#### NABin-seminar, Oslo, 211019



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# Sekab

SWEDISH ETHANOL CHEMISTRY

-Biorefinery Technology for Sugar, lignin and Bioethanol Plants



# The road ahead





# **Sekab** IS AN IMPORTANT PART OF THE **BIOREFINERY IN** ÖRNSKÖLDSVIK **SWEDEN**





# **110 YEARS OF COMBINED EXPERIENCE** OF DEVELOPMENT AND INNOVATION







#### **Ownership based in the North of Sweden**

Övik energi



🣒 UMEÅ ENERGI

EcoDevelopment in Europe AB

With important collaborations in the region









SHORT ABOUT SEKAB

SEK 840 million
Chemical plant, dewatering plant, distribution plant, and demonstration plant In Örnsköldsvik Biorefinery
Örnsköldsvik
80
Energy companies in the region and private ownership
60 000 tonnes of chemicals and 20 000 m3 biofuels
60 % of sales
Mainly Acetaldehyde, Ethyl acetate, Industrial vinegar, Technical ethanol, biofuel ED95 and bioethanol for low mixing
Large number of own patents and concepts. Rich history of world-leading research.



# Sekab Biofuels & Chemicals ABSekab E-Technology ABSekab Forest Technology ABONE GROUP<br/>THREE<br/>COMPANIESImage: Company and the second a

To contribute to a future where the need for fossil raw materials and fuels is reduced



Bio Acetaldehyde certified according to the certification body ISCC Chemical products based on bioethanol from wood residues

Bio Ethyl acetate made from biologically produced ethanol. Bio Acetic Acid certified according to the certification body ISCC .

Sekab

Biofuels and low blends

**ED95** 

2021-10-18

# BIOREFINERY TECHNOLOGY FOR THE CLIMATE









## FROM WOOD TO VALUE



#### BIOREFINERY TECHNOLOGY FOR THE CLIMATE

- SEKAB's CelluAPP® technology platform makes it possible to use residue from the forest industry, processing industry, agriculture and the food industry to produce new sustainable chemical products
- In this way chemical products and fuel can be locally produced using local residues as the raw material. This decreases transportation requirements, dependence on fossil raw materials and our impact on our climate.









# Hands-on experience from more than 15 years of demo plant operation





#### The CelluAPP® Technology



Sekab

#### **PRETREATMENT** enables efficient enzymatic hydrolysis of cellulose

- The cellulose more susceptible to enzymatic digestion
- Faster process
- Higher glucose yields from cellulose
- Acidic conditions  $H_2SO_4$ ,  $SO_2$
- Typical temperature 170–220°C
- lntended target: Hemicellulose, not lignin or cellulose









#### **ENZYMATIC HYDROLYSIS**

converts the carbohydrates to monomeric sugars

#### Specifications:

- Sector Agitation
- pH 4 to 6 (depending on enzyme)
- Enzymatic kinetics
- Reaction time
- Typical temperature: 40–65°C
- Enzyme loadings (worked with different enzyme producers, no IP regarding production of enzymes)

















# **Different types of lignin**





#### CelluAPP<sup>®</sup> Process demonstrated in the **BioRefinery Demo Plant**



50.000 total hours of demonstration (since 2010).
23.000 hours pretreatment of spruce (softwood).
Successful product deliveries in EU projects. Around
20.000 hours of pretreatment of a hardwood







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



REsidual soft WOod conversion to high characteristics drop-in bioFUELs

 European consortium led by Global Bioenergies for a 3 year duration

 19.7m€ project 70% financed by the EU via the H2020 program (Project ID : 792104)

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REWOFUE

This project has received funding fro the European Union's Horizon 20 research and innovation programme under grant agreement No 792104

absiskey

# Project deliverables

#### From the Biorefinery Demo plant:

REWOFUEI

- Delivery of approximately totally 100 ton DM, of soft wood residues to the Biorefinery demo plant, Örnsköldsvik
- > 40 ton DM crude residual wood hydrolysate sugar solution for isobutene production
- > 10 ton DM residual wood hydrolysate lignin
- The produced lignin from the BDP will be tested at lab in development of lignin-bitumen blend, asphalt mixing and measurement of properties













### Driving on lignin from the forest – it may be possible!















ÖRNSKÖLDSVIKS KOMMUN | 12 aug

# Jätteföretagens satsning i Örnsköldsvik – lägger miljövänlig asfalt: "Rätt i tiden"





# The time is right for development





# **DEVELOPMENT PLAN**

#### cellulosic biomass production plant to be operational in end of 2025

- ✓ advanced bio-ethanol out of sawdust and softwood forest residues
- ✓ Sekab biorefinery plant is expected to produce:
  - ✓ 78 kt of advanced bio-ethanol
  - ✓ 51 kt crude lignin oil, 146 kt lignin
  - ✓ 6 kt bio-gas and
  - ✓ 83 kt bio-CO2 per year.





#### Praj + Sekab advantages – in summary to scale up CelluAPP® Technology

Innovations / Forest residue technology handling patent portfolio experience

Sekab **Engineering and** DISH ETHANOL CHEMISTRY

Pilot and demo plants



Resource strength

integration

capabilities

Industrial scale references in bio-processing



# **PROJECT MANAGER** OF THE FEASABILITY STUDY





# **INNOVATION FUND**

Driving clean innovative technologies towards the market



Funded by: EU Emissions Trading System



# CAN WE AFFORD NOT TO VALORIZE SOFTWOOD RESIDUES?





# What roads should we take in the future?





#### **THANK YOU FOR YOUR ATTENTION!**

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