

Ciemat



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KOREA EUREKA Day

Meet with **SPAIN**

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CIEMAT



Ministry of Trade,
Industry and Energy



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General description

- The **CIEMAT (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas)** is a public research body assigned to the Ministry of Science and Innovation, focused on energy and environment and the technologies related to them.
- **CIEMAT** has offices in several different regions of Spain (Six Centers), and its activity is structured around projects which form a bridge between R&D&I and social interest goals.
- **CIEMAT** collaborates with other R&D&I institutions, universities and industry in the sector to transfer the knowledge and technology that it has generated, supporting and encouraging innovation and changing the economic model.
- **CIEMAT's mission** is to contribute to sustainable development of the country and to the quality of life of its citizens through the generation and application of scientific and technological knowledge and **CIEMAT's goal** is to maintain its position as a centre of excellence in energy, environment and technology and in basic research.
- **CIEMAT** is operating in several scientific-technical areas under the framework of its R&D&I activities: renewable energies and energy savings, nuclear fission, nuclear fusion, energy valuation, elementary particles and astroparticles, biology and biomedicine, environment, ionizing radiations, scientific instrumentation and medical physics, materials analysis and characterisation, computation and information technology sciences, and energy and environmental system studies.
- **CIEMAT** human resources amounts 1294 employees. (60% researchers, 40% research support, administration and general services).- The average annual budget is 120 M€.
- The main activity is focused on Technological Research and Development, Test and Demonstration and Basic Research.

S/T Areas

Energy

- [Analysis of Sustainable Energy Systems](#)
- [Bioenergy, Bioproducts, and Waste](#)
- [Wind and Photovoltaic Energy and Energy Efficiency](#)
- [Hydrogen Technologies](#)
- [Solar Thermal and Photochemical Technologies](#)
- [Science and Technology for Nuclear Fission](#)
- [Science and Technology for Fusion Energy](#)

Environment

- [Air Quality and Climate Change](#)
- [Applied Environmental Hydrogeosciences](#)
- [Measurement and Evaluation of Ionizing Radiations](#)
- [Soils and Climate Change](#)
- [Social Studies](#)

Technologies

- [Biomedical Innovation](#)
- [Particle Physics and Astrophysics](#)
- [Accelerators, Magnets, and Power Electrical Systems](#)
- [Medical Applications of Ionizing Radiations](#)
- [Scientific Computing](#)
- [Materials and Chemistry for Energy Production](#)



Products, services, technologies.

Product 1

Advanced VREs O&M, new materials and recyclability

Product 2

VREs Systems hybridization and grid Integration

Product 3

Energy Efficiency

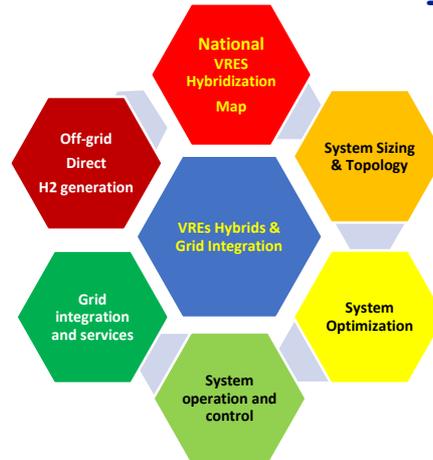
Product 4

Characterization, Modelling & Simulation of systems.

Advanced VREs O&M, new materials and recyclability

- Recyclability of Wind blades and PV modules
- New NDT Field inspection solutions
- Tools for analysis, detection, characterization and classification of defects
- Emerging materials for a Low carbon and S&C environment
- Device integration of Novel materials
- Tandem devices and technology hibridization

VREs Systems hybridization and grid Integreation



Energy Efficiency

Advanced design of cities, building and envelops

Energy integration in cities, building and envelops

Sustainable technology development

Characterization, Modelling & Simulation

Evaluation and development of simulations models and tools

Strategies to increase the reliability models

Characterization of PV and Wind Devices

Evaluation, development and improvement of models for specific systems and complete powerer plants

Main challenges and solutions.

Challenge 1

Sustainability VREs and Operation and Maintenance.

Challenge 2

VREs System integration

Challenge 3

Energy Efficiency

Challenge 4

Characterization, digitalization and modelling

Challenge 1

COST and ENVIRONMENTAL IMPACT REDUCTION

Sustainability VREs and Operation and Maintenance

- ▶ Sustainable materials in design and recyclability by design
- ▶ Solutions for lifetime extension
- ▶ Monitoring technologies
- ▶ Automation for O&M
- ▶ Digital tools for control and monitoring
- ▶ Predicting environmental parameters
- ▶ Digital solutions for smart operations
- ▶ Sensor technologies diagnostic and response

Challenge 2

MANAGEABILITY AND FLEXIBILITY OF THE POWER SYSTEM

VREs System integration

- ▶ Hybrid AC/DC microgrids
- ▶ Diversification of renewable energy generation (Hybrid power plants, P2X, Sector Coupling)
- ▶ New LT Energy Storage Solutions (I-CAES, REDOX)
- ▶ New ST Energy Storage Solutions (Flywheels, Ultracaps)
- ▶ New Hybrid Energy Storage Solutions (ST/MT/LT, Electricity + Heat,..)
- ▶ Integrated control and monitoring systems
- ▶ System simulation,
- ▶ Field testing procedures.

Challenge 3

ZERO EMISSION ENERGY SYSTEM

Energy efficiency

- ▶ Methodologies for optimisation of the energy design of buildings
- ▶ Modular and "plug and play" components for refurbishment.
- ▶ New products and processes for new and existing buildings
- ▶ ICT for “building-to-grid” and “building-to-building” interactions
- ▶ Envelope adaptive to a dynamic environment
- ▶ Integration of renewable energy sources in buildings and cities.
- ▶ Urban availability of renewable energy sources (geothermal, solar and wind).
- ▶ Methodologies and tools for the adaptation to climate change
- ▶ Decision matrices based on the analysis of the energy behaviour of components, buildings and neighbourhoods

Challenge 4

DIGITALIZATION OF ENERGY SYSTEM

Characterization, modelling and simulation

- ▶ Integrated forecasting of power production and demand
- ▶ Digital tools for control and monitoring
- ▶ Integrated verification of models for the balance of plant and turbine and PV array and energy storage
- ▶ Reinforce mesoscale models and wind resource assessment in 'complex terrain'
- ▶ Energy modelling. performance assessment and control.
- ▶ Supercomputing multipurpose environment for simulation of building and cities
- ▶ Development of dynamic models predicting reliable energy fluxes in cities
- ▶ Procedures for experimental energy performance through system identification techniques (D&V).

Ideas for a Korea - Spain collaboration

Idea 1

Electricity and heat microgrid.

Idea 2

Direct H2 generation with wind turbines.

Idea 3

Advanced materials. (PV and Wind)

Meet with SPAIN



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Thank you!



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