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Newsletters

Flexible chemical looping combustion for combined heat and power production from biogenic residues with negative emission

Project number: 101147904
Project Coordinator: RISE
Project Manager: Amir Soleimani Salim
Duration: 2024 - 2028
EU funding: €3,948,500.00
Topic: HORIZON-CL5-2023-D3-02-01

Ed. 3 - July 2026



www.bioflexclcproject.eu/



WELCOME TO THE THIRD Bio-FlexCLC NEWSLETTER

Welcome!

This edition features the introduction of our coordinator and RISE. Bio-FlexCLC has made significant progression in the past 2 years and we have included a brief update on the project in this edition.

On our website www.bioflexclcproject.eu you will find more info on our project, public deliverables, videos and latest updates. Please follow us!

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Meet our coordinator



I hold a Ph.D. in Chemical Engineering and a Diploma in Engineering Management and have conducted research across several leading universities and research institutes in Europe and North America in the field of bioenergy and industrial decarbonization, with a particular focus on BECCUS (Bioenergy with Carbon Capture and Utilization/Storage) and broader carbon dioxide removal pathways. My work has centred on developing and assessing scalable solutions that integrate biomass conversion, carbon management, and circular economy principles, ensuring both technical feasibility and alignment with long-term climate goals. Within the BioFlex-CLC project, I act as coordinator, responsible for steering the overall technical and strategic implementation, aligning activities across work packages, and facilitating collaboration between research and industry partners. I also focus on ensuring that project developments are coherently translated into practical, scalable circular solutions that can be integrated into existing industrial value chains.



Research Institutes of Sweden (RISE) is Swedish national research institute and innovation partner, and one of Europe's largest applied research organisations. As a state-owned and independent institute, RISE works across industry, academia and the public sector to accelerate innovation and support the development of technologies, products and services that contribute to a sustainable and competitive society. With more than 3,000 experts and over 130 testbeds and demonstration environments, RISE bridges the gap between research and real-world application in helping ideas move from early concept to scalable solutions. Its work spans areas such as life science, digital systems, materials, bioeconomy and built environment, always with a strong focus on sustainability, industrial renewal and societal impact.





Meet the team



Daniel Tamm
Research and Development Engineer



Emil Hed
Research and
Development Engineer



Olivia Cintas Sanchez
Researcher



Diego Peñaloza
Researcher

**RI
SE**



Clara Wickman
Analyst



Sennai Mesfun
Researcher



Panagiotis Evangelopoulos
Researcher



Erik Fischer
Researcher



Project progress

The Bio-FlexCLC project has successfully completed its first 18 months of implementation, making strong progress toward its objective of developing and demonstrating a an efficient, and scalable CLC-CFB process to convert low-value biogenic residues and organic waste to heat and power with an integrated CO₂ capture.

1

Project management and scientific coordination (WP1) are fully established, with effective governance structures, risk monitoring procedures, data management practices, and reporting frameworks in place. Collaboration among partners is supported through structured communication channels and regularly updated project management and data management plans.

2

Significant technical progress has been achieved in process performance evaluation (WP2), including the successful selection of representative biomass feedstocks and the completion of advanced CFD modeling for fuel reactors and post-oxidation chambers. Designs for retrofitting 10 kW and 20 kW pilot plants have been finalized, and early experimental campaigns have already generated initial emissions and fuel conversion datasets. Investigations into NO_x, SO_x, ash behavior, and bed material interactions have begun and will expand in the next reporting period.

3

In downstream gas treatment and CO₂ liquefaction (WP3), requirements for flue gas cleaning have been defined and pilot-scale gas treatment and CO₂ liquefaction concepts for both CLC and CFB modes of operations are developed.. Engineering and procurement of additional gas cleaning components are underway to enable high-purity CO₂ conditioning and emissions control. Work remains aligned with the project schedule.

4

Progress toward large-scale demonstration (WP4) includes the continued design, upgrade, and preparation of the 1 MW pilot plant, incorporating a post-oxidation chamber, fuel flexibility improvements, enhanced gas measurement systems, and corrosion monitoring instrumentation. Planned campaigns will validate fuel flexibility, conversion efficiency, emissions performance, and reactor stability, while generating experimental datasets to support CFD model validation.

Project progress

5

In process evaluation and optimization (WP5), scalable Bio-FlexCLC plant layouts have been developed, and early integration concepts for CHP applications using biogenic residues and waste fuels are in place. Upcoming work will focus on dynamic operation modeling, heat-to-power flexibility, and techno-economic benchmarking against state-of-the-art CHP systems with post-combustion capture.

6

Sustainability and social life cycle assessment (WP6) is scheduled to commence at Month 25; preparatory coordination and conceptual alignment activities have already been initiated.

7

Exploitation, dissemination, and communication activities (WP7) have progressed steadily, including delivery of dissemination plans, communication tools, workshops, and engagement with industry stakeholders. Early exploitation roadmap development and outreach to utilities, waste-to-energy operators, and end users are underway, strengthening pathways toward future commercialization.

Overall, the project has met or exceeded early technical milestones, reduced key uncertainties related to biomass fuel behavior, reactor performance and flue gas cleaning, and established a strong foundation for the upcoming demonstration, techno-economic, and sustainability assessment phases. The next project period will focus on extended pilot operation, full process chain validation, CO₂ liquefaction demonstration, and integrated performance and impact assessment, accelerating Bio-FlexCLC toward TRL5+ readiness and commercial relevance.

Highlights & Updates



16 Oct 2025
4th GA meeting at CSIC, Zaragoza, Spain



21 - 23 Oct 2025
Project coordinator, Amir
Soleimani Salim, presented at
SepTech conference, Eindhoven



4 - 7 Nov 2025
Feedstocks samples displayed
in ECOMONDO showcase in
Rimini, Italy



Highlights & Updates



26 - 27 Nov 2025

International workshop on Sustainable & Circular Technologies, Eindhoven

This workshop is co-hosted by Bio-FlexCLC and other 12 EU projects, receiving 125 participants on-site and online.

Project coordinator joined the panel discussion; CSIC and TUDA did oral presentations.



INTERNATIONAL WORKSHOP Sustainable & Circular Technologies

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Panel discussion I: Advanced biofuels and biomass conversion



Chair - Dr. Yury Kolenko
International Berlin Nanotechnology
Laboratory



Prof. Angela Diberedetto
University of Bari Aldo Moro



Dr. Amir Soleimani Salim
Research Institutes of Sweden



Ali Hedayati
IVL, Sweden

DESIRED



Bio-Flex
CLC

CSIC TUDA

CARBIOW



Highlights & Updates



26–27 November 2025
George Kanellis from CERTH
presented at Nordic Flame Days
2025 in Copenhagen



26 Jan 2026
Bio-FlexCLC, together with Bio-MeGaFuel and COUPLED, organized a webinar
“Chemical Looping Processes”. Dr Jochen Ströhle & Prof. Tobias Mattisson did
presentations. At peak, there were 69 participants online.



WEBINAR
Chemical Looping
Processes

26 Jan 2026 10 AM 12 NN Teams Link

Prof. Fausto Gallucci
Basilisk University of Technology / ICUBE

Dr. Amir Soleimani Salim
Research Institutes of Sweden

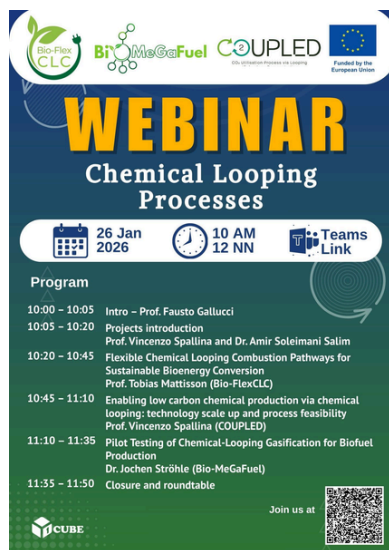
Prof. Vincenzo Spallina
University of Manchester

Prof. Tobias Mattisson
Chalmers University of Technology

Dr. Jochen Ströhle
Darmstadt University of Technology

Join us at

ICUBE



WEBINAR
Chemical Looping
Processes

26 Jan 2026 10 AM 12 NN Teams Link

Program

10:00 – 10:05 Intro – Prof. Fausto Gallucci

10:05 – 10:20 Projects introduction
Prof. Vincenzo Spallina and Dr. Amir Soleimani Salim

10:20 – 10:45 Flexible Chemical Looping Combustion Pathways for Sustainable Bioenergy Conversion
Prof. Tobias Mattisson (Bio-FlexCLC)

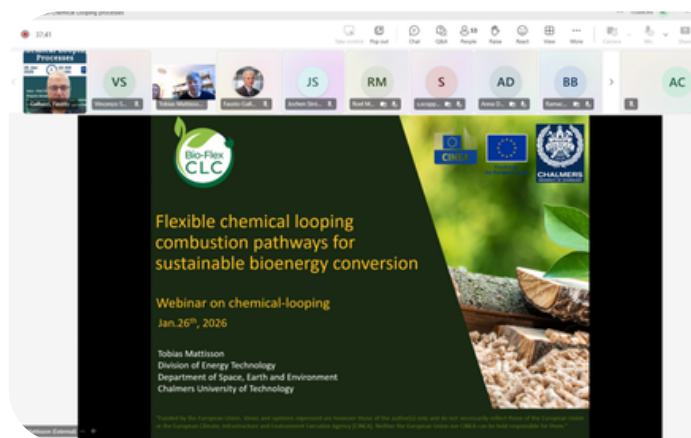
10:45 – 11:10 Enabling low carbon chemical production via chemical looping: technology scale up and process feasibility
Prof. Vincenzo Spallina (COUPLED)

11:10 – 11:35 Pilot Testing of Chemical-Looping Gasification for Biofuel Production
Dr. Jochen Ströhle (Bio-MeGaFuel)

11:35 – 11:50 Closure and roundtable

Join us at

ICUBE



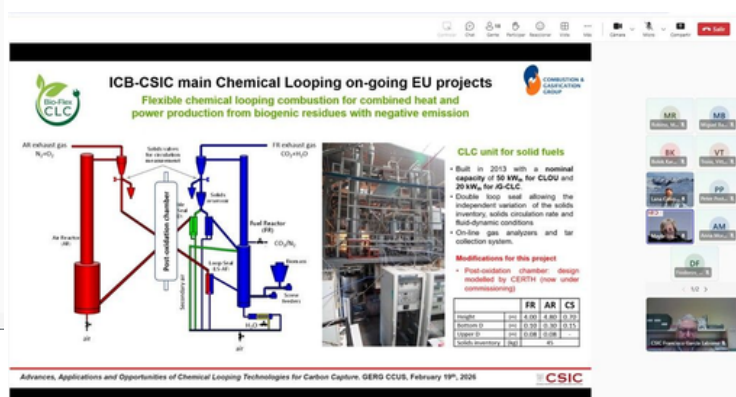
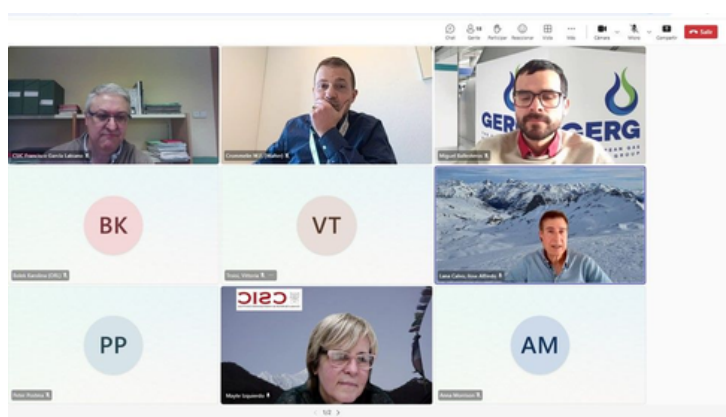
Flexible chemical looping
combustion pathways for
sustainable bioenergy conversion

Webinar on chemical-looping
Jan. 26th, 2026

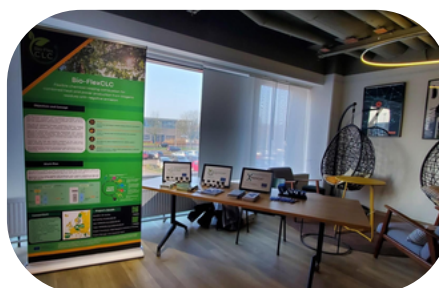
Tobias Mattisson
Division of Energy Technology
Department of Space, Earth and Environment
Chalmers University of Technology

Highlights & Updates

- » 19 Feb 2026, María Teresa Izquierdo from CSIC presented in a webinar organized by GERG (European Gas Research Group)



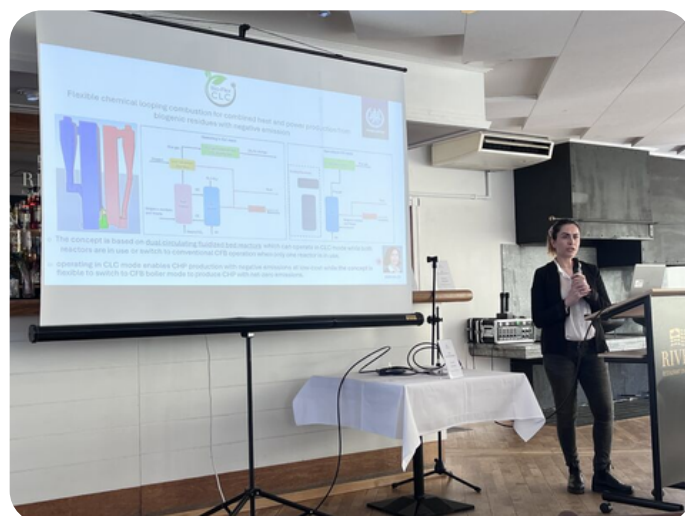
- » 25 - 26 Feb 2026, during the 3 Winter School in Eindhoven, Francisco Garcia Labiano introduced the Bio-FlexCLC project. The project was also showcased with roll-up, brochures and feedstock samples.



Highlights & Updates



23 Apr 2026, Nasrin Nemati from Chalmers University of Technology presented the Bio-FlexCLC project in the seminar day held by Energy Technology division.



12–13 May 2026
Francisco García Labiano from CSIC introduced the Bio-FlexCLC project to the CORAL consortium at ICB-CSIC facilities.





Highlights & Updates



Bio-FlexCLC was proud to form a project cluster “Chemical Looping and gasification” with other 5 EU projects, including Bio-MeGaFuel, BioNETzero, COUPLED, HYIELD and PYRAH2.

The press release was launched in April and the official kick-off meeting was on 4th May 2026. The cluster will create a shared platform for workshops, events, and joint outreach to increase the visibility of results and encourage uptake by policymakers, industry, and research communities.

Press Release

New EU research cluster targets green hydrogen and renewable fuels from biomass and waste

13 April 2026

Six EU-funded projects are combining expertise in chemical looping and gasification to accelerate the production of green hydrogen and renewable fuels from biomass and waste. The technology they are developing will also enable efficient CO₂ capture.

The projects are forming a collaborative cluster, set to launch formally in May 2026, to connect their complementary approaches and strengthen cooperation. Other EU-funded projects and initiatives working in related fields are welcome to join. Those interested are encouraged to contact the organising team.

While each project addresses a specific technological pathway, they share a common focus: converting biomass and waste-derived feedstocks into valuable products such as hydrogen, syngas, and renewable fuels. The cluster will create a shared platform for workshops, events, and joint outreach to increase the visibility of results and encourage uptake by policymakers, industry, and research communities.

Further details on the cluster's activities will be announced following its official launch.

Participating projects:

[Bio-FlexCLC](#) · [Bio-MeGaFuel](#) · [BioNETzero](#) · [COUPLED](#) · [HYIELD](#) · [PYRAH2](#)

Acknowledgements



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Upcoming events of Bio-FlexCLC and partner projects



31 Aug - 4 Sep 2026
International Conference on
Chemical Looping ICCL 2026,
Manchester, United Kingdom



During this conference, Bio-FlexCLC will have one poster and one oral presentations about the project. Some of our partners, including RISE, CSIC and Chalmers will also do oral presentations. Apart from this, Bio-FlexCLC will also take part in a joint workshop with the project cluster.



25 -29 Oct 2026
Our partners from CSIC will participate in
the 18th Greenhouse Gas Control
Technologies Conference (GHGT 18)
Perth, Australia





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