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Norwegian Institute for
Sustainability Research

LOUISE

LOUISE 2nd public workshop 20.11.2024

Life Cycle Assessment results



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Life Cycle Assessment of Chemical Looping Combustion Plants for CCS

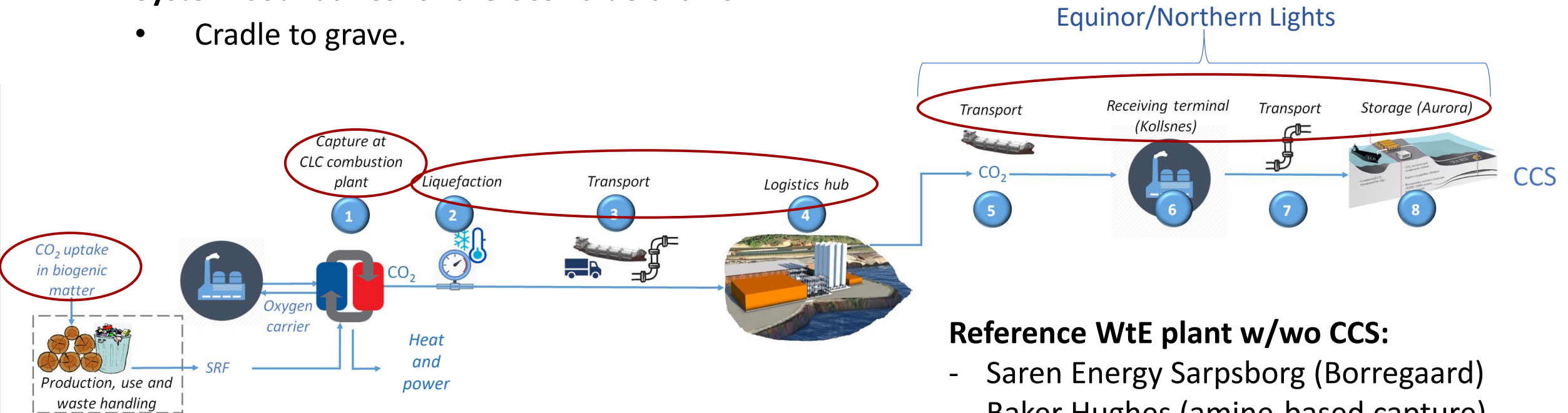


Methodology

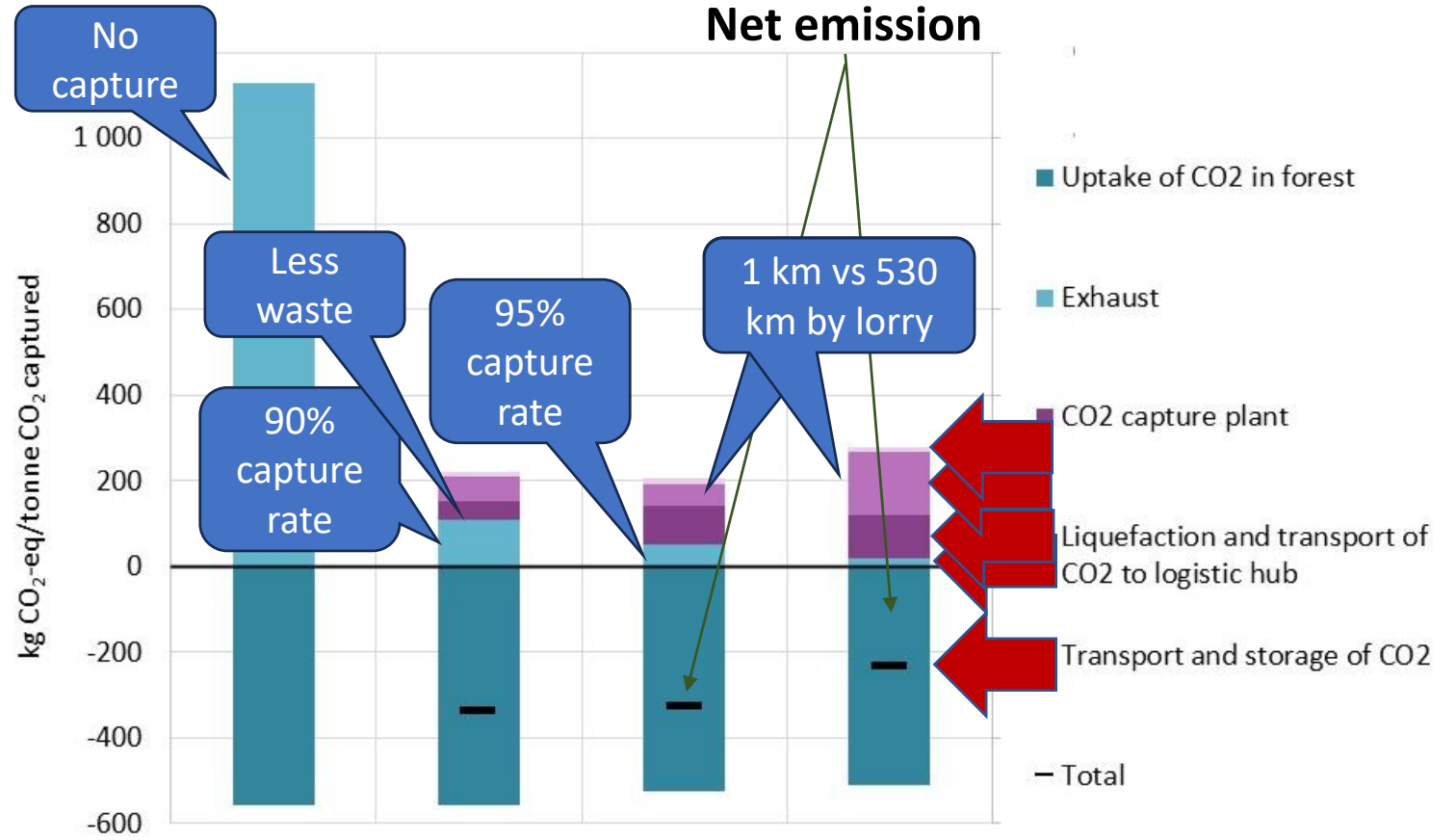
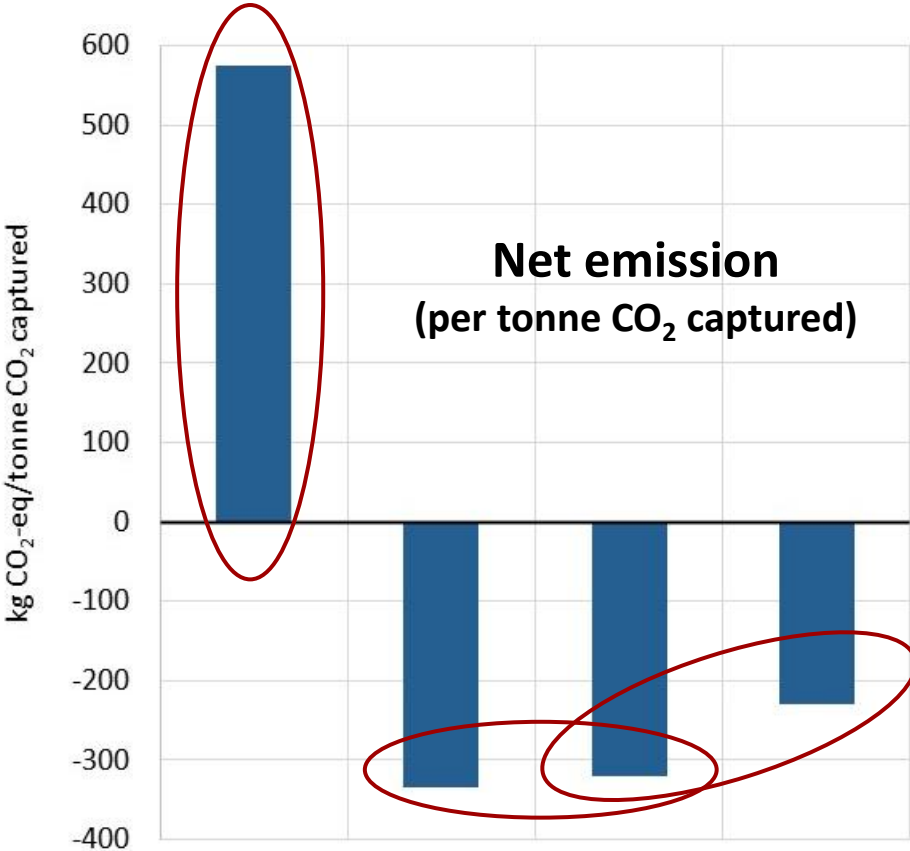
- Life Cycle Assessment (LCA) methodology according to the ISO-standards 14044/48.
- Both uptake and emissions of biogenic CO₂ have been included.
- Negative characterization factor for uptake and positive factor for emission of CO₂.

System boundaries for the CCS value chains

- Cradle to grave.



Climate results for the CCS systems



Net project results
50% biogenic C in waste

Reference WtE without CCS	Reference WtE amine based CCS	LOUISE WtE-CLC with CCS, Norway	LOUISE WtE-CLC with CCS, Germany

Detailed project results
50% biogenic C in waste

Reference WtE without CCS	Reference WtE amine based CCS	LOUISE WtE-CLC with CCS, Norway	LOUISE WtE-CLC with CCS, Germany

Conclusions: Life Cycle Assessment of CLC with CO₂ storage

- Burdens from ship/pipeline transport and from storage are of minor importance for climate change.
- Land based transport affects the results.
- WtE-CLC with CO₂ storage competes well with existing CCS (amine) systems with regard to climate change results.
 - More burdensome capture for CLC (waste treatment) is offset by higher capture rate
- More indicators will be investigated (acidification and cumulative energy demand).
- CCU fuels/chemicals:
 - Energy demanding
 - Suboptimal solution as long as fossil-based electricity can be substituted.
 - Results for CCU fuels are generally valid and not related to the CLC technology!

Thanks!



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