Drop-in Fuels from Black Liquor

– Combining Increased Pulp Capacity with Production of Sustainable Biofuels

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Message

- Drop-in biofuels from Kraft BL are cost competitive
- Added value from increased pulp production capacity
- Biofuel production is an efficient way to utilize a pulp mill energy surplus
- Hydrogen supply and refinery energy integration are critical issues for lignin separation and upgrading

Pulping and chemical recovery – black liquor processing often bottleneck

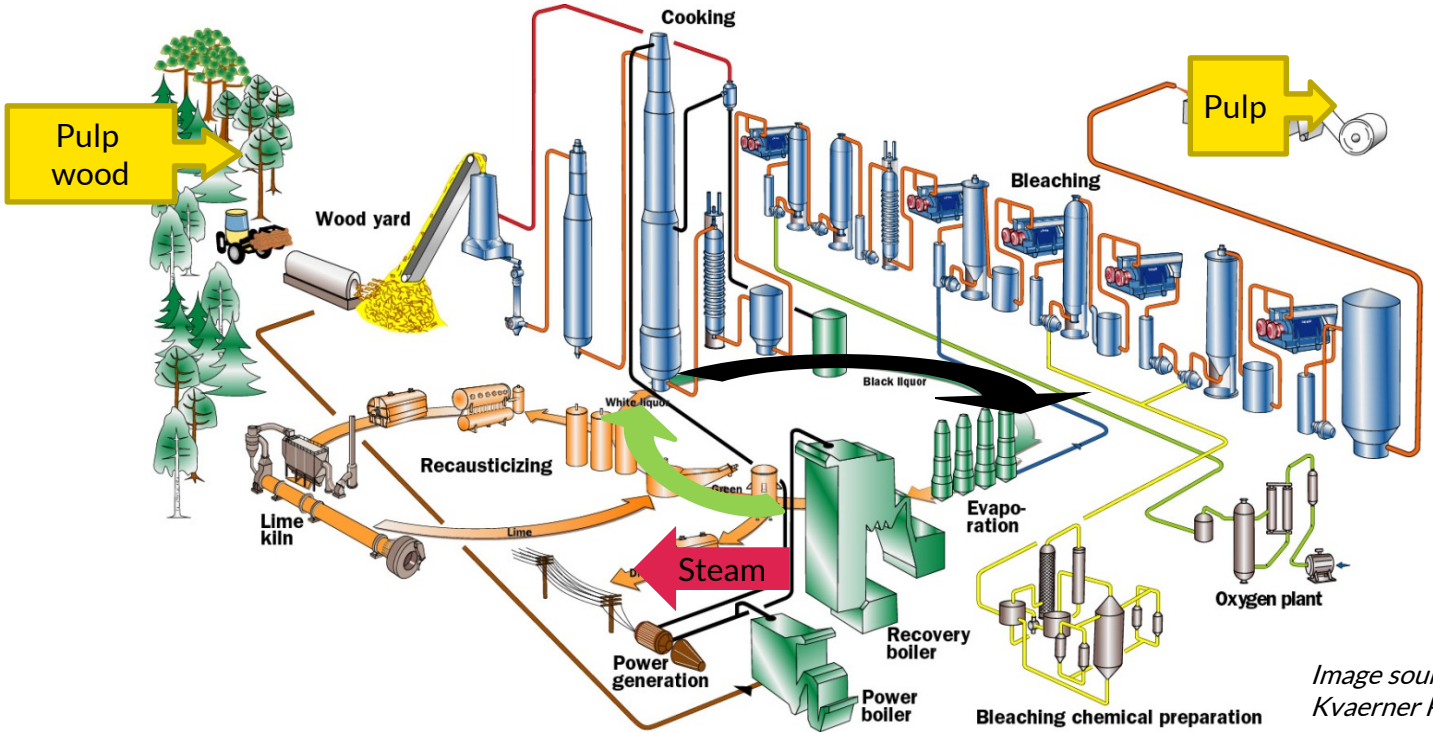

Image source: Kvaerner Pulping

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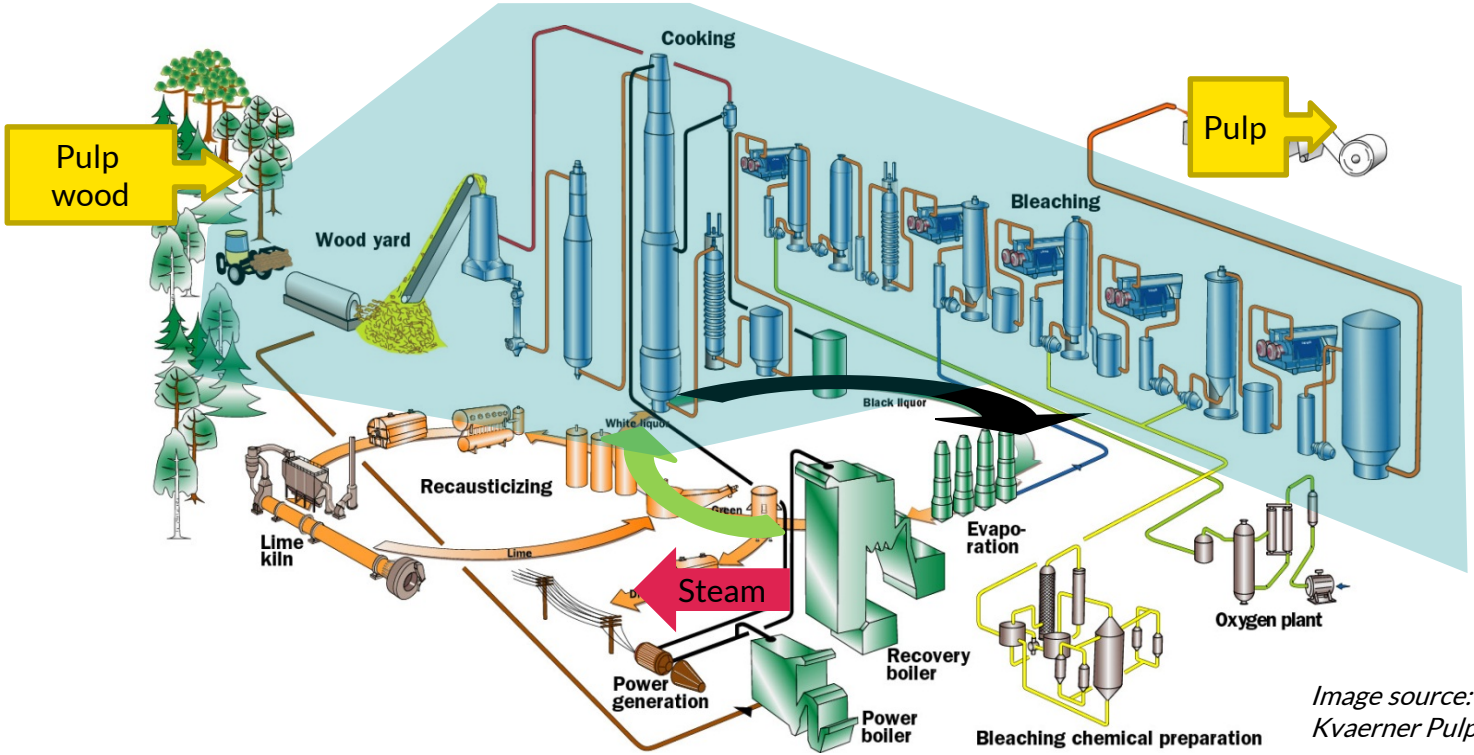

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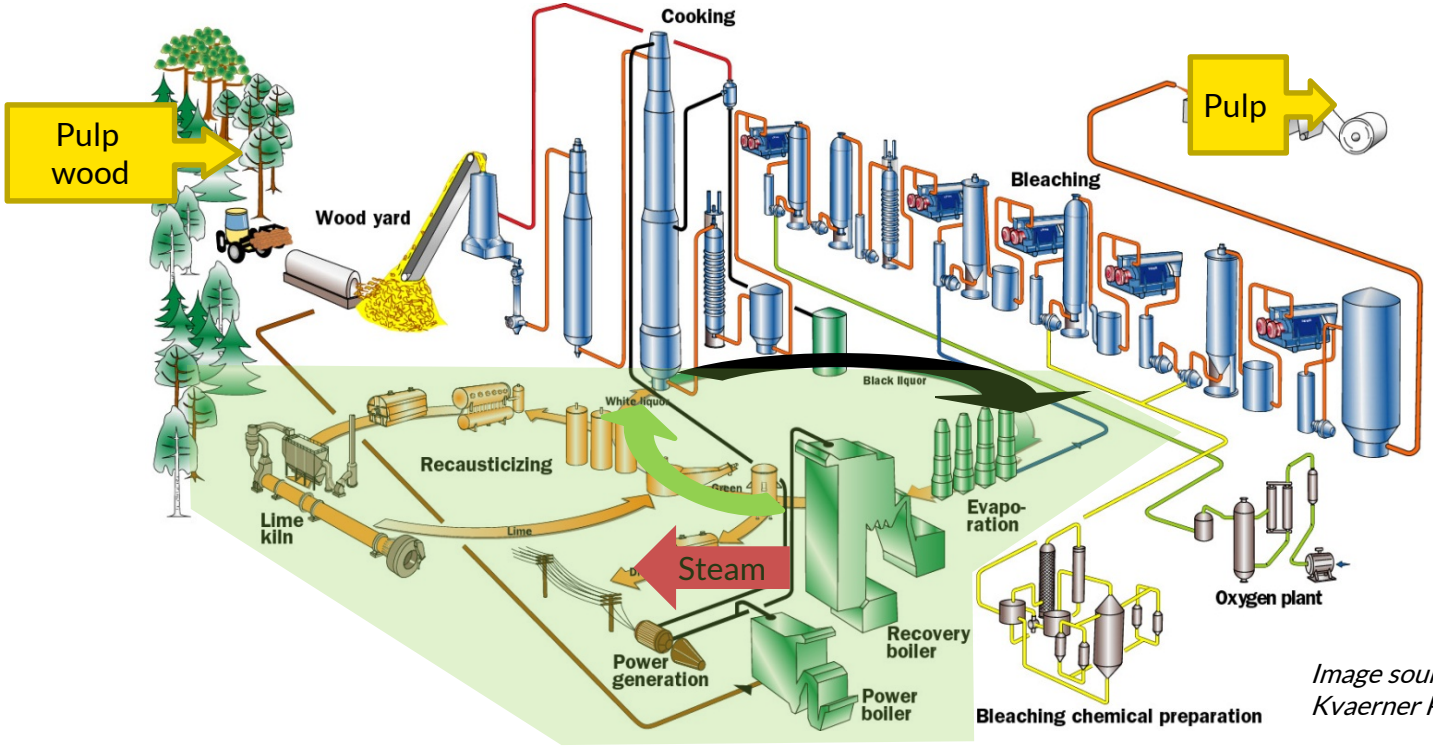

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Studied technology tracks

Black liq. gasification w. MTG

- BL gasification w. methanol synthesis
- Methanol-to-gasoline (and LPG)
- Gasification pilot 3 MW
  >28,000 h operation
- Exxon Mobil MTG
  Commercial operation
- Overall TRL ~7

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CHEMREC
Energy to succeed

Lignin separation and upgrading

- Lignin membrane-based separation
- Purification, stabilization in VGO matrix
- Hydrodexygenation and –cracking
- Partly validated in pilot scale,
  partly in lab
- Overall TRL 4-5

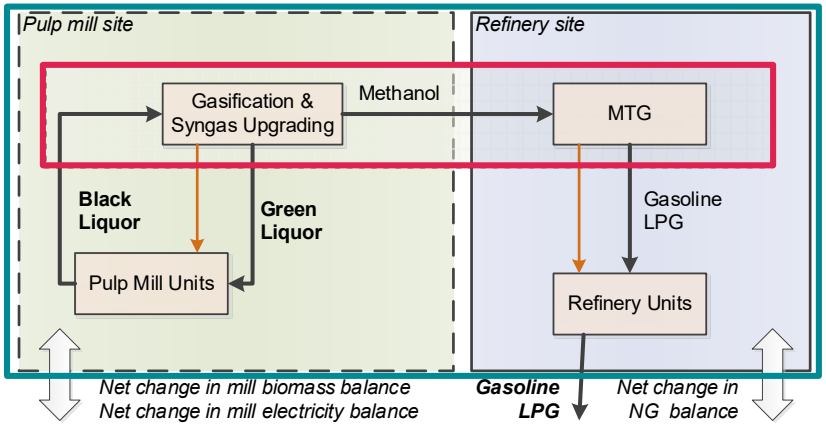
SunCarbon

preem

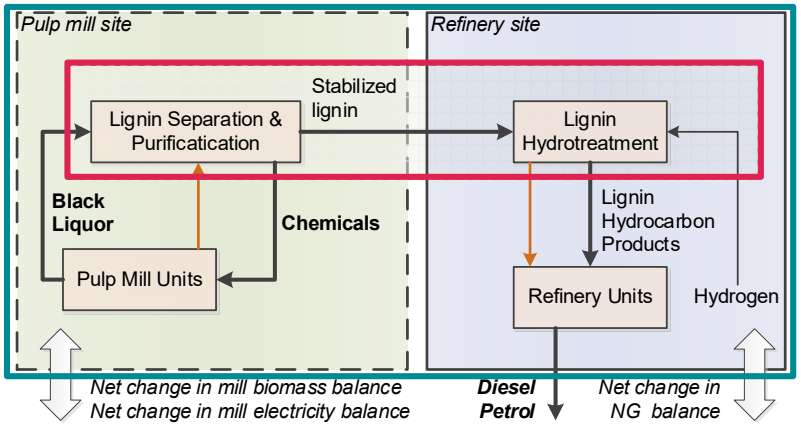
RI. SE

System view of technologies

Black liq. gasification w. MTG

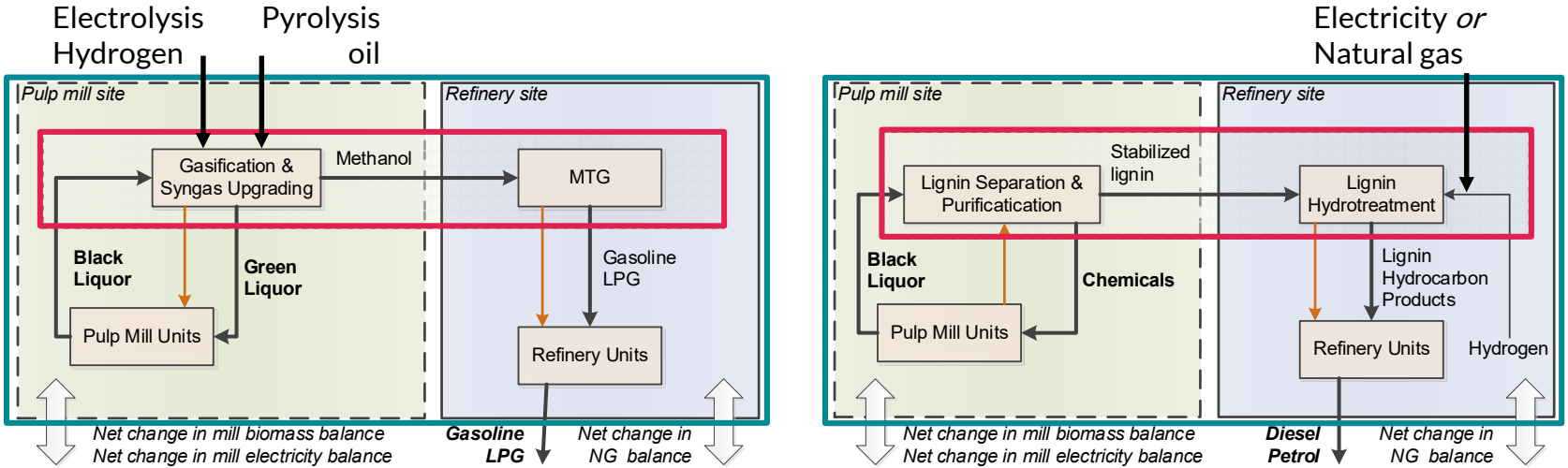


Lignin separation and upgrading



Expanded system Direct conversion efficiency

System view of technologies



Expanded system Direct conversion efficiency

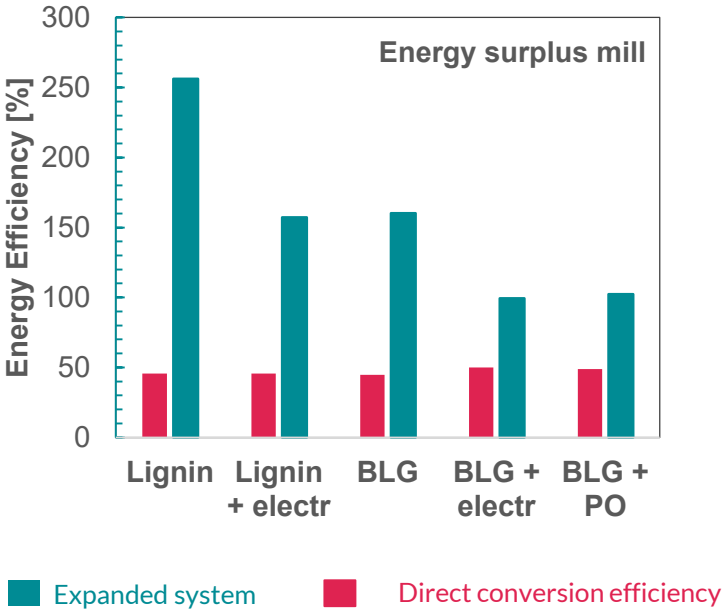
Technology evaluation

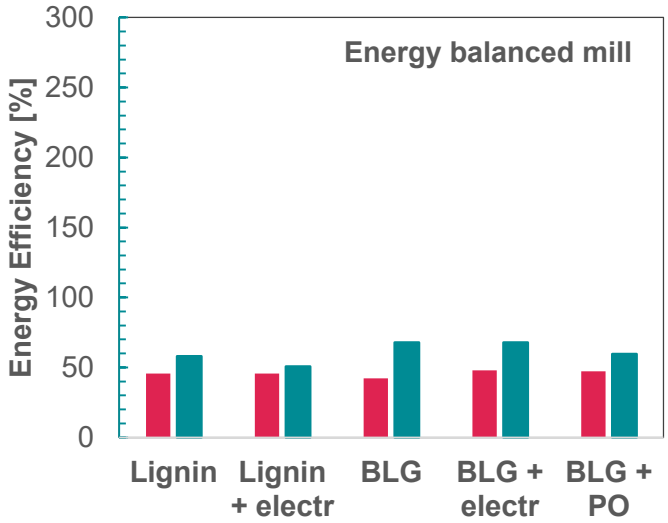
ENERGY EFFICIENCY

PRODUCTION COST

GHG PERFORMANCE

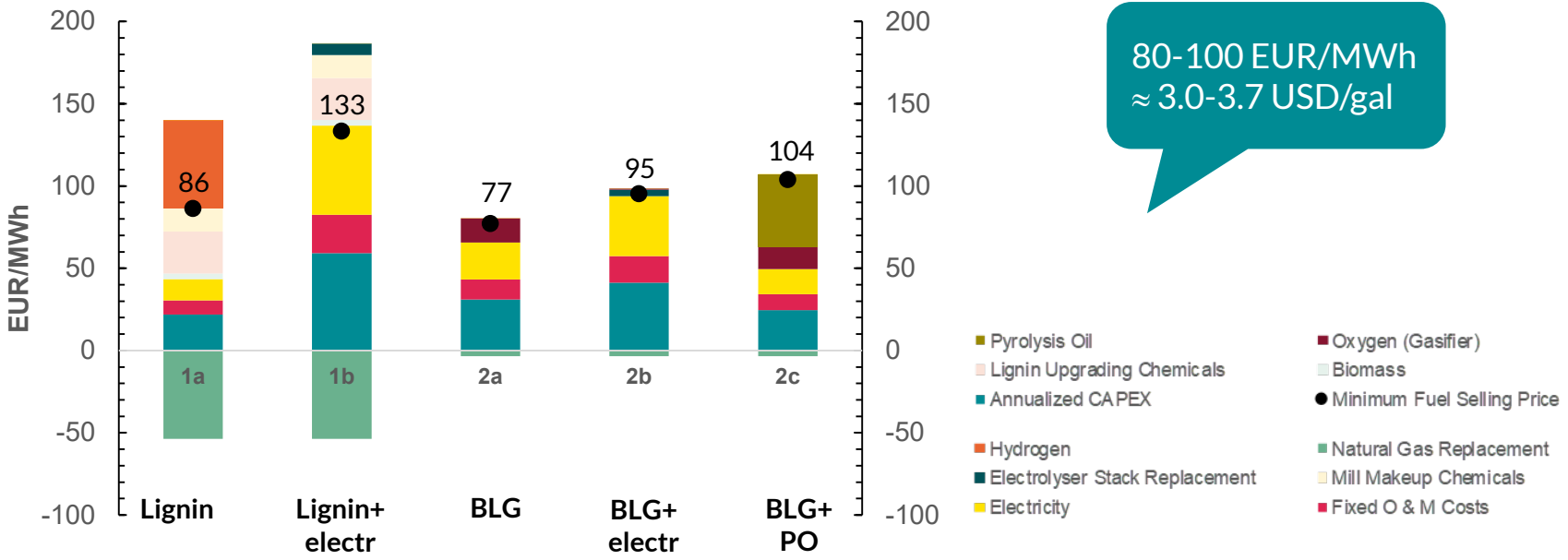
Energy efficiency





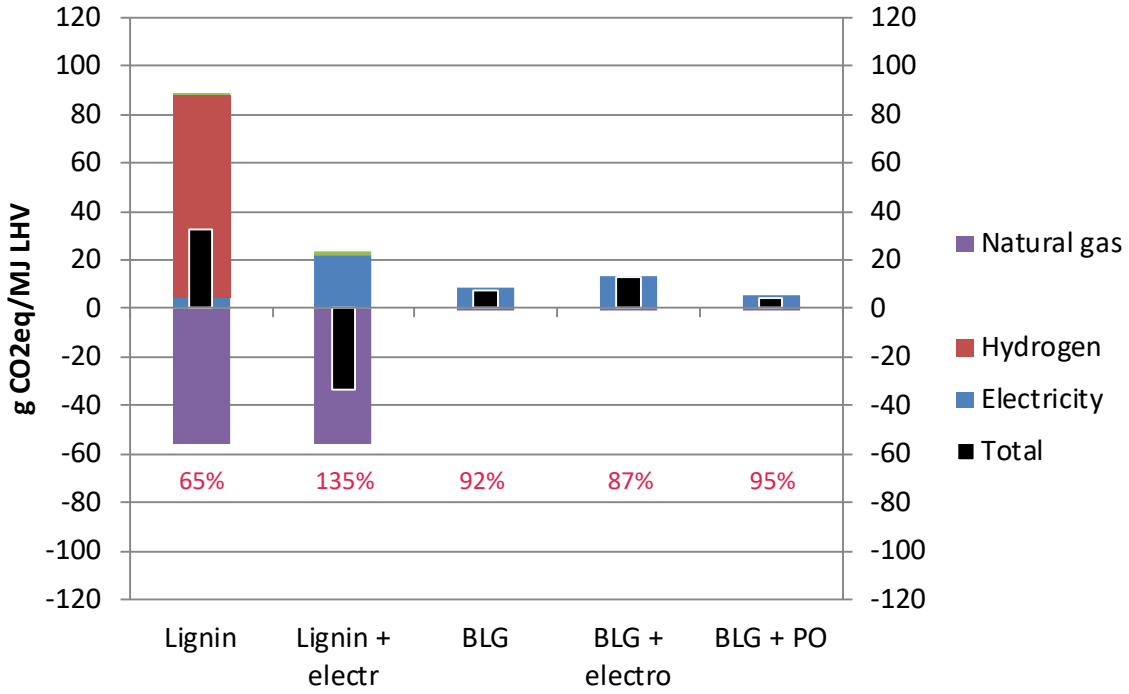
Production costs

- Energy surplus mill (similar for balanced mill)



Greenhouse gas performance

- Energy surplus mill (similar for balanced mill)



Results valid for low carbon electricity production!

Conclusions

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Thank you for listening

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