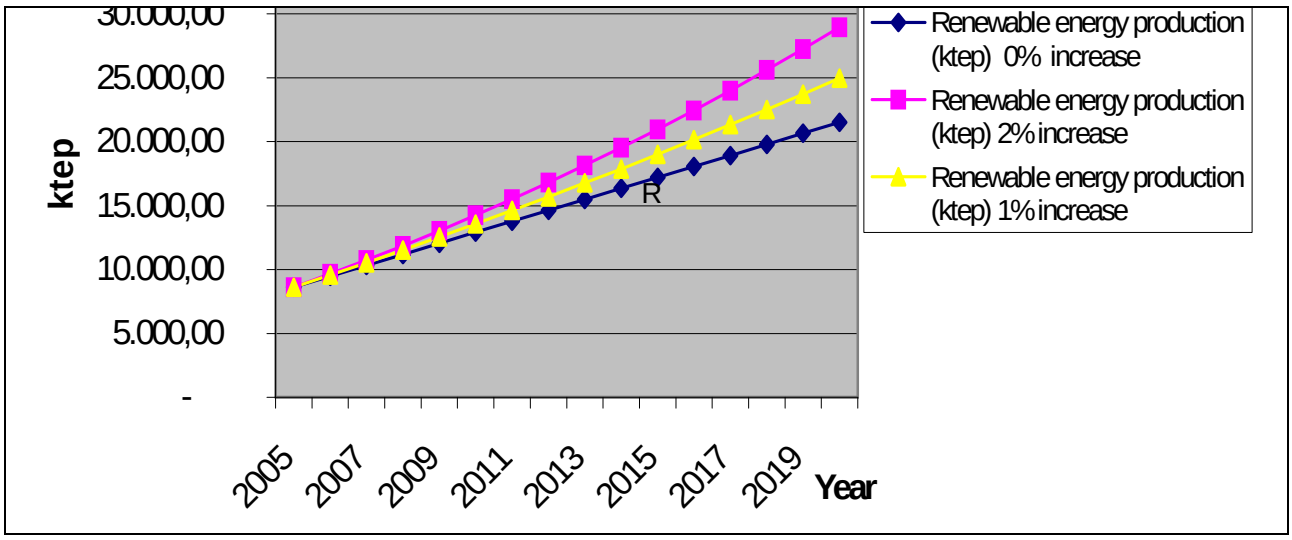
The sector maintains to this date its positive job creation estimates.

[22] These studies use a similar approach as in 2007 but introduce improved data as the distribution of jobs by subsectors.

3.2. Job estimates for the renewable sector in Spain

It is almost certain that 20% of energy consumption by 2020 will be provided by renewable sources. Regardless of our preference in terms of energy saving and efficiency, we estimate yearly increase of energy demand to be in between 1% (required by the National Strategy on Climate Change and Clean Energy for 2007, 2012 and 2020) and 2%, a figure close to the gas and electricity plan 2007-2016. Both Assumptions can be easily compared in Graphic 6.

Graphic 6: Final energy covered by renewables in different scenarios



Source: own elaboration

Employment estimates for 2020 were calculated considering that efficiency improvement will reduce the needed jobs for each installed energy unit.

Estimates for 2020 are based upon two energy demand scenarios. The first scenario expects a 2% increase and the second one just 1%, which implies 270.788 and 228.435 jobs respectively (detailed in tables 8 and 9). Graphic 7 clearly shows expected job increases due to the expansion of renewable energies in the next 12 years. Graphic 8 describes the internal distribution of jobs classified into tow categories: Operation and Maintenance, and Building and Installation.

Table 8: Job estimates for 2020 with a 2% yearly increase of energy demand

Type of Energy	Installed power 2020	Direct jobs in renewables 2020	Jobs B+I	Jobs O+M
Wind	32.733 MW	49.427	46.462	2.966
Small hydro	7.036 MW	27.936	23.466	4.470
Solar thermal	7.951.301 m^2	8.170	7.435	735
Solar thermoelectric	1.948 MW	13.642	13.097	546
Solar photovoltaic	6.439 MW	41.859	39.766	2.093
Biomass	14.324 MW	101.705	63.057	38.648
Biofuels	3.569 ktep	24.807	16.125	8.683
Biogas	381 MW	3.241	3.079	162
TOTAL		270.788	212.486	58.302

Source: Own elaboration

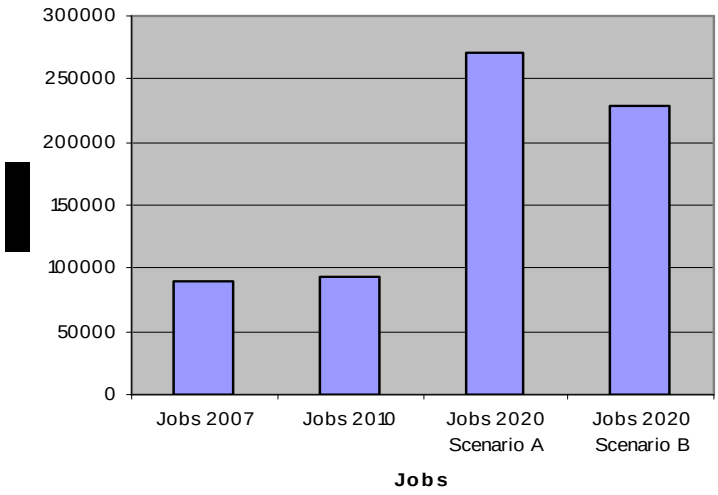
Table 9: Job estimates for 2020 with 1% yearly increase of energy demand

Type of energy	Installed power 2020	Direct jobs in renewables 2020	Jobs C+I	Jobs O+M
Wind	28.236 MW	42.637	40.079	2.558
Small hydro	6.070 MW	24.098	20.243	3.856
Solar Thermal	6.858.928 m^2	7.047	6.413	634
Solar thermoelectric	945 MW	6.616	6.351	265
Solar phototovoltaic	5.555 MW	36.108	34.303	1.805
Biomass	12.356 MW	87.733	54.394	33.338
Biofuel	3.079 ktep	21.400	13.910	7.490
Biogas	328 MW	2.796	2.656	140
TOTAL		228.435	178.349	50.086

Source: Own elaboration

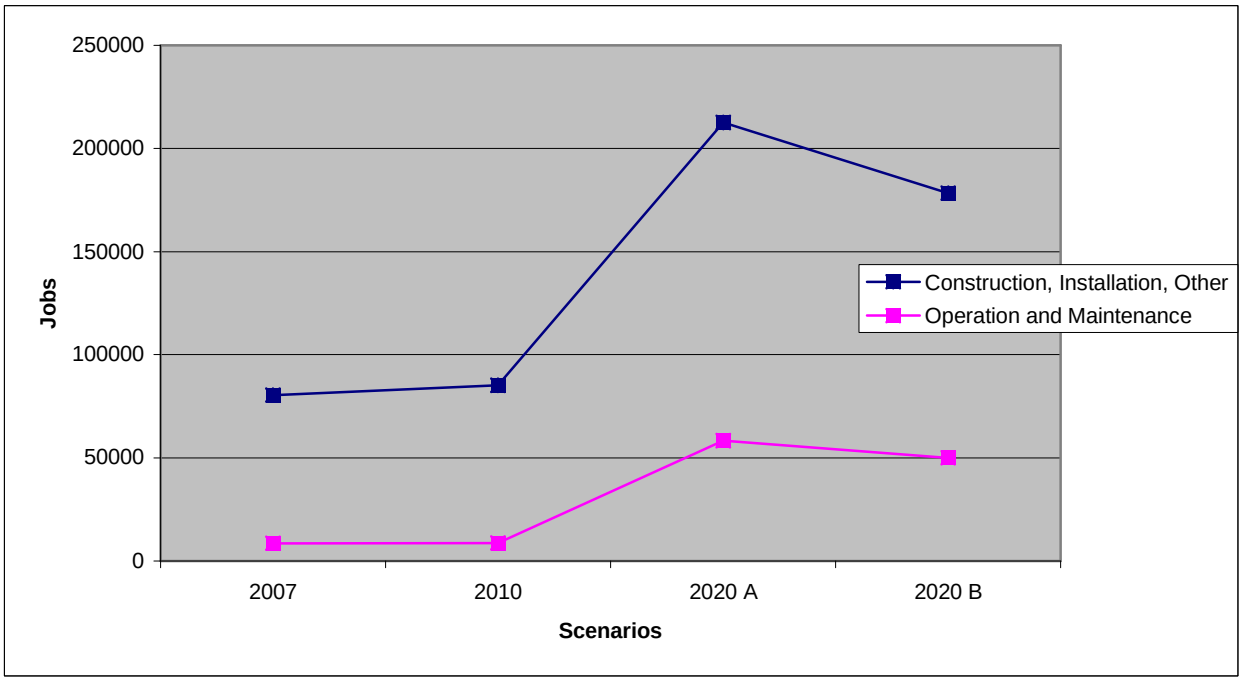
Both assumptions, the optimistic scenario with 270.000 and the less positive estimate with 228.000 jobs are good news in terms of employment. If we add indirect jobs that might reach similar numbers, it is obvious that renewable energies are a solid and significance source of employment, a crucial issue in times of economic turmoil and job insecurity. Renewable energies are a powerful tool to maintain well-being and to stop global warming.

Graphic 7: Total jobs by different scenarios



Source: Own elaboration.

Graphic 8: Evolution of jobs in Building, Installation and others; Operation and Maintenance



Source: Own elaboration

3.3. Other social, environmental and economic benefits

Job creation is not the only reason to support investment in renewable sources, but it is the most important argument in a medium/short term. There also other benefits as the improvement of environmental quality (reduction of air, acoustic, water and soil pollution) and mitigation of global warming, which ultimately protect biodiversity.

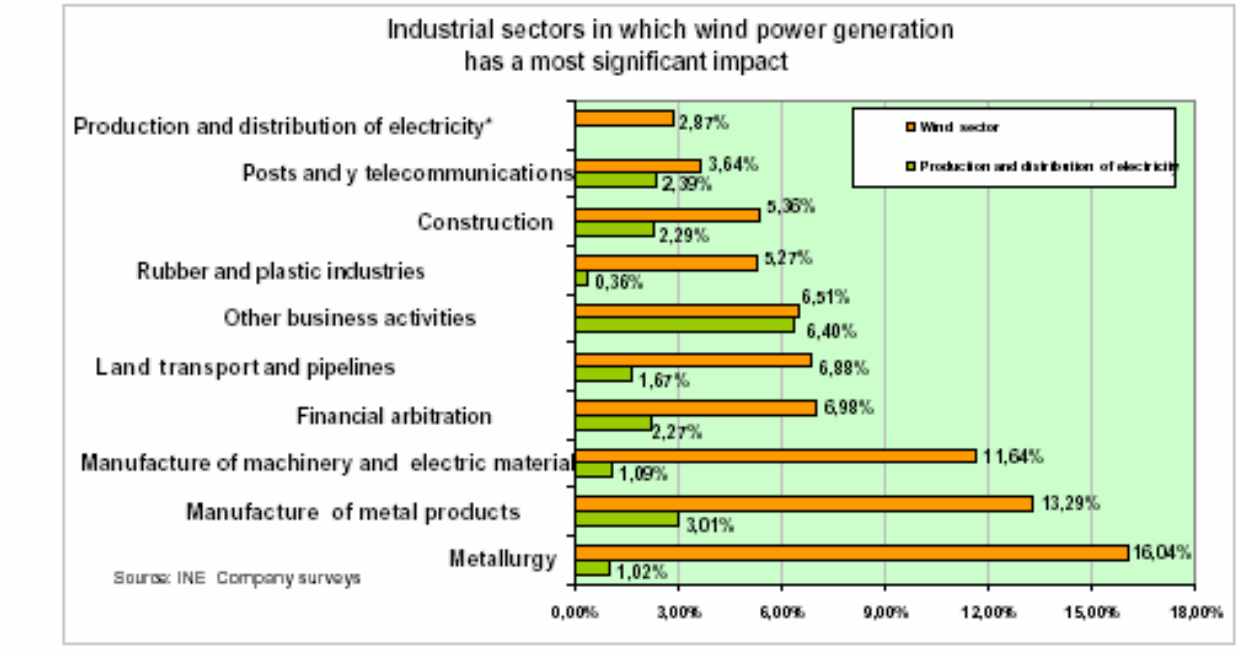
Of all renewable sources, wind power generation is considered the technology with contributes the most to the reduction of emissions.

Renewable sources also reduce our country's energy dependency (over 80%). That is the reason why renewable sources have been set a 20% final energy consumption goal for 2020. Estimates for wind energy expect this sector to cover 11.6% of electricity demand in Europe and 26% in Spain.

It is also a fact that renewable energies promote the development of different industrial sectors, which boosts local industrial networks. Production based on own resources reduces uranium and oil imports increasing local job generation. The Wind Energy Employers Association reported more than 50 industrial plants involved in activities such as the manufacture of turbine blades, air generators, gondola casings, multipliers, etc., that obviously have a positive impact on employment.

Graphic 9 shows the impact of wind power energy on different sectors.

Graphic 9: Industrial sectors in which wind power has a most significant impact



Source: AEE

The renewable sector also makes its contribution to the economy. The AEE[23] reported wind power GDP growth of 62%, which exceeds the energy sector GDP (25%).

[23] Macroeconomic study on the impact of the wind power sector in Spain.

Table 10: Wind power sector contribution to GDP

Millions of Euros	2003	2004	2005	2006	2007
Real GDP Wind (2003)	1.021	1.170	1.332	1.533	1.663
Real GDP. Productinn and Distributi of electricity (Base 2003)	11.373	11.550	12.565	12.450	*
% GDP wind /GDP Electricity Prod.	8,98%	10,13%	10,60%	12,31%	*
Real GDP Energy Sector (Base 2003)	19.088	20.274	23.379	23.749	23.927
% GDP Wind / GDP Energy	5,35%	5,77%	5,70%	6,45%	6,95%
Real GDP Total Spain (Base 2003)	706.932	727.395	750.144	774.957	799.479
% GDP wind / Total GDP Spain	0,14%	0,16%	0,18%	0,20%	0,2 %

Fuente: INE. Memorias de compañías del Sector Eólico. CNE. Global

Source: AEE

Renewable energies promote international business expansion. Spanish renewable energy companies are well established international exporters active in the U.S., Canada, U.K., France, as well as in emerging economies like China and India. Renewable energy projects are being developed in Morocco, Turkey, Russia, Mexico and many other countries.

4. CONCLUSIONS ON CALZADA'S DOCUMENT

After a detailed study of the document we arrived at the following conclusions:

- The document is clearly designed for impact on media with a twofold purpose: a) an attempt to influence US mass media, and to discredit social partners that support a new energy model (trade unions and environmental organizations); b) trying to push a debate on green economy although with a poor line of reasoning.
- The validity of the study is brought into question since it does not provide its own method of analysis and it attempts to compare totally different contexts like those of the US and Spain.
- The study misconstrues the concept of green jobs as those that involve only the development and implementation of renewable energies. This blunder leads to wrong assertions on the negative impact of green jobs on employment. Even if the renewable energy sector destroys jobs, we would have to consider the job creating capability of other green jobs sources.
- The document does not provide any clear evidence of the destruction of jobs by the expansion of the renewable energy sector. Most of the previous research studies prove exactly the opposite: renewable energies are net job sources.
- Investment in renewables cannot be approached from a purely business/reductionist perspective. This would contradict scientific evidence on the urgent need to reorientate energy production to combat climate change. The document also contains bulk errors in the calculation of economic costs and the investment/jobs relation.

- Activity in the renewable energy sector in Spain is not a recent issue. It has developed over a long period and past negative experiences have been used to help start a new technological sector. Different institutions and valuable experts have joined their efforts in this process. Discrediting the benefits of clean energy based on groundless arguments is out of the question, especially after the adoption of binding European legislation.

- Other important aspects such as environmental externalities, the decreasing trend of costs, the cause of energy costs increase, and public funding among other issues, are presented in a hazy manner in an attempt to promote the fallacy: that cheap energy is the best solution in economic and environmental terms.

- Finally, renewable energies offer economic, social and environmental benefits beyond job creation. The best example in Spain is the development of a wind power industry, whose activity has created its own business network, has reduced considerably CO_2 emissions and developed its own technology, making a significant contribution to GDP.

5. FINAL CONSIDERATIONS

Reviewing Calzada's document has proved an excellent opportunity for an in-depth analysis and allowed us to conclude that:

- There must be a critical approach to the correlation between the increase of energy consumption and well-being. It becomes necessary to assess how much we can reduce consumption while maintaining certain quality standards of living.

- ISTAS-CCOO and other social partners defend and share the view of combining clean energy production with the creation of decent work[24] in such a way that the inevitable change of the energy system would also bring benefits for workers and for the general society.

- Employment generation is one of the many benefits of changing the trends in energy consumption towards a carbon-free economy. Opinions that are based only on the analysis of green jobs creation and on strictly economic indicators are unacceptable in social and environmental terms.

- The fact that renewable energies are net job creators is undeniable.

- Monitoring of investments in renewable energies must be improved to achieve more transparency of information and easier access to it. Public authorities must provide the necessary tools to the different institutions involved in such tasks to grant information to all the interested parties. Data on such investments must reach both private and public institutions at all levels (municipal, regional, national, European).

We hope we have clarified certain points and separated alarming media headlines from true solutions to problems. We faced a similar situation in the early 1970s, when we failed to shift the productive model towards a sustainable alternative. Forty years later, we cannot afford to commit the same mistakes. The current international crisis offers the possibility to create a socially fair, truly democratic and environmentally sustainable economic model. A different world is possible and we should not miss that opportunity.

[24] ILO defines decent work as one which promotes *"opportunities for women and men to obtain decent and productive work, in conditions of freedom, equity, security and human dignity."*