HARNESSING POTENTIAL OF BIOLOGICAL CO_2 CAPTURE FOR CIRCULAR ECONOMY

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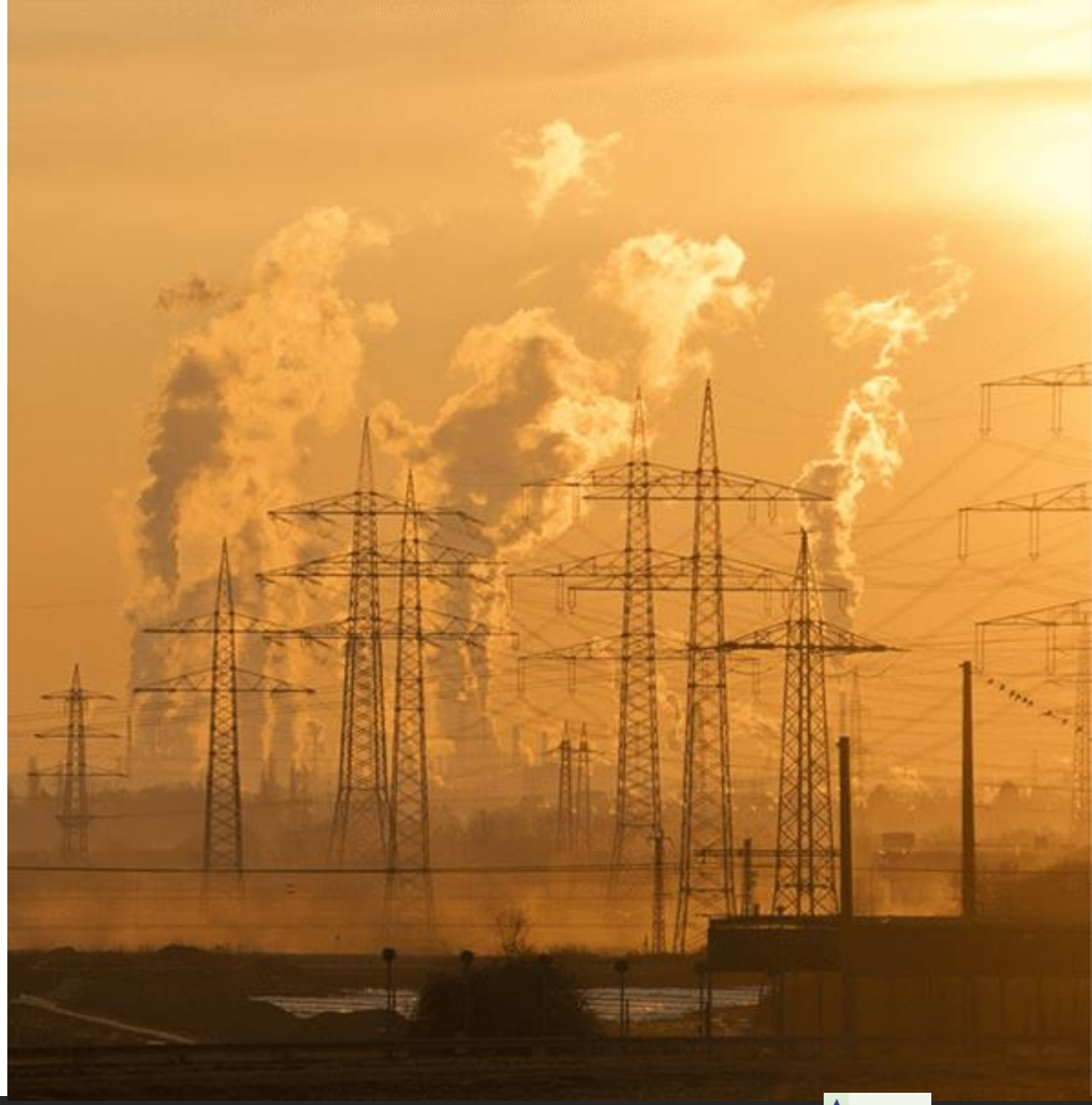
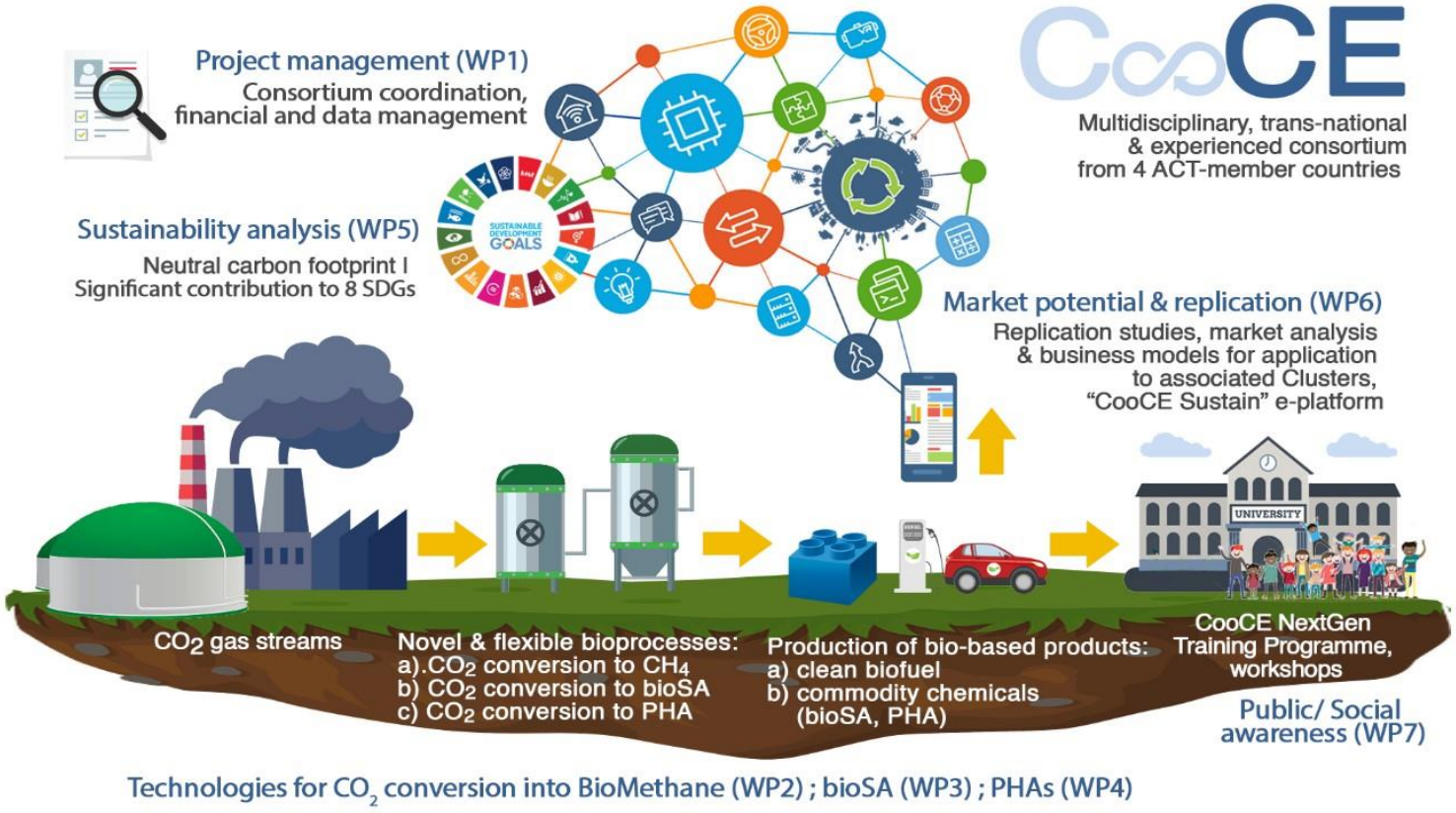


Concept & Main Objectives

Industrial sectors currently account for 20% of global CO_2 emissions

CooCE targets to develop and demonstrate a novel biotechnological platform where **CO_2 from biogas or exhaust gasses** is converted into:

- **upgraded biofuels** for flexible on-site hybrid energy storage
- **high market value platform chemicals** forming the building blocks of various biopolymers and bioproducts.



CooCE PARTNERS

DeBio Department of Biology

EURONEWPACK global pack solutions

DTU Technical University of Denmark

BTS

Imperial College London

pond

SWRI Soil and Water Resources Institute

BIOME BIOPLASTICS

ECORESOURCES RESEARCH • TECHNOLOGY • CONSULTANCY

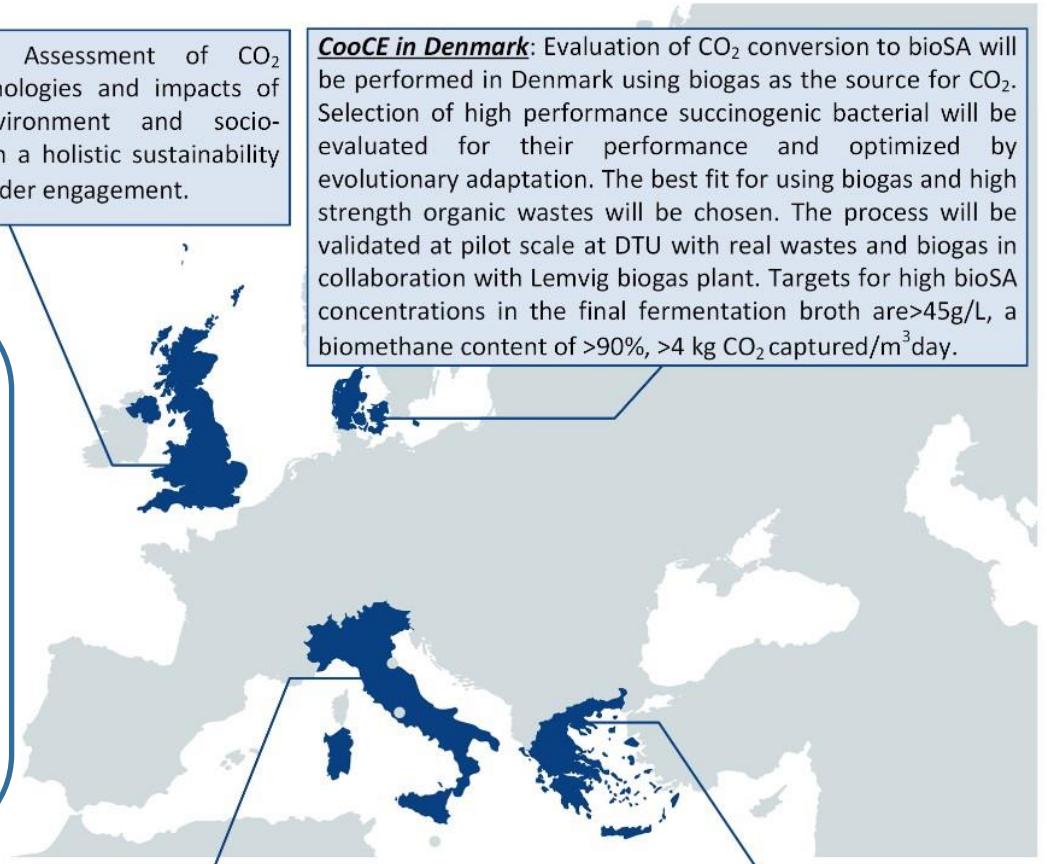
Lemvig Biogasanlæg A.m.b.A.

CooCE Partners

University of Padua	UNIPD	IT	UNI
BTS Biogas s.r.l.	BTS	IT	SME
Euronewpack s.r.l.	ENP	IT	SME
Hellenic Agricultural Organisation- DEMETER	ELGO	GR	RTO
EcoResources PC	ER	GR	SME
Technical University of Denmark	DTU	DK	UNI
Lemvig Biogas A.m.b.a.	LBP	DK	SME
Imperial College London	ICL	UK	UNI
Biome Bioplastics Ltd	BBP	UK	SME
Pond	PO	DK	SME

CooCE in UK: Assessment of CO_2 conversion technologies and impacts of **CooCE** on environment and socio-economy through a holistic sustainability analysis, stakeholder engagement.

CooCE in Denmark: Evaluation of CO_2 conversion to bioSA will be performed in Denmark using biogas as the source for CO_2. Selection of high performance succinogenic bacterial will be evaluated for their performance and optimized by evolutionary adaptation. The best fit for using biogas and high strength organic wastes will be chosen. The process will be validated at pilot scale at DTU with real wastes and biogas in collaboration with Lemvig biogas plant. Targets for high bioSA concentrations in the final fermentation broth are>45g/L, a biomethane content of >90%, >4 kg CO_2 captured/m^3day.

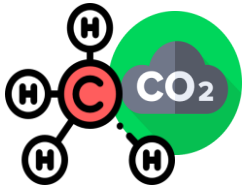


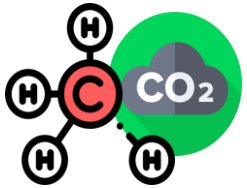
CooCE in Italy: Evaluation of CO_2 conversion into PHA will be performed in Italy using emissions from BTS biogas s.r.l. Mainstream and alternative PHA producers will be tested to choose the best fit for the specific gaseous CO_2-rich streams (biogas) ensuring to use the best possible microbial strains. PHA produced will be further evaluated by ENP to pre-commercial phase by producing prototype bioplastic materials.

CooCE in Greece: Evaluation of CO_2 hydrogenation will be performed in lab and pilot scale conditions in Greece addressing the needs of the Greek Cluster of Raw Materials (www.grawmat.gr). The GRawMat cluster, led by EcoResources (member of the European Raw Materials Alliance), is comprised by the **top-10 Greek mining industries** (Mytilineos Group, Hellenic Gold, Stonegroup, Grecian Magnesites, North Aegean Slops, Mathios Refractories, GeoHellas, Aegean Perlites, Eco Efficiency, Ellimet.). The overall goal is to **demonstrate for the first time** an optimized bioprocess able to capture and transform **>5 kg CO_2/m^3reactor/day.**

CO_2 sources: biogas & exhaust gasses

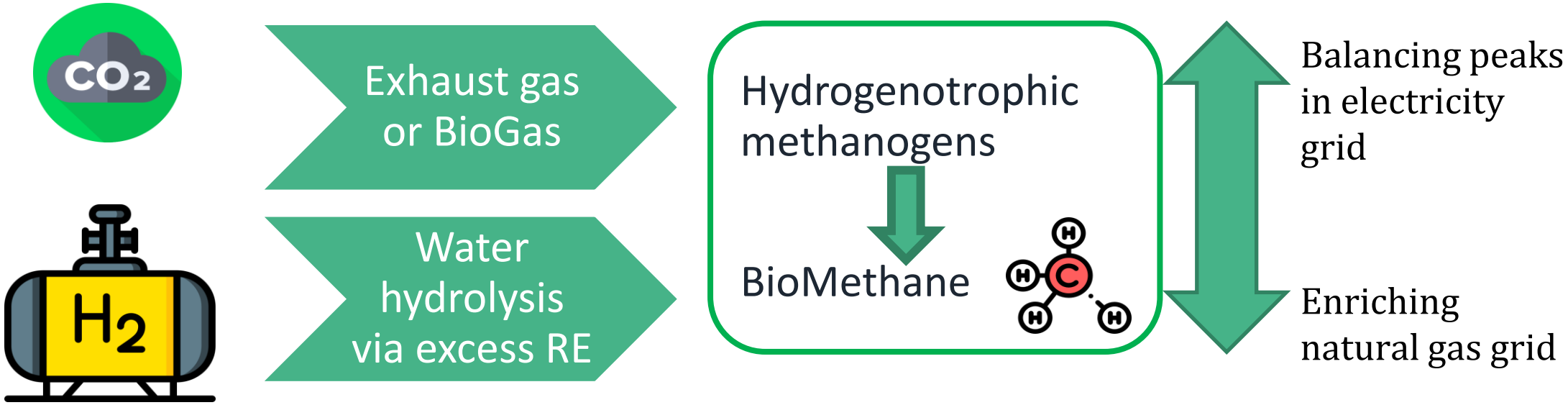
BTS

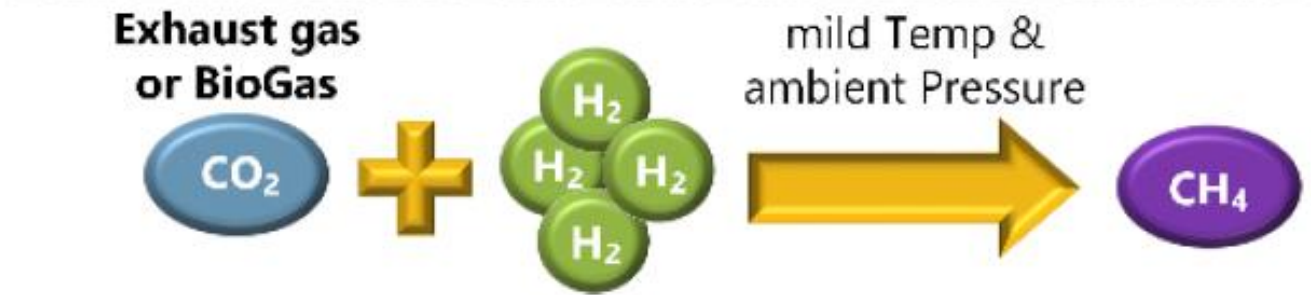




Lemvig Biogasanlæg A.m.b.A.

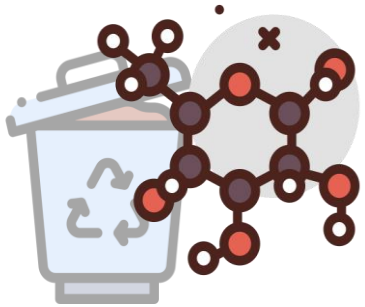
Biomethane production and target applications



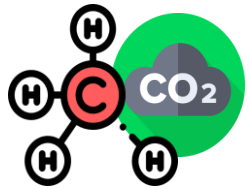


WP2

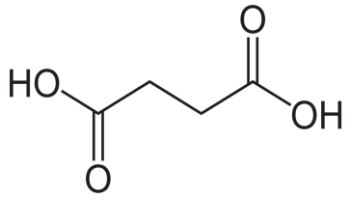
Succinic acid production and target applications



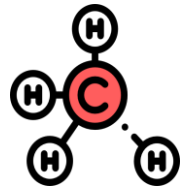
Waste streams containing sugars



BioGas



BioSuccinicAcid



BioMethane

Pilot

Centrifugation

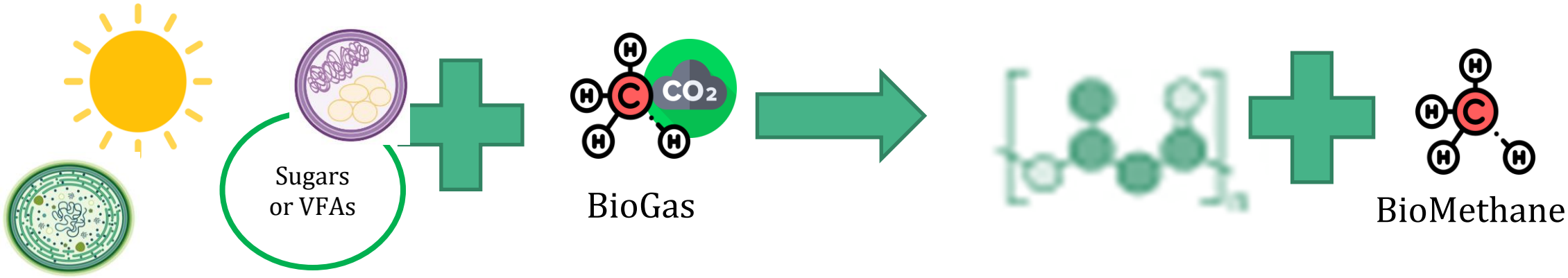
Filtration

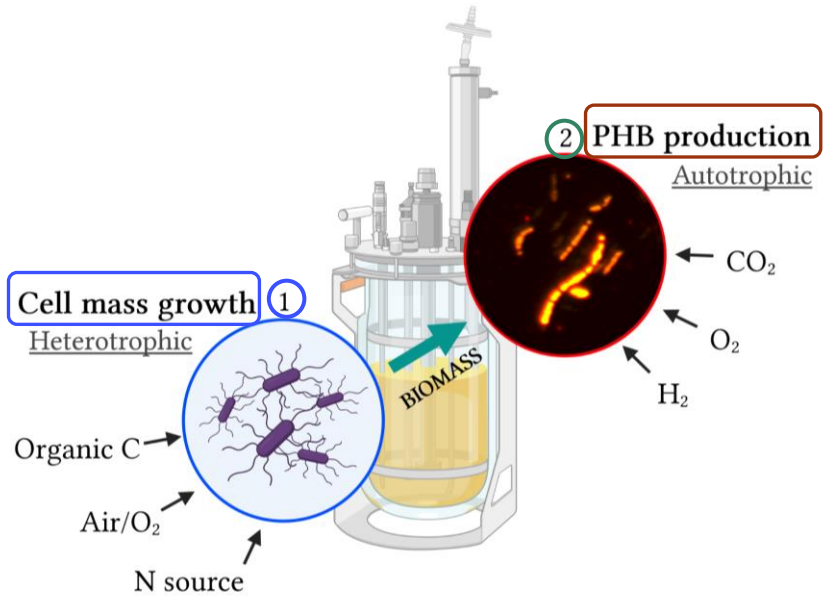
Nanofiltration

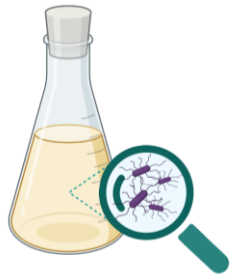
Crystallization

WP3 DTU

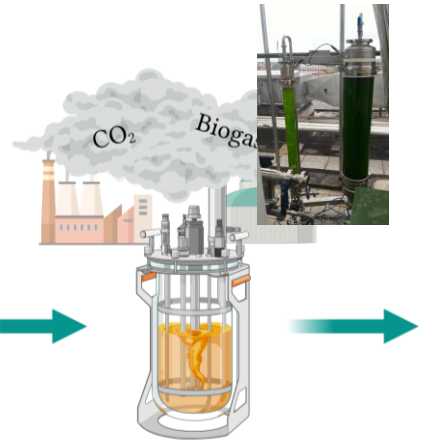
PHA production and target applications



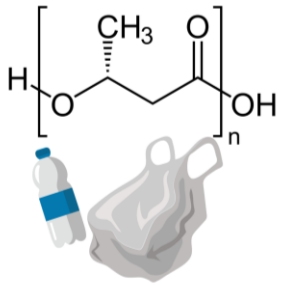




Lab-scale analyses



Pilot scale

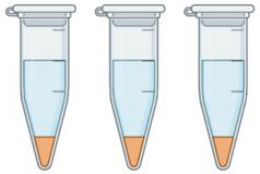


PHB production

WP4

Platform chemicals evaluation & end users

extraction



precipitation using alcohols

optimization evaluated in terms of

recovery

purity

productivity of the extraction process

PHAs fractions shipment

BIOME BIOPLASTICS

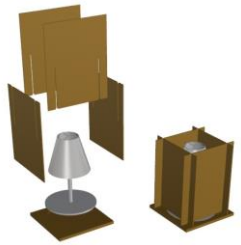
pond

applicability as biomaterial assessment

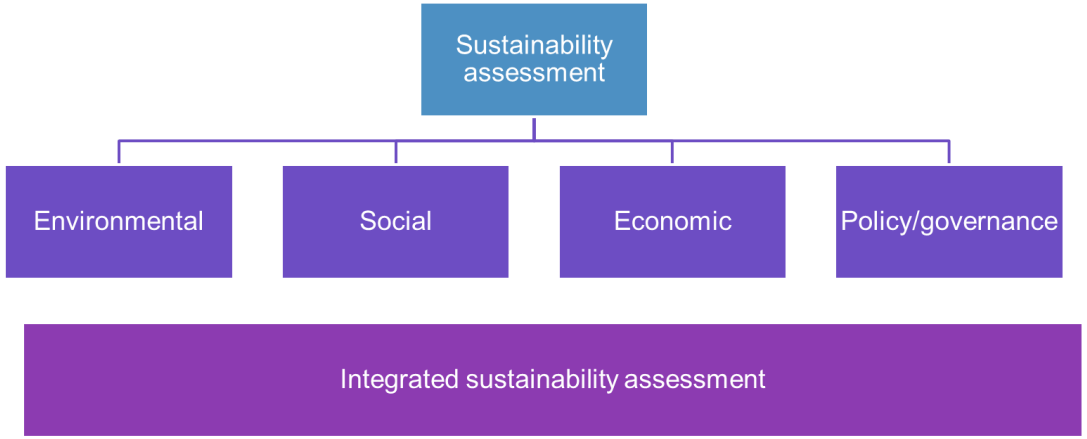
pond

EURONEWPACK global pack solution

packaging production

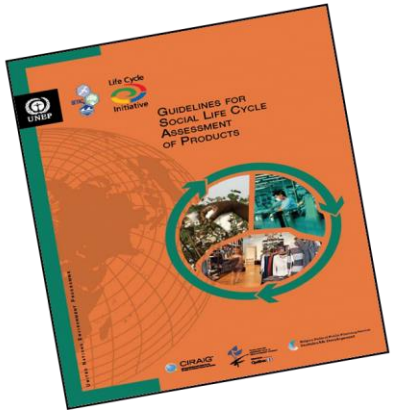


LCA Sustainability & Market analysis

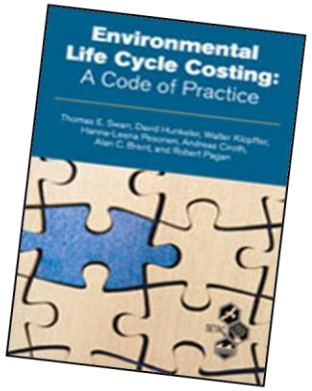


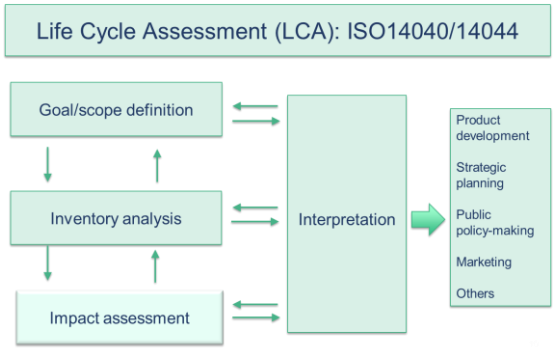
Life Cycle Assessment (LCA)

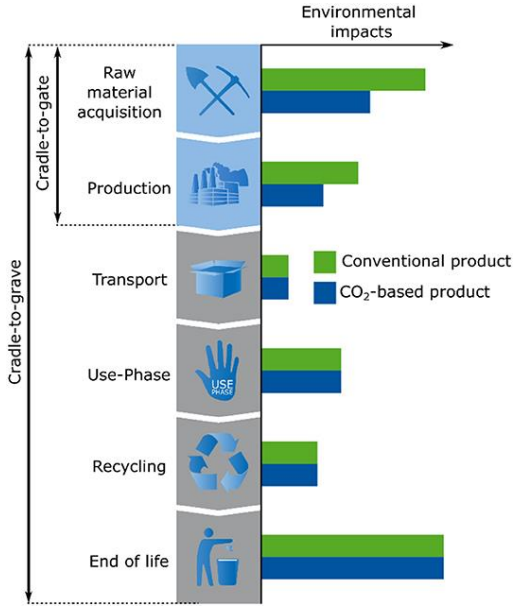
Social Life Cycle Assessment (SLCA)



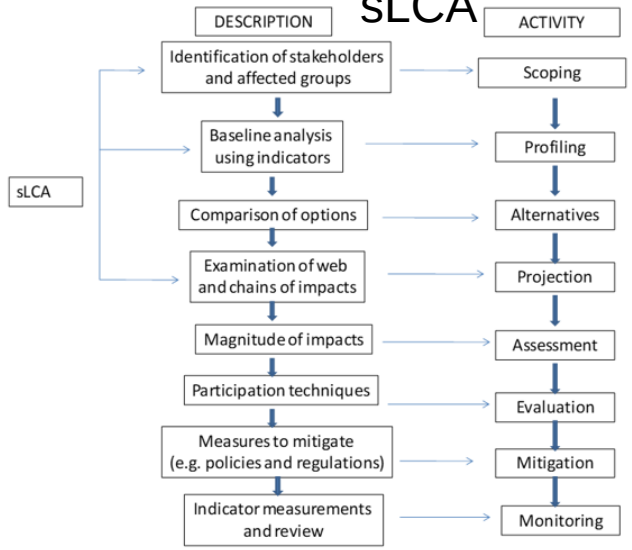
Environmental Life Cycle Costing (ELCC)







sLCA



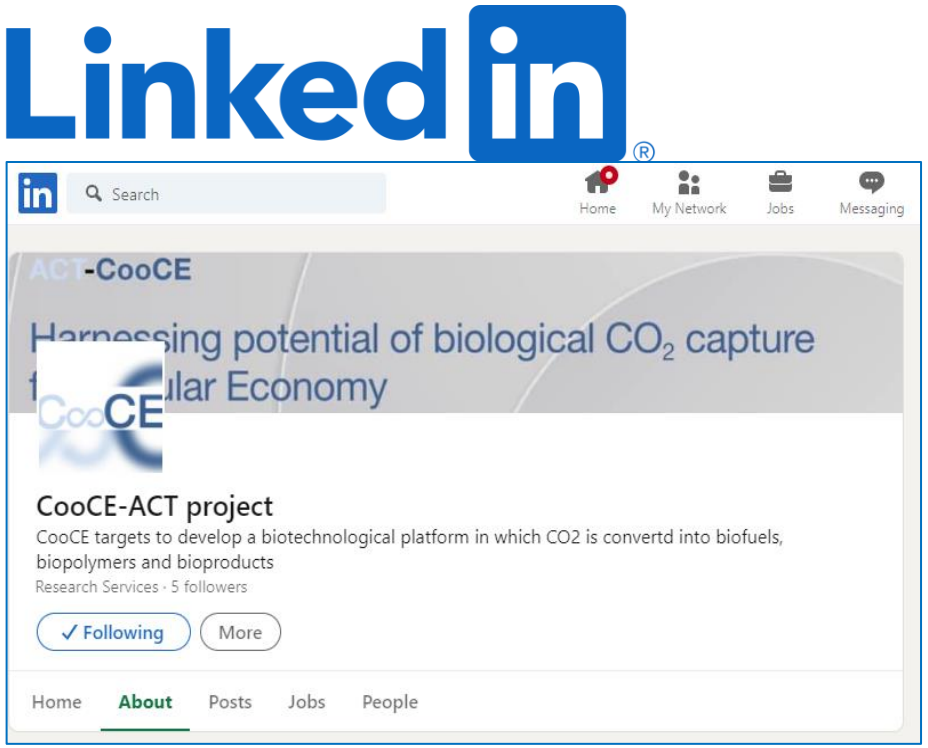
Adapted SCLA and SIA (Diaz-Chavez, 2014; Diaz-Chavez et al., 2016)

Imperial College London

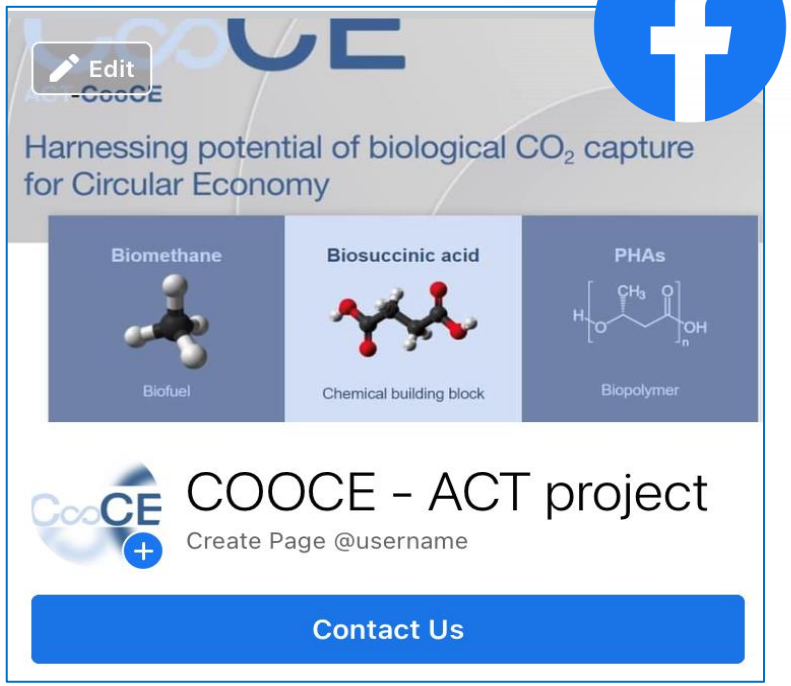
WP5

WP6

Innovation, impact, communication & exploitation

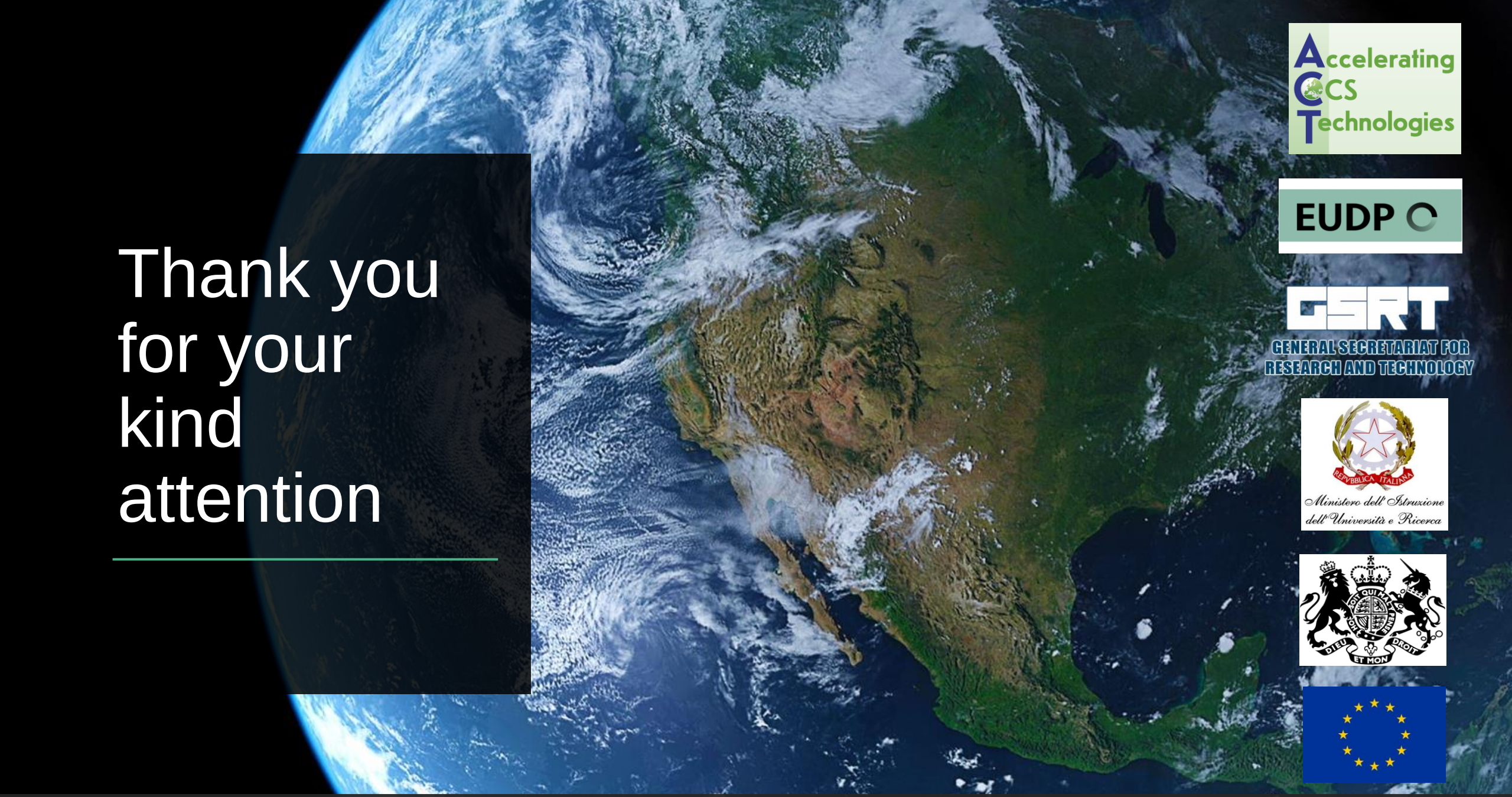


@CoocePro



https://cooce.eu/

WP7



Thank you for your kind attention

Accelerating CCS Technologies

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