Grass to biogas turns arable land to carbon sink

LOVISA BJÖRNSSON
Project funding and reporting


https://energiforskmedia.blob.core.windows.net/media/20192/grass-for-biogas-energiforskrappot-2016-280.pdf


http://lup.lub.lu.se/record/c4b9d90c-c7f6-4481-b094-3e2e3fa6ad89
Arable land use and biofuels

![Graph showing the share of renewable fuels in domestic transport from 2005 to 2015 for EU 28 and Sweden.]

Eurostat (2017) Share of renewable energy in fuel consumption of transport
“iLUC-directive” (EU) 2015/1513
Arable land and soil carbon

Atmosphere: 750 billion t C

“45% of the soils in the EU have low or very low (0-2%), and declining, soil organic carbon (SOC) content”

Above ground biomass: 550 billion t C

“...soil resources in many parts of Europe are being over-exploited, degraded and irreversibly lost due to inappropriate land management practices...”

Soil: 1 500 billion t C

"A healthy, fertile soil is at the heart of food security"


Aim

Visualize how existing knowledge on crop and biofuel production can be applied to create a system with dual benefits;

Increasing soil carbon content in combination with a locally produced biofuel with low GHG emissions

“Existing policies tend to address issues in relative isolation”
Agricultural specialization

Grass as biogas feedstock
Soil carbon development

- D ökad avkastning och biogödsling
- D nuvarande
- S2 med vall och biogödsling
- S2 med vall
- S2 nuvarande
- S1 med vall och biogödsling
- S1 med vall
- S1 nuvarande
GHG emissions cultivation

- GHG emissions [t CO2-eq per hectare and year]
- Cultivation input: Mineral fertilizer and materials, N2O mineral fertilizer, N2O indirect, SOC
- Field emissions: N2O crop residues, N2O biofertilizer, Diesel & other energy input

For S2 present:
- Cultivation input: 0.5, Field emissions: 0.0

For S2 modified:
- Cultivation input: 0.75, Field emissions: 0.25
GHG emissions from a fuel perspective

-25
-20
-15
-10
-5
0
5
10
15
20
25

GHG emissions [g CO2-eq/MJ biofuel]

Replacing crops
Biogas production
Net climate benefit cultivation
To conclude

- Too narrow perspectives makes us miss systems with dual benefits

- It is important to consider potential conflicts between sustainable food supply and an increasing demand of biomass in other sectors

*But also consider the fact that current agriculture on our most high yielding soils is not sustainable from a long term perspective – and drastic measures will be needed to change this development*

- To introduce integrated cereal and energy grass production is one way to turn the present soil carbon losses

*But grass based biogas production is not sustainable according to the EU RED calculation method for biofuels*
Lovisa Björnsson
Professor
Environmental and Energy Systems Studies

lovisa.bjornsson@miljo.lth.se
046-222 8324
www.miljo.lth.se