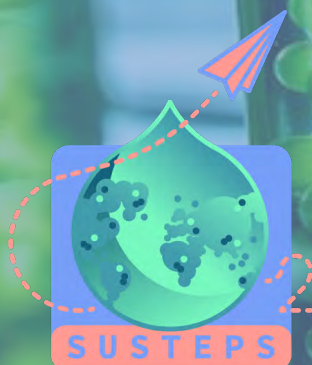


June 2024

1st 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

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COORDINATOR

TUBITAK Dr. Abdullah Z. Turan
contact@susteps.eu



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HOW DO YOU ENVISION THE FUTURE OF SUSTEPS
IN 5 YEARS TIME AFTER THE PROJECT COMPLETION?

TÜRKİYE BİLİMSEL VE TEKNOLOJİK ARASTIRMA KURUMU (TUBİTAK)

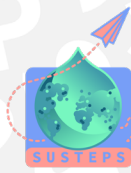


Our research on sustainable biofuels, particularly Sustainable Aviation Fuel (SAF), will likely lead to widespread adoption and integration within industries. We anticipate that our findings will not only catalyse the transition towards more sustainable energy sources but also foster collaboration between traditional oil companies and emerging biofuel producers. This collaboration could manifest in joint ventures or technology licensing agreements, as traditional oil companies seek to diversify their portfolios and meet sustainability goals. Over the next five years, we aim to strengthen existing partnerships and establish new ones with organizations, research institutions, and governments worldwide.



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ARDITEC (ARD)

Bio-fuels are set to revolutionise global economies and industries, especially aviation, by enabling cleaner and more sustainable transportation. In particular, SUSTEPS microalgae-fuels are expected to significantly reduce greenhouse gas emissions compared to traditional fossil fuels. Comprehensive, integrated life cycle assessments of sustainable aviation fuels (SAFs) are essential to prove their environmental, economic, and social benefits. These assessments, covering production, usage, and disposal phases, will generate the data needed to validate the commercial viability of bio-fuels. By demonstrating a reduced carbon footprint and sustainable sourcing, these evaluations will be key to the future commercialization and widespread adoption of bio-fuels in the market.

Beyond environmental benefits, adopting bio-fuels will yield significant economic and social impacts. Economically, the growth of the bio-fuel industry will create new jobs across various sectors, including agriculture, manufacturing, and technology, thus stimulating local and global economies. Socially, the shift to cleaner fuels will improve public health by reducing air pollution and associated respiratory issues. Moreover, communities involved in the production of bio-fuel feedstocks could experience enhanced economic development and greater energy security. This transition will set new references for other industries aiming to reduce their environmental impact, driving a holistic approach to sustainable development.



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BOGAZICI UNIVERSITESI (BOUN)

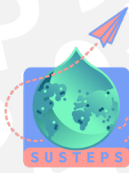


Microalgae are powerful tools in the fight against climate change, thanks to their remarkable ability to absorb carbon dioxide. Here's where the SUSTEPS impact will come to play large-scale algae cultivation facilities can be strategically placed near industrial plants that emit CO₂. Flue gas from these facilities, rich in CO₂, is then fed directly into the algae cultivation systems. These microscopic marvels gobble up the CO₂ as they photosynthesize, effectively capturing carbon from the atmosphere. Collaborative efforts will help develop streamlined regulatory frameworks that incentivize investment and production of algae based SAF. This captured carbon becomes the building block for sustainable aviation fuel (SAF), most likely to become a blend mandate to be reached by 2025 within the EU. Once the algae are harvested, their lipids can be processed and refined into biofuels that meet the stringent specifications for jet fuel. Creating a closed-loop system: CO₂ emissions are reduced, and the aviation industry gets a cleaner burning alternative.



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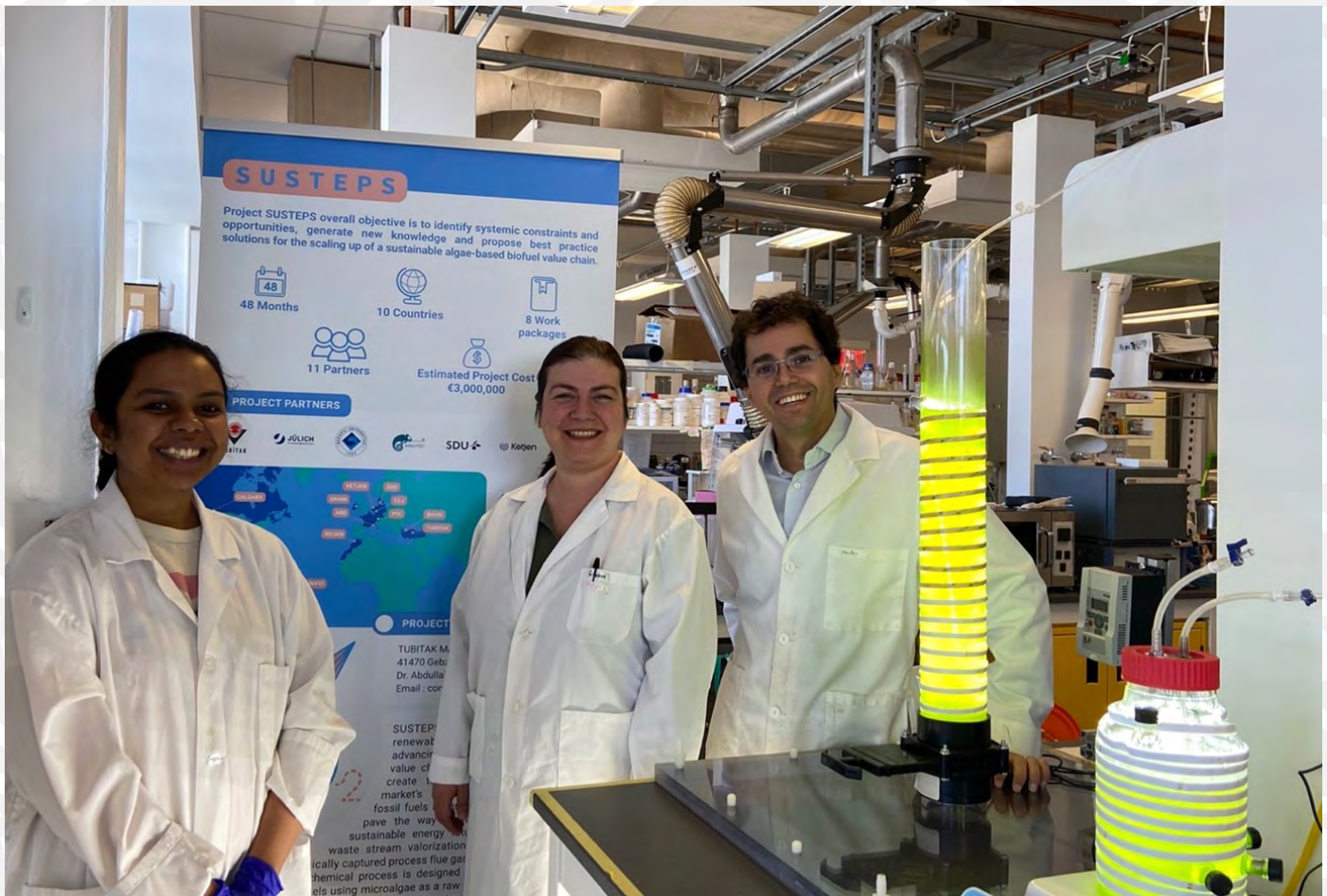
HOW DO YOU ENVISION THE FUTURE OF SUSTEPS IN 5 YEARS TIME AFTER THE PROJECT COMPLETION?

UNIVERSITY OF CALGARY (CALGARY)



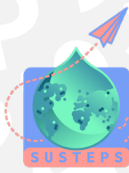
The successful completion of the SUSTEPS project will result in the development of a robust, carbon neutral, and circular process for producing sustainable biofuels, and will also set the framework to produce other feedstocks currently derived from fossil resources. In five years, we will be in a position to engage with energy companies to move forward with scaling up the process to pilot-scale. This will require partnering with large CO₂ emitters, as well as large biofuel consumers, for example the aviation industry.

Besides these overarching targets, additional commercialization opportunities will like to arise, such as technologies related to CO₂ separation from reformat gas and flue gas, CO₂ delivery systems, photobioreactors, and control strategies and software.



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PAUL SCHERRER INSTITUT (PSI)



SUSTEPS project will likely trigger knowledge transfer and strong interactions with key stakeholders active in the production of sustainable aviation fuels (SAF). The jet fuels produced by the project have a good potential for being used by the aviation industry at a time when the demand for SAF is increasing. If the objectives of the project are reached, we believe SUSTEPS can interest industry and can lead to concrete industrial applications, may the economic environment be favourable. The project might lead to intellectual properties which will hopefully be licensed.



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HOW DO YOU ENVISION THE FUTURE OF SUSTEPS
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FORSCHUNGSZENTRUM JÜLICH GMBH (FZJ)

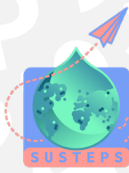


Due to the goals of SAF share in civil aviation, the demand for CO₂ neutral kerosene will raise over the next decades and therefore it is mandatory to do research. In addition, the diesel and gasoline fraction may be used in special applications. This variety offers a wide use of the products. However, we from FZJ regard the kerosene as most important synthetic fuel due to the most challenging replacement of carbon-based fuels in aviation compared to other sectors. SUSTEPS is comprising the whole value chain starting from CO₂-capture followed by algae growth, using upgrading technology like hydrotreating, fractionation and even reintegration of by-products with reforming technology. This holistic approach makes it possible to build up a whole fuel production plant starting from zero based on the outcomes of this project. Finally, the combination of all different technologies coming from different disciplines and countries all over the world, offers the opportunity of a growing scientific network every participant can profit from.



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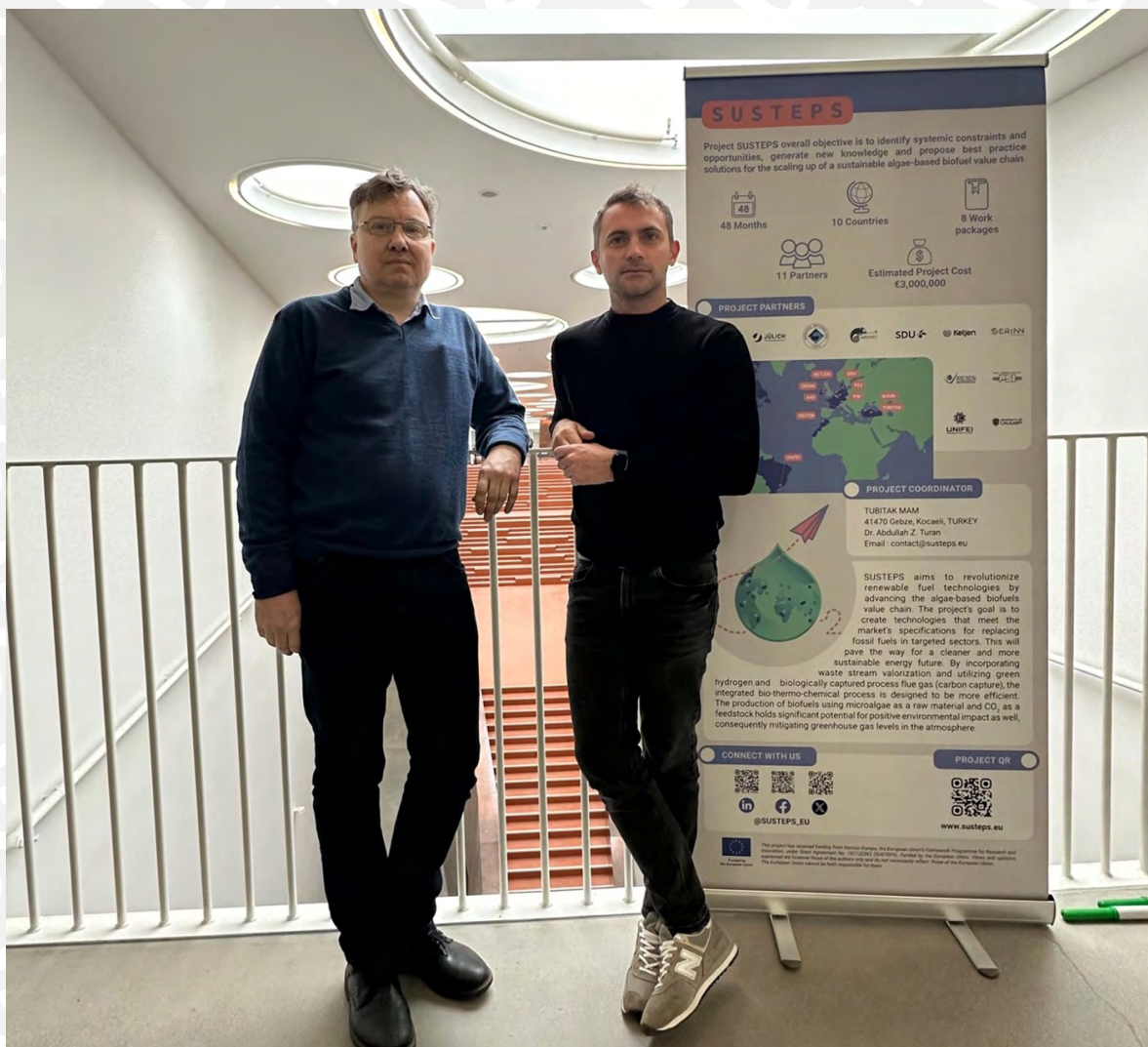


HOW DO YOU ENVISION THE FUTURE OF SUSTEPS IN 5 YEARS TIME AFTER THE PROJECT COMPLETION?

SYDDANSK UNIVERSITET (SDU)

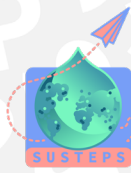


Thanks to SUSTEPS, our worldwide activities allow researchers and engineers from different countries to combine their knowledge and expertise. SDU aims to establish a close collaboration with all project partners exploring complementarities in knowledge and possibilities to extend the project results to other research challenges. The inclusion of industrial partners will become essential in achieving the full aims of the green transition and this necessity will be enhanced by the dissemination of activities over the project lifetime.



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KETJEN NETHERLANDS BV (KETJEN)

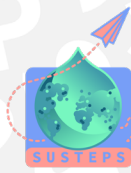


The critical elements for SUSTEPS to develop further are (next to the process and value chain integration which is an objective of the project) are feedstock availability, conversion by HTL and the technical certification of the SAF pathway. Each of these require future work with various industries, not only the downstream oil industries that operate the assets that produce SAF, but also the agricultural industry and the technology developers. Developing a process is a matter of resilience and enduring investment. International collaboration is key in sustaining this long-term effort. Additionally, commercialization of the algae-based aviation fuel will happen if the pathway can be certified and is sufficiently developed at scale. The main opportunity for creating (or further developing) spin offs is probably in the liquefaction technology.



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HOW DO YOU ENVISION THE FUTURE OF SUSTEPS
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INSTITUT DE RECHERCHES EN ENERGIE SOLAIRE ET ENERGIES NOUVELLES (IRESEN)

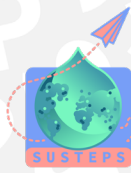


In recent years, the Kingdom of Morocco has shown significant interest in advancing synthetic fuels, marking a crucial stage in its energy development. Morocco unveiled its roadmap in 2021, focusing on biomass-to-energy biogas conversion, intending to utilize biogenic carbon from biogas as a key ingredient for synthetic fuels. Besides, endeavours in carbon capture have begun within the cement sector, as demonstrated by CimENTS du Maroc (Heidelberg Group) that establishes a pilot project for algae production using captured carbon. The aviation industry has also emerged as a promising domain for synthetic aviation fuels, evidenced by Royal Air Maroc and Afriquia SMDC's collaboration to launch Africa's inaugural carbon-neutral flight fuelled by Sustainable Aviation Fuels, operating between Casablanca and Dakar. This pioneering flight, carried out by a Dreamliner at full capacity with 302 passengers, utilized nearly 9 tonnes of sustainable aviation fuel, equating to 40% of the flight's fuel requirements and preventing the emission of around 23 tonnes of CO₂.



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HOW DO YOU ENVISION THE FUTURE OF SUSTEPS IN 5 YEARS TIME AFTER THE PROJECT COMPLETION?

ERINN INNOVATION LIMITED (ERINN)



In envisioning the future of SUSTEPS five years from now, we see a landscape where sustainable biofuels derived from microalgae have become essential components of global energy solutions. The project's emphasis on fostering international cooperation will play a pivotal role in this transformation. SUSTEPS will continue to engage experts worldwide, by fostering international cooperation. This will facilitate the exchange of insights and best practices in sustainable biofuel production and usage. SUSTEPS will contribute to the creation of new networks in sustainable biofuels by establishing active links with related projects and initiatives globally. These collaborations will accelerate the upscaling of microalgae-based biofuels, particularly in sectors like aviation, where sustainable alternatives are in high demand. The knowledge transfer facilitated by SUSTEPS will not only drive innovation but also ensure the long-term sustainability and scalability of biofuel value chains worldwide.

In summary, SUSTEPS future lies in its ability to cultivate strong international partnerships and promote knowledge exchange in the field of sustainable biofuels. By leveraging these collaborations, SUSTEPS will continue to lead the way towards a more sustainable and secure energy future for all.



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UNIVERSIDADE FEDERAL DE ITAJUBA (UNIFEI)

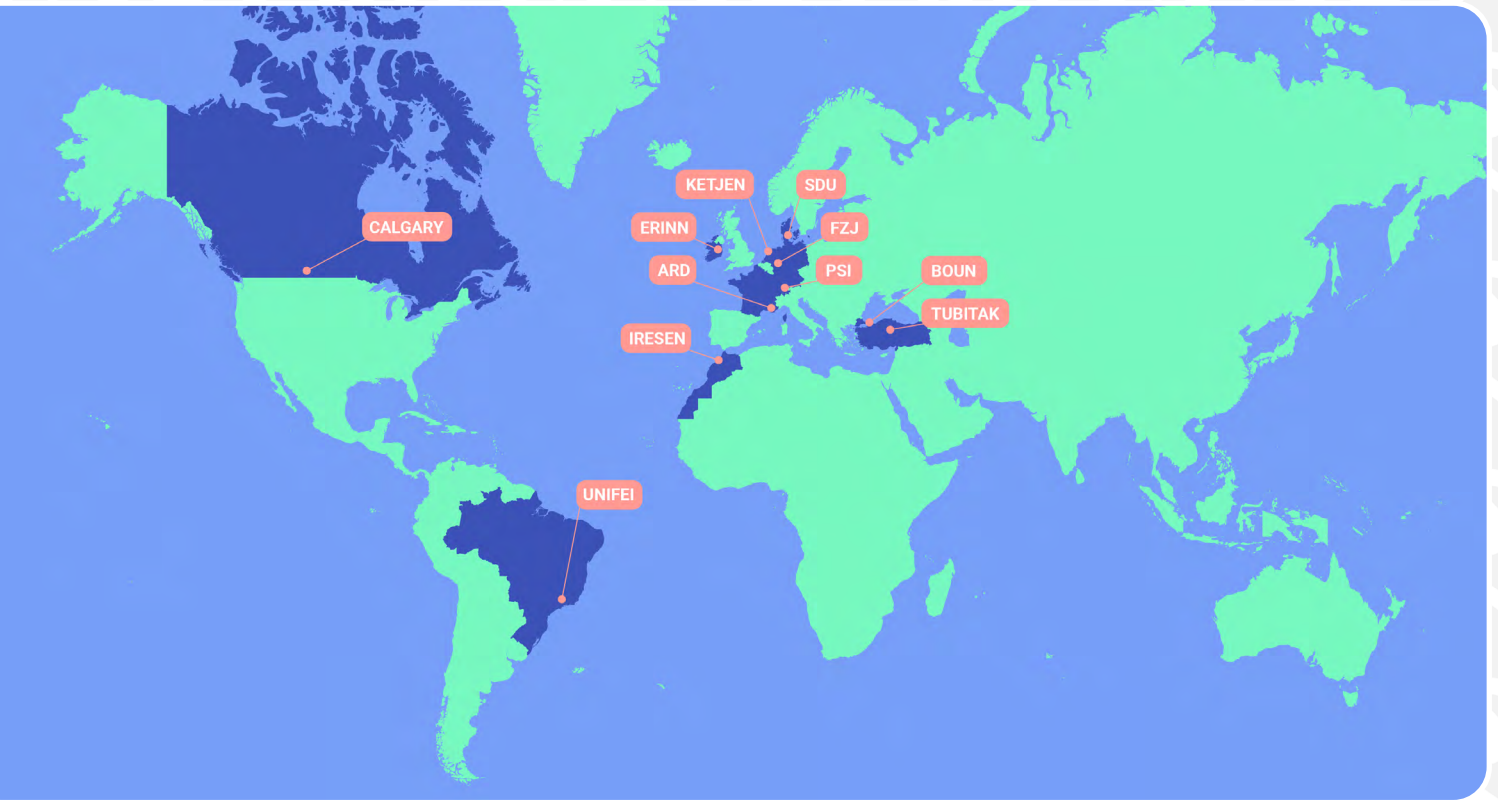
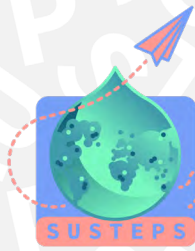


The implementation of the circular economy philosophy will permit the conversion of waste materials, such as carbon dioxide and effluents, into high-value products, including commercial fuels. Future applications of this technology would be related to decarbonization in the cement and metallurgy industries, both of which are very difficult to decarbonize. This would be accompanied by the production of commercial biofuels, including aviation fuel. It is evident that SUSTEPS project will facilitate the establishment of collaborative links between researchers from different research centers who possess complementary approaches and knowledge. This is the sole means of scaling up these technologies.



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