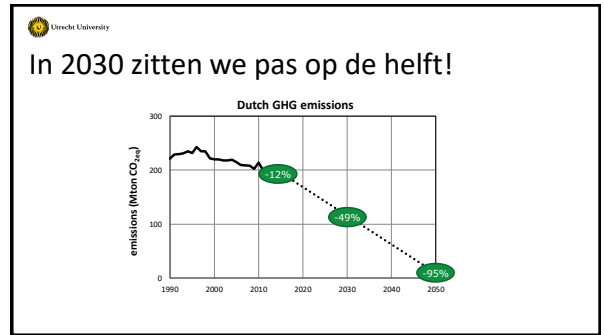


Universiteit Utrecht Copernicus Institute of Sustainable Development

De rol van biomassa in 2030/2050

Prof. Dr. Martin Junginger
 Circulair congres TKI-BBE
 8 mei 2019

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Negative emissions in the IPCC Special Report on Global Warming of 1.5°C

Pathways to Sustainability
 24 January 2019
 Utrecht

Helen de Coninck
 Department of Environmental Science
 Faculty of Science

Radboud University

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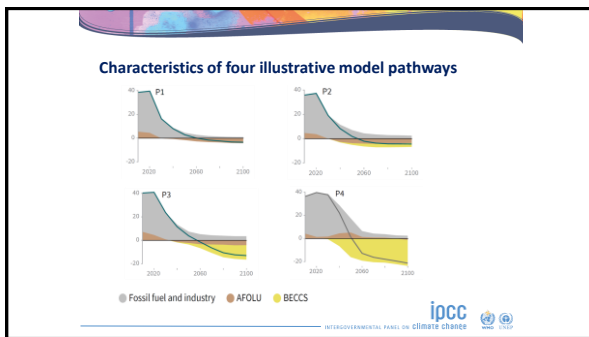
Impacts of warming of 1.5°C

At 1.5°C compared to 2°C (for example):

- Less extreme weather where people live, including extreme heat and rainfall
- By 2100, global mean sea level rise around 10 cm lower
- Coral reefs disappearing vs. some remaining
- Ice-free North Pole every 100 vs. every 10 years

ipcc

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Carbon Dioxide Removal (CDR) options in the SR1.5

Natural	Natural & technological	Technological
Afforestation & reforestation	Bio-energy and CO ₂ capture and storage (BECCS)	Enhanced Weathering
Biochar		Direct Air CO ₂ Capture and Storage (DACCS)
Soil Carbon Sequestration		

Only BECCS and afforestation/reforestation included in modelled pathways

ipcc

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Potential and costs of NETs in the Netherlands

- First order indicative estimate of technical and realistic potential in 2030 and 2050.
- Sources: scientific literature, reports, experts, internet, own estimates.
- Based on *current* economic structure and some insights on future developments (roadmaps).
- *Additional* costs only.
- Not an integrated scenario study.
- No policy recommendations.

NEGATIVE EMISSIES
Realistische emissies: methaankoolstof op kosten voor Nederland
Achtergrondinformatie
Bij de rapporten, zijn de kosten, winst en risico's, maar niet het voor de Staat te betalen bedrag, meegenomen.

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Why BECCS in NL? NET potentials till 2050

Option	Technical potential	Realistic potential 2030	Realistic potential 2050	Add. cost	Biomass	TRL
	Mtons CO ₂ /year			€/ton	PJ/Mt	
Post-combustion CO ₂ (total)	46-55	4,6	17			
Coal power plants to BECCS	23	0*	0*	40-60	10	8
Biogas plants	6-8	Almost 0	>0	50-100	33	8
Steel Hiarna proces	4,8	0,7	4,8	0	9	6-8
High temp heat	7-14	2,5	7,4	60-110	10	8
MSW biogenic fraction	4,9	1,4	4,9	60-80		7-8
Advanced Biofuels	45-55	>2,3	>>2,3	0	20	5-7

* Assuming all coal power plants will be closed by 2030. Source: Strengers et al. 2018.

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Recente rapporten bevestigen dit beeld

Option	Without CCS	With CCS
F-T synchrude in Norway	~24	~27
Bio-SNG in The Netherlands	~20	~23

Implementation of Bio-CCS in Bioethanol production

*The addition of CCS to a biofuel production value chain will roughly double the amount of mitigated CO₂ in both value chains, from 0.6 to 1.1 Mtonny while the overall biofuel production costs increasing by 10%. Alamo et al., 2018, Task 33

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For comparison –other NET options in NL

Option	Technical potential	Realistic potential 2030	Realistic potential 2050	Add. cost	Biomass	TRL
	Mtons CO ₂ /year			€/ton	PJ/Mt	
Bio-based chemistry (methanol, ethylene, styrene, others)	16	2,7	7,5	60-80	31	7-9
(Green) concrete +buildings	11 + >0,6	1,9 + 0,3	2,8 +0,6	<0-70	9	
Agriculture & afforestation	5,3	1,3	2,2	0-200		9
Biochar	6	Close to 0	0-1	100-500	18	3-6
Advanced weathering	9	0,2	1,4	70		5-6
Direct Air Capture	Not applicable	Close to 0	Close to 0	250-850		4-8

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Other PBL-study 'Exploration of climate goals'

Biomass: ~500 PJ total for biofuels for HT heat industry for LT heat (green gas)

BECCS: ~37 Mton
Largest part is achieved with CCS & transport biofuels production, not with power plants

Source: Daniels and Ros (2017) 'Exploration of climate goals'

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Bio-energie gebruik 20350

Pijlen enkel indicatief/kwalitatief, veel zal ook afhangen van BECCS

Chemie ?

ECN, Nationale Energieverkenning 2017.

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Utrecht University

Constateringen 1/2

- Alleen fossiel CCS staat in het klimaatakkoord, BECCS ontbreekt (vrijwel?) volledig...
- Terwijl diverse vormen van BECCS het grootste potentieel tegen relatief lage kosten lijken te bieden in Nederland => Als Nederland zelf serieus negatieve emissies wil behalen, moet deze discussie gevoerd worden

Want het zal uiteindelijk ook de vraag naar biomassa sterk bepalen...

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Utrecht University Planbureau voor de Leefomgeving

Biomass demand (food, feed and materials excluded)

2030: 340-570 PJ extra +?

2050: 700 PJ

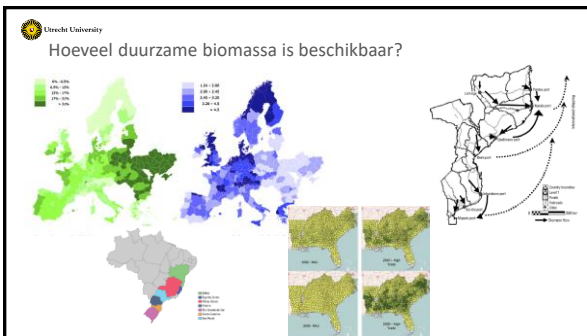
Potential supply in the Netherlands up to 250 PJ

Availability uncertain

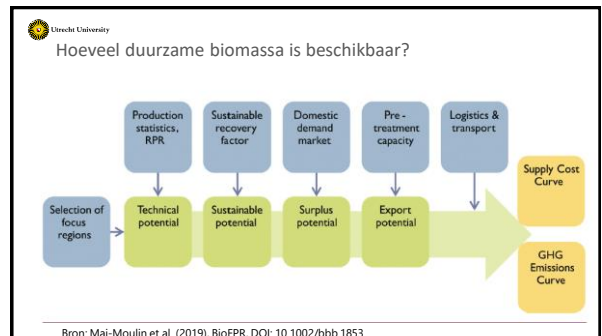
Based on a potential global supply of 100-150 EJ

Indication for the Netherlands 600-900 PJ

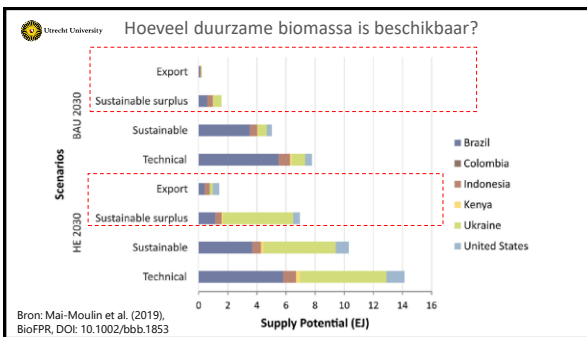
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Utrecht University

Voorbeeld Brazilië

Geschat technisch potentieel van sugar cane trash in Brazilië > 4 EJ, wordt momenteel vrijwel niet gebruikt

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Constateringen 2/2

- Bij grote vraag naar biomassa zal Nederland moeten importeren.
- De discussie over beschikbaarheid van biomassa gaat vaak alleen over "hele bomen"...
- Terwijl er substantiele, duurzame potentielen van agri- en bosresiduen beschikbaar zijn
- Die echter niet gemobiliseerd zullen/kunnen worden zolang er geen stabiele vraag is

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Dank voor uw aandacht!

Vragen?

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