University of Natural Resources and Life Sciences, Vienna

Valorization of by-products and wastes via the carboxylate platform within the projects ValorPlast and VOLATILE

University of Natural Resources and Life Sciences, Vienna
Department for Agrobiotechnology (IFA-Tulln)
Institute for Environmental Biotechnology

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Markus Neureiter

Carboxylate Platform

University of Natural Resources and Life Sciences, Vienna

Heterogeneous Biomass
Biogenic Wastes, Residues, Agricultural Biomass
(Polysaccharides, Lipids, Proteins)

Hydrolysis

Acidification
(“Primary Fermentation”)

Mixed Culture Fermentation

Intermediates
Short-chain Carboxylates, Ethanol

… **“Secondary Fermentation”**

Mixed or Pure Culture Fermentation

Products/Building Blocks
(CH_4, H_2, Actetate, Solvents, PHA, Lipids, ...

Project “ValorPlast”

Valoriziation of Sugar Industry By-Products for the Production of Bioplastics

University of Natural Resources and Life Sciences, Vienna

Funding:

“Produktion der Zukunft – Biobased Industries”

Cooperative R&D-Project (Industrial Research)

Duration: 01.03.2016 – 28.02.2019

5 Partners:

“ValorPlast” – Aims:

1

Desugarized Molasses

Characterization of Desugarized Molasses

Fermentation with Halotolerant Strains

Polymer Extraction and Characterization

PHBHV

By-Products from Sugar Production

Substrate Pre-Treatment and Characterization

Screening of Microbial Strains

Biotechnological Conversion Process Development

Material Properties and Potential Applications

Economical and Ecological Process Evaluation

Bioplastics

2

Sugar Beet Pulp

Characterization of Sugar Beet Pulp

Hydrolysis & Acidification

Fermentation with VFAs

Polymer Extraction and Characterization

mcl PHA

“ValorPlast”
Acidification of Sugar Beet Pulp:

bioenergy2020+

Optimization of Process Conditions:

Labscale Experiments (1 L)

- **Inoculum**
- **Temperature** (mesophilic/themophilic)
- **pH**
- **Pre-Treatment**
  (size reduction of sugar beet pulp)
- **Hydraulic Retention Time**

Production of VFA-Substrate for PHA-Production:

Semi-Continous Acidification at 250 L Scale

“ValorPlast”
Production of mcl-PHA

University of Natural Resources and Life Sciences, Vienna

Process Development:

Labscale Experiments in Parallel Bioreactor Sytem (Dasgip)

- **Production Strains** (*Pseudomonas* sp.)
- **Nutrient Requirements**
- **Addition of VFA-Substrate in Fed-Batch Mode**
- **Results:**
  - 35–45% mcl-PHA in Cell Dry Weight
  - Polymer Composition:
    PHH (1.5–3.0%), PHO (36–37.5%), PHD (61%)

Next Steps:

- **Production of 4 kg mcl-PHA from Acidified Sugar Beet Pulp (Pilot Plant Facility)**
- **Evaluation of the Material Properties**

Biowaste derived volatile fatty acid platform for biopolymers, bioactive compounds and chemical building blocks

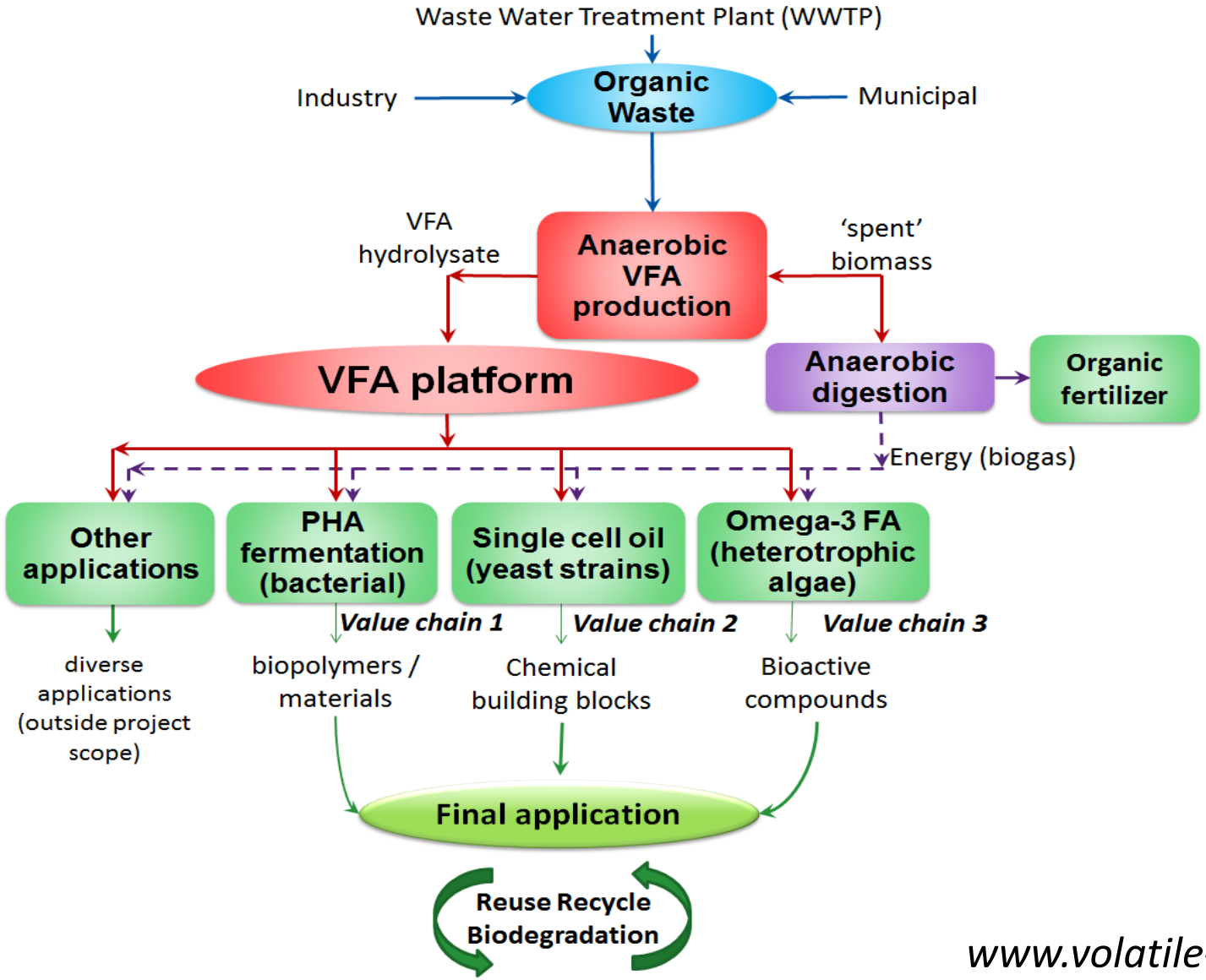
H2020 Project, 21 Partners

Coordinator: Tecnalia Research & Innovation (Spain)

Duration: 01.12.2016 – 30.11.2020

This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 720777

Aims & Objectives



www.volatile-h2020.eu

Volatile

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Aims & Objectives

Volatile Fatty Acid Platform

based on anaerobic digestion from heterogeneous waste streams

- **Waste Water Treatment**
- **Municipal Waste**
- **Industry (Food, Agricultural**)

– Optimization of VFA production
– Scale-up
– VFA Recovery

Development of 3 Process Chains

- **PHA** based biopolymers
- Chemicals & chemical building blocks based on **Single Cell Oil (SCO)**
- **ω-3-Fatty Acids** as value-added bioactive compounds

– Strain selection
– Process development & optimization
– Scale-up and DSP development

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Volatile

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Aims & Objectives

Case Study Implementation

- Feedstock analysis
- State of the art
- Market demand
- 8 case studies

Market Barrier & Stimuli

- Product quality requirements
- Legal barriers & stimuli
- Economic assessment and subsidy policy

Business Case Developments

- Integration & optimization (agent based modelling)
- Standardization (CEN Workshop & Roadmap)
- Web-based decision support system

Economic Feasibility Study and Life Cycle Assessment

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