Planbureau voor de Leefomgeving

Drivers and societal conditions (SSPs and CMIP6)

Detlef van Vuuren,
Keywan Riahi
and many others.

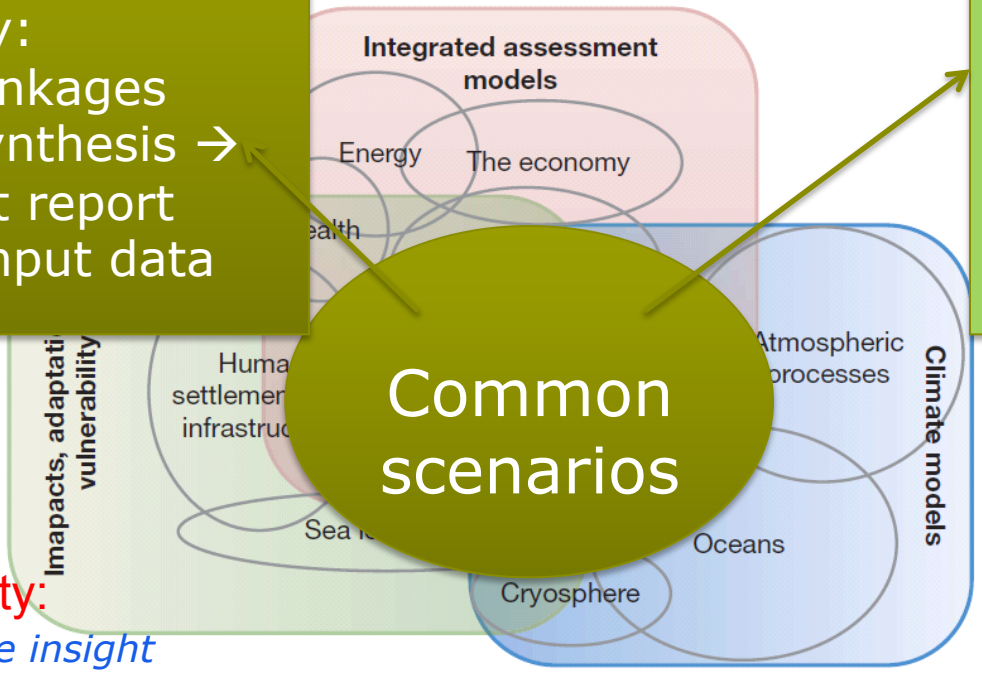
Scenarios play a key role in climate research

WG3 Community:

Scenarios provide insight into… socio-economic development, emissions, climate targets in order to determine mitigation effort

Facilitates large research community by:
- Providing linkages
- Enabling synthesis → assessment report
- Providing input data

Updates needed :
- new insights
- new requirements for model inputs
- new questions



WG2 Community:

Scenarios provide insight into… socio-economic development (vulnerability) and climate change (impacts)

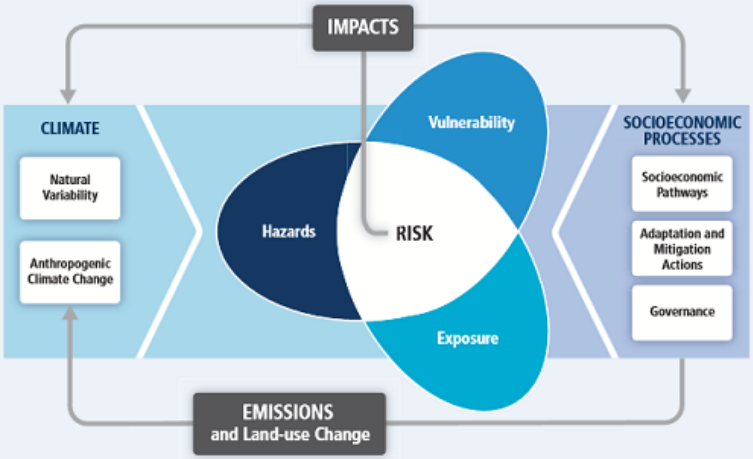
WG1 community –

Scenario provide insight into… plausible development of forcers and plausible climate futures

Adapted from Edmonds

Scenarios as mean to link communities

Planbureau voor de Leefomgeving



SSPs

RCPs

Climate

Exposed population, ability to adapt

Impact

Drivers (population, GDP)

Energy use, Land use

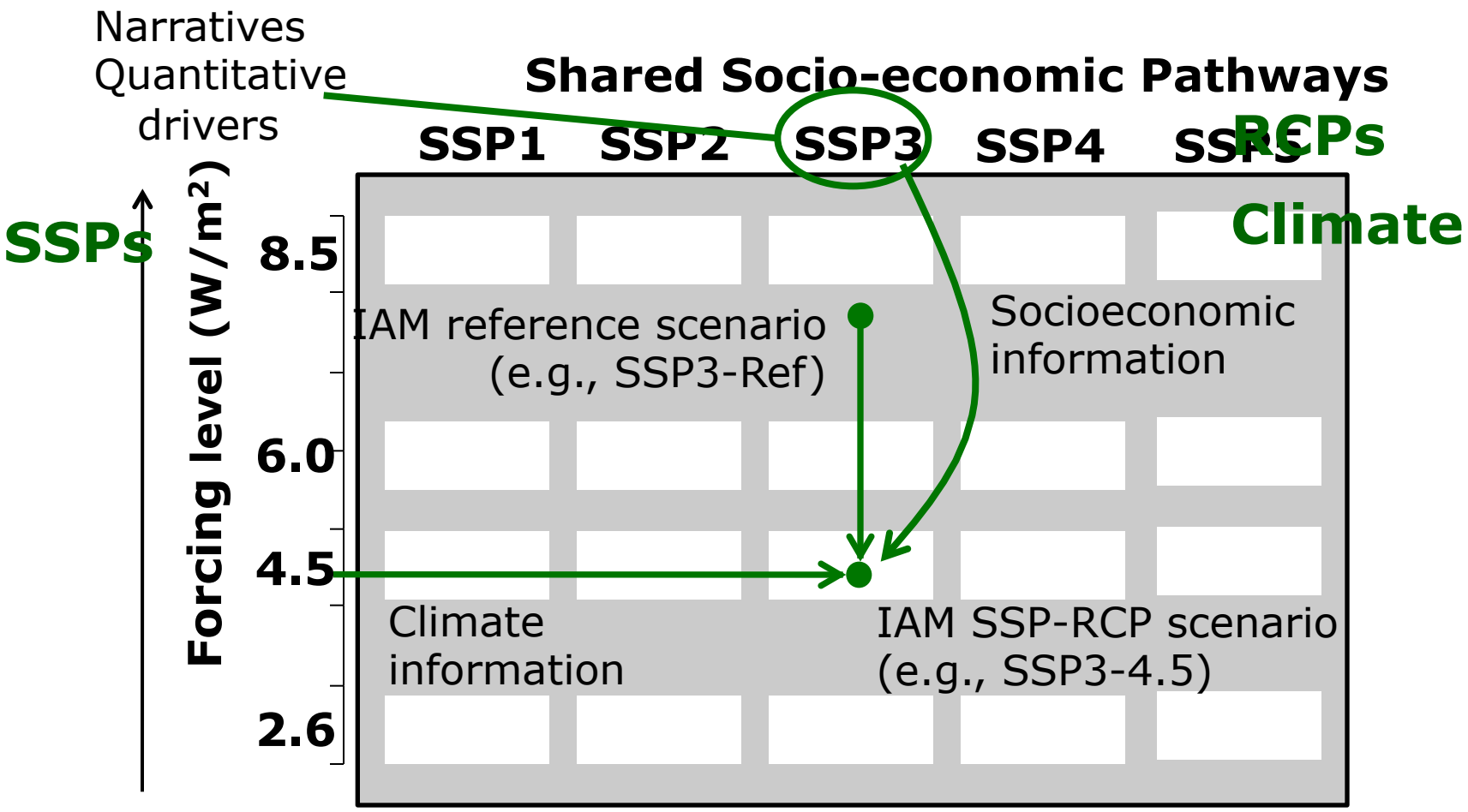
Emissions

Conc./ forcing

Climate/ Environmental change

The Scenario Matrix Architecture

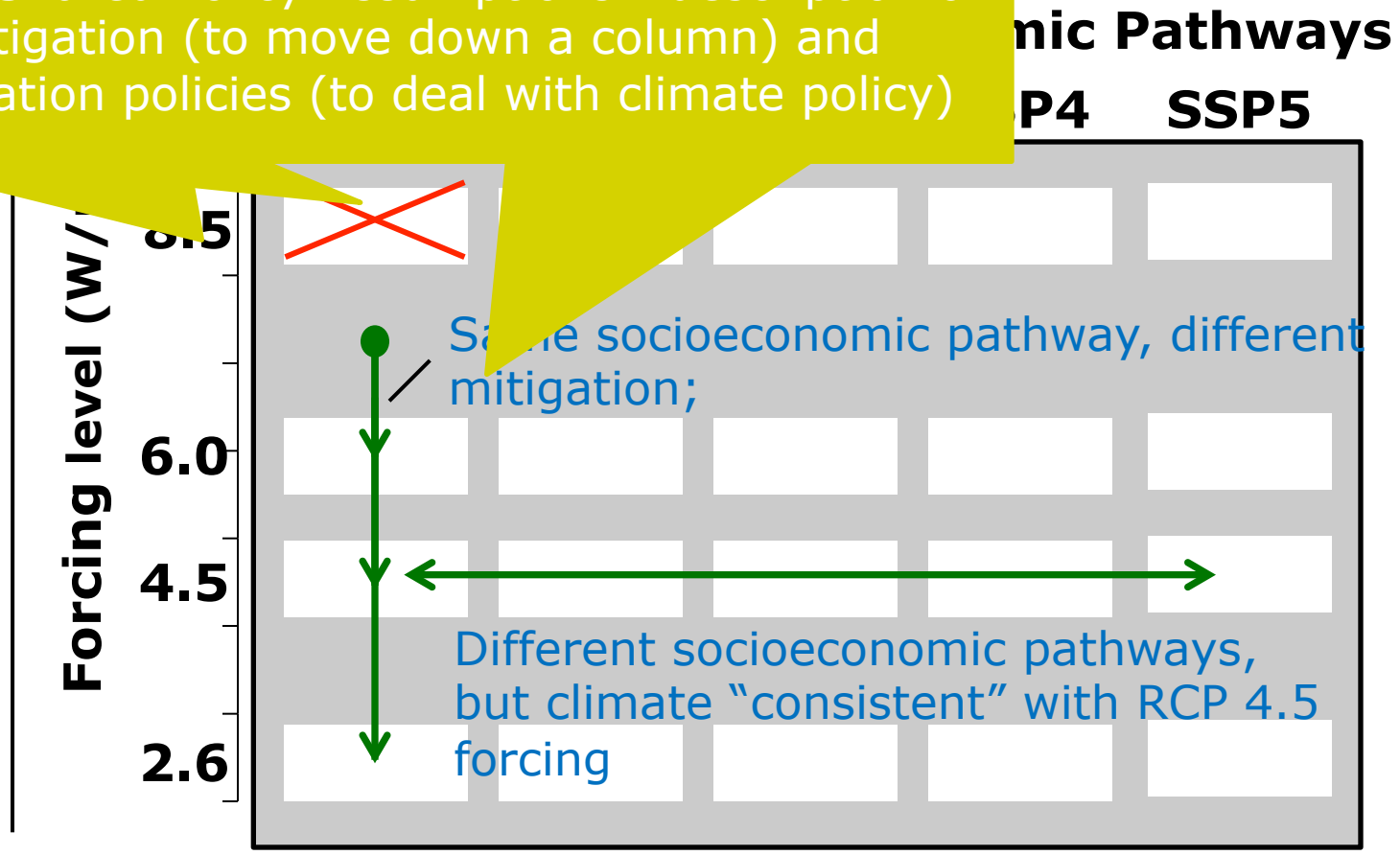
Planbureau voor de Leefomgeving



The Scenario Matrix Architecture

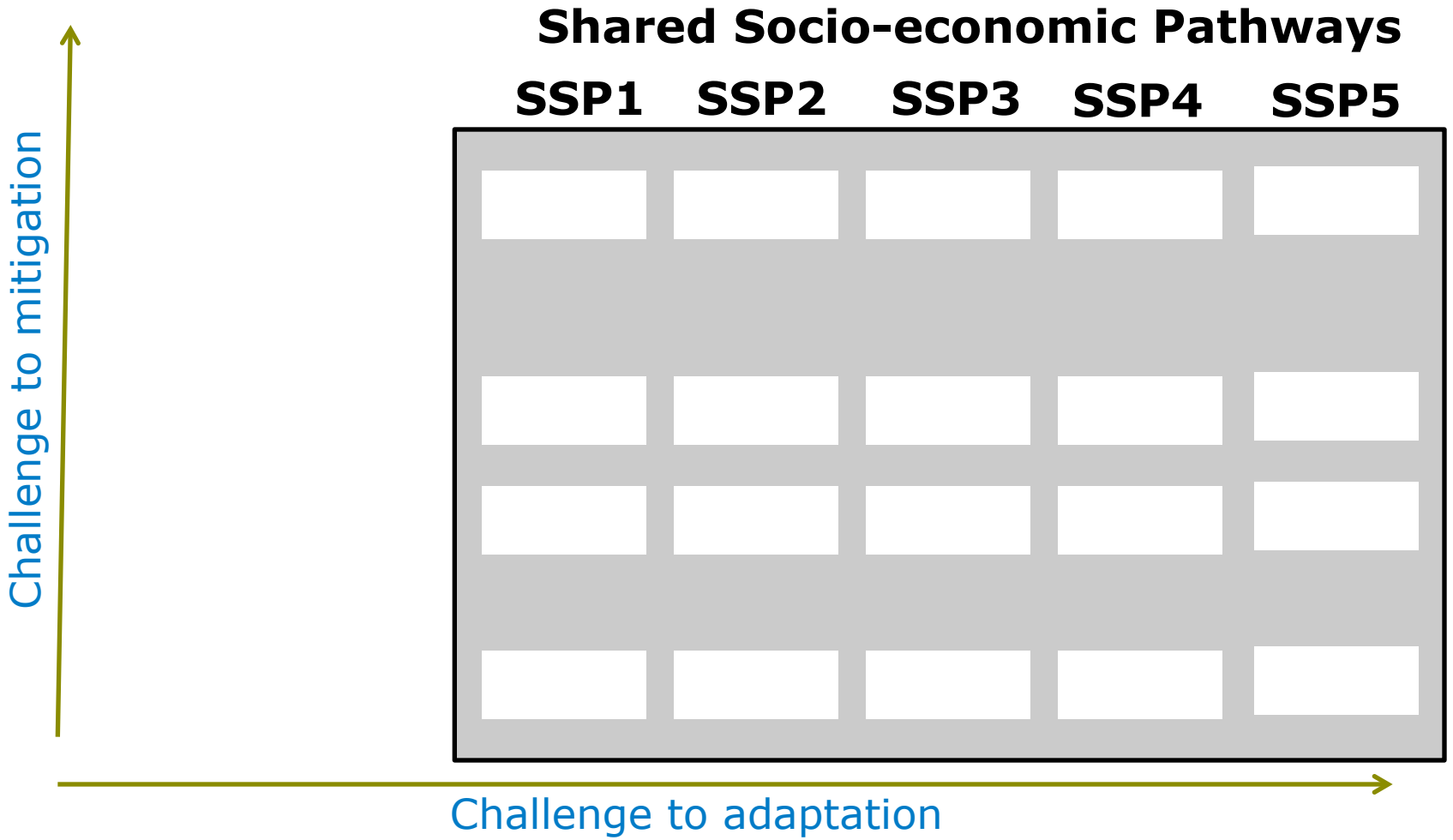
Planbureau voor de Leefomgeving

SPA = Shared Policy Assumptions - description of mitigation (to move down a column) and adaptation policies (to deal with climate policy)



The Scenario Matrix Architecture

Planbureau voor de Leefomgeving



The Scenario Matrix Architecture

Planbureau voor de Leefomgeving

SSP5: Fossil fuel-ed development

SSP3: Regional rivalry

SSP2:
Middle of the Road

SSP1:Sustainability

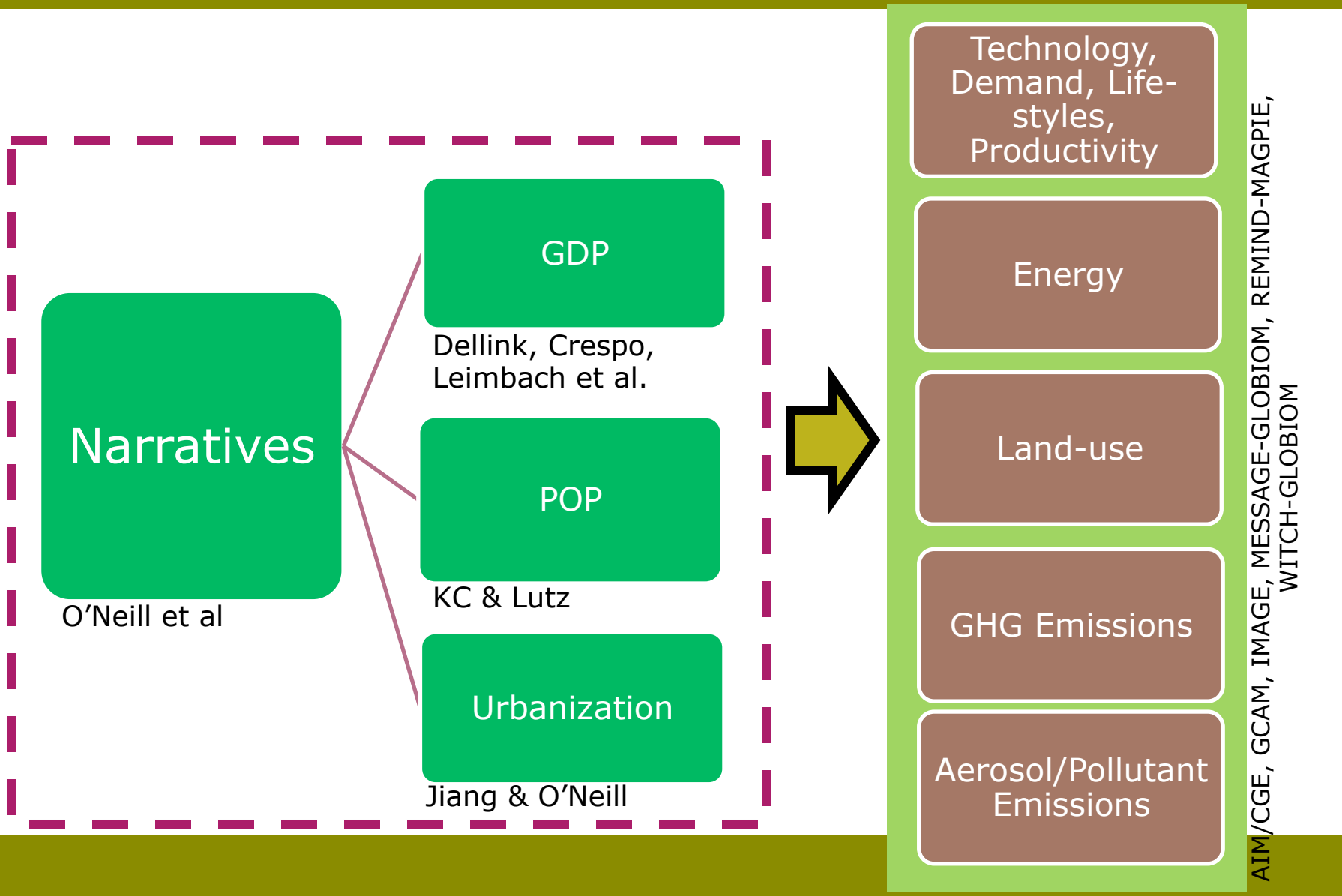
SSP4: Inequality

Challenge to mitigation

Challenge to adaptation

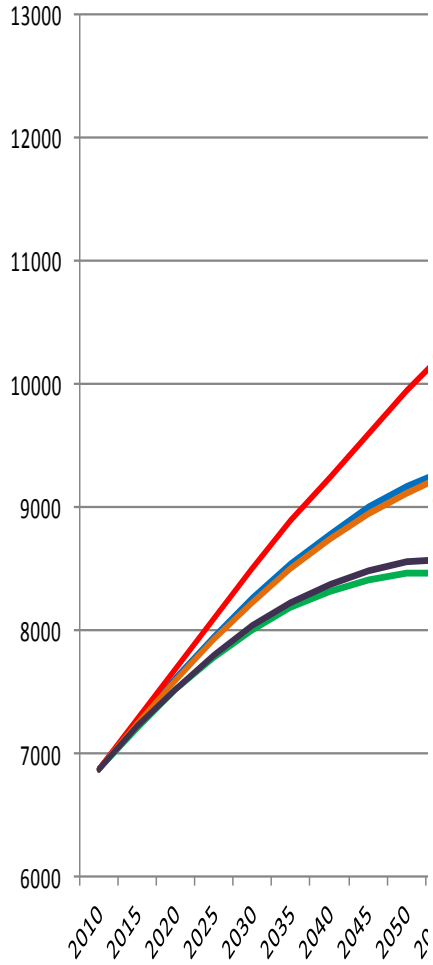
SSPs

Planbureau voor de Leefomgeving

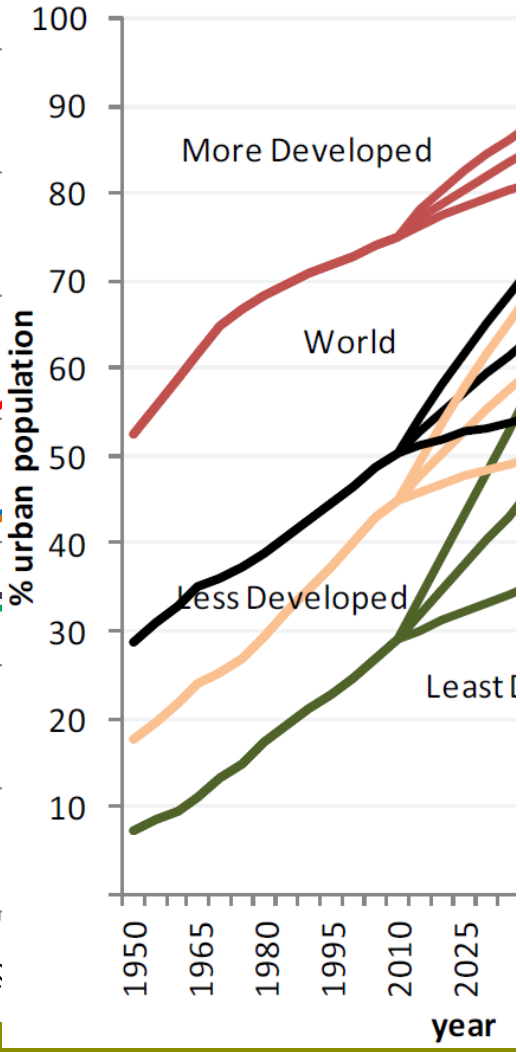


SSPs

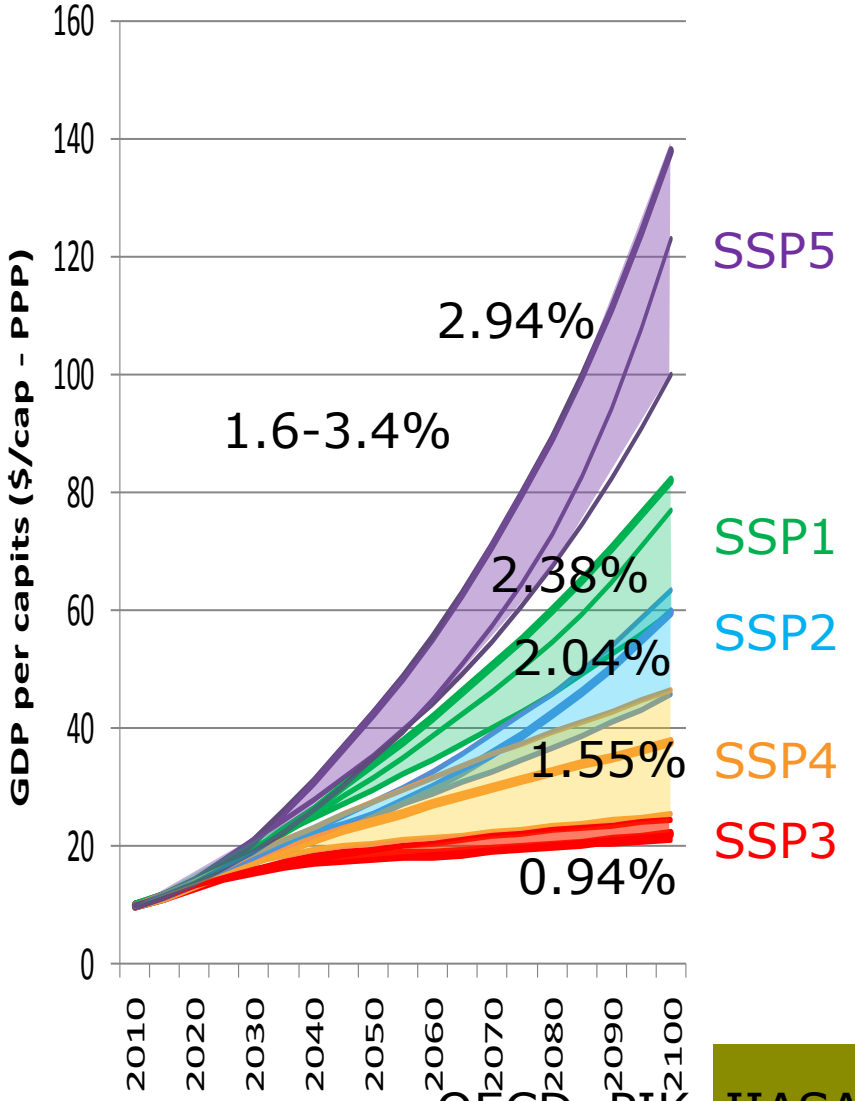
Planbureau voor de Leefomgeving



Lutz & KC, 2014



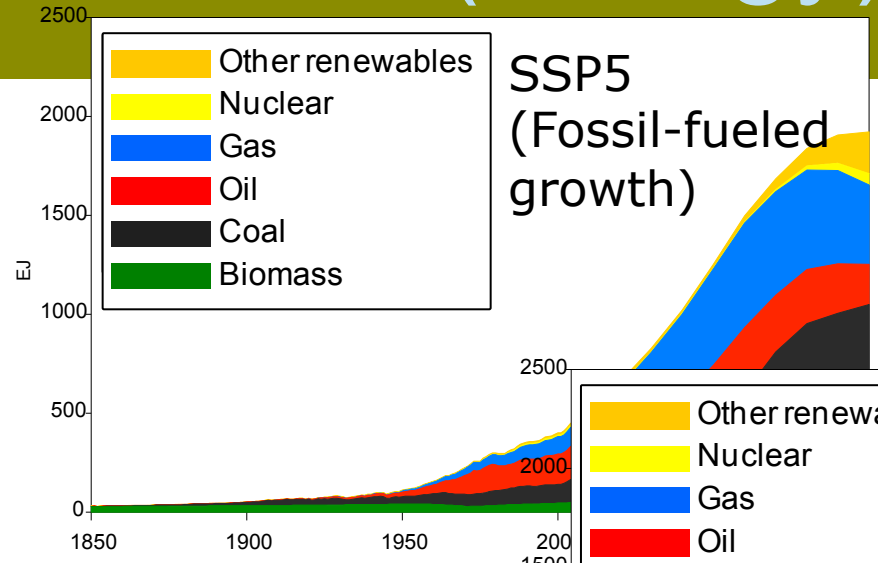
Jiang & O'Neill



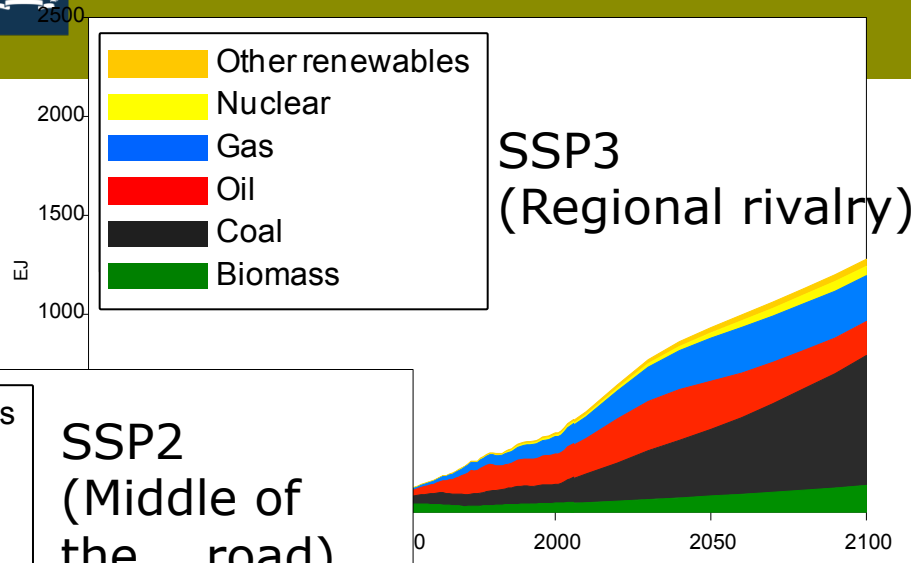
OECD, PIK, IIASA

SSPs (Energy)

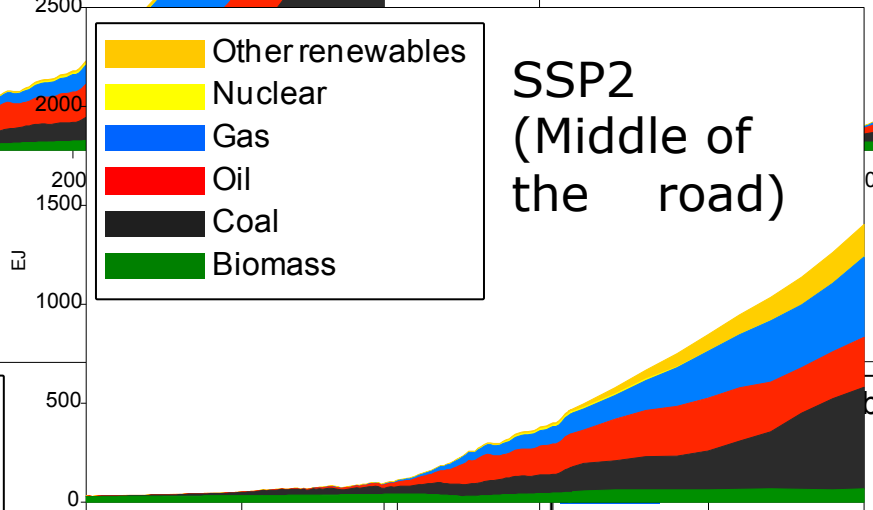
Planbureau voor de Leefomgeving



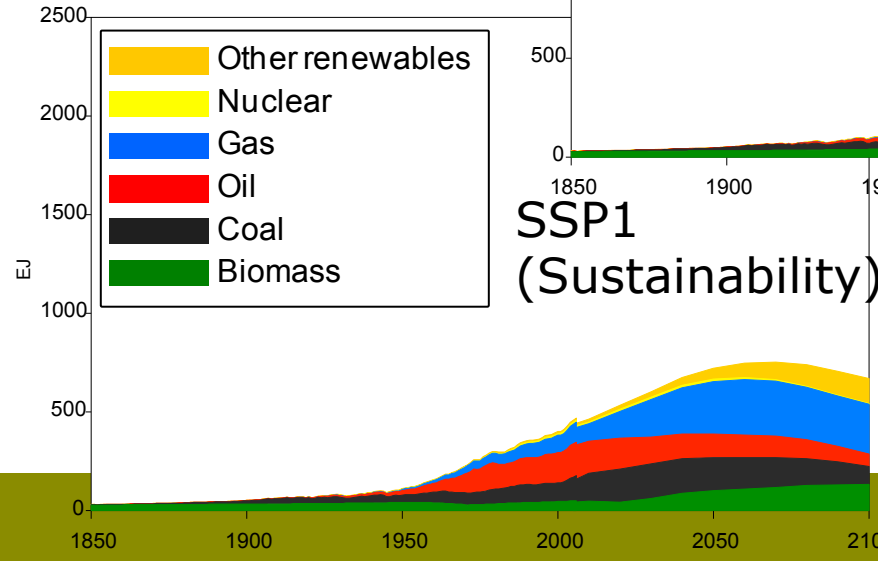
SSP5 (Fossil-fueled growth)



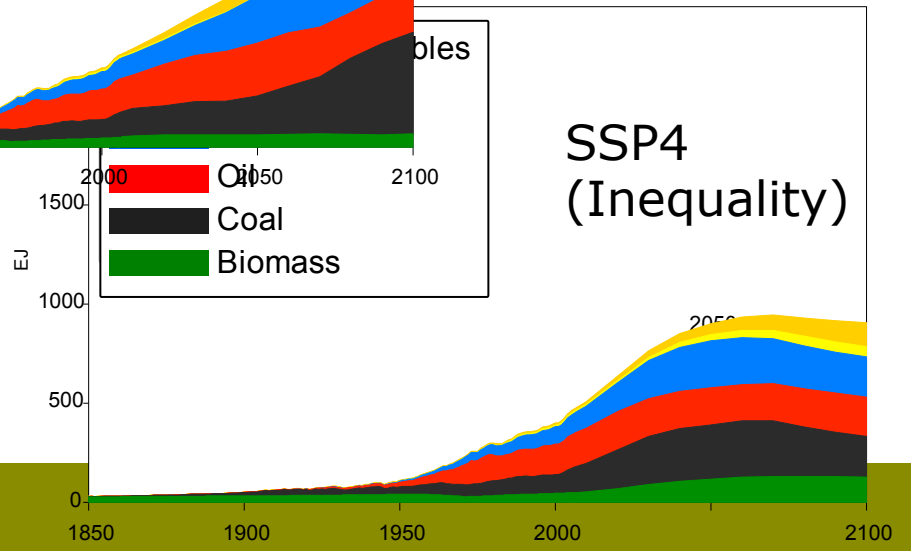
SSP3 (Regional rivalry)



SSP2 (Middle of the road)



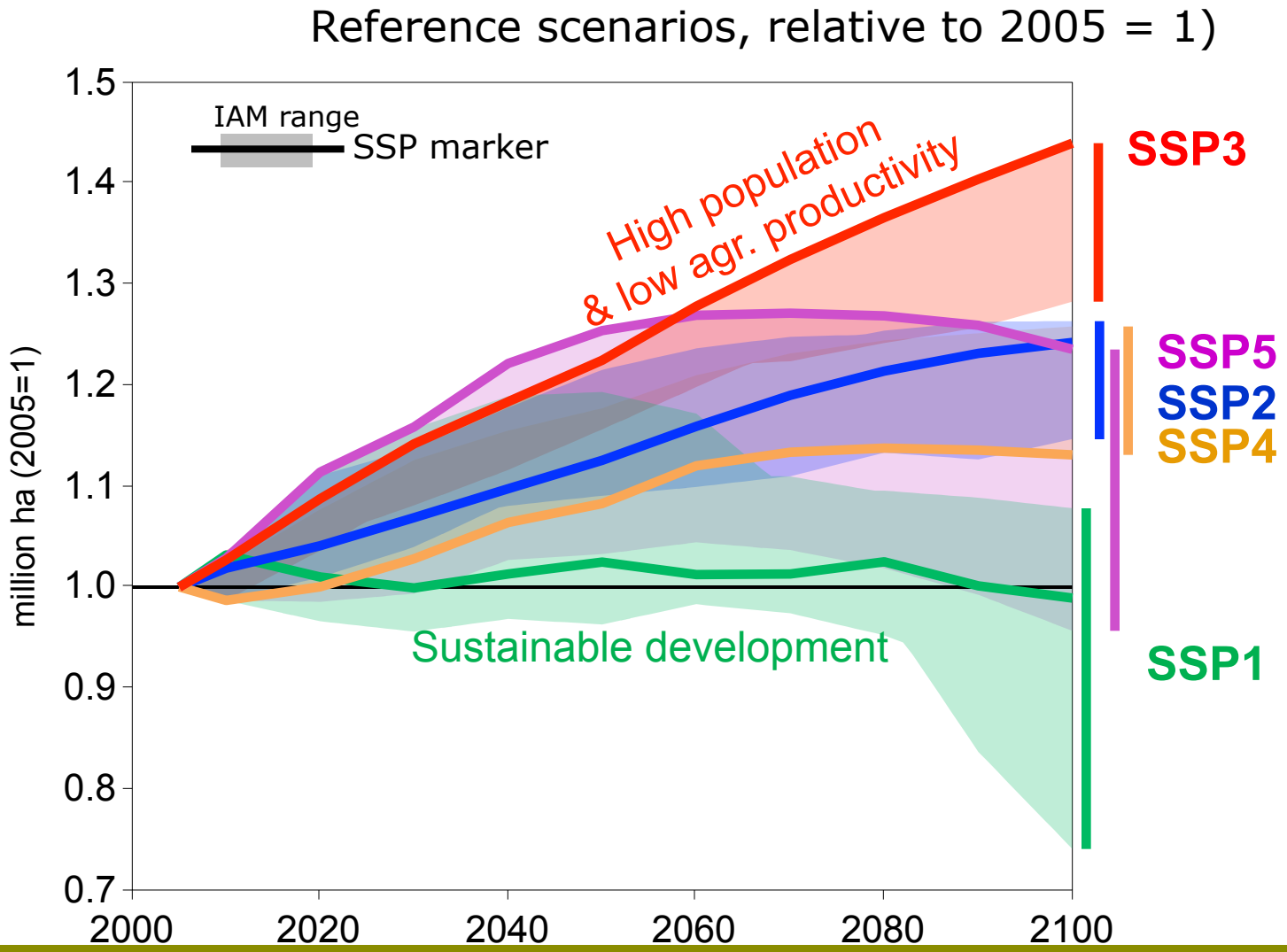
SSP1 (Sustainability)



SSP4 (Inequality)

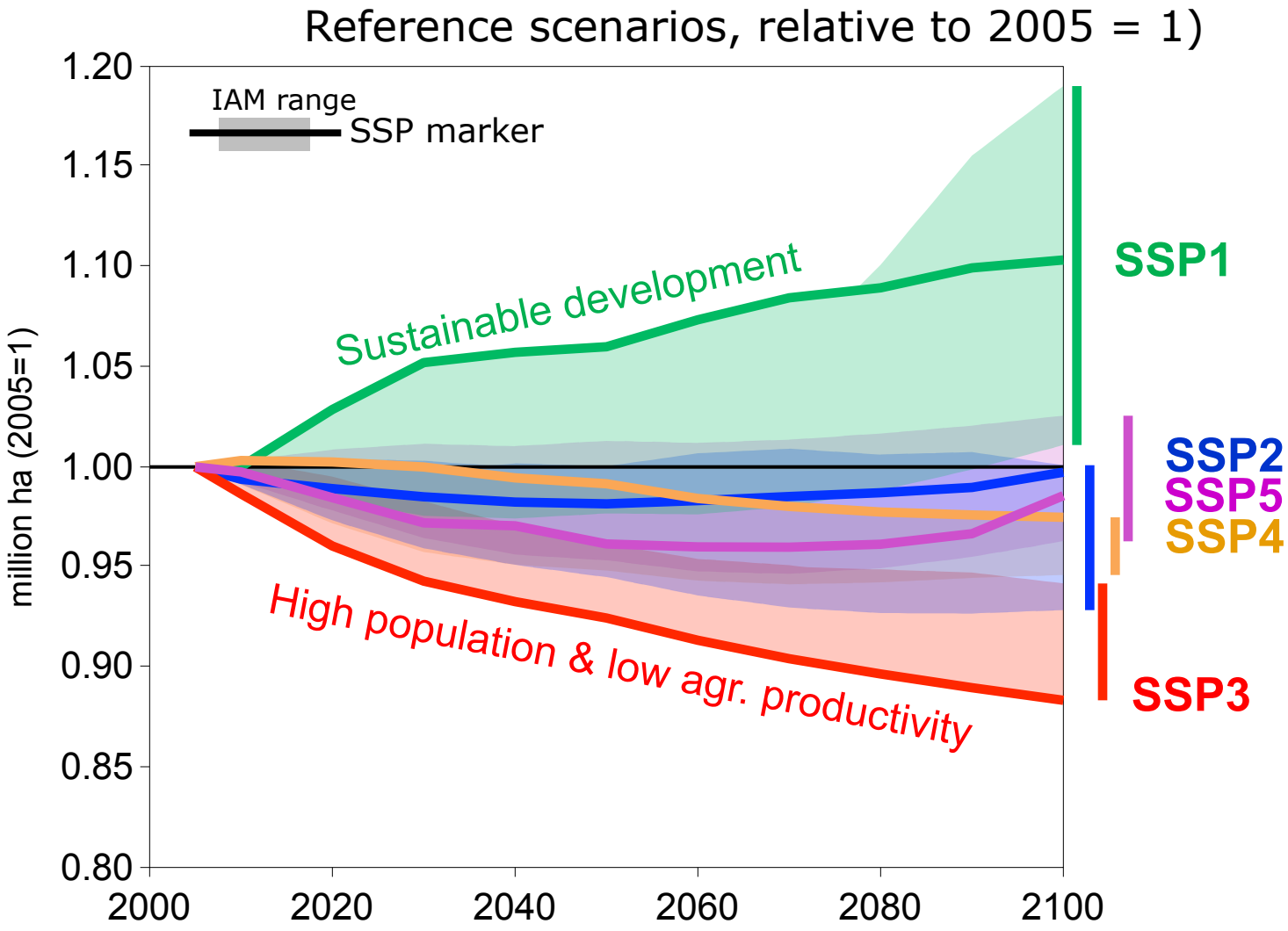
SSPs (cropland)

Planbureau voor de Leefomgeving

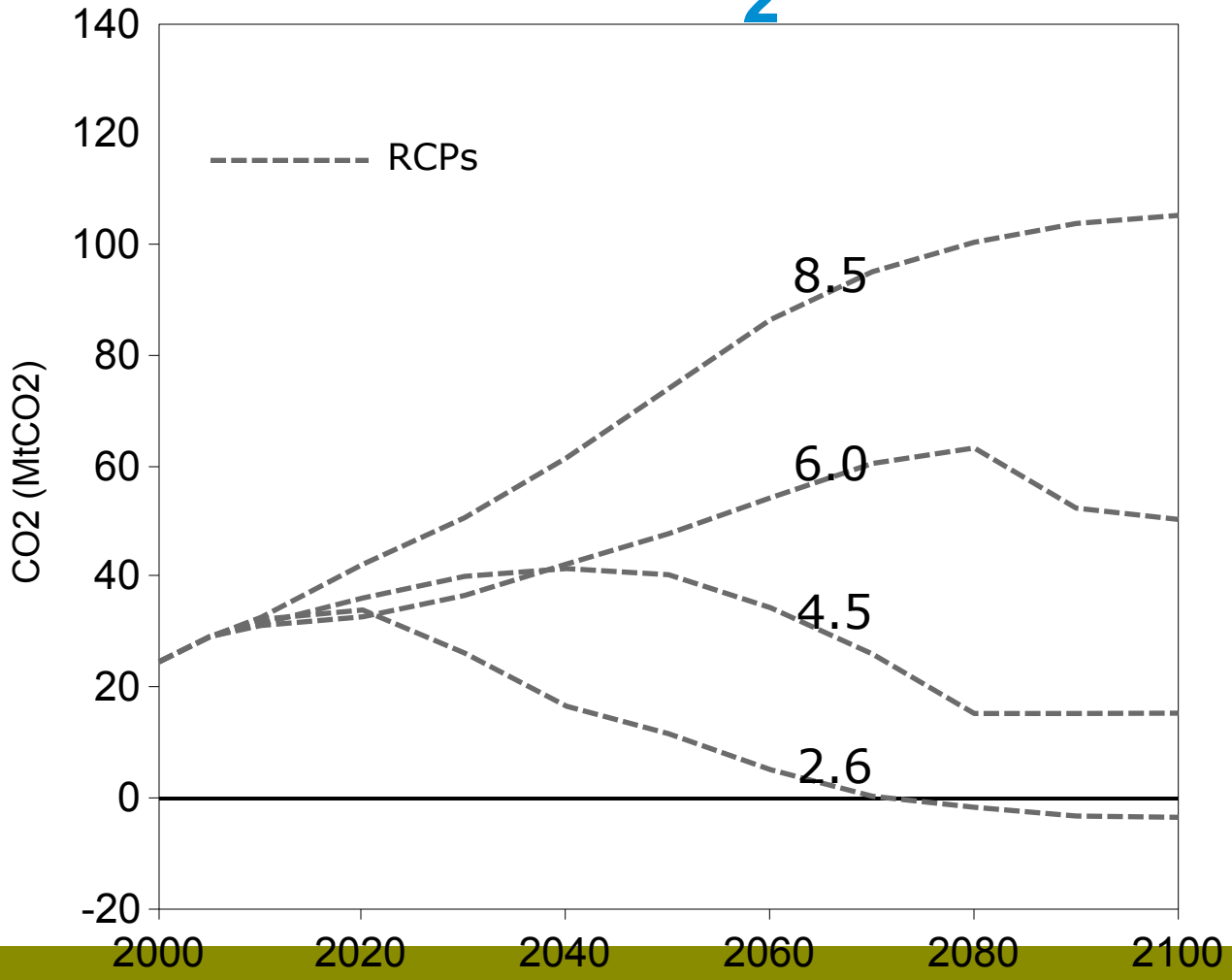


SSPs (forest area)

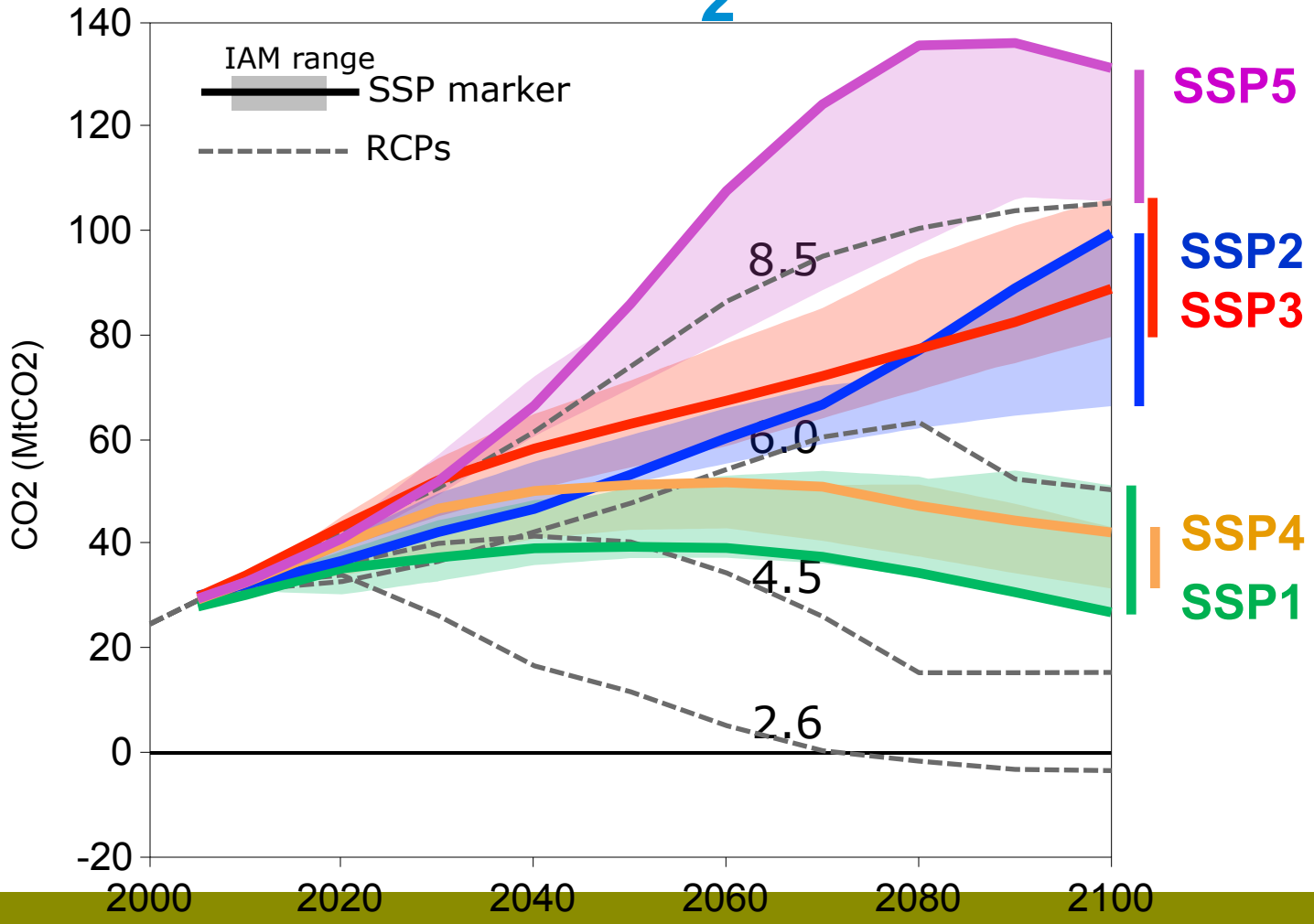
Planbureau voor de Leefomgeving



World CO_2 Emissions

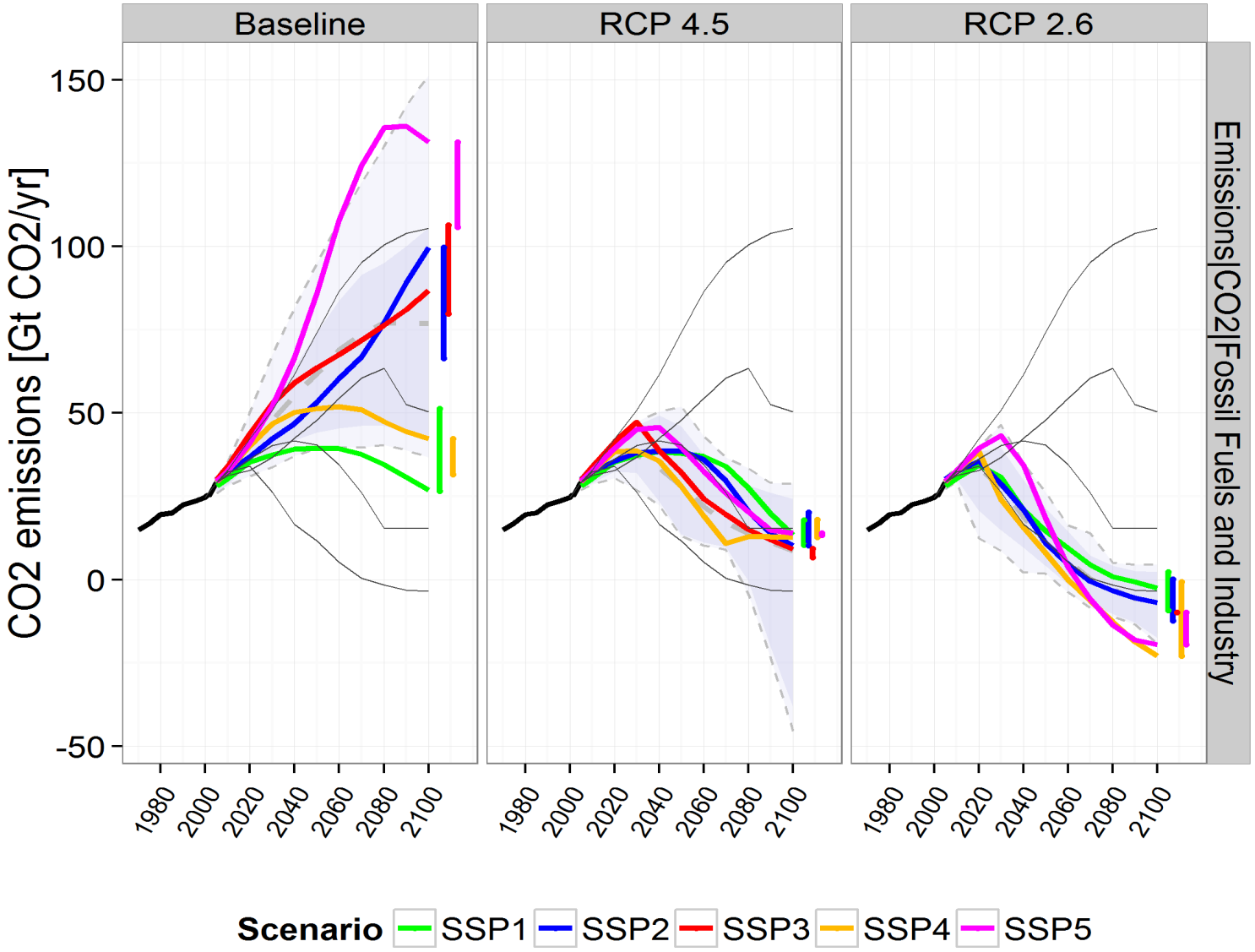


World CO_2 Emissions



CO_2 Emissions

Planbureau voor de Leefomgeving

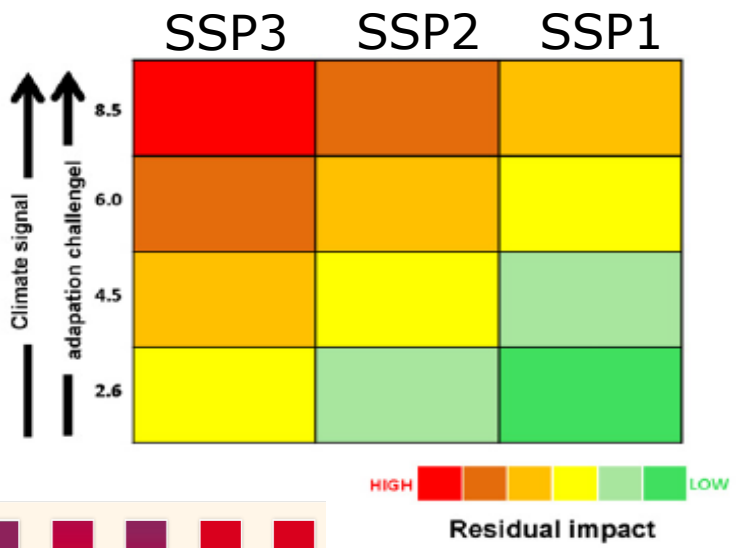


Scenario matrix architecture forms scenario tool kit

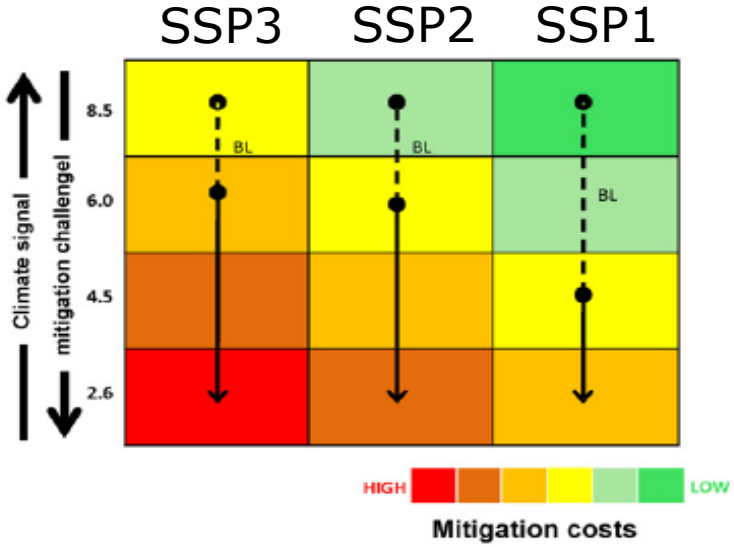
- Offers storylines ánd quantitative information for ‘reference scenarios’ for:
  - Further elaboration in impact research (consistent set of socio-economic data)
  - Basis for new climate research (e.g. treatment of land-use, aerosols)
  - Offers opportunity to elaborate scenarios in regional/sectoral studies
- Provides opportunity for mitigation ánd impact/ adaption research in one structure

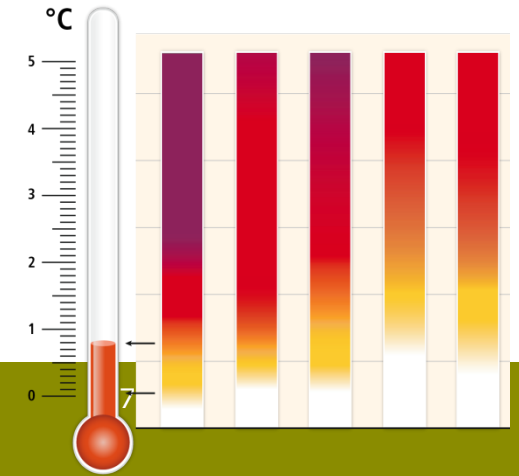
Scenario matrix architecture forms scenario tool kit

Impacts/adaptation



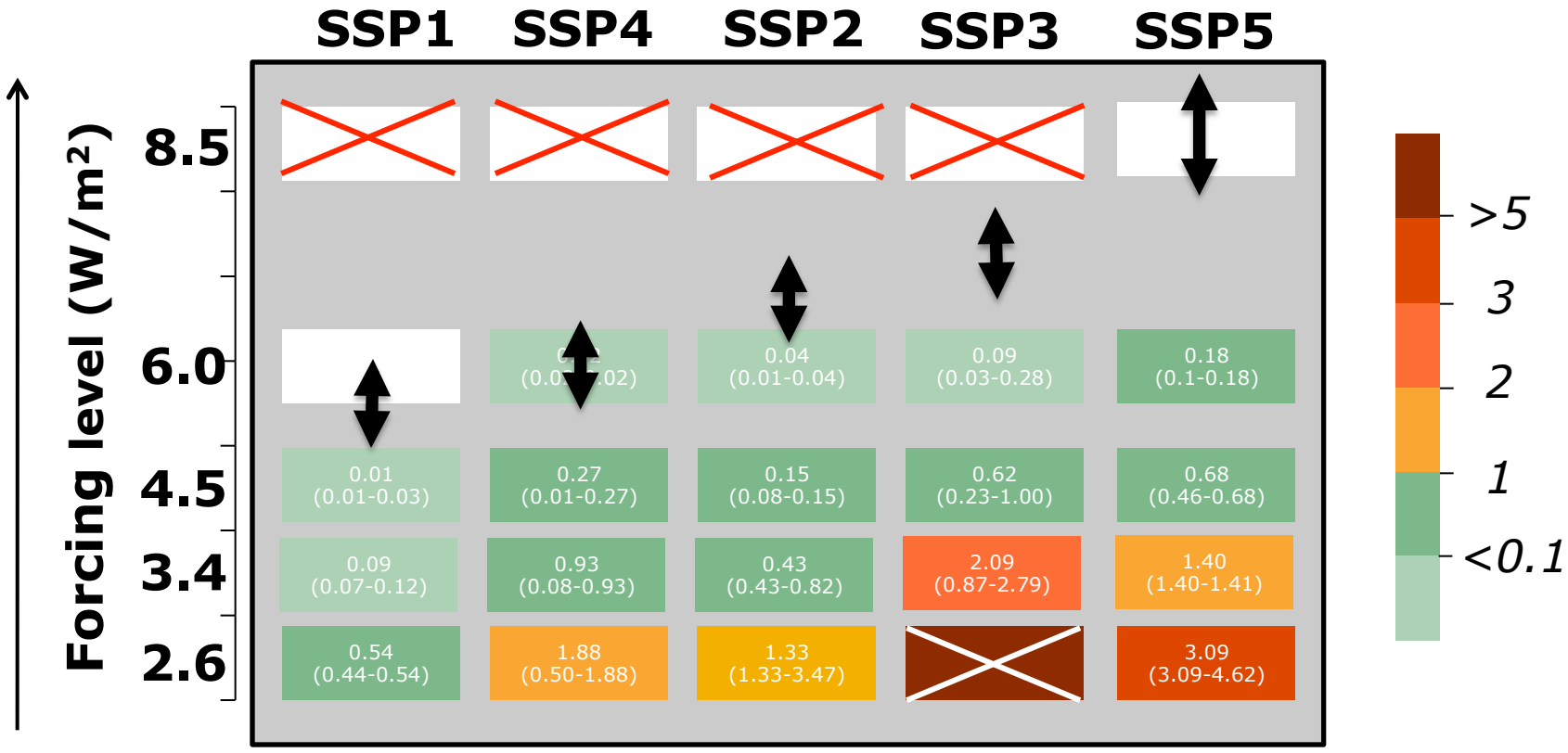
Mitigation





Feasibility and costs of targets greatly depend on the SSP

(Mitigation costs as % of GDP)



Mitigation costs are given as area under the MAC and percent of total GDP (2010-2100)

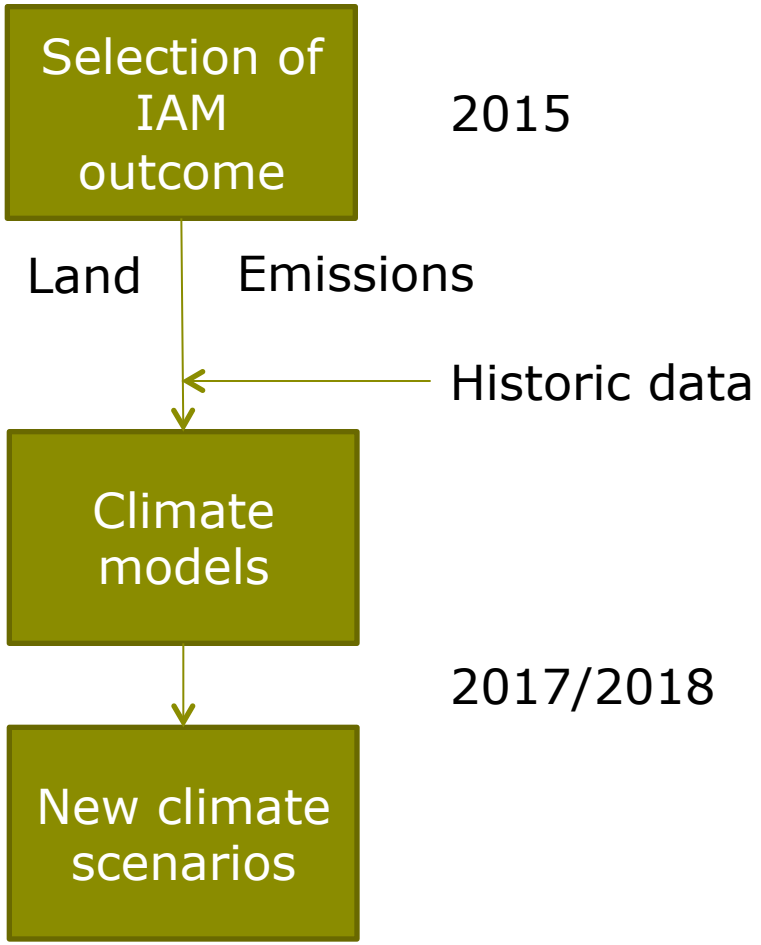
Scenario MIP

Planbureau voor de Leefomgeving

Purpose scenarioMIP: Provide new community scenarios for range of forcing targets

Part of CMIP6 – scenarios harmonised with science experiments in LUMIP, AirChemMIP etc.

IAM data will be "harmonised early 2016'



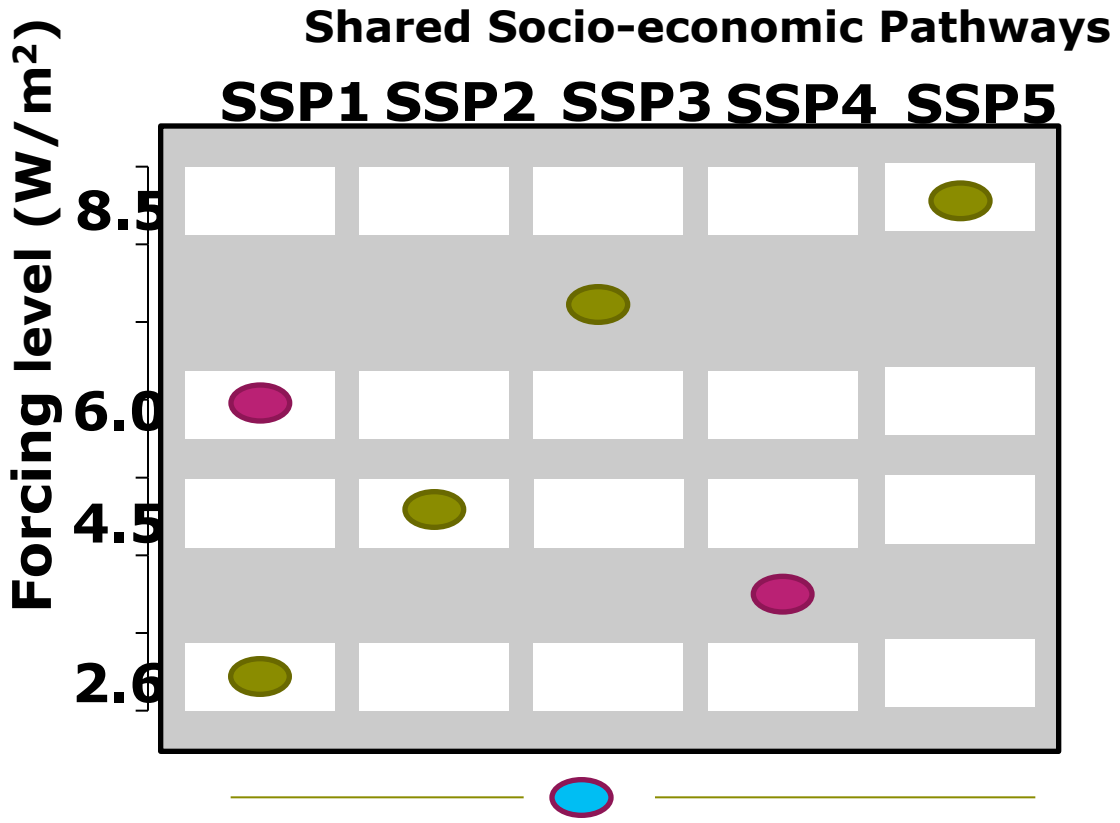
Scenario MIP

Planbureau voor de Leefomgeving

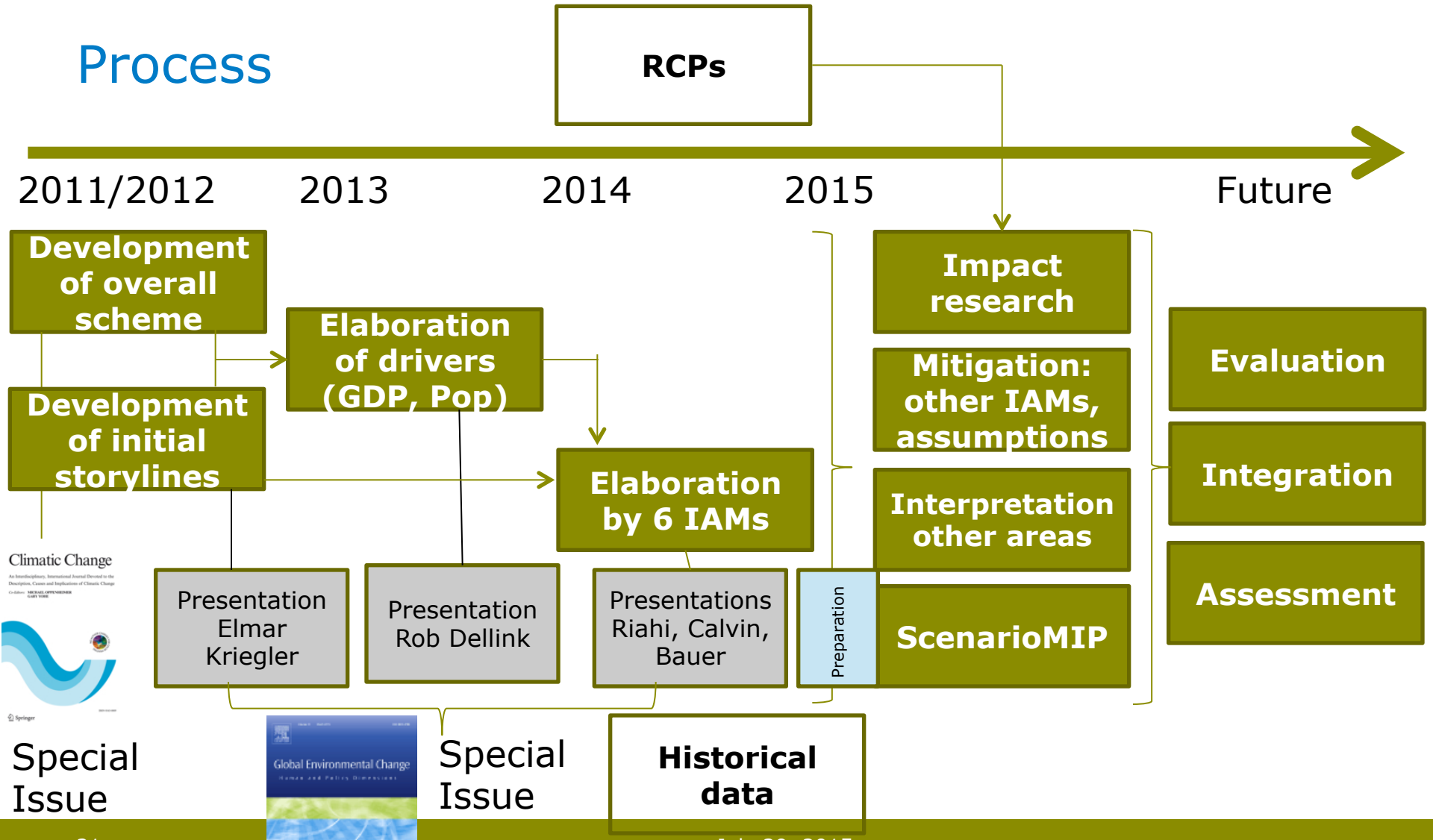
Purpose scenarioMIP: Provide new community scenarios for range of forcing targets

Part of CMIP6 – scenarios harmonised with science experiments in LUMIP, AirChemMIP etc.

IAM data will be "harmonised early 2016'



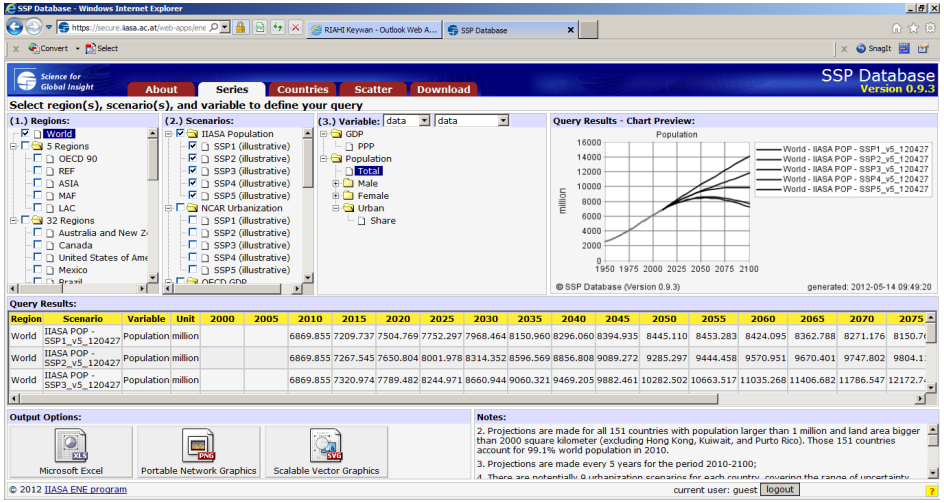
Process


RCPs
2011/2012
2013
2014
2015
Future
Development of overall scheme
Development of initial storylines
Elaboration of drivers (GDP, Pop)
Elaboration by 6 IAMs
Impact research
Mitigation: other IAMs, assumptions
Interpretation other areas
ScenarioMIP
Preparation
Evaluation
Integration
Assessment
Presentation Elmar Kriegler
Presentation Rob Dellink
Presentations Riahi, Calvin, Bauer
Climatic Change
Special Issue
Global Environmental Change
Special Issue
Historical data

Data availability and resolution

Planbureau voor de Leefomgeving

All data publicly accessible at the SSP database



National data (since 2013):

GDP

Population (structure, education, tot)

Urbanization

IAM scenario data (for illustration)

Energy

Land-use

Emissions

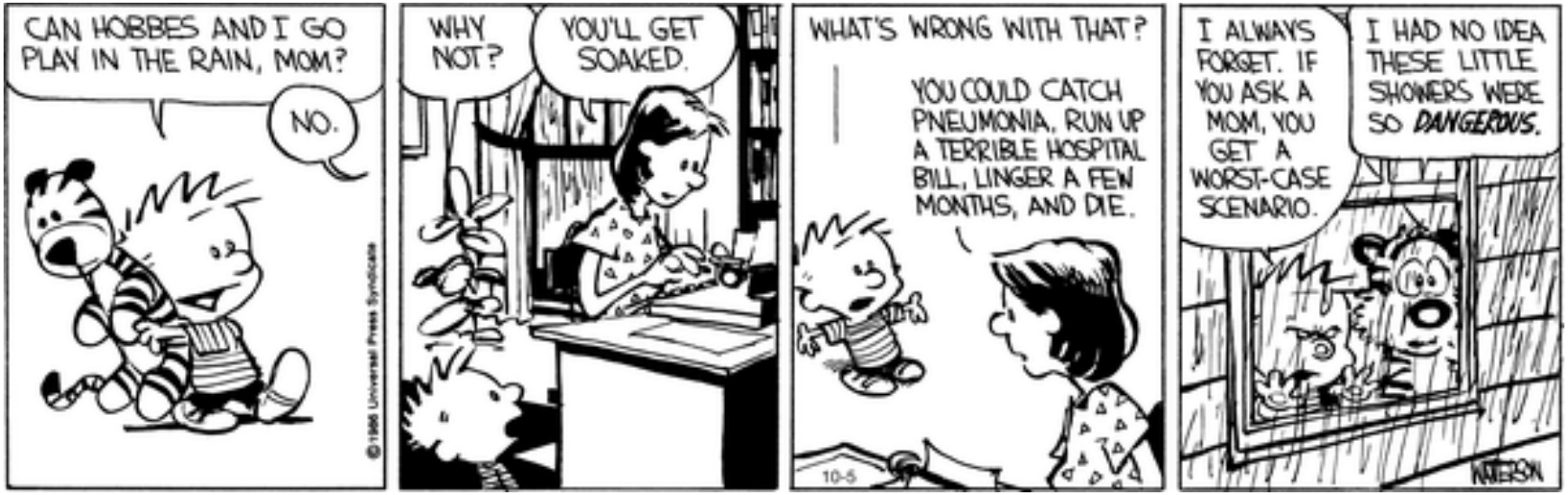
Forcing & Temperature

Other relevant indicators (carbon price, economic feedbacks, etc..)

https://secure.iiasa.ac.at/web-apps/ene/SspDb

Resolution: 5 World Regions (more details available from IAM teams 10-26 regions)

Questions?

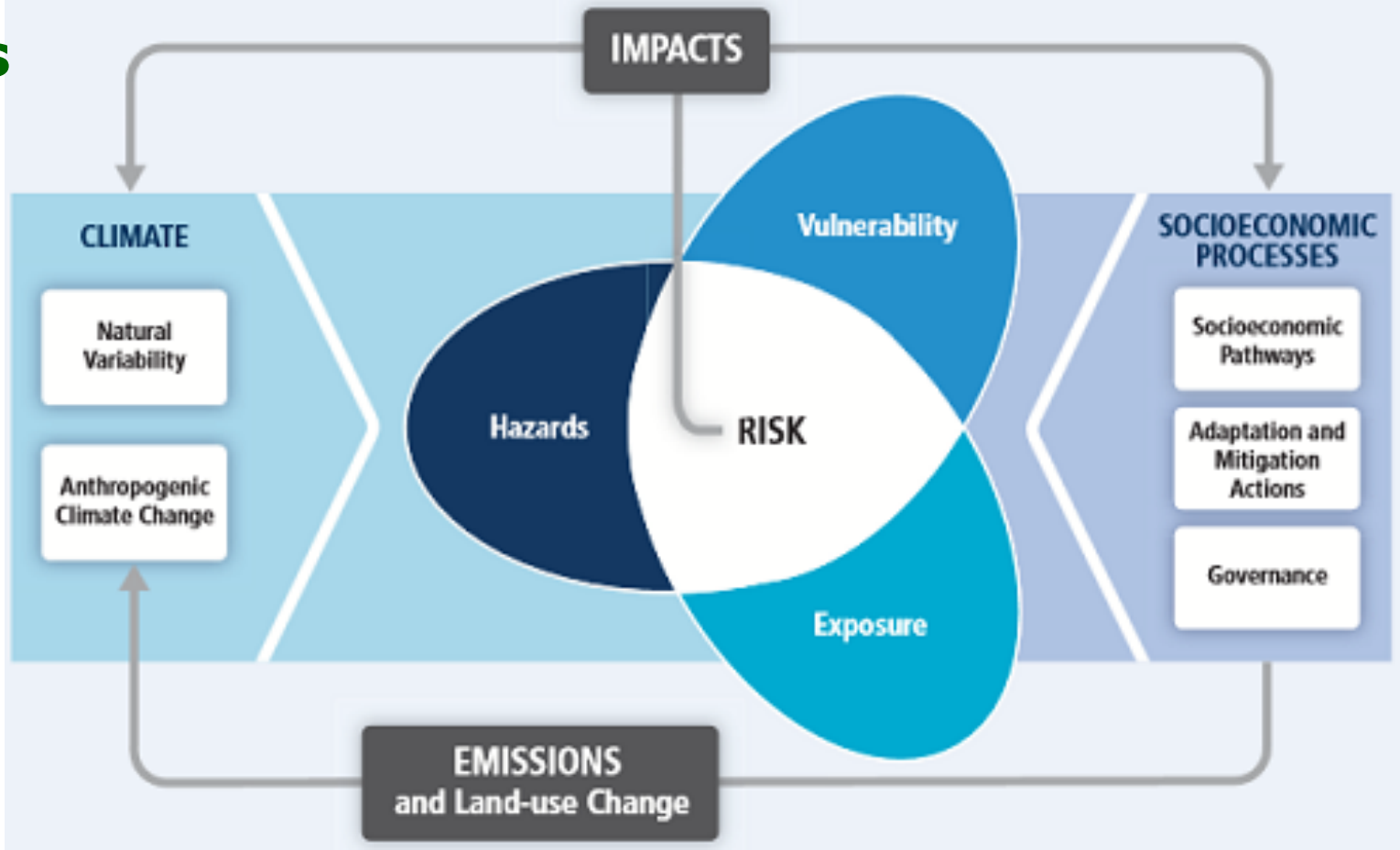

CAN HOBBES AND I GO PLAY IN THE RAIN, MOM?
NO.
© 1988 Universal Press Syndicate
WHY NOT?
YOU'LL GET SOAKED.
WHAT'S WRONG WITH THAT?
YOU COULD CATCH PNEUMONIA, RUN UP A TERRIBLE HOSPITAL BILL, LINGER A FEW MONTHS, AND DIE.
10-5
I ALWAYS FORGET. IF YOU ASK A MOM, YOU GET A WORST-CASE SCENARIO.
I HAD NO IDEA THESE LITTLE SHOWERS WERE SO DANGEROUS.
WATTERSON

Climate

Socio-economic processes

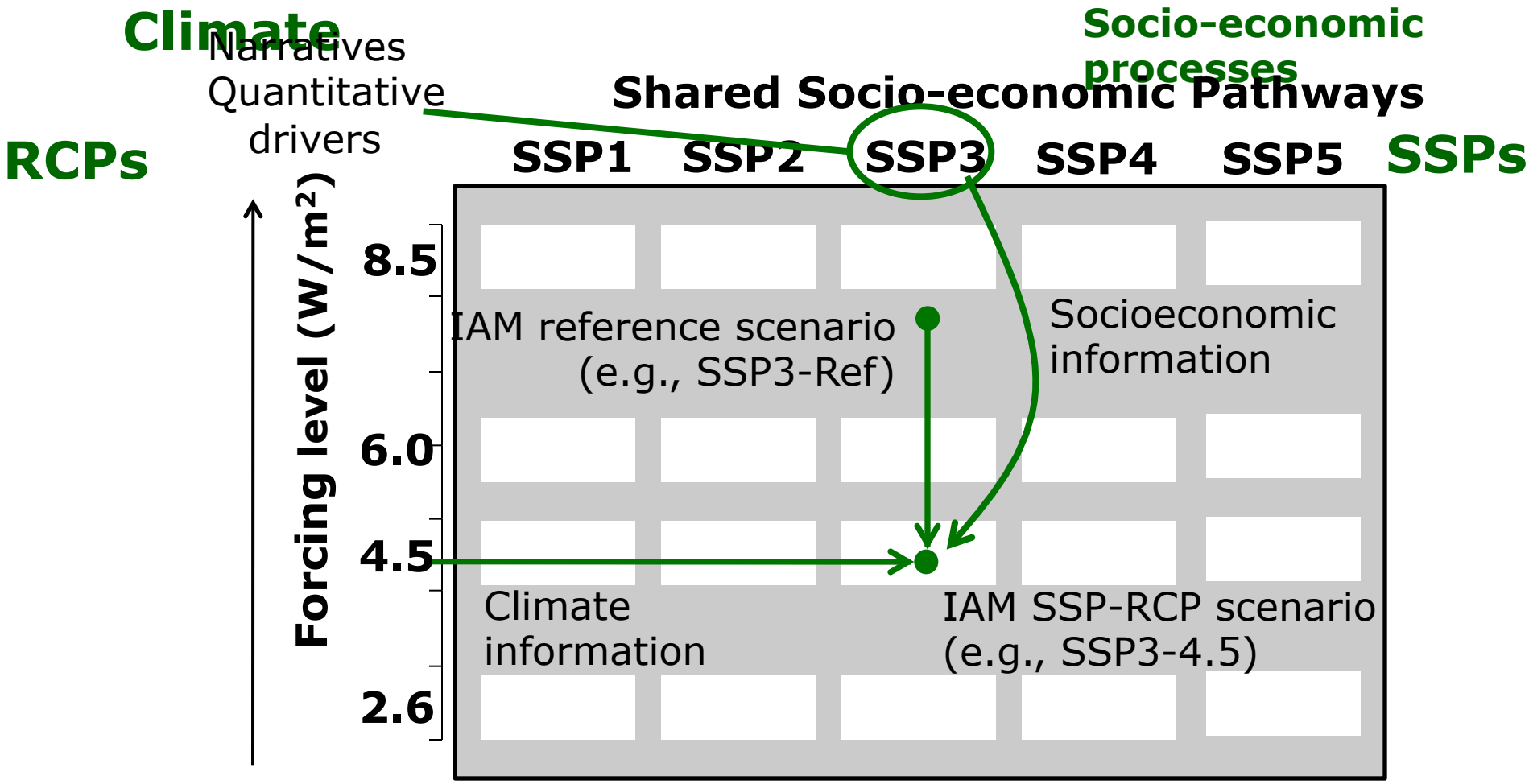
RCPs

SSPs



The Scenario Matrix Architecture

Planbureau voor de Leefomgeving



Special Issue
Global Environmental Change

Riahi and van Vuuren (eds.) (under preparation)

- Narratives: O'Neill et al (accepted)
- Population: KC & Lutz (accepted)
- GDP: (1) Leimbach et al, (2) Dellink et al, (3) Crespo (accepted)
- Urbanization: Jiang & O'Neill (accepted)
- 5 x SSP marker papers
- Crosscut papers:
  - Energy (Bauer et al)
  - Land-use (Popp et al)
  - Air Pollution/Aerosols (Rao et al)