

10<sup>th</sup> International Conference on Sustainable Solid Waste Management

Environmental, economic and circularity assessment of the hydrothermal liquefaction of black liquor under a biorefinery approach

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# From conventional pulp mill to a biorefinery scheme



# **Environmental assessment**





7/5/23



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### **Environmental assessment**



### **Environmental assessment**



## Comparison with the scenarios: environmental perspective



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### **Economic assessment**



Electricity selling price: 0.05 €/MWh

**Biocrude selling price:** 4.32 €/US Gallon (1.28 €/kg)

Hardwood pulp selling price: 0.59 €/ad-kg

20

### **Economic assessment**



4.32 €/US Gallon (1.28 €/kg) Hardwood pulp selling price:

0.59 €/ad-kg

Utilization of black liquor as feedstock for biofuel production within a biorefinery approach: techno-economic and sustainability assessment

#### **Comparison with the scenarios**

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Higher NPV: Base case >>> BL 30% >>> BL 5% >>> BL 10%

#### Lower ROI: Base case <<< BL 30% <<< BL 5% <<< BL 10%

## **Circularity assessment**



Utilization of black liquor as feedstock for biofuel production within a biorefinery approach: techno-economic and sustainability assessment

# Conclusions



The **amount of black liquor** used for biocrude production is a **key aspect** to ensure the feasibility and suitability of the integrated pulp mill biorefinery.



The production of **"extra" electricity** implies an **environmental benefit** but an important damage for 30% of BL scenario.



Electricity optimization is required for the hydrothermal liquefaction unit.



The economic assessment shows that the 30% of BL is the most promising scenario.



From a **circular perspective**, **optimization** on the energy requirements is needed.



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