


## Werkconferentie Topsector Energie

### Industrial Ecology analysis of Biofuel options

Ester van der Voet



Department of Industrial Ecology  
Institute of Environmental Sciences  
Universiteit Leiden  
The Netherlands

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### Industrial ecology analysis of biofuel options

- Considering large scale biofuel production
  - Questions asked are mainly from business perspective
  - In view of aim (complying with Paris goals) environmental perspective also important
  - Analysis of transport fuel options to assess both benefits and drawbacks
  - Helps to choose between alternatives but also informs technology development

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### Industrial ecology analysis of biofuel options

- Questions:
  - What are environmental impacts of different types of fuel (GHG emissions and others)
  - What are benefits of shifting to fuel alternatives
  - What are side-effects of shifting to fuel alternatives

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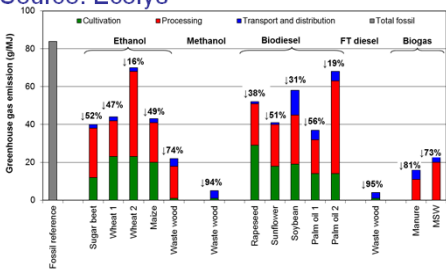
### Industrial ecology analysis of biofuel options

- Life Cycle Assessment: impacts of biofuels over their life cycle (well-to-wheel)
- Greenhouse gas calculators LCA based
- Lessons learned:
  - Energy use in agricultural production chain is considerable
  - LCAs generally show GHG benefits of biofuels, but usually modest
  - Choice of feedstock is very important

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### Industrial ecology analysis of biofuel options

- Source: Ecofys



Feedstock	Cultivation (%)	Processing (%)	Transport and distribution (%)	Total (%)
Sugar beet	52%	47%	1%	100%
Wheat 1	47%	53%	0%	100%
Wheat 2	16%	84%	0%	100%
Millets	49%	51%	0%	100%
Waste wood	74%	26%	0%	100%
Waste wood	94%	6%	0%	100%
Repurposed	38%	62%	0%	100%
Sunflower	51%	49%	0%	100%
Soybean	31%	69%	0%	100%
Palm oil 1	56%	44%	0%	100%
Palm oil 2	19%	81%	0%	100%
Waste wood	95%	5%	0%	100%
Municipal MSW	81%	19%	0%	100%
MSW	73%	27%	0%	100%

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### Industrial ecology analysis of biofuel options

- Life Cycle Assessment: impacts of biofuels over their life cycle (well-to-wheel)
- Lessons not yet learned, but available:
  - GHG benefits, but often severe drawbacks in other areas (land use, water use, nutrient use, pesticide use)
  - “Carbon neutral” hazy concept
  - Methodological choices heavily influence results, and are often badly reported

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## Industrial ecology analysis of biofuel options

LCA / GHG calculators are micro-scale

Macroscale also important

Biofuels for aviation, shipping and road transport, to meet Paris climate objectives

- Aviation: 5% of global GHG emissions
- Shipping: 3%
- Heavy road transport: 6%

All rising rapidly.

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## Industrial ecology analysis of biofuel options

- Not just micro-level analysis, also macro-level: planetary boundaries!
- 15% of global energy biobased means doubling of global crop production
- Leads to global constraints in land (well established), water, nutrients
- Closed loops in biomass production ???

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## Industrial ecology analysis of biofuel options

- Be on the lookout
  - Biobased fuels part of solution
  - Specific options analysed on life cycle impacts ...
  - ... and on planetary boundaries if implemented widely
- Biofuels “without the hot air”
  - Be wary of easy statements
  - Consider alternatives, and analyse!

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