5th General Assembly of the European PV Technology Platform

SET Plan & Industry Initiative: Feedback from Spain

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BASIC PRINCIPLES AND POLITICAL OBJECTIVES

Measures that *pull* the development of new technologies and help us to transform to a low carbon society:

Legally binding targets for 2020

- ✓ 20% renewables,
- ✓ 20% reduction of green house gas emissions, and
- ✓ 20% more energy efficiency.

Directive on the promotion of renewable technologies and

Directive establishing the Emissions Trading System.

OUTLOOK

- **Europe 2020 strategy**
- **New strategy for energy policy for the period 2011-2020**

we need to implement.

- ✓ the **2nd and 3rd internal energy market package**
- ✓ **policy on renewable energy, energy efficiency** Initiatives such as Covenant of Mayors but also Smart Cities for innovative technologies are instrumental.

New priority areas of actions:

- ✓ A new proposal for an **Energy Infrastructure Package**
- ✓ **New framework for energy efficiency policy.**

OUTLOOK

In March 2010, EU leaders agreed on the Europe 2020 strategy, centred around smart, sustainable and inclusive growth.

Initiatives like the SET-Plan already point the way forward to tackling major societal challenges.

The SET-Plan

- sets clear objectives and builds on existing initiatives in the field;
- it fosters a cooperative approach to research and innovation based on building partnerships;
- it has put in place a high level Steering Group to ensure progress and created a dedicated information system to support decision and policy making.

OUTLOOK

The main pillar of SET Plan are the European Industrial Initiatives (EIIs)

From the Commission side, in the SET Plan Conference in Madrid, R. Strohmeier, Deputy Director General- Scientific Advances, DG RTD, said:

> "I can assure you that we will support these initiatives with both human and financial resources.
>
> We have decided to focus our Community Programmes on the implementation of the SET-Plan and this will be reflected in future work programmes.
>
> Before the summer we will publish the FP7 Work Programme for 2011 and you will already see the prominence given to the European Industrial Initiatives – we are putting our money where our mouth is.
>
> And, our scientific officers will continue to proactively animate the EII Teams that have been set up to take the initiatives forward".

OUTLOOK

Another pillar of the SET-Plan is the **European Energy Research Alliance**

The best national research institutes in Europe are putting together their existing resources into jointly agreed and comprehensive programmes of applied research.

That means that:

Hundreds of person-years of research effort and world class facilities and infrastructures are being harnessed to achieve common goals.

SET PLAN MAIN EVENTS

Over the last two years the industry, Member States and the European Commission, have worked together to establish a low carbon energy technology strategy.

In 2008, in Paris , French Presidency.This marked the beginning of the European Energy Research Alliance.

In 2009, in Stockholm, Swedish presidency. Validating the 2010-2020 Technology Roadmaps for Wind, Solar, Bioenergy , Carbon Capture and Storage, Nuclear, Smart Grids and Smart Cities and the estimated financial needs.

In 2010, in Madrid, The first tangible results of the SET Plan. Implementation Plans as well as governance structures and monitoring systems for four of the SET-Plan Industrial Initiatives: Wind, Solar, CCS and Electricity Grids.

SET PLAN MAIN EVENTS

Some important activities during the Spanish Presidency:

- political vision and commitment in leading the Council to adopt Conclusions supporting the Commission Communication on Investing in the Development of low carbon technologies.

- Active participation jointly with EC in the elaboration of the Joint statement read and adopted on the launch of the EIIs at the SET Plan Conference in Madrid

- Active participation jointly with EC in the elaboration of an "orientation" paper". SET Plan framework vis-à-vis S&T cooperation in the field of energy at both EU and MS level

CHALLENGES

The Council stresses that it is essential to move from "planning to action" and it considers necessary to launch all European Industrial Initiatives (IIES) as soon as possible and not later than 2011 and carry out the rest of actions proposed in the conclusions of the European Council at European, National and Regional level:

- **Adopt the Implementation Plans** (2010-2012).

  Identify the interests of each agent, either Member State, Region or even research organizations and industries.

- **Establish, at national level, a close cooperation** among all public administration involved

SETTING THE SCENE FOR SUCCESS……..

In its conclusions the Council ……:

For example, the creation in Spain of a "**NATIONAL TASK FORCE**" devoted to the control and planning of activities related to SET Plan.

This group includes as members a representative of most of the main national actors involved in financing projects and actions oriented to a low carbon economy.

Also, in this Group there are

- ✓ Representatives of all actors involved in European programs related to SET Plan (eg Framework Programme, Recovery Plan, CIP and NER300).
- ✓ Representatives from Spanish Autonomous Communities, and
- ✓ Spanish representatives in the EII Teams

SETTING THE SCENE FOR SUCCESS..... THE NATIONAL WORKING GROUP

Main Functions:

- Support and advise the Spanish representatives in the preparation of various meetings in which they are deciding the IIES, mainly in the "Steering Group".
- Assist in the coordination of the different financial instruments available to the General Administration to fund the activities of SET Plan, as calls and grants.
- Collaborate to align R & D national policies in energy with the SET Plan activities and objectives and enforce the general interests of Spain in the IIES.
- Study and differentiate those lines of action that may be included within the SET Plan and protect those less mature areas that should have national funding.

KEY CHALLENGES

In summary, the strategy of the Spanish Central Government is:

- Align the interests and objectives with those of the SET Plan

- Identify those lines of action that could / should be included within the SET Plan

- Adapting existing funding instruments to provide national funding for such actions.

KEY CHALLENGES

We need a change in generation mix, with a growing importance of renewable energy that is not something that we face in the future but is already taking place and where the objective enshrined in the package "Energy and Climate Change adopted by the European Union in 2008 (so named 20/20/20) has meant a major push in this direction.

In more theoretical terms, if I may, there are two clear market failures: presence of positive external economies, and imperfect information, which requires public sector intervention to

- Support and promote the coordination of projects
- Foster and induce a pull factor to funding, encouraging public-private collaboration.

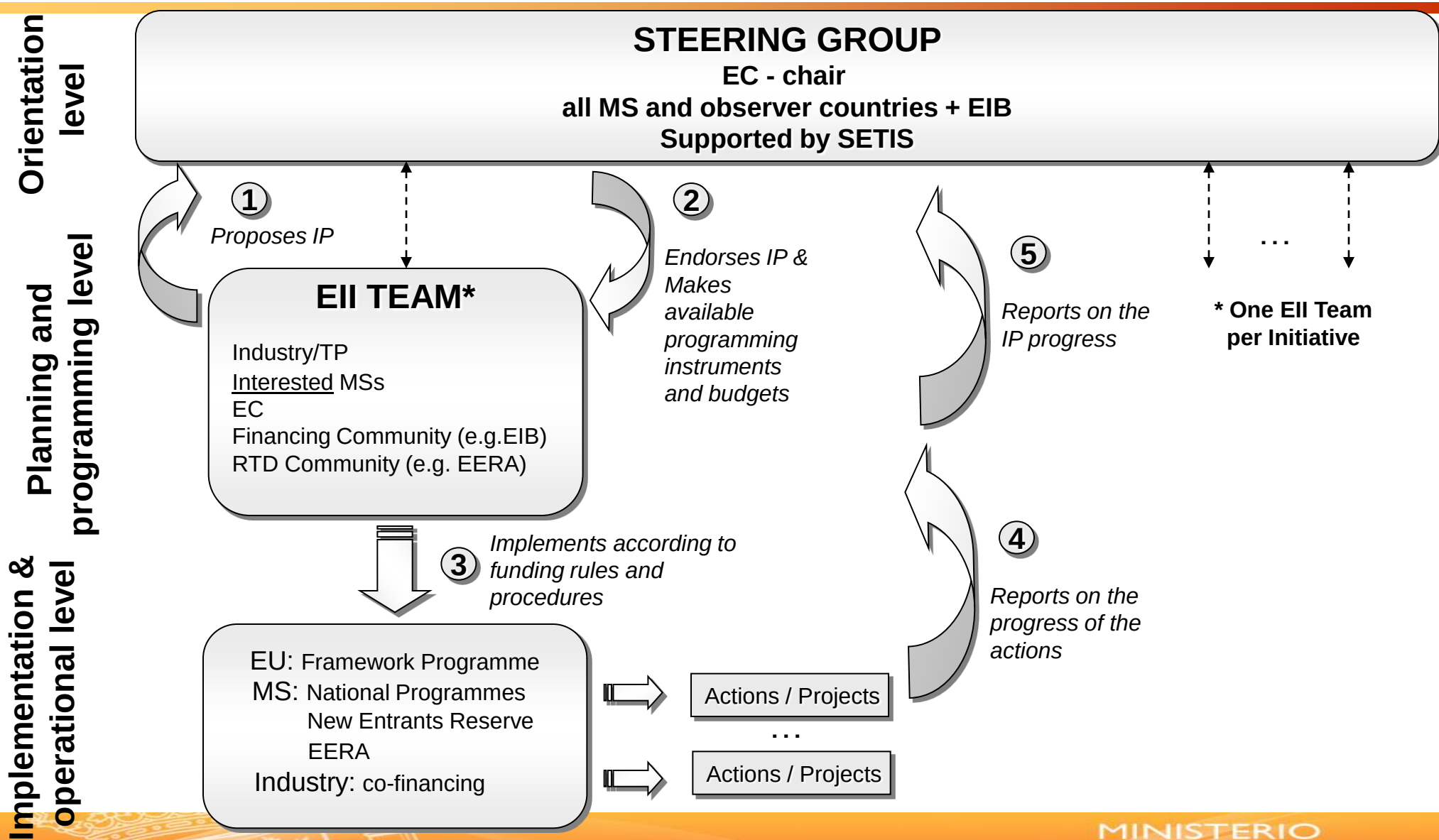
SOME COUNCIL CONCLUSIONS

- light and non bureaucratic structure and governance
- open architecture
- share objectives, planning, monitoring, reporting tools and implementation mechanisms
- partners engaged voluntarily
- preserve sovereignty over national research funds
- launch without delay … 1st EII in 2010 …all by 2011

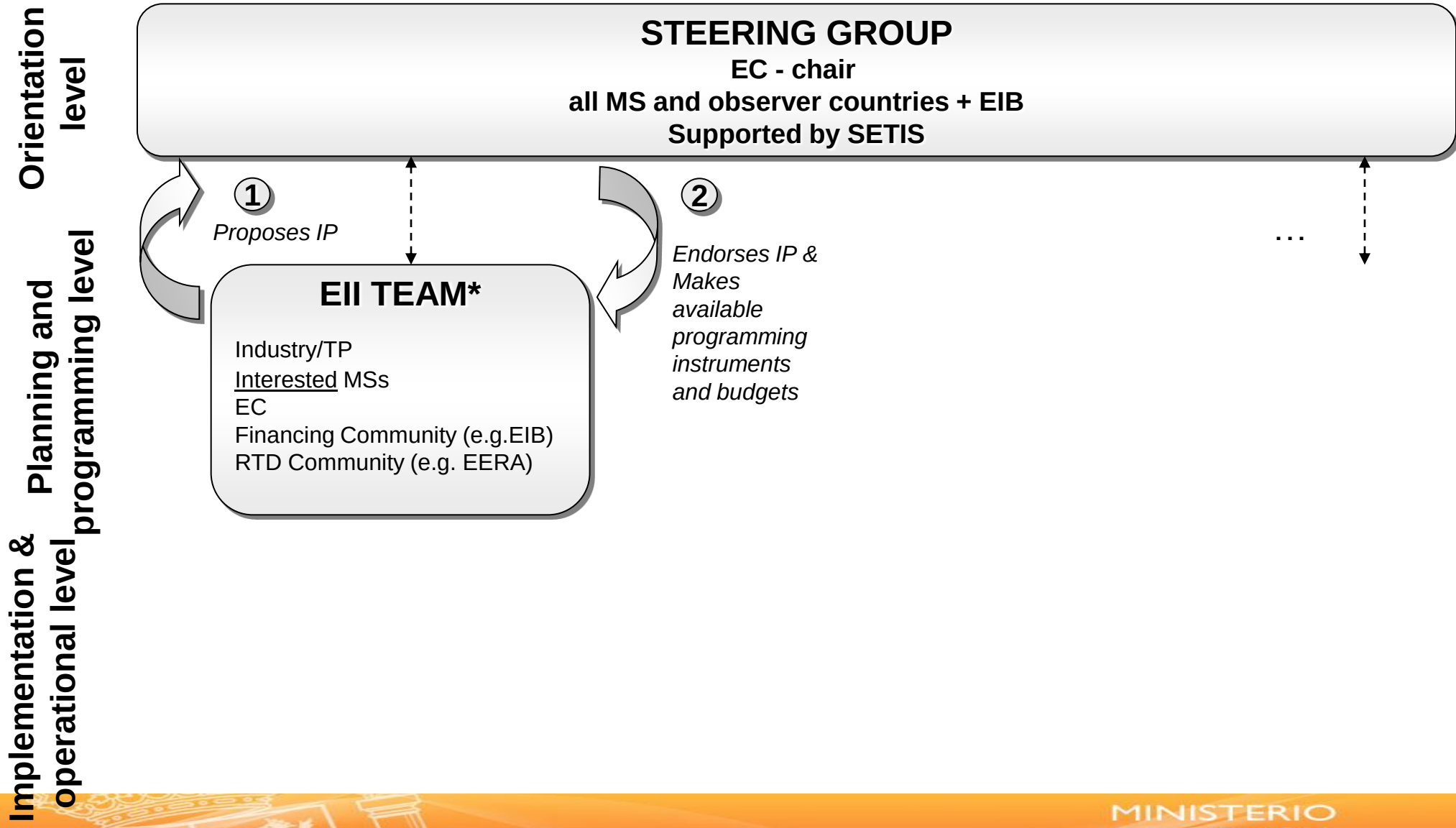
GOVERNANCE ARCHITECTURE

- **Three levels of intervention:**
  - Orientation level - SET-Plan Steering Group
  - Planning and programming level - EII Team
  - Implementation and operational level - 'where the projects happen'
- **Common set of principles and practices - can be adapted by the sectors**
- **Develop organically as activities expand and different needs emerge**

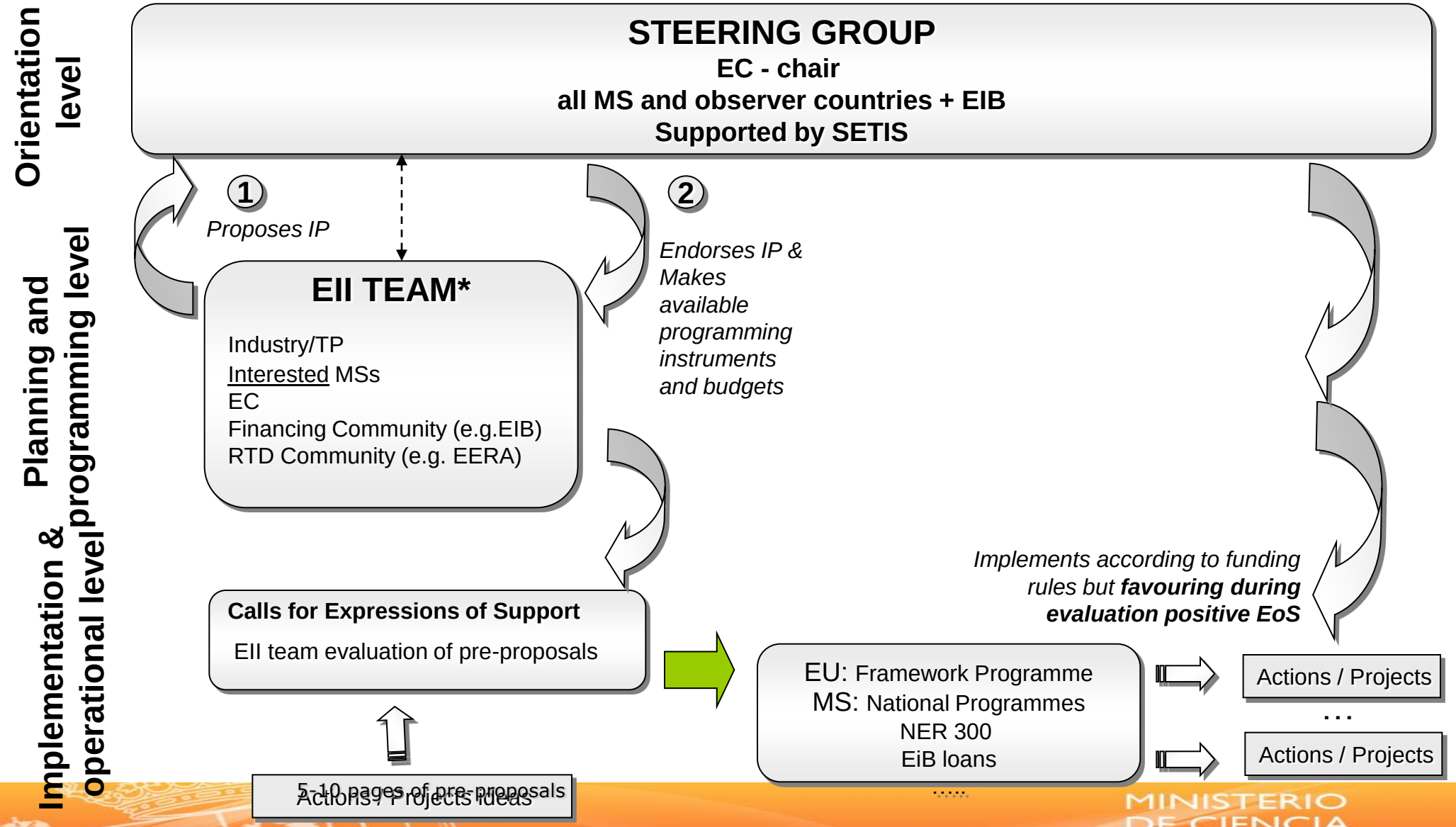
GOVERNANCE ARCHITECTURE..... The Global Process



GOVERNANCE ARCHITECTURE..... Where we are now



GOVERNANCE ARCHITECTURE..... A possible Solution



THE WAY FORWARD..... General Approach

EUROPEAN COMMISSION
Community research

Expectations from Committed MSs

- Agree priorities in Implementation Plans
- Actively participate in the EEI Teams
- Indicate availability of instruments and resources
- Adapt procedures, where necessary
- Adhere to the 'joint launching declaration'

THE WAY FORWARD..... Spanish representatives

The list of names of the persons that Spain proposes as representatives in the EII Teams for the different European Industrial Initiative

SOLAR CSP EII - PV EII	Carlos Montoya	cmontoya@idae.es	34 91 456 49 68	Head of Solar Energy Departament - Renewable Energy Directorate - IDAE
	Jose Herrero Rueda (alternate)	jose.herrero@ciemat.es	34 91 346 66 70	PV Unit - CIEMAT

THE WAY FORWARD..... Spanish representatives

Other representatives who will give support for all the crosscutting activities related to the existing RTD funding instruments and mechanisms in the Spanish National R&D&I Plan and the coordination with the main RTD actors (i.e. industry, research centres, Universities).

CROSS-CUTTING ACTIVITIES				
RTD FUNDING INSTRUMENTS MICINN	Jose Ignacio Alonso Montes	jignacio.alonso@micinn.es	34 91 603 79 80	Deputy Director General for Planning, Education and Monitoring - Ministry of Science and Innovation
	Severino Falcón	severino.falcon@micinn.es	34 91 603 79 59	Technical Adviser to the Deputy Director General for European Programs - Ministry of Science and Innovation
RTD FUNDING INSTRUMENTS CDTI	Agustín Morales Bueno	agmb@cdti.es	34 91 581 56 03	Directorate of Technology - Information and communication technologies - CDTI

A. Cost reduction: paving the way to 2020	
Number	**Project cluster**
1	Advanced manufacturing processes for cells and modules
1.1	Wafer silicon technologies
1.1.1	New, low-cost & low-energy silicon feedstock technologies -
1.1.4	High-throughput processes for manufacturing of advanced, high-efficiency cells and modules, including integrated (wafer/)cell & module approaches and process equipment (up to 17% multicrystalline and 20% monocrystalline, on module level)
1.2	Thin-film technologies
1.2.1	High-rate, large-area deposition processes, including process equipment and control methods (active and passive layers)
1.2.3	From LAB to FAB: pilot-line demonstration of (2) novel low-cost, high-efficiency technologies
1.3	Concentrator PV (CPV) technologies
1.3.1	Industrial manufacturing processes for high-efficiency concentrator cells and receivers, including process equipment and control methods
1.3.2	Industrial manufacturing processes for concentrator optics, including process equipment
1.3.3	High-throughput, high-precision assembly technology for CPV modules
2	Performance enhancement & lifetime extension
2.2	Concentrator PV technologies
2.2.2	System designs and materials for >25 yrs lifetime - ligado a 2.1.2 Ageing models and outdoor performance,
2.2.3	Outdoor performance evaluation methods
3	Materials development & sustainability
1.2	Building integration
2	2.Large scale PV power plants
2.1	Realisation of large-scale CPV power plant (20MW) with tracking system

C. Preparing for cost and penetration beyond 2020 levels	
Number	**Project cluster**
2	Very high efficiency approaches
2.1	proofs-of-concept (2) for very-high efficiency novel PV technologies
2.2	Modelling and characterisation

SPANISH PUBLIC INVESTMENT

Investments on basic science and RTD provided by the Spanish Central Administration[1] and its agencies to universities, public research organisations and industries in the following areas:

- ✓ Wind
- ✓ Photovoltaic solar power
- ✓ Concentrated solar power
- ✓ Bio-energy
- ✓ CO2 Capture
- ✓ Electricity grid
- ✓ Nuclear Energy

THE ACTUAL SPANISH NATIONAL R&D&I PLAN

IS NOT THEMATIC ORIENTED

Grants and loans awarded in open calls in the period 2007 - 2009.
The average duration of each project is 3 year. Some of these projects run until 2011, then the transfer of funds extend to that date.

[1] It neither takes into account funding from regions nor other incentives for the energy production.

SPANISH PUBLIC INVESTMENT

Investment in basic science.

From 2007 to 2009, the Ministry of Science and Innovation (www.micinn.es) has granted a total 127 projects for a total amount of 27,9 M€. The beneficiaries of these grants are universities and public research institution[1].

[1] Corresponde a las convocatorias gestionadas por la SG de Proyectos de Investigación del MICINN.

EII (1)	Projects	Budget
Wind	19	2.223.583
Photovoltaic solar power	25	2.383.936
Concentrated solar power	13	1.202.982
Bio-energy	30	4.657.504
CO2 Capture	11	14.333.633
Electricity grid	20	2.191.150
Nuclear Energy	9	913.034
Subtotal (euros)	127	**27.905.822**

SPANISH PUBLIC INVESTMENT

Research and Technological Development.

The Ministry of Industry (www.mityc.es), the Ministry of Science and Innovation and its CDTI[1] agency, have funded a total of 207 projects with a contribution of 347,7 M€ (182,5 M euros in grants and 165,3 M€ in loans) .

EII	Projects	Euros	
		Grants	Loans
Wind	30	34.396.257	17.756.585
Photovoltaic solar power	44	22.205.992	28.364.736
Concentrated solar power	31	12.031.469	38.668.601
Bio-energy	36	39.022.474	27.221.543
CO2 Capture	8	26.963.780	3.322.982
Electricity grid	52	47.755.534	47.479.833
Nuclear Energy	6	82.000	2.466.978
Subtotal	207	182.457.506	165.281.258

SPANISH PUBLIC INVESTMENT

The breakdown of these projects by funding instrument is represented below.

1. Singular Projects.
RTD projects where industry and public institutions should work ensemble[1].

EII	Projects	Euros	
		Grants	Loans
Wind	2	3.827.000	466.000
Photovoltaic solar power	3	12.029.000	903.000
Concentrated solar power	1	681.000	0
Bio-energy	4	13.318.000	9.419.000
CO2 Capture	1	4.319.000	0
Electricity grid	2	2.259.000	1.117.000
Nuclear Energy			
Subtotal	13	36.433.000	11.905.000

[1] Corresponde a proyectos singulares estratégicos gestionados por la Subdirección General de Estrategias de Colaboración Público-Privada del MICINN.

SPANISH PUBLIC INVESTMENT

2. Projects where the main stakeholder is the industry[1].

EII	Grants		Loans	
	Projects	Euros	Projects	Euros
Wind	5	30.347.257	22	17.290.585
Photovoltaic solar power	4	10.161.992	36	27.461.736
Concentrated solar power	2	11.350.469	28	38.668.601
Bio-energy	5	25.455.474	26	17.802.543
CO2 Capture	4	22.495.780	2	3.322.982
Electricity grid	4	45.405.534	45	46.362.833
Nuclear Energy	0	0	5	2.466.978
Subtotal	24	145.216.506	164	153.376.258

Corresponde a la suma de la financiación CDTI que incluye proyectos CENIT y línea bancaria (prestamos) más la financiación del Ministerio de Industria en su última convocator

SPANISH PUBLIC INVESTMENT

3. Coordination & Support Actions (CSAS)[1].

EII (1)	Grants	
	Projects	Euros
Wind	1	222.000
Photovoltaic solar power	1	15.000
Concentrated solar power		
Bio-energy	1	249.000
CO2 Capture	1	149.000
Electricity grid	1	91.000
Nuclear Energy	1	82.000
Subtotal	6	808.000

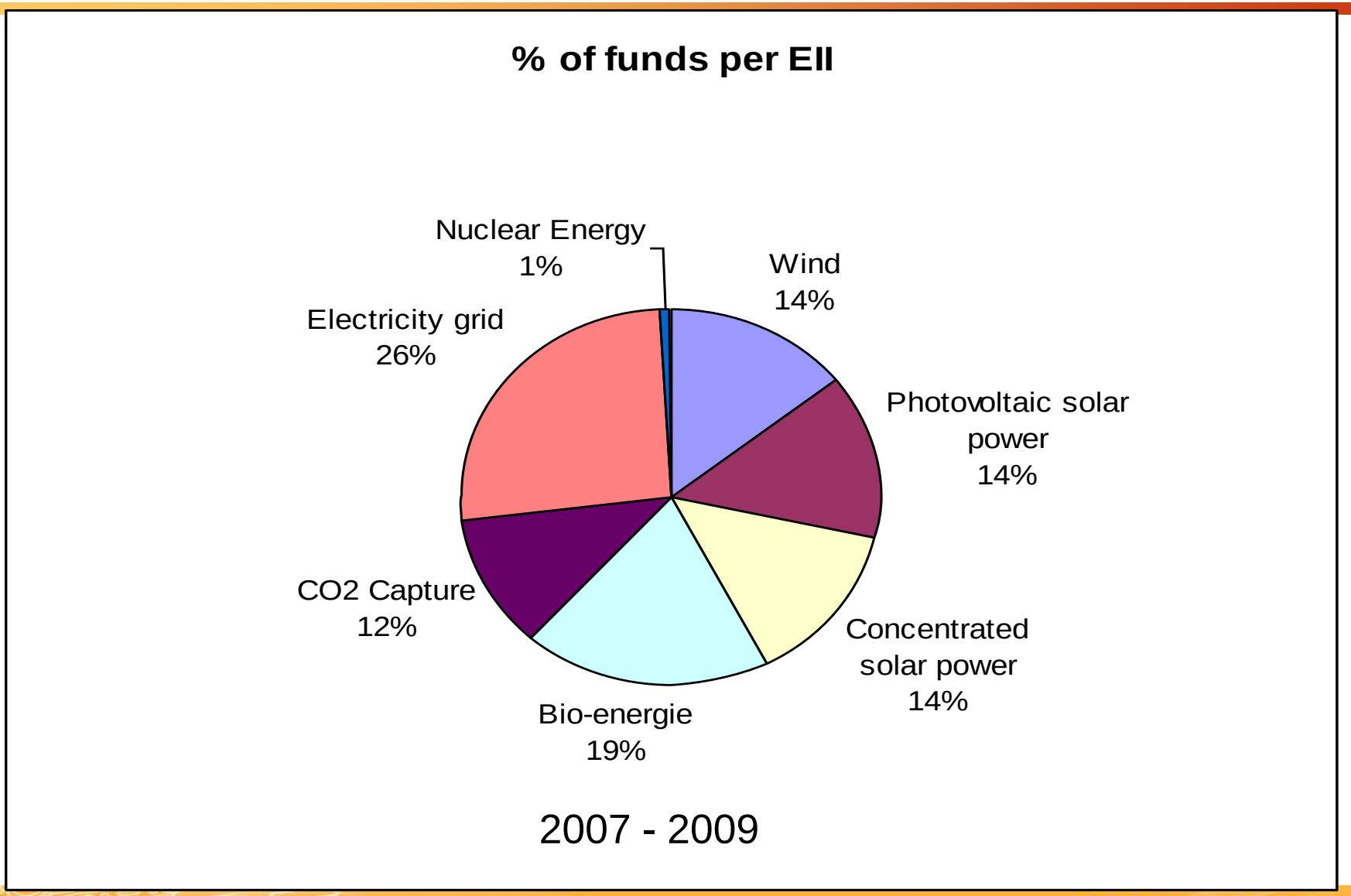
[1] Corresponde a Plataformas Tecnológicas gestionados por la Subdirección General de Estrategias de Colaboración Público-Privada del MICINN.

SPANISH PUBLIC INVESTMENT..... SET PLAN

From 2007 to 2009 Spanish Central Administration has funded a total of 334 projects:

EII (1)	Projects	Euros		
		Grants (2)	Loans (3)	Total
Wind	49	36.619.840	17.756.585	54.376.425
Photovoltaic solar power	**69**	**24.589.928**	**28.364.736**	**52.954.664**
Concentrated solar power	**44**	**13.234.451**	**38.668.601**	**51.903.052**
Bio-energy	66	43.679.978	27.221.543	70.901.521
CO2 Capture	19	41.297.413	3.322.982	44.620.395
Electricity grid	72	49.946.684	47.479.833	97.426.517
Nuclear Energy	15	995.034	2.466.978	3.462.012
Total	334	210.363.328	147.524.673	357.888.001

SPANISH PUBLIC INVESTMENT..... SET PLAN



SPANISH PUBLIC INVESTMENT..... SOLAR PV

SOLAR PV

Instruments	Projects	Funding	
		Grants	Loans
Basic Research	25	2.383.936	
Singular Projects	3	12.029.000	903.000
CENIT + CDTI banking financing line	4	10.161.992	
	36		27.461.736
Technological platforms	1	15.000	
Total	69	24.589.928	54.376.425

SPANISH PUBLIC INVESTMENT..... SOLAR PV

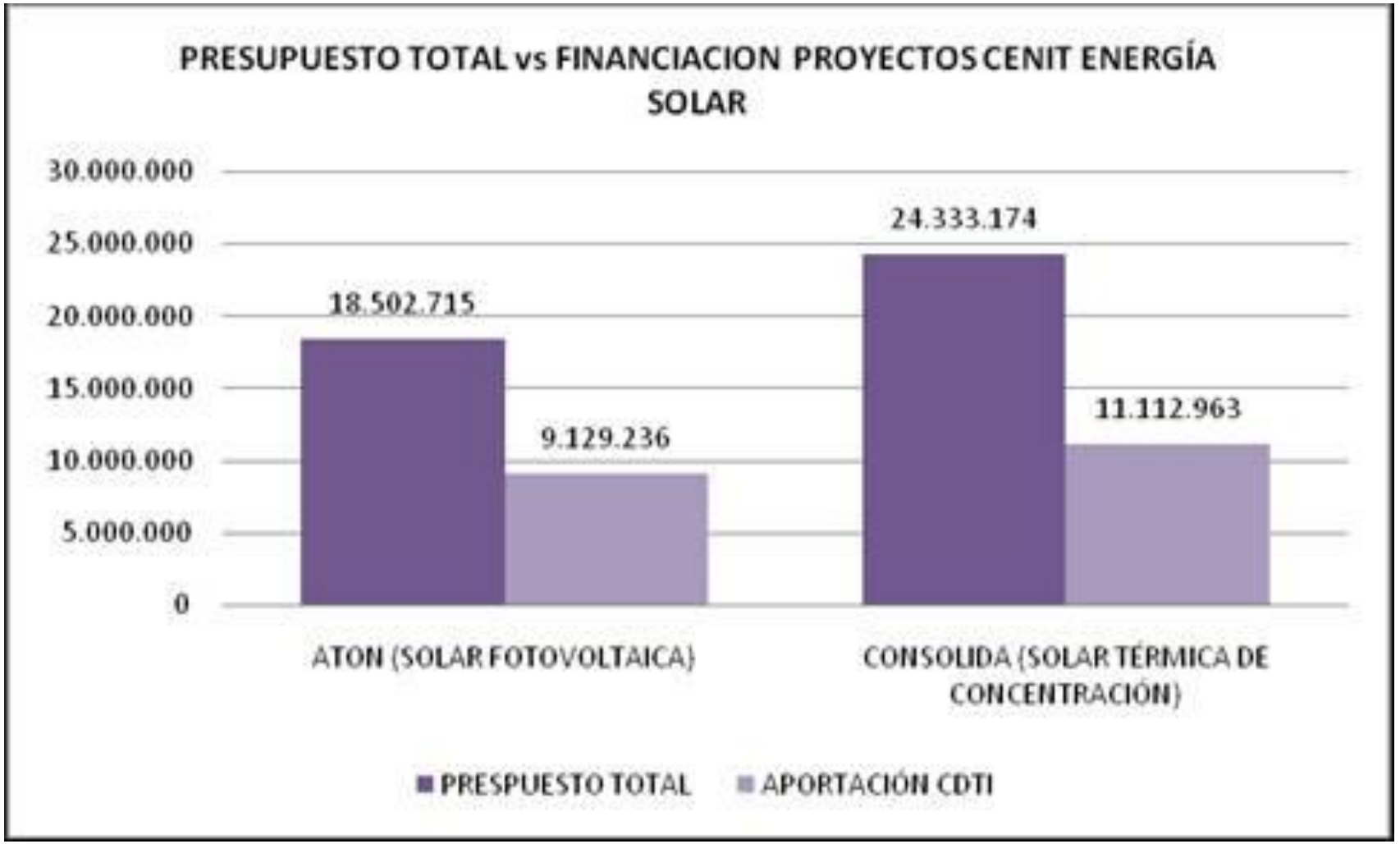
ACTIONS DURING THE PERIOD 2007 – 2009
GRANTS

No. CENIT Projects awarded : 1
Project Type:
- Basic research x
- Innovation x
- Development and demonstration x

Total amount funded: € 9,129,236.
Total budget: € 18,502,715.

Proyecto ATON (RESEARCH AND DEVELOPMENT OF NEW TECHNOLOGIES FOR POWER GENERATION BASED ON THIN FILM PHOTOVOLTAIC CELLS). The project's main objective is to generate scientific and technical knowledge in the various technologies involved in the manufacturing of photovoltaic modules to provide the Spanish industry of its own technology and competitive thin-film PV. This is intended to induce significant jump that achieves substantial improvements in efficiency and manufacturing costs, developing new materials to form photovoltaic devices sustainable, efficient manufacturing processes and advanced electronic systems to make them optimally compatible with the distribution networks.
Project year: 2009.

SPANISH PUBLIC INVESTMENT..... SOLAR PV



SPANISH PUBLIC INVESTMENT..... SOLAR PV

ACTIONS DURING THE PERIOD 2007 – 2009

LOANS

Number of projects awarded.

Project Type: R & D: 34

Financing

-Committed by CDTI (€): 26,191,927

- Total approved budget (€): 42,680,450

Comments

74% of the approved projects were submitted by SMEs

SPANISH PUBLIC INVESTMENT..... SOLAR PV

ACTIONS PLANNED FOR THE NEXT THREE YEARS

Industrial Research CENIT projects:	1 Project	10 M € grant.
Partially refundable: R & D business	30 projects	CDTI contribution: 24 M €

Beneficiaries:

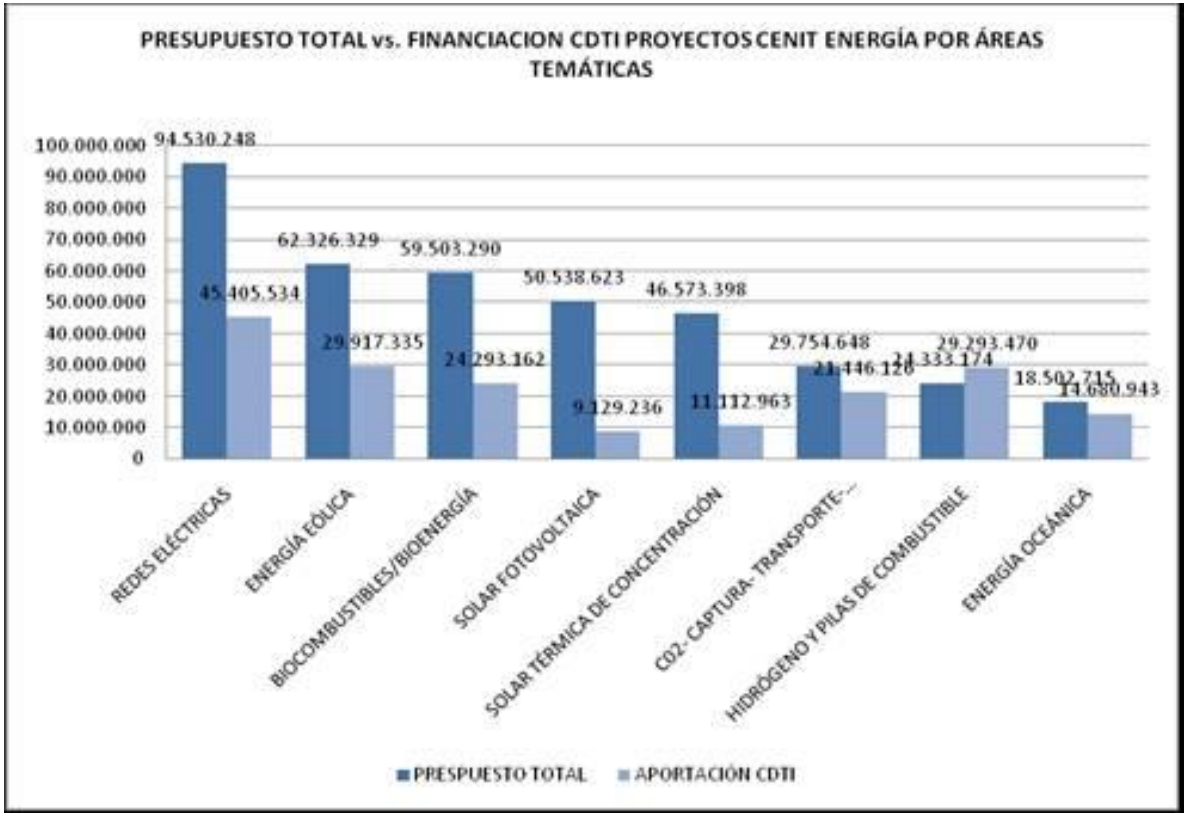
Private companies. Research Centers participate as subcontractors.

* It has been taken into account in the forecast that in 2009 a project was financed at a cost well above average

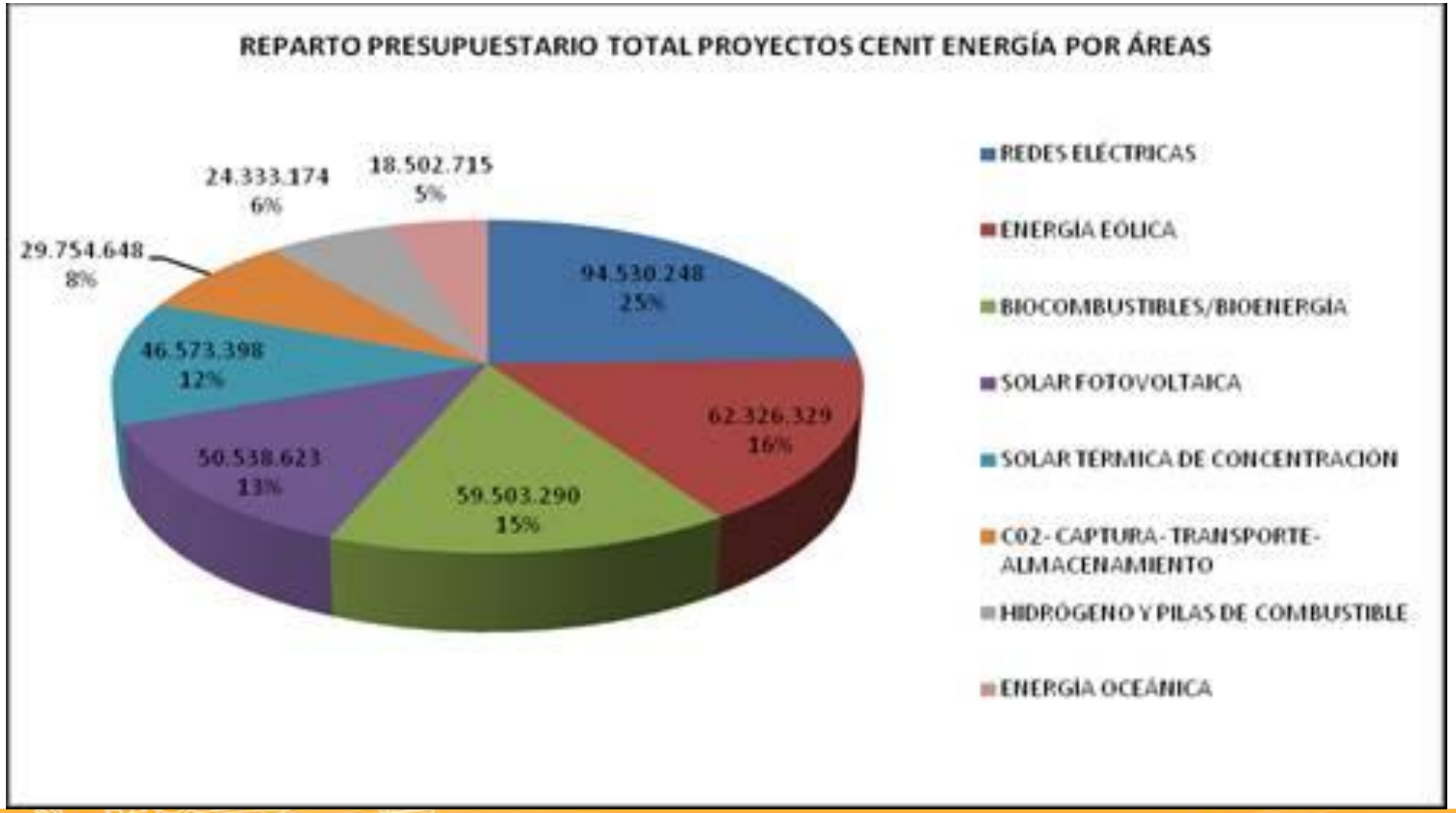
SPANISH PUBLIC INVESTMENT..... SET PLAN

Summary of grants CENIT awarded in Energy (2007-2009)

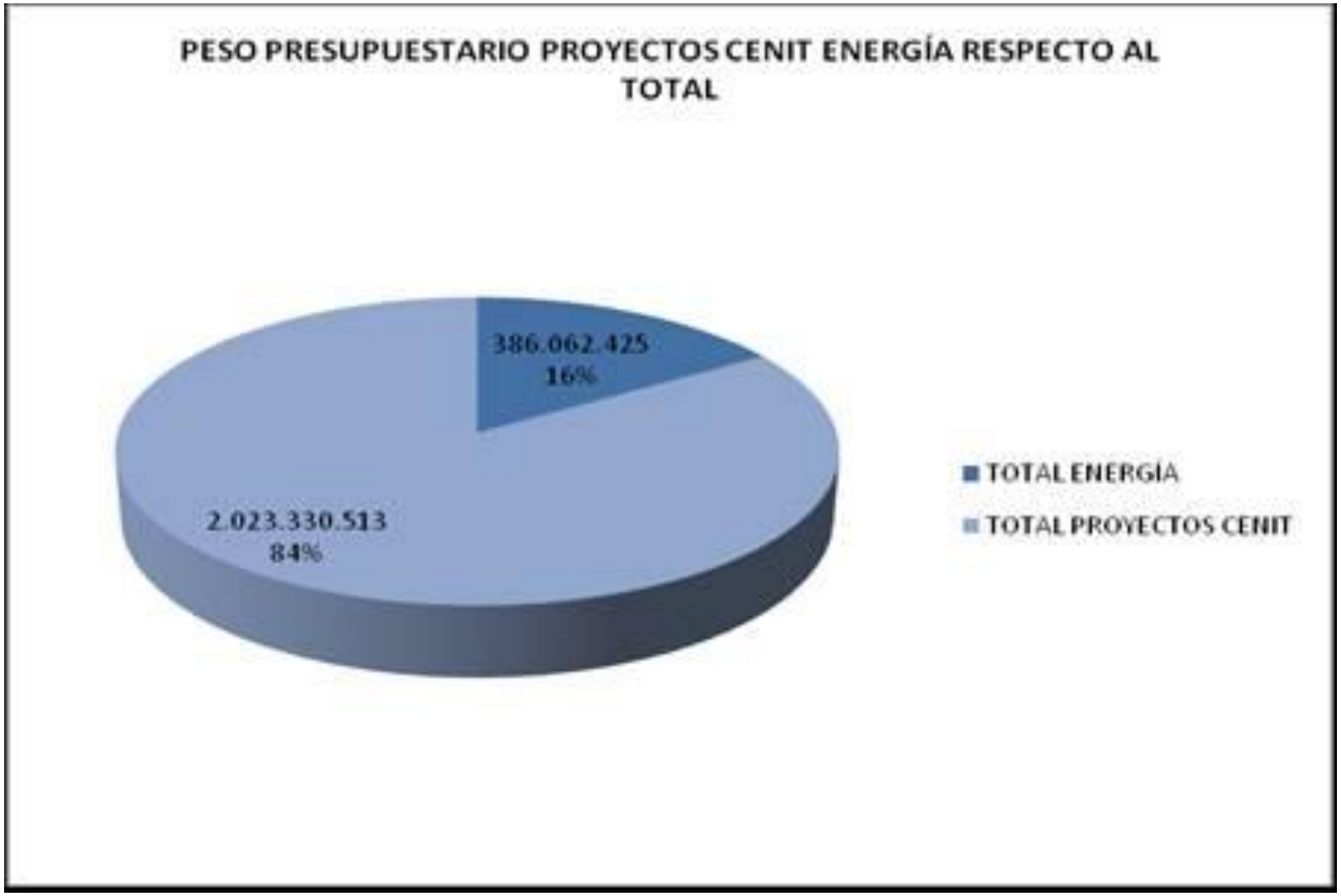
Total no. of CENIT projects granted	15
Total budget	386.062.425 €
Total grants	185.278.769 €



SPANISH PUBLIC INVESTMENT..... SET PLAN

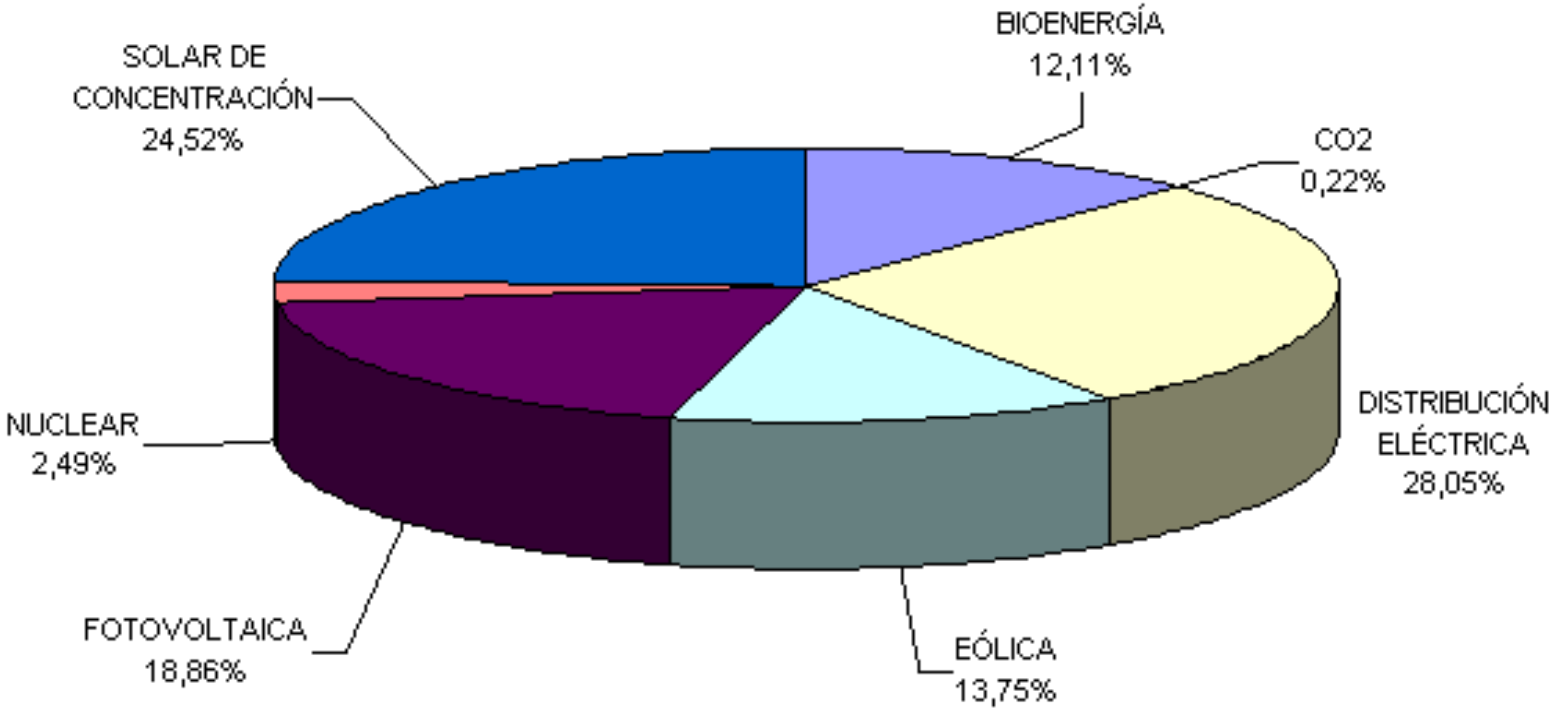


SPANISH PUBLIC INVESTMENT..... SET PLAN



SPANISH PUBLIC INVESTMENT..... SET PLAN

Total budget approved in R & D (loans and partially refundable loans) in areas from 2007 to 2009



SPANISH PUBLIC INVESTMENT..... SET PLAN

INNPACTO PROGRAM
Ministry of innovation and Science (MICINN)

The purpose of this aid is to promote cooperation between research organizations and companies for the joint execution of R + D + i.

The intention is create innovative companies, guiding the activity of existing firms to innovative activity, obtain clearly exploitable results, mobilizing private investment, generate employment and improve the country's technological balance

Minimum budget per project: 700.000 euros
TOTAL PROGRAM BUDGET: 837 M euros

RENEWABLES ENERGIES..... Ministry of Industry

ACTUAL FRAMEWORK

- Plan de Energías Renovables (**PER**) 2005-2010.
- Ley **54/1997**, del Sector Eléctrico, de 27 de noviembre.
- Real Decreto **1578/2008**, de 26 de septiembre.
- Real Decreto **661/2007**, de 25 de mayo.
- Real Decreto **1663/2000**, de 29 de septiembre.
- **Resolución**, de **31 de mayo de 2001**, de de Dirección General de Política Energética y Minas.
- Real Decreto **314/2006**, de 17 de marzo, que aprueba el Código Técnico de la Edificación.
- Real Decreto **1955/2000**, de 1 de diciembre.
- Real Decreto **842/2002**, de 2 de agosto. (Reglamento de Baja Tensión).

RENEWABLES ENERGIES…… Ministry of Industry

2010 is the year where we expect major developments on the Spanish renewable energy legislation front. The Spanish government continues to be extremely committed to renewable energies, which are a success story and play a crucial role in achieving its energy policy objectives of security of supply (reducing dependence on foreign energy sources), competitiveness (keeping energy costs down) and sustainability (reducing emissions).
The Spanish government has an intense pipeline of renewable energy legislation for 2010.

- **Renewable Energy Plan**.
- **Economic framework reviews:**.
- **New high-level framework:**

RENEWABLES ENERGIES…… Ministry of Industry

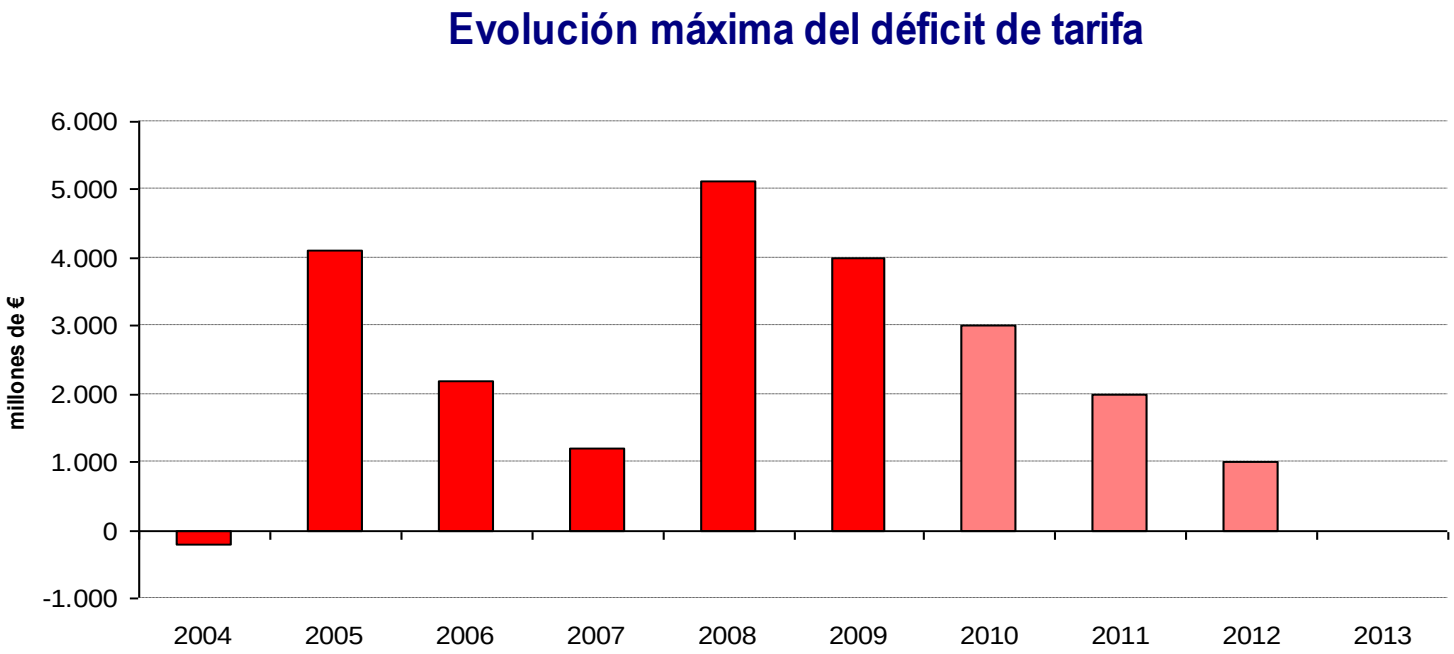
What have we done?

The Spanish Government has taken the following initiatives:

- ✓ **A new framework for PV in 2008 (RD1578/2008) that brings order to the installation rate and uses market signals allowing faster transfer of technological gains to consumers.**
- ✓ **Creation of a pre-registration for other technologies in May 2009 has allowed us to avoid the "bubble" that was generated in thermal and prevent the system is made even more untenable in 2010.**
- ✓ **Package of measures to reduce the tariff deficit, with inputs from traditional utilities, consumers and government (without the contribution of renewable energy).**

RENEWABLES ENERGIES..... Ministry of Industry

Difficulties in reducing the tariff deficit



Despite changes in the wholesale market (pool), the output of some items and the increase of light bill, the tariff deficit was only slightly reduced rate.

RENEWABLES ENERGIES……. Ministry of Industry……. OBJECTIVES

1. Reaching 20% of final energy and 40% of electricity generation from renewable sources by 2020.
2. Reducing the deficit and preserve the competitiveness of industry and household welfare.
3. Transfer gain technological developments to consumers.
4. Avoid speculation caused by excess profits, which hurt its image and slows the construction of the plants pre-assigned (with an adverse effect on the industry).
5. Mitigate the incentive for fraud that can generate the current differential between the rate and the price of the pool.
6. Promote technological improvement and cost reduction, advancing achieving "grid parity", which will allow more renewable facilities until 2020.

RENEWABLES ENERGIES..... Ministry of Industry

CONCLUSSIONS

Dominant role for solar PV technology in a new scheme of the electrical system:

- Relevant role in the **distributed generation** of electricity. Exchange of concept to Intelligent Networks.
- Main role in building (architectural integration, roofs and facades).
  Important role in other initiatives (eg electric vehicles).
- Achieving Network Parity (Parity Grid), can cause a significant increase of installed power.
- Great expectations in cost reduction.

RENEWABLES ENERGIES……. Ministry of Industry

Evolution Solar Photovoltaic

The expected contribution of solar PV to the fulfilment of binding targets for 2020 is estimated at **14 316 GWh**, generated by a cumulative installed capacity of 8367 MW in 2020. The increase of power in the period 2011-2020 is estimated in 4.346 MW.

It has been considered the continuity of the framework currently in place, establishing a quota system and associated fees for two types of facilities, ground and covers.

RENEWABLES ENERGIES..... Ministry of Industry

Evolution Solar Photovoltaic

The estimate of energy generated in this period is based on the assumption of a park with 67% of fixed installations on deck and 33% in ground with monitoring. It was considered a progressive shift of the location of facilities to areas with higher radiation.

From 2015 it is forecast and increased penetration of solar photovoltaic systems for energy self-consumption interconnected with the distribution network as it is reach the "parity" of the cost of generation with the energy costs for consumers

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THANK YOU VERY MUCH FOR YOUR ATTENTION

Francisco Larios
Subdirector general Adjunto Programas Europeos
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