

The Bio-Based Economy a Company View

Bioboost Colloquium
Brightlands Chemelot Campus, June 5th 2015

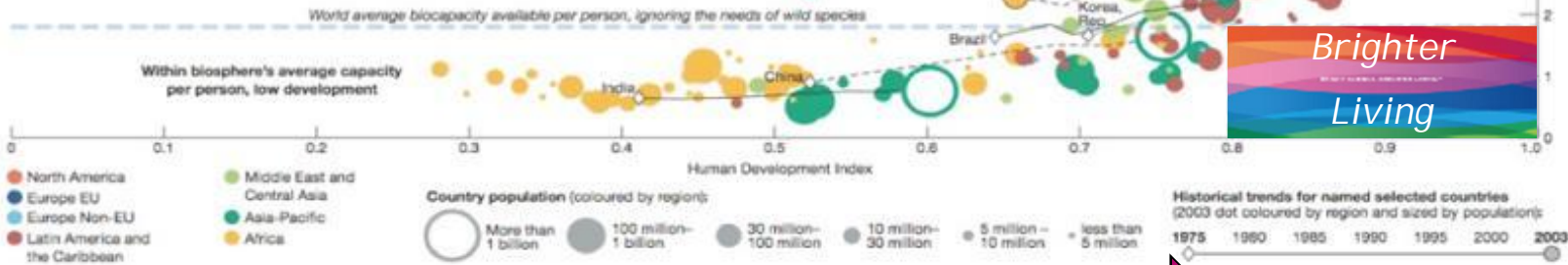
Reinier Grimbergen, PhD
Director Science to Innovate

Our challenge

*Quality of life within our planet boundaries**



Exceeds biosphere's average capacity per person, low development



Closing the Loop (Eco+)

Quality of Life (People+)



Taking a life cycle approach

Measure impact and look for improvement opportunities in all stages of the lifecycle

Eco+



People+

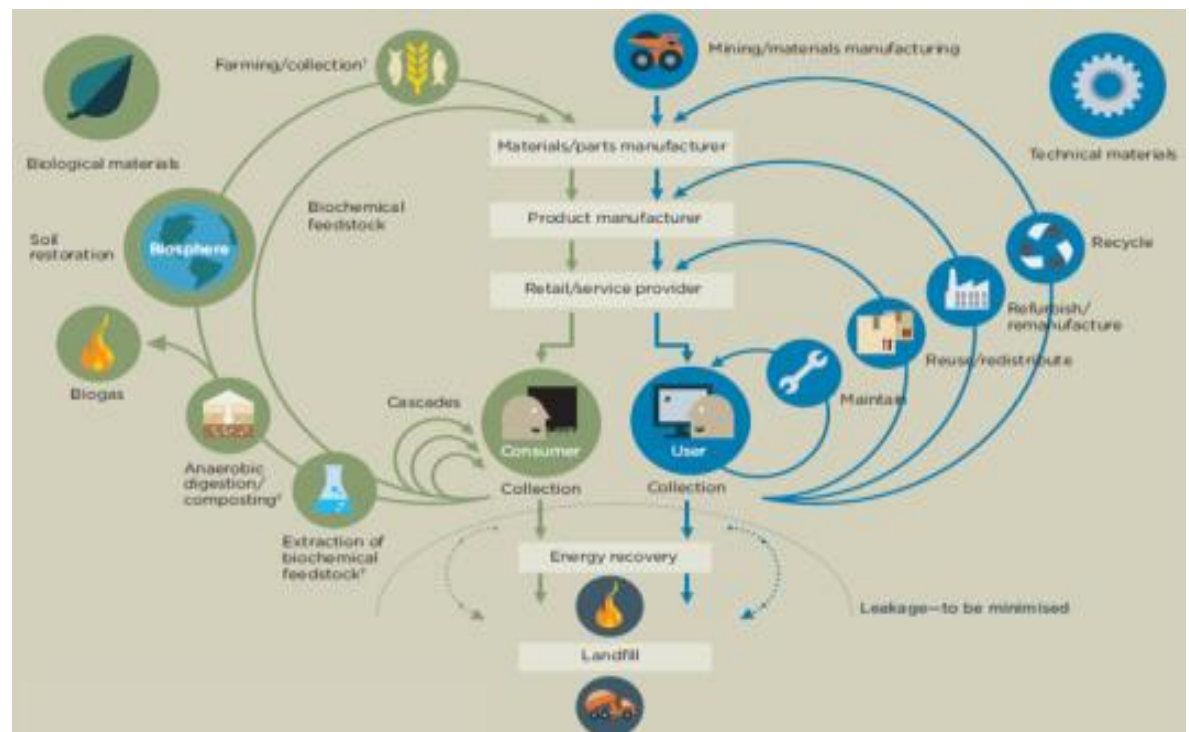


Transition from the linear economy to the circular economy

A circular economy is one that is restorative by design, and which aims to keep products, components and materials at their highest utility and value, at all times*

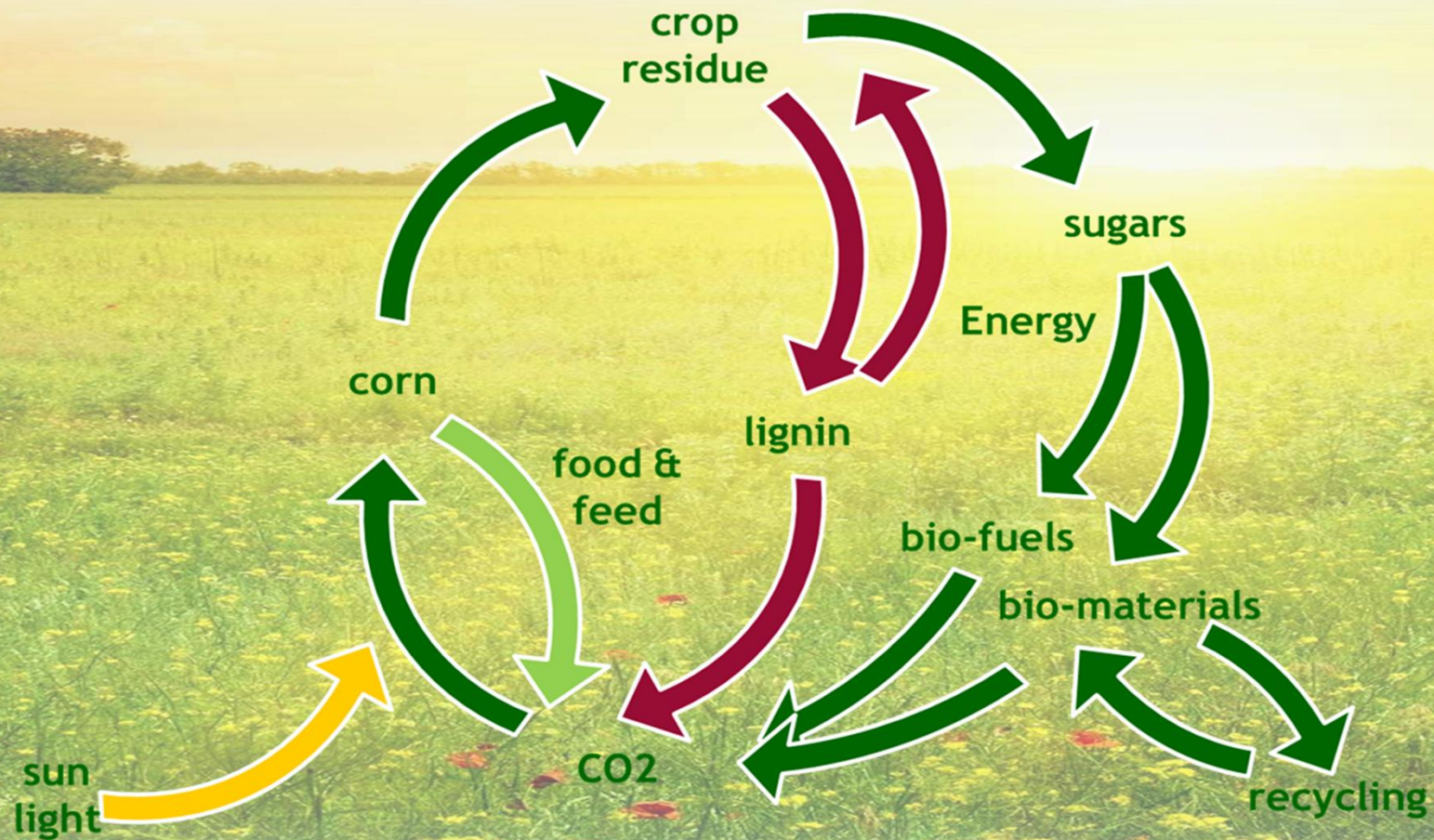


from
linear
to
circular



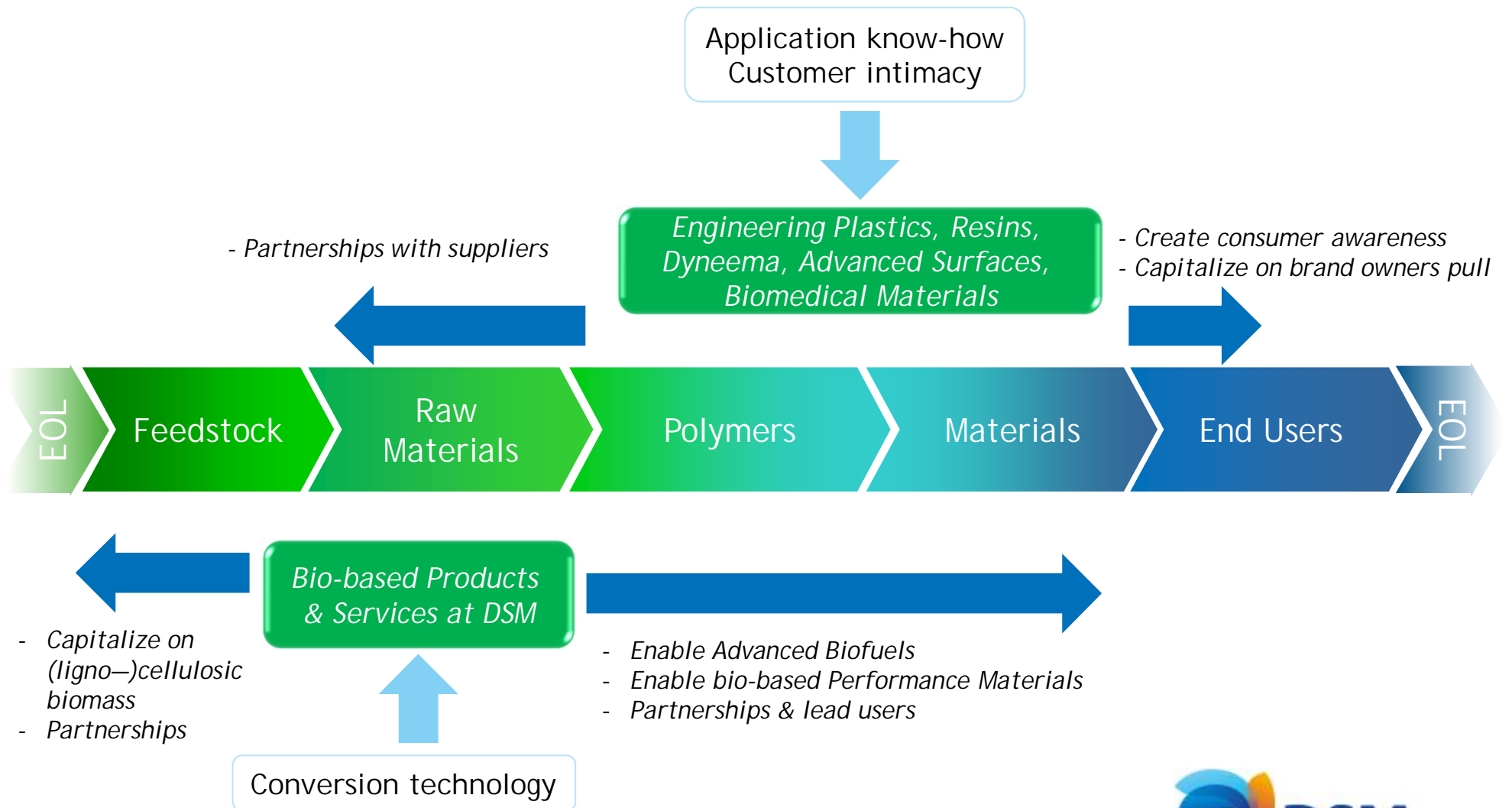
Bio-based Economy = Circular Economy!

Producing Food, Feed, Fuels and Functional Materials



Re-design of Value Chains

Acting in different Positions of the Value Chain



Arnitel[®] Eco

High performance thermoplastic elastomer

Partially made from renewable rapeseed oil

UV and heat resistant



BioBased: EcoPaXX[®] Engine cover

- 70% bio-based engineering plastic
- Metal replacement
- High thermal resistance up to 250 °C
- Reduction of 40% of the CO₂ emissions compared to conventional polyamides

Mercedes A class

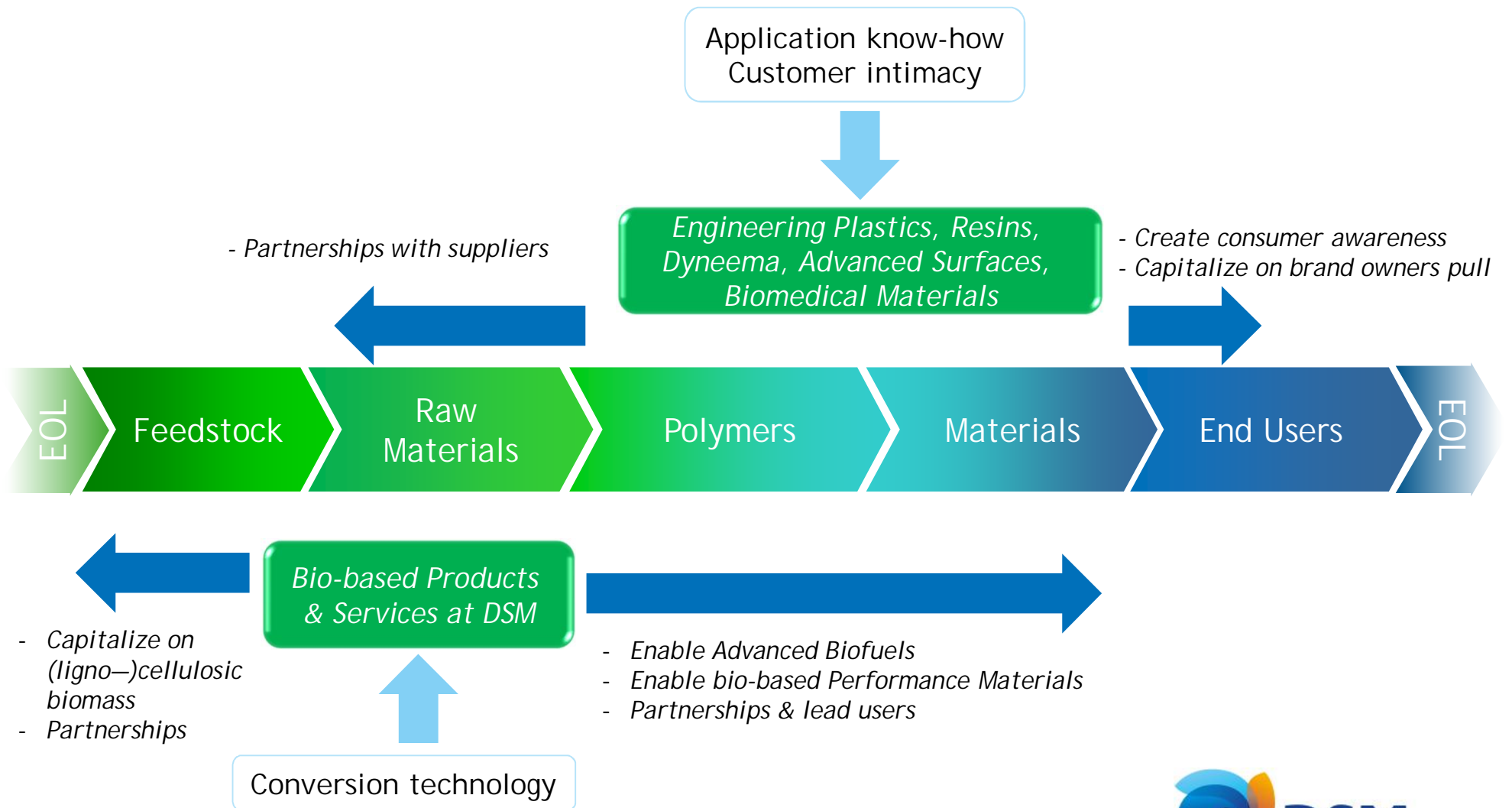


Biobased Waterborne Decorative Coatings

- Need for sustainable paints reducing the carbon footprint
- Bio-based waterborne, VOC free, high performance
- Renewable content between 40 - 70%
- Protecting indoor air quality and improving working conditions

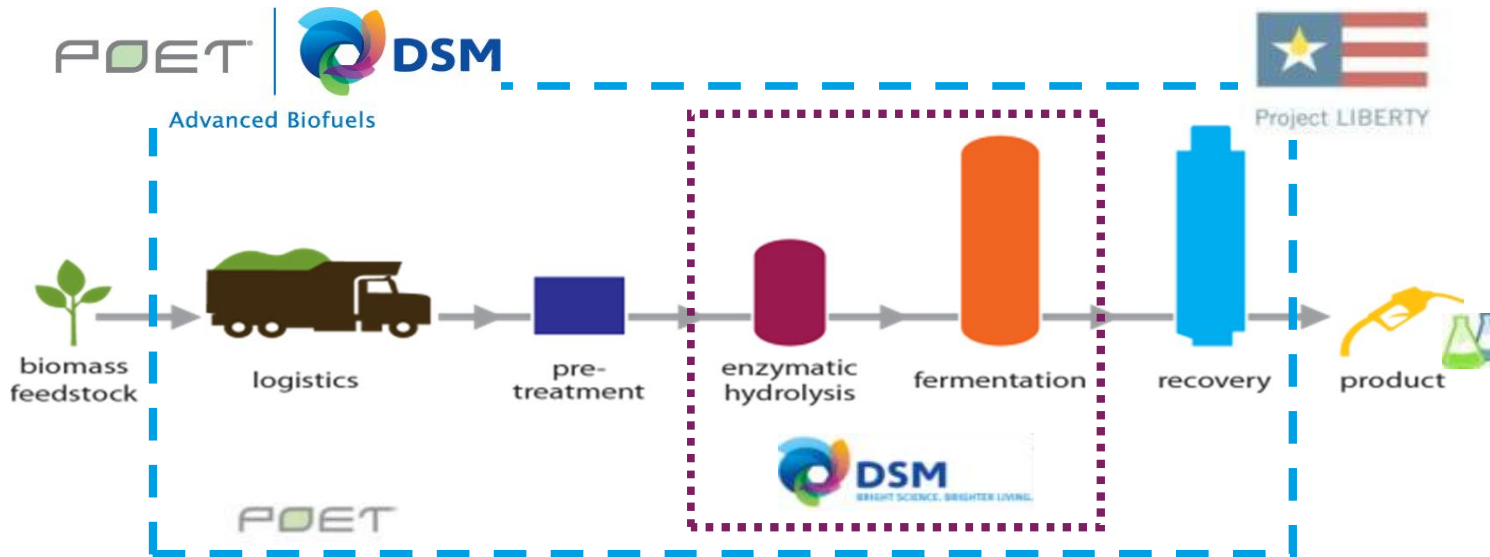
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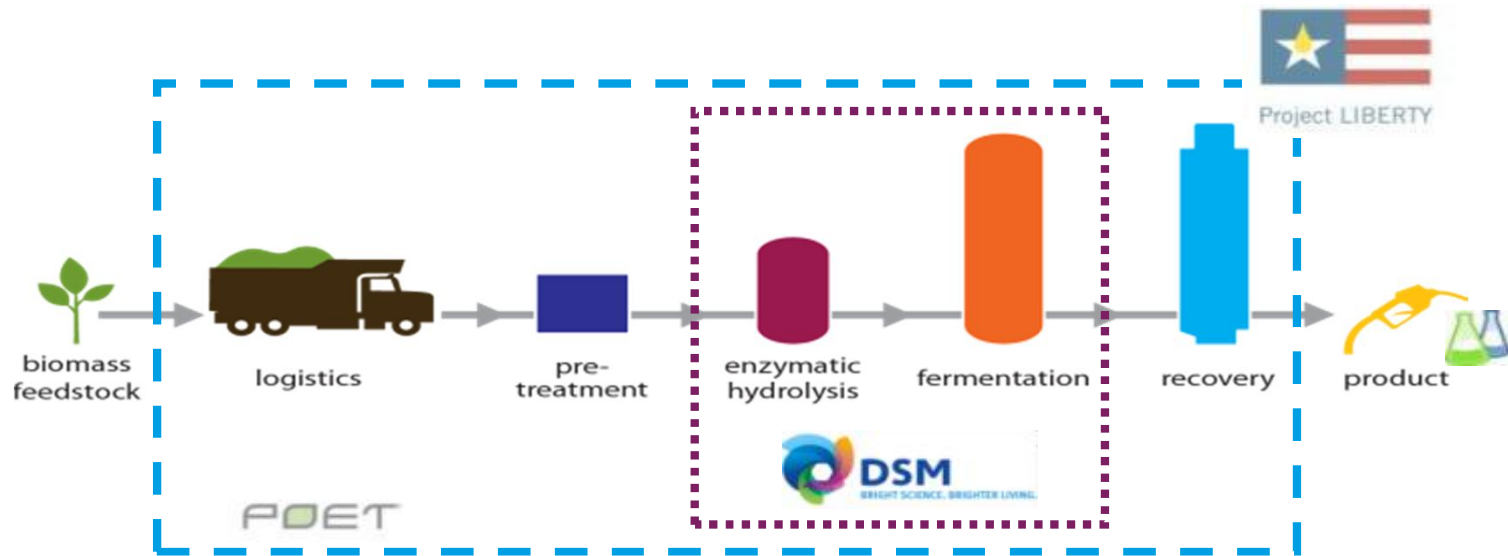
POET-DSM Advanced Biofuels Project LIBERTY

1st commercial scale 2nd generation bio-ethanol

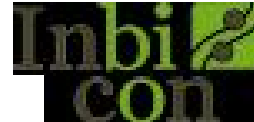


- Officially opened on September 3rd, 2014
- DSM and POET 50% share
- Total investment \$250 million
- Designed to produce up to 25 million gallons annually
- Replicate technology via a licensing model throughout POET's existing network of 27 corn ethanol plants, other US corn ethanol plants and globally

This is not possible without Open Innovation Partnerships to develop the Core Technology



ABENGOA BIOENERGY



Delft University of Technology
Kluyver Centre for Genomics of Industrial Fermentation



Kluyver CENTRE





Emmetsburg, September 3rd, 2014



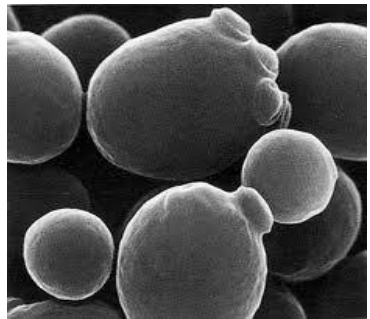
Reverdia: Powered by DSM + Roquette

Utilizing the distinct and unique competencies of two leading companies



Experts on the potential of biomass

- Top global starch and derivatives producer
- Biorefinery experts
- €3 billion Euros turnover
- Member of UN Global Compact



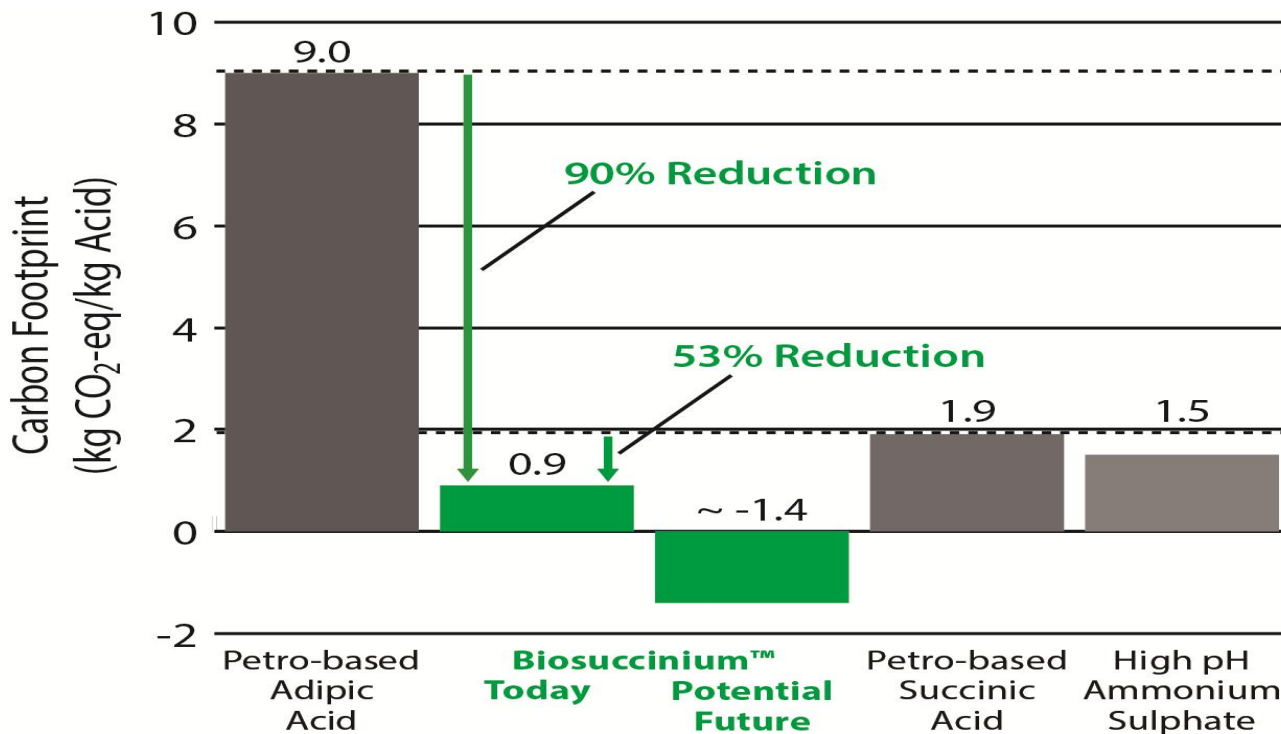
Experts on using microorganisms to convert sugars from biomass into chemicals/materials

- Biotechnology leader
- Annual net sales of around €9 billion
- Top ranking Dow Jones Sustainability Index



Biosuccinium™ Footprint Benchmarks

Large CO₂ reduction potential



- Executed by the Copernicus Institute at Utrecht University, the Netherlands
- The adipic acid data is for a best in class plant with 98% N₂O abatement.
- Data is published in the Wiley Online Library (August 2013)



Status supply chain

Consistent supply with growing production capacity



- **Current Biosuccinium™ capacity at Cassano (IT) about 10 kta**
- **Expansion plans towards global presence**

Does Europe have a Role to Play in the Bio-Economy?

Realising the European Bio-economy Potential via BBI, a Public Private Partnership of the EC and Bio-based Industries

Supported
by



Marcel Wubbolts
Chair BIC
Vice Chair BBI
CTO Royal DSM



Benefits for Europe



EC estimates European bio-economy at **€2 trln** and providing more than **22 mln jobs**

Maximizing potential **of waste, agriculture and forestry residues**

Diversify and grow **farmers' incomes**: up to 40% additional margins with existing residues

Boosting **job creation**, 80% of which will be in rural and underdeveloped areas

Replace at **least 30% of oil-based chemicals and materials** with bio-based and biodegradable ones (2030 target)

Meet **25% of Europe's transport energy needs** with advanced biofuels (2030 target)



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

We welcome the focus on climate change at the
2015 World Bank Group/IMF Spring Meetings

**Let's partner on
climate action.
Now.**

We are CEOs from 43 companies and 20 economic sectors. With operations in over 150 countries and territories, together we generated over \$1.2 trillion of revenue in 2014.

*If you want to be incrementally better:
Be competitive.*



*If you want to be exponentially better:
Be cooperative.*
(unknown source)

BRIGHT SCIENCE. BRIGHTER LIVING.™



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