POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

Fragmented policy scenarios for integrated assessment. Plus a couple of broader points

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Potsdam Institute for Climate Impact Research
Research Domain Sustainable Solutions

Challenges for identifying fragmented policy scenarios

The scale of the problem: Global, 2010 - 2100

Thousands of climate and energy related policies around the globe

➔ Need to filter those of highest relevance for GHG emissions on macro scale

Sectoral / regional / technology policies can only be implemented on the resolution of the model

➔ Key subscale policies would need to be parameterized or omitted.

But what after 2020? How to cover all world regions?

➔ „Policy realism“ quickly becomes a scenario exercise

Challenges for identifying fragmented policy scenarios

The scale of the problem: Global, 2010 - 2100

Policy scenarios should:

- be specific enough to reflect and possibly extend the fragmented policy situation until 2020
- project current level of expectation and/or ambition of climate policy into the future („Policy as usual“)
- be generic enough to gain relevant insights from their application

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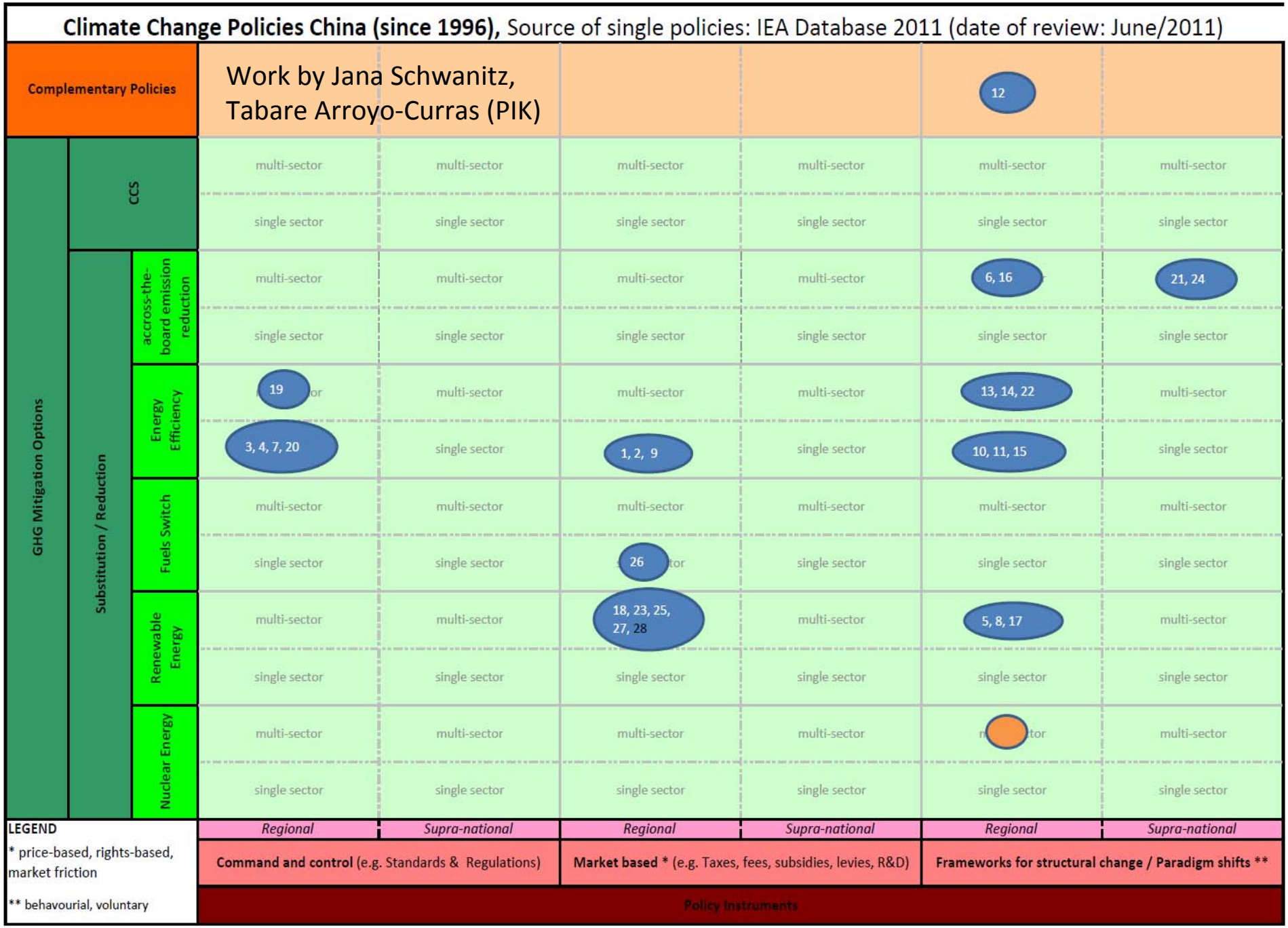
IEA policy database

Work by Jana Schwanitz,
Tabare Arroyo-Curras (PIK)

Climate Change Policies China, Source of single policies: IEA Database 2011

http://www.iea.org/textbase/pm/?mode=cc&action=result

Number	Policy Name	Scope	Policy Instrument	Year	Status	Update	Further information
1	Efficient light bulb subsidy programme	Single sector: Energy	Market based (e.g. Taxes, Fees, Subsidies, Levies, R&D)	2008	Planned		Subsidises 50 million low-energy bulbs onto the market.
2	Hong Kong - Tax Incentives for Environmentally Friendly Commercial Vehicles	Single sector: Transport	Market based (e.g. Taxes, Fees, Subsidies, Levies, R&D)	2008	In force		Defines incentive scheme to encourage investment in environmentally friendly commercial vehicles meeting Euro V emission standards for heavy-duty and light-duty diesel vehicles.
3	National Building Energy Standard	Single sector: Built environment	Command & control (e.g. Standards & Regulations)	2008	In force		Requires 50% reduction of building's total operation load based on a building's energy consumption during the 1980s.
4	Aluminium Industry Permitting Standards	Single sector: Industry	Command & control (e.g. Standards & Regulations)	2007	In force		Defines new standards that must be met for permits to be issued for bauxite mines, alumina refineries, primary aluminium smelting operations, secondary aluminium and aluminium process plants.
5	Medium and Long Term Development Plan for Renewable Energy	Multi-sector	Frameworks for structural change / Paradigm shifts	2007	In force		Establishes targets for the development of various sources of renewable energy up to 2020, calling for the percentage of renewable energy to rise to 10% of total energy consumption by 2010 and 15% by 2020.
6	National Climate Change Program	Multi-sector	Frameworks for structural change / Paradigm shifts	2007	In force		Sets out a strategy to address climate change and sustainable development, including economic restructuring, energy efficiency improvement, among others. Targets: 1) reducing energy consumption per unit of GDP by 20% by 2010; and, 2) quadrupling GDP between 2000 and 2020 while only doubling energy use.
7	Retirement of Inefficient Plants	Single sector: Industry	Command & control (e.g. Standards & Regulations)	2007	In force		Orders to retire small and inefficient plants in various industrial sub-sectors.
8	Renewable Energy Law	Multi-sector	Frameworks for structural change / Paradigm shifts	2006 (revised in 2009)	In force		Frameworks policy which lays out general conditions for renewable energy to become a more important energy source in China. Includes, middle- and long-term targets for the total volume of renewable energy development.


Climate Change Policies China (since 1996), Source of single policies: IEA Database 2011 (date of review: June/2011)
Complementary Policies
Work by Jana Schwanitz,
Tabare Arroyo-Curras (PIK)
12
GHG Mitigation Options
CCS
Substitution / Reduction
accross-the-board emission reduction
Energy Efficiency
Fuels Switch
Renewable Energy
Nuclear Energy
multi-sector
single sector
6, 16
21, 24
19
13, 14, 22
3, 4, 7, 20
1, 2, 9
10, 11, 15
26
18, 23, 25, 27, 28
5, 8, 17
LEGEND
* price-based, rights-based, market friction
** behavourial, voluntary
Regional
Supra-national
Command and control (e.g. Standards & Regulations)
Market based * (e.g. Taxes, fees, subsidies, levies, R&D)
Frameworks for structural change / Paradigm shifts **
Policy Instruments

Selection of macro-scale policies for IAM – Example China

Targets for renewable energies

- 10 % RE of total energy consumption by 2010 and 15 % by 2020 (5)
- provision of 100 MW wind, 5,5 GW biomass by 2010, 20 GW wind by 2015 and 30 GW by 2020 (17)

Targets for Nuclear Energy

- 86 GW by 2020, 400-500 GW by 2050

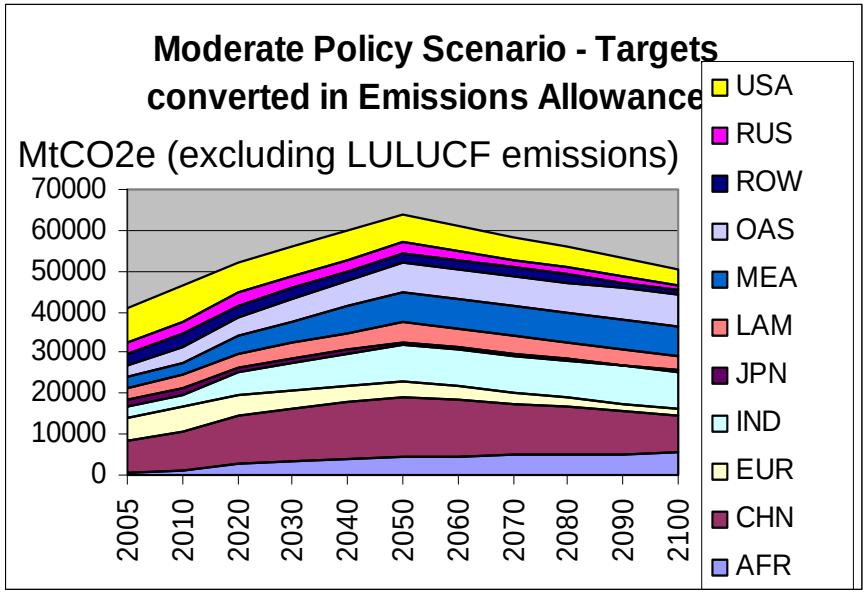
Targets for energy intensity, energy efficiency

- energy intensity reduction target of 20 % by 2010 (reference year 2005) or 4 % /a (14)
- carbon intensity reduction by 40-45% (reference year 2005) by 2020
- 50 % reduction of building emissions (reference year 1980) for existing buildings
- reduce kiln and boiler coal consumption by 70 million tons
- electric motors EEI target of 2 % (save 20 billion kWh/a)

RoSE moderate policy scenario

Developed by Elmar Kriegler, Gunnar Luderer, Niklas Höhne (Ecofys)

- Keep as simple as possible
- Reflect "Policy as usual"
- Avoid trend breaks – Expectation of weak future climate policy
- Reduce dependence on baselines



Industrial Countries: ***Absolute emissions reduction targets***

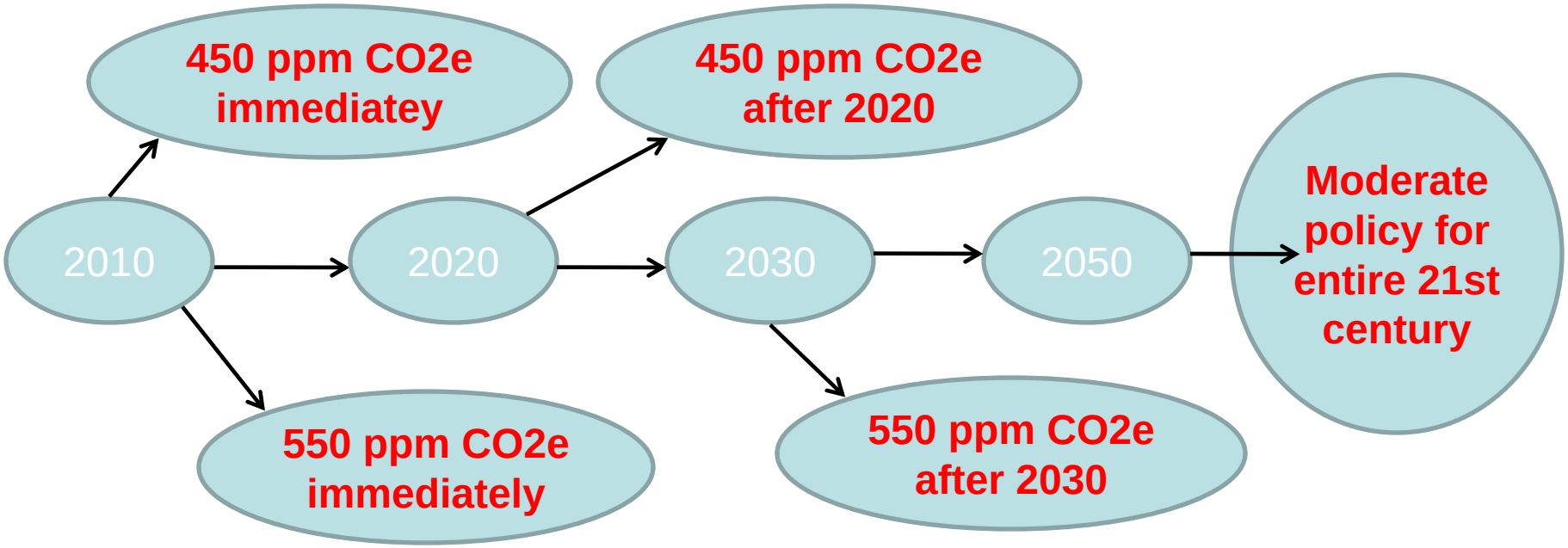
Percent reduction	2020 rel to 1990	2020 rel to 2005	2050 rel to 1990	2050 rel to 2005	2100 rel to 1990	2100 rel to 2005
EU	-20%	-13%	-40%	-34%	-80%	-78%
JPN	-10%	-16%	-40%	-44%	-80%	-81%
USA		-5%		-18%		-51%

Developing countries:
Emissions reduction relative to baseline / Emissions Intensity (EI) targets

Percent reduction	2020 EI rel to 2005	2020 rel to base	gEI [%/yr]	gEI [%/yr] 2020-50	2050 EI rel to 2020	gEI [%/yr] 2050-2100	2100 EI rel to 2050
China	-40%		-3.3%	-3%	-60%	-3%	-78%
India	-25%		-1.9%	-3%	-60%	-3%	-78%
Lat. America		-10%	-1.1% -gBase	-2.5%	-53%	-2.5%	-72%
Korea		-15%	-1.1% -gBase	-3%	-60%	-3%	-72%
Other Asia		-0%		-3%	-60%	-3%	-72%
South Africa		-17%	-1.2% -gBase	-2.5%	-53%	-2.5%	-72%
Other Africa		0%		-2.0%	-45%	-2.5%	-72%
EEU + Turkey		-15%	-1.1% -gBase	-3%	-60%	-3%	-78%

Oil and gas exporting countries, including Russia: ***No targets***

RoSE policy scenarios



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And now to the broader points

General assumptions about future development patterns are in the „background“ of IAMs:

➔ GDP per capita growth, convergence between regions, labor productivity, technological change

Interaction between climate change & climate policy and the future development patterns have been recognized, but neglected due to lack of theory and quantitative ready-to-use models.

Long-term goal: Integrate some sort of „unified“ growth (and shrink) theory in integrated assessments to study interaction endogenously

➔What is the role of technological change?

➔What is the role of external pressures (e.g. environmental change) in changing institutions, rules, societies

The new scenario process as a possible entry point

Socio-economic reference pathway

Forcing level (W/m^2)

	SSP1	SSP2	SSP3	….
8.5				
6.0				
4.5				
3.7				
2.6				

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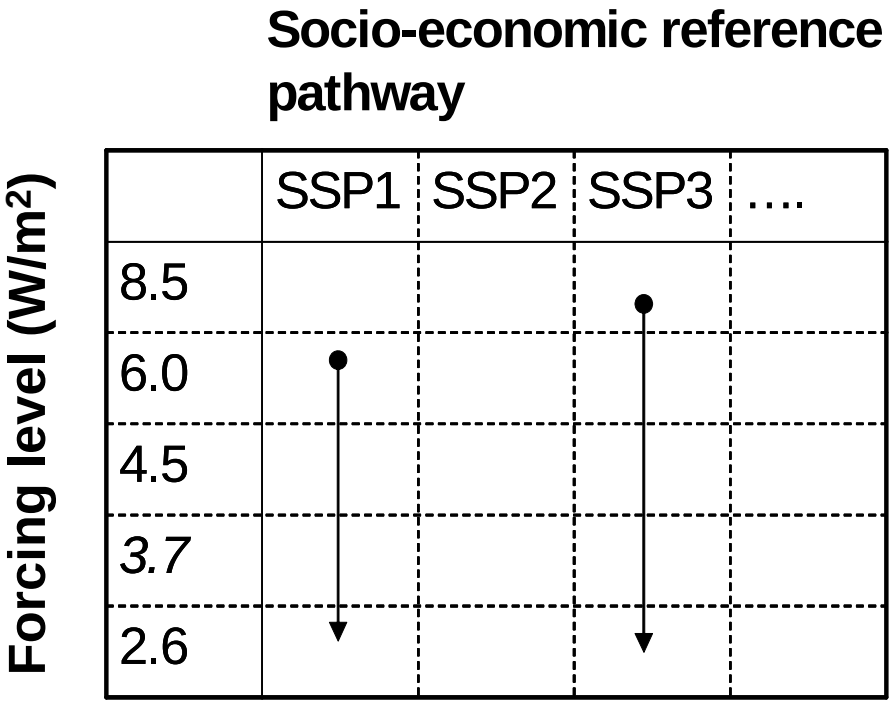
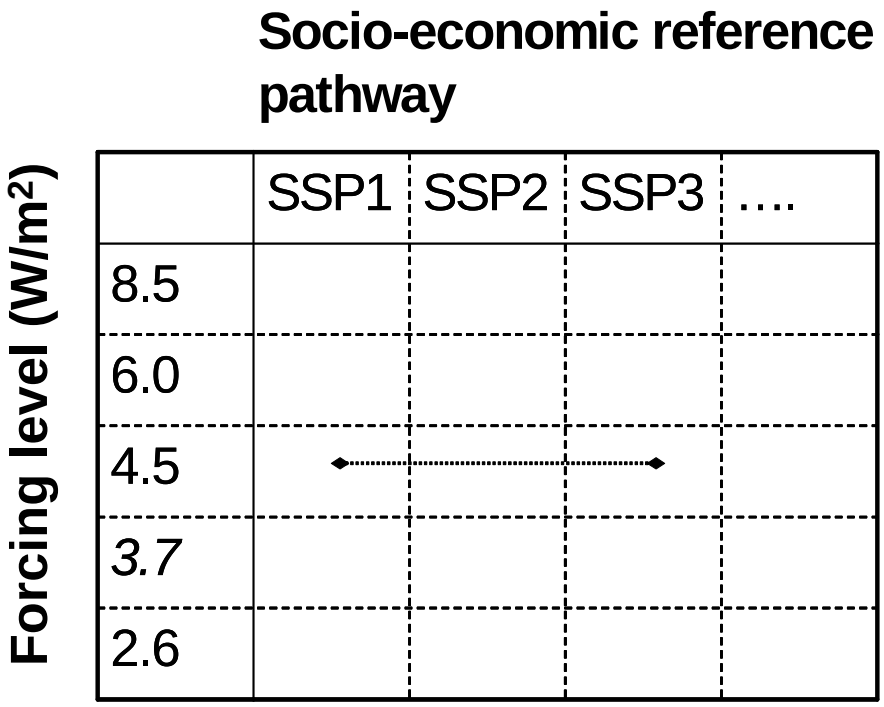
The new scenario process as a possible entry point





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Thank you!

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