EU cofin Project Annual Report 2018
The EU projects that receive co-finance from the top sectors must submit an annual report on their technical and financial progress. This format is to be used for reporting the technical progress. The report must be submitted by 15 February 2019 to Hans van der Kolk

General information	
TKI Number of the project	AF-EU-18004
Title	*BIOCONCO2- BIOtechnological processes based on microbial platforms for the CONversion of CO2 from iron steel industry into commodities for chemicals and plastics*
project leader WR (e-mail address)	Ana.lopez-contreras@wur.nl Carmen.boeriu@wur.nl
Address project website	https://biocon-co2.eu/
Start date	01-01-2018
End date	31-12-2021

Short description/aim project (this information can be published on a website of the TKI/Topsectors)

The main objective of BIOCONCO2 is to develop and validate in industrially relevant environment a flexible strategy to biologically transform CO2 into added-value chemicals and plastics. The proposed platform is based on three main stages(Figure 1): i) STAGE 1: CO2 solubilisation technologies, ii) STAGE 2: bioprocess development and iii) STAGE 3: downstream technologies. Several technologies and strategies will be developed for each stage that will be combined as "puzzle pieces" to optimize the processes depending on i) the target chemical to be produced and ii) the required biological system to be used (microorganism or enzymes) and their properties. Aiming to prove the versatility and flexibility of the proposed strategy, BIOCONCO2 will develop 4 cell factories based on low-energy biotechnological processes using CO2 from iron&steel industry as a direct feedstock using three different biological systems: anaerobic microorganisms, aerobic microorganisms and enzymes.

Planning and progress Is the project going according to plan? Are there any substantive bottlenecks? If yes, please explain with a brief description of the current situation

The project started on 1st January 2018 and is proceeding according to plan.

Highlights and deliverables in 2018 / so far (this information can be published on a website of the TKIs/Topsectors)

The use of CO2 as a feedstock for producing chemicals and plastics via biological processes is highly promising and valuable mainly because i) CO2 is an abundant EU resource for a wide range of chemicals and polymers, ii) its use avoids the overexploitation of natural resources and iii) GHG emissions are reduced and reused. In this frame, CO2 become a secondary raw material and valuable commodity rather than a pollutant, provided that a cheap and renewable energy source is available. Although biotechnological processes offer significant advantages compared with chemo-catalytic conversions, more research on their industrial implementation for CO2 valorisation is needed in order to overcome their current drawbacks: i) low yield and/or low productivity, ii) energy

requirements and iii) capability of microorganisms and/or enzymatic systems to process raw CO2 in the concept, as well as handicaps related to CO2 concentration and purity. Moreover, the success of CO2 valorisation technologies and their penetration in the EU market will depend on developing processes which can be feasibly scaled up to an industrial level.
BIOCON-CO2 project research team is working to develop strategies to biologically transform CO2 into added-value chemicals and plastics and to validate them in industrially relevant environment.
In order to create a database of gas composition, the CO2-producing industrial partners (Arcelormittal, Nesher and Laborelec Engie), are analysing and integrating statistics of gaseous effluents from different gas streams. This database, whose preliminary results have already been shared with the rest of the project beneficiaries, will be available within the consortium for modelling, lab-scale and pilot scale studies. Work at WFBR on enzymes technologies and CO2 fermentations has been started. On the enzymatic part, WFBR has characterized NAD^+-dependent formate dehydrogenase from *Candida boidinii* (*Cb*FDH) and an NAD-dependent glucose dehydrogenase (GDH) to regenerate in situ the NADH. Also, the gas composition of the gas streams from AM and Nesher and evaluated their potentiality to produce formic acid. WFBR has also started characterizing the inhibitory effect of contaminants present in this gas streams.

Number of delivered products in 2018 (in an appendix, please provide the titles and/or description of the products or a link to the products on public websites)

Academic articles	Reports	Articles in journals	Introductions/workshops
	2 deliverables (not public)		1 (EFIB)

Appendix: Names of the products or a link to the products on a public website

Non-scientific congresses

Stand at EFIB 2018, Toulouse (France), 16-18 October 2018.