

Stakeholderdialog „Biobased Industry“, 07.Dezember 2018

OPTISOChem – Nachhaltigkeitsbewertung der Umwandlung von Weizenstroh in die Plattformchemikalie Bio-Isobuten im Demomaßstab

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content

- Project profile OPTISOCHEM- H2020-BBI
- Isobutene characteristics & applications
- Our role - Sustainability & Life Cycle Assessment
- First results & future prospects

OPTISOCHEM - OPTimized conversion of residual wheat straw to bio-ISObutene for bio based CHEMicals



Project duration
June 2017 – Mai 2021

EU contribution
EUR 9,76 million

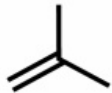
Project objectives:

- Demonstrate the **production of wheat straw hydrolysate** and establish a quality standard to feed the IBN fermentation unit
- Demonstrate the **production of bio-IBN from wheat straw hydrolysate (WSH)** at pre-commercial scale
- Demonstrate the **quality of end products obtained with bio-IBN** as a feedstock and using traditional commercial processes designed for fossil based IBN
- **Determine and validate the targeted technical, economic as well as environmental & social sustainability performances to be achieved for a flagship plant project**



OPTISOCHEM – Project partners

Coordination



GLOBAL BIOENERGIES

France, technology owner for light hydrocarbons via biological methods

Project partners



Clariant Produkte (Deutschland) GmbH,
Munich, Germany



INEOS Services, Belgium



Technip France SAS, France



IPSB, France



Energy Institute at the
Johannes Kepler University Linz, Austria

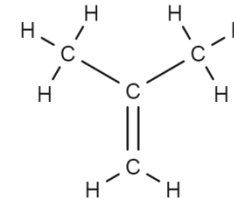


[www. http://optisochem.eu/](http://optisochem.eu/)

Isobutene

- a platform molecule with large existing markets

- **C₄H₈** - four-carbon branched alkene (olefin)
- one of the four isomers of butylene
- colorless flammable gas at standard temperature and pressure
- Application in **materials** Application in **fuels**



- Butyl rubber
- Plastics & lubricants
- Organic glass
- Chemicals & cosmetics

- Gasoline
- Jet fuel
- Domestic gas

today's potential in
fuels application
~ **12 mio. t/a**



today's potential in
materials application
~ **2.5 mio. t/a**



Isobutene – biobased technology in the upscaling

- Global Bioenergies: Breakthrough via synthetic biology for direct fermentation of gaseous hydrocarbons from sugars (protected by 32 patent families)
 - ⇒ purification and further conversion by conventional petrochemistry
- Demo plant in Leuna, Germany © Global Bioenergies



5,000 L fermentation unit



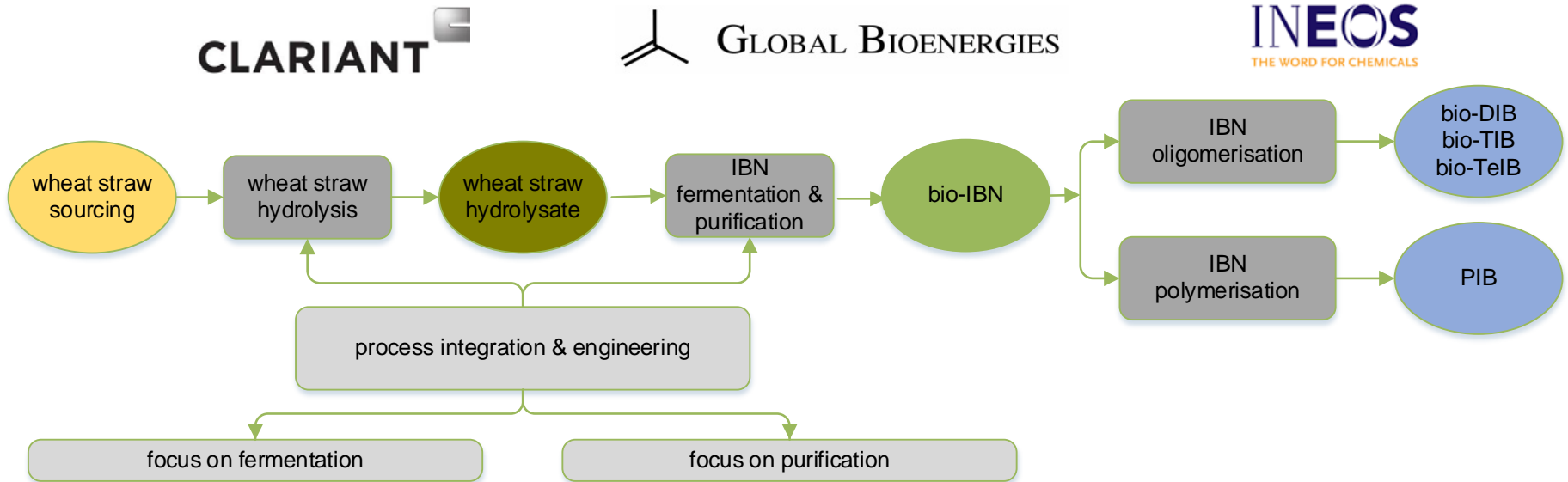
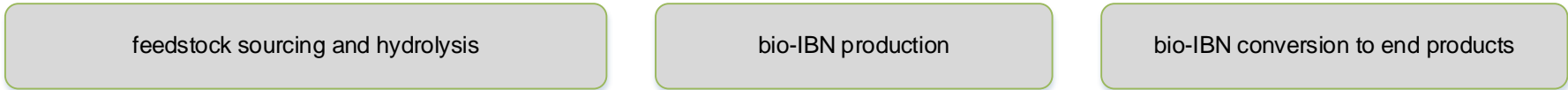
DSP, purification

 GLOBAL BIOENERGIES

Overview of OPTISOCHEM project activities



e ENERGIEINSTITUT **JKU** **JOHANNES KEPLER UNIVERSITÄT LINZ** **global sustainability analysis of full value chain**



© Global Bioenergies

Our role - Sustainability & Life Cycle Assessment

- **Full Life Cycle Analysis for isobutene from three different feedstocks** (fossil and bio-based) and comparison and ranking of the environmental performance of the analysed production routes and validated end-user products
- In depth understanding on the **availability and price of lignocellulosic raw material in Europe** and its influence on process economics and LCA.
- Providing a system's perspective on the **socio-economic impact of an advanced biobased isobutene market in Europe**

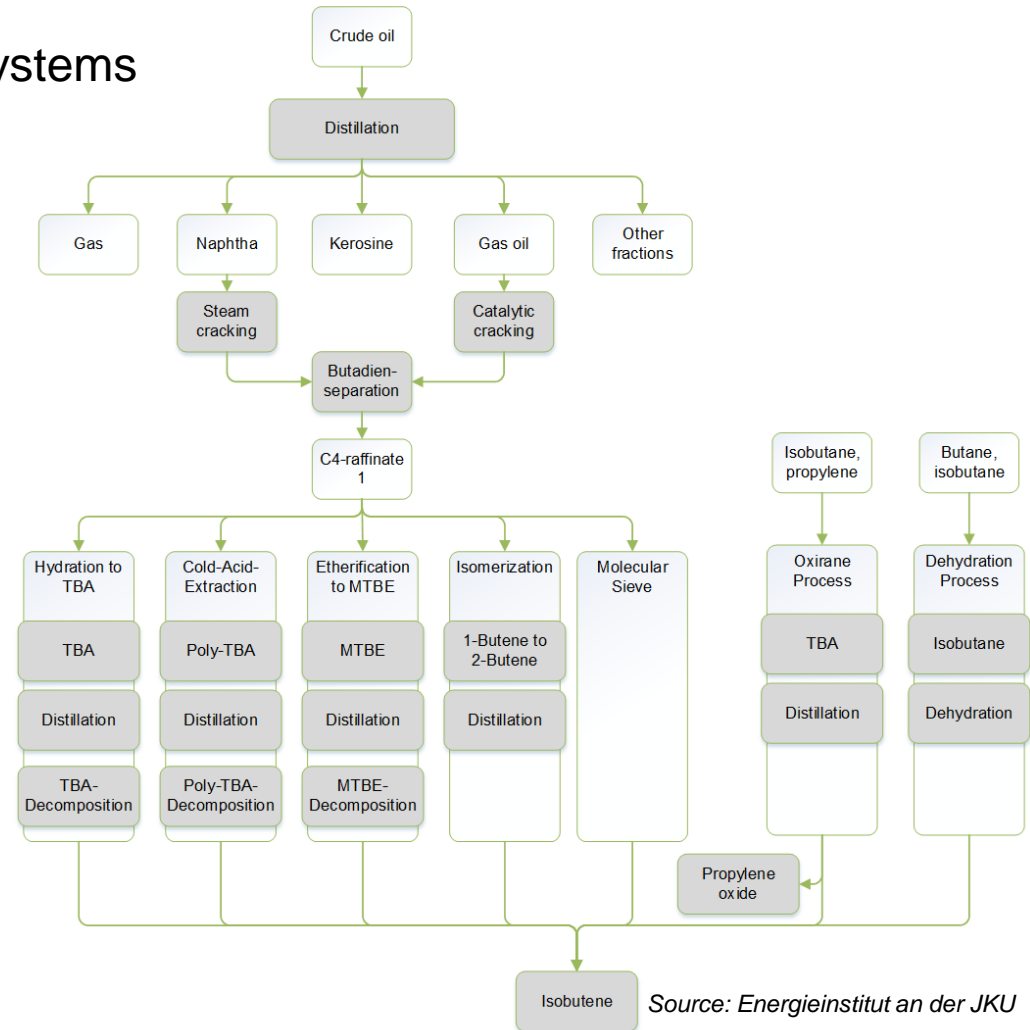


Sustainability & Life Cycle Assessment

- LCA fossil isobutene reference systems

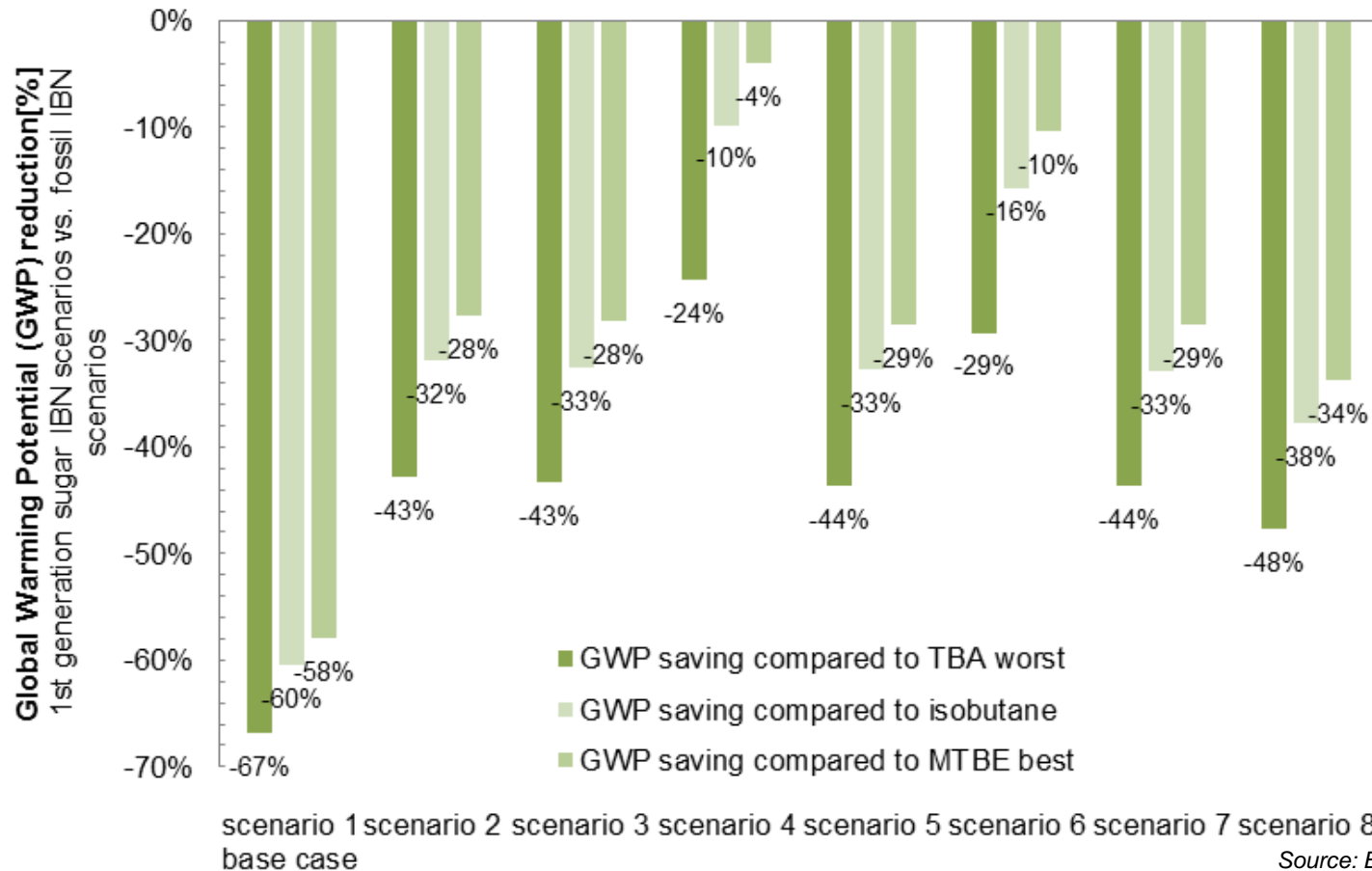
Several different production routes applied in industry – application partly dependent on market conditions

⇒ limited data availability



Sustainability & Life Cycle Assessment

- LCA on isobutene from 1st generation sugars

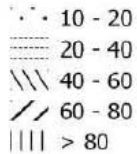


Source: *Energieinstitut an der JKU*

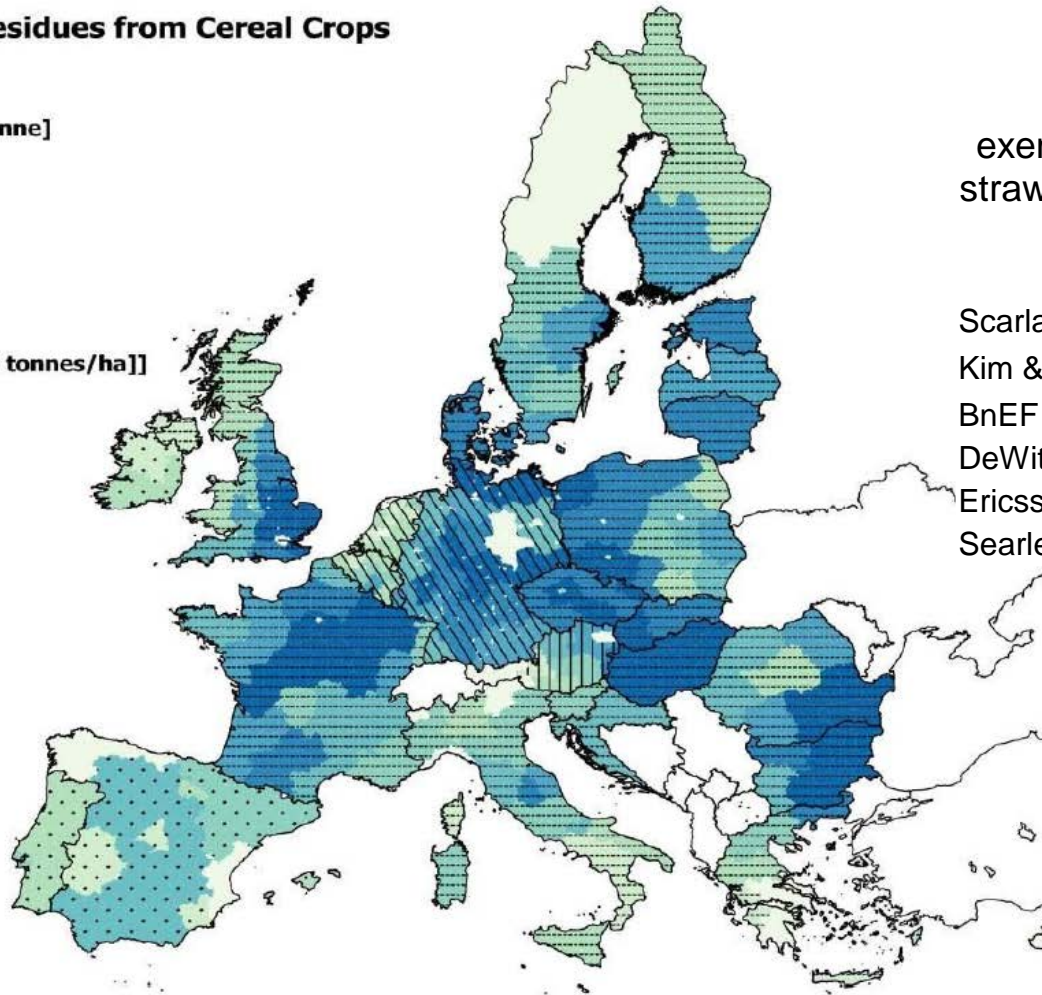
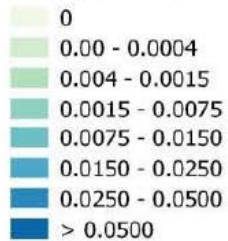
Cost Supply: Residues from Cereal Crops

2012

Cost Levels [EUR/tonne]



Supply Levels [1000 tonnes/ha]



exemplary literature estimates for straw residue availability in the EU

	million tonnes yr ⁻¹
Scarlat et al. (2010)	62-109
Kim & dale (2004)	225
BnEF (2012)	151
DeWit & Faaij (2010)	182-229
Ericsson & Nilsson (2006)	35-53
Searle & Malins C. (2013)	139

Source: <http://www.s2biom.eu/en/>, Delivery of sustainable supply of non-food biomass to support a "resource-efficient" Bioeconomy in Europe, EU-7th Frame Programme. Grant Agreement no. 608622

REWOFUEL - RESidual soft WOOD conversion to high characteristics drop-in bioFUELS

<http://www.rewofuel.eu/>

- demonstrate the performances, reliability, environmental and socio-economic sustainability of the entire value chain, for the transformation of **residual soft-wood into hydrolysate (RWH)**, conversion of RWH into **bio-Isobutene (bio-IBN)** by fermentation and further conversion to **biofuels**.
- The targeted **biofuels** are **full-bio-ETBE**, **bio-isooctane** and **bio-isododecane rich biofuels**.




REWOFUEL

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 792104 .



If you have any questions please contact us!

For more information please visit:

<http://optisochem.eu/>

<http://www.energieinstitut-linz.at/v2/portfolio-item/optisochem/>



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