



POTSDAM INSTITUTE FOR
CLIMATE IMPACT RESEARCH

Scientific Issues and Opportunities for Climate Finance and Climate Risk Assessment

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Rapid System Transitions Towards Low GHG Futures Workshop
Snowmass, 23 July 2019

Overview

Part 1: Scientific issues for practitioners to consider when applying global emission scenarios in climate-related risk assessment

Part 2: Opportunities for improving accessibility of existing science

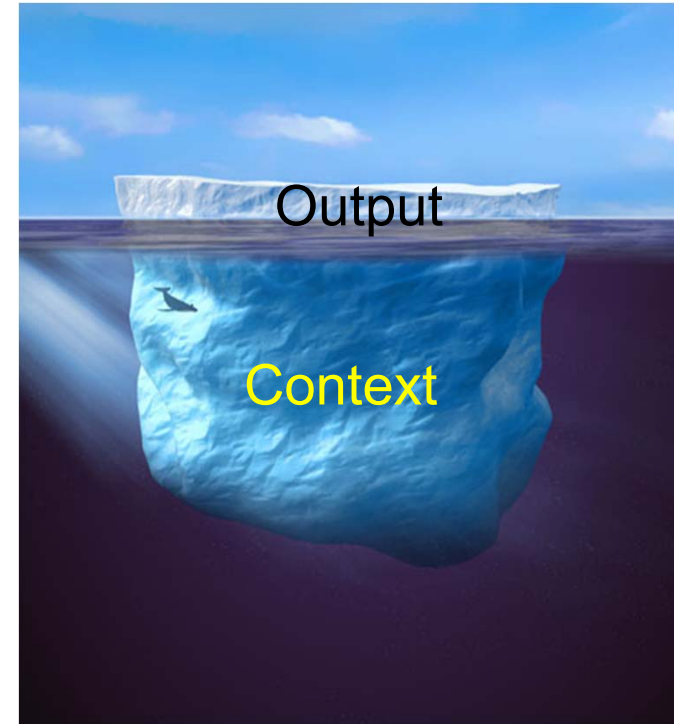
Part 3: Opportunities for improving science

Understanding climate change scenarios

Scenarios are not

- predictions of the future (what will happen?)
- but explorations of
- what can happen (if-then projections) or
 - how to get to societal goals (what should happen?)

Contextualization: To understand scenario information, it is important to understand its context (e.g. questions asked by scenario and associated set of scenarios)

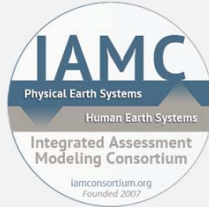


Transition scenarios: Key assumptions and outputs

ASSUMPTIONS

- Socio economic drivers
- Technology
- Policy

Integrated assessment model



- Energy System
- Land System

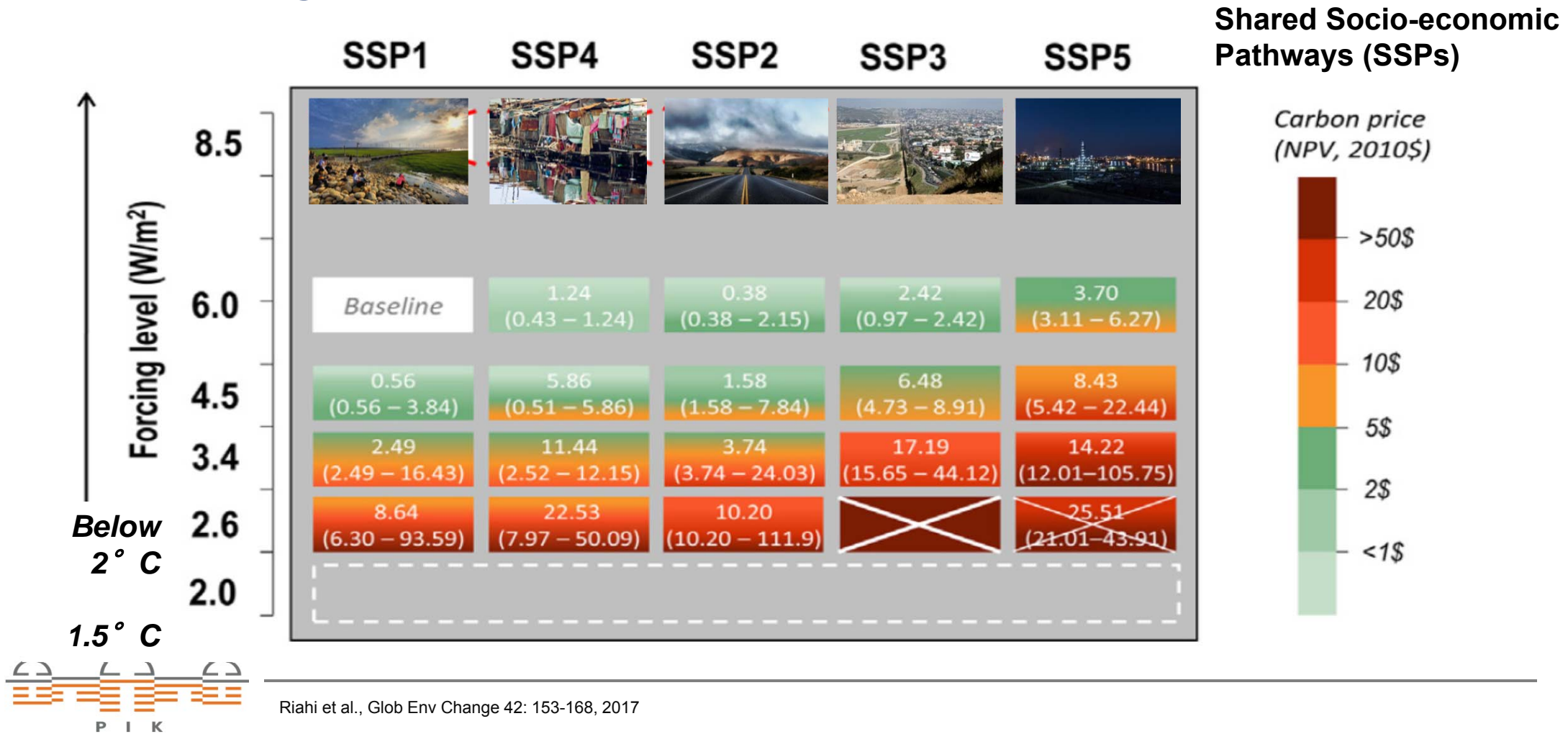


- Economic System
- Climate System

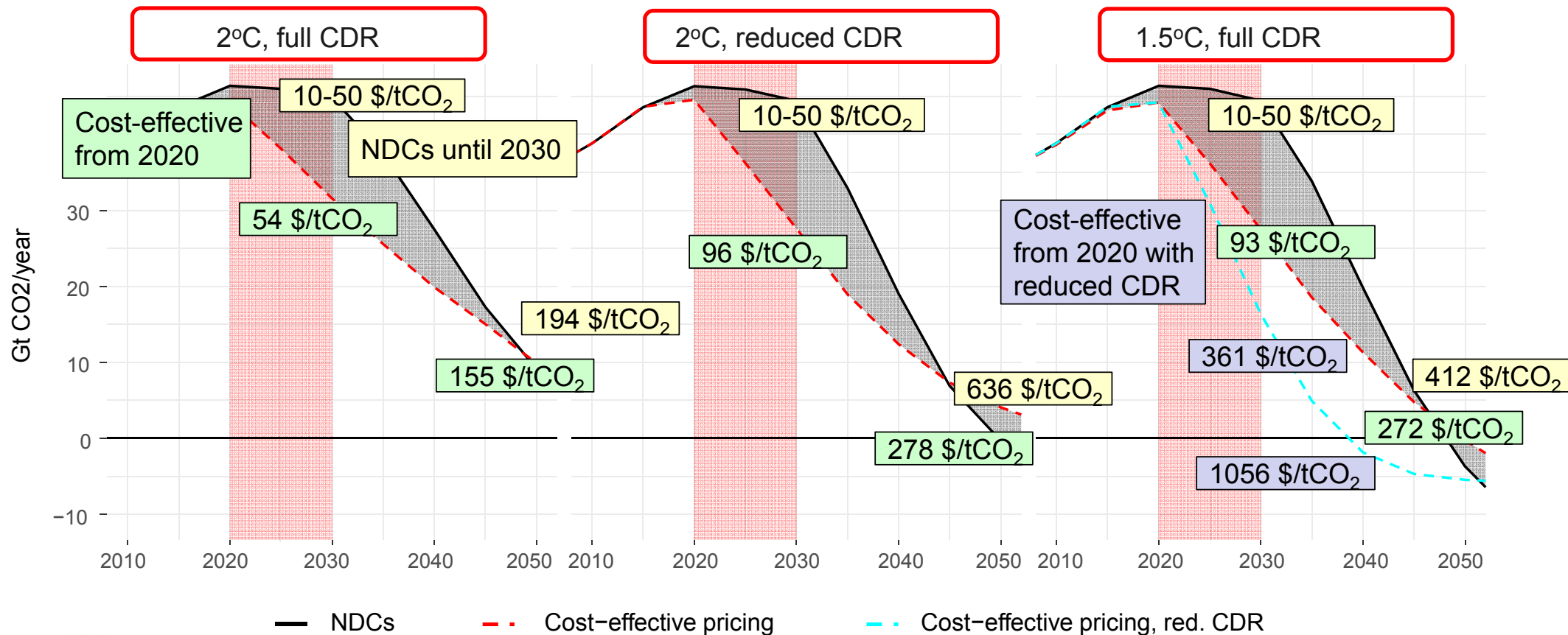
OUTPUTS

- Energy use
- Land use
- Emissions
- Investments
- Tech Deployment
- Prices
- Macro-economic impacts
- Sustainable Development Links

Socio-economic assumptions impact carbon prices as much as climate targets



1.5°C vs. 2°C and the role of near-term policy and carbon dioxide removal (CDR)

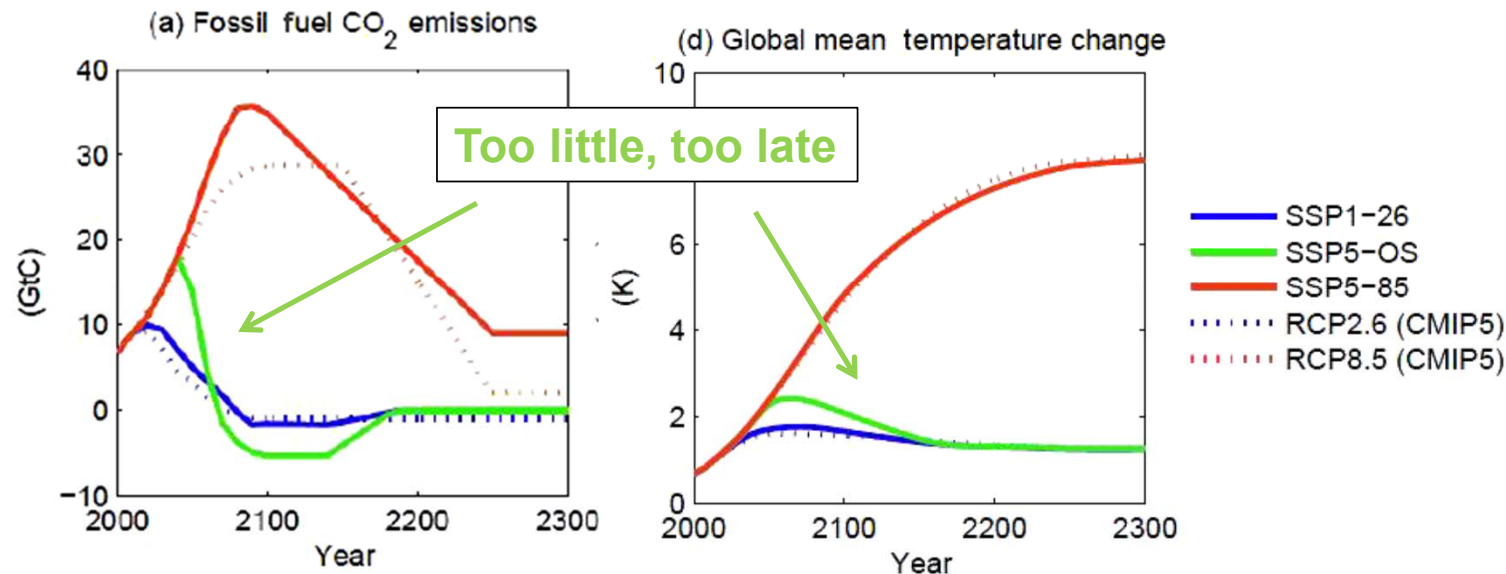
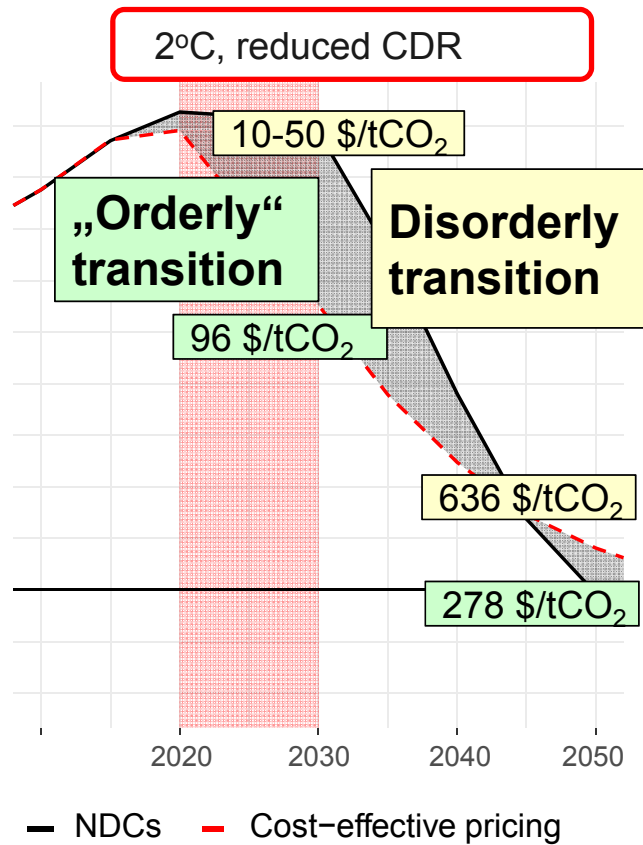


— NDCs - - - Cost-effective pricing - - - Cost-effective pricing, red. CDR



What type of scenarios are requested for transition risk analysis?

1. Managing coordinated („orderly“) transition towards Paris climate goals
2. Stress testing: „disorderly“ transition with large shocks and trend breaks



Connecting climate scenario researchers and finance actors

- **What purpose?** Assessing financial risk or alignment with Paris Agreement
- **What data?** e.g. energy mix, new capacity additions, investments, carbon prices, land use
- **What granularity?** temporal, sectoral, technology, spatial
- **What is needed to contextualize scenarios?** Scenario meta-information
- **What complexity and transparency?** Standards, Selection, Documentation
- **What process?** Institutions, Interfaces, Interactions

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Two ways of co-producing scenario insights with users

1. Co-developing new scenarios with users

(requires some regional / sectoral specificity)

2. Co-generating scenario knowledge based on existing sets of scenarios (e.g. global scenarios assessed by the IPCC)

SENSES: Bringing scenario services to users (www.senses-project.org)

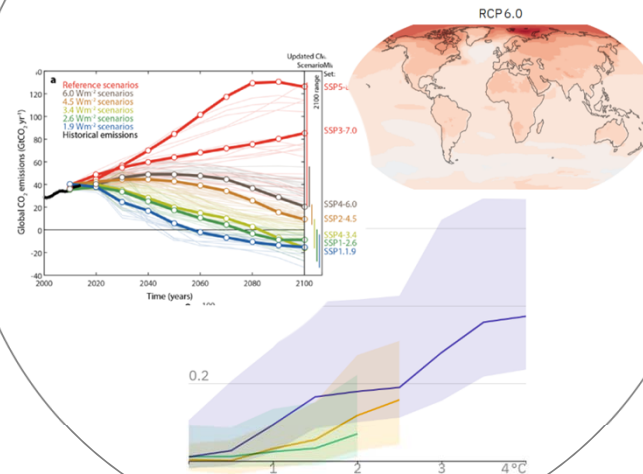
Making climate change scenarios more accessible and usable to selected user groups by effective means to communicate key insights and empowering users to explore scenario information.

SENSES

Toolkit & Portals

Tools and approaches for scenario visualization, contextualization, co-production of knowledge

Scenarios



Users

Climate Policy Makers
Business Actors
Finance Actors
Regional Actors

SENSES TOOLKIT

Collect visualization, contextualization and co-production tools developed in SENSES in three categories

Learn

Communicating scenario insights and fundamentals

Explore

Enabling user-driven exploration of scenario information

Share

Allowing users to disseminate self-generated scenario information

SENSES Toolkit



LEARN module example



Primer on Climate Change Scenario Approaches:

<https://climatescenario.org/primer/>

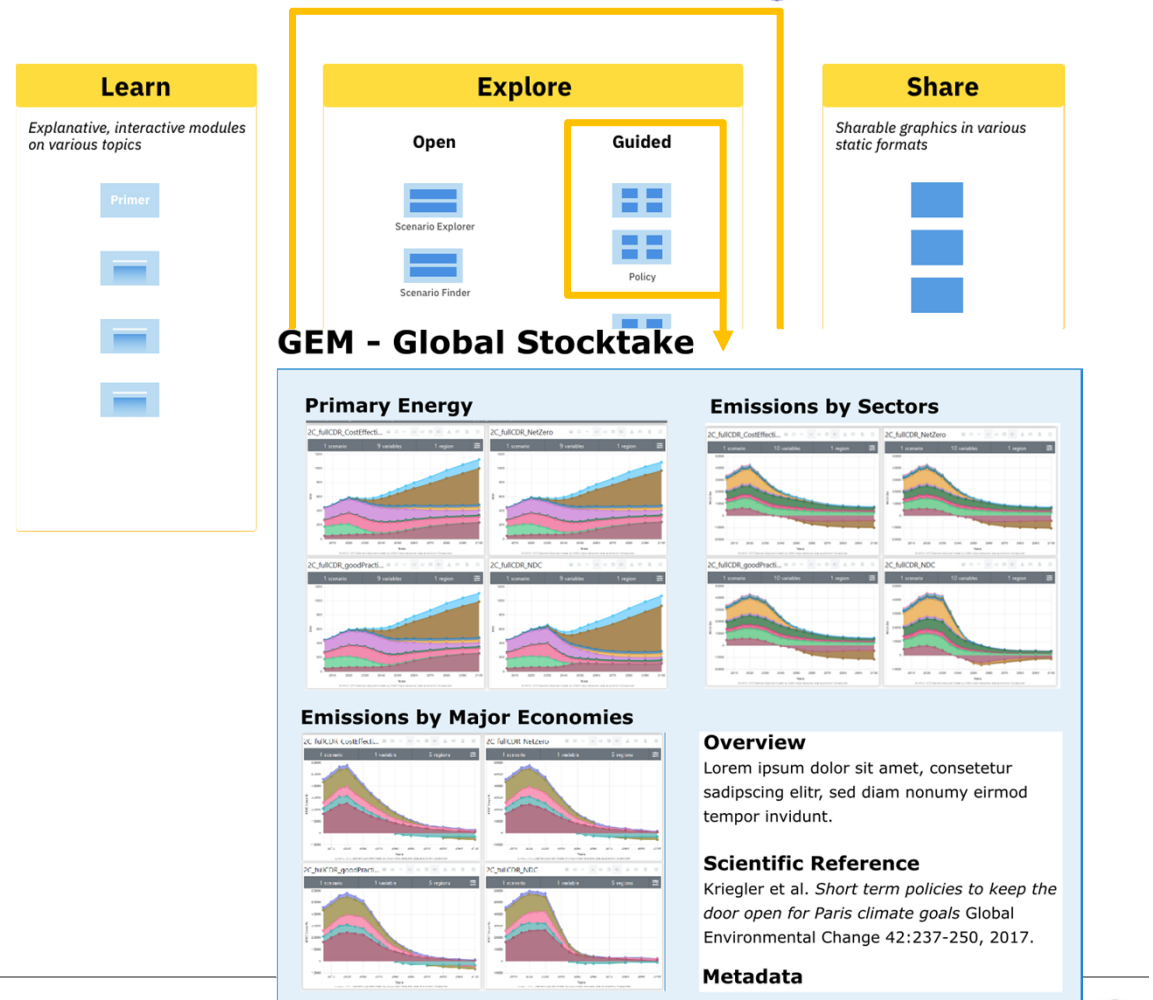
SENSES Toolkit



EXPLORE modules

Provide exploration tools with increasing complexity for users ranging from beginners to experts

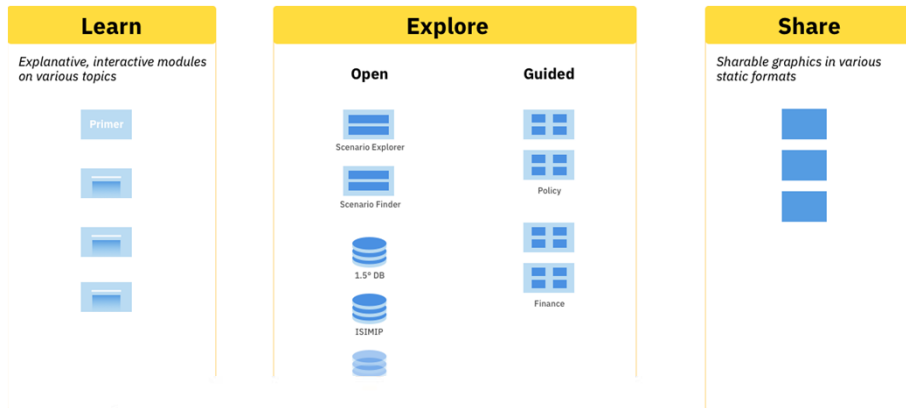
- Open explore modules
- Guided explore modules (GEMs)



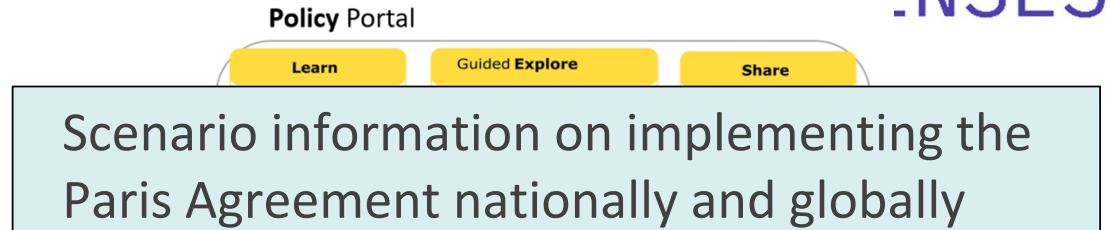
SENSES Portals



Toolkit



Mixed audience

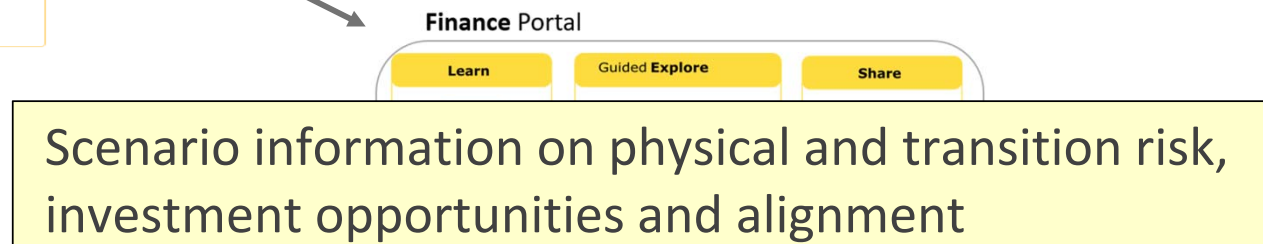


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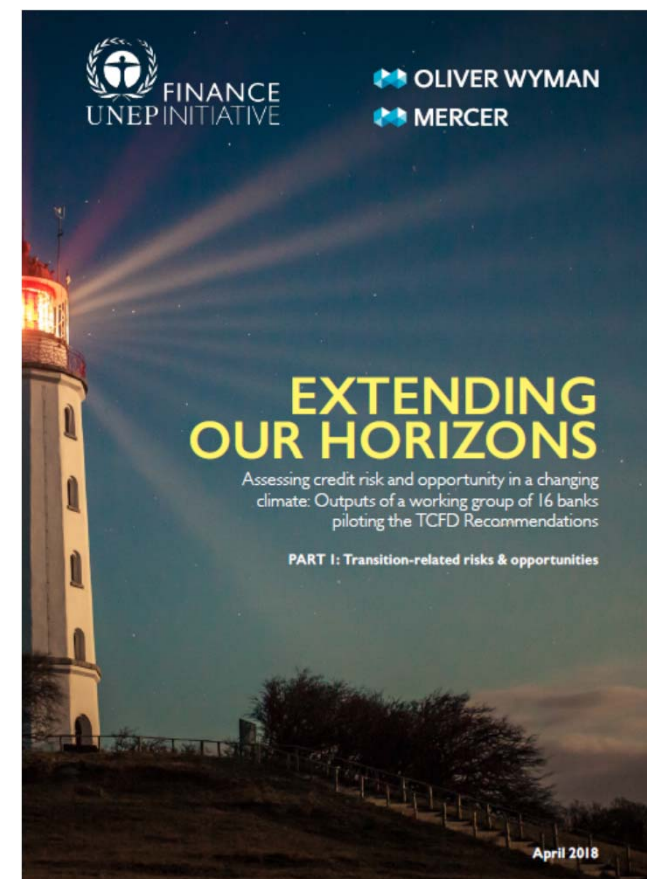
Policy makers



Finance Actors

UNEP-FI Banking Pilot to explore TCFD recommendations

- TCFD recommendation to use 2° C scenarios for financial transition risk disclosure
- Initial piloting study by UNEP-FI together with 16 banks, Oliver Wyman, Mercer, IIASA & PIK



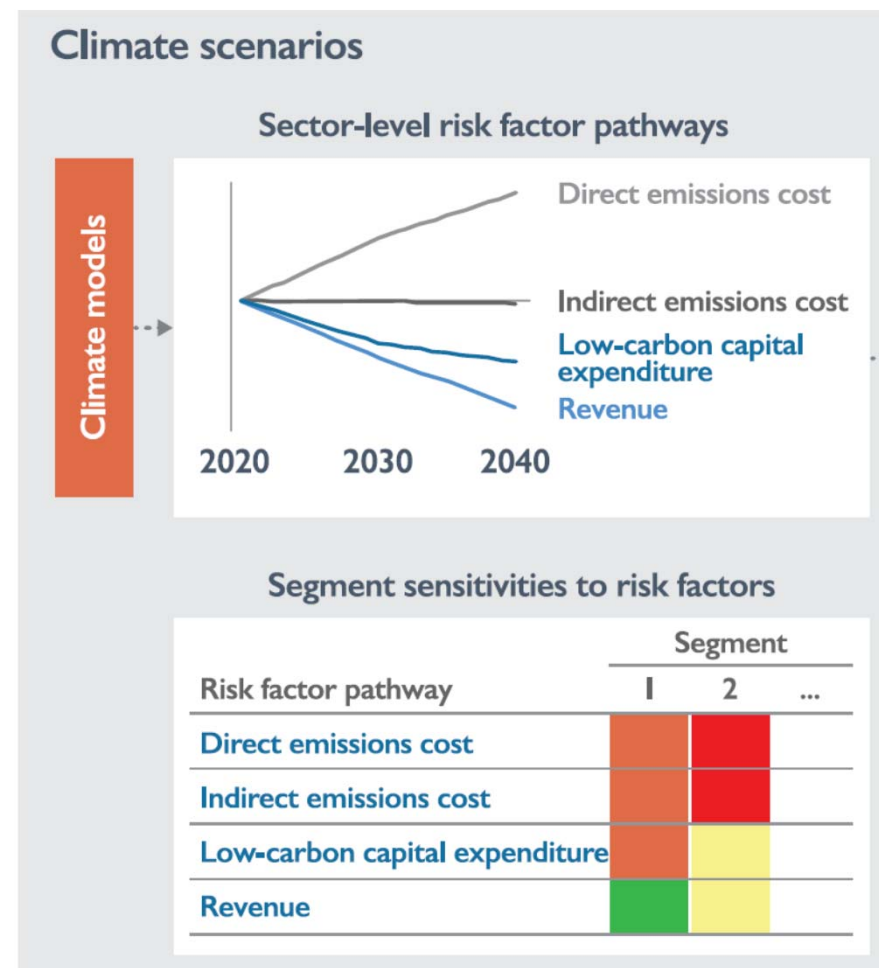
UNEP-FI banking pilot approach

Calculate change in **probability-of-default** as function of balance sheet impacts of scenarios on loans (6 energy supply and 3 enduse sectors)

Total sector balance sheet impact is the sum of **4 risk factor pathways (RFPs)**

- Direct emissions costs
- Indirect emission costs
- Low-carbon capital expenditure
- Revenue effects

Expert judgement: **segmentation & calibration** of impact of RFPs on probability-of-default



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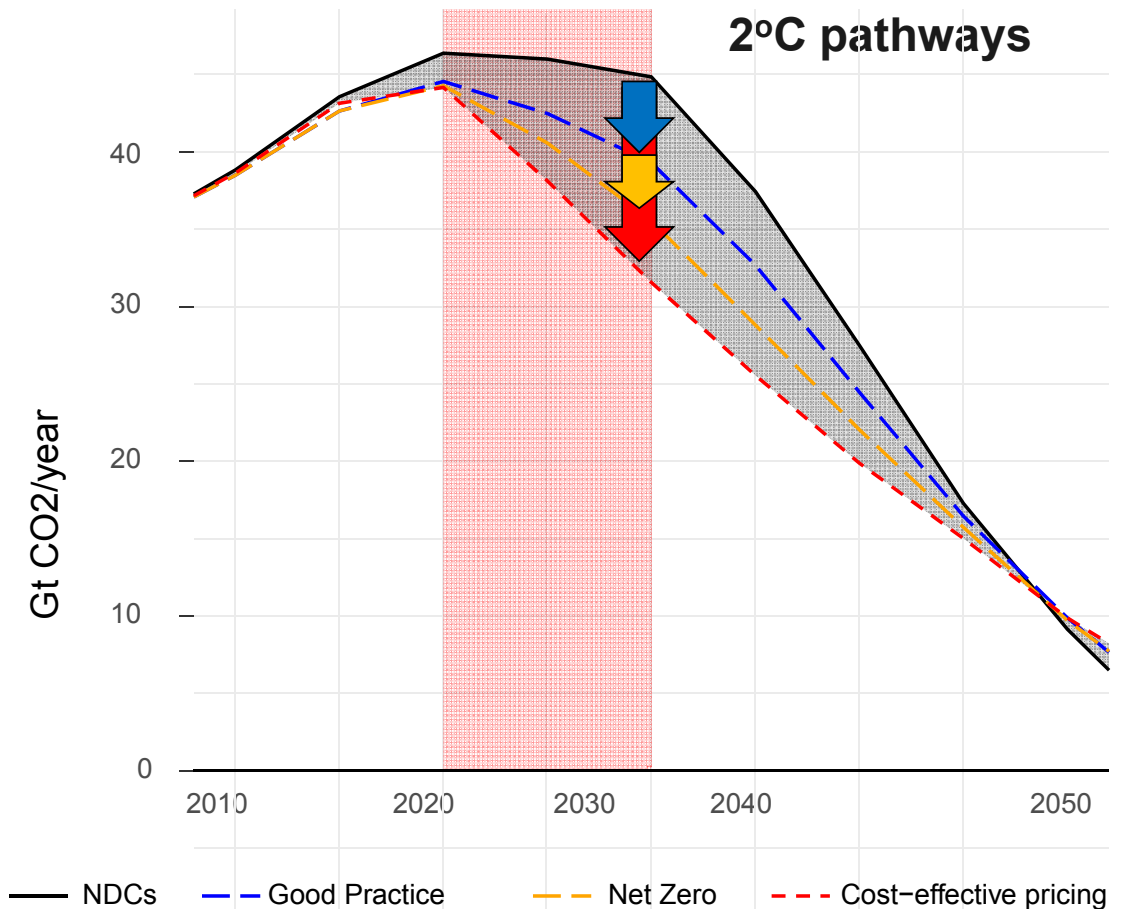
Key steps to achieve the Paris climate goals

1. **Characterize the scope of the challenge:** 2030/2050/long-term targets, pathways, climate impacts, ...
2. **Get going:** Exploiting opportunities, Overcoming barriers, Spurring Innovation
3. **Get coordinated:** Actors, Sectors, Countries and Regions
4. **Scale it up:** Investment, Adoption, Alignment
5. **Take everybody along:** Fair transition, Compensation of Losses,
Offering new perspectives, Reaching multiple goals

Get going: Improving near term assumptions and projections

Example of global roll-out of regulatory policies and moderate carbon pricing

- Renewable energy quotas
- Restrictions on new coal and gas power plants w/o CCS
- Energy efficiency improvements in industry and buildings
- Upscaling of industry CCS
- Fuel efficiency improvements in road transport and aviation
- Increase of electric vehicle share
- More efficient use of nitrogen in agriculture
- Eliminating deforestation and 10 mio ha/yr afforestation
- Moderate carbon pricing



Get coordinated: Sectors, Actors, Countries and Regions

- **Sectors:** Energy, Transport, Industry, Buildings, AFOLU
- **Actors:** Government, private sector and civil society
Multi-level governance
- **Countries and regions:**
Effectiveness and fairness of collective effort, global stocktake

CD-LINKS: www.cd-links.org

COMMIT: <https://themasites.pbl.nl/commit>



New EU H2020 project

ENGAGE

(09/2019-08/2023)

Global mitigation pathways

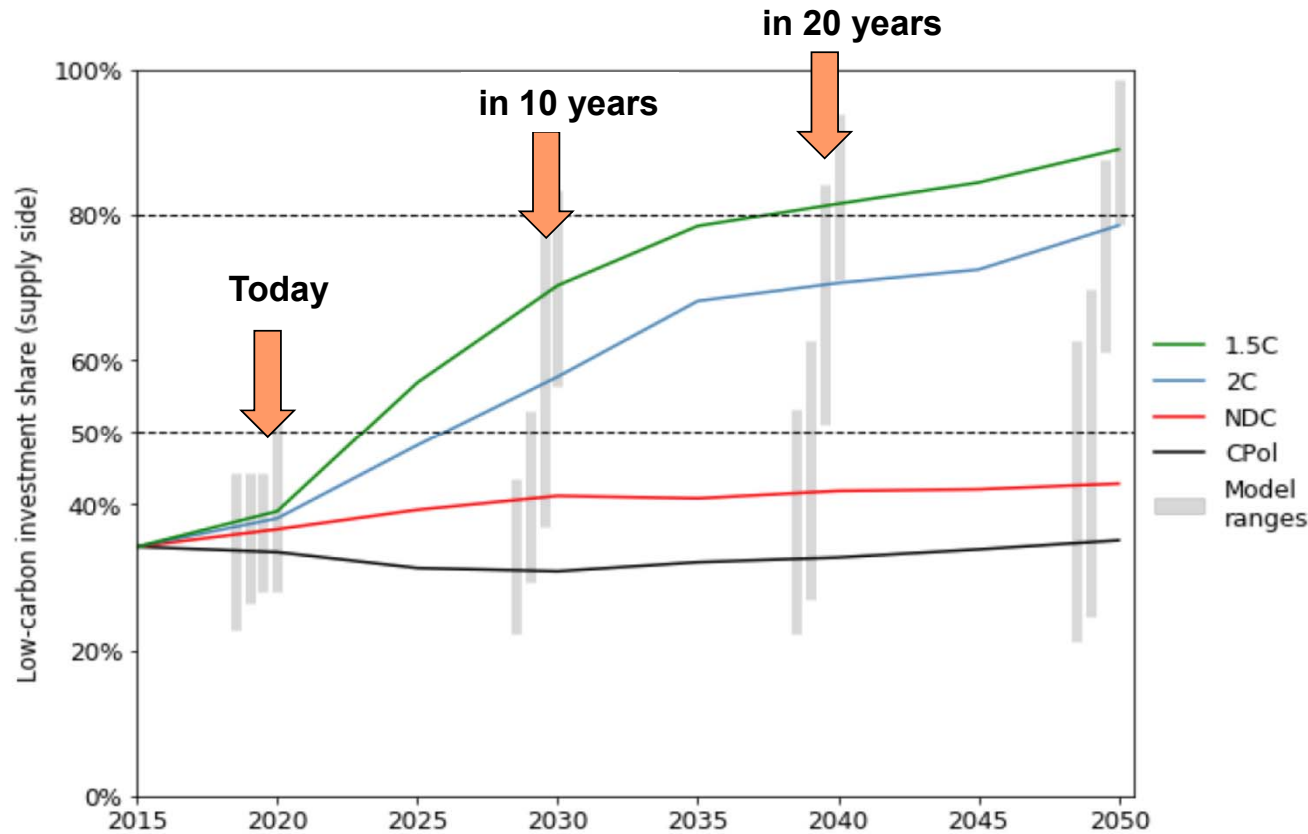
Global climate goals



National circumstances & policy priorities

National low-carbon development pathways

Scale it up: Rapid increase in low carbon investments



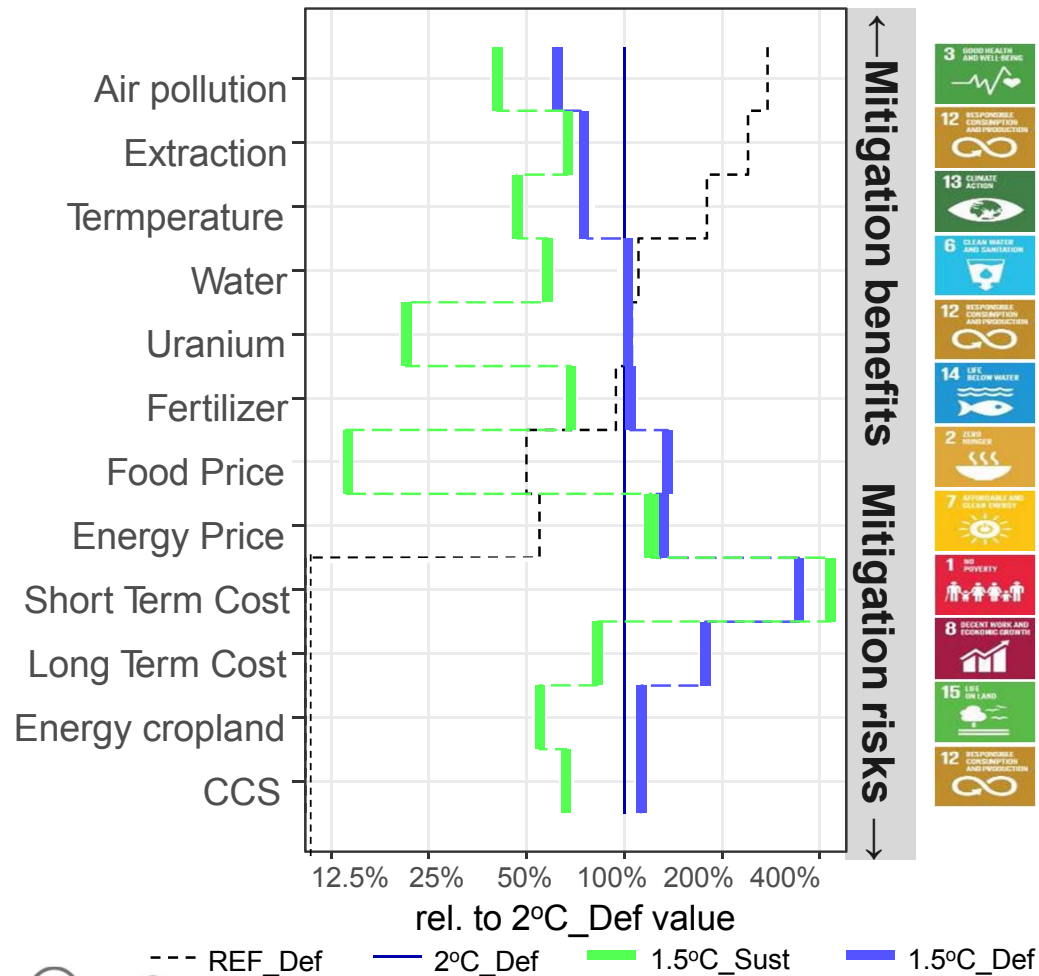
Moving the trillions

Alignment of investment portfolios
(requires sectoral / regional benchmarks, investment strategies)

Taxonomy for green investments



Take everybody along: Connecting mitigation to SDGs



- Dedicated policies can offset most of the SD risk of mitigation and lead to even higher co-benefits
- The most important trade-offs are higher near-term costs and policy requirements
- balance near-term costs with near-term economic benefits

Discussion

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Risk-factor pathways (RFP) per sectors

Sector differentiation motivated by IAM resolution

CATEGORY	SECTOR	DIRECT EMISSIONS COST	INDIRECT EMISSIONS COST	LOW-CARBON CAPITAL EXPENDITURE	REVENUE
Energy	Oil and gas	Product of emissions and carbon pricing, by energy source	Not applicable	Not captured	Product of price and demand, by energy source
	Oil				
	Gas				
	Coal	Product of emissions and carbon pricing, by energy source	Product of fuel demand and price, by fuel type	All renewables investment	
	Renewables			All non-thermal technology investment and CCS	
	Electricity				
	Energy			Not applicable	
End-use	Industrial processes	Product of sector energy demand and price	Product of sector energy demand and price	Energy efficiency and other low carbon investment	Sector-specific revenue (derived from incremental costs and price elasticity assumption)
	Transportation				
	Residential and commercial buildings				
		Directly calculated from the climate variables (no or minor assumptions required)			
		Requires additional assumptions based on external sources			
		Not applicable or not captured			



Implementability indicators across scenarios

