

The Norwegian Model for biogas

Environmental impacts from biogas production
Value chain costs



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Purpose of biogas model

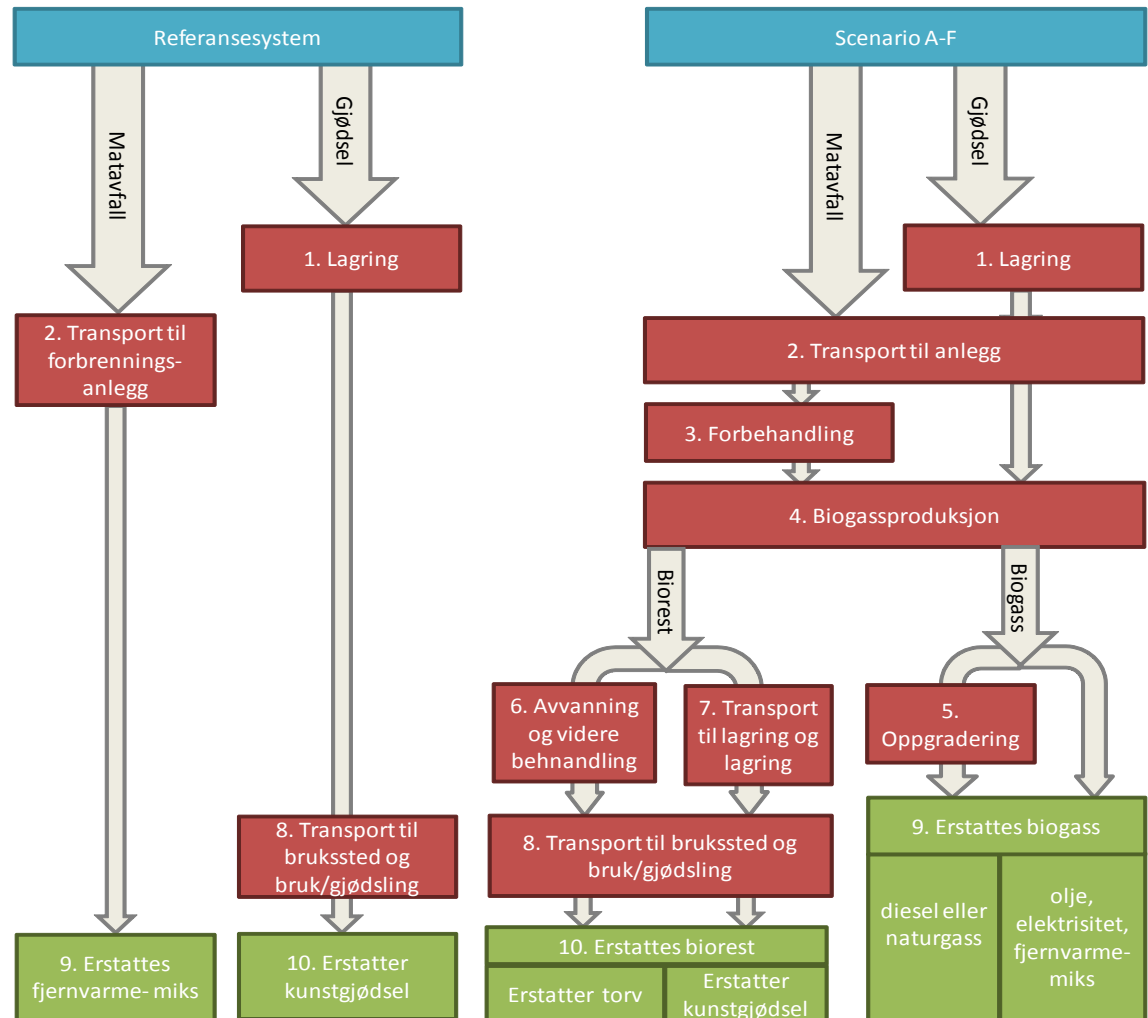
- Documentation of net GWP and other environmental indicators (benefits and emissions) and economy (costs and income)
 - Through the value chain of biogas production
 - In a region, for a specific biogas plant or for treatment of a certain amount of waste/manure
- Simulate the effect of different solutions such as:
 - Size on new plants (amount and type substrate)
 - Analyze consequences of localisation alternatives (transport distances)
 - Different applications of biogas (avoided products)

Value chain scenarios and system boundaries

Generic parameters that can be changed

System expansion

Avoided products



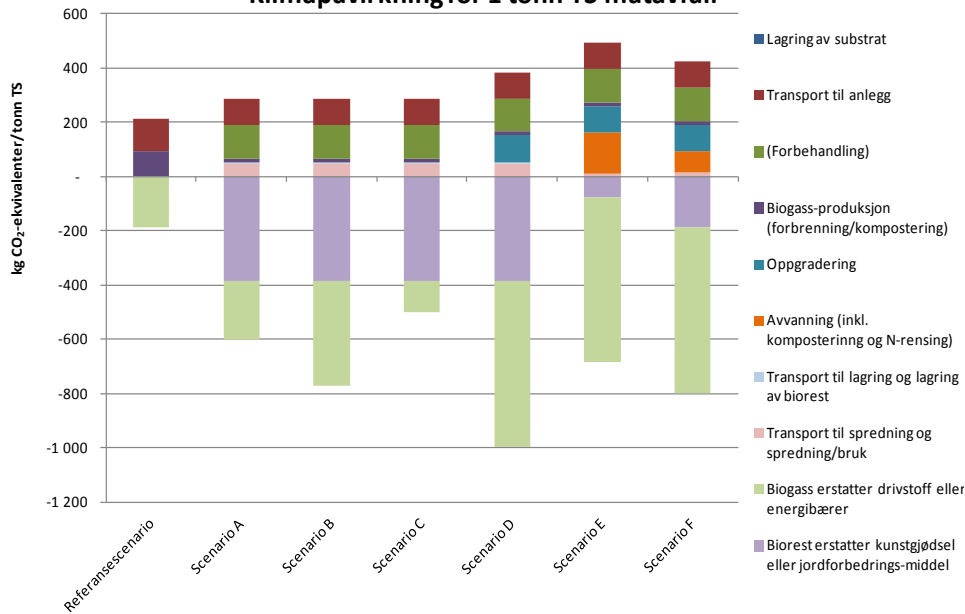
Alternatives for treatment of biowaste and manure

Reference	Treatment	Avoided product heat	Avoided product manure
Biowaste	Energy recovery	District heating mix (NO)	
Manure	Used as fertiliser		Mineral fertiliser
Scenario	Treatment	Avoided product biogas	Avoided product digestate
Biowaste	Biogas production	District heating mix (NO)	Mineral fertiliser
		Heat (oil 75% el 25%)	
		Electricity	Compost (dewatered) Aqueous phase goes to treatment
Manure		Diesel (fuel)	Compost (dewatered digestate) Aqueous phase replaces mineral fertiliser

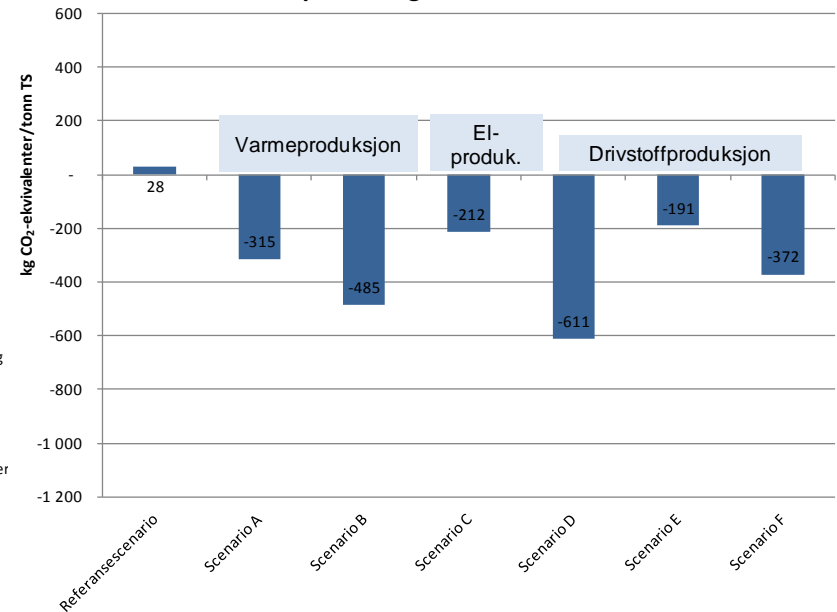
Generic results GWP

Biowaste

Klimapåvirkning for 1 tonn TS matavfall



Netto klimapåvirkning for 1 tonn TS matavfall



Value chain cost

Ongoing work and starting up

- Further development of the model, update of data and add indicators (CED/EPR)
- Testing of the model for specific cases
- Comparative study biogas production Norway and Denmark
 - Conditions such as climate, economy, substrates amounts and types
 - Regulations and policies