NET-Fuels Symposium

Ravenna, 25 June 2026

Call for Extended Abstracts

Biomass-Based Carbon Removal: Pathways to Gigaton-Scale Industrial Transition

Climate impacts are projected to become increasingly nonlinear and globally disruptive, while even very ambitious mitigation efforts based on efficiency, electrification, and renewables cannot remove accumulated atmospheric CO_2 nor fully eliminate hard-to-abate residual emissions in sectors such as industry, transport, and agriculture. At the same time, the pace of transition remains too slow relative to the shrinking carbon budget and accelerating biophysical risks. Against this backdrop, **industrial-scale carbon dioxide removal (CDR) must be understood as a necessary complement to deep emissions reductions**. The transition from fossil-based to biomass-based industrial processes offers the dual advantage of phasing out fossil inputs while, in certain configurations, also enabling the removal of atmospheric carbon. Beyond the carbon capture and storage of biogenic carbon (Bio-CCS), such as through bioenergy with CCS (BECCS), its utilization in Bio-CCU pathways further allows a shift from **carbon-as-a-problem** to **carbon-as-a-resource**, substituting fossil carbon in fuels, chemicals, plastics, and building materials.

From a strategic, geopolitical, and science-diplomacy perspective, the bioeconomy transition can strengthen Europe's competitiveness and global positioning in climate and energy governance against increasingly adverse political and macroeconomic conditions. Early and credible investment in bio-based CDR systems enables **first movers** to shape standards for measurement, reporting, and verification (MRV), develop specialized industrial and technological capabilities, and create new value chains around biomass and carbon removal pathways. For regional and local policymakers, as well as for industrial actors, this opens a concrete opportunity: to evolve from conventional fossil and biomass utilization towards **bio-based carbon removal hubs** (e.g., BECCS, biochar, hybrid configurations) and **regional clusters**. At the same time, scaling these systems from today's modest levels to multi-gigaton capacities raises major challenges, including viable financial models, public acceptance and just-transition concerns, technological and MRV risks, long-term carbon storage liability, and the transformation of industrial and agri-food value chains, from feedstock markets and logistics to energy systems and complementary technologies.

Contributions should address these topics from one of the five complementary themes outlined below, with the aim of addressing the **key question** associated with the selected theme. Particular attention will be given to approaches that move beyond incremental impact reduction and engage with **industrial symbiosis and systemic remediation**.

Theme 1 - Technological pathways and value chain integration

Towards multi-gigaton CDR capacities: which transformations are required in the industrial and agri-food value chains?

Development, performance, scalability, and constraints of bio-based and thermochemical conversion technologies must be examined in relation to the concrete challenge of evolving from today's modest deployment levels to **industrial-scale carbon removal hubs** (e.g., BECCS, biochar, hybrid configurations) and **regional clusters**. How can bio-based processes be integrated into existing industrial value chains through **retrofitting strategies**, **industrial symbiosis**, and **hybrid fossil-bio configurations**? What are the implications for biomass availability, logistics, cascading use, land-use trade-offs, and sustainability across regional and global scales? How do Bio-CCS and Bio-CCU pathways interact with other CDR options within portfolios of climate mitigation and adaptation strategies, and what **systemic constraints** emerge when scaling these systems?

Theme 2 – Environmental assessment frameworks

Beyond impact reduction: how do we assess systemic remediation and long-term carbon management liabilities?

Environmental assessment of bio-based industrial transitions requires frameworks that move **beyond incremental impact reduction** and engage with the complexity of **systemic remediation**. How should life-cycle assessment (LCA) and carbon accounting methodologies evolve to capture the dual role of biomass-based processes as both fossil phase-out mechanisms and atmospheric carbon removal pathways? What are the **trade-offs** between biogenic carbon **storage durability**, **land-use changes**, and **co-benefits** such as soil health, water quality, and biodiversity? How can measurement, reporting, and verification (MRV) standards be designed to address long-term storage liability, leakage risks, and the integration of Bio-CCU outputs (fuels, chemicals, materials) into existing product life cycles? What conceptual and methodological gaps remain in assessing the net climate benefit and environmental co-impacts of regional **bio-based carbon removal hubs**?

Theme 3 - Business models and market mechanisms

From carbon-as-a-problem to carbon-as-a-resource: what viable financial models can support the transition to multi-gigaton CDR economies?

Scaling bio-based carbon removal from demonstration projects to **industrial clusters** requires business models that align **carbon removal incentives** with **value creation** across industrial and agri-food sectors. How can carbon pricing, carbon removal certificates, and emerging compliance

and voluntary markets be structured to support long-term investment in Bio-CCS and Bio-CCU infrastructure? What role can **industrial symbiosis** play in creating new revenue streams from biogenic carbon (biochar, synthetic fuels, bio-based chemicals and materials)? How do feedstock markets, logistics networks, and energy system integration shape the economic viability of regional hubs? What are the risks and opportunities for **first movers** in shaping standards, capturing value, and establishing competitive advantages in the emerging **carbon management economy**? How can financial models address public acceptance, just-transition concerns, and the distribution of costs and benefits across regions and sectors?

Theme 4 - Policy, regulatory, and normative frameworks

Governing carbon removal: how can policy and governance enable responsible deployment of gigaton-scale CDR in real regional and industrial contexts?

The transition to bio-based industrial systems raises fundamental questions about the **design**, **implementation**, and **governance** of carbon removal at scale. How should regulatory frameworks evolve to support the integration of Bio-CCS and Bio-CCU into climate policy, industrial policy, and circular economy strategies? What policy instruments (e.g., mandates, subsidies, public procurement, carbon contracts for difference) are most effective in **de-risking investment** and **accelerating deployment** while ensuring environmental integrity and social equity? How can Europe leverage early investment in bio-based carbon removal to shape international MRV standards, strengthen its **geopolitical positioning** in climate and energy governance, and build competitive advantage in an increasingly adverse political and macroeconomic context? What normative frameworks are needed to navigate trade-offs between climate urgency, land-use pressures, food security, and biodiversity protection? How can regional and local policymakers, together with industrial actors, design governance structures that enable industrial symbiosis, systemic remediation, and just transition in the shift from fossil-based to biomass-based value chains?

Theme 5 - Socio-cultural dimensions and conditions for adoption

From technology to practice: what socio-cultural conditions enable bio-based industrial and CDR systems and how do these, in turn, reshape society?

The transition towards bio-based industrial processes and carbon-negative ecologies raises fundamental questions about how **actors perceive**, **interpret**, **negotiate**, and **enact new roles for biomass**, **land**, and **carbon** within existing value chains, markets, and governance arrangements. Does technological innovation alone generate the behavioural, organisational, and institutional shifts required for adoption, or are complementary processes of learning, participation, and **cultural change** needed to promote stakeholder engagement with bio-based

transitions? What can be learned from both successful and failed attempts at these transitions? How are heterogeneous and sometimes **competing values** measured, evaluated, and commensurated? What role do power, participation, and justice play in shaping the emerging carbon management economy, including for **public acceptance**, **distributional effects**, and the **co-production** of science, technology, and society?

Submission Guidelines

Submissions should be sent to **net-fuels2026@unibo.it** by ~~31 March 2026~~ **8 April 2026**, using the provided template, with the subject line: *"NET-Fuels 2026 – Call for Abstracts."*

Extended abstracts may be submitted for consideration as **oral presentations** or as **posters** to be exhibited during the symposium.

All accepted extended abstracts will be published open access in the **conference proceedings**, with a DOI assigned. In addition, the Organising Team is exploring the possibility of publishing selected contributions as full-length articles in a **Special Issue** or **themed collection** in peer-reviewed journals (to be confirmed). Further details will be communicated to selected authors in due course.

Important Dates

- Submission deadline: ~~31 March 2026~~ **8 April 2026**
- Notification of acceptance: ~~15 April 2026~~ **22 April 2026**
- Symposium: 25 June 2026

For further information, please contact us at **net-fuels2026@unibo.it**.