July 2025

3rd NEWSLETTER

SUSTEPS : SUSTAINABLE, SECURE, AND COMPETITIVE ENERGY THROUGH SCALING UP ADVANCED BIOFUEL GENERATION

48 Months

10 Countries

8 Work Packages

11 Partners

Estimated Project Cost
€ 3,000,000

COORDINATOR

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Funded by the European Union

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Discussing SUSTEPS progress with the Project Officer

The consortium recently held an online review meeting with the Project Officer (PO), during which the progress of SUSTEPS was presented and received constructive and encouraging feedback. The discussion affirmed the current direction and motivates the team to continue working toward the milestones set out in the grant agreement.

The consortium maintained strategic alignment and firmly established the groundwork for the next phase.

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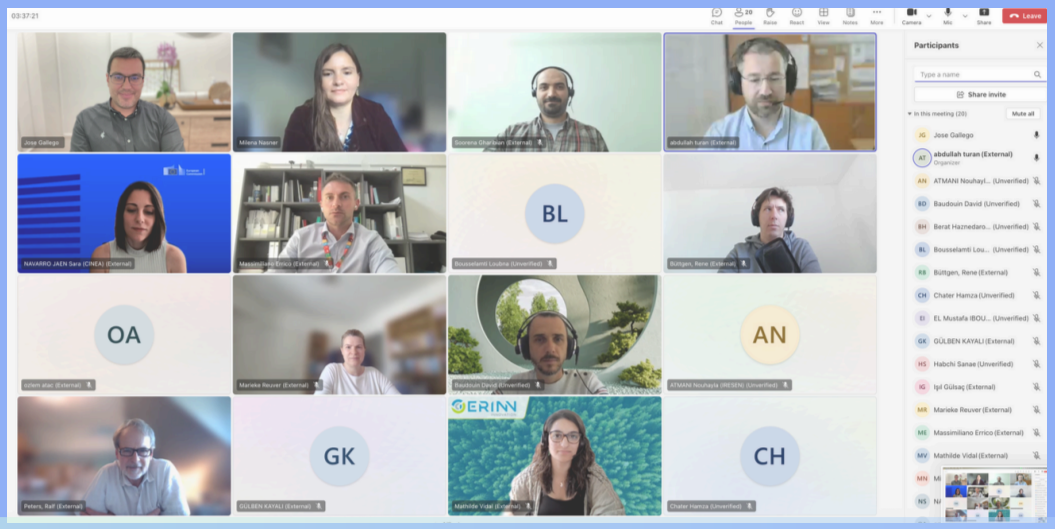


During the first 18 months of the SUSTEPS project (M1–M18), progress has been achieved across all specific objectives and work packages setting a strong foundation for the integrated development of an algae-based biofuel value chain. Key advancements were realized in fostering international collaboration, performing an integrated process design, preliminary experimental trials, and sustainability assessments. In addition, the communication and dissemination (C&D) strategy was delivered and its implementation initiated, with activities already supporting project visibility and stakeholder engagement, including coordination with sister projects to enhance knowledge exchange and synergies.

Advancing on Hydrothermal Liquefaction experiments

Over the recent period, significant progress has been made in optimizing hydrothermal liquefaction (HTL) experiments by our partners at PSI, aimed at improving data quality and reliability. Key achievements include enhanced sample preparation and more consistent reaction conditions.

Refined feedstock preparation

A new method for preparing dried algae feed ensures a homogeneous slurry, improving reproducibility and preventing coke formation.

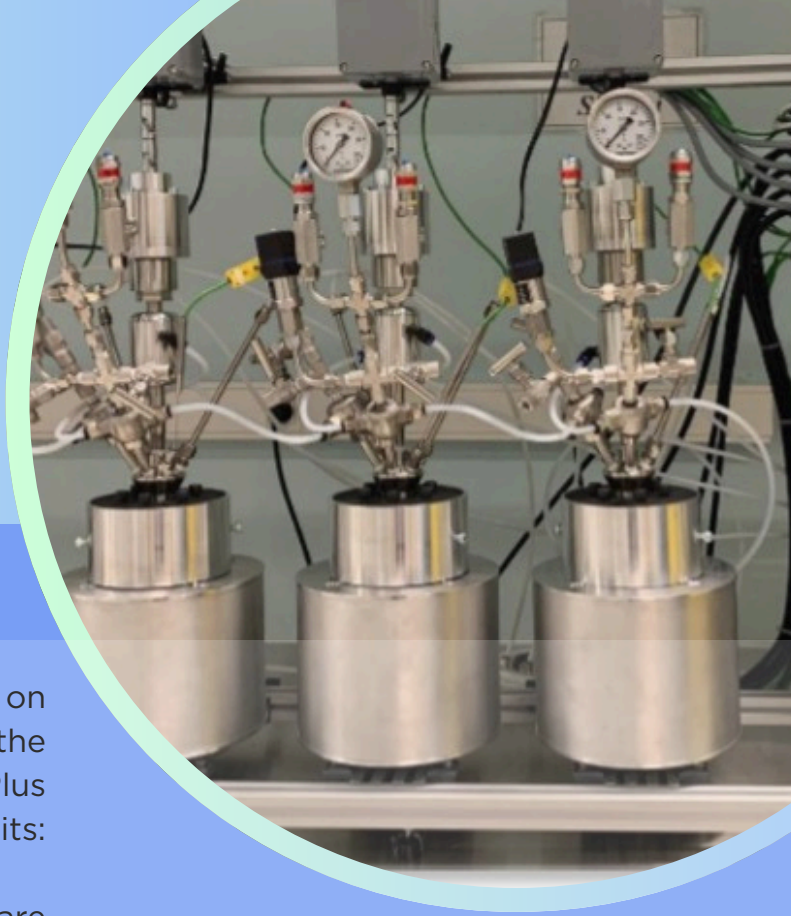
Consistent reaction conditions

The use of a lifting table has standardized batch reactor immersion in the sand bath. This helps maintain stable and consistent temperatures, improving the reliability of test results.
Ongoing tests at varying temperatures and retention times aim to further clarify their effect on yield and product quality.

Cleaner post-reaction work-up

Improvements in the post-reaction work-up process now prevent contamination of the aqueous phase with CH_2Cl_2, crucial for downstream membrane tests. A method to measure residual CH_2Cl_2 in the biocrude has also been developed and will be the basis of a future publication within SUSTEPS Project.

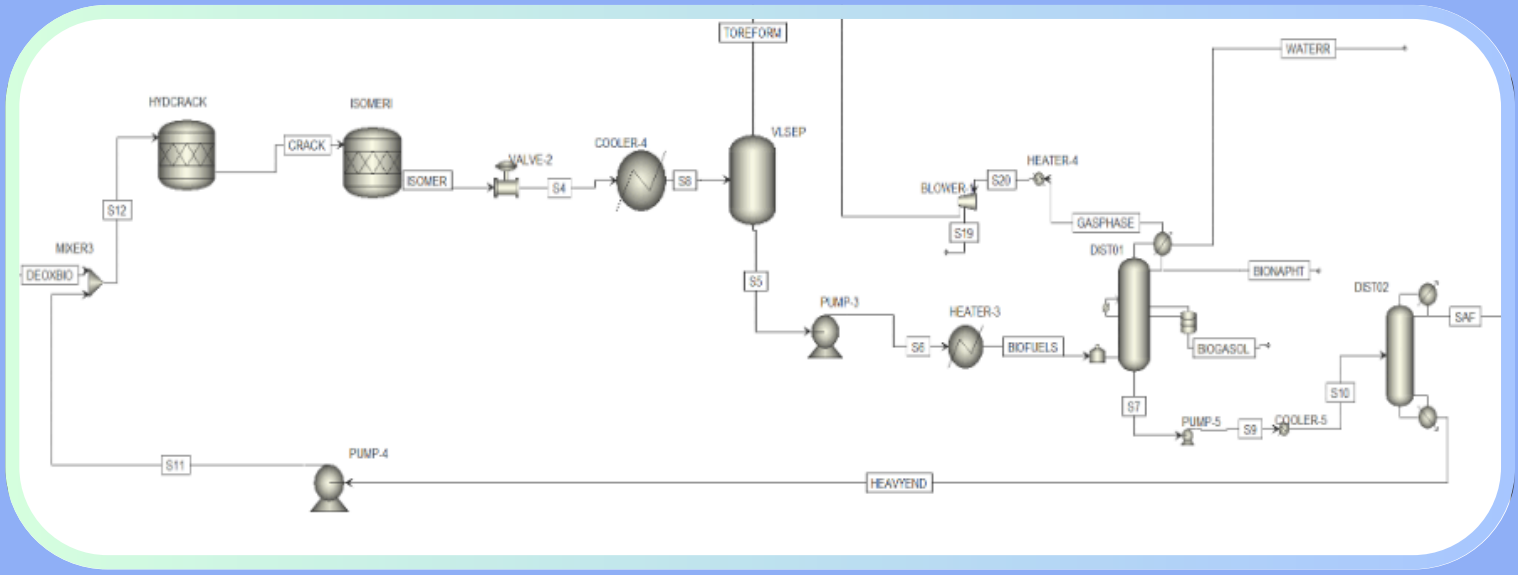
Photo of the HydroBatch setup provided by PSI which is used to conduct the HTL of algae to biocrude. The reactor is immersed in the sand bath.



Progressing on biofuel upgrading system

TUBITAK and FZJ are currently progressing on the work on the experimental tests for the upgrading system with a detailed Aspen Plus study, focusing on three critical units: hydrocracking, isomerization, and distillation.
Following conversion, individual fuel fractions are separated through a distillation process, with a focus on optimizing the cracking and separation stages to ensure maximum recovery and quality of the desired fuel components.

The process is specifically designed to maximize the yield of bio-jet fuel, bio-gasoline, and bio-diesel within the final product distribution.



A series of alumina-supported catalysts were synthesized by impregnation methods. Employing a co-impregnation technique TUBITAK explored the structural and performance effects of $CoMo/Al_2O_3$ and $NiMo/Al_2O_3$, provided by KETJEN, obtaining better quality of the upgraded bio-oil.

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Strengthening global collaboration through International Working Groups

SUSTEPS continues to strengthen global collaboration through its five International Working Groups (IWGs).

Overseen by our partner ERINN and chaired by project partners TUBITAK, BOUN, PSI, FZJ, and SDU, these IWGs bring together experts across the entire value chain. This collective effort is driving forward actionable solutions and long-term impact.

- Socio-economic and environmental considerations
- Microalgae cultivation
- Microalgae conversion to crude bio-fuel
- Biocrude upgrading & green hydroge production
- Aqueous phase recycling and valorization

Creating new connections

During the second year, SUSTEPS has held two successful rounds of IWG meetings, engaging over 20 international experts from 12 countries and four continents, representing academia, industry, and NGOs. These discussions have generated useful feedback to keep SUSTEPS' research aligned with international best practices. Experts, during the latest meetings, highlighted relevant conferences and related projects, helping to expand SUSTEPS' network and create new connections across initiatives.

Enhancing scalability and sustainability through expert insights

The IWGs remain central to SUSTEPS' international collaboration, offering expert perspectives to improve the scalability and sustainability of algae-based biofuel value chains. By connecting global knowledge and building synergies with related initiatives, these working groups are strengthening vital networks that will shape the future of the sector. The next IWG meetings are set for summer 2025, and the SUSTEPS team looks forward to further productive exchanges.

Showcasing SUSTEPS at EUBCE, Valencia 2025

Our partners from UNIFEI participated in the European Biomass Conference EUBCE 2025 in Valencia last month on June 12th. Representing the consortium, Prof. Electo Silva took part in the parallel event titled: Advancing International Collaboration: Integrated Biorefineries Mission & EU-Funded Research Projects.

SUSTEPS project played a key role at EUBCE 2025 in Valencia, actively contributing to both the workshop and the panel discussion organized by BioTheRoS and ICARUS – International Cooperation for Sustainable Aviation Biofuels. This event explored ways to strengthen international research and innovation (R&I) cooperation in sustainable aviation and maritime fuels. Contributions from SUSTEPS and its sister projects showcased the importance of coordinated efforts across EU-funded initiatives. The session concluded with a dynamic panel on global collaboration and sustainability in the development of advanced fuels.

Showcasing SUSTEPS at CILCA, Mexico City 2025

ARDITEC presented the latest Life Cycle Assessment (LCA) results from the SUSTEPS project at the XI CILCA International Conference, Latin America's leading event on life cycle thinking, held in Mexico from April 7–13, 2025. The conference brought together experts and stakeholders from across the region.

The LCA presentation highlighted:

- Environmental performance of algae-derived biofuels vs. fossil and other bio-based alternatives,
- The role of co-products in improving system sustainability,
- Integration of LCA into process optimization and policy scenarios.

The session opened dialogue on the future of advanced biofuels, and how tools like LCA can guide sustainable bioeconomy development across continents.

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Showcasing SUSTEPS at Alga Europe Conference, Athens 2024

BOUN University participated in AlgaEurope 2024 in Athens, alongside 400 delegates from 43 countries and 256 attending companies. Highlighting the innovation of SUSTEPS which is processing microalgae into biocrude, upgrading biocrude, producing green hydrogen, using CO_2 from industry flue gas and valorizing aqueous streams.

Professor Berat Haznedaroglu from BOUN successfully had in-person meetings with international experts on the Algae Growth and Cultivation advanced field, a significant step forward for the collaboration and knowledge exchange needed to drive further innovation in SUSTEPS Project.

For years AlgaEurope has been one of the most global comprehensive conferences about science, technology and business in the Algae Biomass sector organized by industry professionals.

The main target of the European Algae Biomass Association EABA (AlgaEurope organizer) is to act as a catalyst for fostering synergies among scientists, industrialists, and decision-makers in order to promote the development of research, technology, and industrial capacities in the field of Algae.
SUSTEPS is ready to join the next meeting in Latvia.

Joining forces to boost dissemination Impact

The EU-funded projects ALFAFUELS and SUSTEPS are joining the Horizon Results Booster (HRB), a European Commission initiative focused on boosting the visibility, dissemination, and exploitation of research outcomes from Horizon 2020 and Horizon Europe projects.

Through this joint effort, both projects are aligning and strengthening their communication strategies, stakeholder engagement, and exploitation plans to ensure their results reach a broader audience and deliver meaningful socio-economic and environmental impact.
With HRB's support, ALFAFUELS and SUSTEPS will be developing synergies, clustering results, and accelerating the uptake of innovations beyond the lifespan of their projects. Roadmap was developed detailing all the most suitable set of Booster services for the Projects.

Participating with the ALGAE Cluster

Three sister projects have formed a cluster to identify synergies and maximize impact. This collaboration will enable knowledge exchange and coordinate dissemination events. The alliance is already planning activities for this semester to share with diverse audiences and target groups.

- *Technical topics related to HTL of algae and bio-oil upgrading.*
- *Transversal topics such as market & regulation, social perception.*
- *Joint events, workshops, newsletters, programs. Upcoming Next November.*

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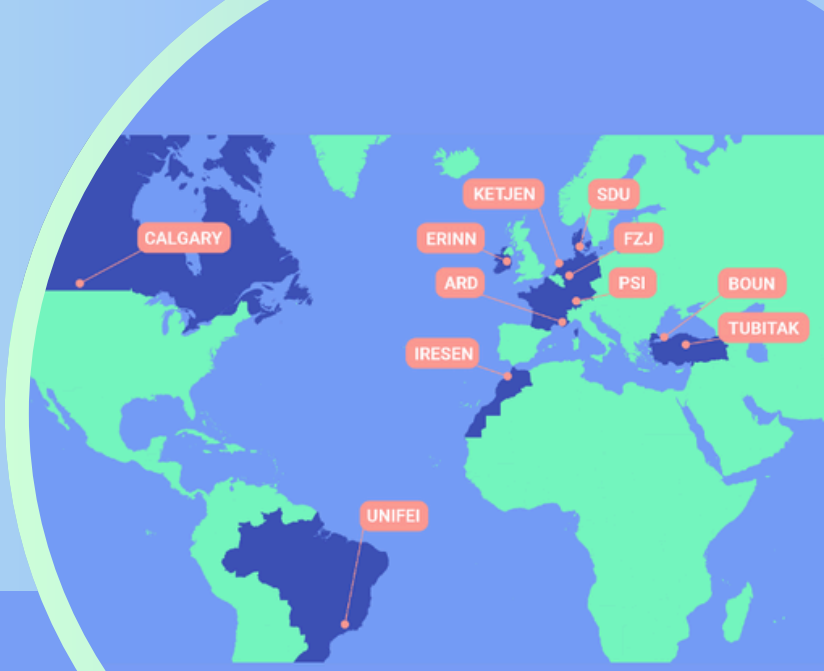

SUSTEPS in the media and key industry events

Project Overview by SUSTEPS Coordinator

Words from SUSTEPS Partners

Our partners from FZJ attended the *aireg - SAF conference 2025,* on June 23rd in Berlin, Germany. This relevant event is actively contributing to the ongoing industry dialogue on the future of sustainable aviation. Fostering collaboration, aligning industry efforts, and deepening on the collective understanding of the transition toward sustainable aviation.

Watch the videos in the SUSTEPS channels!

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