



**Innovation and Transfer of Results of energy RTD in national and
European Community programmes**

A comparative study of mechanisms, results and good practices

Contract RTD-J1-CT-2005-25

Annex IX

**Innovation and Technology Transfer
in the Spanish Energy Sector**





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1. The innovation landscape in the energy sector

1.1. ENERGY MARKET STRUCTURE AND IMPLICATIONS FOR INNOVATION IN THE ENERGY SECTOR

According a recent report¹ the level of liberalisation of the Spanish Energy Market is in the average of the EU, being comparable Germany, but far of the most liberalised markets (UK and Nordic). One indicator for the degree of competition on national markets is the total market share of the biggest three producers (electricity) and wholesale suppliers (gas) (see graph below).

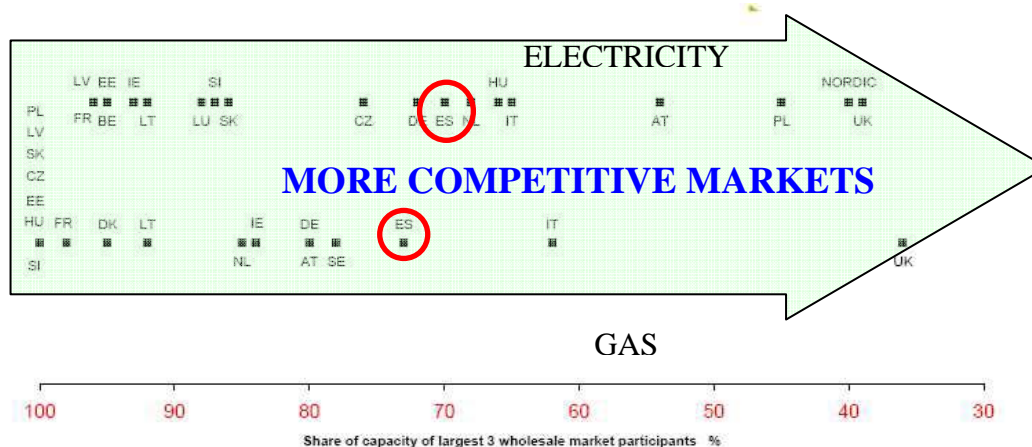


Image 1 : European Commission (2005), "Report on Progress in Creating the Internal Gas and Electricity Market", November

Regulations protect the Renewable Energy production, forcing distributors to buy electricity from RES origin at special tariffs and conditions. This has been one of the causes of wind power success in Spain, and is considered as the main factor positively impacting in the deployment and network integration of new RES technologies, favouring the creation of specialized “pure” RES Generation companies, which are independent of Distributors.

1.2. ENERGY POLICY AND STRATEGIES, PLAYERS

The Spanish Energy Policy is established by the **Ministry of Industry, Tourism and Commerce** (MITYC). The Ministry of Industry is advised by the **IDAE** (Institute for the Diversification and Energy Saving), an institute which is in dependence of the Ministry. The IDAE is a public, business-structured organisation reporting to the Ministry through the **General Secretariat for Energy**. Its strategic goal is to promote energy efficiency and the rational use of energy in Spain, to support the diversification of sources of supply and promote the use of renewable sources of energy.

IDAE is the organisation in charge of the elaboration and follow-up of the Renewable Energy Plan (Plan de Energías Renovables) for Spain, 2005-2010 (**PER 2005-2010**), and it also was in charge of the previous one, corresponding to the period 2000-2010. The Plan sets up the Spanish objectives in Renewable Energy generation and defines the global strategy for its achievement, describes the framework per RES technology by identifying the regulatory aspects, actors and barriers (including R&D activities).

¹ European Commission (2005) “Report on Progress in Creating the Internal Gas and Electricity Market”



The objective of the PER 2005-2010 is to maintain the commitment to meet **at least 12% of total energy use from renewable sources by 2010**, while incorporating other indicative targets — **29.4% of electricity generated from renewable sources and 5.75% of transport fuel needs to be met from biofuels by 2010** — adopted after the previous Plan came into effect.

According to the “Rationale” chapter of the PER 2005-2010, three forms of renewable energy have made satisfactory progress to date in Spain: wind energy, biofuels and biogas. Small-scale hydroelectric generation has grown more slowly than envisaged. And areas such as biomass and solar energy (photovoltaics) are growing at rates well below those needed to meet the final targets. In the case of biomass, the “Balance sheet for the Plan for the Promotion of RES in Spain over the period 1999-2004”² points out the urgent need to make substantial changes to the framework in which biomass is developing. IDAE indicates that “without these changes it will not be possible to achieve the targets for 2010”.

One of the main barriers for reaching the objectives was the potential instability of the regulatory framework, taking into account that associated costs to RES are non-competitive enough when compared with traditional sources. In order to avoid that, a new framework was established in 2004 with the aim of providing stability for investors. As a consequence, nowadays some RES technologies, as the solar ones (PV and SCP) are experiencing a commercial take-off that is pulling the R&D activities. The **Royal Decree RD 436/2004**, published by the Ministry of Industry, has created a favourable framework for RES by means of:

- providing 25 years of stability to the framework.
- establishing specific Feed-in-Tariffs per technology according to their generating costs. The FITs are calculated as a percentage over the reference electricity price.
- establishing a bonus per energy produced for the early adopter in some of the cases (SCP technology, for instance)

The policy and strategies for **R&D** are co-ordinated by the **Ministry of Education and Science (MEC)**, by means of a multidisciplinary commission involving called **Inter-Ministries Commission for Science and Technology (CICYT)**. The CICYT is in charge of the definition of the National Plan for Scientific Research, Development and Technological Innovation 2004-07. This Plan includes, among others, the **National Program for Energy**, defining the specific strategy for energy technologies. The scope of the National Program for Energy includes:

- Optimisation of conventional forms and uses of energy to make them cleaner and more efficient, which includes the distributed energy networks, the energy efficiency, the clean use of fossil fuels and also the sequestration and capture of CO₂.
- Support for Renewable Energy and Emerging Technologies, which includes all the RES (wind, solar, biomass and biofuels, etc) and also the Hydrogen and Fuel Cells technologies.
- Subprogramme on Thermonuclear Fusion

² “Balance sheet for the Plan for the Promotion of RES in Spain over the period 1999-2004”, IDEA (2005).



1.3. The energy innovation system : Technology Transfer and relevant institutions

According to a COTEC study³ the Spanish innovation system suffers of the common European problems in Technology Transfer, but intensified in some areas as the low number of entrepreneurs, and the gap between university/research and industry, which are specific of the Spanish innovation system.

Some of the “non-energy specific” initiatives which have been undertaken in order to reduce that gap are:

1. Support, by the Ministry of Education and Science, promoting the hiring of researchers by industrial companies (Torres Quevedo program)
2. Support by CDTI to the creation of spin-off (NEOTEC program)
3. Inclusion and promotion of collaborative projects in PROFIT program (Ministry of Industry and Ministry of Education and Science), and CENIT (CDTI), which is described in following chapters.
4. Support to the creation of Technology Parks, involving industry and research institutions.
5. Tax incentives to collaborative R&D

Nevertheless the gap between research and industry in Energy seems to be narrower than in other sectors; this is visible especially in the RES field which could be considered as a new industrial sub-sector, the creation of RTD centres such as CENER focused in collaboration with industry, and the geographical concentration of the players in Madrid and in the North of Spain (Navarre and Basque Country) could be some of the causes of that.

The most relevant institutions in Spain promoting the Technology Transfer in the energy sector are:

CDTI (Centro para el Desarrollo Tecnológico Industrial)

CDTI is an organisation in dependence of the Ministry of Industry, Tourism and Commerce (MITYC), and is **governed by private law** in its relations with third parties. This allows offering swift and flexible support services to Spanish companies for the development of RTD and innovation business projects and international exploitation of technologies developed by companies, **whatever their industrial sector**. Its functions are:

- To evaluate and finance technological development, innovation and modernization projects developed by Spanish companies: CDTI grants financial help of its own to companies and facilitates access to that of third parties for the execution of both national and international research and development projects.
- To manage the Spanish participation in international programmes of technological cooperation.
- To promote technology transfer and technological cooperation between enterprises: it helps Spanish companies to internationally exploit technologies that they have developed.
- To support the generation and development of new technology base firms, through the **Neotec** Initiative.

³ COTEC Foundation: “Nuevos Mecanismos de Transferencia de Tecnología: Debilidades y Oportunidades del Sistema Español de Ciencia y Tecnología”(2003),



IDAE (Instituto para la Diversificación y Ahorro de Energía)

The above mentioned IDAE provides both **technical and financial support** for technological projects that involve the efficient use of energy, covering the research, development and innovation activities. IDAE links end-user in the industrial and commercial sector together with technology developers providing support especially in innovation projects in CHP, solar thermal and photovoltaics, but also in demonstration and development projects in wind energy, biomass and biofuels. For instance IDAE has been the promoter of the pilot plant for the first Spanish biodiesel process designed by the *Universidad Complutense de Madrid*, has promoted experimental wind farms together with turbine manufacturers, and has provided funds for the development of biomass plants, new wind turbines and CHP cogeneration plants.



2. Funding of innovation activities in the Energy sector: the existing and future measures

2.1. FUNDING PROGRAMMES AND ACTIVITIES

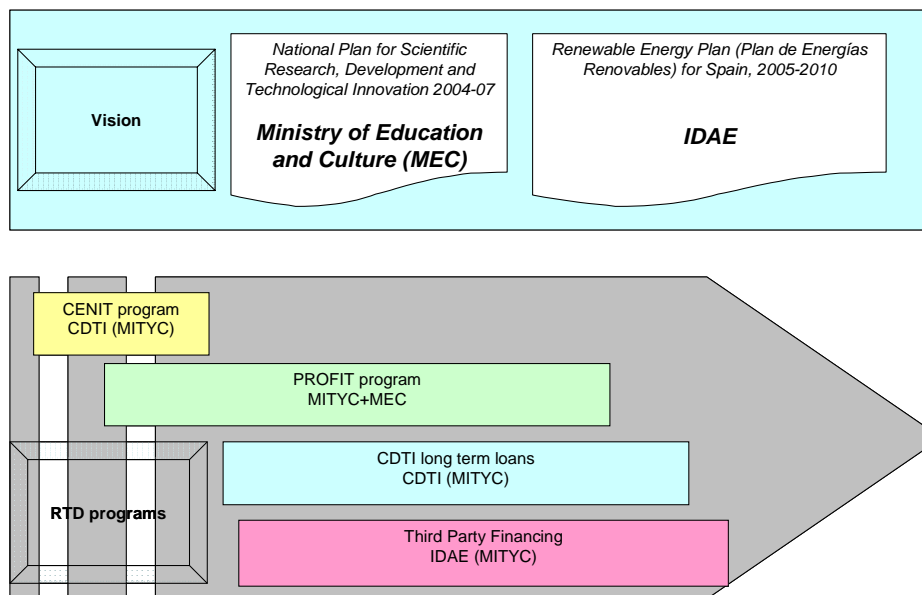


Image 2: Scheme of the Funding Programmes in Energy

Funding to innovation and technology transfer according to the PER 2005-10 & National Program for Energy are provided by the Ministry of Industry (MITYC) by means of:

- the R&D support program PROFIT within the specific calls for Energy
- the R&D financial support to industry by CDTI, which is a Centre in dependence of the Ministry.
- the financial support to demonstration and early adoption provided by IDAE

Basic Research or R&D projects leaded by research centres are not supported by MITYC, as they receive the financial support from the Ministry of Education and Science (MEC). The PROFIT MEC calls are non-specific for Energy.

PROFIT Energy (MITYC)

PROFIT is a set of public support measures. Periodic calls for project proposals are open with the objective of promoting the Research and Technology Development activities of the companies and other organisations. The activities supported have to be aligned with the National Plan for Scientific Research, Development and Technological Innovation 2004-07 (the previous one was for the period 2000-03).

The National Plan set up the general objectives in order to allow the growing and the well-balanced development of the Spanish Science-Technology-Enterprise system. PROFIT is built on the foundation of Thematic Priorities (Energy is one of them), Horizontal Areas (i.e. Materials) and Transversal Actions (i.e. promotion of researchers mobility) established in the National Plan. The main financing actor in PROFIT is the Ministry of Industry, Tourism and Commerce (MITYC), with the participation of the Ministry of Education and Culture (MEC). There is an specific call by the Ministry of Industry for funding Energy projects.



PROFIT MITYC is open to the participation of companies, SMEs, trade associations and RTD centres, with the possibility of individual or collective participation. Public research centres, as universities, are allowed to participate only in collaboration projects as partners, or in individual projects as subcontractors.

The public funding for the approved activities is given in form of a combination of grants (bank guarantee is required) and long term loans at 0% of interest rate. Supported activities could be Industrial Research Projects, Technical Feasibility Studies, Technological Development Projects and Complementary Actions.

PROFIT Energy: Energy is one of the thematic priorities included in PROFIT, and it **has specific calls and budget**. The Energy Program within the National Plan for Scientific Research, Development and Technological Innovation 2004-07 covers the following lines:

- Optimisation of conventional forms and uses of energy to make them cleaner and more efficient, which includes the distributed energy networks, the energy efficiency, the clean use of fossil fuels and also the sequestration and capture of CO₂.
- Support for Renewable Energy and Emerging Technologies, which includes all the RES (wind, solar, biomass and biofuels, etc) and also the Hydrogen and Fuel Cells technologies.
- Subprogramme on Thermonuclear Fusion

LONG TERM LOANS (CDTI)

CDTI evaluates and finances R&D projects developed by companies **regardless of their activity sector and size**. The total amount of financing offered generally fluctuates between 240,000 and 1,000,000 euros per project, a sum that includes fixed assets (laboratory, pilot plant, etc.), personnel devoted to the projects, material and other project expenses. CDTI classifies these technological projects in three categories: *Technological Development* projects, *Technological Innovation* projects, and *Concerted Industrial Research* projects.

The entities that may receive financing in the form of credits granted by CDTI are companies with the technical capacity to undertake a project involving research, development or technological innovation and sufficient financial capacity to cover a minimum of 30% of the total budget for the project with their own resources.

CDTI long terms loans	Interest rate	Term	Credit % of the budget
Technological Development and Innovation Projects	0%	7-9 years	60-40%
Projects linked to international programmes	0%	9 years	60%
Concerted Industrial Research Projects	0%	7-9 years	60%

The financing CDTI offers to companies consist of credits with a zero rate of interest and long-term amortization that covers up to 60% of the total budget for the project. CDTI only backs projects that are technically and economically viable, but does not demand bank guarantees from the promoting company for the awarding of its credits. The financing given by CDTI basically comes from the Centres own resources and from the European Fund for Regional Development (FEDER).

These credits are characterised by the inclusion of a technical risk clause according to which in the event that the project did not reach its technical objectives, the company is exempt from reimbursing the total sum of the loan.

CENIT Program (CDTI)

At the end of 2005, CDTI launched a new funding line for collective projects called CENIT. The CENIT projects are “pure industrial research” projects focusing on strategic issues, with the participation of, at least, two big or median enterprises and two small companies.



Consortia are composed only of industries , and 25% of subcontracting to RTD centres is compulsory.

CENIT projects	Duration	Project Budget	Grant (% of accepted budget)
Strategic Industrial Research Areas	4 years	20-40 M€	50%

ICO-IDAE:

IDAE supports investment and, in some specific cases, demonstration projects in the form of an ICO-IDAE line of banking finance. In 2005, this line committed long term loans for a total of **360M€**. This line focuses mainly in implementing solar installations (photovoltaics and solar thermal).

THIRD PARTY FINANCE – TPF (IDEA):

IDAE supports RTD and demonstration projects by means of the Third-Party Finance system for specific one-off projects. Third-party finance (TPF) is specifically designed for undertaking investment projects in energy saving and efficiency and energy generation projects using alternative sources, such as renewable energy sources. The IDAE is the main sponsor of this mechanism of finance in Spain and has been using it since 1987. **TPF was acknowledged with a special prize in the 2003 EU Awards of the Renewable Energy Campaign for Take-Off.**

Under the heading of TPF the IDAE presents an ensemble of financial operations that share the following characteristics:

- IDAE participates as financial partner in the project.
- The investment starts to be recouped in IDAE operations as of the moment the new facility comes into operation and will depend on the energy output of the project and its economic value (i.e. energy production of a wind turbine prototype, savings due to a co-generation installation, royalties, etc).
- IDAE can provide both technical and financial support for technological projects that involve the efficient use of energy.
- IDAE can participate also in Joint Ventures and Economic Interest Associations. IDAE participates in the capital shares of companies in the following fields: wind farms, biomass and biofuels, urban solid waste plants and mini-hydro.

The problems addressed by the Third Party Finance are:

- High initial capital outlay requirements
- Lack of understanding of energy issues by financial intermediaries
- Lack of familiarity of investors with energy technologies
- Need of a reliable company to trust in

TPF Simple Modality: Suitable for small scale projects: substitution of equipment, cogeneration and some renewable installations. Within this modality, there are two main contracts:

- Contract between IDAE and the client
- Contract between IDAE, the equipment supplier & services suppliers

TPF Complex Modality:

- TBU (Temporary Business Unions): When the law established the participation of the user. In general there are other participants, such as the distribution societies. Mainly used in Cogeneration projects. The execution, property and exploitation are made by IDAE, that sells it to the user after a time period.



- AIE (Economic Interest Groups): Alternative to the TBU, for large scale investment projects. Having a legal entity, allows to contract directly the required financing that IDAE proposes
- Shareholding in joint-stock companies: For large scale projects. IDAE participates in a maximum of 49%, and contributes with technical experience and mediation for the financing. Mainly for RES projects.
- Account in participation contract: For innovative projects managed by thirds. IDAE participates financially to risk-venture.

2.2. ENERGY R&D: FUNDING (BASIC RESEARCH, DEMONSTRATION PROGRAMMES), PLAYERS (PUBLIC, PRIVATE), IMPACT, KEY INSTITUTIONS IMPLEMENTING RESEARCH, MAIN FOCUS AREAS

2.2.1 Energy R&D Funding and players, impact

There are no available or published reports on the analysis of the impact of the existing programs, with the exception of IDAE. The available data

- **PROFIT Energy:** In 2004, the PROFIT Energy budget for Energy was of **14,6M€** distributed in a 77% for renewable energy projects (more than 6M€ to wind energy), a 17% for energy efficiency and a 6% for fossil fuels. One relevant success story is that the first commercial applications⁴ of the SCP technologies have been developed under the PROFIT program in the form of collaborative projects between ABENGOA and CIEMAT, and between IBERDROLA and CIEMAT.

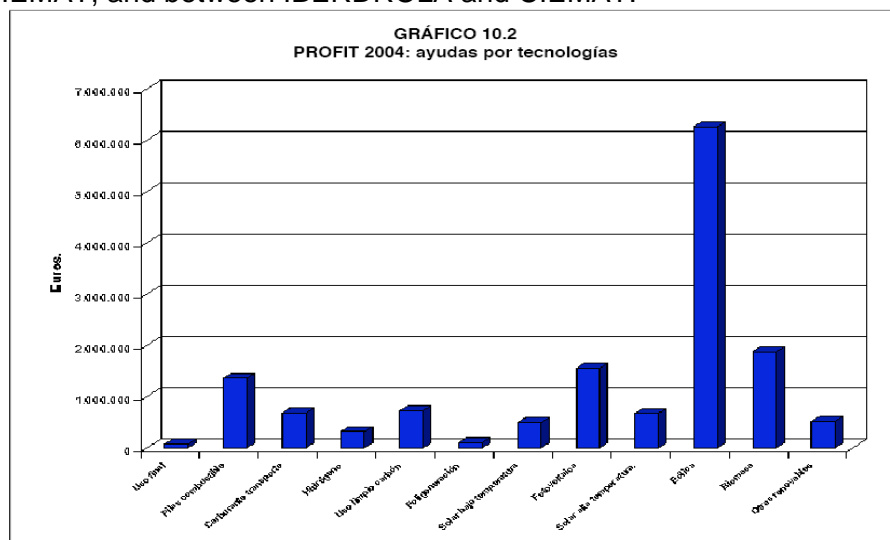


Image 3 Figures of the public support to the approved projects within the PROFIT Energy (call 2004).

Source: “La Energía en España 2004”, Ministerio de Industria Turismo y Comercio, (2005)

- **TPF (IDAE):** In total, in 2004 IDAE has invested in 54 projects, with a participation of **16,77M€** (75% of these investments were on renewable energy projects). In 2005 this figure increased up to **18,50M€**. Since 1987 to 2005, IDAE has provided 369M€ of financial support to 226 Energy projects (renewables and energy efficiency).
- **CDTI Long Term Loans:** There are no available specific data for the support to Energy related projects. This is due to the categorisation of projects used by CDTI: “Agro Food and Environmental Technologies”, “Information and Communication Technologies”, “Production Technologies”, “Materials, Chemical and Health Technologies”.

⁴ The technologies were developed in several European projects funded by the V and VI Framework Programs. The step for the development first commercial applications have been under the PROFIT support.



- **CENIT:** Three Energy related projects have been approved in the first call of CENIT (out of 16 approved projects, covering several thematic priorities different to Energy), covering Wind power (led by Gamesa), CO₂ capture and sequestration (led by Endesa and Unión Fenosa), and Biofuels technologies (led by Repsol and Acciona Energía). These projects sum a total budget of more than 80M€ (27M€ as average per project), receiving public funds equal to the 46,60% (**37M€** of public support for the next **4 years**) of the budget. The 53,40% of the project budget is provided by the companies.

2.2.2 Key institutions implementing research and main focus areas

The key institutions involved in the implementation of energy research include: Public research organisations (research centers and universities) and Industry. The description below presents a non-exhaustive list of universities and research centres implementing research activities in the areas covered by the present. The list of players are mainly drawn from a recent report⁵ prepared by CENER and the Polytechnic University of Madrid (UPM)

CIEMAT

The CIEMAT, an Organism of the Ministry of Education and Science (MEC), is a Public Research Agency for excellence in energy and environment, as well as in many vanguard technologies and in various areas of fundamental research. Since 1951 it has been carrying out research and technological development projects. The CIEMAT team is made up of approximately 1200 researchers. CIEMAT research activities are related with biomass, wind power, solar (PV and SCP), hydrogen and fuel-cells, nuclear energy (fusion and fission), fossil fuels combustion and also energy efficiency. CIEMAT is also in charge of:

- Plataforma Solar de Almería (PSA), the major European large scientific installation in Solar Concentrating research since 1977.
- Centre for the Development of Renewable Energy Sources (CEDER). The two basic lines of R&D activity in the CEDER include the most relevant aspects of study of the chain of biomass as fuel in heat and electricity production processes.
- CIEMAT El Bierzo, placed in a mining region in the North of Spain, and focusing in the combustion processes of fossil fuels, CO₂ capture and sequestration and the decontamination of land previously used for mining activities.

In 2004, the total budget of CIEMAT was of 85,6M€, from which 29,31M€ were dedicated to R&D projects with the following distribution:

	Millions of Euros
Energy efficiency	0,28
Fossil Fuels (coal)	4,41
Renewable Energy	10,36
Solar	7,49
Wind	1,15
Biomass	1,72
Nuclear Energy	13,02
Fusion	6,21
Fission	6,82
Other	1,24
Total	29,31

CENER

The CENER-CIEMAT Foundation manages the RTD centre “Centro Nacional de Energías Renovables” (CENER). CENER has been founded under the patronage of the Navarre regional government, the Spanish Ministry of Education and Culture (MEC) and the CIEMAT. Compared with CIEMAT, CENER activities are closer to the market. In 2004, 86% of the contracts came from the private sector, and only 14% of them from the public administrations.

⁵ RENOVALIA, final report (March of 2005)



CENER R&D lines cover Photovoltaic, Wind Power (which is by far the most important area due to the geographical proximity to companies as Gamesa, Acciona Energía and MTorres), Biomass, Power electronics (focusing on hydrogen and fuel cells) and Bioclimatic architecture.

Recently, the Navarre regional government and the Ministry of Education and Culture have signed an agreement to provide 48,35M€ to CENER (26,9M€ of them as long term subsidised loans) for investment in new laboratories, most of them Wind Power testing facilities.

Other RTD centres

Several universities and RTD centres deal with RES in Spain. For instance, the Polytechnic University of Madrid (UPM), the CIRCE centre of the University of Zaragoza or the Instituto Tecnológico de Energías Renovables (in the Canary Islands) are members of EUREC Agency (European Renewable Energy Centres Agency).

Other RTD centres involved in Energy activities are Ikerlan (hydrogen and fuel cells) and Robotiker in the Basque Country, University of Sevilla (Photovoltaics), University of Almería (SCP, in collaboration with the PSA), INTA (wind turbines) in Madrid, CEMITEC (biofuels) in Navarre, etc. The RTD centres are “fuelled” by the collaboration with the Spanish RES Companies, such as Acciona Energía, Iberdrola, Abengoa, Gamesa, Isofotón, Ecotecnia Ingeteam, etc.

Energy Industry

The main industrial players contributing to innovation in Energy in Spain are:

IBERDROLA (utility), which is the world’s biggest promoter of wind farms, and leads FP6 projects and networks on DER. Iberdrola is promoting 450MW of Solar Concentrated power plants in the next 5 years.

ENDESA and UNIÓN FENOSA (utilities), companies that are investing in the CO2 capture and sequestration technologies, and who lead one of the first approved CENIT projects.

ACCIONA ENERGÍA (“Pure Player” in RES), which is one of the major wind farm promoters. It leads the Spanish R&D efforts in Biofuels, and is active in Solar Thermal and PV, Hydrogen, Biomass and Small Hydro Power, including manufacturing of Wind Turbines. ACCIONA has bought recently the American company SOLARGENIX for Solar Concentrated.

ABENGOA (“Pure Player” in RES), which leads the Spanish R&D effort in Bio-Ethanol. It is the biggest producer of Bio-Ethanol in the USA. Abengoa is also promoting near to 500MW of Solar Concentrated power plants.

GAMESA EÓLICA (Equipment Manufacturer), which was the 2nd world manufacturer of Wind Turbines in 2004, and has been the 4th in 2005. It is expanding manufacturing capacity in United States, China and India.

ECOTECNIA (Equipment Manufacturer), which is one of the 10 major manufacturers of Wind Turbines.

ISOFOTÓN (Equipment Manufacturer), which is one of the 5 major companies of Photovoltaics and participates in several European projects.

MTORRES (Equipment Manufacturer), which develops multi-pole Wind Turbines

GUASCOR (Equipment Manufacturer), which is a motor manufacturer, including biogas motors, and is active in fuel-cells.



3. Strengths and weaknesses of the public funding system at national level -Recommendations

3.1. GOOD LESSONS LEARNT IN THE PAST TEN YEARS ON THE ROLE OF PUBLIC FUNDING AT NATIONAL LEVEL

Some good lessons have been identified:

- The experts interviewed considered that Energy innovation and tech transfer in Spain occurs mainly because of the existence of regulations that have previously created market (wind, solar concentrated, etc.).
- PROFIT Energy and CENIT are industry-oriented programs supporting projects led by companies, but promoting the collaboration with RTD centres. According to COTEC report the participation rules are favouring Technology Transfer & Innovation. Furthermore, it is well considered by the interviewed experts to have specific calls for Energy (Profit ENERGY).
- National Plan for Scientific Research, Development and Technological Innovation 2004-07 includes the same thematic areas of the VI-FP for Energy RTD. At least, a coherent message is sent by different public administrations.
- Demonstration projects, which generally involve several Million Euros of budget (5-20M€), receive financial support by means the Third Party Financing (TPF) from IDAE. One of the main advantages of TPF is its capacity to convince private banks financing for demonstration projects due to the involvement of IDAE, which “reduces” the perceived technical risks.
- Spain is a decentralized State, divided into 17 Communities. Regarding co-ordination between administrations, IDAE acts as co-ordinator between State & Regions in Spain for defining the support measures in Energy, avoiding overlaps or contradictory messages.

3.2. PITFALLS OF PUBLIC FUNDING THAT HAMPER THE INNOVATION PROCESS

The main pitfalls of public funding hampering the innovation process for renewable energy technologies in Spain that have been identified are the following:

- **Demonstration:** Increased funds are needed for R&D projects which include demonstration phases (integrated projects), as demonstration is not funded under the PROFIT programme, CENIT programme only finances Research activities, and IDAE finances “pure” demonstration projects (not involving R&D)
- **Training:** there is an urgent need for supporting training of researchers: senior technicians are uncommon throughout all the Energy Sector (industry and research centres). Especially, a significant barrier has been identified for the future of SCP, nowadays with less than 80 researchers specialized in SCP, and 50% of them belong to PSA. Specific support for Training Actions is requested.
- **Biomass and Biofuels:** Additional support for the implementation of new research infrastructures (test facilities) is needed. Additional support to collaboration projects is needed (even Joint Calls) due to the synergies with other disciplines as some Industry and Agricultural sectors are involved. Special emphasis is recommended in dissemination of results to regional authorities and agriculture players.
- **Hydrogen and Fuel Cells:** There is the need for supporting the creation of testing infrastructures. There exists also the need of implementation of a legal framework supporting the investment in hydrogen/fuel cell related technologies. Support to standardisation, and to co-ordination of efforts is a must. Promote the development of development and demonstration projects on transport and storage of Hydrogen.



- **Distributed Energy Resources:** Until today, public resources invested in this technology have been scarce. The line exists in the calls, but public budget and projects are not accompanying.

3.3. TABLE WITH MEASURES (BASED ON PUBLIC SOURCES)

TECHNOLOGY	Solar Thermal Concentrating Technologies				
TYPE OF MEASURE	PROFIT: Public support to R&D projects (individual and co-operation projects)	CDTI: Public support to R&D industrial projects	IDAE FTP (Third Party Financing): Public financial and technical partnership in the project	Feed in Tariff: Price of generated energy determined by authorities	Law 53/2002: relief in corporate taxes
TYPE OF FINANCIAL SUPPORT	Public grants or public loans with long term reimbursement.	Public loans with long term reimbursement	Public loans with long term reimbursement; reimbursement depending on energy generation. IDAE participates as a project partner	Price of solar electricity guaranteed for the next 25 years	Tax relief due to investment assets (acquisition of equipments for sun generation of heat and/or electricity)
GENERAL DESCRIPTION OF THE MEASURE	R&D projects evaluated against the criteria defined in the "R&D National Plan 04-07" (prev. 00-03) and the quality and innovation of the proposal. Call published every year. Individual and co-operation projects are included in the call. * Subvention: 30%-35% of the approved budget * Loan: 75% of the approved budget; 0% interest rate; max 15 yrs reimbursement; guarantees required	Loan: 60% of the approved budget; 0% interest rate; 7 to 9 yrs reimbursement; no guarantees required	IDAE gives financial support, and provides technical expertise. The "reimbursement" occurs according to the amount of generated energy. A partnership contract/agreement is signed with IDAE.	The electricity generated is paid at 300% of the TMR (reference price for electricity from non-renewable sources). This price is guaranteed for the next 25 years. Utilities are "forced" by law to buy solar generated electricity. Additional 250% of premium.	Law 53/2002: tax relief of 10 % of investments in durable goods for the electricity/heat generation from the Sun power.
PROBLEMS THAT THE MEASURE WANTS TO TACKLE	Improvement of performance of the SCP Technologies Cost reduction	Facilitation of Industrial development	Capital support (IDAE acts as an investor) to national demonstration projects of new high-potential technologies in renewables	Stability of the market conditions (25 years of stability) Promote Solar Generation by increasing profitability	Support to investment in renewables
STAGE OF THE DEVELOPMENT SUPPORTED	Research and Development	Development	Development and Demonstration	Commercialisation	Commercialisation
AGENTS INVOLVED IN THE TECHNOLOGY TRANSFER	Public research laboratories / Utility companies / Engineering companies/ Component manufacturers / professional associations /	Industries	Utility companies / Engineering companies / Component manufacturers	Utility companies / Engineering companies	Utility companies
TYPE OF FINANCING AGENTS AND FINANCING MEASURES INVOLVED IN THE PROCESS	Spanish Ministry of Industry Spanish Ministry of Education	CDTI: Organisation in dependence of the Spanish Ministry of Industry	IDAE is a public, business-structured organisation reporting to the Ministry of Industry	Utility companies	Spanish Treasury Ministry
PERFORMANCE INDICATORS (if available), IMPACT OF THE TECHNOLOGY TRANSFER	2004: >600k€ of public funding for SCP technologies; 2003: Demonstration plant 10 MW in Sevilla, with total budget 36MEUR; long term loan 1,7MEUR + public grant 0,2MEUR.	no SCP projects supported yet	no SCP projects supported yet		

TECHNOLOGY	Photovoltaic					
TYPE OF MEASURE	PROFIT: Public support to R&D projects (individual and co-operation projects)	CDTI: Public support to R&D industrial projects	IDAE FTP (Third Party Financing): Public financial and technical partnership in the project	ICO-IDAE: Support to investment in RES	Law 53/2002: relief in corporate taxes	Feed in Tariff: Price of generated energy determined by authorities
TYPE OF FINANCIAL SUPPORT	Public grants or public loans with long term reimbursement.	Public loans with long term reimbursement	Public loans with long term reimbursement; reimbursement depending on energy generation. IDAE participates as a project partner	Combination of private + public loans with long term reimbursement	Tax relief due to investment assets (acquisition of equipments for sun generation of heat and/or electricity)	Price of solar electricity guaranteed for the next 25 years
GENERAL DESCRIPTION OF THE MEASURE	R&D projects evaluated against the criteria defined in the "R&D National Plan 04-07" (prev. 00-03) and the quality and innovation of the proposal. Call published every year. Individual and co-operation projects are included in the call. * Subvention: 30%-35% of the approved budget * Loan: 75% of the approved budget; 0% interest rate; max 15 yrs reimbursement; guarantees required	Loan: 60% of the approved budget; 0% interest rate; 7 to 9 yrs reimbursement; no guarantees required	IDAE gives financial support, and provides technical expertise. The "reimbursement" occurs according to the amount of generated energy. A partnership contract/agreement is signed with IDAE.	Loans with long term reimbursement (12 years, alone with no repayments in the 1st year); interest rate: EURIBOR+0,75% Projects financed up to 600k€, up to the 100% of the project budget. Projects according to the IDAE technical rules of efficiency, homologation, costs, etc	Law 53/2002: tax relief of 10 % of investments in durable goods for the electricity/heat generation from the Sun power.	The electricity generated is paid at 575% of the TMR (reference price for electricity from non-renewable sources). This price is guaranteed for the next 25 years. Utilities are "forced" by law to buy solar generated electricity
PROBLEMS THAT THE MEASURE WANTS TO TACKLE	Improvement of performance of the PV Technologies Cost reduction	Facilitation of Industrial development	Capital support (IDAE acts as an investor) to national demonstration projects of new high-potential technologies in renewables	Support to investment in renewables	Support to investment in renewables	Stability of the market conditions (25 years of stability) Promote Solar Generation by increasing profitability
STAGE OF THE DEVELOPMENT SUPPORTED	Research and Development	Development	Development and Demonstration	Commercialisation	Commercialisation	Commercialisation
AGENTS INVOLVED IN THE TECHNOLOGY TRANSFER	Public research laboratories / Utility companies / Engineering companies / Component manufacturers / professional associations / incubators	Industries	Utility companies / Engineering companies / Associations	End Users: Companies / Individuals	End Users: Companies (not for Individuals)	End Users: Companies / Individulas
TYPE OF FINANCING AGENTS AND FINANCING MEASURES INVOLVED IN THE PROCESS	Spanish Ministry of Industry Spanish Ministry of Education	CDTI: Organisation in dependence of the Spanish Ministry of Industry	IDAE is a public, business-structured organisation reporting to the Ministry of Industry	ICO is a corporate entity attached to the Ministry of Economy and Finance; ICO works by mediation or second-floor loans (applications for loans are filed with banks and saving banks)	Spanish Treasury Ministry	Utility companies
PERFORMANCE INDICATORS (if available), IMPACT OF THE TECHNOLOGY TRANSFER	2004: >1500kEUR of public funding for PV technologies;	not available	1,3M EUR of IDAE investment in three Photovoltaic projects in 2004 (demonstration projects)	In 2005, 3584 requests were approved but without funding. Because of this fact, a new line was created with a budget of 500M€ oriented to grid-connected PV installations <100kWp		

	Biofuels					
TYPE OF MEASURE	PROFIT: Public support to R&D projects (individual and co-operation projects)	CDTI: Public support to R&D industrial projects	IDAE FTP (Financiación por Terceros): Public financial and technical partnership in the project	Exemption of Special Taxes	Law 53/2002: relief in corporate taxes	
TYPE OF FINANCIAL SUPPORT	Public grants or public loans with long term reimbursement.	Public loans with long term reimbursement	Public loans with long term reimbursement; reimbursement depending on energy generation. IDAE participates as a project partner	biofuels have "fuels special taxes" equal to 0% (until 2012)	Tax relief due to investment assets (acquisition of equipments for biofuels production)	
GENERAL DESCRIPTION OF THE MEASURE	R&D projects evaluated against the criteria defined in the "R&D National Plan 04-07" (prev. 00-03) and the quality and innovation of the proposal. Call published every year. Individual and co-operation projects are included in the call. * Subvention: 30%-35% of the approved budget * Loan: 75% of the approved budget; 0% interest rate; max 15 yrs reimbursement; guarantees required	Loan: 60% of the approved budget; 0% interest rate; 7 to 9 yrs reimbursement; no guarantees required	IDAE gives financial support, and provides technical expertise. The "reimbursement" occurs according to the amount of generated energy. A partnership contract/agreement is signed with IDAE.	Law 53/2002 specify that Biofuels have NO Special Taxes to Biofuels	Law 53/2002 tax relief of 10% of investment in durable goods for the biofuels production.	
PROBLEMS THAT THE MEASURE WANTS TO TACKLE	Research and Development of new energy crops Development of High Efficiency processes for biofuels production Logistics of supplies for biofuels production	Facilitation of Industrial development	Capital support (IDAE acts as an investor) to national demonstration projects of new high-potential technologies in renewables	To equal the price of conventional fuels and biofuels, considering that biofuels producing costs double the costs of conventional fuels	Support to investment in renewables	
STAGE OF THE DEVELOPMENT SUPPORTED	Research and Development	Development	Development and Demonstration	Commercialisation	Commercialisation	
AGENTS INVOLVED IN THE TECHNOLOGY TRANSFER	Public research laboratories / Utility companies / Engineering companies/ Component manufacturers / professional associations / incubators	Industries	Utility companies / Engineering companies / Associations	Fuel retailers	Industrial companies	
TYPE OF FINANCING AGENTS AND FINANCING MEASURES INVOLVED IN THE PROCESS	Spanish Ministry of Industry Spanish Ministry of Education	CDTI: Organisation in dependence of the Spanish Ministry of Industry	IDAE is a public, business-structured organisation reporting to the Ministry of Industry	Spanish Treasury Ministry	Spanish Treasury Ministry	
PERFORMANCE INDICATORS (if available), IMPACT OF THE TECHNOLOGY TRANSFER	210kEUR of grant and 1600kEUR of long term loans in 2004	not available	-	Legislative	Legislative	

TECHNOLOGY	Biomass		
TYPE OF MEASURE	PROFIT: Public support to R&D projects (individual and co-operation projects)	IDAE FTP (Financiación por Terceros): Public financial and technical partnership in the project	Law 53/2002: relief in corporate taxes
TYPE OF FINANCIAL SUPPORT	Public grants or public loans with long term reimbursement.	Public loans with long term reimbursement; reimbursement depending on energy generation. IDAE participates as a project partner	Tax relief due to investment assets (acquisition of equipments for biofuels production)
GENERAL DESCRIPTION OF THE MEASURE	R&D projects evaluated against the criteria defined in the "R&D National Plan 04-07" (prev. 00-03) and the quality and innovation of the proposal. Call published every year. Individual and co-operation projects are included in the call. * Subvention: 30%-35% of the approved budget * Loan: 75% of the approved budget; 0% interest rate; max 15 yrs reimbursement; guarantees required	IDAE gives financial support, and provides technical expertise. The "reimbursement" occurs according to the amount of generated energy. A partnership contract/agreement is signed with IDAE.	Law 53/2002: tax relief of 10 % of investments in durable goods for transformation of biomass into heat and/or electricity
PROBLEMS THAT THE MEASURE WANTS TO TACKLE	Research and Development of new energy crops	Capital support (IDAE acts as an investor) to national demonstration projects of new high-potential technologies in renewables	Support to investment in renewables
STAGE OF THE DEVELOPMENT SUPPORTED	Research and Development	Development and Demonstration	Commercialisation
AGENTS INVOLVED IN THE TECHNOLOGY TRANSFER	Public research laboratories / Utility companies / Engineering companies/ Component manufacturers / professional associations / incubators	Utility companies / Engineering companies / Associations	Industrial companies
TYPE OF FINANCING AGENTS AND FINANCING MEASURES INVOLVED IN THE PROCESS	Spanish Ministry of Industry Spanish Ministry of Education	IDAE is a public, business-structured organisation reporting to the Ministry of Industry	Spanish Treasury Ministry
AREAS OF IMPROVEMENT OF THE TECHNOLOGY TRANSFER MEASURE	<ul style="list-style-type: none"> - efficient combustion technologies and mitigation of malfunctions caused by combustibles. - combustion together with other fuels - development of small scale systems - gasification technologies and use in combustion engines - purification of biogas - logistics of biomasa - new energy crops 	Capital support (IDAE acts as an investor) to national demonstration projects of new high-potential technologies in renewables	Support to investment in renewables
PERFORMANCE INDICATORS (if available), IMPACT OF THE TECHNOLOGY TRANSFER			

TECHNOLOGY	Hydrogen and Fuel Cells		
TYPE OF MEASURE	PROFIT: Public support to R&D projects (individual and co-operation projects)	CDTI: Public support to R&D industrial projects	IDAE FTP (Financiación por Terceros): Public financial and technical partnership in the project
TYPE OF FINANCIAL SUPPORT	Public grants or public loans with long term reimbursement.	Public loans with long term reimbursement	Public loans with long term reimbursement; reimbursement depending on energy generation. IDAE participates as a project partner
GENERAL DESCRIPTION OF THE MEASURE	R&D projects evaluated against the criteria defined in the "R&D National Plan 04-07" (prev. 00-03) and the quality and innovation of the proposal. Call published every year. Individual and co-operation projects are included in the call. * Subvention: 30%-35% of the approved budget * Loan: 75% of the approved budget; 0% interest rate; max 15 yrs reimbursement; guarantees required	Loan: 60% of the approved budget; 0% interest rate; 7 to 9 yrs reimbursement; no guarantees required	IDAE gives financial support, and provides technical expertise. The "reimbursement" occurs according to the amount of generated energy. A partnership contract/agreement is signed with IDAE.
PROBLEMS THAT THE MEASURE WANTS TO TACKLE	Hydrogen • Production, Storage, Distribution and supply, Standardisation and quality of the product, Life Cycle Analysis, safety, reliability, etc., Creation of testing infrastructure, Training of Human Resources Fuel Cells • Clean combustibles for fuel cells, Materials, Components, Applications (transport, electricity, cogeneration, auxiliary power, etc), Simulation tools, Integration with other sources	Facilitation of Industrial development	Capital support (IDAE acts as an investor) to national demonstration projects of new high-potential technologies in renewables
STAGE OF THE DEVELOPMENT SUPPORTED	Research and Development	Development	Development and Demonstration
AGENTS INVOLVED IN THE TECHNOLOGY TRANSFER	Public research laboratories / Utility companies / Engineering companies/ Component manufacturers / professional associations / incubators	Industries	Utility companies / Engineering companies / Component manufacturers
TYPE OF FINANCING AGENTS AND FINANCING MEASURES INVOLVED IN THE PROCESS	Spanish Ministry of Industry Spanish Ministry of Education	CDTI: Organisation in dependence of the Spanish Ministry of Industry	IDAE is a public, business-structured organisation reporting to the Ministry of Industry
PERFORMANCE INDICATORS (if available), IMPACT OF THE TECHNOLOGY TRANSFER	1,7M€ of support to R&D projects in 2004	no hydrogen/fuel cells projects supported yet	no hydrogen/fuel cells projects supported yet



TECHNOLOGY	Distributed Energy	
TYPE OF MEASURE	PROFIT: Public support to R&D projects (individual and co-operation projects)	CDTI: Public support to R&D industrial projects
TYPE OF FINANCIAL SUPPORT	Public grants or public loans with long term reimbursement.	Public loans with long term reimbursement
GENERAL DESCRIPTION OF THE MEASURE	R&D projects evaluated against the criteria defined in the "R&D National Plan 04-07" (prev. 00-03) and the quality and innovation of the proposal. Call published every year. Individual and co-operation projects are included in the call. * Subvention: 30%-35% of the approved budget * Loan: 75% of the approved budget; 0% interest rate; max 15 yrs reimbursement; guarantees required	Loan: 60% of the approved budget; 0% interest rate; 7 to 9 yrs reimbursement; no guarantees required
PROBLEMS THAT THE MEASURE WANTS TO TACKLE	Integration of micro-networks, connection of windfarms, microgeneration by means of fotovoltaics and fuel cells. Development of components for active distribution networks Energy storage systems (flywheels, ultracapacitors, fuel cells, etc) Network management systems; homologation and certification of equipments and systems	Facilitation of Industrial development
STAGE OF THE DEVELOPMENT SUPPORTED	Research and Development	Development
AGENTS INVOLVED IN THE TECHNOLOGY TRANSFER	Public research laboratories / Utility companies / Engineering companies/ Component manufacturers / professional associations / incubators	Industries
TYPE OF FINANCING AGENTS AND FINANCING MEASURES INVOLVED IN THE PROCESS	Spanish Ministry of Industry Spanish Ministry of Education	CDTI: Organisation in dependence of the Spanish Ministry of Industry
PERFORMANCE INDICATORS (if available), IMPACT OF THE TECHNOLOGY TRANSFER		



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