

Iberian Centre for Research in Energy Storage, CIAE (Cáceres)

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1.1 CIIAE organization and capacities



RESEARCH STRUCTURE



Iberian Center
homologous to INL, Braga (PT)

Electricity Storage

- **Advanced materials** (Metal-Air; Zn-Air) / Li-ion and Na-ion / flow batteries
- **Circular economy** (chemical and physical damage, energy storage recycling process, incorporation of secondary raw materials)
- **Supercapacitors** (micro-SC, hybrids SC, isolation for high V)

Hydrogen and power-to-X

- **LT electrolysis and fuel cells** (AEL, AEM, PEM)
- **HT electrolysis and fuel cells** (SOEC, SOFC, r-SOC, co-SOEC, PCEL, SSAS)
- **Electrochemical CO₂ reduction, photocatalysis**
- **Hydrogen storage and transport** (metal hydrides, adsorbent materials, LOHCs, NH₃, MeOH)
- **CO₂ capture and uses** (DAC), Pre-/Post-/Oxy-combustion, Physisorption, Chemisorption
- **Catalysis for chemicals and synthetic fuels** (direct CO₂ hydrogenation, methanol and NH₃ synthesis)

Thermal storage

- **Sensible heat** (molten salts, nanofluids, HTF)
- **Latent heat** (Phase Change Materials PCMs)
- **Thermochemical heat** (chemical reactions, liquid absorption, solid adsorption)
 - Design and characterization of materials, improvement of thermophysical properties (e.g. heat transfer, encapsulation, stabilization)
 - Integration in buildings and industry

Pilot plants: Flow battery, Hydrogen & Power-to-X, thermal storage, circular economy and microgrid

LCA, circular economy, techno-economic analysis, energy system analysis and regulation

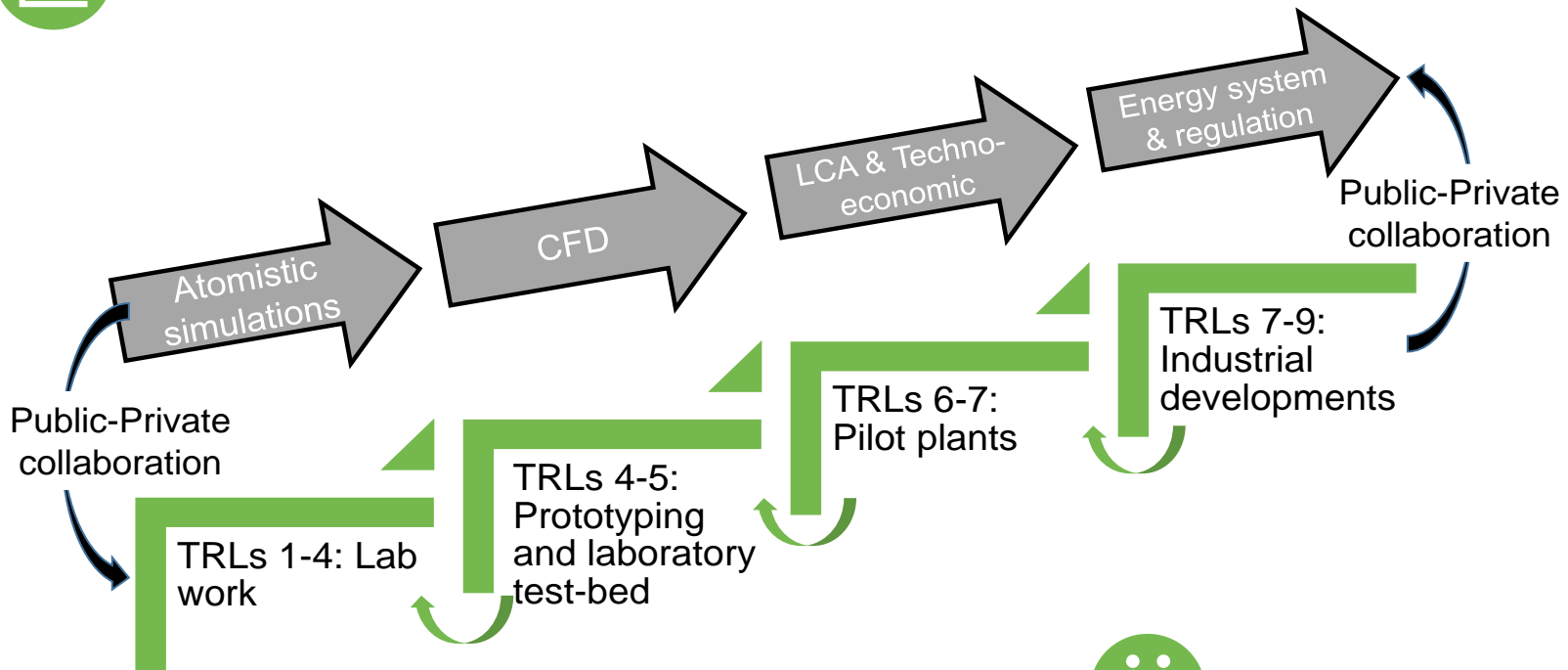
Multi-scale modelling including atomic, materials and CFD

Synthesis and characterization of advanced materials & prototyping

1.2 CIIAE organization and capacities



SCALING STRATEGY



>40 researchers & engineers
(125 by 2025)



MEMBERSHIPS



2.1. Topics of interest in calls 2024

- **Electrical energy storage related topics:** Deadline in 2024

Destination	Topic code	Topic title / Project idea / Partners sought
D2	CL5-2024-D2-02-01	<p>Post-Li-ion technologies and relevant manufacturing techniques for mobility applications (Generation 5) (Batt4EU Partnership)</p> <p><i>Project idea:</i></p> <ul style="list-style-type: none"> - Metal air batteries development - Secondary raw materials applications to energy storage systems - Na-ion battery developments - Redox flow batteries with enhanced capacity
D2	CL5-2024-D2-02-03	<p>Size & weight reduction of cell and packaging of batteries system, integrating lightweight and functional materials, innovative thermal management and safe and sustainable by design approach (Batt4EU Partnership)</p> <p><i>Project idea:</i></p> <ul style="list-style-type: none"> - Lighter Li-ion batteries development
D2	CL5-2024-D2-02-04	<p>Accelerated multi-physical and virtual testing for battery aging, reliability and safety evaluation (Batt4EU Partnership)</p> <p><i>Project idea:</i></p> <ul style="list-style-type: none"> - Microgrid emulator as demo
D2	CL5-2024-D2-01-01	<p>Advanced sustainable and safe pre-processing technologies for End-of-Life (EoL) battery recycling (Batt4EU Partnership)</p> <p><i>Project idea:</i></p> <ul style="list-style-type: none"> - Mechanical wet pre-treatment - Advanced EoL detection - Logistic in-situ decision making
D5	CL5-2024-D5-01-03	<p>Advanced battery system integration for next generation vehicles (2ZERO Partnership)</p>

2.2. Topics of interest in calls 2024

- **Thermal energy storage related topics:** Deadline in 2024

Destination	Topic code	Topic title / Project idea / Partners sought
D3	CL5-2024-D3-01-10	<p style="text-align: center;">Next generation of renewable energy technologies</p> <p><i>Project idea:</i> - Development of double metal oxide nanofluids as heat transfer fluids for advanced renewable energy systems. Synthesis and testing of different perovskite nanoparticles.</p>
D2	CL5-2024-D2-01-04	<p style="text-align: center;">Emerging energy technologies for a climate neutral Europe</p> <p><i>Project idea:</i> - Thermochemical materials for adsorption refrigeration technologies.</p> <p><i>Partners sought:</i> - RTOs, SMEs interested in the development of cooling systems based on solid sorption processes</p>
D3	CL5-2024-D3-01-06	<p style="text-align: center;">Innovative applications/integration of geothermal heating and cooling in industry</p>

2.3. Topics of interest in calls 2024

- **H₂ and Power-to-X related topics:** Deadline in 2024

Destination	Topic code	Topic title / Project idea / Partners sought
		Emerging energy technologies for a climate neutral Europe
D2	CL5-2024-D2-01-04	<u>Project idea:</u> - Solid-state H ₂ storage and long-distance transport by mixing metal-hydrides, complex hydrides and hydrolytic systems. Study of synergistic effects and energy optimisation
		Demonstration of improved intermediate renewable energy carrier technologies for transport fuels
D3	CL5-2024-D3-01-03	<u>Project idea:</u> - Pilot plant to test catalysts for methanol/ammonia synthesis which have been developed in previous project and require performance testing at higher scale, utilising CO ₂ captured in situ and renewable H ₂
D3	CL5-2024-D3-01-06	Innovative applications/integration of geothermal heating and cooling in industry
		Next generation of renewable energy technologies
D3	CL5-2024-D3-01-10	<u>Project idea:</u> - We offer the explicitly required regulatory analysis. Development of new catalytic systems for the synthesis of methanol, ammonia and sustainable aviation fuel
		Energy Management Systems for flexibility services
D3	CL5-2024-D3-01-12	<u>Project idea:</u> - We offer regulatory analysis and technico-economic analysis about flex services + other potential partners incl. a Spanish DSO <u>Partners sought:</u> (nascent) consortium with leader + demo sites outside Iberia
D3	CL5-2024-D3-01-16	Demonstration of innovative pumped storage equipment and tools in combination with innovative storage management Systems
		Low-disruptive renovation processes using integration of prefabricated solutions for energy-efficient buildings
D4	CL5-2024-D4-01-01	<u>Project idea:</u> - We offer regulatory analysis and technico-economic analysis + pilot plant for CO ₂ capture, required for the formulation of carbonates that will be incorporated in the buildings + demo site in Extremadura <u>Partners sought:</u> (nascent) consortium
		Smart grid-ready buildings
D4	CL5-2024-D4-01-02	<u>Project idea:</u> - We offer regulatory analysis + pilot plant + a demo site with social houses <u>Partners sought:</u> (nascent) consortium with leader + demo sites outside Iberia

2.4. Topics of interest in calls 2024

- **H₂ and Power-to-X related topics:** Deadline in 2025

Destination	Topic code	Topic title / Project idea / Partners sought
D3	CL5-2024-D3-02-01	Digital tools for CSP and solar thermal plants
D3	CL5-2024-D3-02-02	Development of next generation synthetic renewable fuel technologies
D3	CL5-2024-D3-02-06	Innovative, Community-Integrated PV systems
D3	CL5-2024-D3-02-10	Market Uptake Measures of renewable energy systems
D3	CL5-2024-D3-02-11	<p style="text-align: center;">CCU for the production of fuels</p> <p><u>Project idea:</u> - Adsorbent materials focused on reducing the need for pre-concentration and/or purification</p> <p><u>Partners sought:</u> - (nascent) consortium</p>
D3	CL5-2024-D3-02-12	<p style="text-align: center;">DACCS and BECCS for CO2 removal/negative emissions</p> <p><u>Project idea:</u> - Increase of lifecycle of adsorbent materials without capacity reduction</p> <p><u>Partners sought:</u> - (nascent) consortium with leader + demo sites outside Iberia</p>
D4	CL5-2024-D4-02-04	<p style="text-align: center;">Design for adaptability, re-use and deconstruction of buildings, in line with the principles of circular economy (Built4People Partnership)</p> <p><u>Project idea:</u> - CO₂ capture, required for the formulation of carbonates that will be incorporated in the buildings</p> <p><u>Partners sought:</u> - (nascent) consortium</p>

We are open to collaborate!

Check our list of preselected Horizon Calls and contact us!

**Thank you for your
attention**