

Biomassa en 1.5°C: Wat zegt het IPCC?



Dilemma's rond biomassa
Milieunetwerk GroenLinks &
Wetenschappelijk Bureau GroenLinks
24 mei 2019

Heleen de Coninck
Afdeling Milieukunde
Faculty der Natuurwetenschappen, Wiskunde & Informatica

Radboud University



Inhoud

Wat is het IPCC en waarom het 1.5°C rapport?

Hoofdboodschappen over 1.5°C

Wat is het verschil tussen 1.5°C en 2°C?

Wat vergt 1.5°C en wat is de rol van biomassa?

Hoe duurzaam zijn 1.5°C emissiepaden?

Hoe zit het met CO₂-verwijdering ('negatieve emissies')?

Achtergrond van het Special Report over 1.5°C

Parijsakkoord: “well below 2°C” en “make efforts” for 1.5°C

Landen hadden Nationally Determined Contributions (NDCs) opgestuurd, maar... (COP21)

- “...notes that much greater emission reduction efforts will be required than those associated with the intended nationally determined contributions”

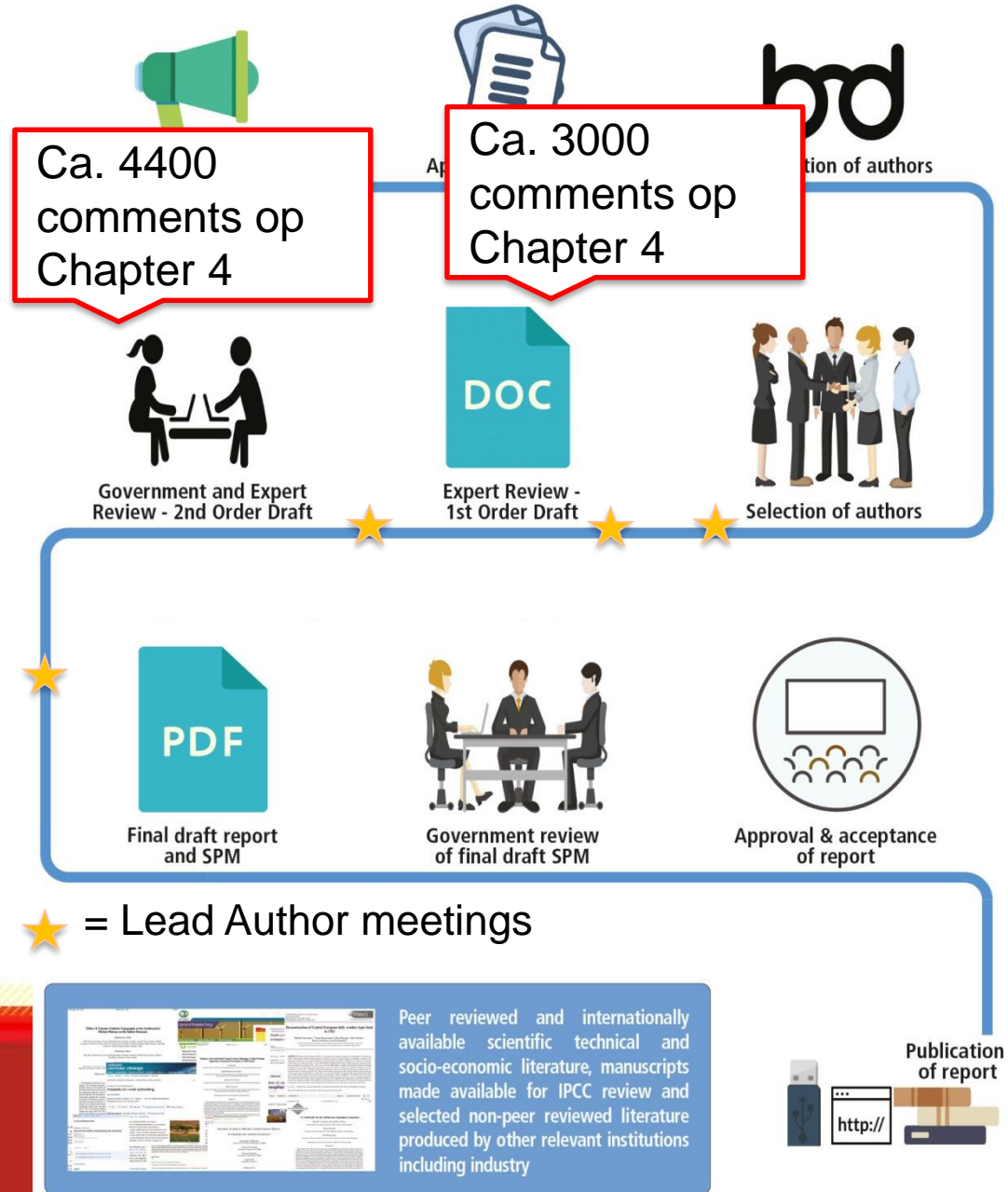
“Invites the Intergovernmental Panel on Climate Change to provide a special report in 2018 on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways” (COP21 decision, para 21)



Deadline: COP24 (Katowice, november 2018): eerste keer dat de partijen van het Parijsakkoord de balans opmaken over hoe het gaat

Special Report on Global Warming of 1.5°C (SR1.5)

- Mondiaal niveau, verschil 1.5 en 2C
- Korte tijd (1.5 jaar) vanwege Katowice deadline
- Literatuur in beweging; heel veel en heel weinig
- Hoge verwachtingen en politieke druk
- Heel, heel veel commentaren (waar het rapport beter van is geworden)



What comments look like

Comment ID	From Page	From Line	To Page	To Line	Category	Jump To Location	Sections	Reviewer	Affiliation	Comment	LEAD
30550	6	25	6	27	substance	Click link	Section Executive Summary	Government of France	Ministère de la Transition écologique et solidaire	This subject should be further documented.	CLAs
60714	6	25	6	27	substance	Click link	Section Executive Summary	Government of United States of America	U.S. Department of State	Report does not provide sufficient evidence to make a claim that active involvement by central banks is "necessary". Moreover, such a statement is not in line the IPCC principles to not be policy prescriptive.	CLAs
31704	6	25	6	32	editorial	Click link	Section Executive Summary	Michael SUTHERLAND		The phrase "1.5°C-compatible worlds" can be confusing. How many worlds are there?	CLAs
36060	6	25	6	32	substance	Click link	Section Executive Summary	Government of India	Ministry of Environment, Forests and Climate Change	Institutional capacity in financial sector, as emphasized in the Report, is needed. All sources of finance are important, given the enormity required. However contrary to what draft Report suggests, the multilateral development banks can come as a supportive channel to leverage climate finance. The front loading has to arrive from the financial pledges the developed country Parties have undertaken under the UNFCCC. Private sector finance also play a supportive and a critical additional role. This needs to be	CLAs
53136	6	25	6	32	substance	Click link	Section Executive Summary	Westphal Michael	World Resources Institute	The section gives short shrift to other instruments for low-emission and adaptation investments, such as other derisking instruments, green bonds, and insurance. Also, 4.6 could also mention financial instruments that address co-benefits of climate action, such as social impact bonds that target health improvements from air pollution	CLAs
1860	6	26	6	26	substance	Click link	Section Executive Summary	Willem Pieter Pauw	German Development Institute/ Deutsches Institut für Entwicklungspolitik (DIE)	I would include bilateral banks too. And commercial banks	CLAs
31504	6	26	6	26	substance	Click link	Section Executive Summary	Government of Japan	Climate Change Division, Ministry of Foreign Affairs	We would suggest mentioning not only central and multilateral banks but also financial regulatory authorities because in some countries, functions are distinguished between the central bank and the financial regulatory authority.	CLAs
							Section Executive Summary	Amory Lovins	Rocky Mountain Institute	I doubt that up-to-date models (which no IAMs are) would show "front-loading of investments compared to current actions is unavoidable". IAMs tend to use old and fixed cost data (especially for wind and solar power), and sometimes to assume largely or wholly unnecessary bulk electrical storage (http://dx.doi.org/10.1016/j.tej.2017.11.006), rather than to assume observed experience/scaling curves and least-cost grid	

Summary for Policymakers approval: 1 to 6 October 2018



Image: ENB. Plenary room in Incheon, Korea

The report in numbers

91 Authors from 40 Countries

133 Contributing authors

6000 Studies

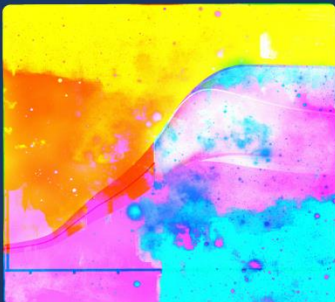
1 113 Reviewers

42 001 Comments

ipcc
INTERGOVERNMENTAL PANEL ON climate change

Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.





Belangrijkste boodschappen

We zitten al op 1°C opwarming

Met het huidige tempo overstijgen we 1.5°C tussen 2030 en 2052

Opwarming beperken tot 1.5°C heeft duidelijke voordelen

We kunnen de opwarming nog beperken tot 1.5°C maar dit vergt veranderingen op nooitvertoonde schaal

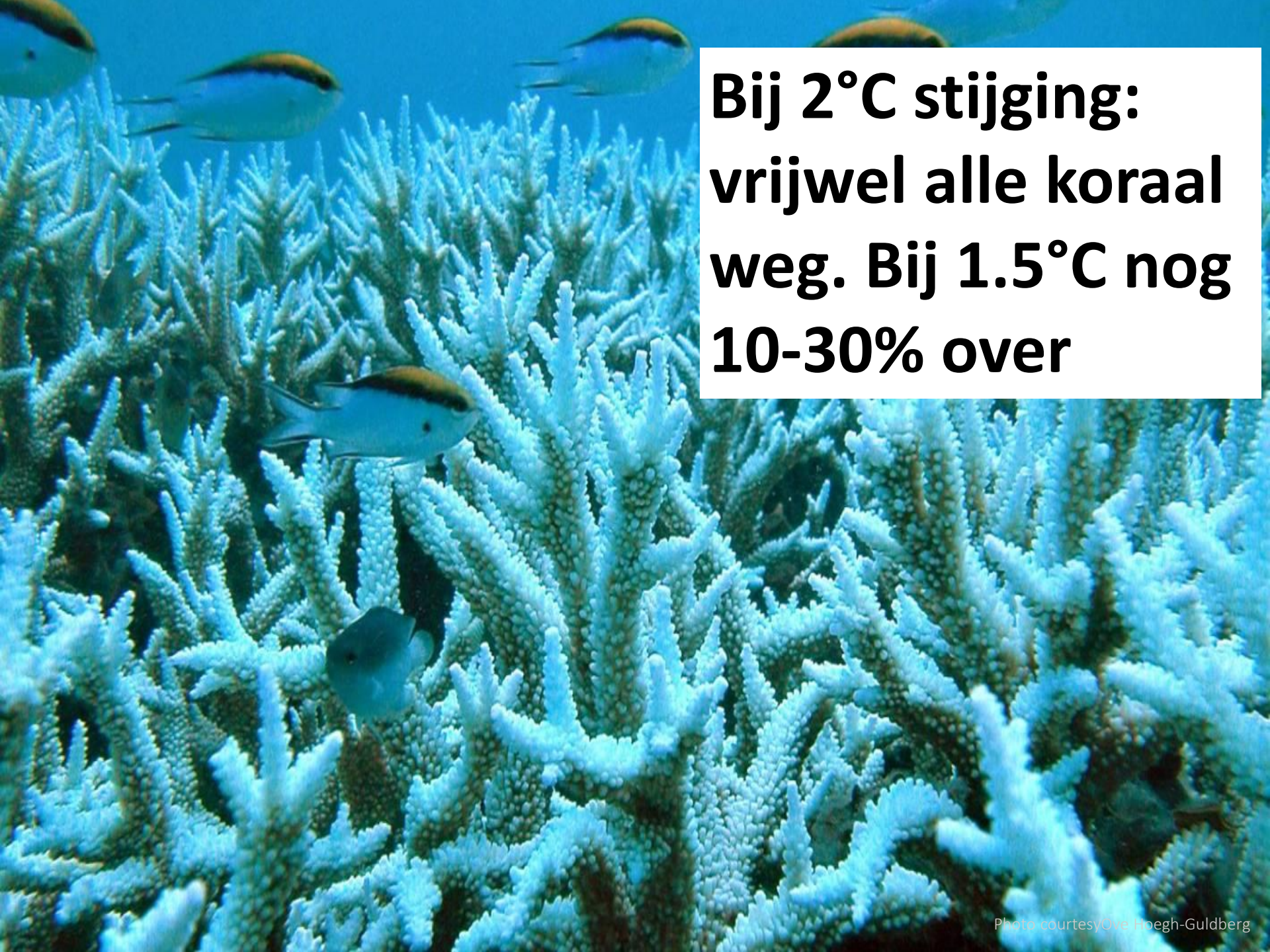
Opwarming beperken tot 1.5°C gaat hand in hand met andere maatschappelijke doelen

Ashley Cooper / Aurora Photos


ipcc

INTERGOVERNMENTAL PANEL ON climate change





**Bij 2°C stijging:
vrijwel alle koraal
weg. Bij 1.5°C nog
10-30% over**



**Bij 2°C: 10 cm meer
zeespiegelstijging
dan bij 1.5°C in 2100.
Langere termijn meer**

**Keerpunt irreversibel
afsmelten landijs ergens
tussen 1.5 en 2°C**



**Bij 2°C volledig zeeijsvrije
Noordpool iedere 10 vs.
iedere 100 jaar bij 1.5°C**



**In 2050 lopen
honderden
miljoenen mensen
meer risico's bij 2°C
dan bij 1.5°C**





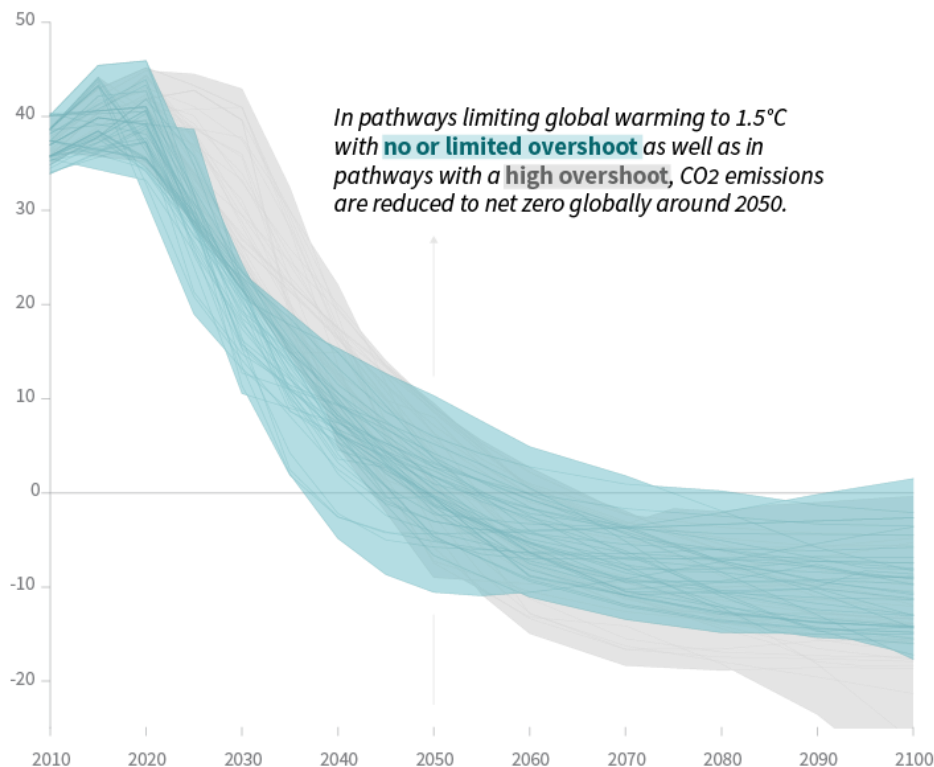
Opgave voor broeikasgasemissies

- Voor 1.5°C moeten mondiale CO₂ emissies in 2030 ongeveer 45% lager zijn dan in 2010
 - ↳ 25% voor 2°C
- Voor 1.5°C moeten mondiale CO₂ emissies 'netto nul' zijn 2050
 - ↳ Voor 2°C is dat rond 2070
- Weinig verschil voor niet-CO₂ emissies; al maximaal bij 2°C

Emissiepaden voor CO₂ en andere “forcers”

Global total net CO₂ emissions

Billion tonnes of CO₂/yr



*In pathways limiting global warming to 1.5°C with **no or limited overshoot** as well as in pathways with a **high overshoot**, CO₂ emissions are reduced to net zero globally around 2050.*

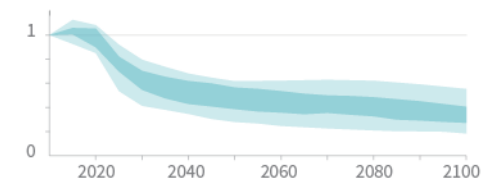
Timing of net zero CO₂
Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios



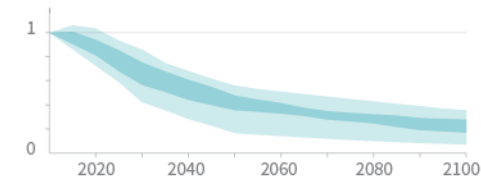
Non-CO₂ emissions relative to 2010

Emissions of non-CO₂ forcings are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.

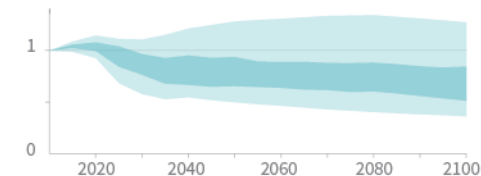
Methane emissions



Black carbon emissions



Nitrous oxide emissions

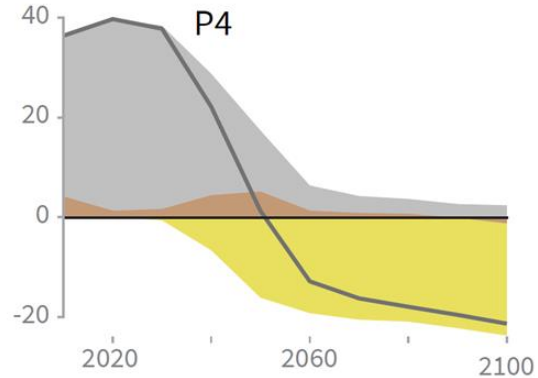
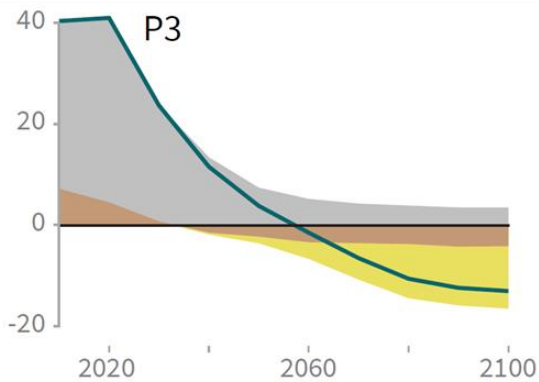
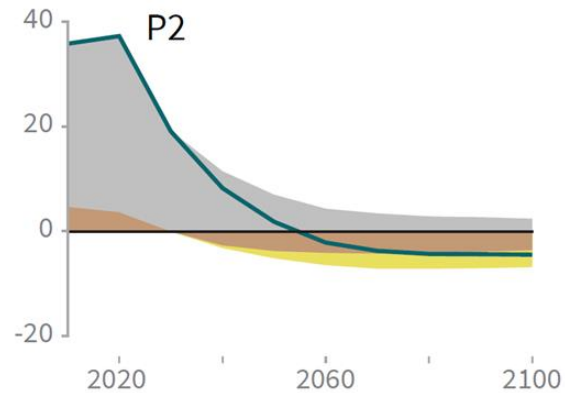
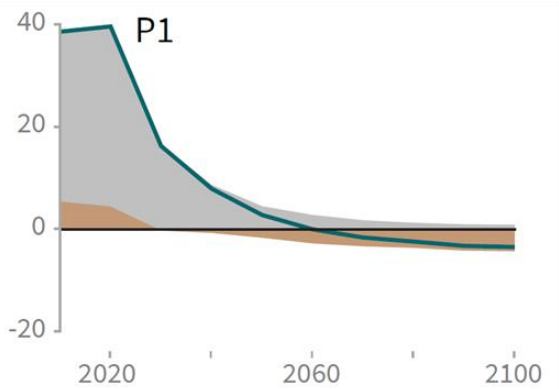




Systemtransities nodig

- Zelfs met collectieve persoonlijke acties lukt het niet om 1.5°C te halen
- Opwarming beperken tot 1.5°C vergt systeemtransities en CO₂ verwijdering
 - Energy systems transition
 - Land and ecosystems transition
 - Urban and infrastructure system transition
 - Industrial system transition
 - Carbon dioxide removal
- Mitigatie- en adaptatieopties binnen deze systeemtransities in samenhang

We hebben nog iets te kiezen: vier verschillende paden



● Fossil fuel and industry ● AFOLU ● BECCS

Veranderingen in energiebronnen en -dragers

Global indicators	P1	P2	P3	P4	Interquartile range
Pathway classification	No or low overshoot	No or low overshoot	No or low overshoot	High overshoot	No or low overshoot
Primary energy from coal in 2030 (% rel to 2010)	-78	-61	-75	-59	(29,80)
↳ in 2050 (% rel to 2010)	-97	-77	-73	-67	(123,261)
from oil in 2030 (% rel to 2010)	-37	-13	-3	-1	(-34,3)
↳ in 2050 (% rel to 2010)	-87	-50	36	418	(-78,-31)
from gas in 2030 (% rel to 2010)	-25	-20	121	37	(-26,211)
↳ in 2050 (% rel to 2010)	-74	0	21	-48	(151, 320)
from nuclear in 2030 (% rel to 2010)		49	98	724	(44,102)
↳ in 2050 (% rel to 2010)	-11	98	283	468	(91,190)
from biomass in 2030 (% rel to 2010)	-16	93	36	-1	(29,80)
↳ in 2050 (% rel to 2010)	-16	93	121	418	(123,261)
from BECCS in 2030 (% rel to 2010)	22	470	315	110	(243,438)
↳ in 2050 (% rel to 2010)	832	1327	878	1137	(575,1300)
area of bioenergy crops in 2050 (million hectare)	0	348	687	1218	(550, 1017)
area of BECCS (GtCO ₂)	0	151	414	1191	(364, 662)
Land area of bioenergy crops in 2050 (million hectare)	22	93	283	724	(151, 320)

Ter vergelijking: landbouw (2016): 4900 miljoen ha
(Wereldbank data)



Wat bepaalt of we het kunnen halen?

- Finance & investment
 - Mondiale investeringen ca. 2.5% omhoog
 - Shift van fossiel naar lage-emissie
- Policy instrumentation
 - Een mix aan instrumenten
 - CO₂-beprijzing niet zaligmakend
- Institutionele capaciteit
 - In overheid (ook lokaal), bedrijven, gemeenschappen en financiële sector
- Governance: Samenwerking tussen verschillende actoren
- Gedrag en acceptatie, ook publieke steun
- Technische innovatie – overal!

Peter Essick / Aurora Photos

ipcc

INTERGOVERNMENTAL PANEL ON climate change



IPCC SR1.5 over biomassa & BECCS

Beperkt in SR1.5, op diverse manieren beschouwd:

1. Geïntegreerde modellen:

- Biomassa is nul-CO₂, BECCS is CO₂-negatief. Vooral tweede generatie
- Elektriciteit, brandstof, feedstock voor chemische industrie, biogas, etc.
- Top-down beperkingen op landgebruik (Land Use, Land-Use Change, and Forestry)
- Landgebruik en impacts worden beperkt
- Grote range inschatting van impacts
- BECCS beperken = meer bioenergy

2. Bottom-up/haalbaarheidsassessment interacties

- Biomassa is nul-CO₂, BECCS is CO₂-negatief
- Impacts, 'governance' en implementatievragen meewegen
- Potentielen worden lager door meer beperkingen
... maar dat geldt voor veel andere opties ook

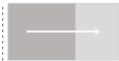


Is 1.5°C eigenlijk wel goed voor duurzame ontwikkeling?



Interactie mitigatieopties en Sustainable Development Goals

Length shows strength of connection



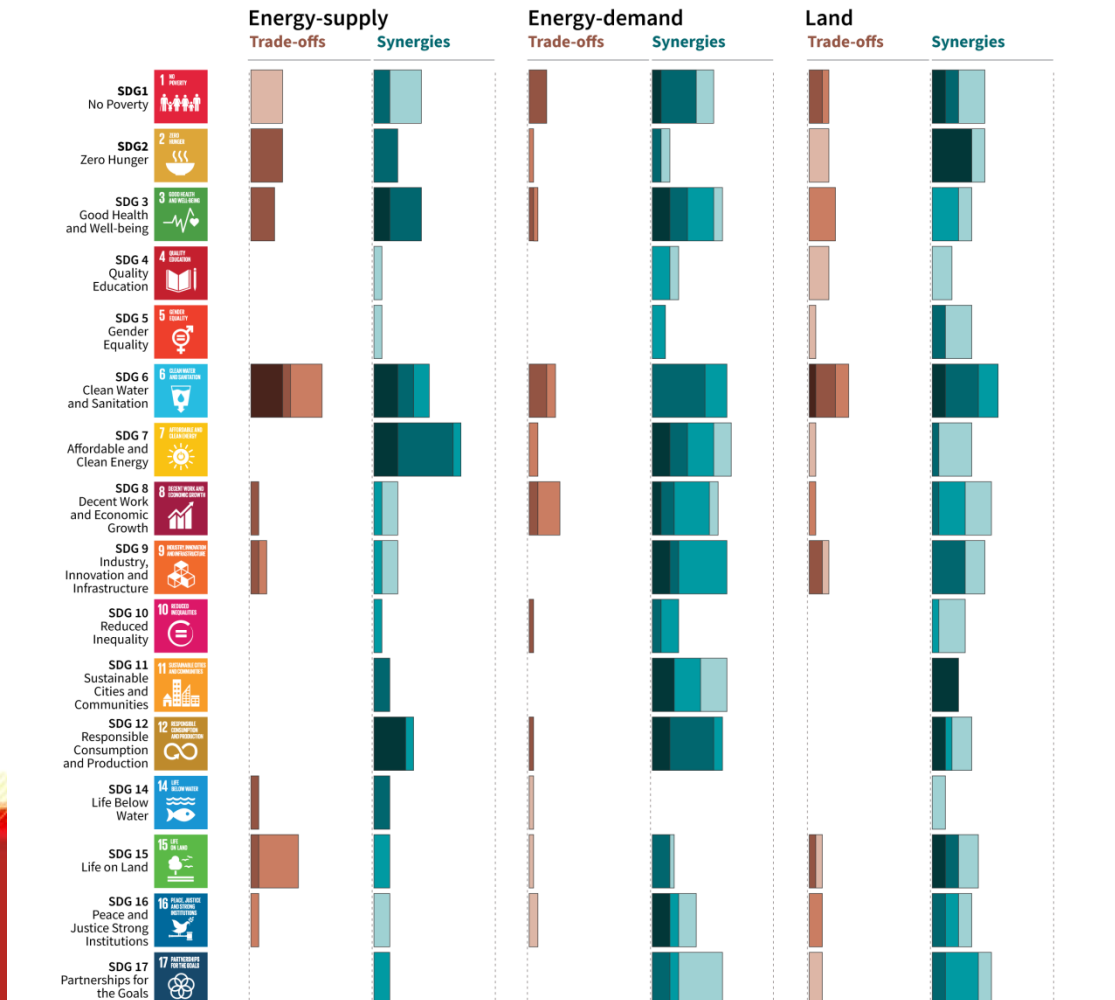
The overall size of the coloured bars depict the relative size for synergies and trade-offs between the sectoral mitigation options and the SDGs.

Shades show level of confidence

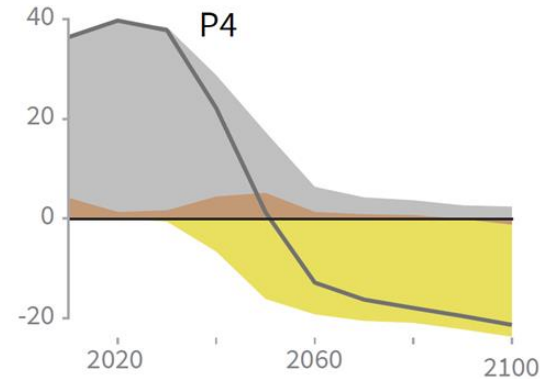
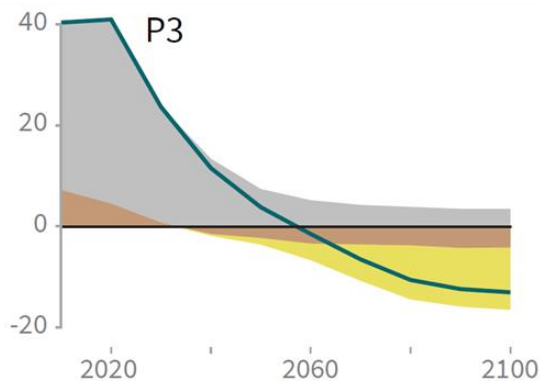
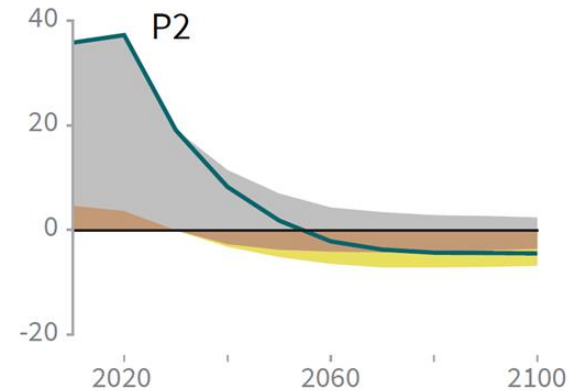
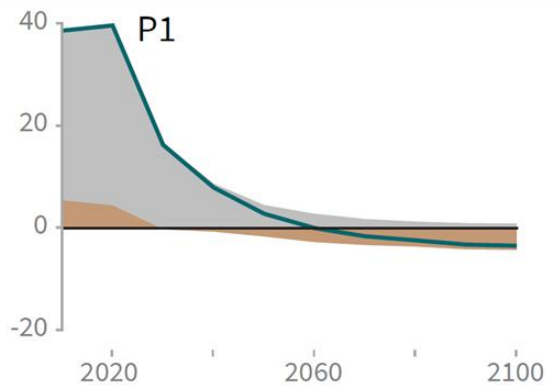


Very High Low

The shades depict the level of confidence of the assessed potential for Trade-offs/Synergies.



We hebben nog iets te kiezen: vier verschillende paden



● Fossil fuel and industry ● AFOLU ● BECCS

CO₂-verwijderingsopties in het SR1.5

Natural

Afforestation & reforestation

Biochar

Soil Carbon Sequestration

Natural & technological

Bio-energy and CO₂ capture and storage (BECCS)

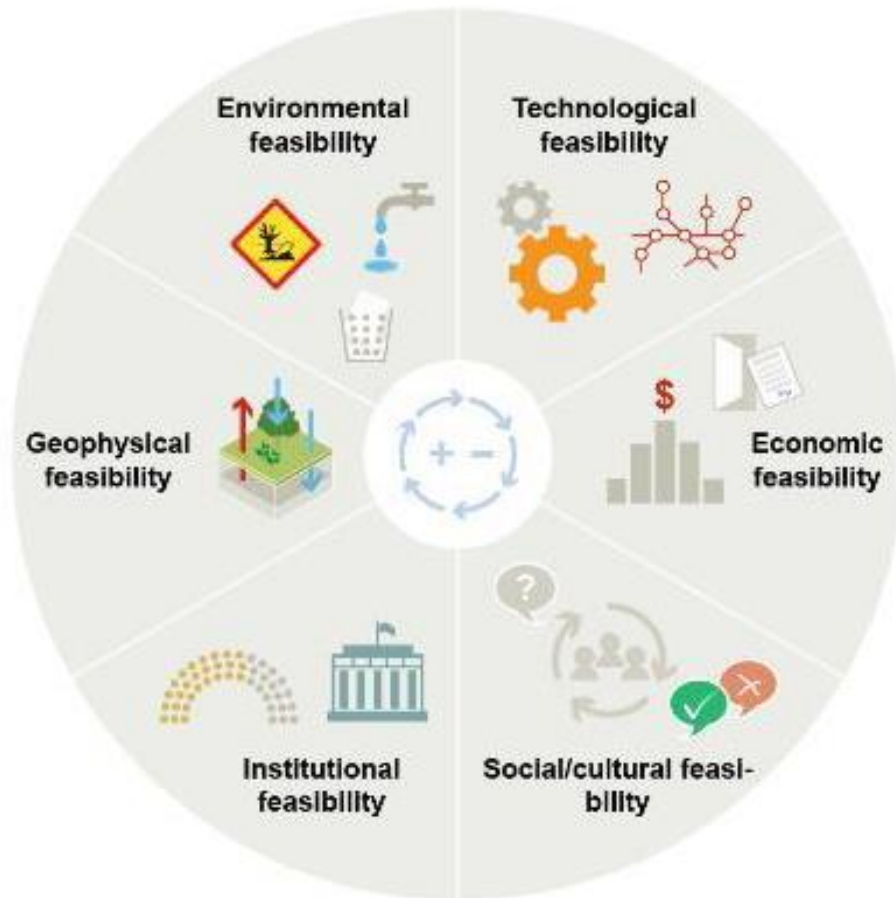
Technological

Enhanced Weathering

Direct Air CO₂ Capture and Storage (DACCS)

BECCS en afforestation/reforestation zitten in de modellen, de andere opties niet

Hoe haalbaar zijn de opties in systeemtransities?



Zes dimensies van
“haalbaarheid”

Resultaat:

- Waar kan een beleidsmaker of beslisser beginnen?
- In welke dimensies zitten barrières?
- Waar weten we nog onvoldoende?

Haalbaarheid van opties voor CO₂-verwijdering

Mitigation Option	Evidence	Agreement	Economic	Technological	Institutional	Socio-cultural	Environmental	Geophysical	Context
Bioenergy with CCS	Robust	Medium							Depends on biomass availability, CO ₂ storage capacity, legal framework, economic status and social acceptance
Direct Air Capture and Storage	Medium	Medium							Depends on CO ₂ -free energy, CO ₂ storage capacity, legal framework, economic status and social acceptance
Afforestation & reforestation	Robust	High							Depends on location, mode of implementation, and economic and institutional factors
Soil carbon sequestration & biochar	Robust	High							Depends on location, soil properties, time span
Enhanced weathering	Medium	Low							Depends on CO ₂ -free energy, economic status and social acceptance

Biomassa nodig voor 1.5°C-paden, maar....

- Beperkbaar door energie- en materiaalvraag mondiaal
- Landgebruik- en andere effecten duidelijk in beeld
- Flexibiliteit en negatieve emissies groot voordeel
- Modellen geven veel variatie, maar meeste zetten veel biomassa in, vooral voor CO₂-verwijdering
- IPCC rapport over land (augustus 2019) geeft meer antwoorden