ISTITUTO ITALIANO DI TECNOLOGIA
CENTER FOR SUSTAINABLE FUTURE TECHNOLOGIES

Politecnico di Torino

CO_2 Circle Lab

15 aprile 2021

EVENTO DI PRESENTAZIONE

dell'infrastruttura CO_2 Circle Lab – CCL

"CO_2 da problema a risorsa: processi e tecnologie per le imprese"

Fabrizio Pirri

Istituto Italiano di Tecnologia

ENERGY CENTER

torinowireless

ENVIRONMENT PARK Parco Scientifico Tecnologico per l'Ambiente

REGIONE PIEMONTE

per una crescita intelligente, sostenibile ed inclusiva

www.regione.piemonte.it/europa2020

INIZIATIVA CO-FINANZIATA CON FESR

CO_2 Circle Lab Research Infrastructure

Research Infrastructure co-financed by Regione Piemonte, POR FESR Piemonte 2014-2020, ASSE I, Azione I.1.a.1.5, "INFRA-P - Sostegno alle infrastrutture di ricerca considerate critiche/cruciali per i sistemi regionali"

Management of Green House Gas emissions in the atmosphere is undoubtedly an actual challenge, but it also represents a potentially extraordinary innovation engine, both at the research level and at the technological and industrial one.

CSFT-IIT is engaged with POLITO and Environment Park in boosting the **CO_2 Circle Lab (CCL) Research Infrastructure** with the aims to:

- provide technological solutions for CO_2 capture and utilization visioning CO_2 trasformation paths towards novel products
- provide solution for H2 production and use
- elicite or consolidate synergy of high-tech with start-ups, SMEs or companies willing to take part to the transition to a sustainable management of production

WHY DO YOU CONTACT THE INFRASTUCTURE?

- CONFIDENTIAL
- FINANCIAL DERISKING
- SHORTEN TIME TO MARKET

http://co2circlelab.eu

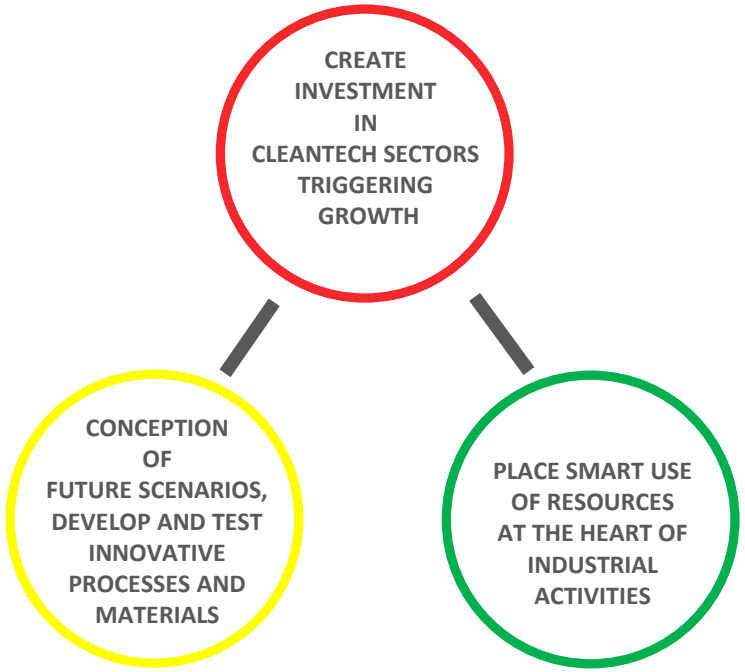
CO_2 Circle Lab Innovation Engines

The **CCL** research infrastructure aims to

set up an **easily accessible** network of **multipurpose** facilities to

foster **open innovation** towards

sustainable development goals



- CO_2 & H_2 capture
- Bioconversion of C1 gas in commodities
- CO_2 reduction
- H_2 production
- Synthesis and charcaterization

- Bioenergy
- Multi-energy systems analysis
- Energy storage
- Renewable energy sources

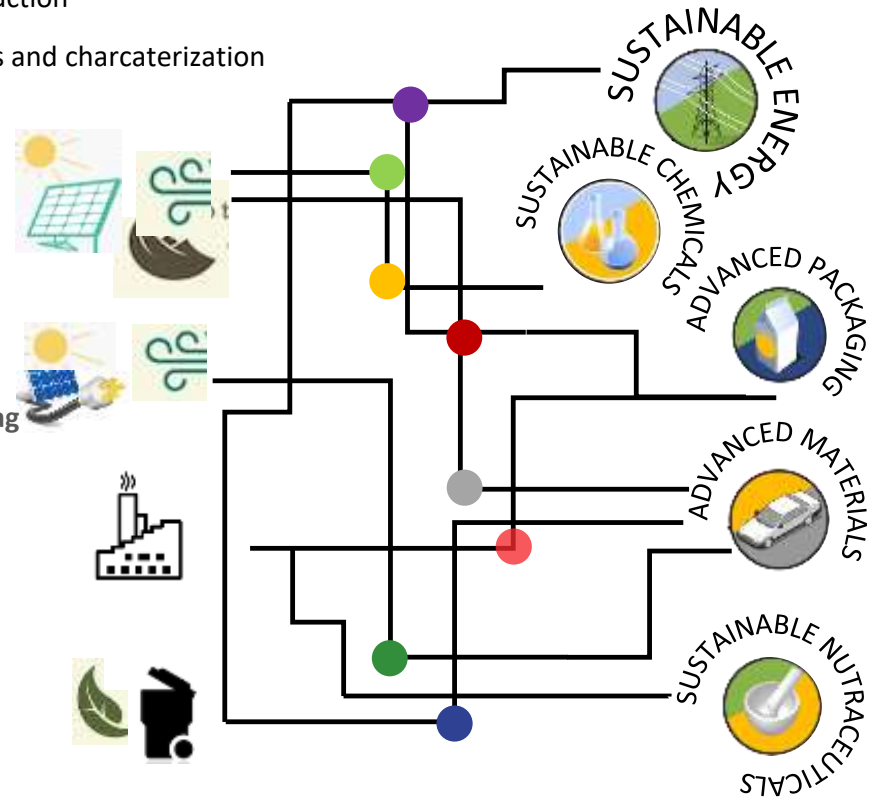
Heat from RES (concentrated solar, geothermal energy, wind)

Electricity from RES (wind, PV)

H_2 production and storag

Carbon-rich gas streams (industrial off-gases, air, reformed biogas)

Biomass matrices (MSW, organic industrial waste, agrofood waste)



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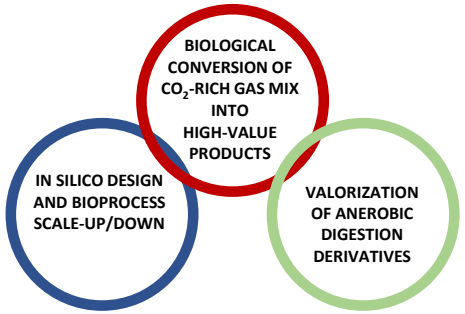
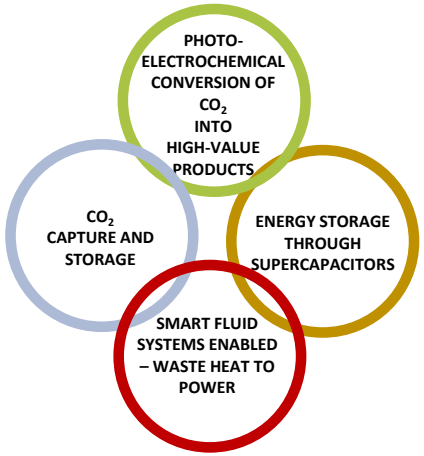
Centre for Sustainable Future Technologies

The **Centre for Sustainable Future Technologies** (CSFT-IIT) is focused on technologies for sustainability, energy transition and low carbon economy .

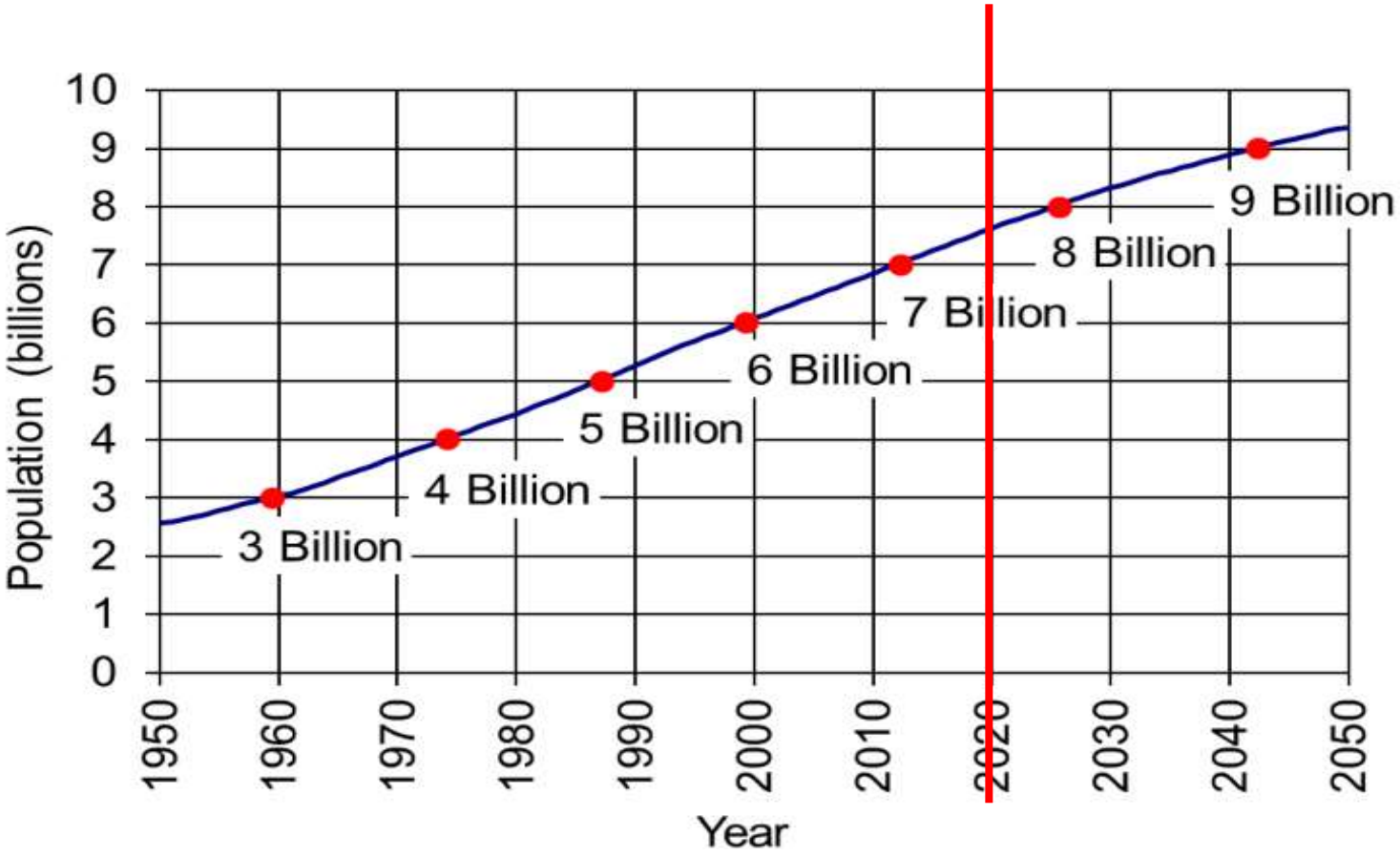
In particular CSFT-IIT develops the future generation of materials, processes and systems

- for reduction of antropic carbon dioxide through capture, storage and valorization
- for H_2 production, storage and use
- For an efficiency in the use of renewable feedstocks within a circular economy
- for an efficient energy storage





World population growth

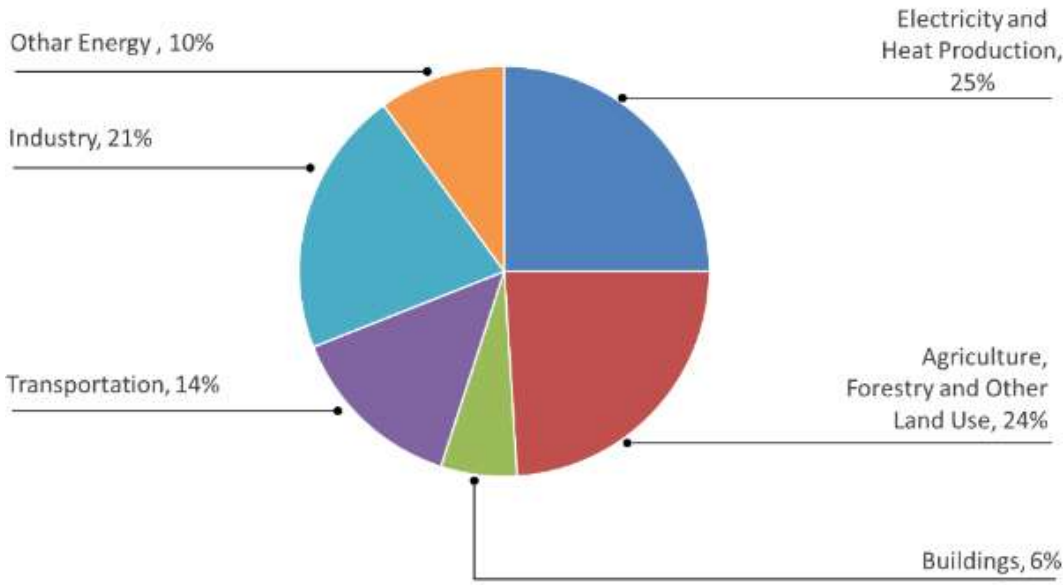


Fonte: US Census Bureau, International Data Base, August 2016

Total world energy consumption: 16 TW y

EU roadmap for a low carbon economy

within 2050 EU 80% reduction of CO2 compared to 1990




SLOVENIA
CROATIA
BOSNIA AND HERZEGOVINA
MONACO
SAN MARINO
ITALY
Roma
Napoli

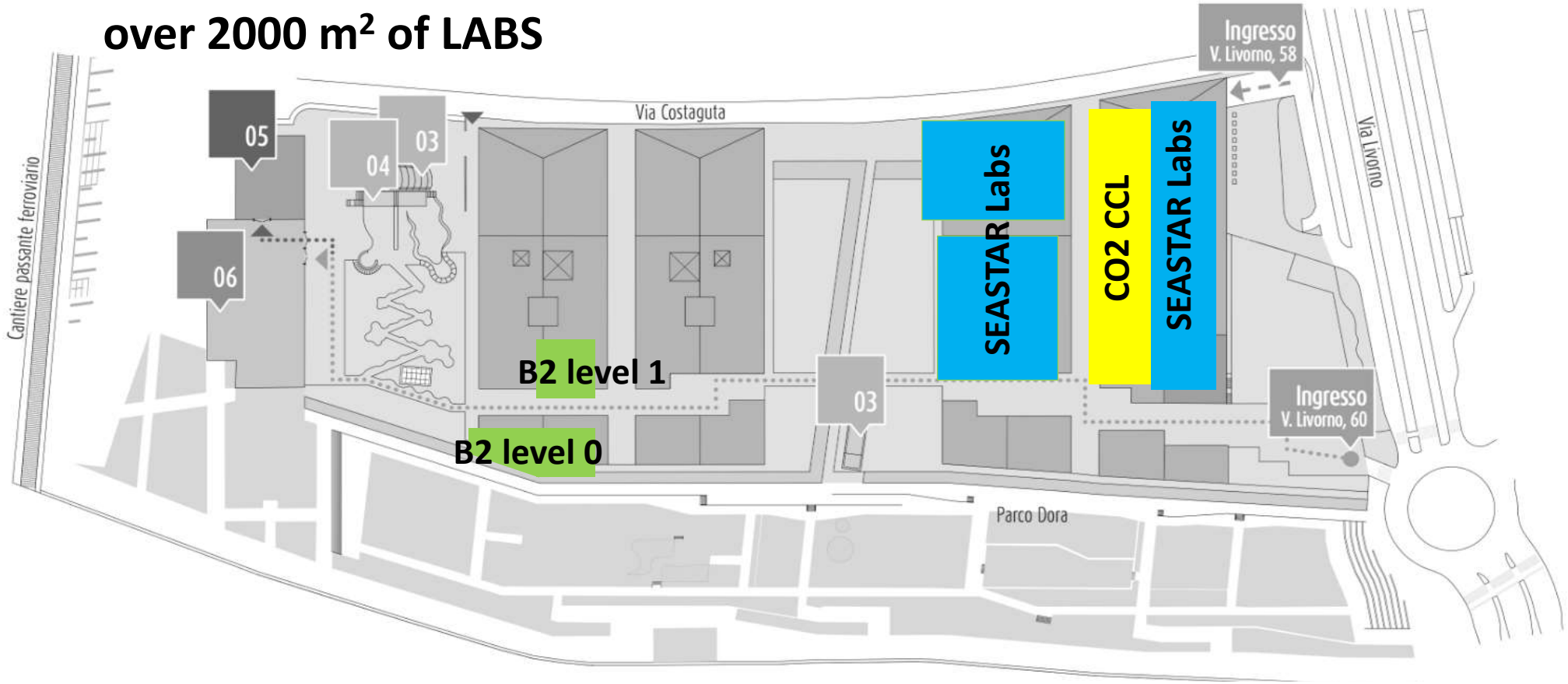

Torino
Environment Park

CORE LABS - 2017

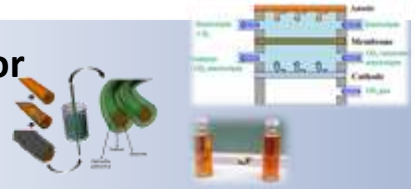
LABS CO2 CCL - 2018

LABS SEASTAR - 2020

over 2000 m² of LABS



Advanced Materials for Sustainable Future Technologies



Systems and Synthetic Biology

Characterization **Materials synthesis** **Reactors and Bio Reactors**

The Center is organized in two research lines:

Advanced Materials for Sustainable Future Technologies

Systems and Synthetic Biology

The mission is focused on **materials, technologies and processes for sustainability:**

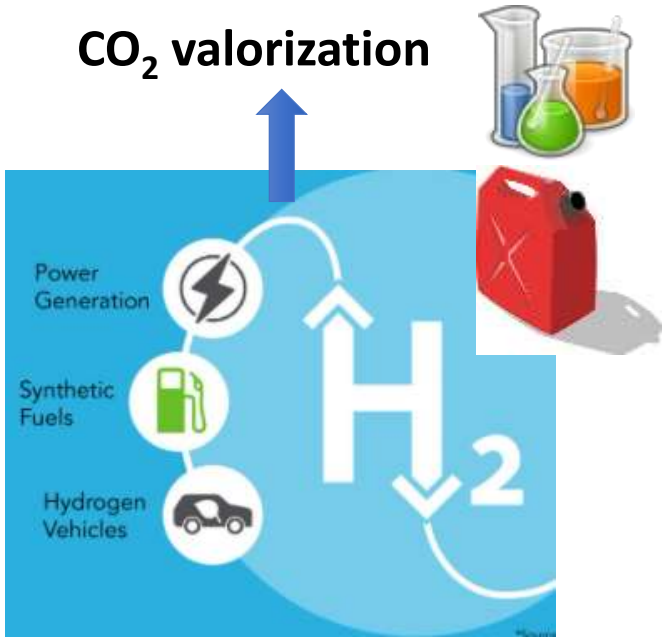
- **capture/storage** and **valorization** of antropic **CO_2**; **H_2 production and storage ;**

  H_2 and CO_2 geological storage
- technologies for production of **renewable raw materials** for a **circular economy**
- **s**ynthetic **fuels** and **chemicals**
- **energy harvesting, storage** and **raw materials recovery** through **sustainable processe**s

CO_2 Circle Lab

IIT ISTITUTO ITALIANO DI TECNOLOGIA CENTER FOR SUSTAINABLE FUTURE TECHNOLOGIES

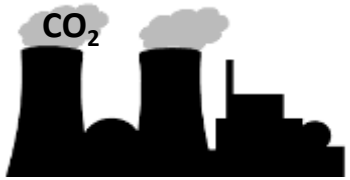
CO_2 valorization



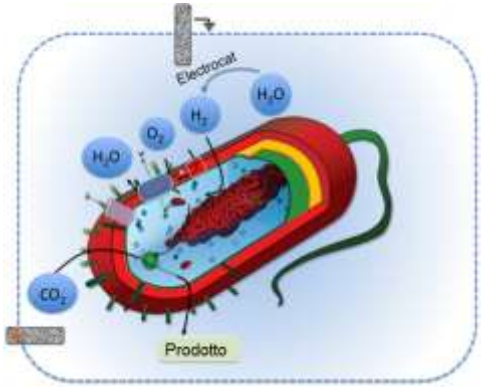
Chemicals

Fuel storage

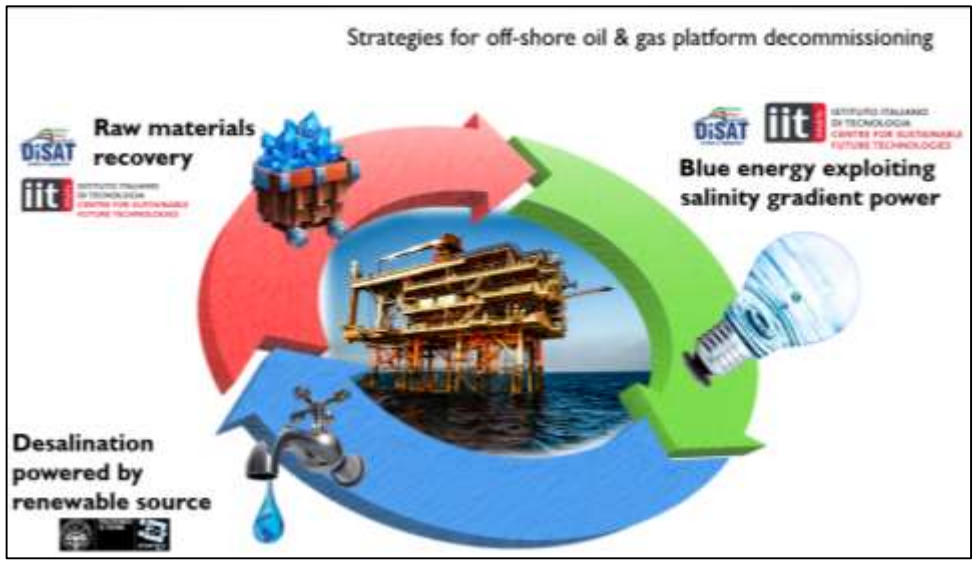
CO_2 capture/separation/storage



Synthetic biology and Metabolic engineering



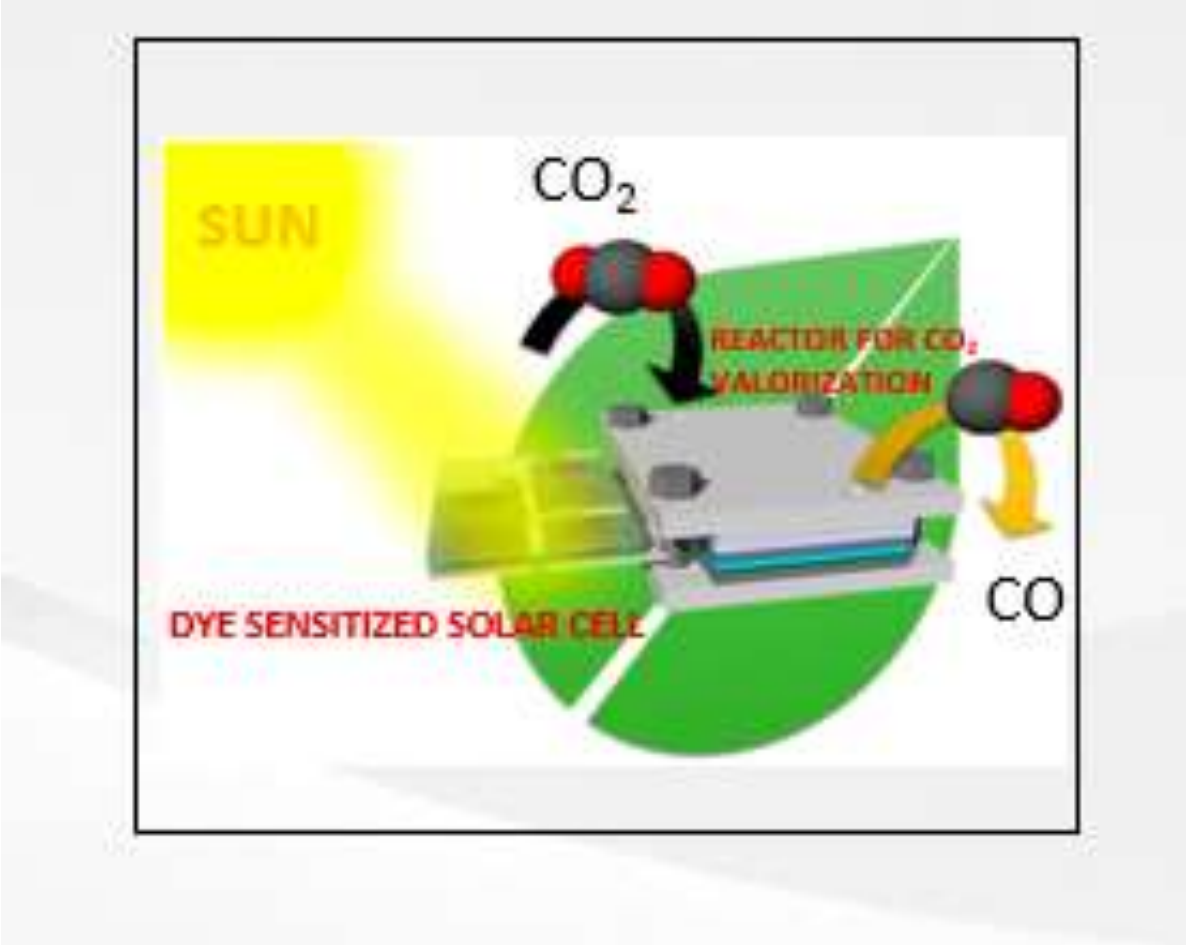
Storage in green SuperCap
Integrated energy HS systems
Blue Energy
Raw materials recovery



From CO_2 & H2 to:

- **new synthetic fuels**
- **chemicals**
- **pharma compounds**
- **….**

From CO_2 to fuels and chemicals: the artificial leaf



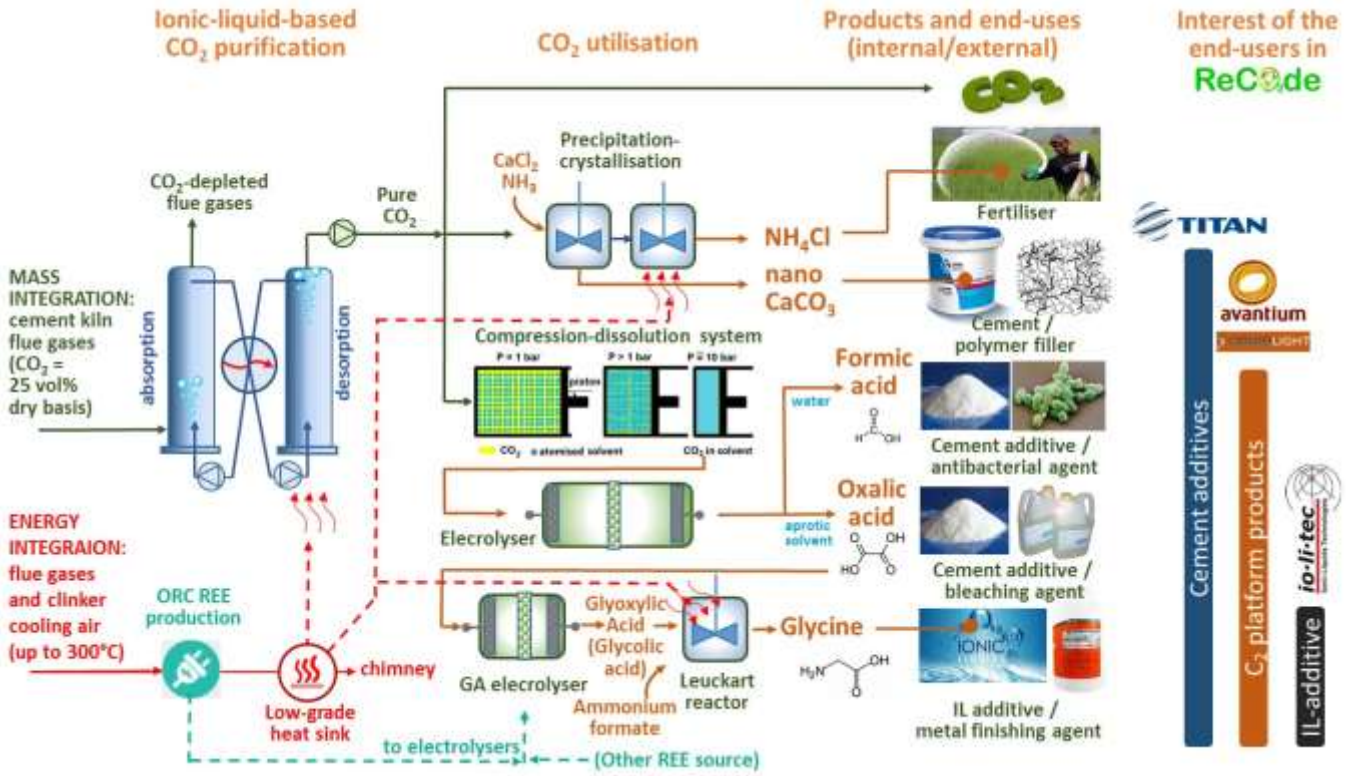
ACS Sustainable Chem. Eng. 2020, 8, 20, 7563–7568

August 2017 – January 2022

www.recodeh2020.eu
info@recodeh2020.eu

Recycling carbon dioxide in the cement industry to produce added-value additives: a step towards a CO2 circular economy

Goal: make cement industry able to contribute to at least 20% reduction of CO_2 emissions in the medium to long term



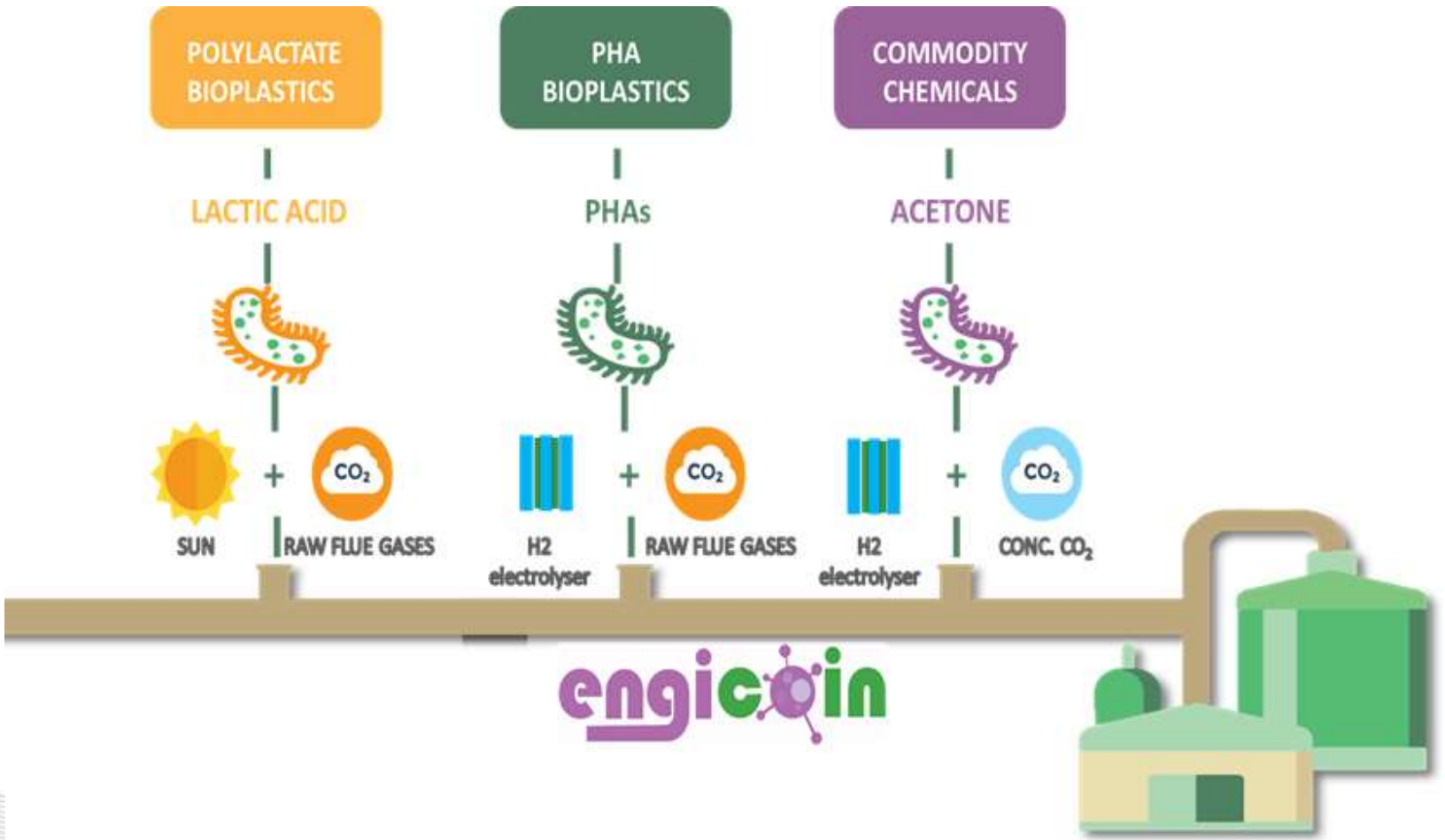
This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 768583

Engicoin Project: Microbial Factories

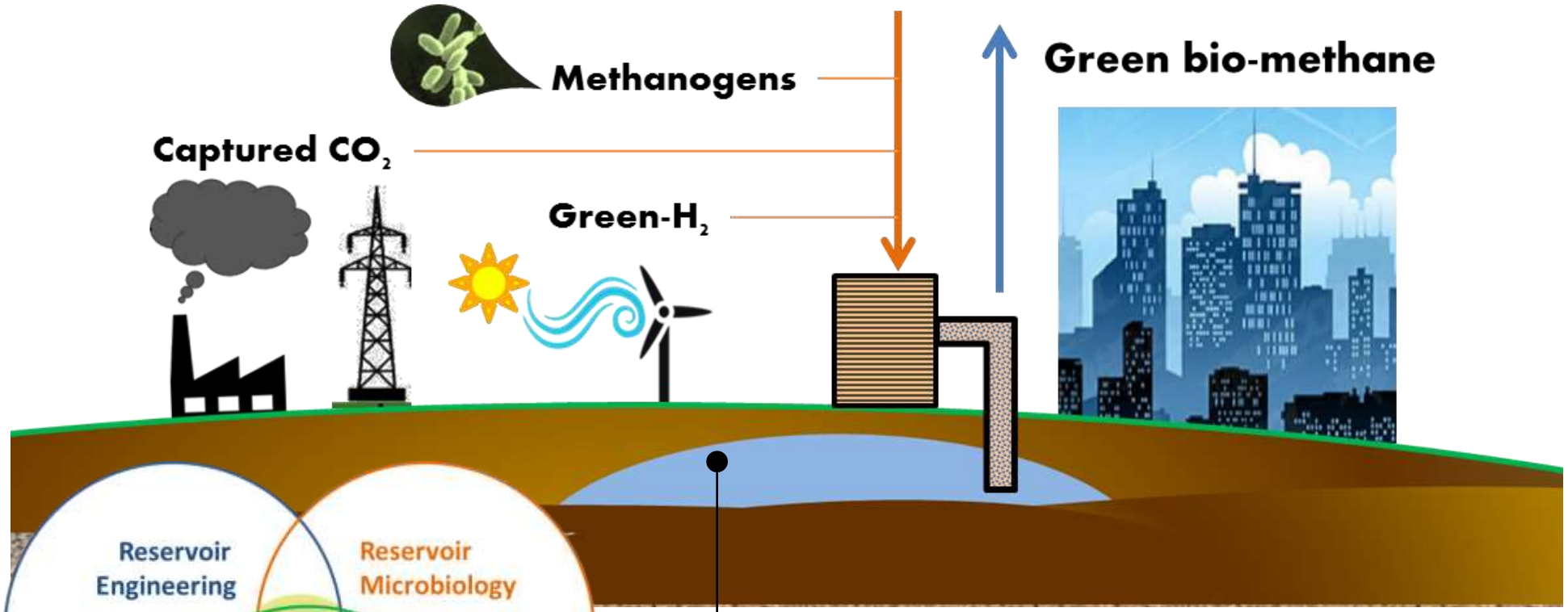
MF1
CO2 conversion to lactic acid with *Synechocystis*

MF2
Synthesis of PHA from CO2 + H2 with *Cupriavidus necator*

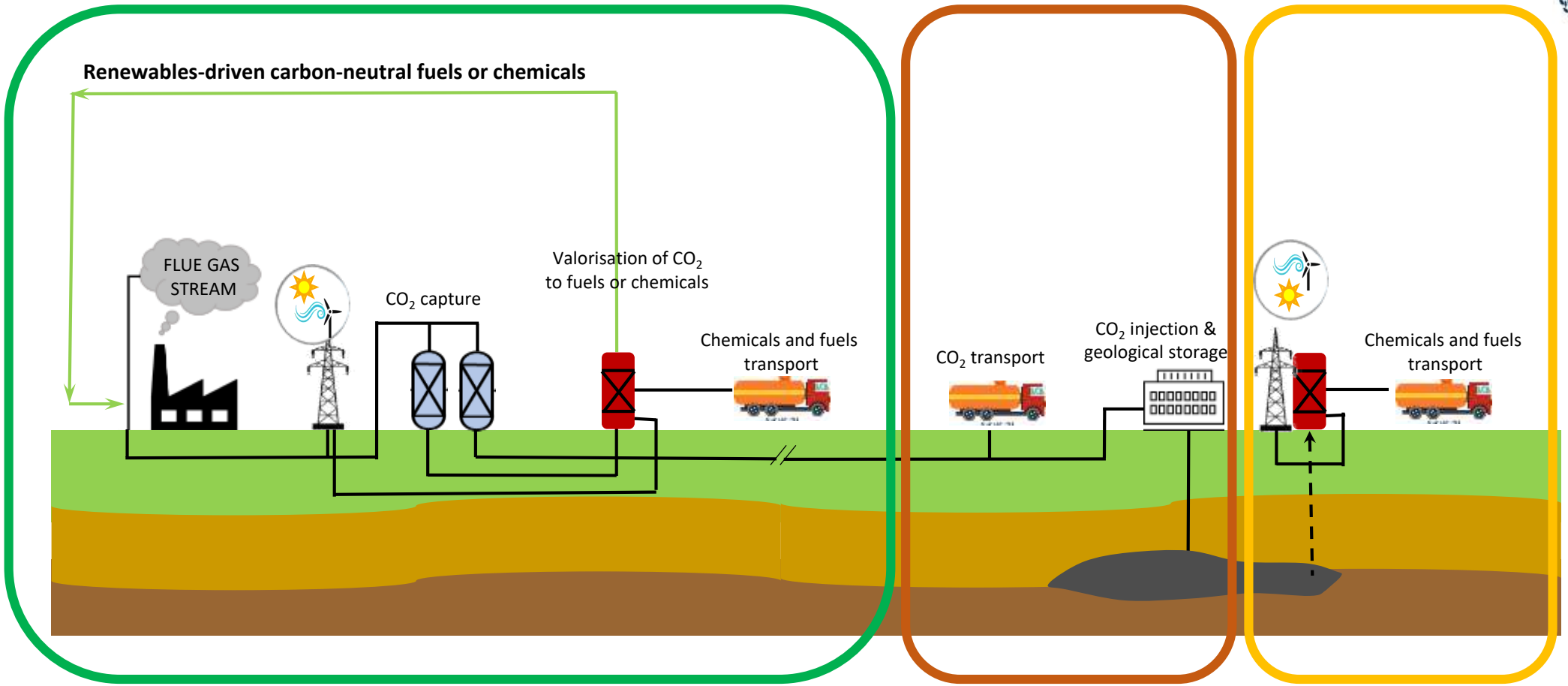
MF3
Synthesis of acetone from CO2 + H2 with *Acetobacterium woodii*.



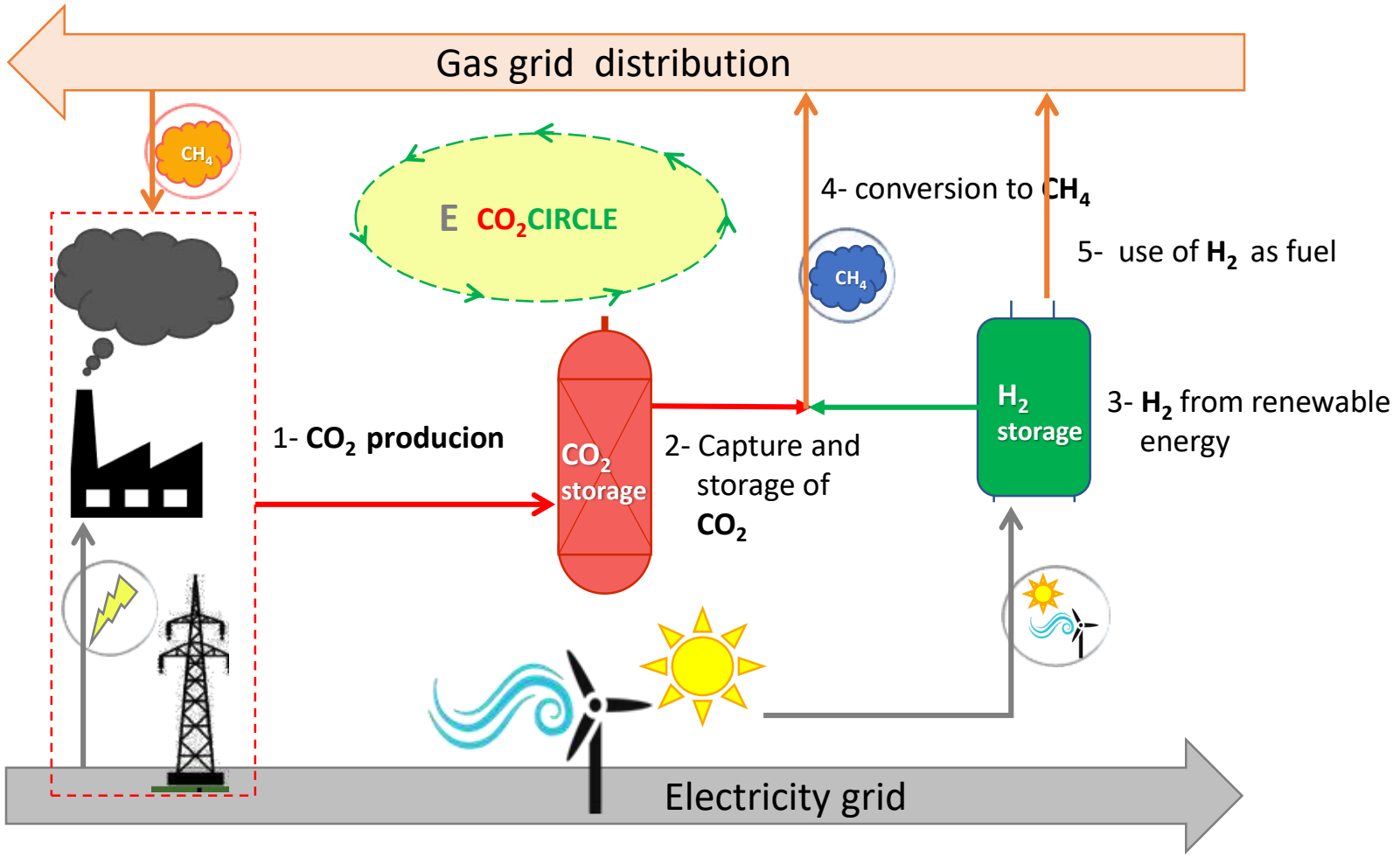
Sustainable underground H2 and CO_2 storage



Carbon Capture Usage and Storage (CCUS) roadmap



H2@IIT roadmap



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GRAZIE PER L'ATTENZIONE

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