



*Chemical building blocks from versatile
MSW biorefinery*

Chemische Grundstoffe aus kommunalen Abfällen

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Stakeholderdialog Biobased Industry
Wien, Wirtschaftskammer
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- ▶ **Consortium**
12 partners from 9 European countries
- ▶ **Total budget: € 3.394.181**
- ▶ **EU grant: € 2.518.517**
- ▶ **Duration: 6/2017- 5/2020 (36 month)**

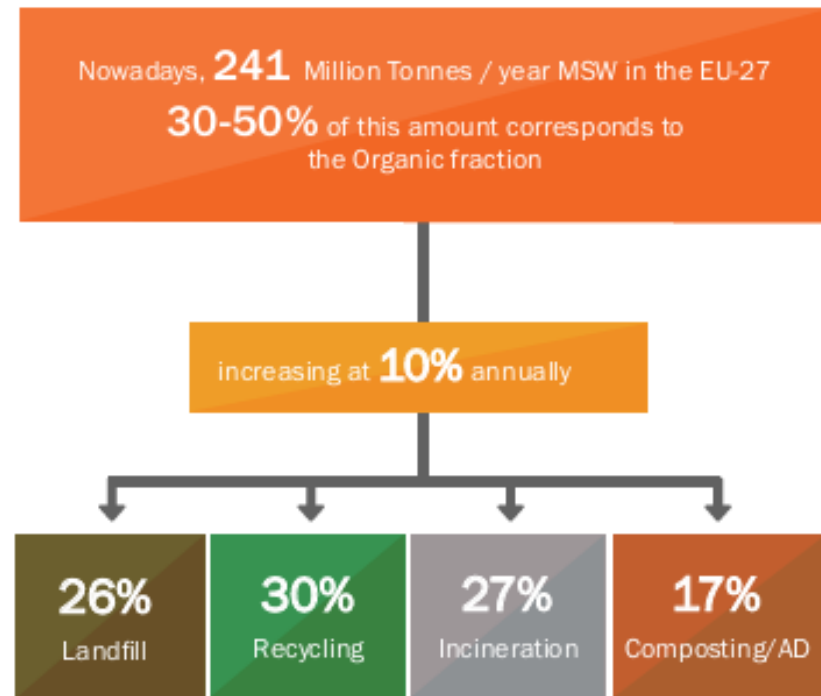


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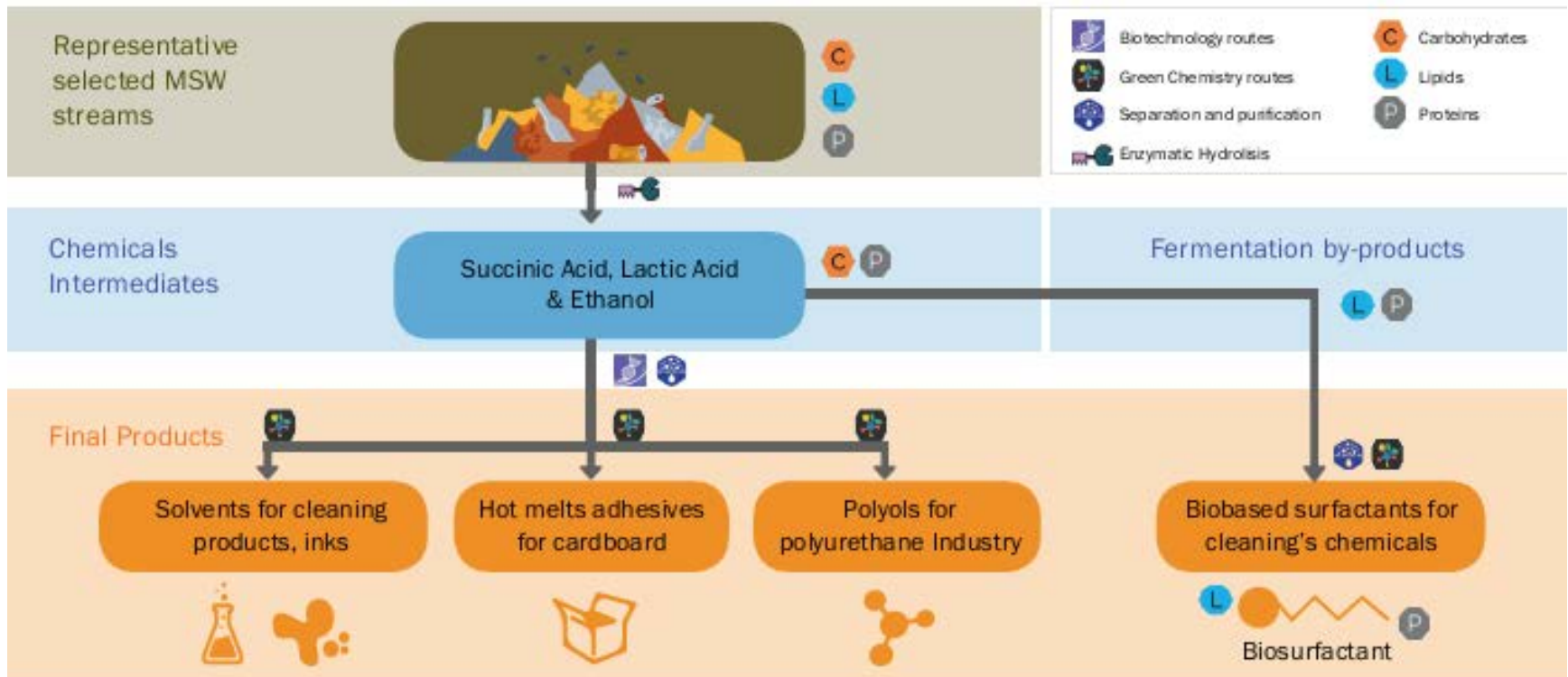
- ▶ Utilize the organic fraction of MSW for biorefining
- ▶ Develop a robust processing to produce bulk chemicals as intermediates
Lactic acid, Succinic Acid and Ethanol
- ▶ Further processing of intermediates to a range of final products
*solvents (cleaners, inks), hot melt adhesives
polyols & polyurethanes, surfactants*
- ▶ Assessment - technical/economical/environmental

- ▶ Waste is **THERE** and a cost factor too!
- ▶ Collection systems in place
- ▶ Organic fraction is significant (30-50%)
- ▶ Valorisation possible **BUT** challenging



Reference: Eurostat-2015 http://ec.europa.eu/eurostat/statistics-explained/index.php/Municipal_waste_statistics

➤ Feedstock -> intermediates -> final products



© Percal-project.eu

Enzymatic Hydrolysis
Fermentation Ethanol



© PERSEO Bioethanol

Demo

Fermentation
Lactic Acid, Succinic Acid



© ATB Potsdam

Lab, Bench, Pilot

Reactive Extrusion



© AIMPLAS

Bench, Pilot

Reactive Distillation



© tbw research

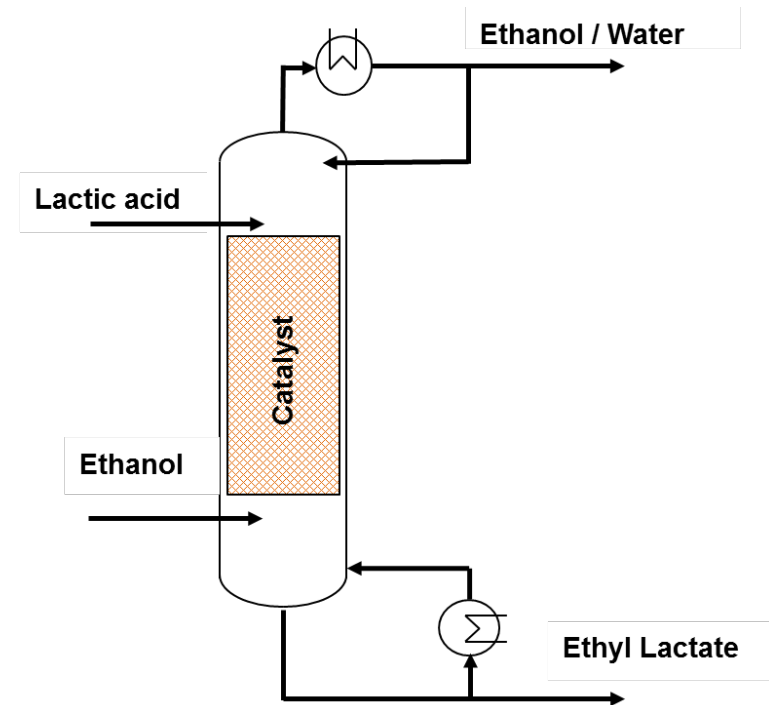
Lab, Pilot

other
process's
development
at
Lab/ Bench
scale

- › **Organic fraction of MSW is a very variable feedstock**
- › **Feedstock is not fresh at all – natural decomposition**
- › **Need for very robust processes along the pathway**
- › **Cheap feedstock versus higher processing efforts**
- › **Achieve quality according to technical standards**
- › **Develop efficient & economic process solutions for manifold implementation**

- ▶ Increase organic content recovery from MSW by 25%
- ▶ Fermentable sugars recover 85% of theoretical yield
- ▶ Lactic acid recover > 90% of fermentable sugars
- ▶ Succinic acid recover > 90% of fermentable sugars
- ▶ Shear adhesive strength > 90MPa for hot melt adhesives
- ▶ Reactive distillation for ethyl lactate yields 3-5L/h

- ▶ Ethyl lactate is a very environmental benign solvent
- ▶ Applications: Paints, inks, degreaser, for cleaning products...
- ▶ Reactive distillation for continuous esterification of lactic acid and ethanol with integrated product separation





News



Grants



Standards



Events



Technical Articles



Patents

In this section, you can access to the latest technical information related to the PERCAL project topic.

- 03/12/2018 - Morphology, Thermal, Mechanical Properties and Rheological Behavior of Bionanocomposites (poly(lactic acid)/poly(succinate)/poly(lactic acid) In-Situ Submicrofibrillar Composites
- 03/12/2018 - Isothermal Adsorption Properties for the Adsorption and Removal of Reactive Phosphorus by a Novel Cross-Linked β -Chitosan Glycan as Acid-Resistant Adsorbent
- 03/12/2018 - Composite Hydrogels with the Simultaneous Release of VEGF and HGF for Wound Healing: Engineering Applications
- 03/12/2018 - Investigation on effect of chemical composition of bio-filler on the mechanical properties of bio-reinforced composites using FTIR
- 03/12/2018 - Microwave pre-oxidation for polyacrylonitrile precursor coated with polyacrylonitrile
- 03/12/2018 - Purification of Metallurgical-Grade Silicon by Acid Leaching
- 03/12/2018 - Acidic ionic liquid-functionalized mesoporous melamine-formaldehyde resin as a heterogeneous catalyst for biodiesel production

To date references to app.
11800 publications,
7200 patents,
350 technical standards...

Process residues biorefining

- ▶ Besides of municipal waste process residues are interesting feedstocks for biorefining
- ▶ Examples: Residues from food processing, dairy industry, starch production....garden waste
- ▶ Process residues are
 - defined in composition and quantity
 - availability “on” site - no supply chain needed
 - at reasonable prices

Issues in biorefining of process residues

- ▶ **Current legal framework for wastes is a hurdle**
- ▶ **Products for process residues valorisation are likely to target onto a complete different market**
- ▶ **New business cooperation models are needed to initiate biorefining for more revenues**
- ▶ **Biorefining of process residues requires mostly customized solutions**
- ▶ **Long term thinking / approach is required (investment, ROI)**

Biorefinery Networking

- ▶ AUSTRIA is part of IEA Bioenergy Task 42- Biorefining in a future BioEconomy
<http://task42.ieabioenergy.com/>

- ▶ National Task 42 Biorefining network managed



Michael Mandl (NTL)



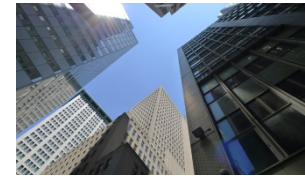
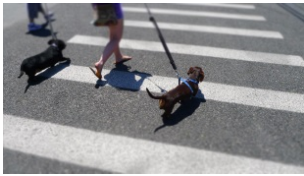
Johannes Lindorfer



Franziska Hesser

- ▶ Newsletters, strategic biorefining & country reports...

JOIN Biorefinery Network !!



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