Planbureau voor de Leefomgeving

Representative Concentration Pathways.

Detlef P. van Vuuren

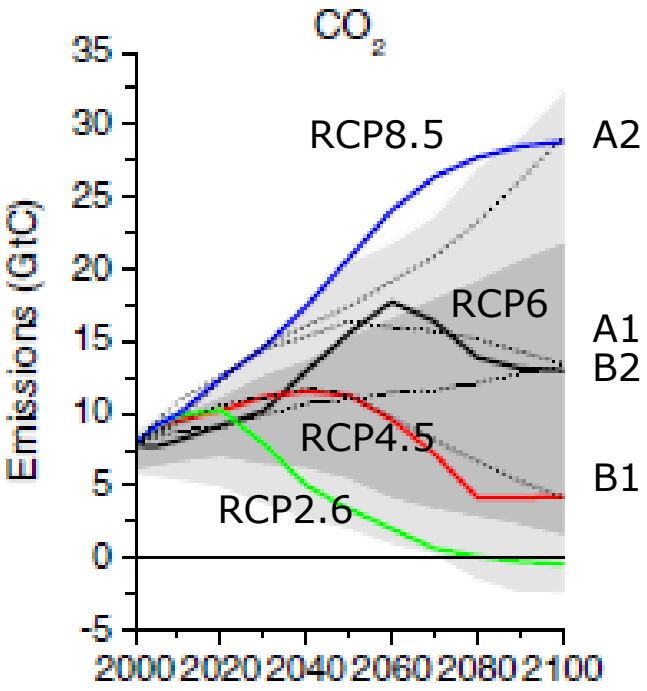
Reasons for new scenarios

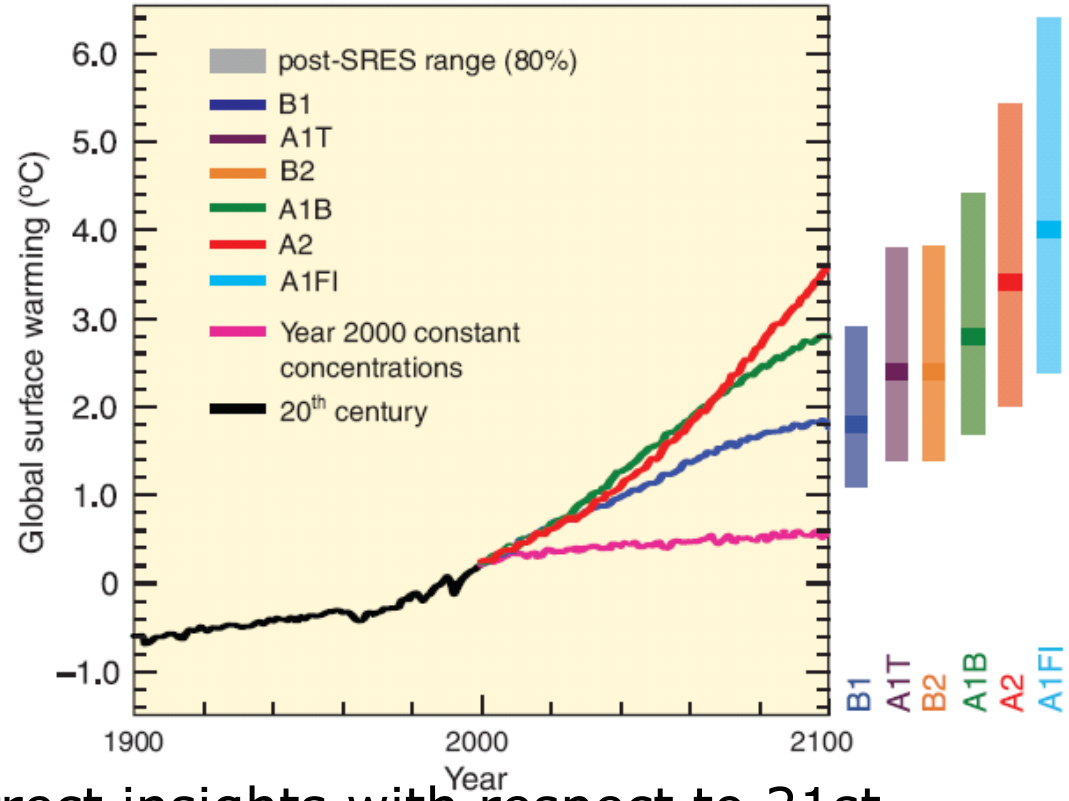
Planbureau voor de Leefomgeving

- **Four important reasons to develop new community** scenarios for climate assessment:
  - 1. Need to cover a wider range **of GHG concentrations** (SRES only included baseline scenarios)

Moss RH, et al (2010) The next generation of scenarios for climate change research and assessment. Nature 463:747-756.

SRES only covered scenarios without climate policy





SRES does not lead to correct insights with respect to 21st century warming and warming commitment.

Reasons for new scenarios

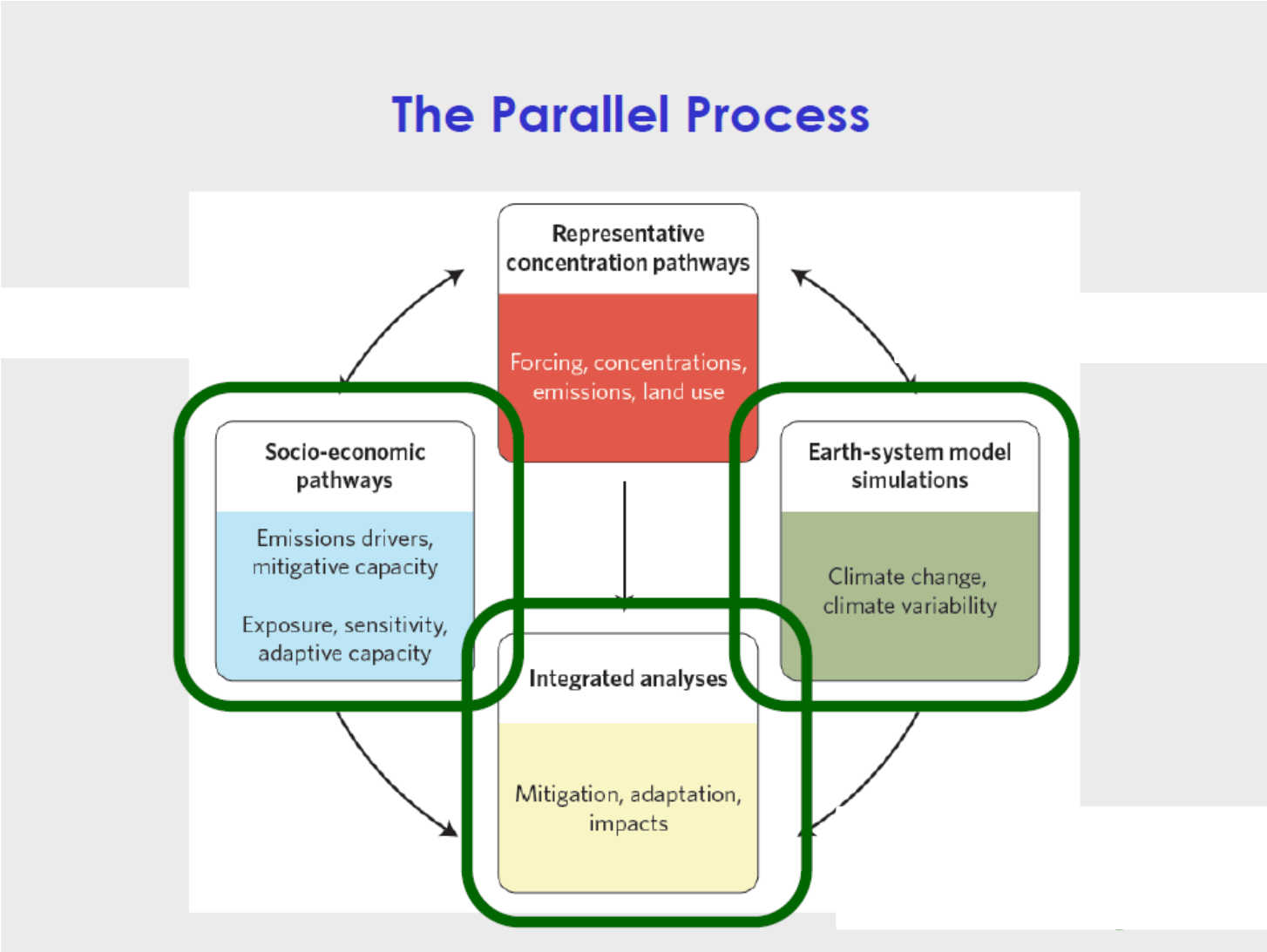
Planbureau voor de Leefomgeving

- **Four important reasons to develop new community** scenarios for climate assessment:
  - 1. Need to cover a wider range **of GHG concentrations** (SRES only included baseline scenarios)
  - 2. Need for a wider set of parameters (Climate models have become more complex; higher information need).
  - 3. Need for scenarios that cover mitigation & adaptation issues (need for more collaboration between "WGs")
  - 4. Use more recent insight into trends in scenario drivers (update)

Moss RH, et al (2010) The next generation of scenarios for climate change research and assessment. Nature 463:747-756.

New scenarios

Planbureau voor de Leefomgeving

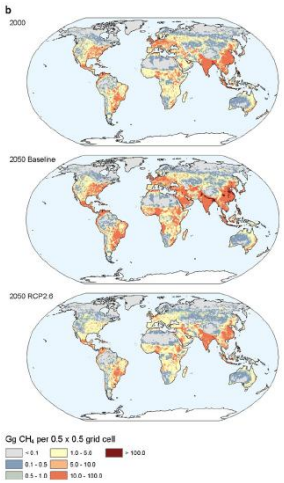


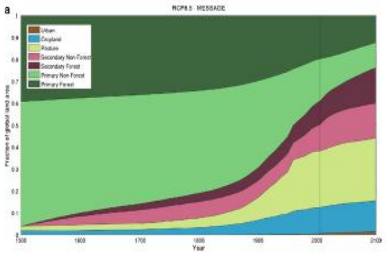
Moss RH, et al (2010) The next generation of scenarios for climate change research and assessment. Nature 463:747-756.

Overall process

Planbureau voor de Leefomgeving

Detailed, mapped data from integrated Assessment models

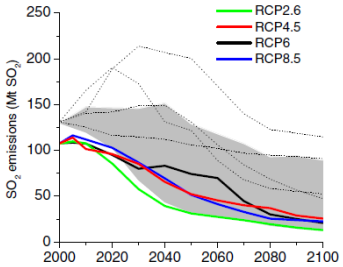


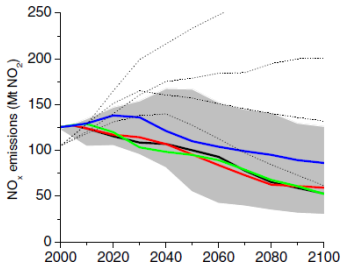


Data on emissions, land and concentration

Data on climate change and functioning of Earth system

Earth system and climate models

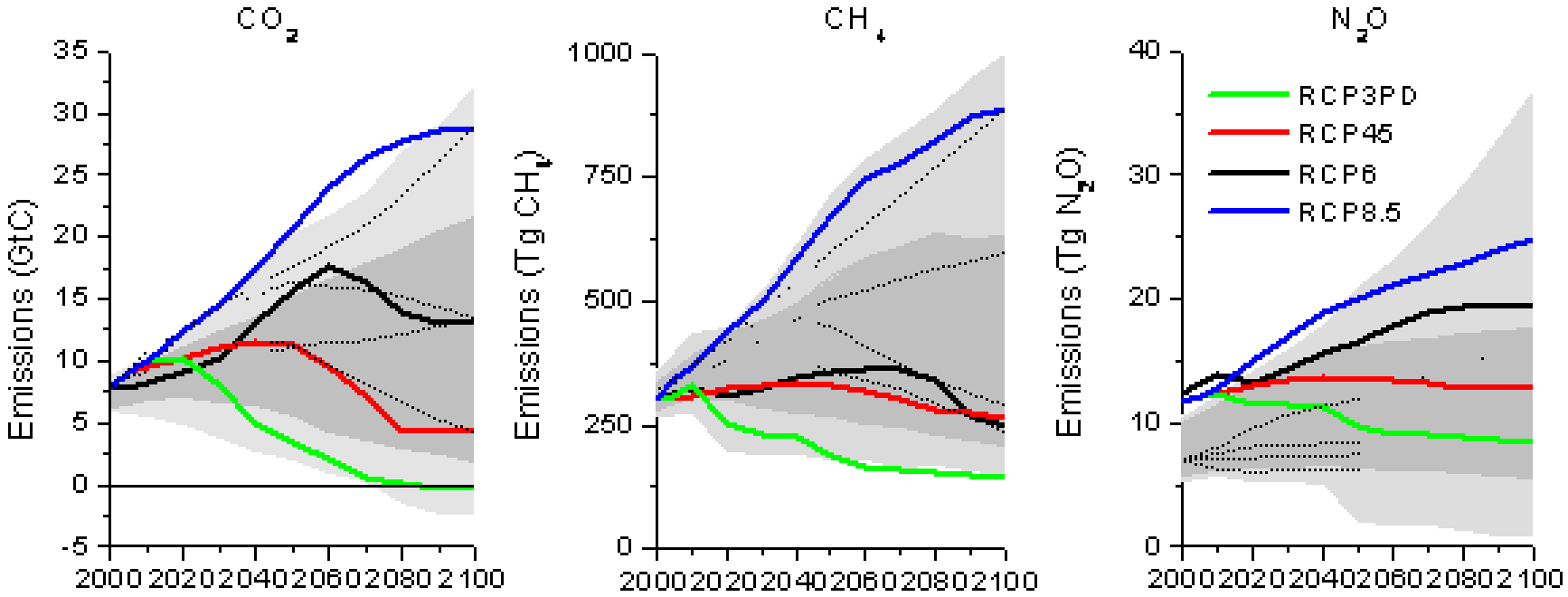




Van Vuuren, D.P. et al 2011. Representative Concentration Pathways: An overview. Climatic Change.

Emissions

Planbureau voor de Leefomgeving

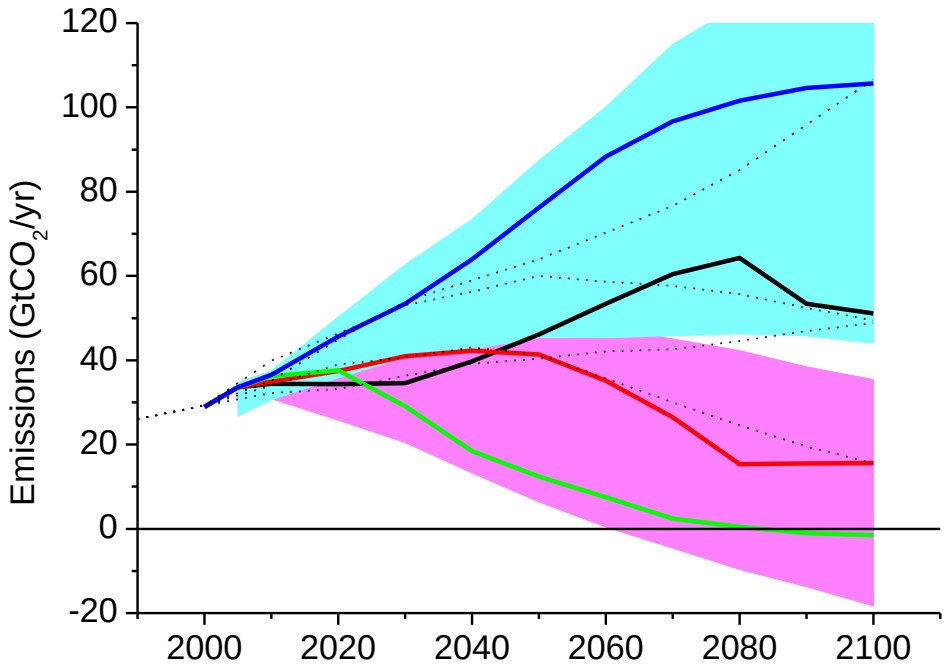


RCPs span nicely the range of the scenario literature

Van Vuuren, D.P. et al 2011. Representative Concentration Pathways: An overview. Climatic Change.

Emissions

Planbureau voor de Leefomgeving



RCP8.5: High range emission scenario (possible development for high population numbers, high fossil/coal use)

RCP6.0: Medium range emission scenario (low-medium baseline scenario or high mitigation scenario)

RCP4.5: Medium range emission scenario (high mitigation scenario)

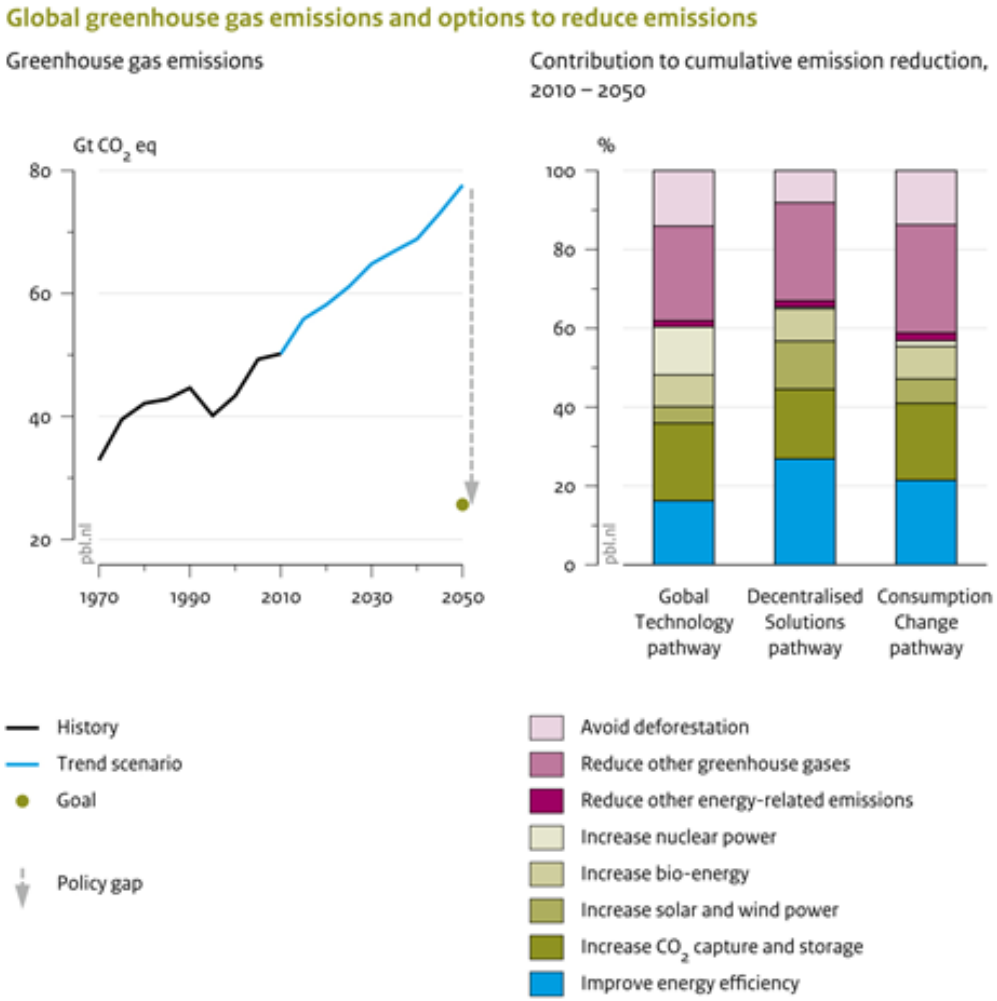
RCP2.6: Low range mitigation scenario

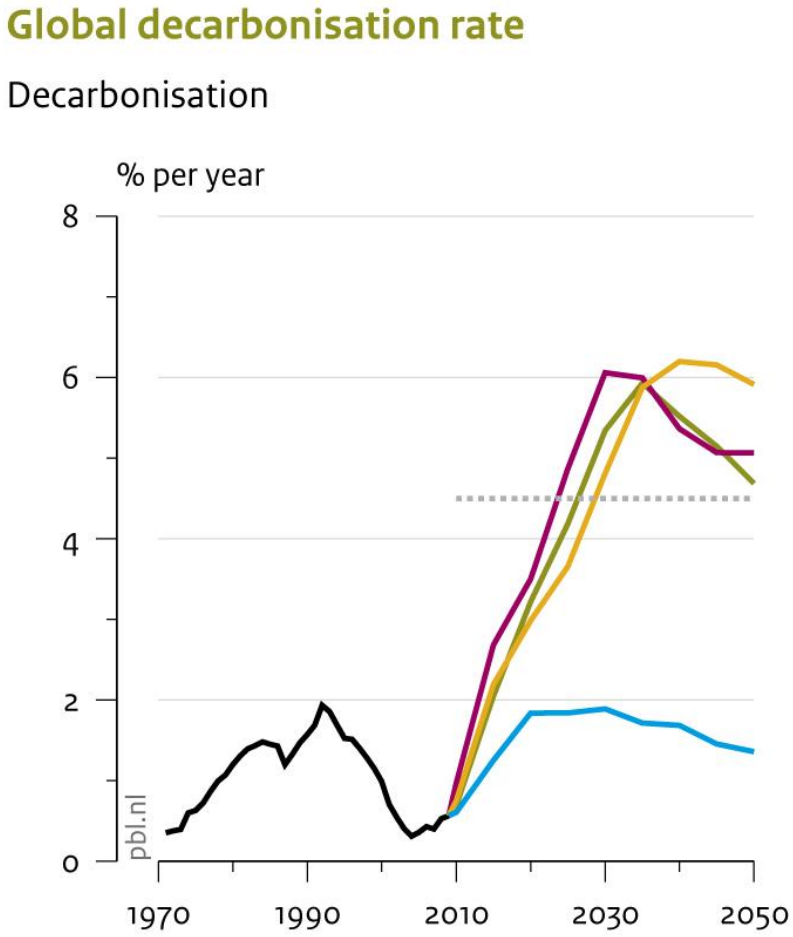
Reference	SRES
8.5 Wm^{-2}	A2 / A1FI
6.0 Wm^{-2}	B2 / A1B
4.5 Wm^{-2}	B1
2.6 Wm^{-2}	

Van Vuuren, D.P. and Carter, T 2013. Reconciling the old with the new. Climatic Change.

Emissions

Planbureau voor de Leefomgeving

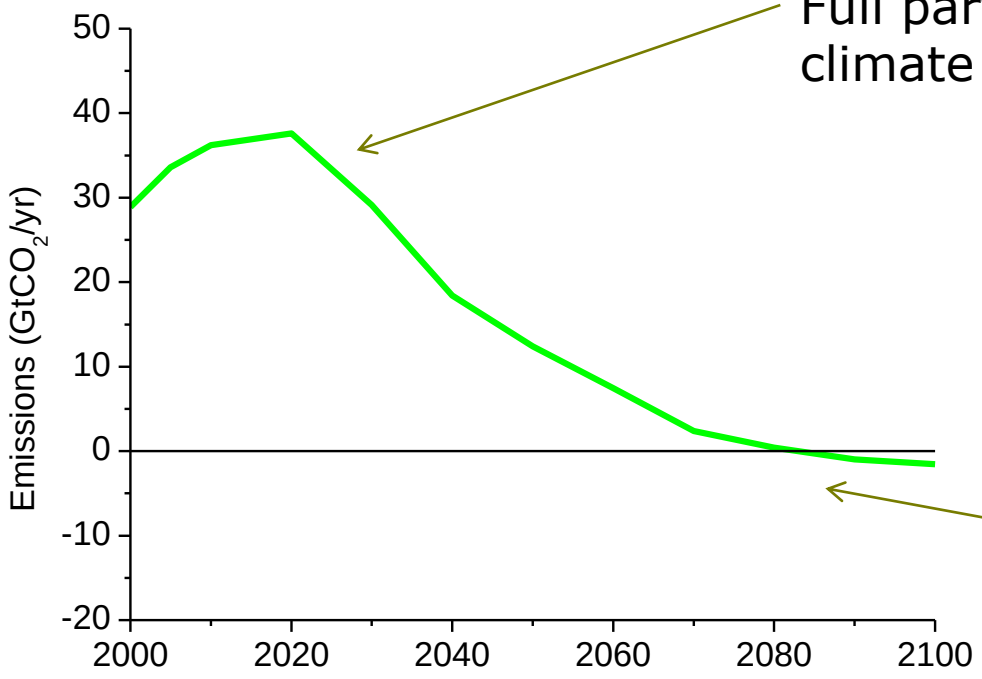




Van Vuuren, D.P. et al 2013. Roads from Rio+20. PBL Netherlands Environmental Assessment Agency.

Emissions

Planbureau voor de Leefomgeving



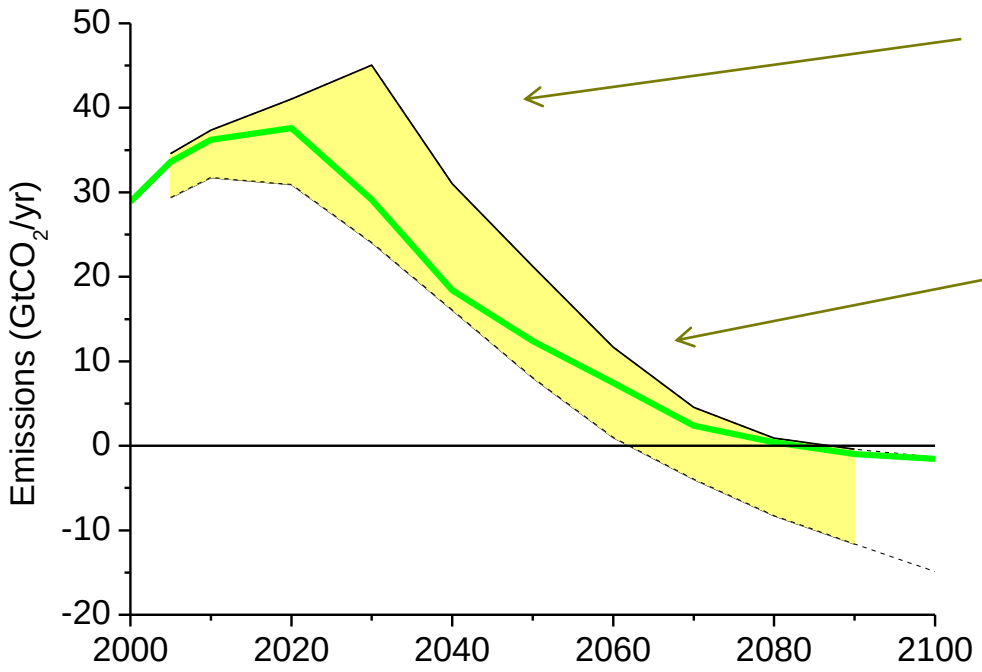
Full participation in climate policy

Negative emissions: implies reliance on "carbon dioxide removal technologies" (mostly Bio-energy and CCS)

Sustainable bio-energy 150 EJ/yr ?
~ -10 GtCO2 /yr -→ but only if everything is used for BECCS

Emissions

Planbureau voor de Leefomgeving



Some delay possible (e.g. pledges)

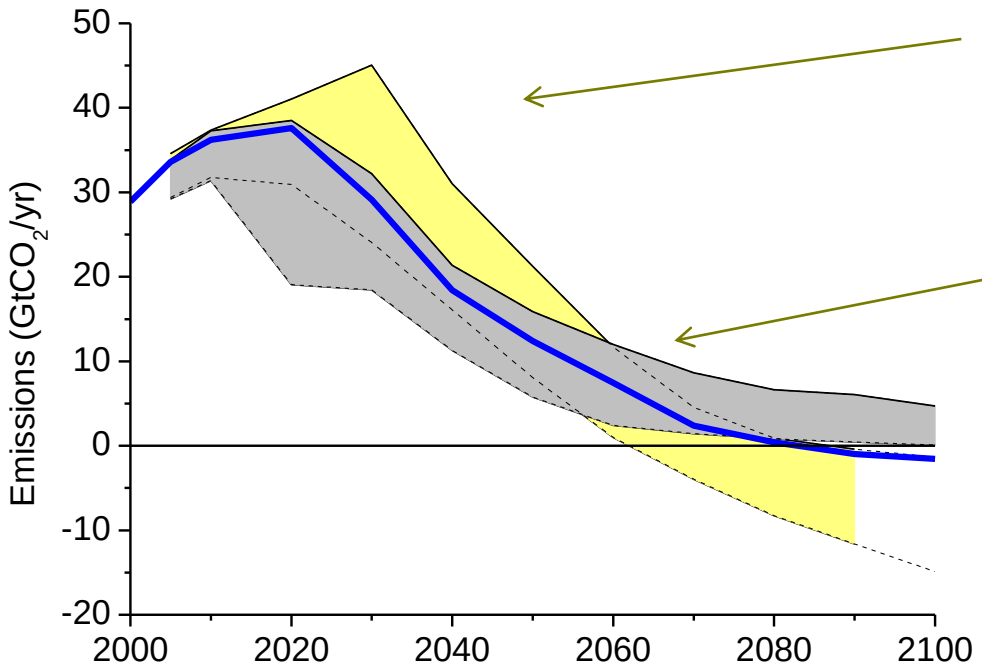
But even stronger emission reductions 2030-2050 → -5% p.a.

More negative in 2100

Van Vuuren, D.P. et al 2011. Representative Concentration Pathways: An overview. Climatic Change.

Emissions

Planbureau voor de Leefomgeving

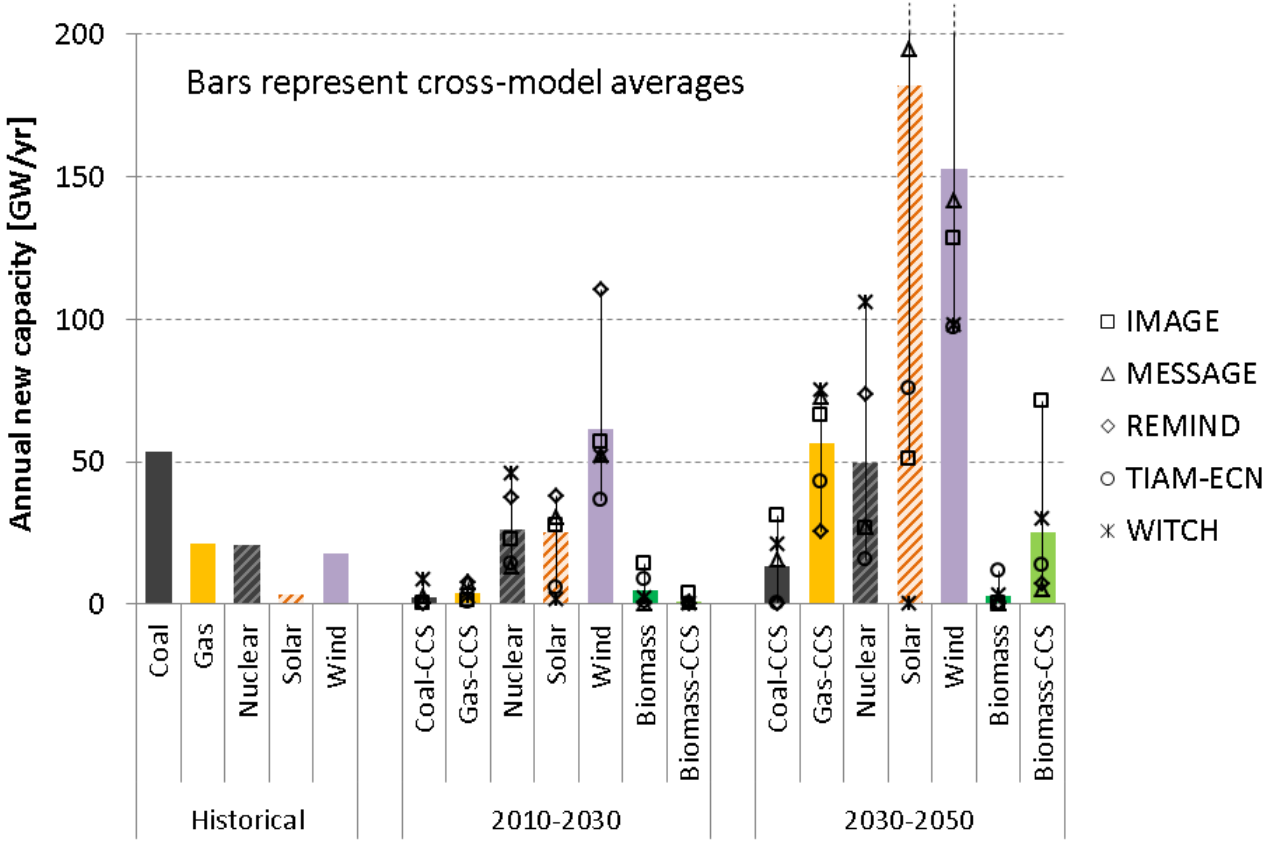


But requires more immediate reductions.

Alternative no negative emissions…

Van Vuuren, D.P. et al 2011. Representative Concentration Pathways: An overview. Climatic Change.

Annual capacity additions



Average annual capacity additions (history and short to medium term future) for various fossil-based and low-carbon energy technologies in the RefPol-450 scenario.

Conclusions

- RCPs has provided a strong link between WG1 – WG3 work.
- RCPs allow for a set of policy-relevant conclusions in WG1 – and at the same updating of WG-3 type models.
- RCP2.6 allowed for a strong research focus on the feasibility of the 2^{o}C target
- Further research needed on climate impacts of RCPs (needs also assessment of socio-economic conditions)