CIEMAT (Centro de Investigaciones Energéticas Medioambientales y Tecnológicas)

Enrique Soria

Director Renewable Energy Division

CIEMAT

CIEMAT Spanish Research Center in Energy, Environment and Technology

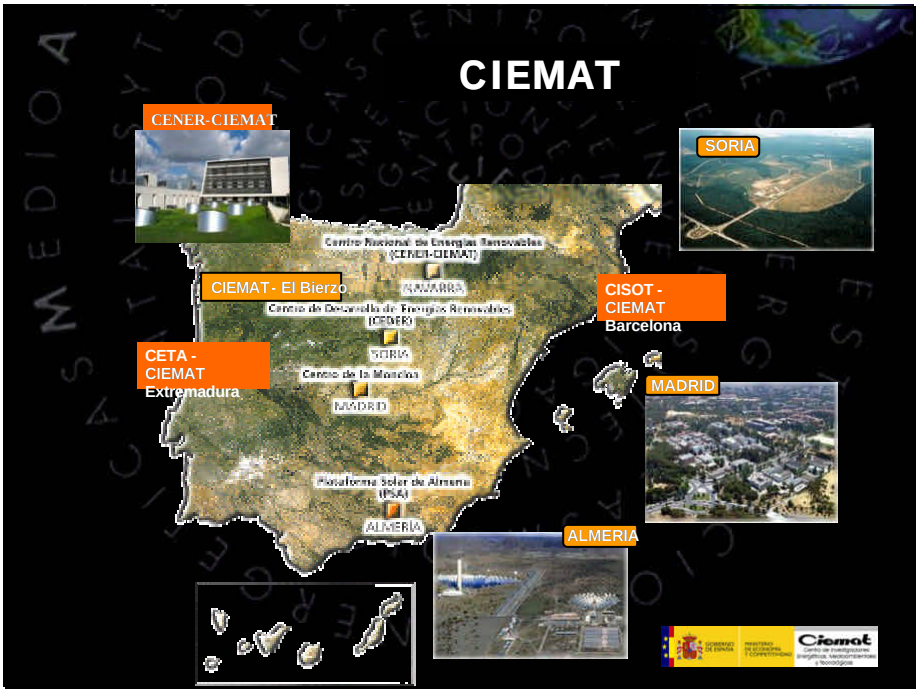
Mission: To contribute to the sustainable development of the country and the quality of life of its citizens, through the generation and application of scientific and technological knowledge.

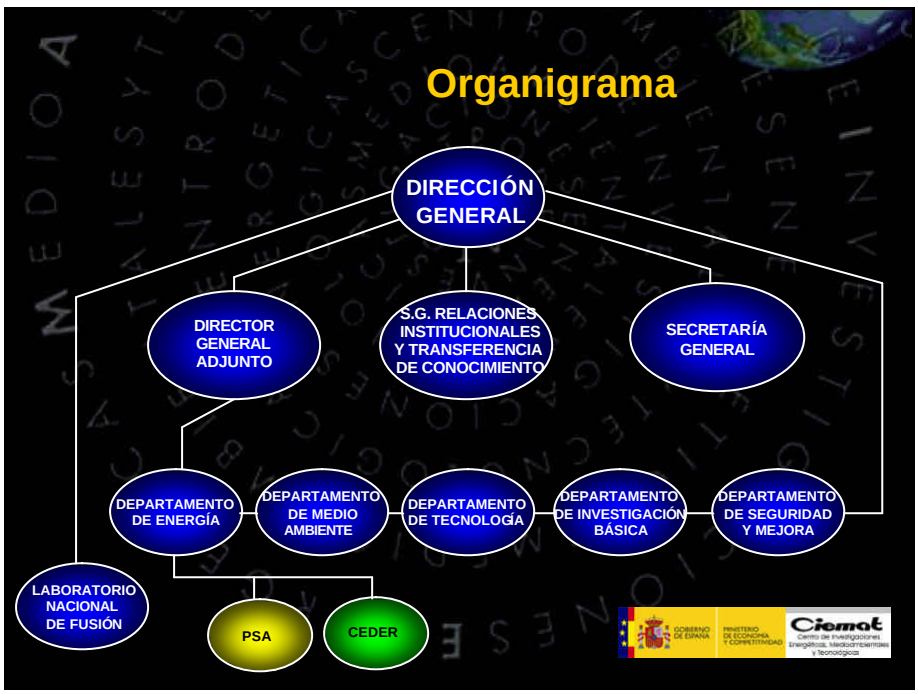
Areas of activity:

- Energy (Combustion and Gasification , Nuclear Fission, Hydrogen and Fuel Cells., Renewable Energies : Solar , Wind, Biomass and Biofuels, Energy efficiency in building)
- National Lab for Fusion and Basic Research
- Environment
- Technology
- Knowledge Transfer

Personnel : 1.400 staff

Budget : 92 M€ / year


CIEMAT
CENER-CIEMAT
SORIA
Centro Nacional de Energías Renovables (CENER-CIEMAT)
NAVARRA
CIEMAT - El Bierzo
Centro de Desarrollo de Energías Renovables (CEDER)
CISOT - CIEMAT Barcelona
SORIA
CETA - CIEMAT Extremadura
Centro de la Mancha
MADRID
MADRID
Plataforma Solar de Almería (PSA)
ALMERÍA
ALMERÍA


Organigrama
DIRECCIÓN GENERAL
DIRECTOR GENERAL ADJUNTO
S.G. RELACIONES INSTITUCIONALES Y TRANSFERENCIA DE CONOCIMIENTO
SECRETARÍA GENERAL
DEPARTAMENTO DE ENERGÍA
DEPARTAMENTO DE MEDIO AMBIENTE
DEPARTAMENTO DE TECNOLOGÍA
DEPARTAMENTO DE INVESTIGACIÓN BÁSICA
DEPARTAMENTO DE SEGURIDAD Y MEJORA
LABORATORIO NACIONAL DE FUSIÓN
PSA
CEDER

ENVIRONMENT DEPARTMENT

GEOLOGICAL STORAGE

Mobile Laboratory of Migration and Hydrogeochemistry

RADIATION PROTECTION

LE Ge Detector. CIEMAT full body counter

ENVIRONMENTAL TECHNOLOGIES

Environmental Instrumentation Laboratory

BASIC RESEARCH DEPARTMENT

DIVISION OF EXPERIMENTAL PHYSICS

Participation in the CMS experiment of the LHC

Acelerador LHC del CERN

Participation in other experiments:

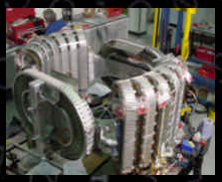
CDF (en Fermilab, EEUU), **FAST** (PSI, Suiza), **Double Chooz**

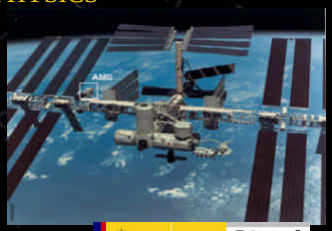
DIVISION OF ASTROPARTICLE PHYSICS

(Alpha Magnetic Spectrometer, AMS)

Detection of dark matter

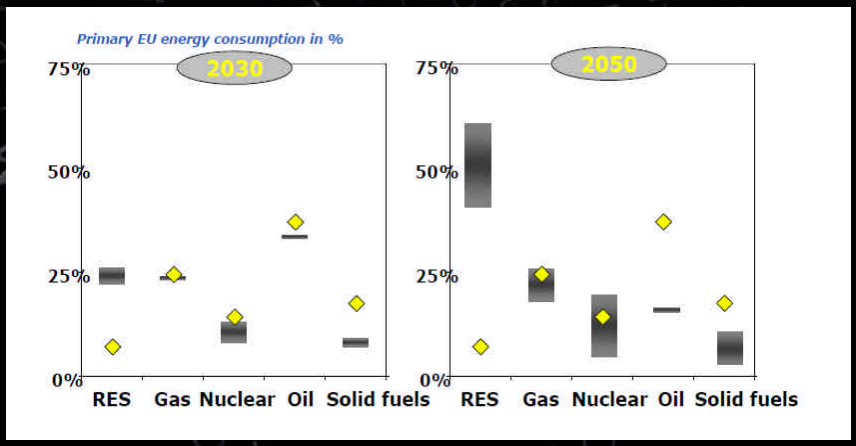
Detection of antimatter





GRID units for Particle Physics, and supercnductivity, mainly for accalerators

EU ENERGY ROADMAP 2050



Energy activities at CIEMAT

LABORATORIO NACIONAL DE FUSIÓN

DEPARTAMENTO DE ENERGÍA

- PLATAFORMA SOLAR (ALMERÍA)
- ENERGÍAS RENOVABLES
- CEDER (SORIA)
- Análisis de Sistemas Energéticos
- COMBUSTIÓN Y GASIFICACIÓN
- FISIÓN NUCLEAR

CIEMAT IN THE SPANISH NUCLEAR SECTOR

ENRESA (80% CIEMAT)

Radioactive wastes management

ENUSA (40% CIEMAT)

Fabrication of nuclear fuel

Ciemat

Research, Development, Innovation
Specialized Technical Services

SAFETY NUCLEAR COUNCIL

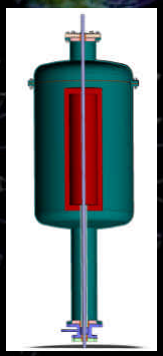
NUCLEAR PLANTS, INDUSTRIES, HOSPITALS, etc.

HYDROGEN

Production

Thermal dissociation of methane and thermochemical processes

PILOT TEST 10 kW



Fuel Cells

PEMFC

New systems of production of electrodes

SOFC

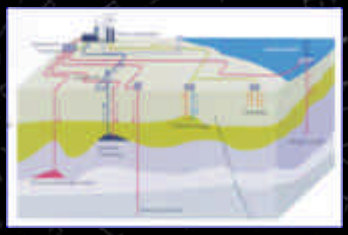
New anodic and cathodic materials (600-800º C).

Integration

Autonomous systems for power generation.

COAL : CIUDEN - EL BIERZO

EXPERIMENTAL PLATFORM



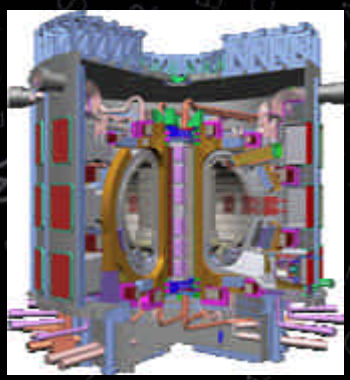
CO_2 GEOLOGICAL STORAGE

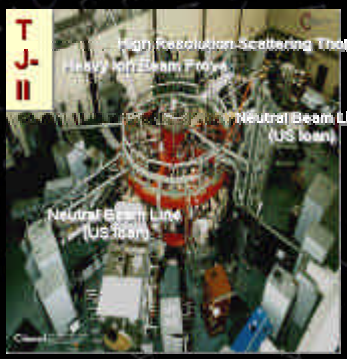
SOIL RESTAURATION LABORATORY

Construction of a 20 MW Oxycombustion and a 30 MW Fluidisized Bed Combustion

50 Mm^3/year, 800 m. depth
100 MT of CO_2

NATIONAL LABORATORY OF MAGNETIC CONFINEMENT FUSION





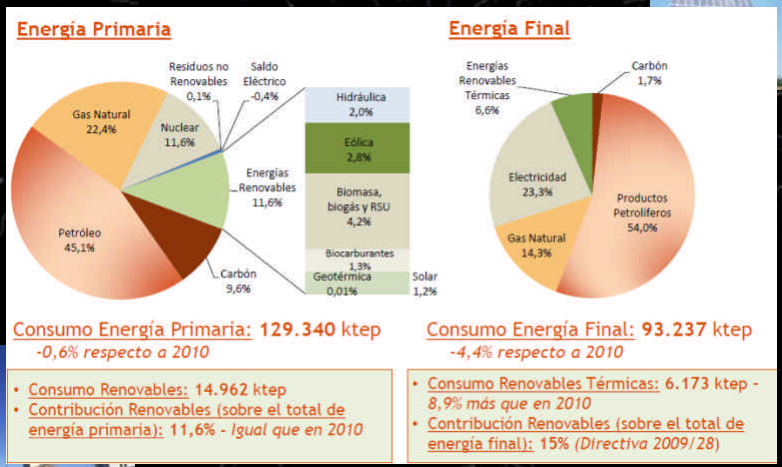
ITER: THE NEXT STEP

2 MeV Van de Graaff acelerator.

RENEWABLE ENERGY IN SPAIN

PRIMARY ENERGY (YEAR 2011)

Source : I D A E



Consumo Energía Primaria: **129.340** ktep

-0,6% respecto a 2010

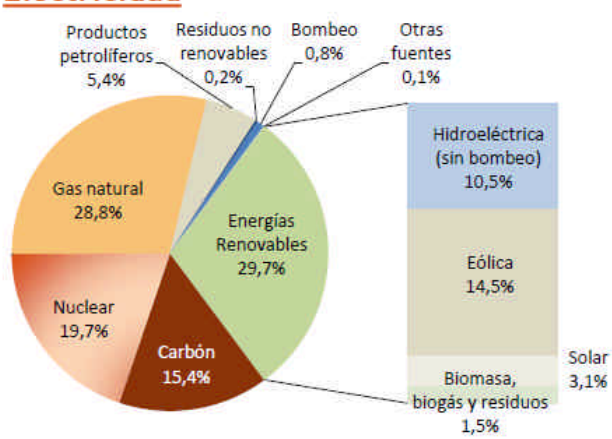
- Consumo Renovables: **14.962** ktep
- Contribución Renovables (sobre el total de energía primaria): **11,6%** - *Igual que en 2010*

Consumo Energía Final: **93.237** ktep

-4,4% respecto a 2010

- Consumo Renovables Térmicas: **6.173** ktep - *8,9% más que en 2010*
- Contribución Renovables (sobre el total de energía final): **15%** *(Directiva 2009/28)*

RENEWABLE ENERGY IN SPAIN

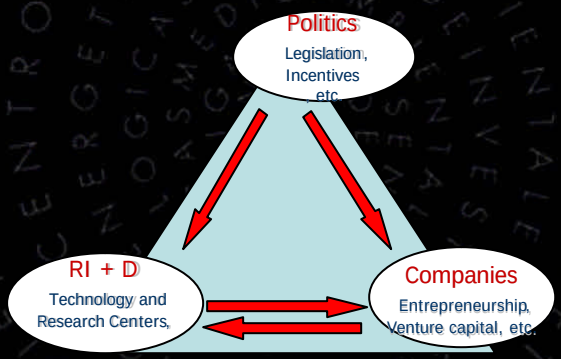


RENEWABLE ENERGY PLAN (REP) 2011-2020

In 2020, renewable energies will represent (RES shares have been calculated following Directive 2009/28/EC methodology):

- 20,8% RES share in gross final energy consumption
- 11,3% RES share in final consumption of energy in transport
- 39,0% Renewable electricity share in gross electricity consumption

Conditions for renewable deployment

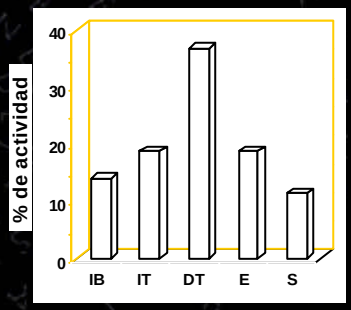


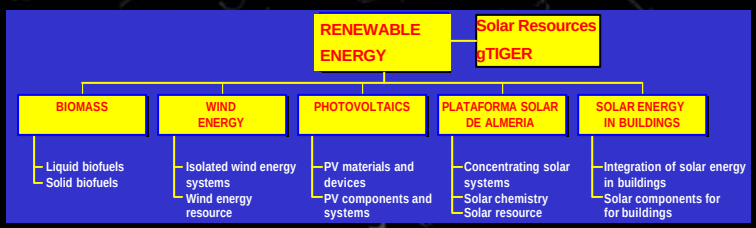
New objectives EUROPE 2020:

20 % of primary energy with RES
20% reduction of CO2 emissions

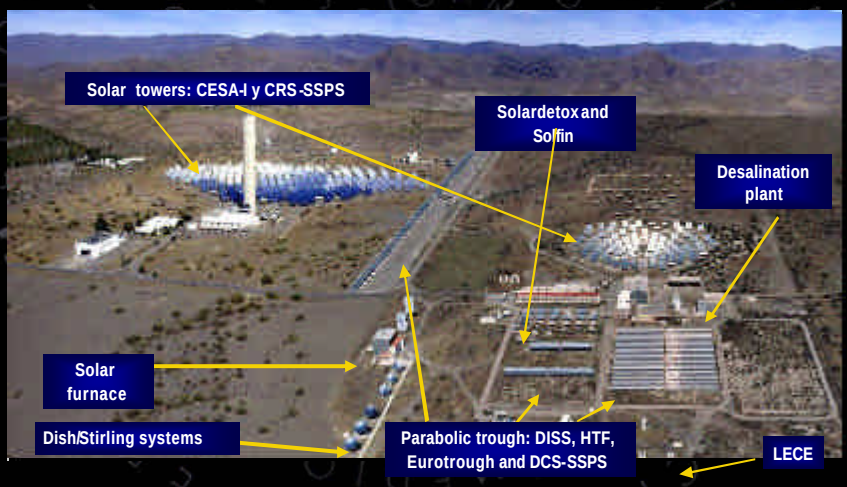
RENEWABLE ENERGY ACTIVITIES AT CIEMAT

- ✓ Including at Energy Department of CIEMAT
- ✓ Public Research Body→ Technological Development
- ✓ Facilities in Madrid, Almería (PSA) and Soria (CEDER)
- ✓ Pioneer team from 1985 with a international projection
- ✓ Staff more then 250 people





DIVISION OF SOLAR PLATFORM OF ALMERIA



3 MWe prototypes using water vapor and gas as platforms for optimizing the designs and construction of 50 MWe industrial plants

CENTRE FOR RENEWABLE ENERGY (CEDER-SORIA)

Planta piloto en L'Alcudia (Valencia)

Acuerdo con IMECAL, Ambiensys y Ford para demostrar la tecnología CIEMAT

Hidrólisis ácida diluida

Residuos orgánicos urbanos y agrícolas

70 Tons/día

ICTS Biocombustibles located in Navarra

PV Plant at Milagro (Navarra)

Power: 9,55 MWp

Production: 14 GWh/a

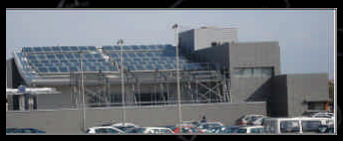
753 owners; 65 M€ investment
Operated by Acciona

ENERGY EFICIENCIY IN BUILDING (ARFRISOL)

F. Barredo - Asturias

CEDER (CIEMAT) - Soria

CIEMAT - Madrid



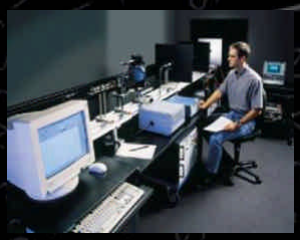
Universidad de Almeńa

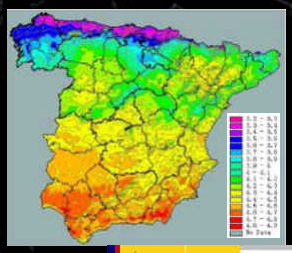
PSA (CIEMAT) - Almería

SOLAR ENERGY (RESOURCES EVALUATION)

MEASUREMENT AND CHARACTERIZATION OF SOLAR RADIATION:

- Excellence in Solar Radiation measurement (BSRN member)
- Two high-quality meteo-stations in Almeria and Soria
- Measurement of spectral distribution and spectral calibration of sensors
- Spatial distribution from treatment of satellite images (Meteosat 7 and MSG)
- Site selection for solar plants with GIS.





Radiometric instrumentation

Meteosat 7 reception antenna

Figura 4. Fotografía banco de ensayos

Planta de ensayos de pequeños aerogeneradores I
CEDER. Lubia **SORIA**

CIEMAT - MADRID

THANK YOU!

enrique.soria@ciemat.es