Workshop "Sustainability and circularity strategies of End-of-Life management of energy systems: PV and Wind"

Jointly organized by EERA JP e3s and JP PV

Madrid, 18th November 2026 | Hosted by CIEMAT

Agenda

Background

The rapid deployment of photovoltaic (PV) and wind energy technologies across Europe is creating significant challenges for the sustainable management of End-of-Life (EoL) components and the recovery of valuable materials. Increasing waste volumes and growing demand for critical and strategic raw materials highlight the need for innovative circular economy strategies that improve resource efficiency, reduce environmental impacts, and strengthen European industrial competitiveness. Addressing these challenges requires an integrated approach combining advanced recycling technologies, repair and reuse strategies, material recovery, eco-design, and Life Cycle Sustainability Assessment (LCSA). Jointly organised by EERA JP e3s and JP PV, with the participation of JP Wind, this workshop will bring together researchers and industry representatives to exchange knowledge, share industrial perspectives through two keynote lectures, and identify research and innovation priorities through three thematic sessions and dedicated round-table discussions.

Scopes & Sessions

1. **Industrial challenges and sustainable EoL management.**

This session will address the technological and economic challenges of EoL management in PV and wind energy systems, focusing on innovative recycling processes, AI-assisted technologies, and PV module repair strategies. Attention will be given to material recovery, technical barriers, and the needs of the European recycling sector, highlighting opportunities to improve resource efficiency, extend component lifetimes, and support the industrial implementation of circular solutions.

2. **Critical and strategical raw materials: Recovery and circularity**

This session will explore strategies to improve resource efficiency and reduce dependence on primary raw materials through recovery, substitution, and valorisation. Topics will include circular-by-design perovskites, recycled silicon, raw material criticality, and waste-derived graphene-based materials for renewable energy applications.

3. **Eco-design and LCSA for circular strategies.**

This session will focus on integrating circularity and sustainability into the design of energy technologies, including recyclable materials, reuse and recycling strategies, and innovative solutions for PV and wind systems. Environmental and economic Life Cycle Assessment (LCA) approaches, including dynamic and prospective LCA, will be discussed as decision-support tools for improving durability, resource efficiency, and overall sustainability.

WEDNESDAY, 18 NOVEMBER 2026 (CIEMAT, Salón de actos Margarita Salas)		
9.00 – 9.15	Welcome from Director of Energy Department (CIEMAT)	Emilio Gómez-Lázaro
9.15 – 9.30	Introduction from EERA JP e3s, PV and Wind	Alessandro Sciullo *JP e3s Coordinator, UNITO* Ines Lujan

		JP PV Manager, EERA ***Julien Balsen*** *JP Wind Manager, EERA*
9.30 – 9:55	**Plenary lecture - Somewhere Down the Line is Now: Why End-of-Life is the next big test for Europe's solar and storage industry, and how to turn compliance into a competitive advantage?**	**Jan Clyncke** *PV Cycle*
9.55 – 10.20	**Plenary lecture - Wind Farm Revamping: A Sustainable Alternative**	**Miguel Hoyos** *Norvento*
10.20 –10.45	***Coffee break***	
10.45 – 12.30	**Scope 1 – Industrial challenges and sustainable EoL management**	Moderated by **Ezilda Costanzo** *ENEA*
10.45 – 11.45	• AI-Guided Metagenomic Mining of Oxidative Enzymes for Chemo-Enzymatic Recycling of Epoxy Wind Turbine Blades *(Ana Ramírez, HI Iberia).* • A Unified Dataset and Machine Learning Pipeline for Predicting Catalytic Pyrolysis of Wind Blade Composites *(Ana Ramírez, HI Iberia).* • Manufacturing Recyclable Wind Turbine Blades Using Thermoplastic Resin *(Rafael Carnicero, CIEMAT).* • Repairing photovoltaic modules ribbon interruptions: A step before recycling *(Félix García-Rosillo, CIEMAT).*	
11.45 – 12.30	Round table: Can Europe build a competitive renewable energy recycling industry?	
12.30 – 13.30	***Lunch break***	
13.30 – 15.15	**Scope 2 - Critical and Strategic Raw Materials: Recovery and circularity**	Moderated by **Carlos del Cañizo** *Universidad Politécnica de Madrid*
13.30 – 14.30	• AI-Guided Generative Discovery of Stable, Circular-by-Design Metal Halide Perovskites for Next-Generation Photovoltaics *(David García, HI Iberia).* • From PV Waste to Solar-Grade Feedstock: Preliminary Characterization of Upcycled Silicon Powder for Crystalline Cell Recrystallization *(Eduardo Díez, UCM).* • Evaluating Raw Material Criticality of Indoor Photovoltaics Versus Non-Rechargeable Batteries for IoT Applications *(Isabella Bulfaro, IREC).* • Waste-derived graphene-based materials integrated into renewable energy technologies *(Isabel Rucandio, CIEMAT).* • Circular economy applied to photovoltaic cell counter-electrodes through the use of recycled graphene oxide *(Sergio Ruiz-Macías, CIEMAT).*	
14.30 – 15.15	Round table: How can Europe secure critical and strategical materials through circularity?	
15.15 – 15.45	***Coffee break***	
15.45 – 17.30	**Scope 3 - Eco-design and LCSA for circular strategies**	Moderated by **Daniel Garraín** *CIEMAT*
15.45 – 16.45	• Validated Molecular Dynamics and Machine Learning for Designing Recyclable Epoxy Resins for Wind Turbine Blades *(David García, HI Iberia).*	

	• Advancing wind energy circularity through recycling, reuse and novel material. Project R3POWER *(Pablo Atance, CIEMAT).* • Dynamic and prospective Life Cycle Assessment of photovoltaic systems: integrating lifetime and circularity *(Federico Rossi, SSSA).* • Integrated Environmental and Economic Life Cycle Indicators for Eco-Design of Photoelectrolysis Cells *(Sonia Sofi, CNR-ITAE).* • LCA of Solar-Assisted Hydrothermal Liquefaction Configurations: Sustainability Indicators for Eco-Design of Solar Thermal Systems *(Karakuş Ece, METU).*	
16.45 – 17.30	Round table: What should the next generation of PV and wind technologies look like?	
17.30 – 17.40	**Conclusions and next steps**	Daniel Garraín *CIEMAT*

Scientific and organizing committee:

- Daniel Garraín Cordero (CIEMAT)
- Alessandro Sciullo (UNITO)
- Araceli Rodríguez (Universidad Complutense de Madrid)
- Carlos del Cañizo Nadal (Universidad Politécnica de Madrid)
- Margherita Menon (EERA)
- Ines Lujan (EERA)