



2nd generation ethanol / ethanol from straw

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Outline

- Upper Austria Univ. of Applied Sciences
- R & D Projects Bioenergy
- 2nd generation ethanol / ethanol from straw

FH OÖ – Fakultäten



Fakultät für Technik/Umweltwissenschaften

Campus Wels

Automatisierungstechnik

Bachelor (V) (B)

Bio- und Umwelttechnik

Bachelor (V)

Entwicklungsingenieur

Maschinenbau

Bachelor (V)

Innovations- und Produktmanagement

Bachelor (V)

Material- und Verarbeitungstechnik

Bachelor (V)



Mechatronik/Wirtschaft

Diplomstudium (B)

Öko-Energietechnik

Bachelor (V)

Produktdesign und Technische Kommunikation*

(für WiedereinsteigerInnen)

Bachelor (B)

Verfahrenstechnische Produktion

Bachelor (V) (B)

Anlagenbau

Master (V) (B)

(V) = Vollzeitstudium (B) = berufsbegleitendes Studium

* vorbehaltlich der Genehmigung durch den Fachhochschulrat

Bioenergy Research at the Department of Bio and Environmental Technology

Biogas

Integrated Systems

Bioethanol
1st Generation

Bioethanol
2nd Generation

R& D Biogas

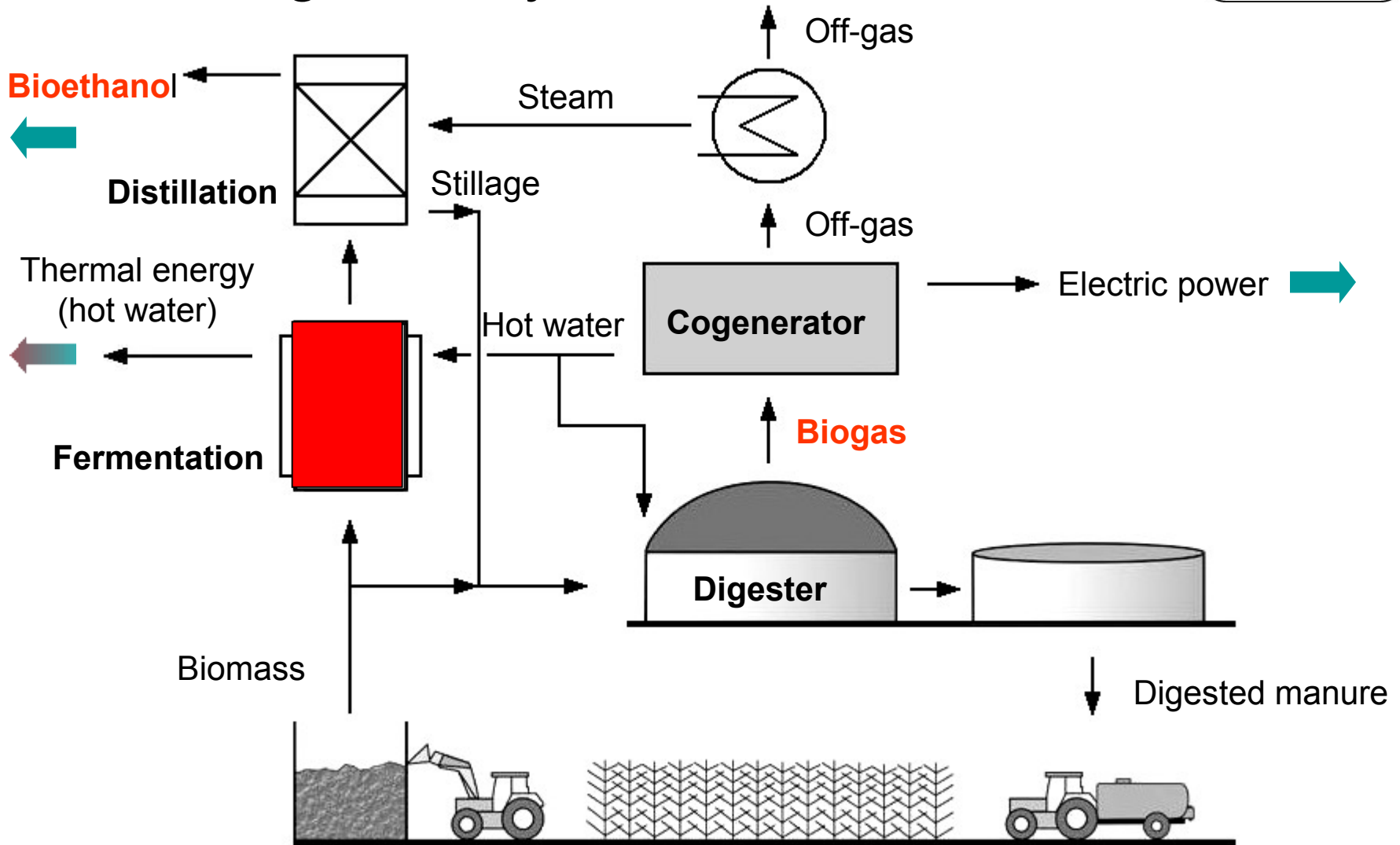
Monitoring system Upper Austria

Substrate analysis

Pretreatment of lignocelluloses

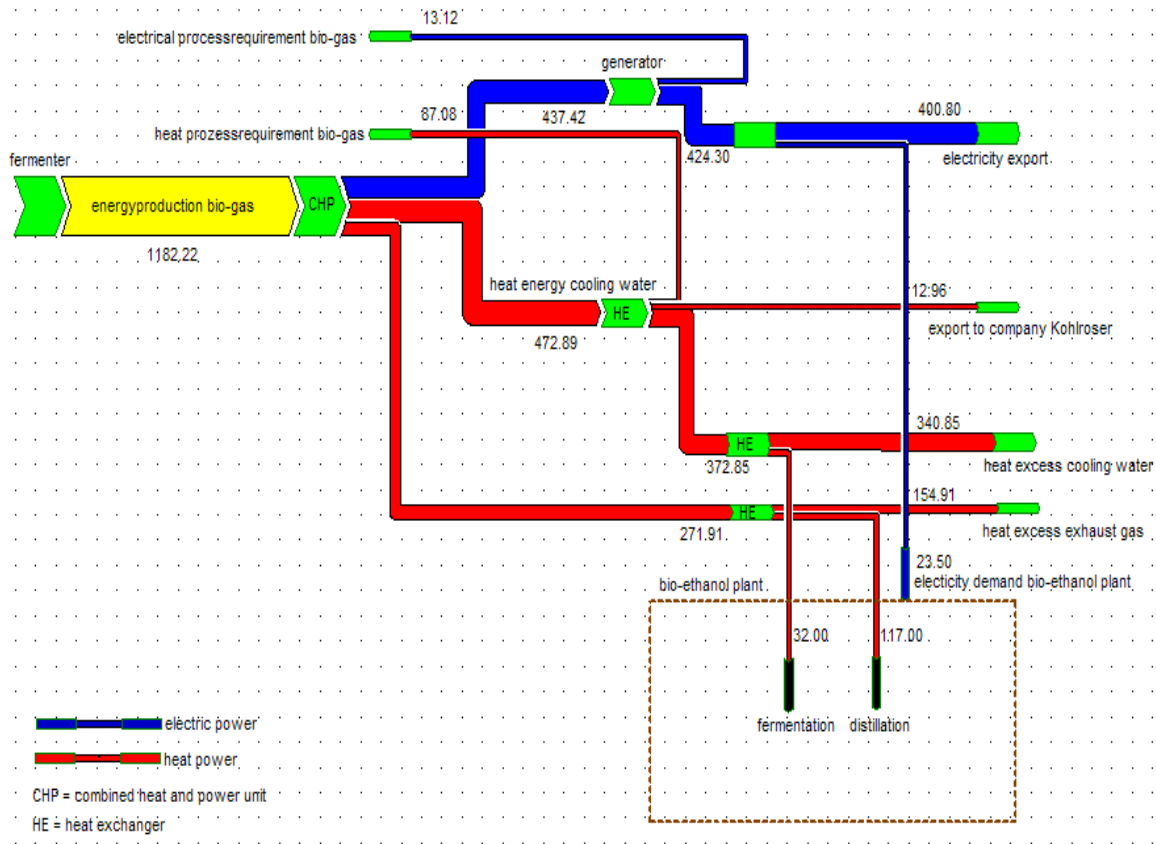


R& D Integrated Systems



Integrated Biogas - Bioethanol Plant

Energy Balance



Integrated Biogas - Bioethanol Plant

Total Economics

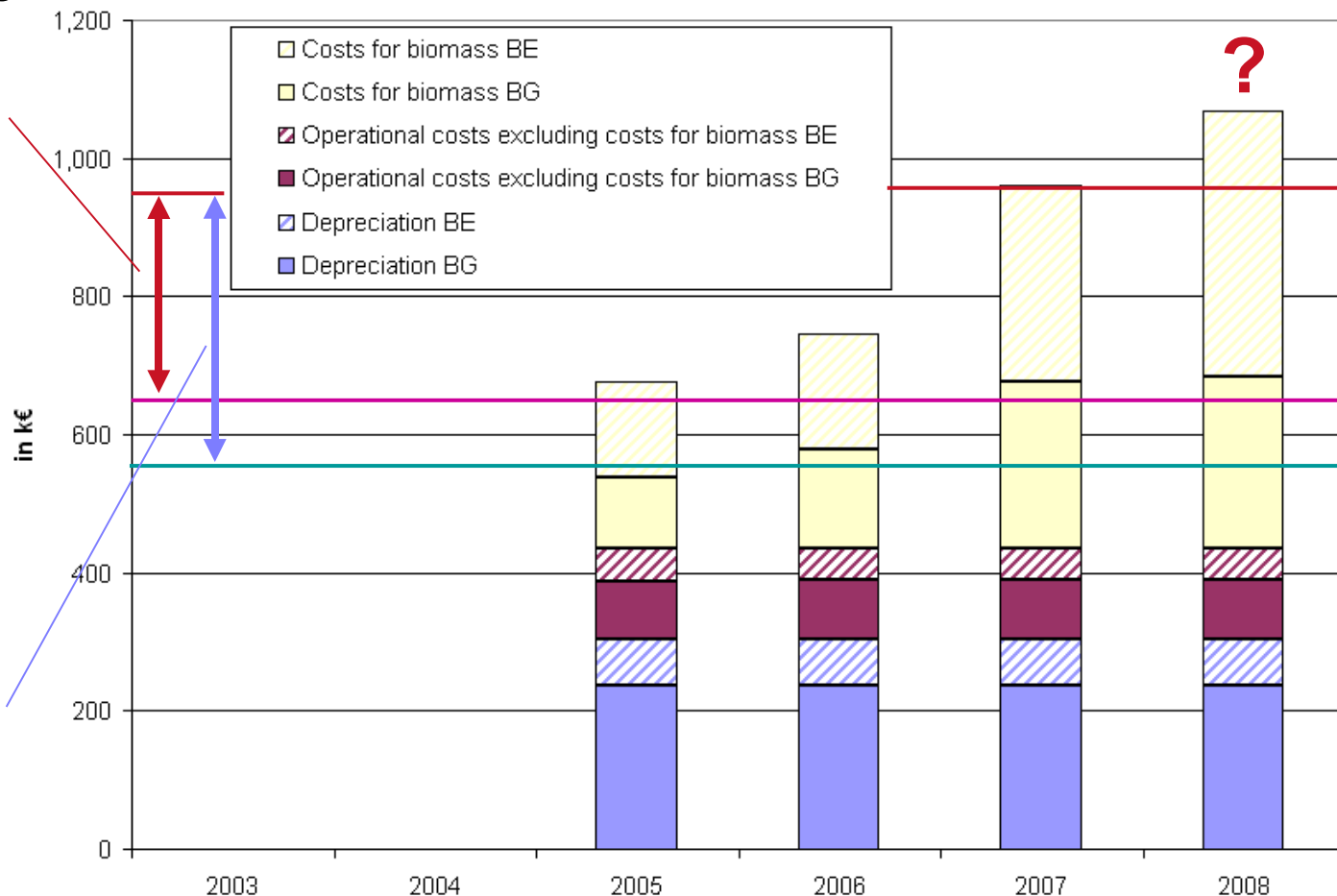
**Min. required price for
bioethanol (92%): 0,60 € / l**

Bioethanol 940 k€

**100% heat
utilization 640 k€**

**Revenues for
el. power 545 k€**

**Min. required price for
bioethanol (92%) without
additional heat utilization:
0,80 € / l**



R& D Bioethanol 1st generation

Substrate analysis

Process optimization

Strain development



R& D Bioethanol 2nd generation

„Bioethanolproduktion aus Lignocellulosen mit Steamexplosion“

Fabrik der Zukunft No. Projekt-Nummer: 814953

- Energieinstitut an der Johannes Kepler Universität GmbH
- FH OÖ Forschungs & Entwicklungs GmbH Wels
- Technologie- und Dienstleistungszentrum Ennstal (TDZ Ennstal) GmbH
- Technische Universität Graz



R& D Bioethanol 2nd generation

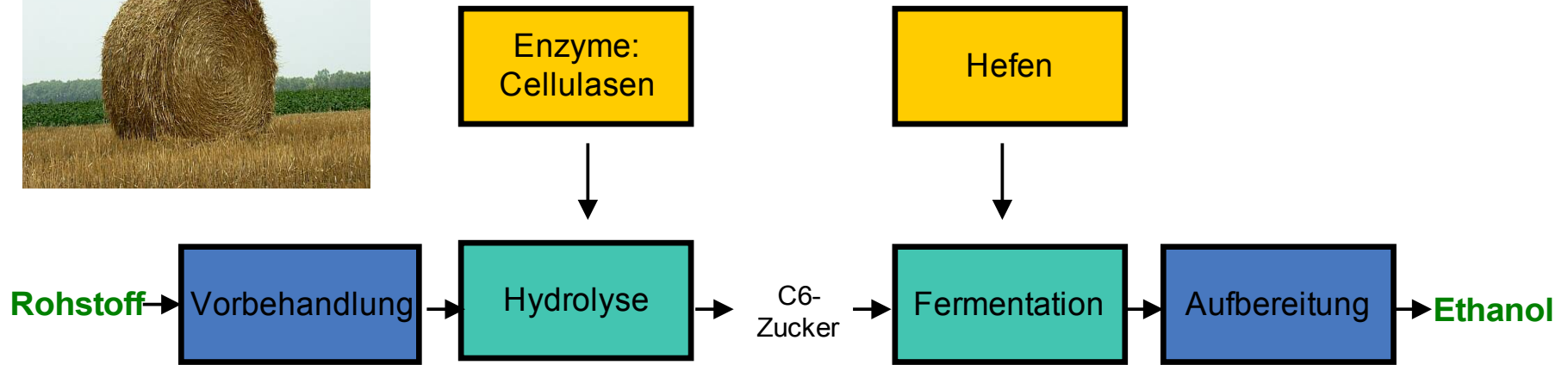
„Steam Explosion“

FH Plus in Coin 818383

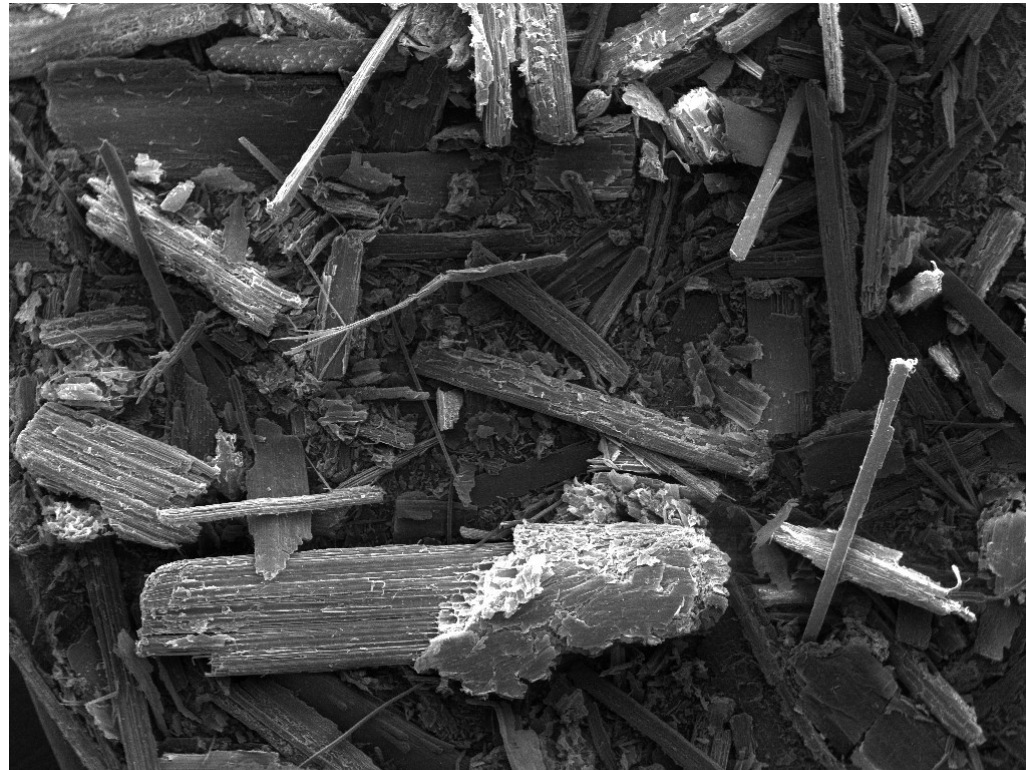
FH OÖ Forschungs & Entwicklungs GmbH Wels



R& D Bioethanol 2nd generation



Pretreatment by Steam explosion

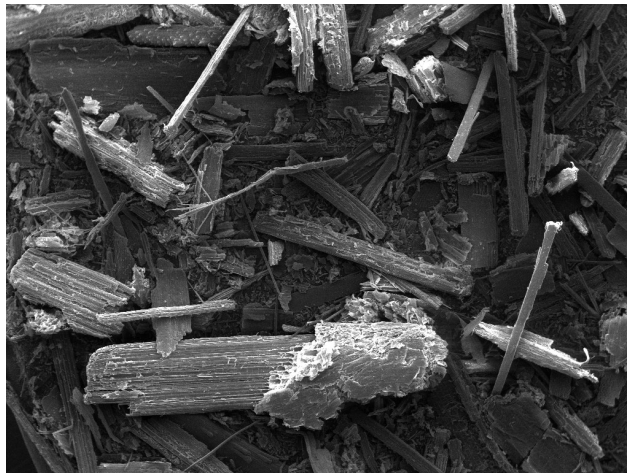


SEM MAG: 60 x
SEM HV: 20.00 kV
Vac: HiVac

Det: SE Detector
Date(m/d/y): 03/20/08
Device: VEGA II LMU

2 mm
VEGA\\ TESCAN
fh ooe

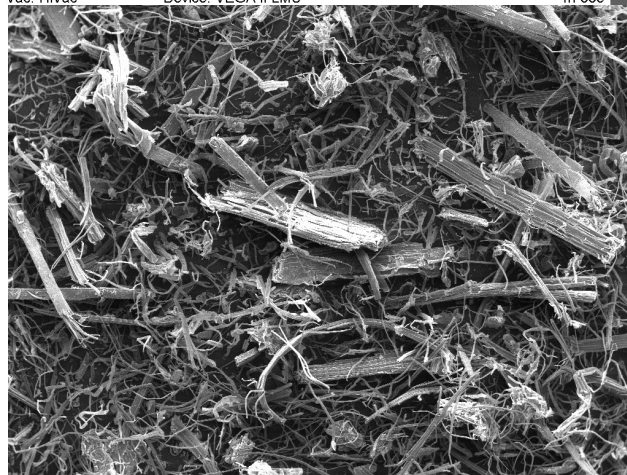
Pretreatment by Steam explosion



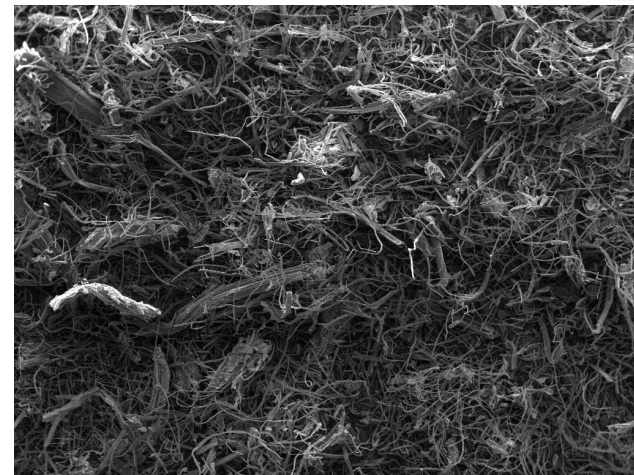
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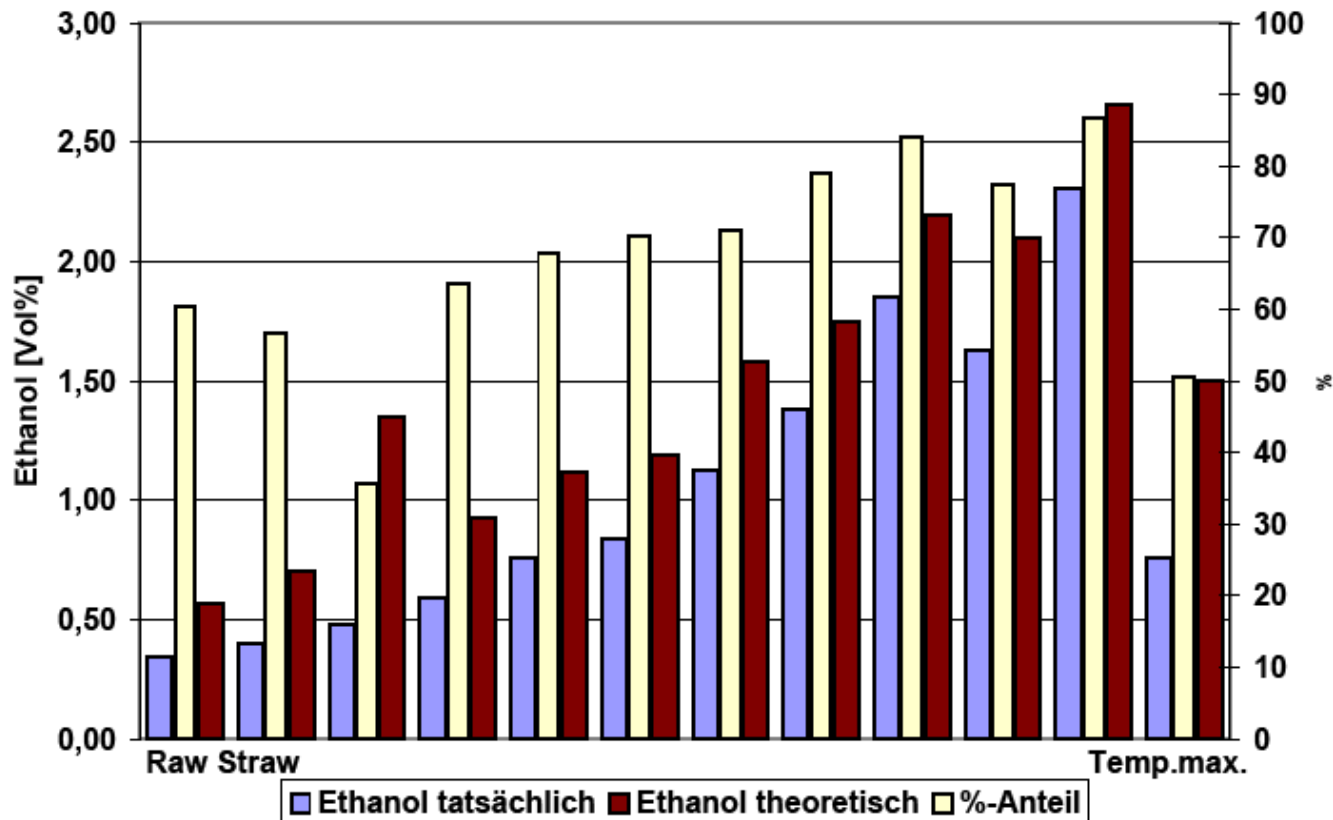


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Bioethanol Production from Straw



Summary

Bioethanol 2nd Generation

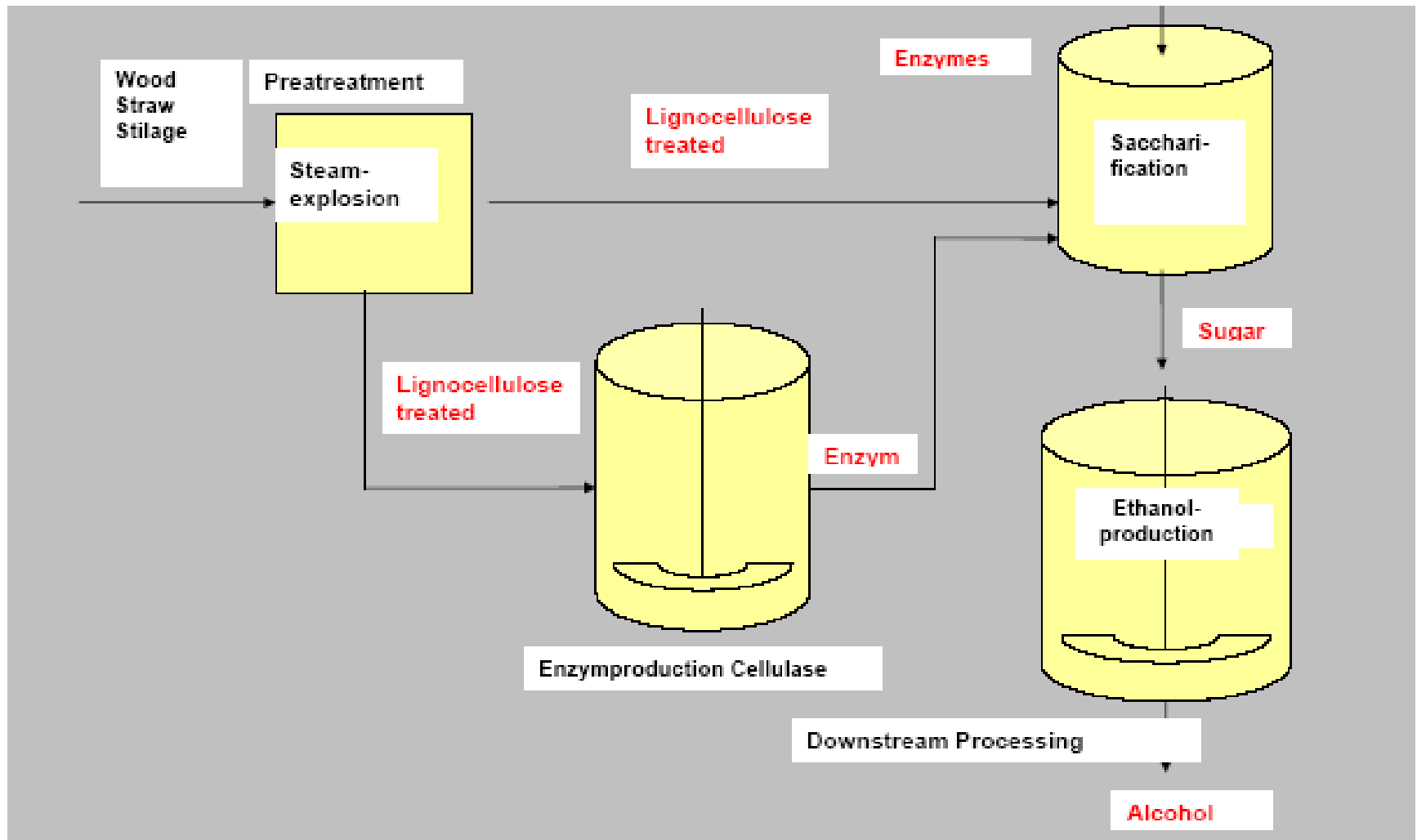
- System for Preatreatment available
- Enzymatic Hydrolysis with both commercial and “own” Enzymes
- > 90 % Conversion of sugar to bioethanol

Challenges

Bioethanol 2nd Generation

- Increase of substrate concentration
- SSF Simultaneous saccharification and fermentation
- Downstream processing of bioethanol at low concentrations
- Pilot Plant

Outlook



Thank for your attention