



ERA CoBioTech

BIO TECH RESEARCH AND INNOVATION HACK 2021

Kick Off of the 3. call projects of ERA CoBioTech

Project name: Replacing food-competing feedstocks with
Methanol, **C**O₂ and **M**ethylamine **for** a **S**ustainable
Bioeconomy

Project acronym: MCM₄SB

Name: Berna Sarıyar Akbulut



This project has received funding from the European Union's Horizon
2020 research and innovation programme under grant 722361

27.09.2021



- **Norwegian University of Science and Technology**, Department of Biotechnology and Food Science (Norway)
Trygve Brautaset (*project leader*), Marta Irla, Luciana Fernandes de Brito, Fernando Perez-Garcia, Marina Gil López
 - **Marmara University**, Department of Bionegineering (Turkey)
Berna Sarıyar Akbulut (*coordinator*), N. Alpagu Sayar, Pemra Ozbek Sarıca, F. Ece Altınışik Kaya
 - **Acies Bio d.o.o.** (Slovenia)
Gregor Kosec (*coordinator*), David Virant
- Self-funded partner*
- **Bielefeld University**, Biology and Center for Biotechnology (Germany)
Volker F. Wendisch (*coordinator*), Julia Eikmeier, Laura Keller

- Project start and end date: 1 April 2021 – 1 April 2024
- Total project budget: 876000 €



Sept-09-2021: Hybrid project meeting @ Trondheim (NO) and online

Call theme

“Bio-based replacement products, technologies and processes” with strong emphasis on *sustainability*

C1 sources

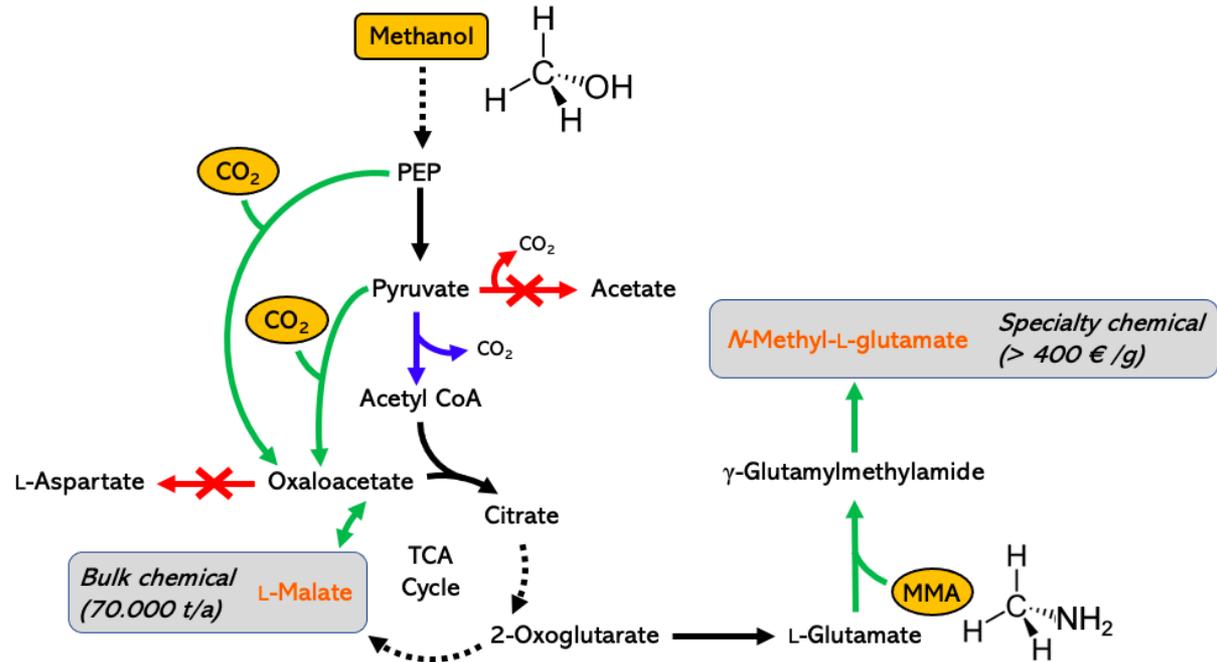
- ✓ Methanol
- ✓ Carbon dioxide
- ✓ Methylamine

Products

- ✓ L-Malate
- ✓ N-methyl-L-glutamate

Microorganisms

- ✓ *Bacillus methanolicus* MGA₃
- ✓ *Methylobacterium extorquens* AM₁





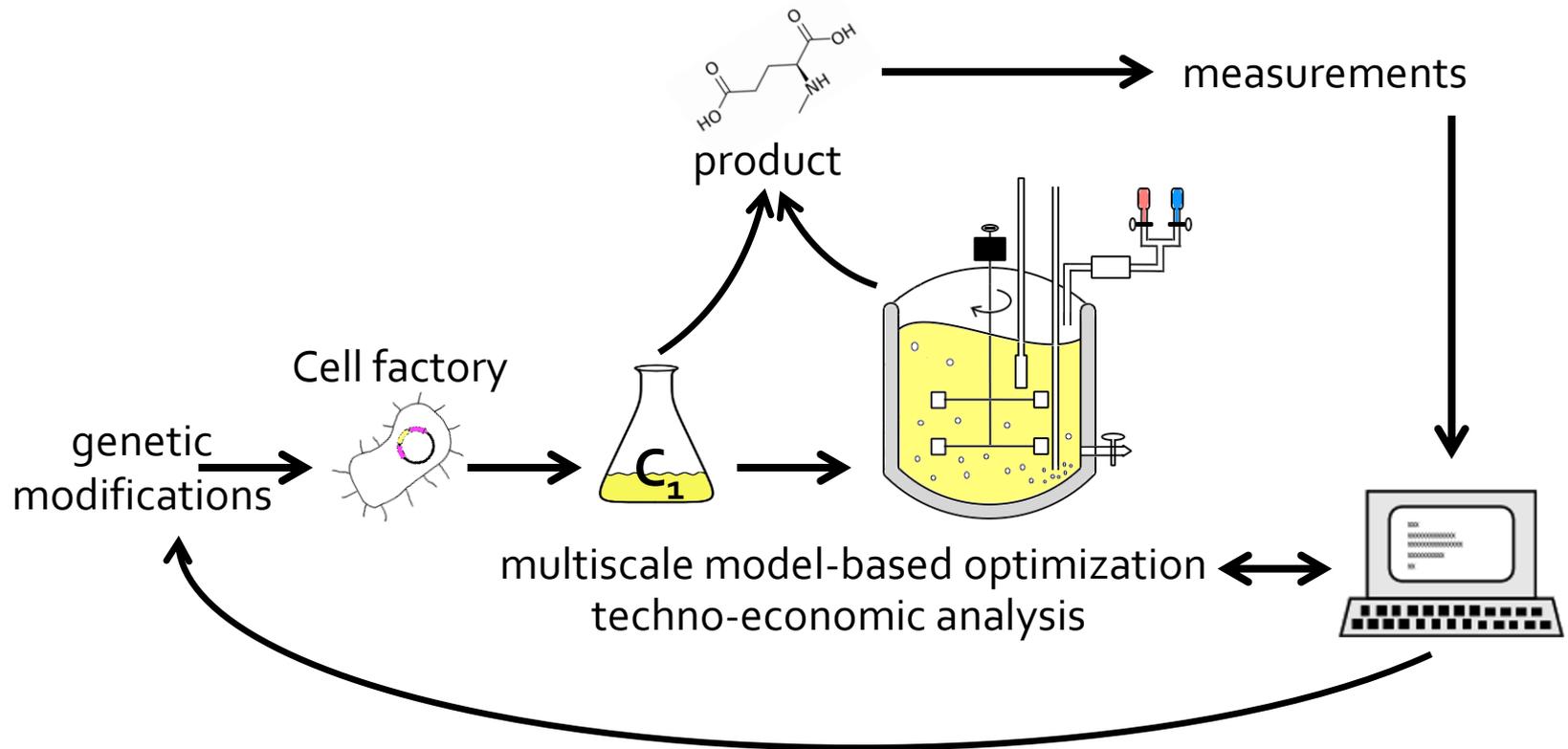
● *B. methanolicus*

- ✓ Gram-positive
- ✓ Methylophilic & thermophilic
- ✓ C₁ assimilation via ribulose monophosphate
- ✓ Feasible for industrial applications
 - glutamate, lysine
 - engineered for cadaverine, acetoin, etc.
- ✓ Genetic tools for gene expression and silencing
- ✓ ¹³C MFA describes metabolic states

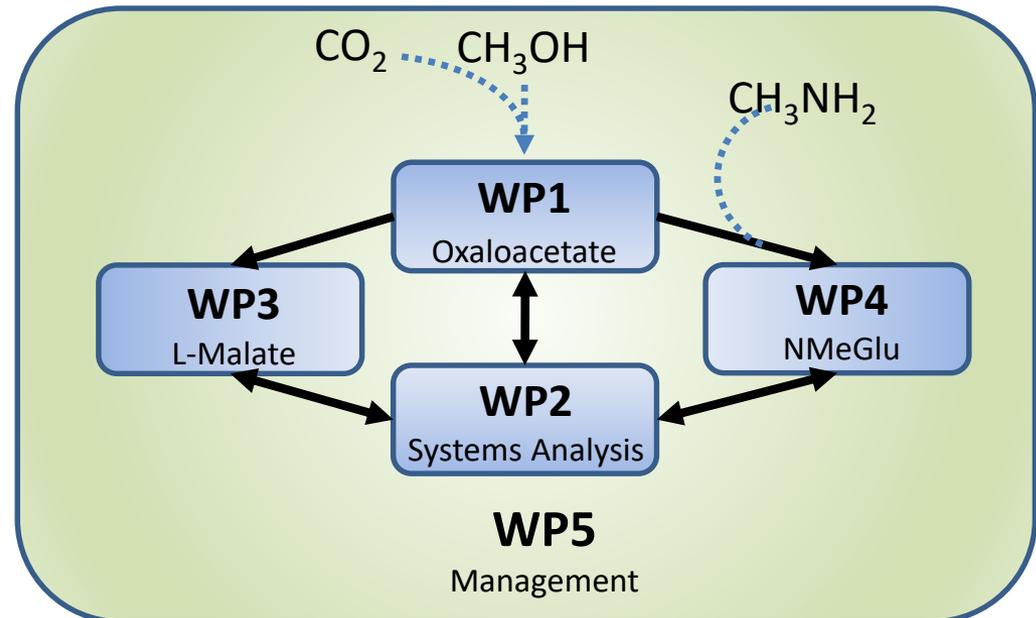
● *M. extorquens*

- ✓ Gram-negative, GRAS
- ✓ Methylophilic & mesophilic
- ✓ C₁ compounds via the serine cycle
- ✓ Focus in industrial settings over the past few decades
 - CO₂ fixation
 - Methylamine assimilation
- ✓ Plethora of genetic tools
- ✓ GSM available

synthetic biology & systems biology & bioinformatic tools & biotechnological approaches



- **WP1:** Oxaloacetate accumulation from methanol and CO₂ (NTNU)
- **WP2:** Systems-based analysis for strains design and optimization (MarmaraUni)
- **WP3:** Establishment of L-malate production from methanol and CO₂ (Acies)
- **WP4:** Conversion of methanol and methylamine to NMeGlu (UniBi)
- **WP5:** Management, Dissemination, RRI, and TEA



Data management

Team

DMP-representative- Prof. Volker F. Wendisch (UNIBI)

PAL-Modeler- Prof Dr. Berna Sariyar Akbulut (MarmaraUni)

PAL- Experimental- Dr. Marta Irla (NTNU)

- ✓ Data acquisition
- ✓ Data storage and curation
- ✓ Data accessibility
- ✓ Data-sharing

3 Level communication strategy

Increased awareness of sustainable C1-based feedstock utilization for bio-based products to decarbonize the economy, to reduce the reliance on fossil feedstocks and to avoid competition with the food and feed industries

<i>Priority level</i>	<i>Audience</i>	<i>Method</i>
1	Policy makers	Newsletters/Leaflet/Workshop
2	Biotech/pharma/chemical professionals	Fairs/Exhibitions/Info day
3	General public	Website/Social media/Seminars

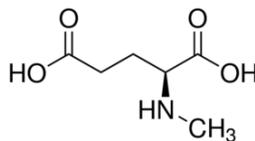
Dissemination

Scientific publications, presentations in conferences, patenting

Responsible research and innovation plan

- RRI experts of the project
 - ✓ Prof. Roger Strand will lead the RRI research and activities
 - ✓ Project leader is the Digital Life Norway Center leader
- Workshop
 - ✓ Transdisciplinary biotechnology and RRI perspectives
- International perspective
 - ✓ Project is an interesting arena for further development of good RRI practices

- Microbial platform for *economical* and *sustainable* production
 - ✓ Expansion of metabolism to utilize different C₁ compounds
 - bulk chemical, L-malate
 - specialty chemical, *N*-methyl-L-glutamate
 - ✓ Platform strains for further development
 - Requires 'affordable' and 'economic' carbon capture and storage technologies



- Transnational cooperation between academia and industry
 - ✓ Involvement of the SME & TEA → translation industrial production

- Prof. Trygve Brautaset, project leader

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