Climate Scenarios
What are they and how are they used?

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The mitigation challenge

**WELL BELOW**

2° **GOAL**
Well below 2° Goal – the mitigation challenge

Human CO₂ emissions accumulate in the atmosphere

→ First, current emissions growth need to be stopped & reversed („Peaking“)

→ Followed by rapid emissions reduction

→ To reach net zero CO₂ emissions to stop warming

Mitigation action must be taken NOW
Well below 2° Goal – the mitigation challenge

- Peak in 2020
- Steep emissions reduction
- Carbon neutrality
- Net CO₂ removal
- Power sector decarbonization
  Coal phase-out
- Carbon neutral economy
  Electrification of end uses
  Challenges:
  - Freight transport,
  aviation, shipping
  - Heavy industry

- Re-directing investments
  from fossils to low carbon
  and efficiency solutions

- Compensate residual emissions
  Compensate budget overshoot

- Intended nationally
determined contributions

- 2° C warming scenario
Well below 2° Goal – the mitigation challenge

CLIMATE SCENARIOS: Exploring possible futures

MITIGATION PATHWAYS: Assessing solutions for the future

- Peak in 2020
- Steep emissions reduction
- Carbon neutrality
- Net CO₂ removal

Risk Investment
A world of alternative futures

MITIGATION SCENARIOS
The world of mitigation scenarios

IPCC 5th Assessment Report  (Scenario data: https://secure.iiasa.ac.at/web-apps/ene/AR5DB)
The world of mitigation scenarios

Shared socioeconomic pathways (SSPs)
(Scenario data: https://secure.iiasa.ac.at/web-apps/ene/SspDb)

SSP5: Fossil-fueled development
SSP4: Inequality
SSP3: Regional rivalry
SSP1: Sustainability

Updated CMIP6 ScenarioMIP Set:
Reference scenarios
6.0 Wm² scenarios
4.5 Wm² scenarios
3.4 Wm² scenarios
2.6 Wm² scenarios
1.9 Wm² scenarios
Historical emissions

Global CO₂ emissions (GtCO₂ yr⁻¹)

Time (years)

60
40
20
0
-20
-40
2000 2020 2040 2060 2080 2100

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The world of integrated assessment modeling

IAM SCENARIOS
Integrated Assessment Model (IAM) scenario information

- Climate
- Sustainable Development Links
- Emissions
- Economics (e.g. carbon prices)
- Land Systems
- Investment
- Energy Systems
- Technologies
- Socio-economic drivers
- Policies
Integrated Assessment Model (IAM) scenario information

The clean energy investment gap

Well below 2° policies

Current policies
IAMC – Integrated Assessment Modeling Consortium

Founded for:
- Development of emissions scenarios for climate change research

Current Mission: Facilitate
- IAM research and development
- Development of integrated scenarios (mitigation, adaptation, impacts)
- Scenarios for climate policy analysis
Challenges of using IAM scenarios in a business context

HOW TO CONNECT?
How to connect?

- IAM scenarios are ‘state-of-the-art’ research assessed by the IPCC, but geared to climate policy makers

- Creating an interface between what is needed and what can be provided

- Getting operational: Documenting scenario assumptions and formulating standard scenarios
Thank you for your attention

DISCUSSION
IAM – Selected study topics (2010-2014)

Global policy landscape & timing of mitigation action (e.g. AMPERE & LIMITS studies)

Role of sectors and technology availability (e.g. EMF27 study)

Role of emissions drivers (e.g. RoSE study)

Regional scenario studies (e.g. AME (Asia), EMF24 (US), EMF28 (EU) studies)
IAM – Selected study topics (2015 - present)

- INDC gap analyses, National & global pathway analysis (e.g. CD-LINKS)
- Deep mitigation pathways (1.5°C & well below 2°C)
  Role of sectors and technologies (e.g. ADVANCE, EMF33)
- Shared Socio-Economic Pathways (SSPs)
- SD implications of climate policy (e.g. CD-LINKS, TWI2050)