



GOBIERNO DE ESPAÑA

MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas



ADVANCED COURSE ON MODELING AND GRID INTEGRATION OF ENERGY STORAGE SYSTEMS

Dates October 19 - 23, 2026

Schedule 9:00 - 17:30

Duration 35 hours

Location **CIEMAT** Av. Complutense 40, 28040 Madrid, Spain
C/ Julián Camarillo 30, 28037 Madrid, Spain



WHAT WILL YOU LEARN IN THIS COURSE?

Format In-person at CIEMAT facilities and laboratories

- Selection and sizing of energy storage solutions for renewable energy applications.
- Use of simulation-based analysis tools and energy storage models, as well as methodologies for parameterization based on commercial and real-world systems.
- Identification of stages and components for grid connection.
- Operation, control, and instrumentation.

TARGET AUDIENCE

Researchers and professionals in the renewable energy sector who have a foundational understanding of energy storage technologies and wish to expand their expertise.

METHODOLOGY

80% of the sessions consist of laboratory and simulation work using real equipment, solving specific case studies analytically or through MATLAB/Simulink modeling.

Registration fee 775€

Limited to 12 participants

Contact:

Coordinator Mirian Bravo Taranilla
Phone +913466295.

Email formacion@ciemat.es
Detailed information [link](#)





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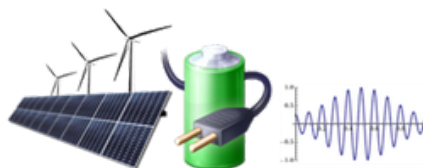
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COURSE PROGRAM

- Energy Storage Requirements
- Overview of Energy Storage Technologies
- Basic Sizing Exercise and Review of Practical Concepts
- Power Electronics: Operation Examples
- Industry Perspective: ENEL – Battery Valuation
- Li-ion Batteries: Dynamic, Thermal, and Aging Modeling (Simulink)
- Supercapacitors: Dynamic and Thermal Modeling (Simulink)
- Flywheels: Modeling (Simulink)
- Li-ion Batteries: Experimental Characterization of Dynamic and Thermal Models and Aging Analysis
- Supercapacitors: Experimental Laboratory Characterization
- Flywheels: Topologies and Manufacturing
- Hybrid Energy Storage: Concept Overview, Exercises, Control Algorithms, and Laboratory Operation Example
- Regulation: Regulatory Frameworks for Energy Storage Integration
- Sizing of Energy Storage Systems: Case Studies
- Pumped-Storage Hydropower: Modeling and Operation Examples

TEACHING STAFF

Marcos Lafoz (CIEMAT)

Jorge Nájera (CIEMAT)

Gustavo Navarro (CIEMAT)

Marcos Blanco (CIEMAT)

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