Welcome to:

Zoom Webinar
BioRECO2VER
Value from CO2:
The Power of
Biotechnology
23 Nov 2021 | 14:00 – 17:00 CET

Practical information

- **Questions**: Please type your questions in Q&A window and address to specific speaker by starting with @speaker name
- **Survey**: Please answer a few general questions in survey (before break)
- **Presentation-Slides**: Presented materials will be available for download on the project website www.bioreco2ver.eu

Agenda

Time	Title	Presenter
14.00	Introduction to the workshop and BioRECO$_2$VER project	*Heleen De Wever, VITO*
14.10	Current market situation: CO_2 as chemical feedstock for polymers	*Pauline Ruiz, nova-Institute*
14.25	CO_2 capture by hybrid chemo-enzymatic process	*Io Antonopoulou, Luleå University of Technology*
14.40	New microbial platforms for CO_2 conversion	*Giuliana d'Ippolito, National Research Council Italy*
15.05	Bio-electrochemistry for CO_2 conversion	*Sebastià Puig, University of Girona*
15.20	(Pressurized) fermentation for CO_2 conversion	*Heleen De Wever, VITO - Jean-Luc Dubois, Arkema*
15.35	**Break**	
15.45	Process and metabolic modelling and Multidisciplinary Design Optimization	*Álvaro Cabeza, IDENER Scientific Computing*
16.00	LCA and social acceptance of CO_2-based products	*Niels de Beus, nova-Institute*
16.15	Biological methanation: An industrial-scale application for energy storage, CO_2 reuse and renewable fuel	*Jose Rodrigo Quejigo, Electrochaea*
16.30	Carbon Capture and Utilization and the EU policy context	*Anastasios Perimenis, CO_2 Value Europe*
16.45	Q&A	
17.00	End of workshop	

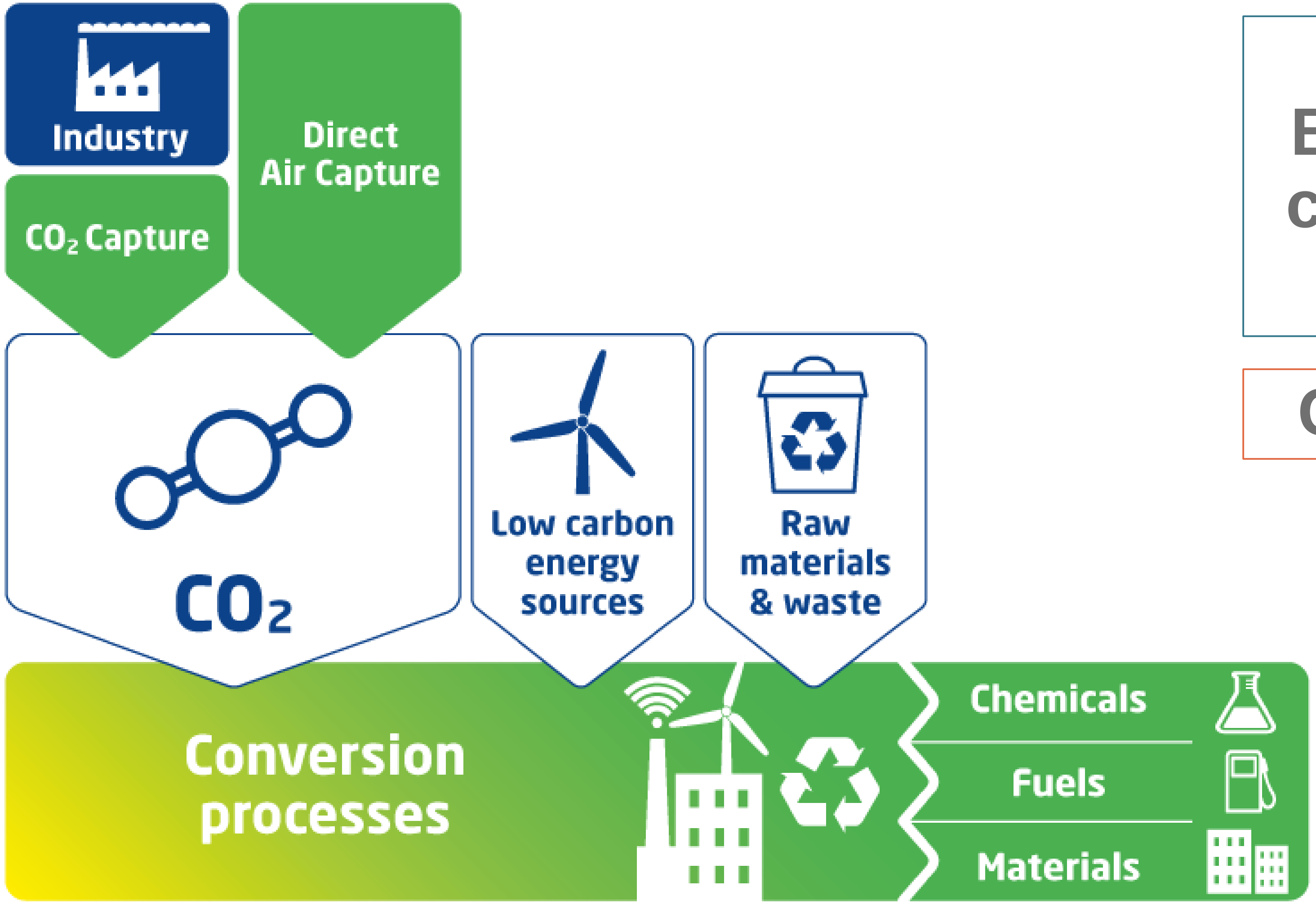
Introduction to the workshop and BioRECO$_2$VER project

Heleen De Wever and project partners, Online webinar, 23 November 2021

Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 760431.

Carbon Capture and Utilization (CCU)



Source: https://www.co2value.eu/ccu/

BioRECO$_2$VER: Biological routes for CO_2 conversion into chemical building blocks

CO_2 <> CO

Research

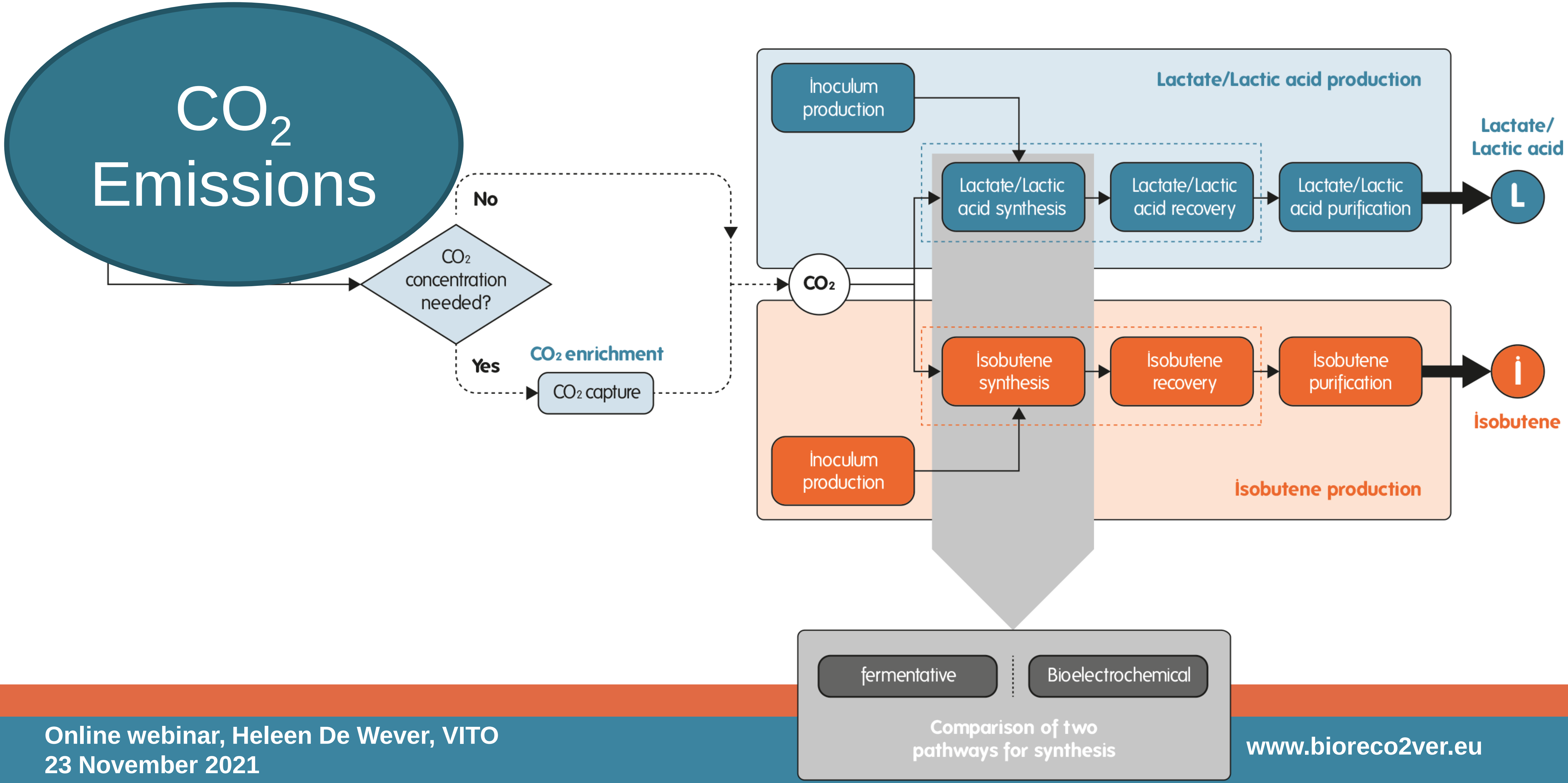
Strong industrial involvement

Why biotechnology?

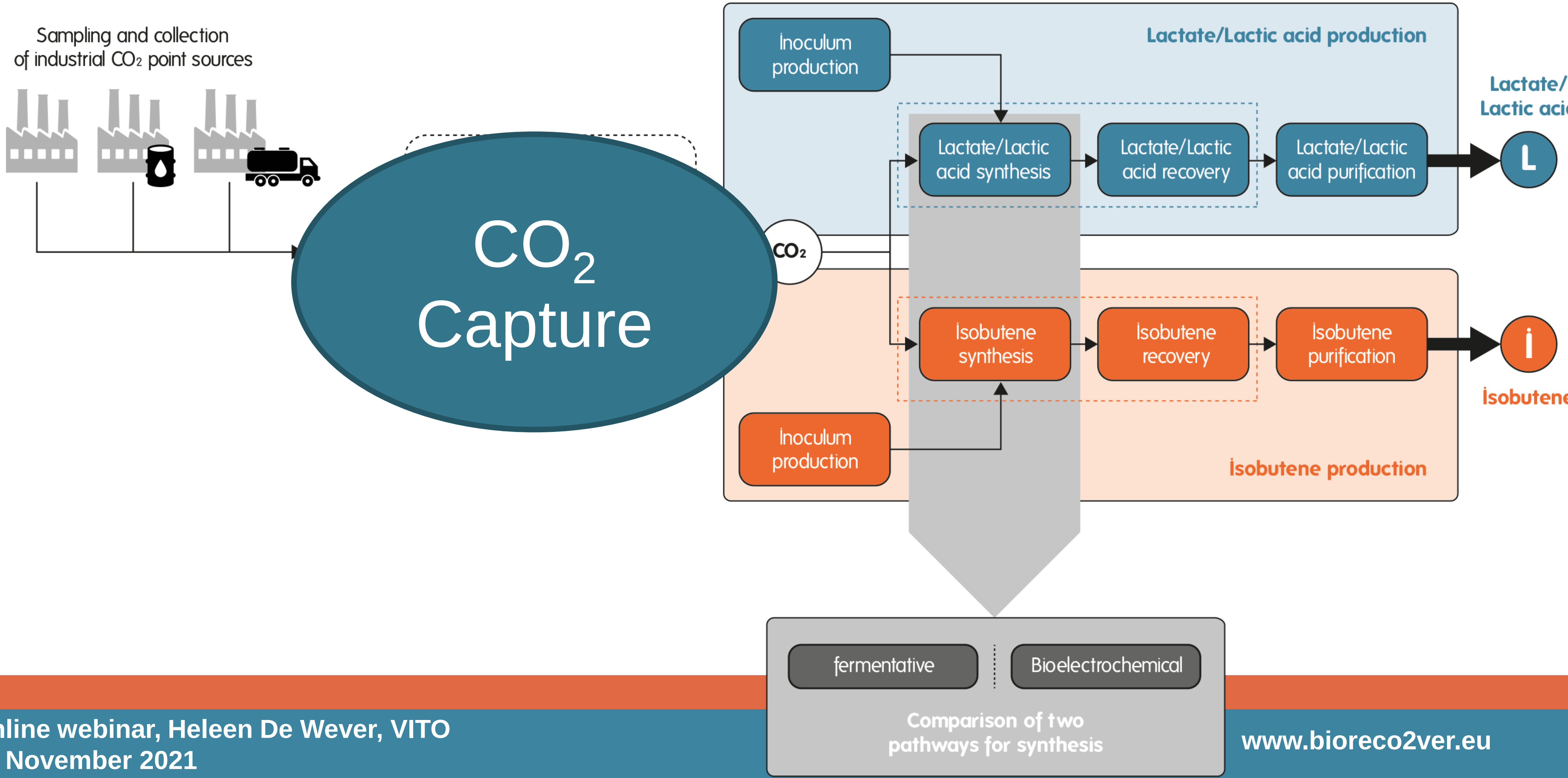
Chemocatalysis	Biotechnology
• (Precious) Metal catalysts – Replacement/recycling	• Whole cell catalysts - Self reproducing
• Reactions at high temperatures and pressures	• Reaction at milder/ambient conditions (safety, sustainability)
• Broader range of optimal conditions	
• Low specificity/selectivity of the catalysts	• High specificity/selectivity
• Usually C1 chemicals	• Also more complex molecules
• Gas phase reaction	• Aqueous media
• High conversion rates	• Low productivity / turnover rates
• Product concentration high	• Products in dilute (aqueous) stream (and sensitive to product toxicity)
• Low tolerance to contaminants or variations gas composition → gas pre-treatment/conditioning	• High tolerance for gas impurities and variations in gas composition

Sources: Lee et al. (2019), Köpke and Simpson (2020), Refai (2021)

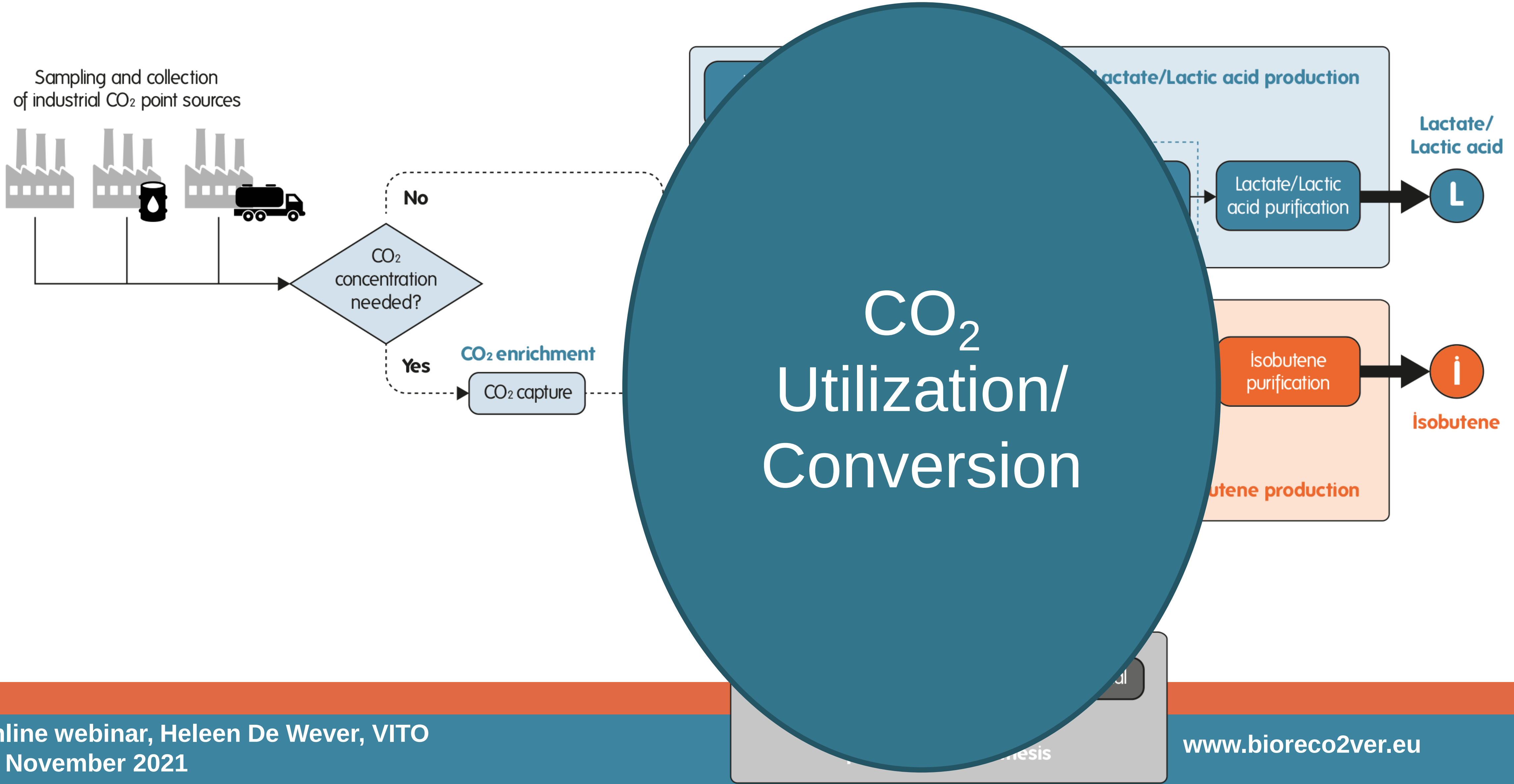
Overall project concept



Overall project concept



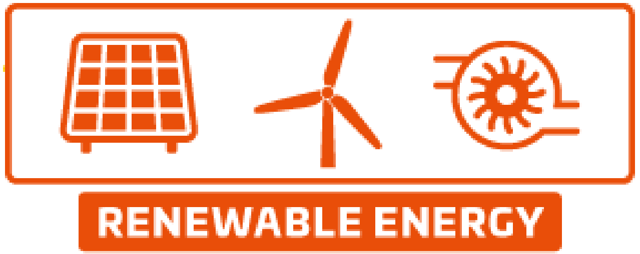
Overall project concept



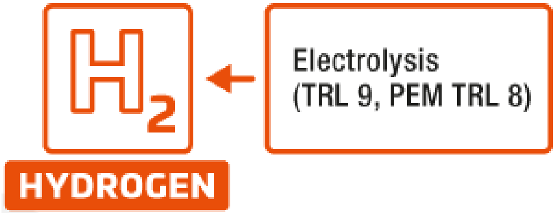
Microbial CO_2 conversion

- 2 technologies

Bioelectrochemical systems



[High pressure] fermentors



Microbial CO_2 conversion

- **3 microbial platforms**

Microbial platforms		T range	O_2 tolerance	Target product	Partner
Autotrophic	Clostridial strain	Mesophilic	Anaerobic	Isobutene	Global Bioenergies
	Cupriavidus necator	Mesophilic	Aerobic	Lactate	Enobraq
Capnophilic	*Thermotoga neapolitana*	Hyper-thermophilic	Strictly anaerobic	Lactate + H_2	Consiglio Nazionale delle Ricerche

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ORLEN
LULEÅ UNIVERSITY OF TECHNOLOGY
GLOBAL BIOENERGIES
Enobraq
Consiglio Nazionale delle Ricerche
vito
Universitat de Girona
CEMENTOS PORTLAND VALDERRIVAS
idener SCIENTIFIC COMPUTING
ARKEMA INNOVATIVE CHEMISTRY
nova Institute for Ecology and Innovation
NatureWorks

Thank you for your attention!

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BioRECO2VER

The Project | Background & Consortium | Publications | Media | Contact | Internal area

PUBLICATIONS

www.bioreco2ver.eu

Publications

-W. Van Hecke; R. Bockrath; H. De Wever (2019): Effects of moderately elevated pressure on gas fermentation processes, DOI: 10.1016/j.biortech.2019.122129

-V. Luongo; A. Palma; E. R. Rene; A. Fontana; F. Pirozzi; G. Espositio; P. N.L. Lens (2018): Lactic acid recovery from a model of Thermotoga neapolitana fermentation broth using ion exchange resins in batch and fixed-bed reactors, DOI:10.1080/01496395.2018.1520727

-G. Dreschke, G. d'Ippolito, A. Panico, P. N.L. Lens, G. Esposito, A. Fontana (2018):Enhancement of hydrogen production rate by high biomass concentrations of Thermotoga neapolitana, DOI: 10.5281/zenodo.3247830

-G. Nuzzo; S. Landi; E. Nunzia; E. Manzo; A. Fontana; G. d'Ippolito (2019): Capnophilic Lactic Fermentation from Thermotoga neapolitana: A Resourceful Pathway to Obtain Almost Enantiopure L-lactic Acid, DOI: 10.3390/fermentation5020034

-N. Pradhan; G. d'Ippolito; L. Dipasquale; G. Esposito; A. Panico; P.N.L. Lens; A. Fontana (2019): Simultaneous synthesis of lactic acid and hydrogen from sugars via capnophilic lactic fermentation by Thermotoga neapolitana cf capnolactica, DOI: 10.5281/zenodo.3247821

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