Solutions for a circular biobased industry

CO_2SMOS - Advanced chemicals production from biogenic CO_2 emissions for circular bio-based industries

CO_2SMOS Project overview

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Biomethaverse workshop

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The CO2MSMOS project has recived funding from the European Union's Horizon 2020 research and innovation programme under grand agreement No 101000790

Introduction

Issue: Generation of **> 506.7 Mt/y** biogenic CO_2 in Europe from different green sources (e.g., biogas, fermentation processes, solid biomass combustion)

Motivation: Recycling/conversion of biogenic CO_2 into **long-life sustainable chemicals, or bioproducts** in general, is of strategic importance for the future of EU BBIs

Solution: Development of a set of **novel and cost-competitive biotechnological & intensified chemical conversion processes** to convert the industrial **biogenic CO_2** & renewable energy sources (green H_2 and biomass) into **added-value chemicals.**

The project counts on the wide expertise and high interdisciplinarity of 15 international partners, including:

- Technology developers
- Industrial end-users;
- Interdisciplinary research institutions;
- Service providers &
- Knowledge hubs

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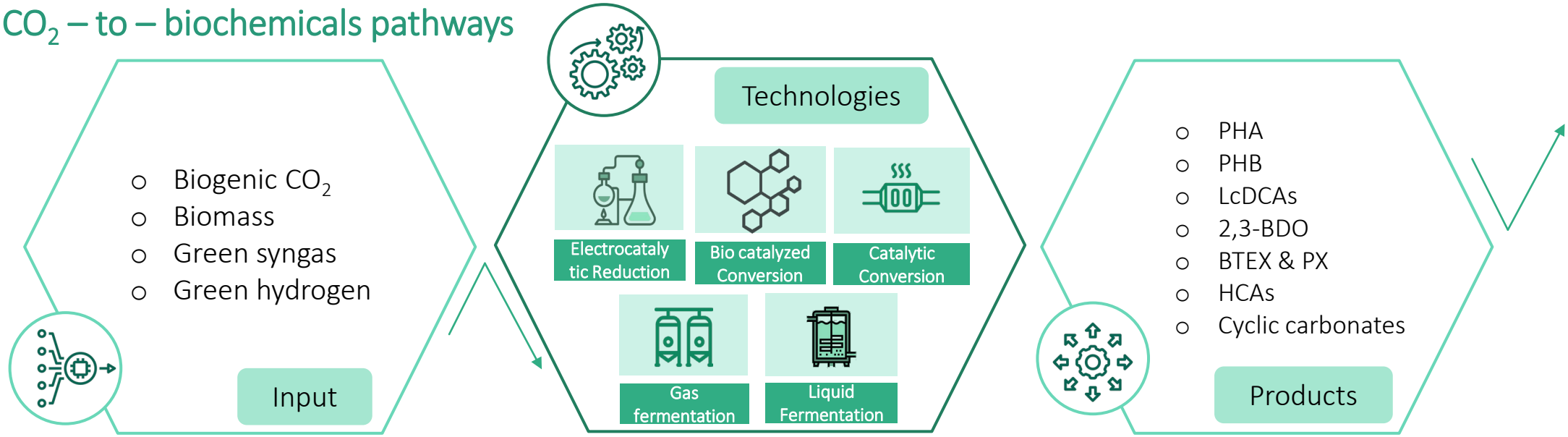
CO_2SMOS Concept

Biogenic CO_2 – to – biochemicals pathways



CO_2SMOS targets

- 5 Conversion technologies
- 7 Bio-based chemicals
- 60% CO_2 emissions reduction
- 40% Production cost reduction

CO_2SMOS technologies target at **negative emissions** through the evaluation of:

- **Neutral CO_2**: biogenic CO_2 used as feedstock
- **Negative CO_2**: emissions avoided using RES & from CCU
- **Positive CO_2**: indirect emissions.

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CO_2SMOS expected results

Environmental targets

Long-term CCU;
Zero or Negative CO2 emissions;
Renewable materials & energy sources.

01

Economic targets

Cost-competitive conversion;
Replicable design;
New **business models**;
Diversification of economic base of BBI.

02

Technical targets

Flexible technologies;
High **energy efficiency**;
Scalable system;
TRL from 3 to 5.

03

Synergies promotion

Creation of **new marketplace** of CO_2SMOS value chains to promote **synergies** between the **interested BBIs**.

04

Replication promotion

Provide lessons learnt & recommendations for further application of CO_2SMOS concept to potential end-users.

05

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CO_2SMOS Industrial Symbiosis Platform

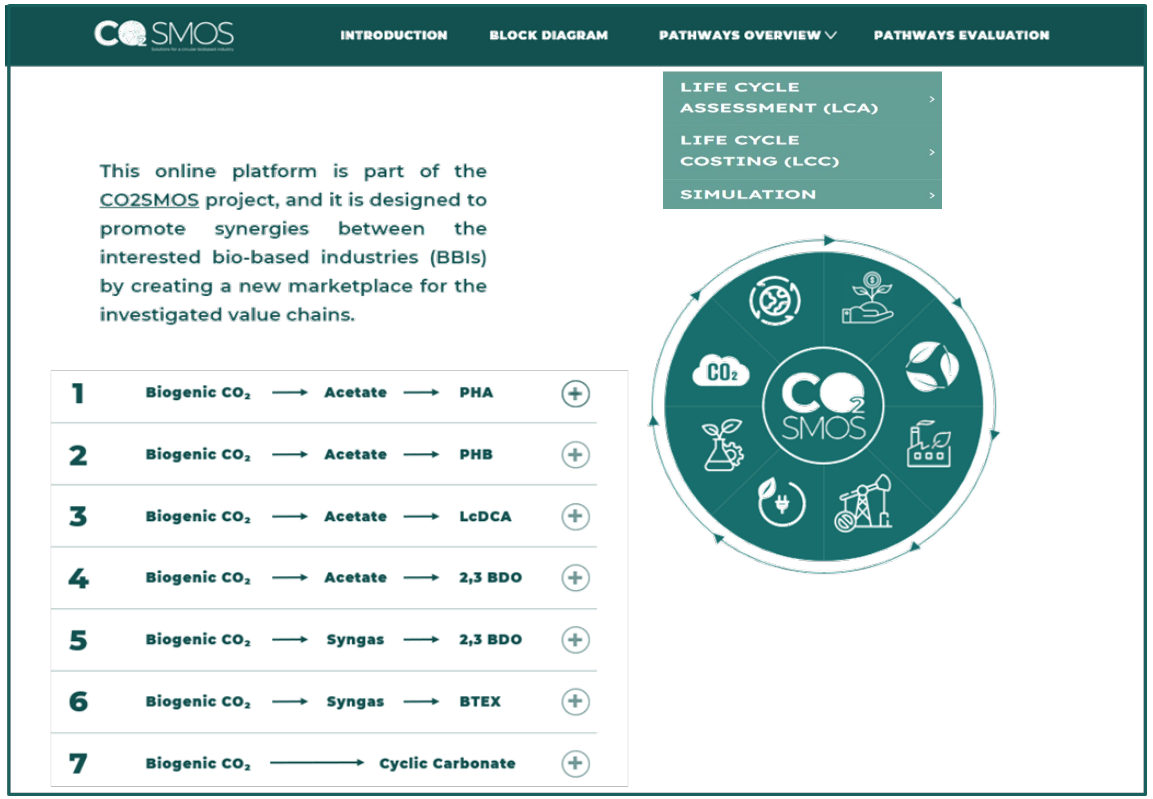
CO_2SMOS targets at the **creation of new marketplace** for CO_2SMOS value chains to promote **synergies** between the **interested BBIS**. The developed Industrial platform is designed for BBIs to determine the **benefits of biochemicals production** from a **CE perspective**.

What is the added value of CO_2SMOS Platform?

- Offers a comprehensive framework for exploring and optimizing value chains;
  - Users can leverage interactive graphs to explore and compare environmental and economic indicators in real-time, enabling informed decision-making.

What are the steps for the integration & creation of the CO_2SMOS Platform?

- The development of a methodology for environmental & economic assessment of CO_2SMOS concept based on the life cycle thinking;
- Followed by the development of a hybrid AHP-TOPSIS MCDA methodology to improve sustainability of CO_2SMOS conversion routes.



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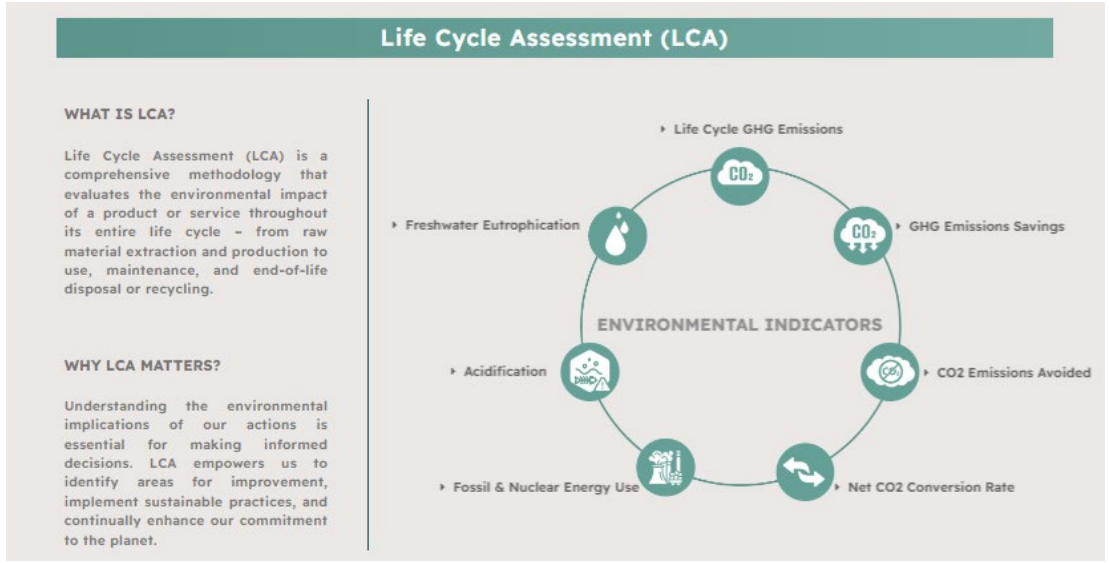
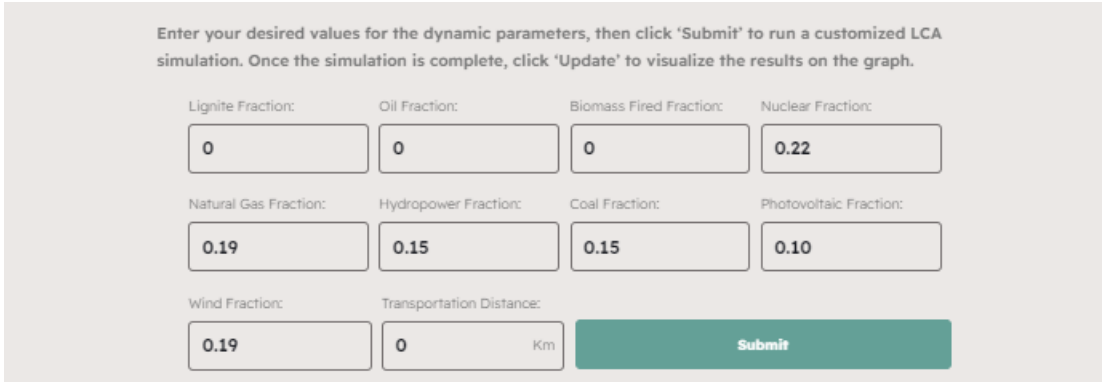
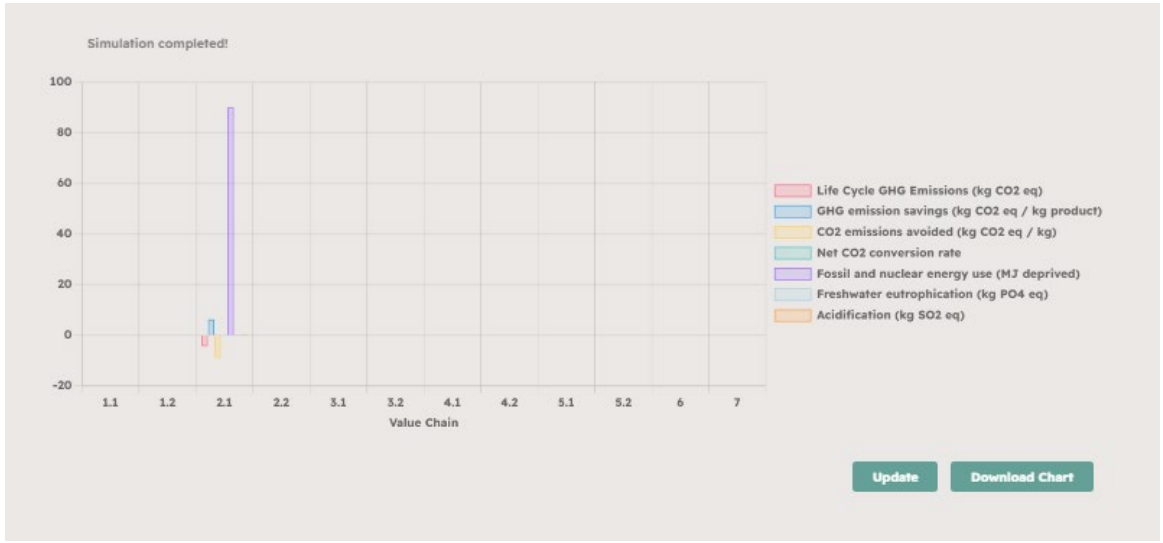
CO_2SMOS Platform: Demonstration of LCA module

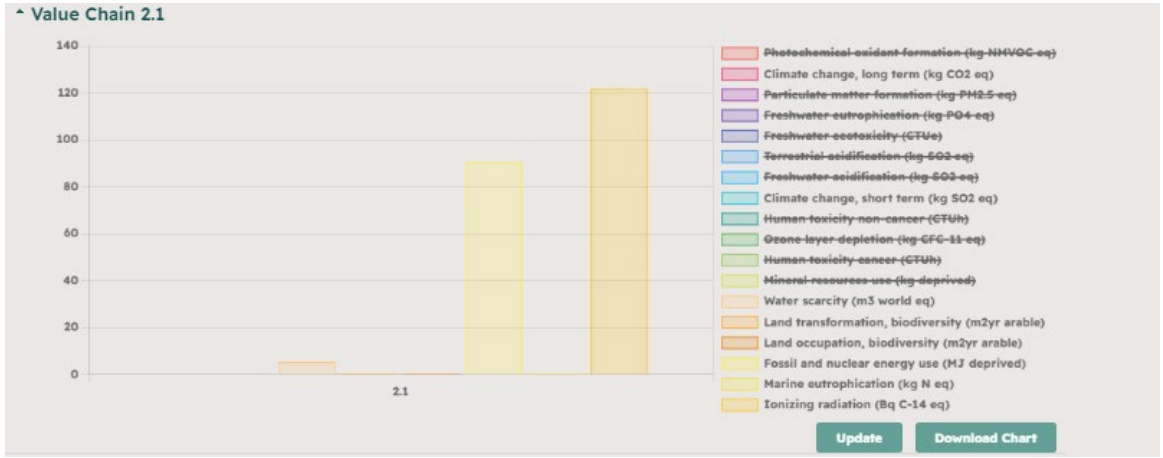


Dynamic Parameters



Simulation Results





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Thank you

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