

Wrapping Up SRREN Expert Meeting 3 on Scenarios: Tasks in AR5 Run-up

Oxford, 1 March, 2010

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Timm Zwicker

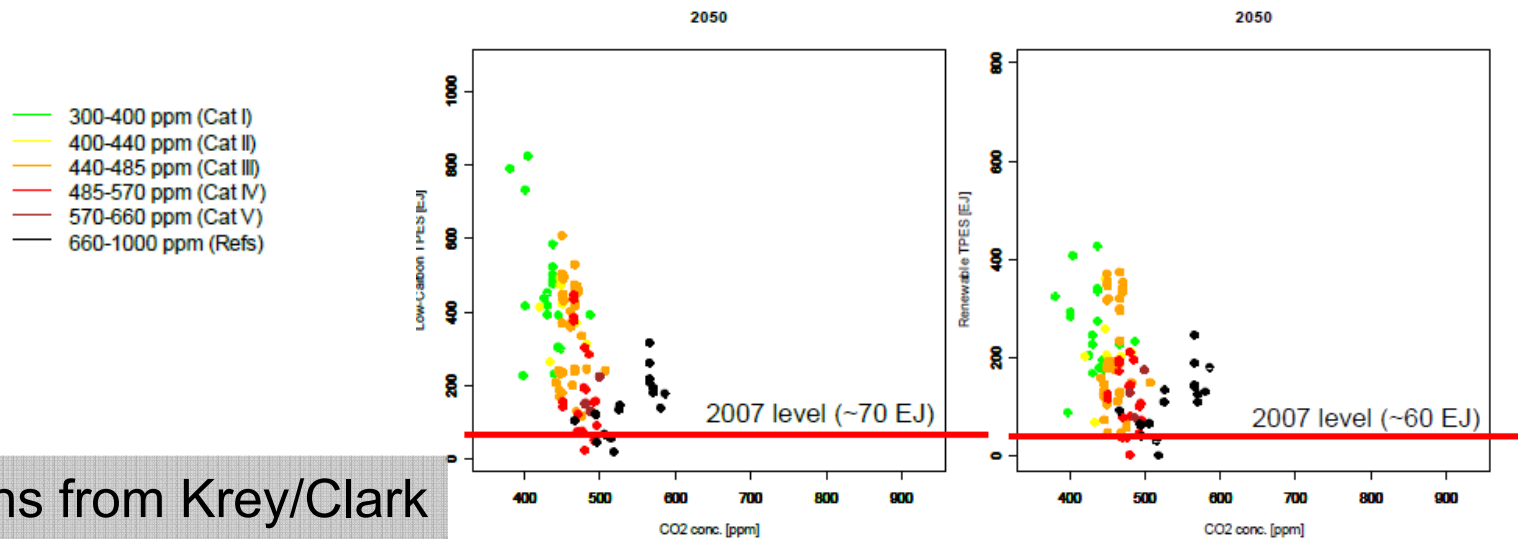
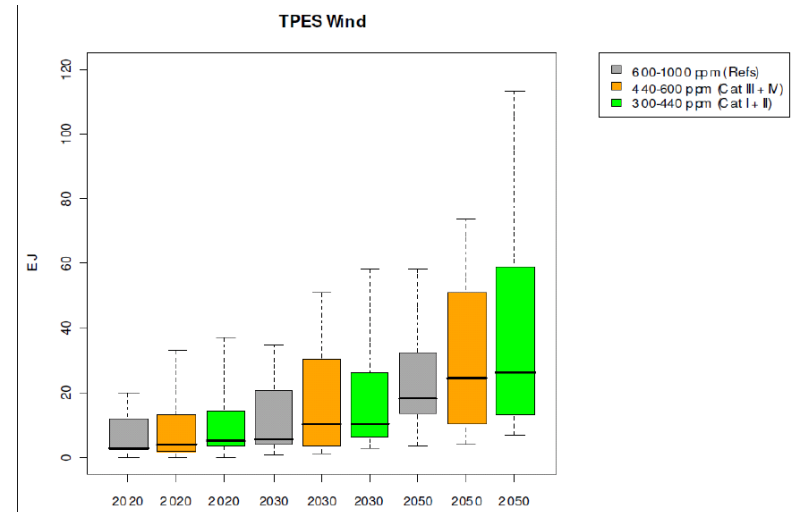
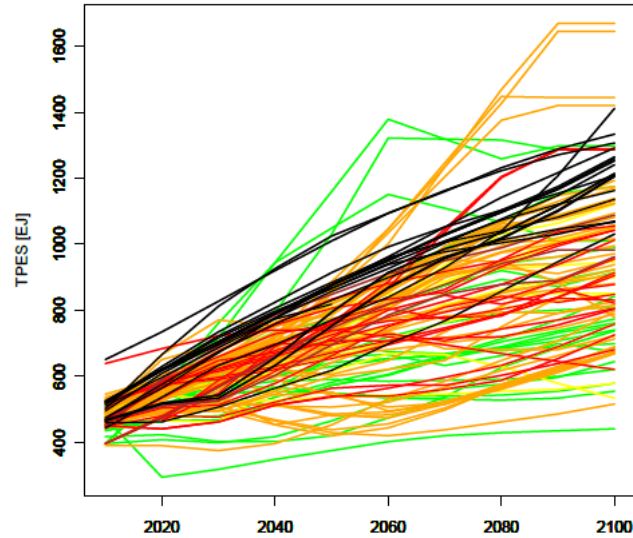
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- Modelling Comparison
- Modelling Innovation
- AR5 Timeline

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Detailed Assessment of Multimodel Data Needed



Graphs from Krey/Clark

Need More Supply Assessments

Wind



PV



Bio-energy



0.5 x 0.5 degree

Geographic potential

Theoretically extractable output

Wind speed
Land cover

Irradiance
Land cover

Crop growth
Land cover

Technical potential

Taking into account extraction

Conversion factors
Density / Suitability
Operational factors (load hours)

Economic potential

Technical potential below certain costs

Investment costs
OM costs
Discount rate
Lifetime

Potential is related to other developments:
depends on scenario

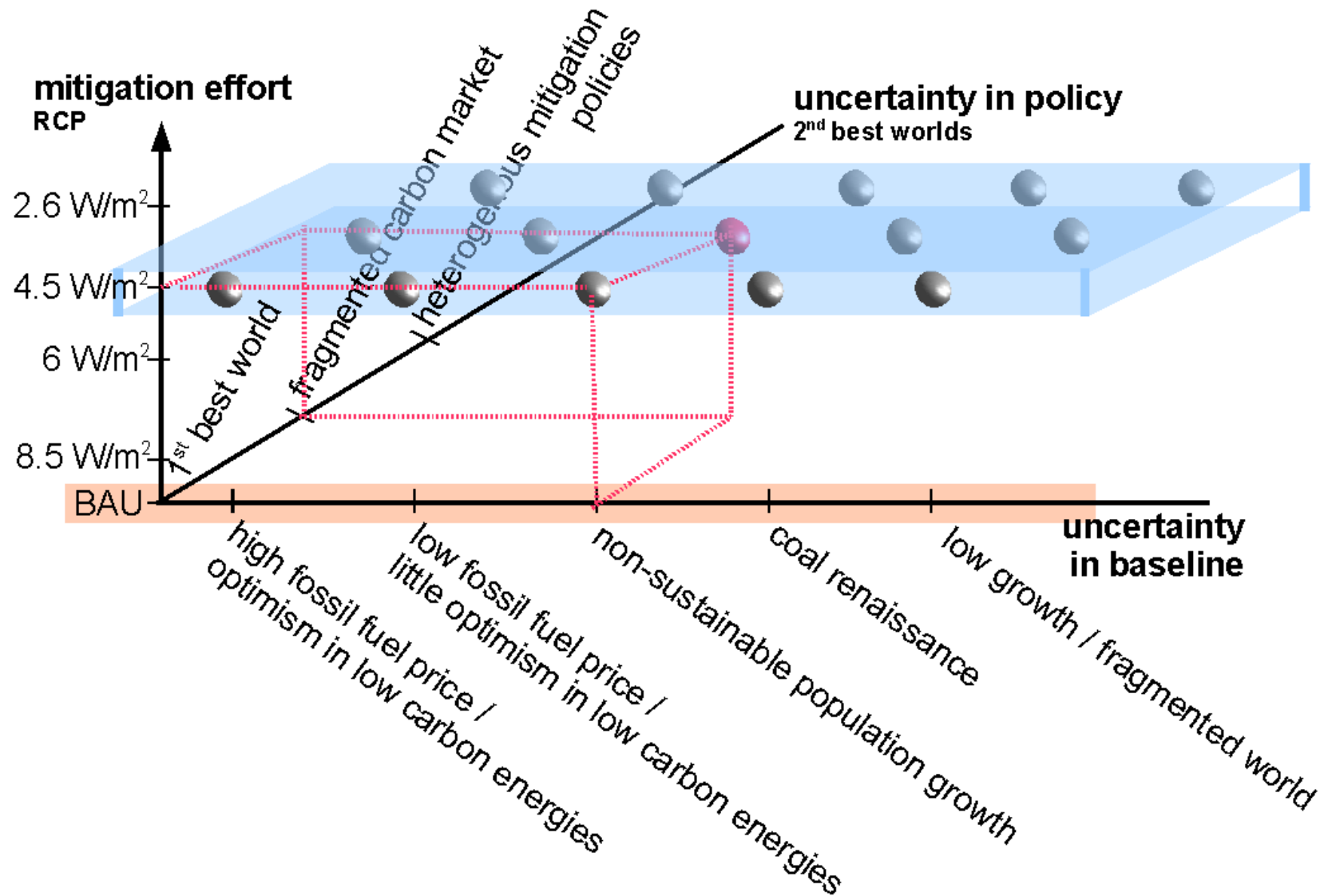
Slide modified from van Ruijven

Hoogwijk, M., 2004. On the global and regional potential of renewable energy sources, Utrecht University.

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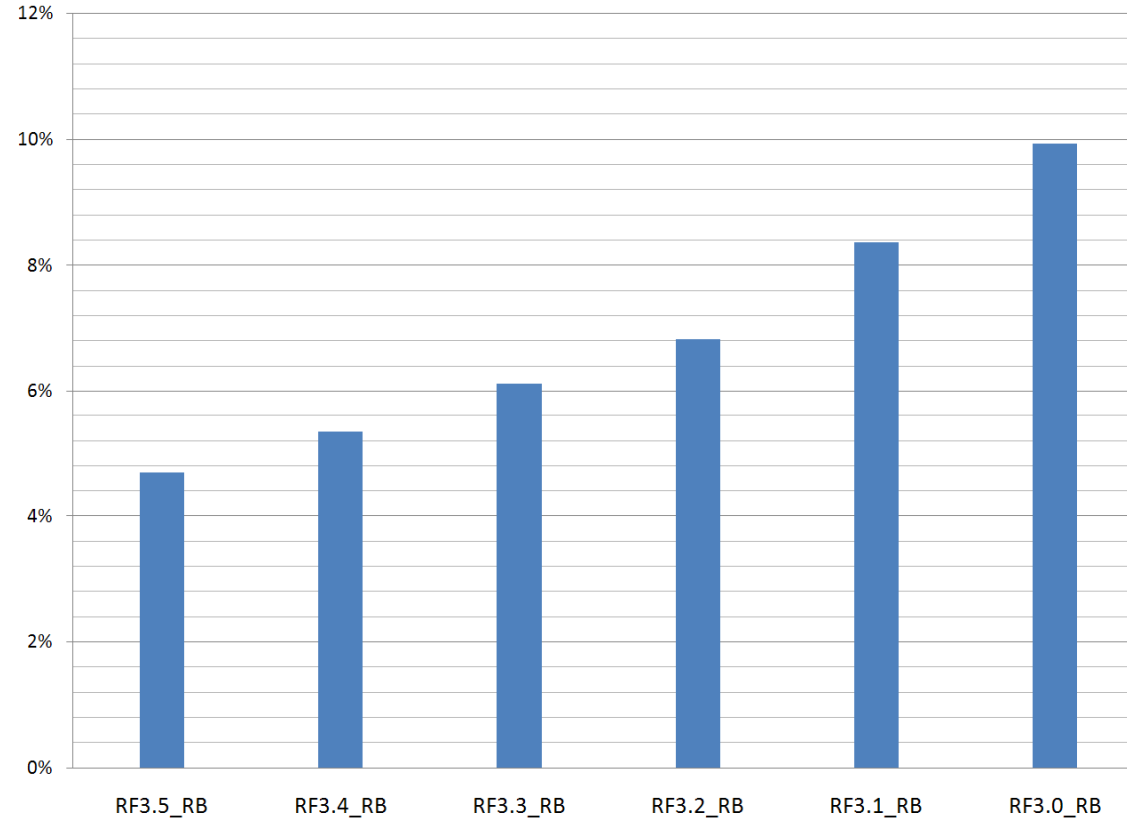
AR5 Scenario Philosophy



Limited availability of technologies

No CCS

Nuclear restricted to what was the lower limit in Ref

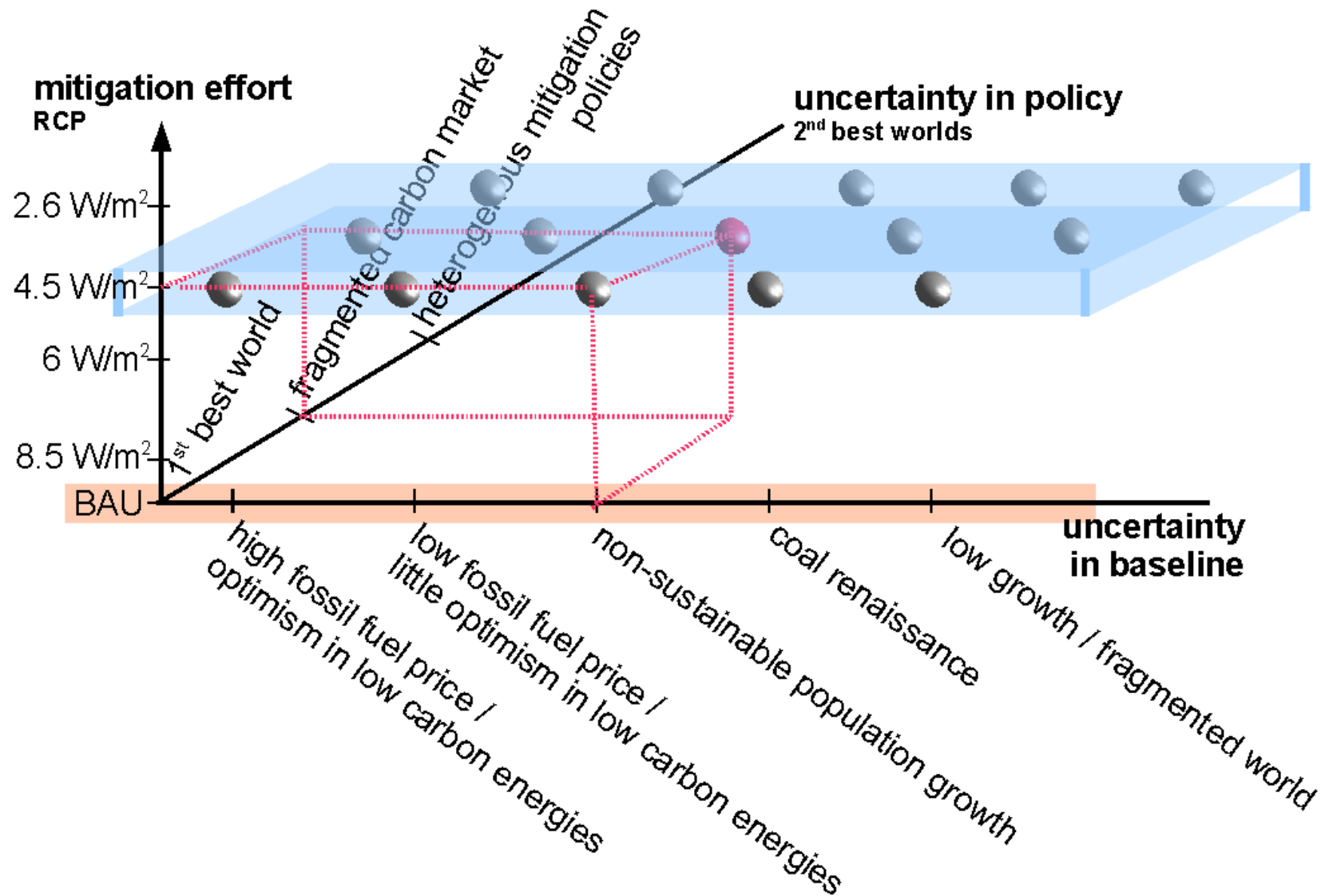


Slide modified from Kanudia

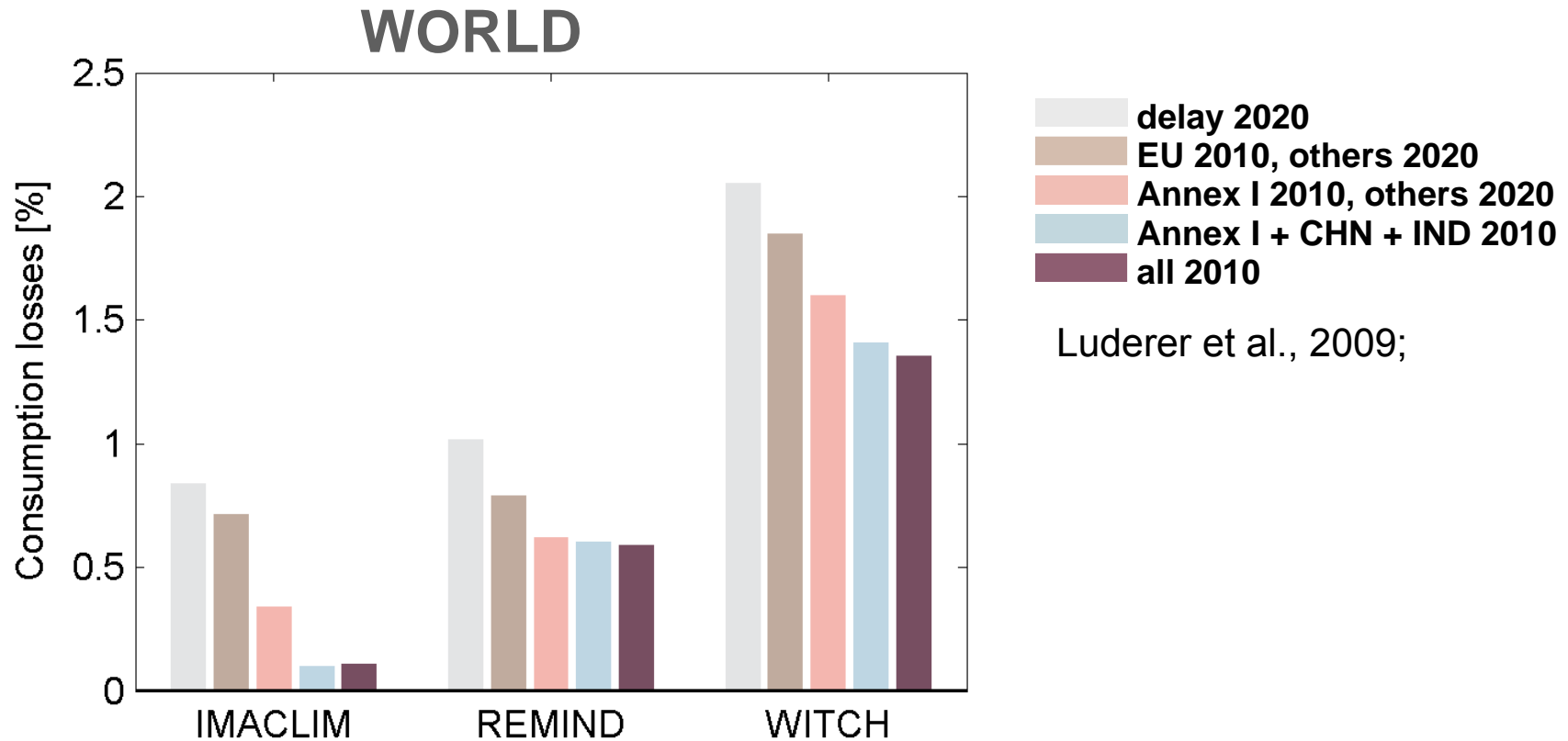
System Cost Increase over Ref

AR5 Scenario Philosophy

Limited Availability of Technologies (EMF24, Luderer)



Delay of Action

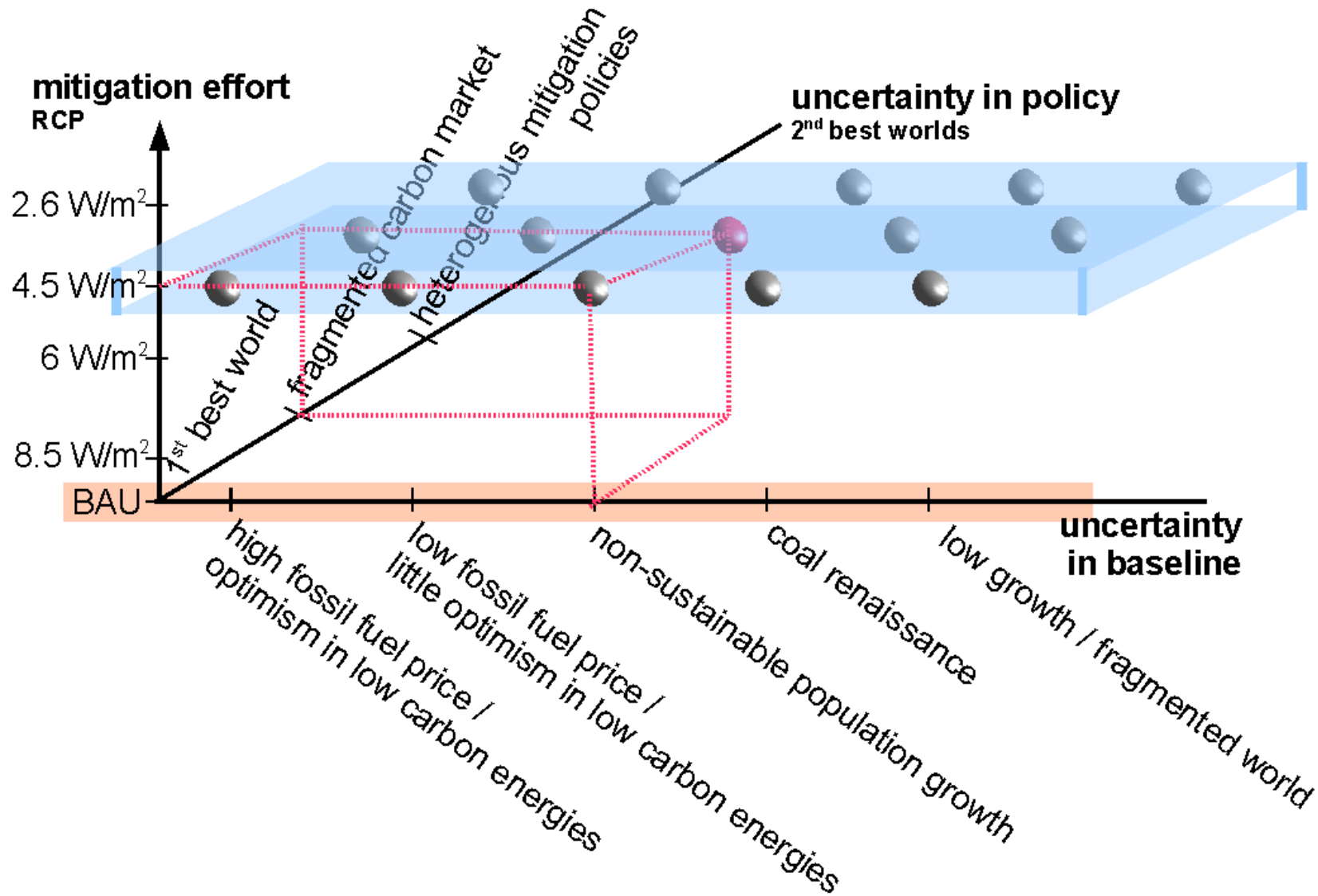


- ➔ delay of action beyond 2020 makes climate target unachievable
- ➔ decreasing costs with increasing participation in climate coalition

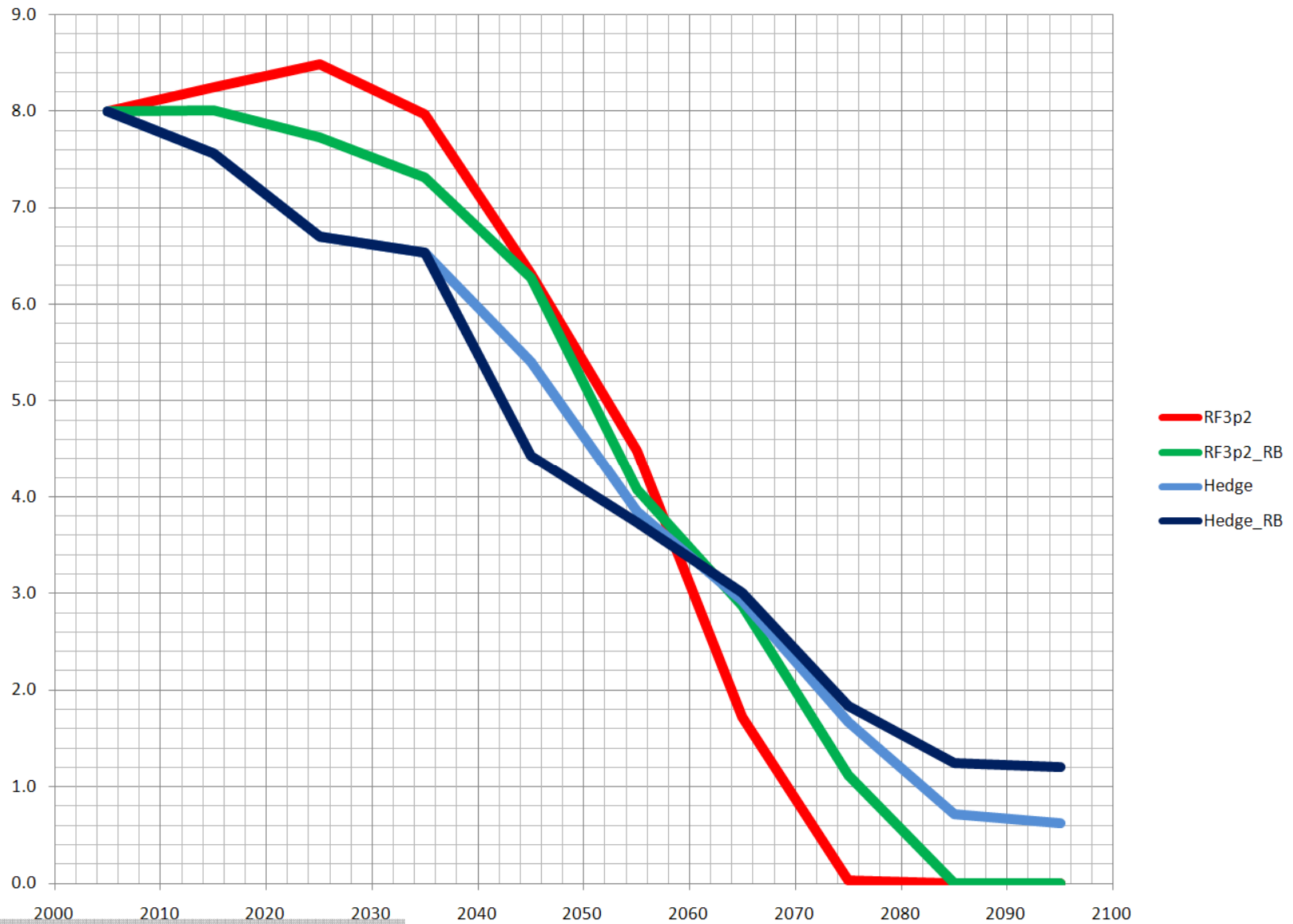
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Limited Availability of Technologies (EMF24, Luderer)

Delayed participation (Luderer)



Uncertainty & Hedging Strategies

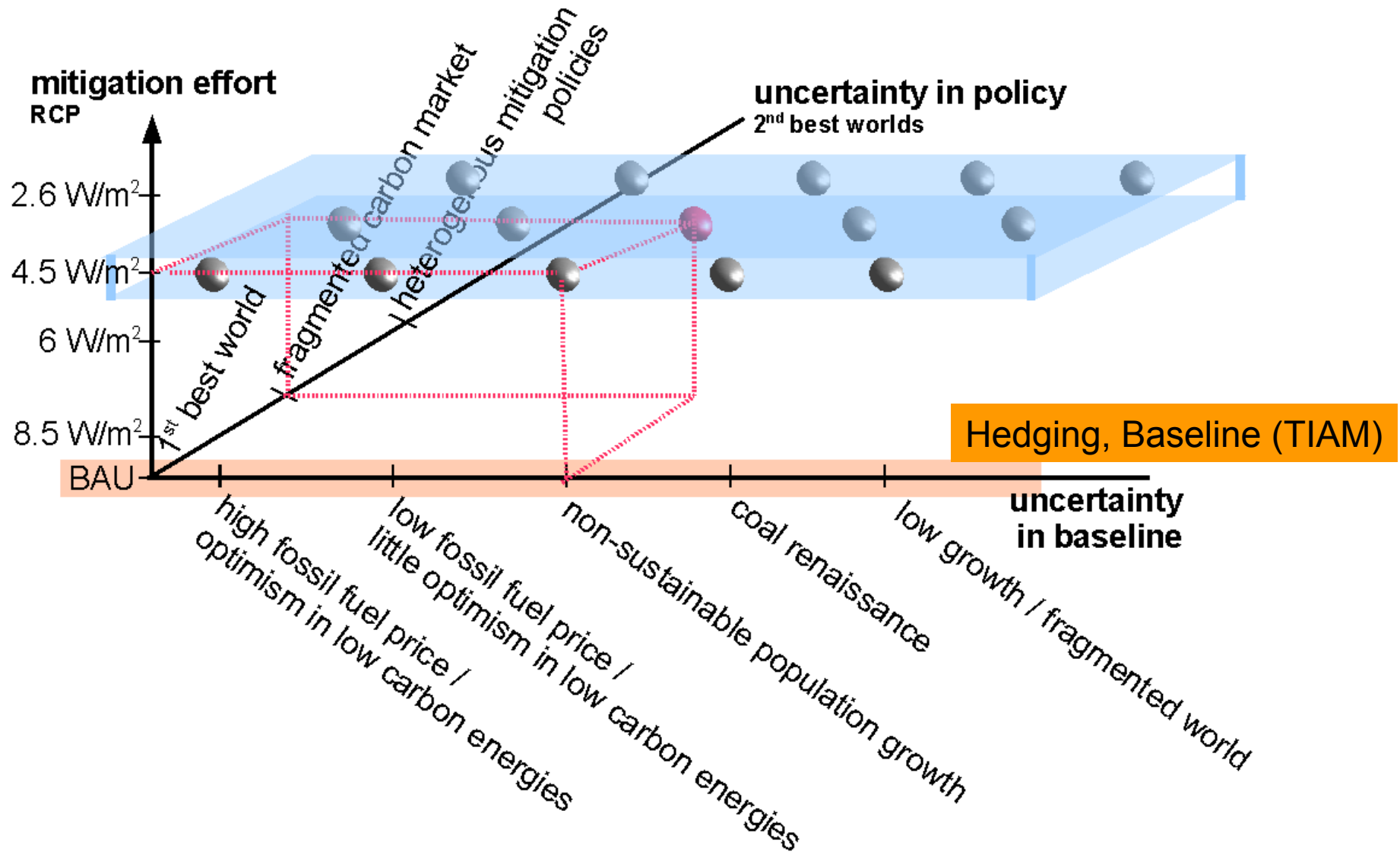


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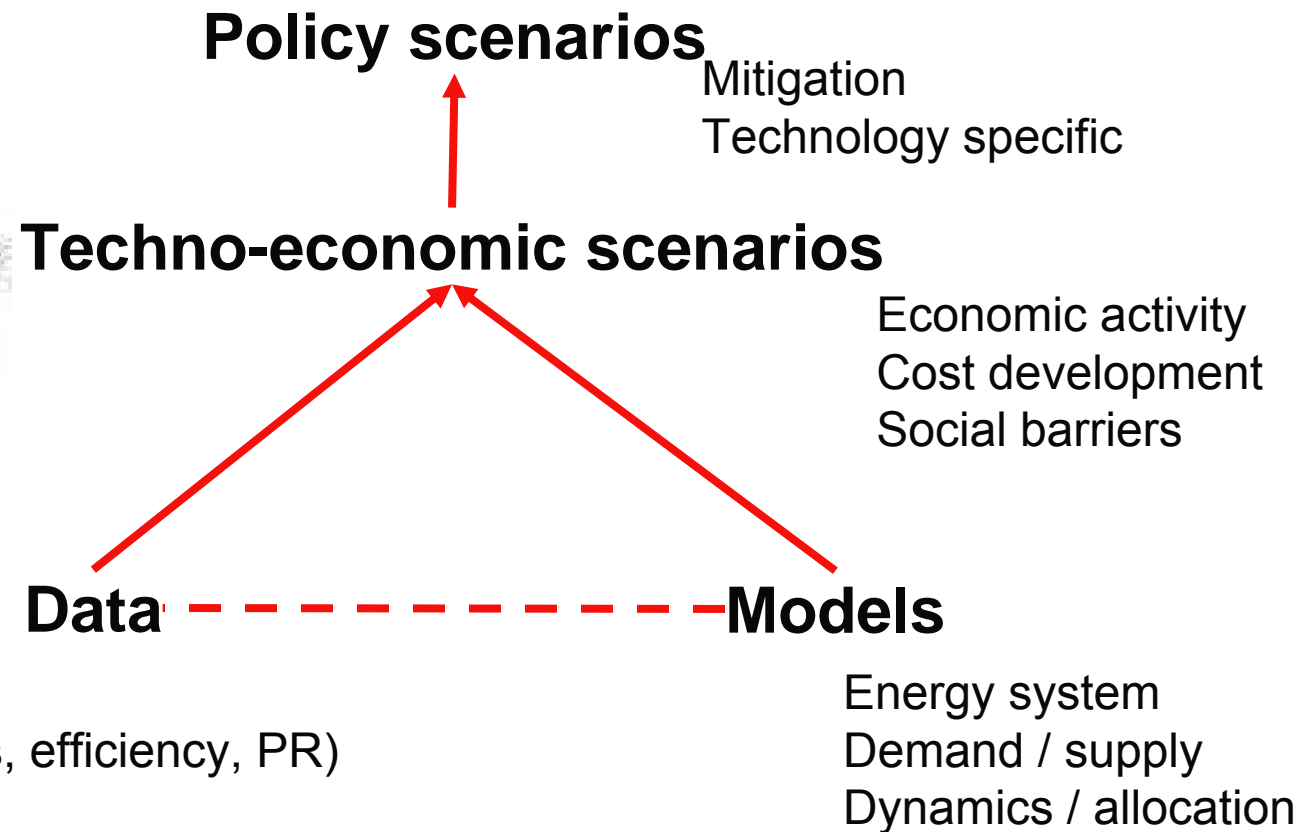
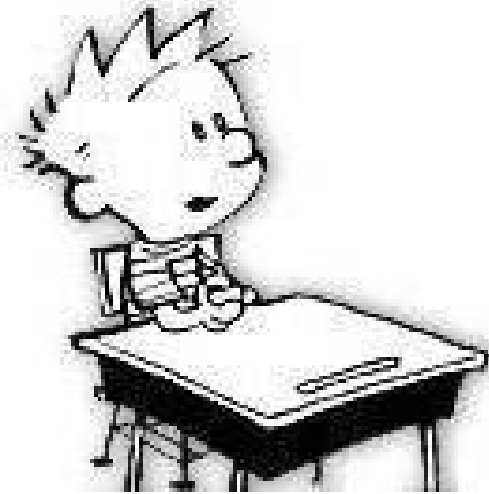
Limited Availability of Technologies (EMF24, Luderer)

Delayed participation (Luderer)



Need IAMs and IPAMs

Integrated Policy Assessment Models



Slide taken from van Ruijven

Integrating Government Plans & Policies

Models assume market as coordination mechanism

In developing countries modelling exercises have to correct for imperfect market conditions

- **Multiple Ministries** dealing with energy policies, e.g.,
 - Renewable targets Vs Grid Availability
- Electricity is on **concurrent list** therefore all states legislate
 - Therefore no uniform policy for renewable (e.g., Feed in Tariff)
- Partial Internalization of **Externalities** from fossil fuels

Evolving coordination mechanisms to integrate government plans:

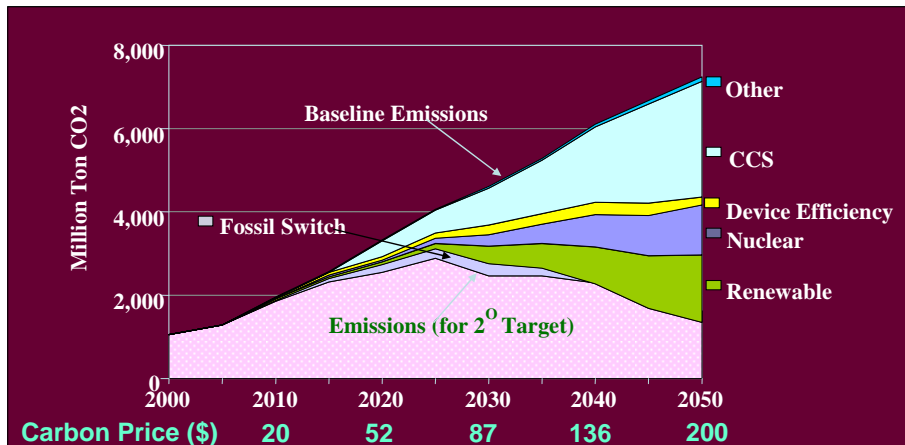
- Conventional (Market focused) - **1st Best Paradigm**
- Sustainable (Co-ordination for co-benefit) - **2nd Best Paradigm**

Alternate Visions

Conventional Vision

Policy Drivers

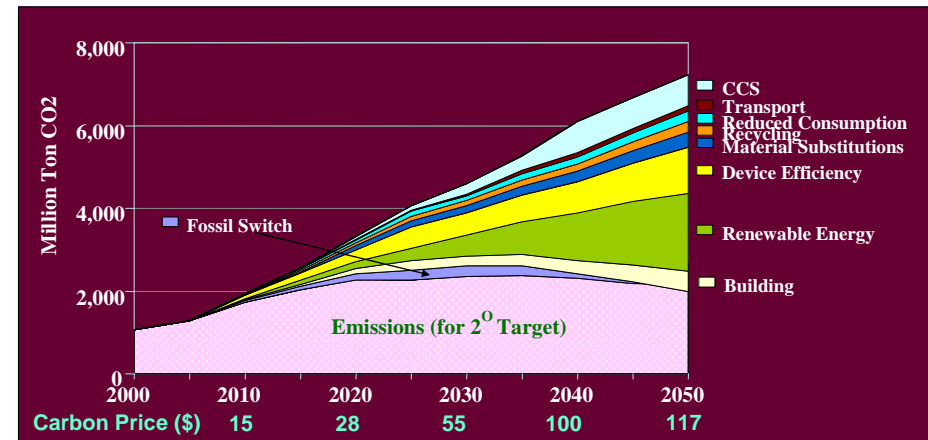
1. Top-down/Supply-side actions
2. High Carbon Price as main instrument
3. Climate Focused Technology Push



Sustainable Vision

Policy Drivers

1. Innovations in technology, institutions
2. Co-operation
3. Long term perspective



Slide taken from Shukla

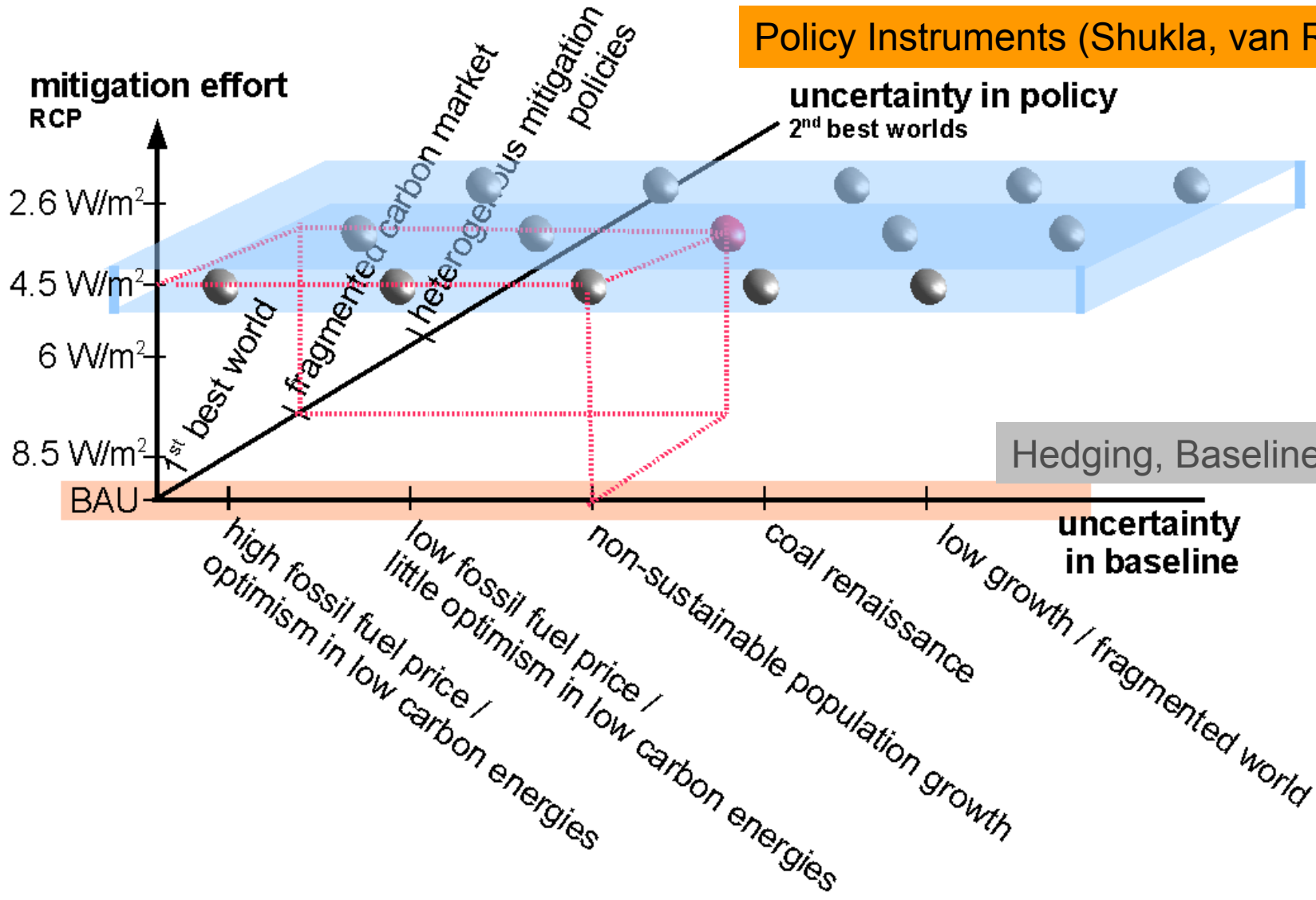
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Limited Availability of Technologies (EMF24, Luderer)

Delayed participation (Luderer)

Policy Instruments (Shukla, van Ruijven)

Hedging, Baseline (TIAM)



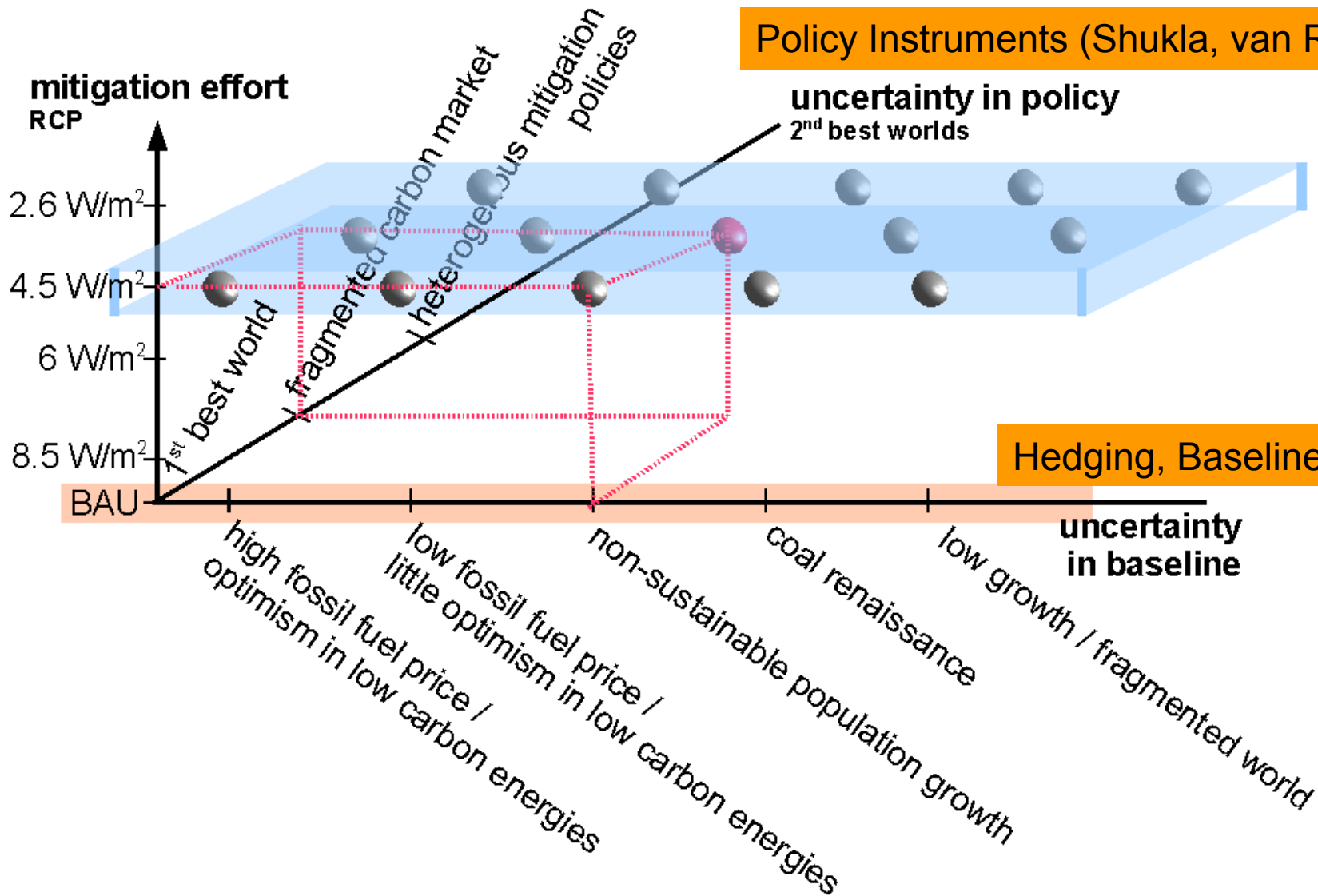
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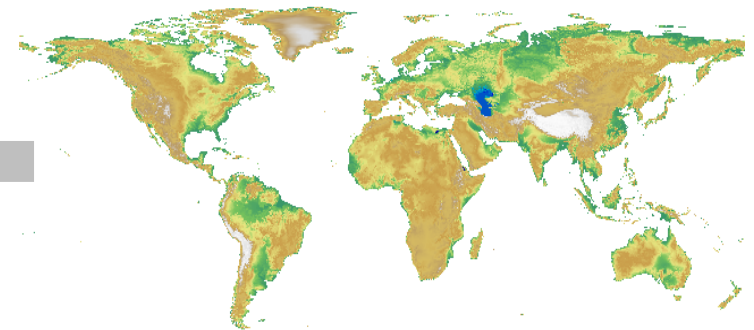
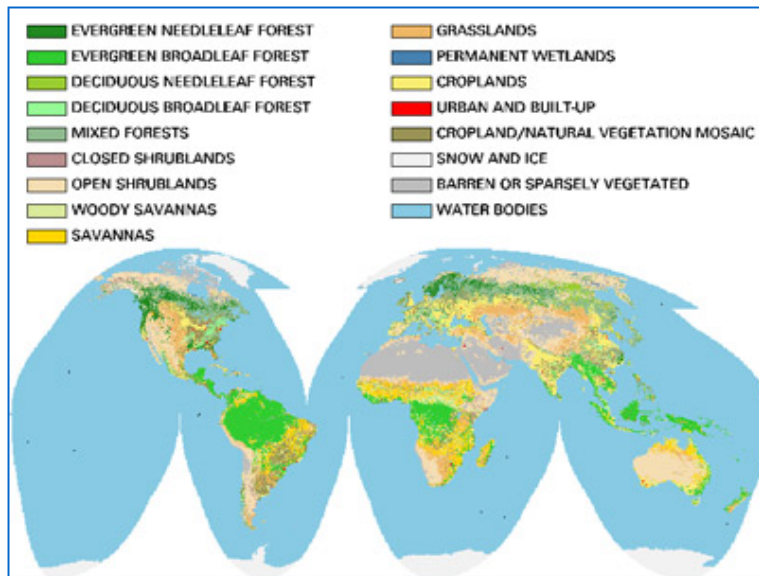


Land-use downscaling

Calculating land-use by 1km grid-cell and summed up into half degree grid cell to make fraction of land-use

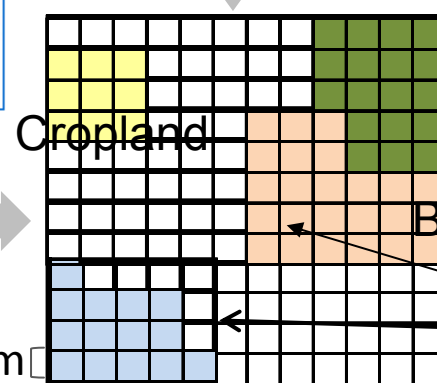
Define the area where the land will not change.

Fix land-use where it is hard to change by using GTOPO30 and land-cover map



0.5deg.

- Built-up area (> 5 degree slope)
- Forest (> 20 degree slope)



Forest

Cropland

Built-up area

Fixed area

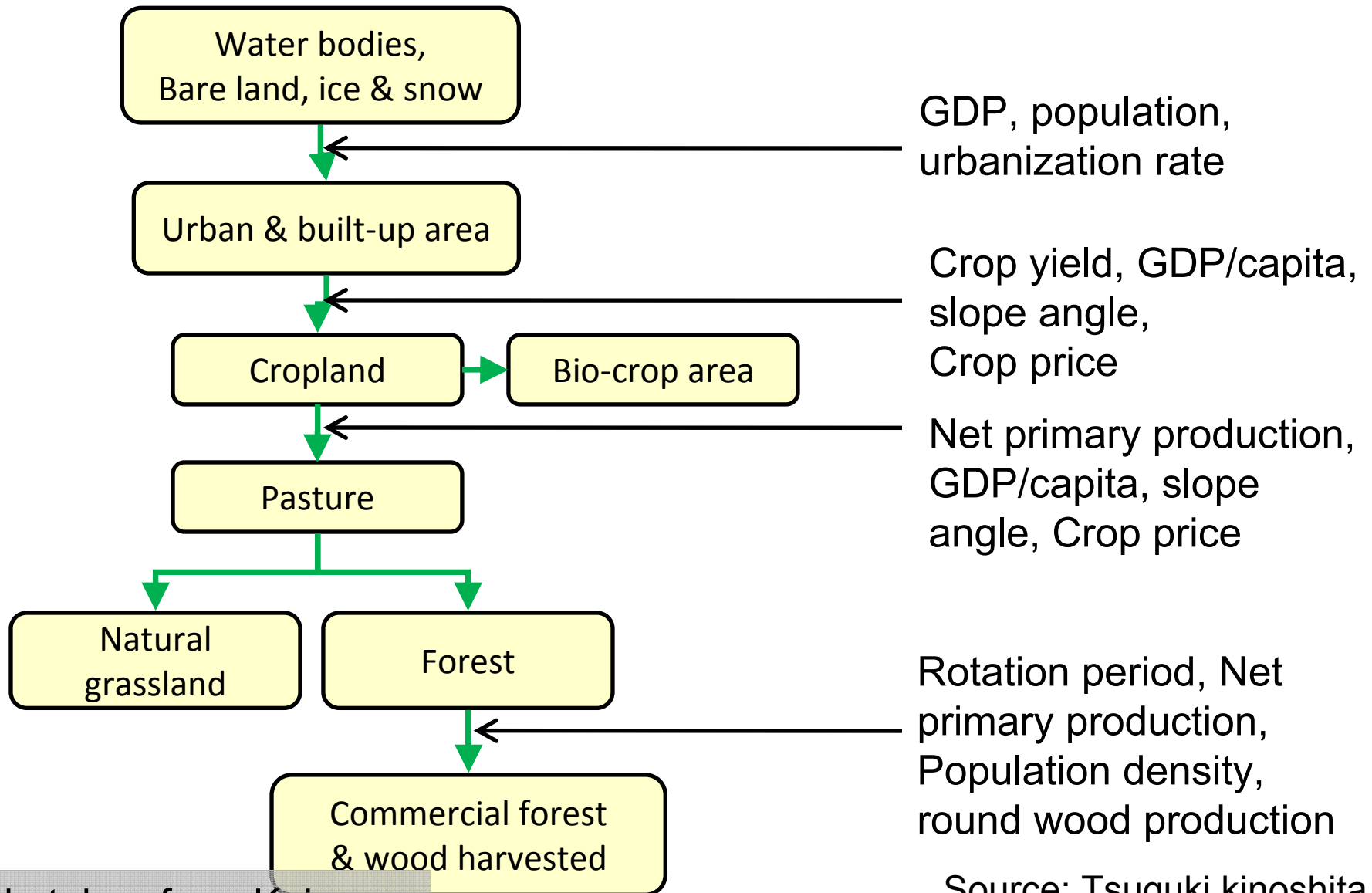
Water bodies, snow & ice, bare land

Slide taken from Kainuma

1km

Land-use downscaling

Land-use distribution is decided step by step



Slide taken from Kainuma

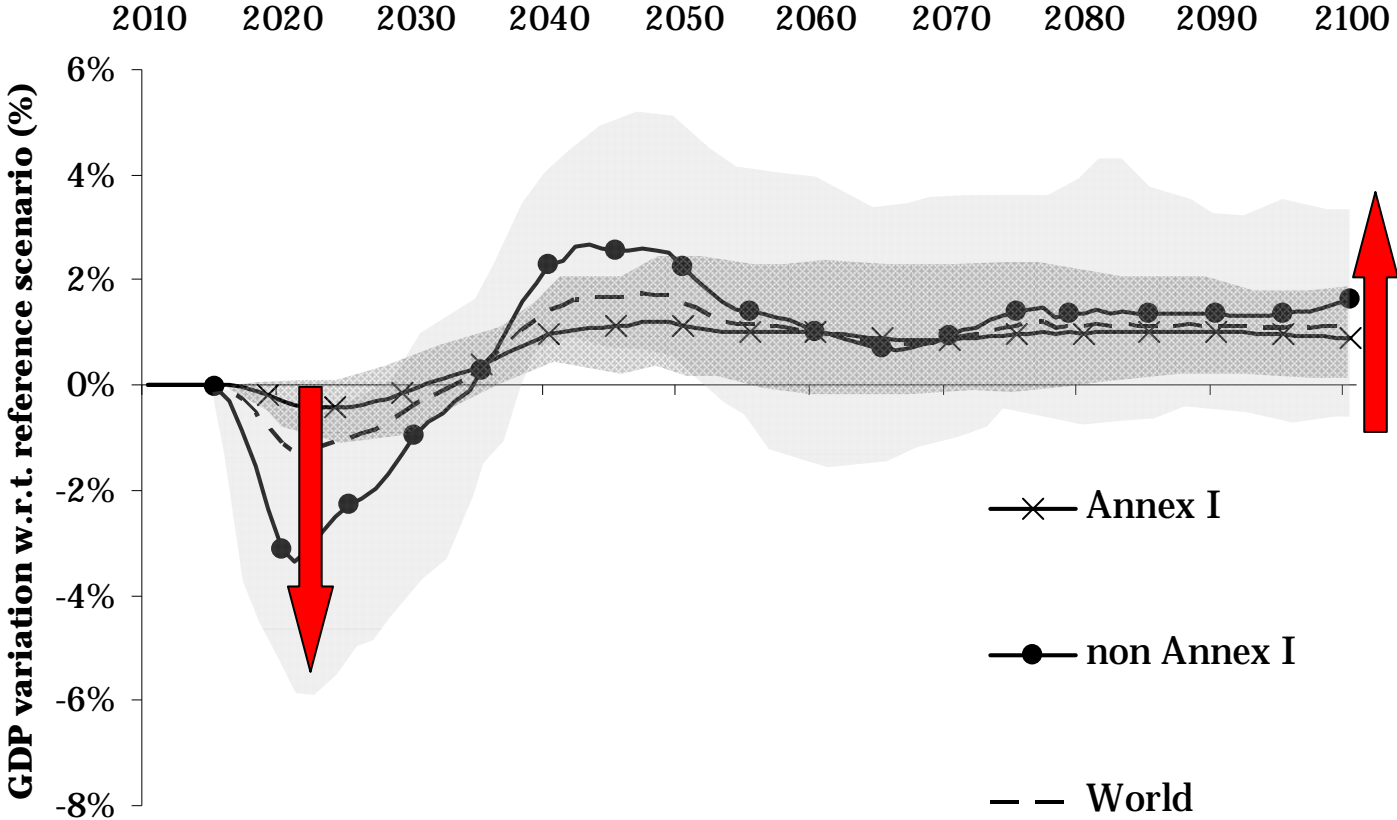
Source: Tsuguki kinoshita

Key Challenges for Treatment of RETs in IAMs

- **Better representation of grid integration costs of intermittent RETs**
 - Storage, Backup, Demand management, Fluctuation balancing
- **Full integration of land use, carbon management and bioenergy**
 - Debate around agricultural productivity and its future potential
- **Accounting for infrastructure and other “systemic components”**
 - Path dependency, leap-frogging, cross-sectoral effects
- **Explicit inclusion of energy demand side**
 - Moving from Exajoule to service units
- **Wider sustainability context**
 - development and climate policy, “metabolic” co-benefits and disbenefits (resource and waste streams), bottlenecks

These are challenges of “bridging scales” (temporal, spatial and sectoral resolution).

Infrastructure



(450ppm CO2 stabilisation scenarios)

Slide taken from Hourcarde

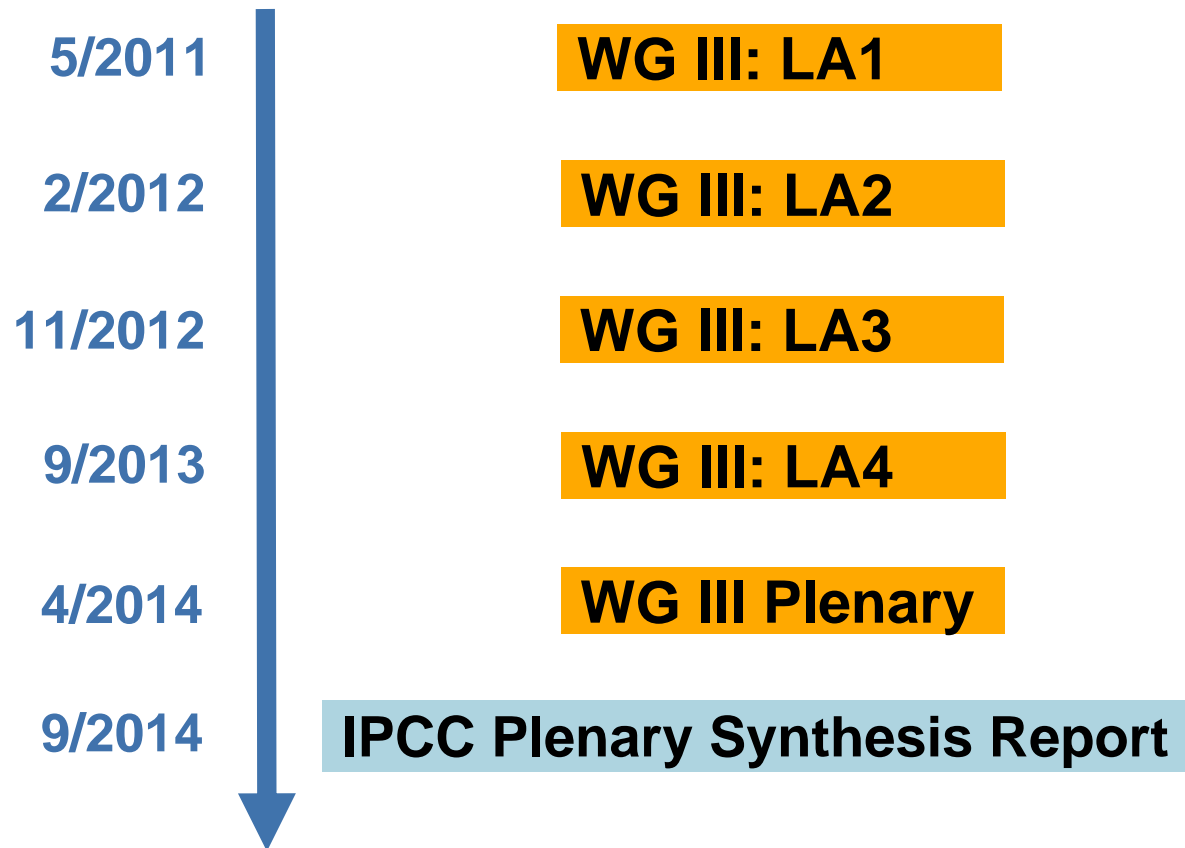
Required Modelling Innovation

- Beyond social planner models
- Decentralized models with market barriers and bounded rationality
- Deriving optimal policy instruments
- Low stabilization scenarios

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AR5 Timeline



Papers should be accepted for publication before 9/2013 to be included in AR5 TOD (Third Order Draft).

Final Remark

The IPCC is the honest broker between experts and decision makers in business, politics and civil society.

The IPCC should be policy relevant without being policy prescriptive.