



Negative CO2 emissions from torrefied biomass gasification

IEA Value (by-)products from gasification
October 19th, 2022

Torrgas technology: two-stage gasification of torrefied biomass (1)

- Application of torrefied biomass
 - Homogeneous feedstock => steady operation, easy pressurisation

	Y	Tough	N	
	Y	Fibrous	N	
	Y	Hydrophylic	N	
	Y	Biodegradable	N	
	Y	Heterogeneous	N	
	Y	Poor energy density	N	

Torrgas solution: two-stage gasification of torrefied biomass (2)

item	Feature
Step 1: low temperature gasification (< 750°C) with steam/oxygen	+ Removal of ash from pyrolysis gas => no ash in high temperature gasifier => reduction in operational problems (no slagging)
	+ High quality byproduct: char
	- Lower efficiency to syngas
Step 2: high temperature gasification (~ 1200°C)	+ Cracking of tars => robust technology, high syngas quality for application in catalytic processes (tar levels < 0.1mg/Nm ³ dry basis)*
	+ nitrogen free syngas => high quality syngas for application in the process industry

* typical for biomass gasifiers: FB 6,000-14,000 mg/Nm³, downdraft 400-800 mg/Nm³)

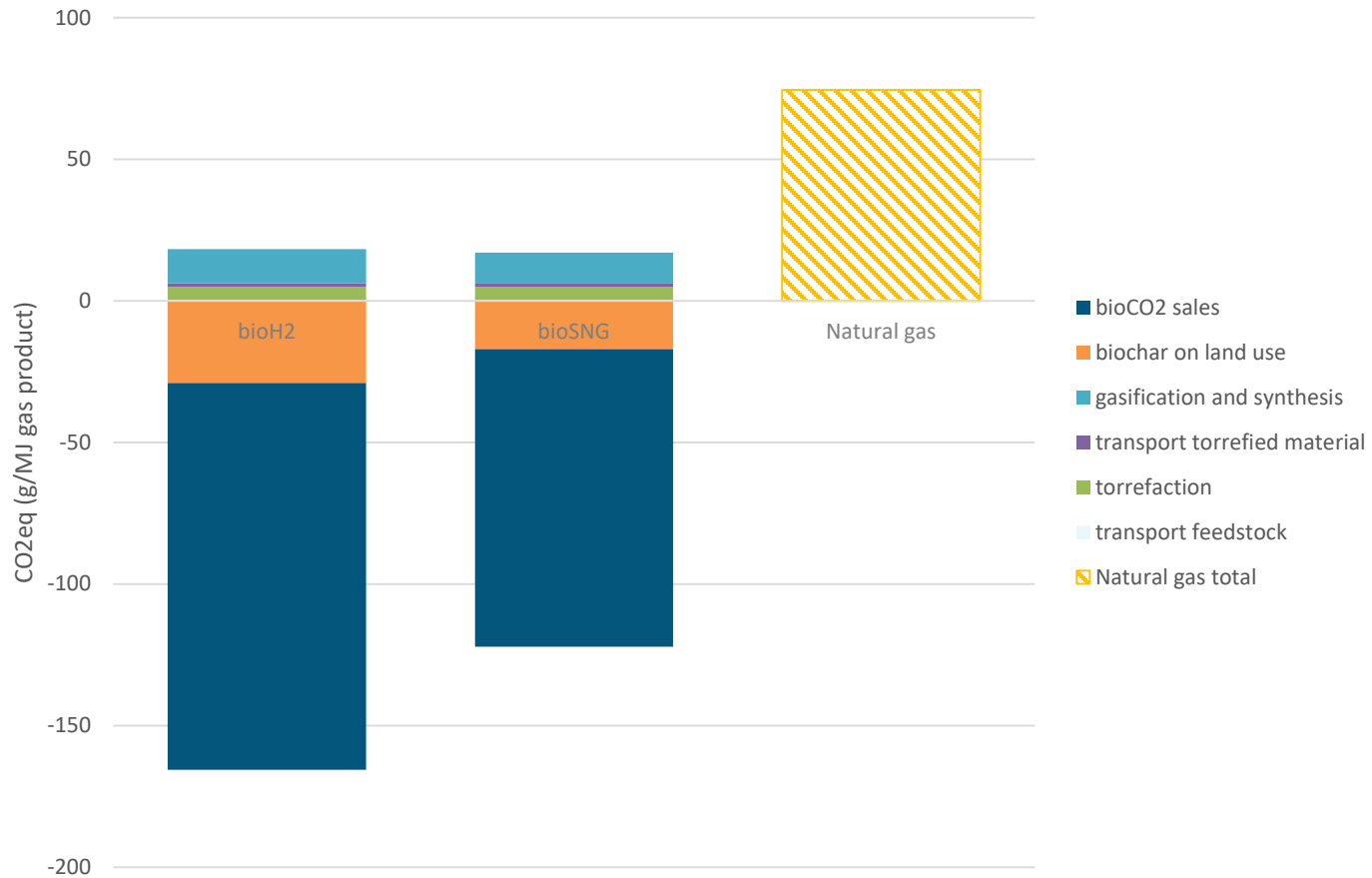
Products from Torrgas gasification process

- Syngas as platform chemical for production of
 - bioSNG
 - bioH₂
 - bioMeOH
- Biochar for application of
 - Fertiliser (clean A wood: forestry residues, agricultural waste)
 - Active coal (water purification, gas cleaning, dashboards, carpets)
 - (Co-)fuel
- bioCO₂ (foodgrade)
- biosteam

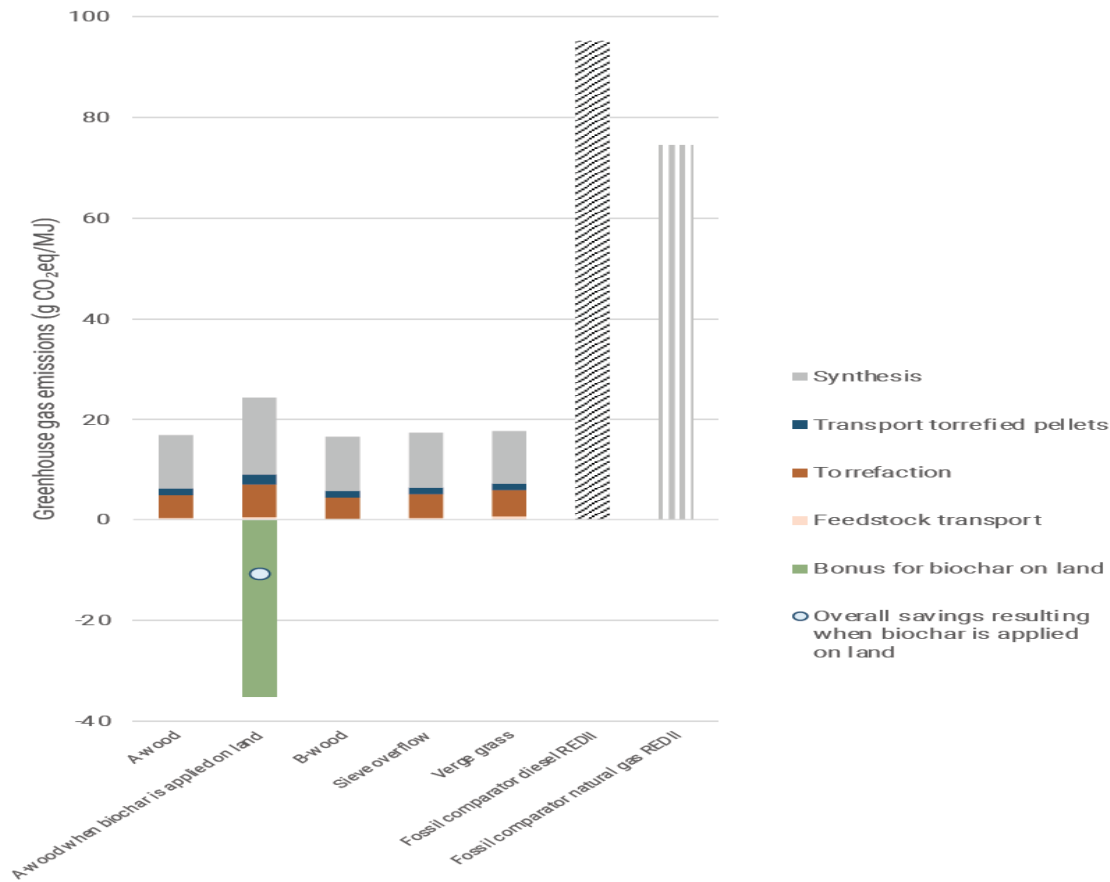
CO2 emission reduction of products by replacing fossil alternatives (WTW) (1)

- Independent assessment by Studio Gear-up according REDII methodology
- Capacity gasification unit: 100 MWth torrefied biomass input
- Several feedstocks analysed
 - A wood (clean wood from e.g. Forest management)
 - B wood (waste wood from construction industry)
 - Sieve overflow (from digestion plants)
 - Verge grass
- Feedstock sourcing
 - 35 km from torrefaction plants
 - 200 km from central gasification plant
- Two gas products analysed
 - bioSNG
 - bioH2

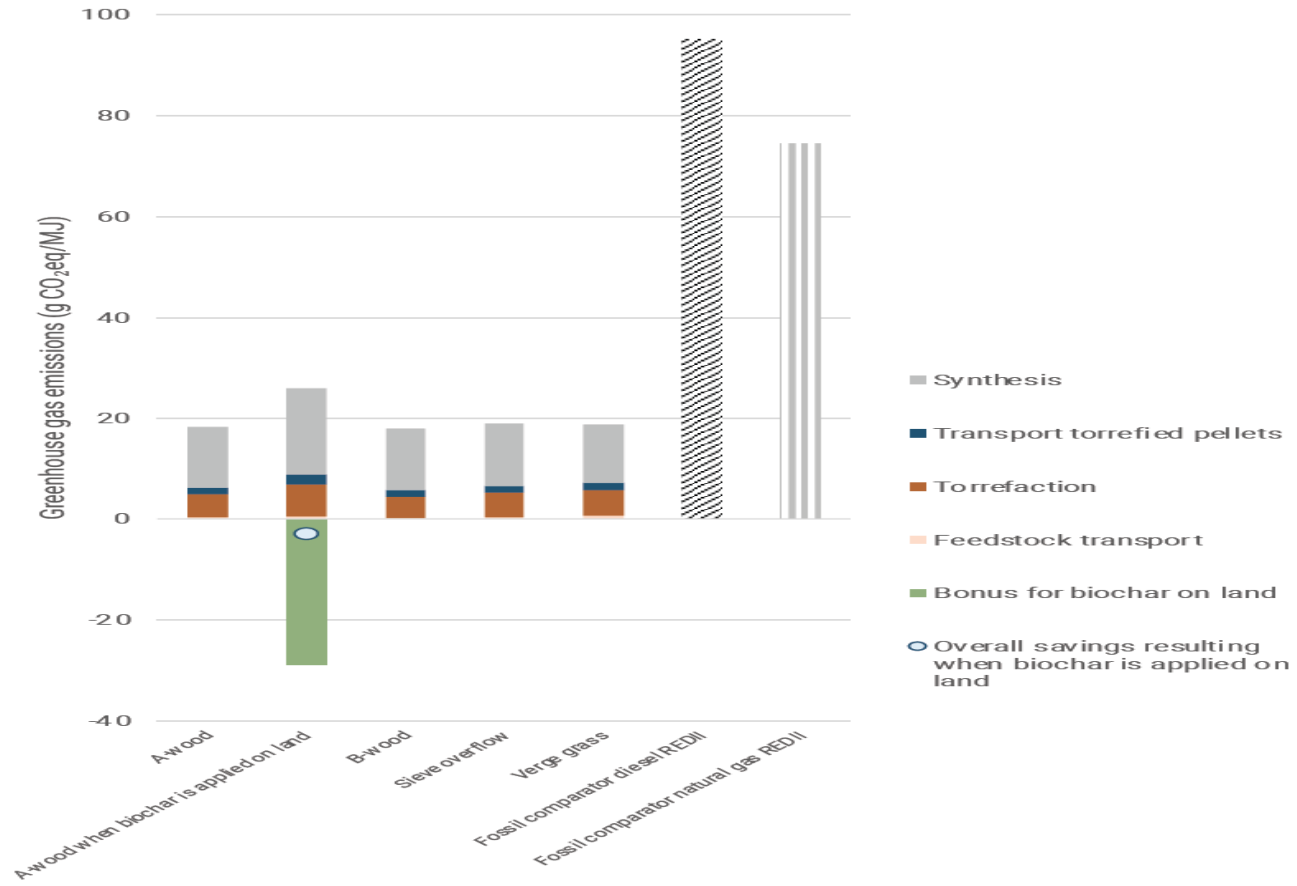
CO2 emission reduction: A wood



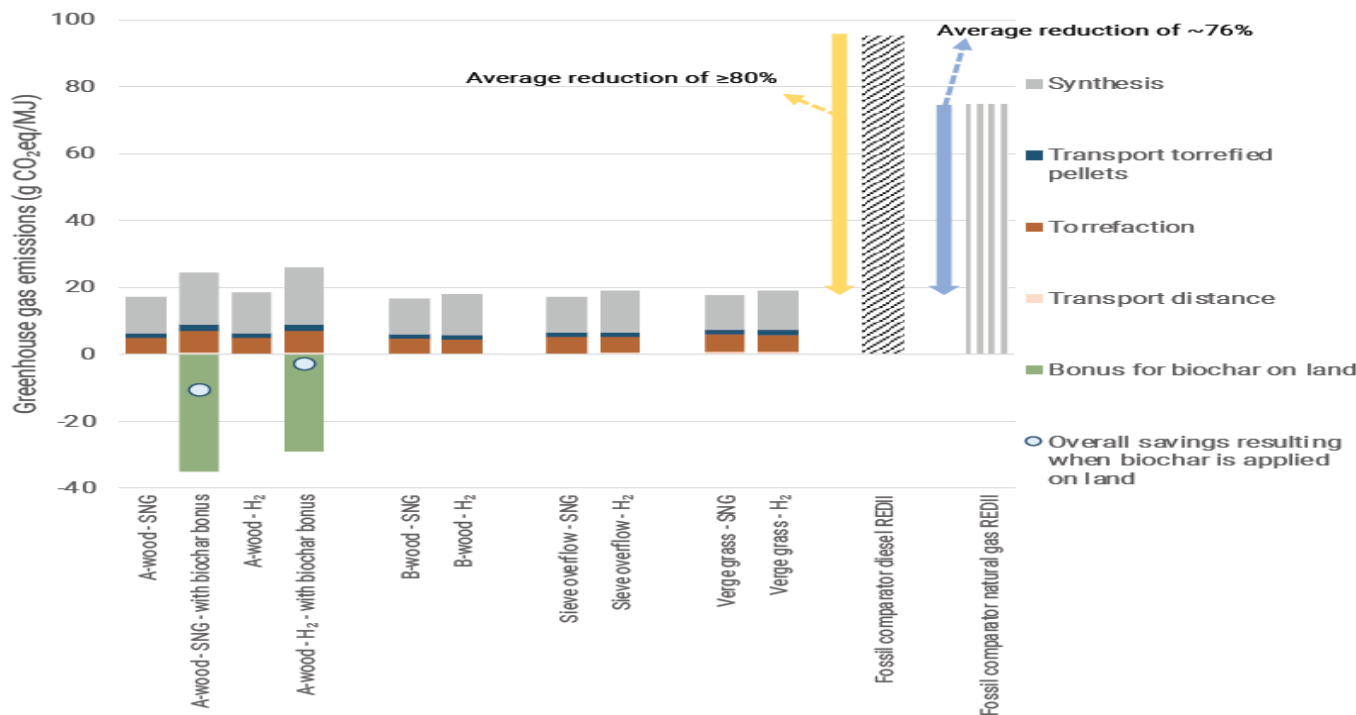
CO2 emission reduction: SNG



CO2 emission reduction: H2



CO2 emission reduction: summarising



Including

- biochar on land use, negative CO2 emissions: reduction 100-120%
- CO2 sales, negative CO2 emissions: reduction > 220-260%
- Both: CO2 emission reduction > 240-300%!!

Thank you for your attention

Questions?

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