CIEMAT
ENERGY SYSTEMS ANALYSIS UNIT

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ClimACT KOM Lisbon
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GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD
Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

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➢ MISSION: Contribute to the sustainable development and to the citizens' quality of life, through the generation and application of scientific and technological knowledge

Personnel (2014): 1.320 (including Ph. D. students)

Operational Budget (2014): 100 M€

External Income (2014): 38 M€

Ministry of Economics and Competitiveness

www.ciemat.es

CIEMAT´s objectives

- Promote and execute **R&D activities** in energy, environ. and technology.
- Become a **centre of reference** in the scope of its competence in cooperation with the national and regional governments.
- **Collaborate** with other national R&D centres, universities and business.
- Integrate activities in the **framework of the European Union** and cooperate with intergovernmental organisms and R&D centres in other countries with special attention to Latin America and the Mediterranean.
- Foster activities derived from its R&D in the fields of **scientific-technical diffusion**, education and technology transfer.
- Provide **technical services** in the areas within its scope of competence.
- **Advise governments** and public and private institutions and **represent Spain** in international forums where applicable.

CIEMAT_centers

Ciemat
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MINISTERIO DE CIENCIA E INNOVACIÓN

GOBIERNO DE ESPAÑA

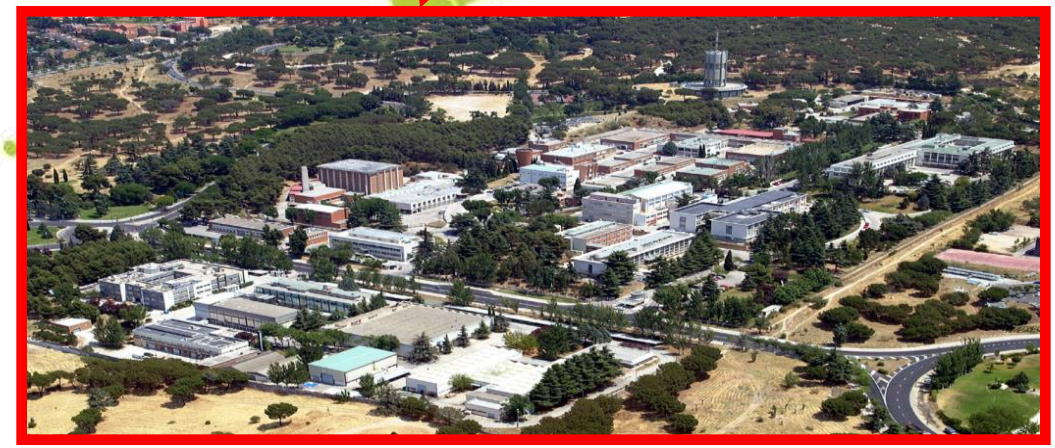
Soria: CEDER y CIEDA

Barcelona: CISOT

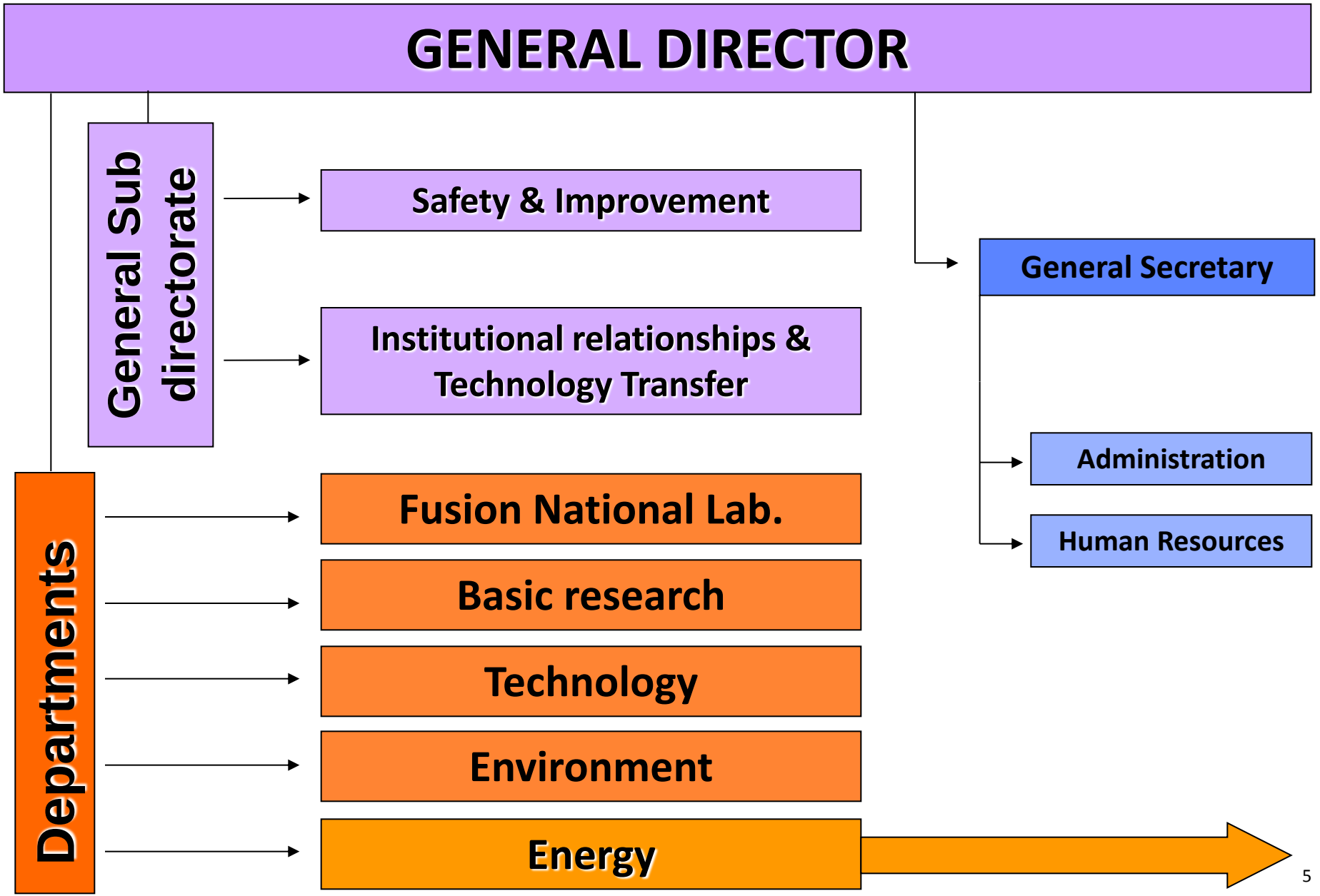
Trujillo: CETA

MADRID: CIEMAT HEADQUARTERS

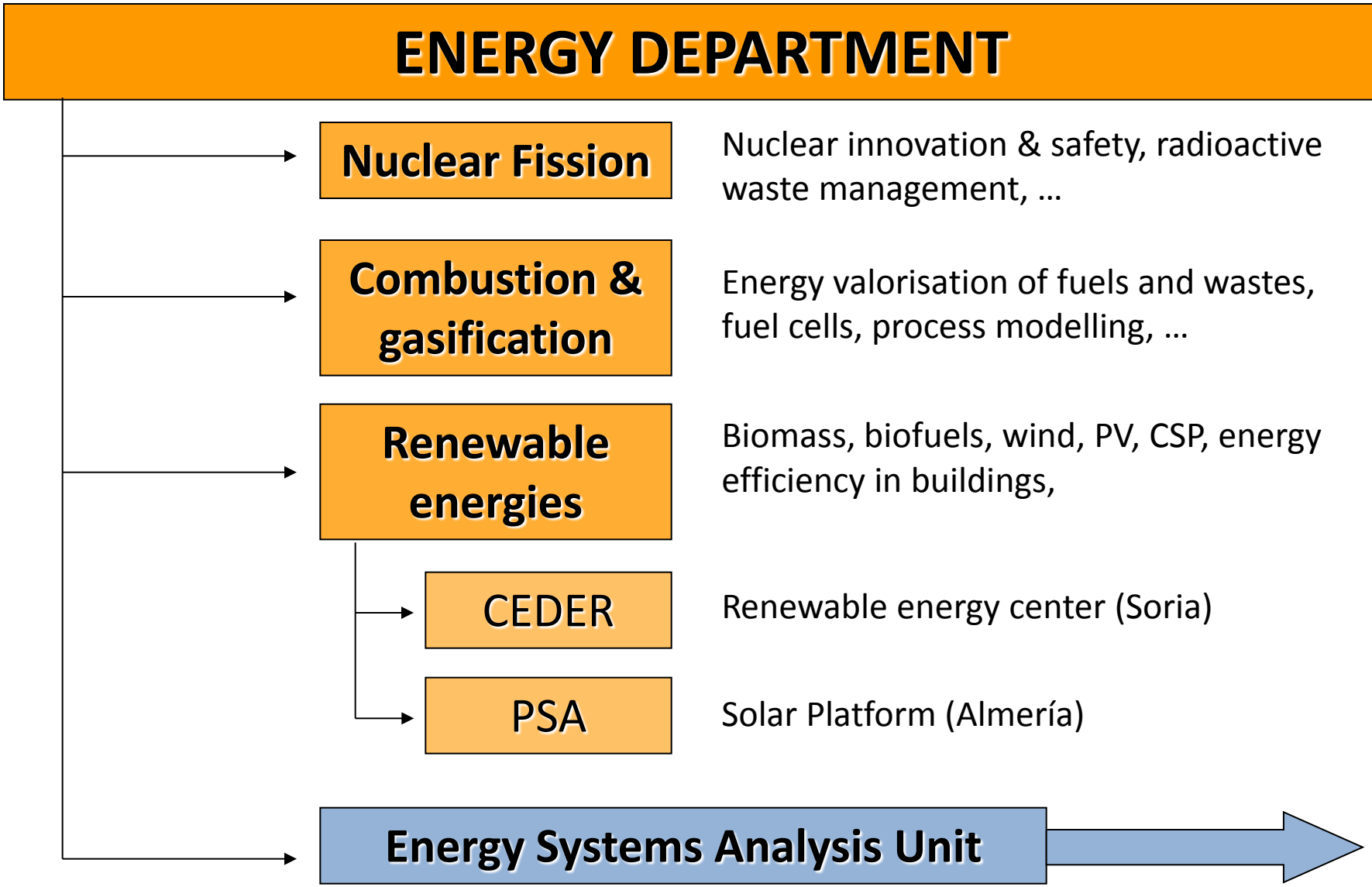
Almería: PSA



CIEMAT structure



CIEMAT Energy Department



CIEMAT. ENERGY SYSTEMS ANALYSIS UNIT

http://rdgroups.ciemat.es/web/ase/1

Socioeconomic and environmental studies to complement technical results of CIEMAT R&D projects, in order to support decision-making in energy and environmental issues

Environmental Analysis and Externalities

Socioeconomic Assessment

Energy modelling

TEAM

Head: Dr. Yolanda Lechón

Research team:

- Dr. Helena Cabal
- Dr. Israel Herrera
- Lic. Carmen Lago
- Dr. Natàlia Caldés
- Dr. Cristina de la Rúa
- Dr. Daniel Garraín
- Dr. Maria José Blanco
- MSc. Irene Rodríguez
- MSc. Eric Montero
- Lic. Ana Rosa Gamarra

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Environmental Analysis and Externalities

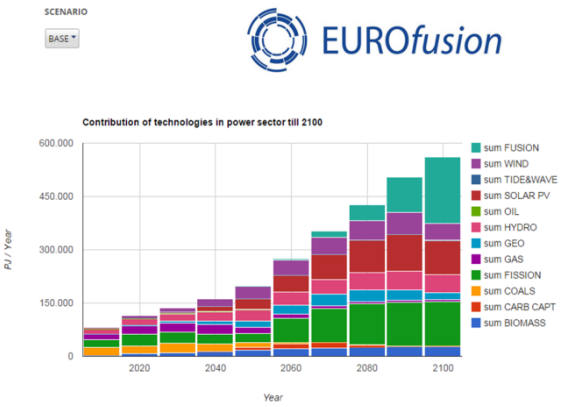
- **Life Cycle Sustainability Assessment** applied to energy technologies
- Quantification of **greenhouse gas emissions of biofuels** and development of biofuel GHG emissions calculation tools in order to implement the RED in Spain.
- Application of the ExternE methodology to energy systems **externalities assessment**.

Socioeconomic assessment

- Application of the **Input-Output** methodology to estimate direct and indirect socioeconomic impacts of energy technologies.
- Development of **integrated tools** for analysis of the three pillars of **sustainability** of energy technologies including environmental, economic and social aspects using E&S-MRIO
- Energy policies evaluation using **Cost Benefit Analysis.**
- Analysis of policy instruments aimed at fostering renewable energies as well as **renewable energy cooperation** at the international level
- Analysis of the effects that renewable energy investments may have in the **development process** of less developed countries (LDC)

Energy Modelling

- Prospective and back casting analysis of the national/regional/global energy system at medium and long term
- Analysis of the influence of economic or/and policy measures



Environmental Analysis and Externalities

WHAT FOR?

- Analysis of the environmental consequences of energy technologies using **Life Cycle Assessment**
- Analysis of the indirect land use change (iLUC) effects of first-generation biofuels
- Quantification of greenhouse gas emissions of biofuels
- Analysis of the social consequences of energy technologies using **Social Life Cycle Assessment**
- **Life Cycle Sustainability Assessment** applied to energy technologies
- Assessment of the externalities of energy technologies using the **ExternE** methodology

WHICH MODELS DO WE WORK WITH?

- Life Cycle Assessment commercial software: **SIMAPRO, GABI**
- Life Cycle Assessment databases: **Ecoinvent, GABI, GEMIS, Social HotSpot Database**
- Input-Output/Life Cycle Assessment tool **(IO-LCA Spain)** and its application to energy technologies
- Environmentally extended Multi-regional input-output models **(E-MRIO)** to assess the effects of energy projects on the environment at the National and International level
- Biofuel GHG emissions calculation tools such as **CALCUGEI**
- Biofuel iLUC emissions calculation tools such as **NexusLandUse**
- Externalities assessment tools such as **Ecosense**

Socioeconomic Analysis

WHAT FOR?

- Evaluation of the economic and social externalities associated to the energy technologies
- Evaluation of both private and social costs and benefits of energy projects, programs and policies
- Analysis of policy instruments aimed at fostering renewable energies as well as renewable energy cooperation at the international level
- Development of new tools aimed at assessing the impacts on the three sustainability pillars
- Analysis of the effects that renewable energy investments may have in the development process of less developed countries (LDC)

WHICH MODELS DO WE WORK WITH?

- Input-Output models **(I-O)** and Multi-regional input-output models **(MRIO)** to assess the effects of energy projects on the economy and employment at the National and International level
- Social Accountability Matrix **(SAM)** and Social Accountability Matrix with energy sector disaggregation **(SAME)**
- Input-Output/Life Cycle Assessment tool **(IO-LCA)** and its application to energy technologies
- New methodological tools based on an MRIO framework aimed at simultaneously evaluate the three sustainability pillars (environmental, social and economic) of energy systems
- Cost-Benefit Analysis **(CBA)** to evaluate all the possible impacts of energy investment decisions
- In collaboration with Real Instituto Elcano, development of a comprehensive framework **(EFDI-D)** to assess the effects that RE investments may have on the development process of host countries

Energy modelling

WHAT FOR?

- Prospective analysis of the national/regional/global energy system at medium and long term
- Medium and long term analysis of new technologies penetration into the energy system
- Analysis of the influence of some economic or/and policy measures
- Backcasting consisting of defining a future sustainable energy scenario (`desirable' one) and identifying the composition of the energy system in each period

WHICH MODELS DO WE WORK WITH?

- Long-term energy models of economic equilibrium, covering the entire energy system from mining to final consumption
- Optimization models which aim at providing the optimum energy system composition in terms of social wealth and sustainability at the minimum cost
- Bottom-up, technology rich model with thousand of technologies well defined by technical, economic and environmental data

✓ **TIMES-Spain**, national energy model representing the Spanish energy system, developed by CIEMAT

✓ **EFDA Times Model (ETM)**, global energy model developed within EUROfusion framework

✓ **ETSAP-TIAM** global model, global energy model developed within ETSAP framework

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Participation in:

•**IEA-ETSAP** (**Energy Technology Systems Analysis Program).** Technology Collaboration Partnership de la AIE. Long term modelling of energy sccenarios.

•**IEA- PVPS (Photovoltaic Power Systems Programme)**

International Energy Agency
Photovoltaic Power Systems Programme

• **EERA (European Energy Research Alliance)**

- **EERA bioenergy.** SP 4. Crosscuting issues. WP3 Global sustainability analysis of bioenergy systems, deployment scenarios and case studies
- **EERA E3s.** SP2. Analysis of policies and RD&D choices. SP3. Energy models for a multidimensional assessment of a European low-carbon energy systemSP4. Integrated energy system analysis and markets. SP5 Low carbon platform
- **EERA storage.** SP6. Technoeconomics

•**CA-RES II** (Concerted Action on Renewable Energies Sources de la C.E.)

•**Other research networks**: Spanish LCA, REMEDIA, Biofuels sustainability alliance, etc.

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Collaborations with other institutions:

- **TECNALIA**
- **GEAR**: Global Energy and Environmental Economics Analysis
- **CEIGRAM**: Centro de Estudios e Investigación para la Gestión de Riesgos Agrarios y Medioambientales
- **IRENA**: Proyecto ECOVALUE "The Economic Value of RES deployment
- **IDAE.** Departamento de Internacional.
  Departamento de Biocarburantes
- **REI:** Real Instituto Elcano
- **IIE :** Instituto de Investigaciones eléctricas de Méjico
- **Univ. Autónoma de Morelos / CIICAp**

More information in our web:

http://rdgroups.ciemat.es/web/ase