Project TwoPager | EuroTeQaThon III

Our third EuroTeQathon will be hosted in Prague (CTU) from Saturday June 10th until Monday June12th 2023. In preparation of thise event every (selected) Collider project is asked to submit a TwoPager on their project according to the locally communicated deadline and procedure. This document will be used by the jury to complement the final presentation on Monday and have a good overview of all the different projects

PROJEC DETAILS

Challenge Collaborator: **Ecole Polytechnique**
Team name: **BioCharge**
Team slogan: **Reuse waste, Recharge your soil**
Team members (full name | study program | university)

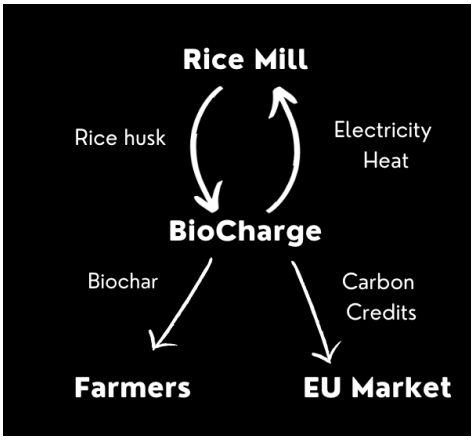
Alejandro Christlieb Picazo	BSc Math & CS, minor Chemistry	Ecole Polytechnique
Mina Goranovic	BSc Math & CS	Ecole Polytechnique
Philippe Guyard	BSc Math & CS	Ecole Polytechnique
Nossaiba Kheiri	BSc Math & Economics	Ecole Polytechnique
Lorentz Dutrievoz	BSc Math & Physics, minor Biology	Ecole Polytechnique

What is the target problem for your project (in one sentence)?

Agricultural residues are not used to their full potential, which leads to excess economic costs (waste management) and CO2 emissions from improper treatement.

How do you solve it (in max. three sentences)?

We transform agriculture residues into biochar, an organic soil amendment and well-recognized carbon capture technique. Using novel technologies and climate regulations, we can sell biochar to farmers at affordable prices, increase the yields of their farms, while generating high-quality carbon credits. Digitalization of the processes with optimization algorithms will help us scale up by minimizing costs and maximizing the efficiency.



EuroTeQ Engineering University

Potential for impact

How does it contribute to a more sustainable future from an environmental, social and/or economic perspective? On what scale and what range of the population could your project have an impact? (regional, national, European, only a small group of people, a wide range of the population etc.)

Biochar production and utilization offer significant contributions to a more sustainable future from environmental, social, and economic perspectives. It reuses agricultural waste, enhances soil fertility, improves water retention in soils, all while capturing carbon for centuries and making crops more resilient towards climate change. Our project aims to lower prices of biochar and sell it to local farmers in tropical regions, benefiting a wide range of the population. Our strategy relies on creating a scalable structure for implementing biochar plants, which will promote sustainable agriculture, support local farming communities, and create economic opportunities while mitigating climate change.

Innovation

How is the solution innovative comparing to existing ones (if exist) from an application area, business model, technological and/or customer experience perspective? Who are the main competitors?

Compared to existing biochar producers, our project has a different business model and incorporates cutting-edge technologies. European producers focus on high-quality and high-price biochar, which restricts to individual buyers. Outside of the EU, some producers have found profitable locations for biochar production, but face challenges in scaling due to variable conditions and extensive research requirements. In contrast, BioCharge provides lower prices and sells to local farmers in tropical areas. Our difference lies in leveraging our team's expertise in mathematical modeling, optimization, programming, and artificial intellignce to create a comprehensive mathematical model that minimizes costs while maximizing biochar value. This model will integrate the vast amounts of existing biochar research, enabling accurate predictions and optimal configurations for efficient production sites and scalable operations.

Feasibility

To what extent can your project be self-sustainable? Are the means available to realize your innovations? What would be your ambition/the next steps with the project?

Our project's pilot phase consists in acquiring a machine to produce biochar and install it next to a rice mill. This pilot phase is expected to be economically and ecologically self-sustainable, capturing 700 tons of CO2eq while also generating profits. The pilot will provide valuable data for training a model to identify optimal biochar production parameters (ground profile, feedstock, transport, etc) and predict performance. Similar pilot facilities implemented by competitors have proven profitable, further supporting the feasibility of this phase. In the long term, the project aims to develop an all-encompassing mathematical model by leveraging the expertise of our multidisciplinary team and the vast quantities of existing biochar research. This model will facilitate the identification and efficient implementation of new biochar facilities, allowing for rapid scaling.

Inclusivity

Are the stakeholders (industry partners, govermental bodies, societal stakeholders, potential users, etc.) involved in the process of the solution development? How did you take them and their feedback into account? What disciplines (engineering perspective, sociological perspective, etc.) are taken into consideration in the development of the solution?

While conducting research for this project, we made sure to collaborate with various farmers to understand their struggles, helping us tailor our solution into a community-centered scheme. We also talked to existing biochar producers (**NetZero, Terra Feritlis, Better Soil**) to assure we adhere to principles of the international biochar initiative (IBI). From an engineering perspective, we interviewed researchers in the field to update ourselves on the latest developments and confirm the technological feasibility of our project. We talked to biochar equipment producers (**Pyreg)** to learn more about their technology. Lastly, we already have a partner (**Schettino Rice in Mexico**) that confirmed their desire to place our machine next to their facilities.