

CLIMATE POLICY DYNAMICS

A TWO-LEVEL GAME SIMULATION

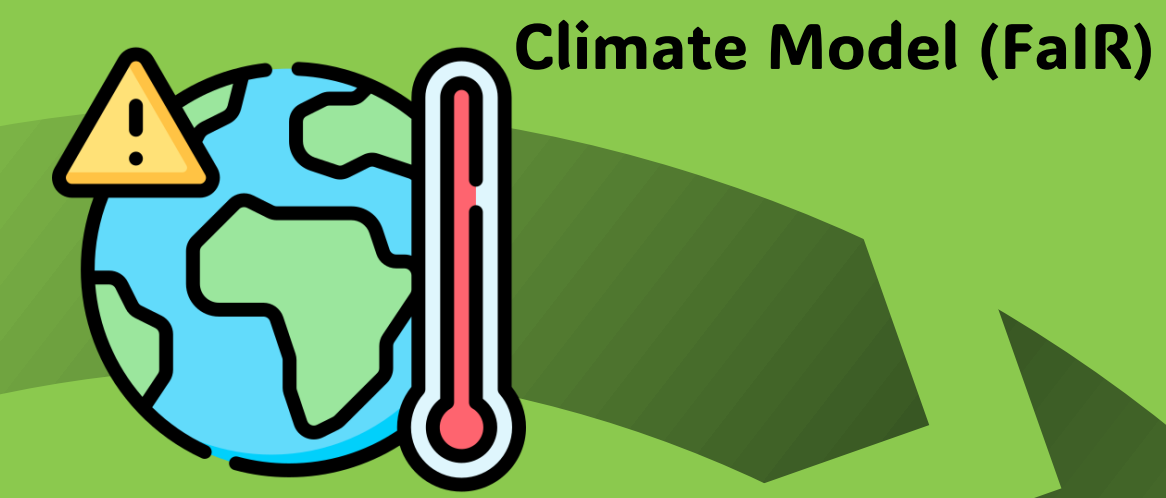
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JUSTICE IAM

TWO-LEVEL GAME

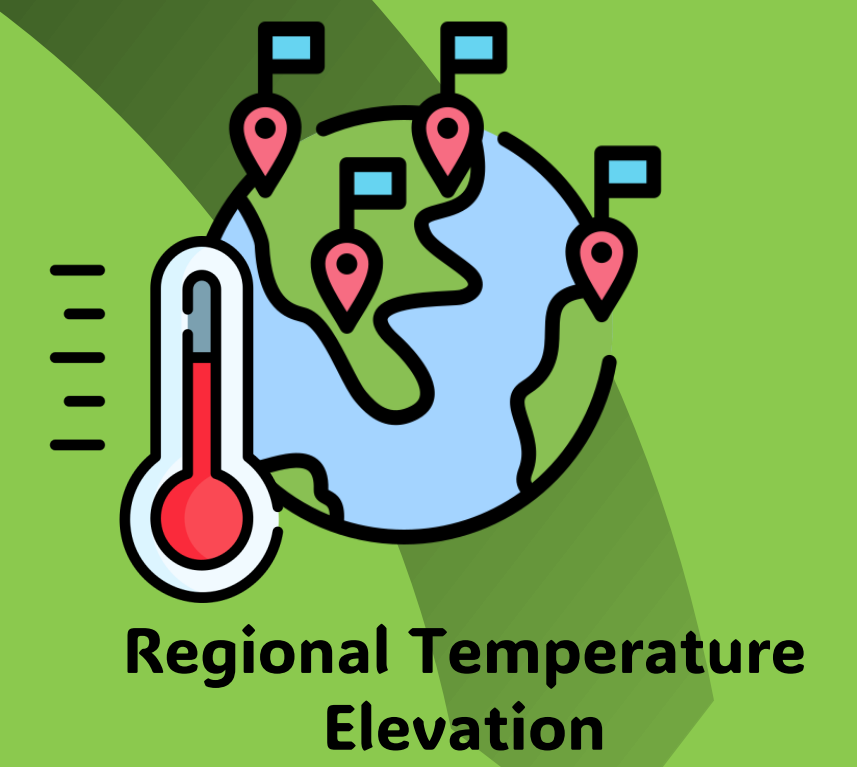
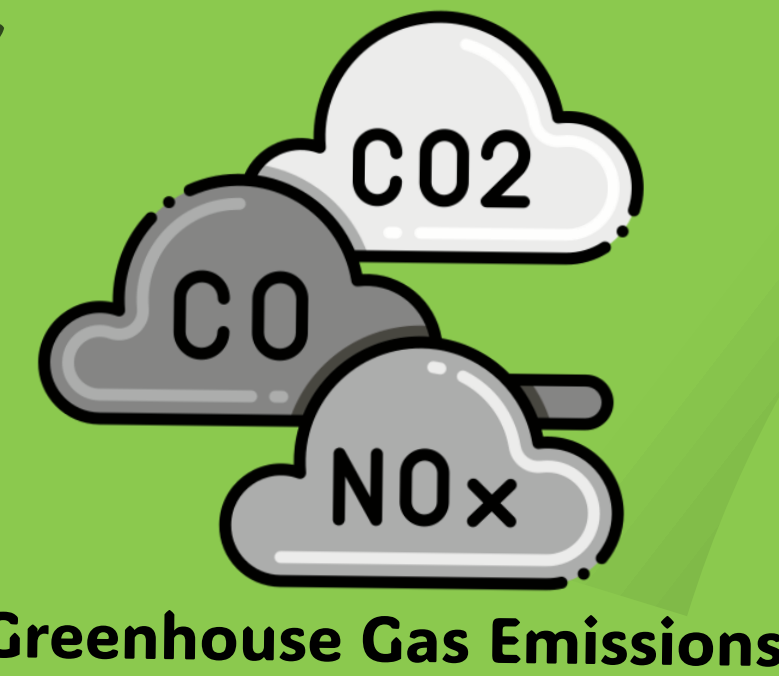
Keys Insights

- Cost-benefit Integrated Assessment Model: JUSTICE.
- Socio-technological tipping-points.
- Coupling of Integrated Assessment Model with Agent-Based Model.
- Two-level game: households and governments (ABM).
- Endogenous policy driven by public opinion and international negotiations.
- Developed in Python.



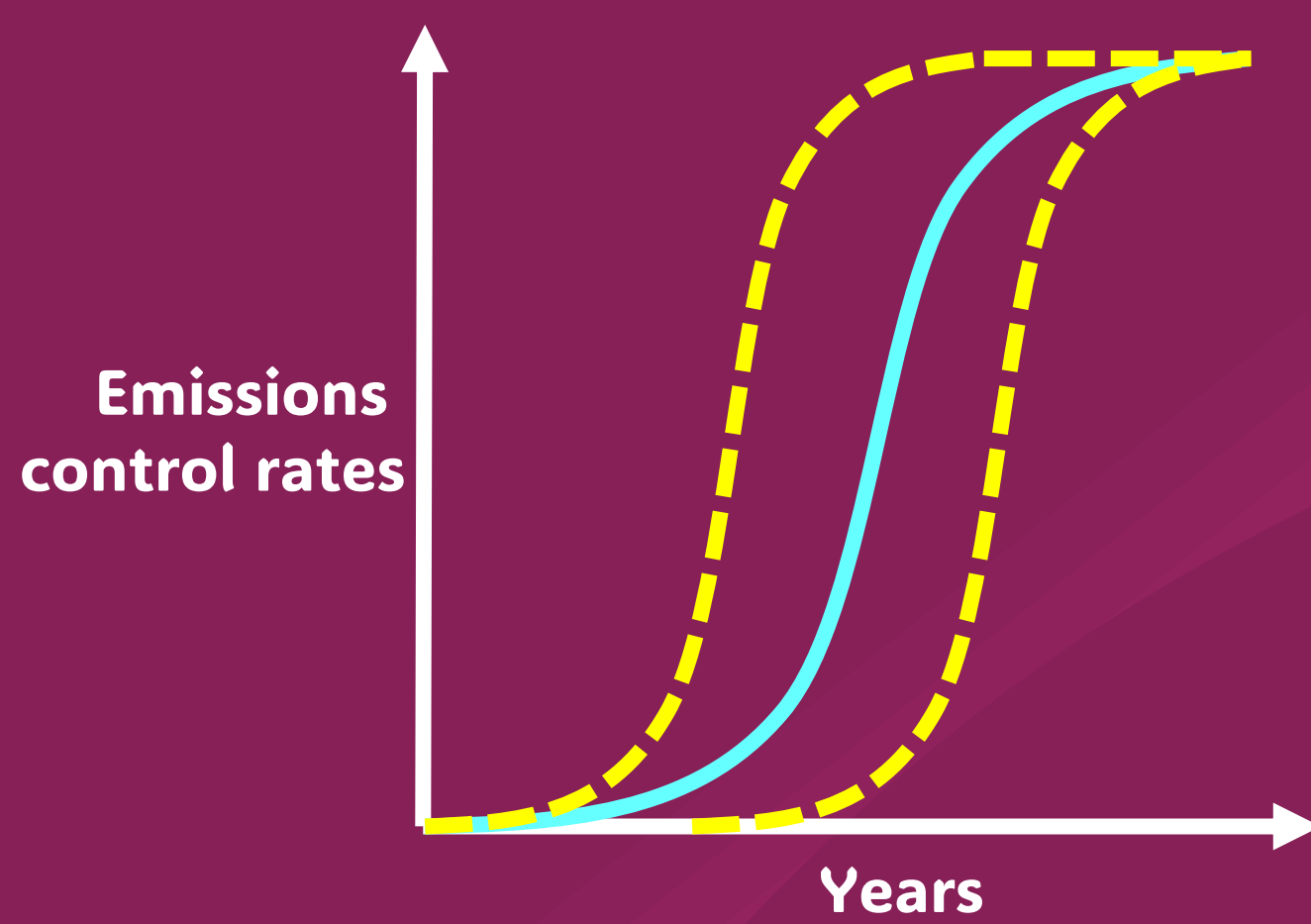
1 MODEL OF THE CLIMATE

- FaIR: a simple model emulating the climate response to emissions
- FaIR outputs global mean temperatures
- We generate 1000 climate ensembles with varied parameters
- We downscale global temperatures to regional temperatures



2 IMPACTS ON THE ECONOMY

- Based on a modified version of RICE50+: JUSTICE (P. Biswas, TuDelft).
- 57 Regions.
- Relying on SSP scenarios: Population, Carbon Intensity.
- Policy lever: savings rate.



6 RESULTING GLOBAL MITIGATION POLICIES

- Regional pledges form a global mitigation path
- This mitigation path is expressed under the form of emission control rates.
- These rates are sent back in JUSTICE to affect the emissions produced by the economy.
- Reducing emissions is however costly and impacts the output of the economy.

3 IMPACTS ON THE HOUSEHOLDS

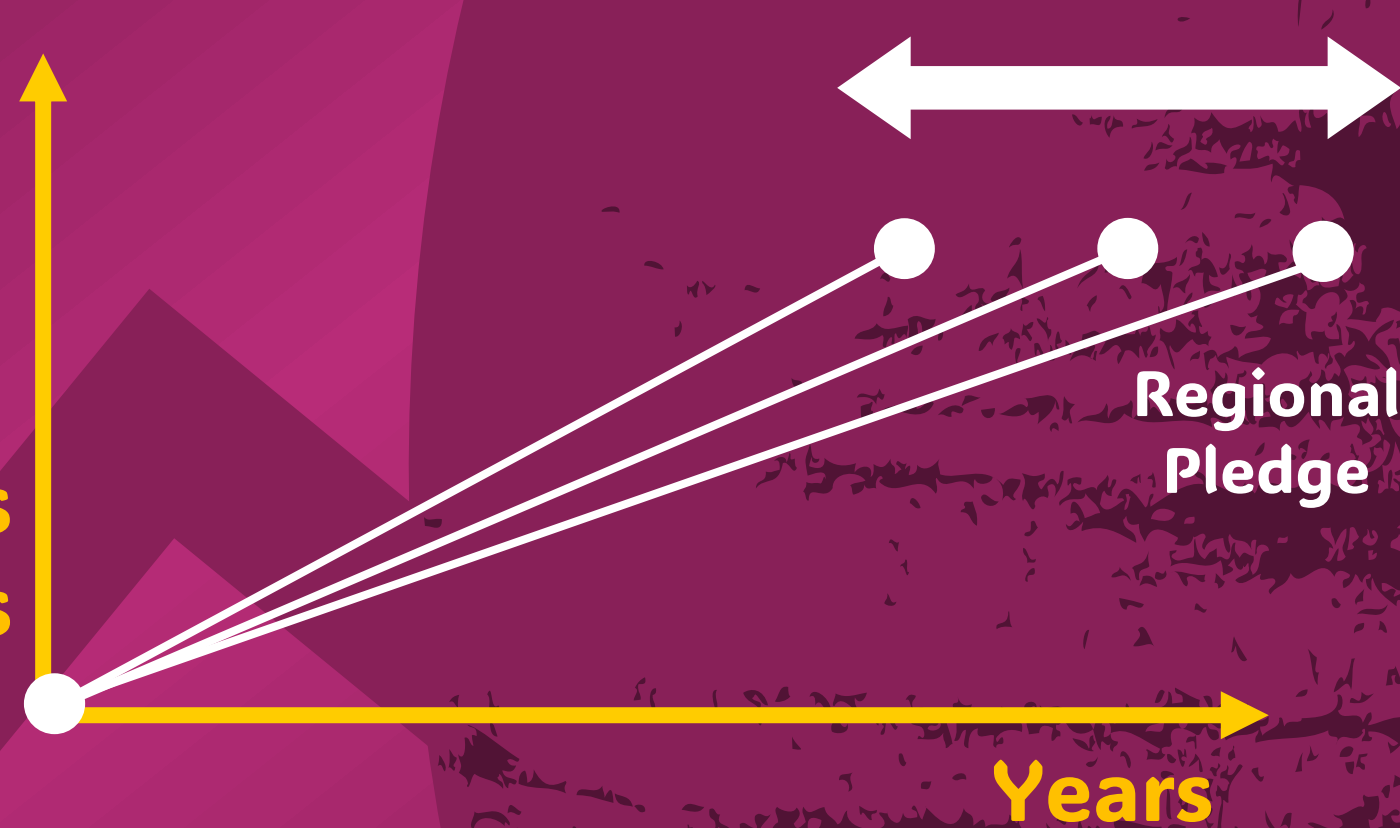


4 RESULTING SUPPORT FOR MITIGATION POLICIES

- Households are agents in the two-level ABM.
- Characterised by their incomes, expectations about future costs, sensitivities to climate events and climate change worry.
- We propose a model of social interactions allowing the evolution of the household's parameters, thereby modifying their support for mitigation policies.

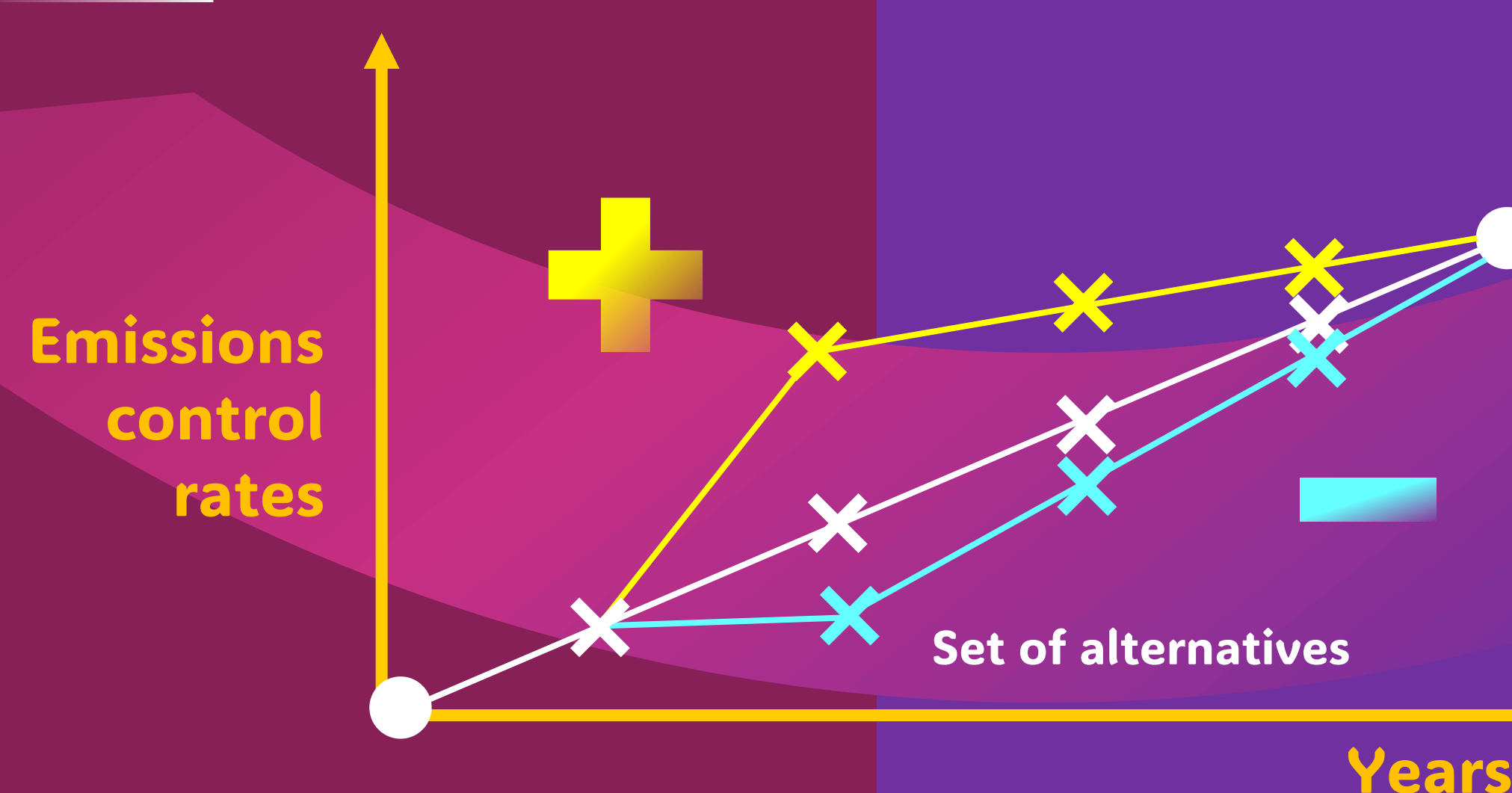
5 INTERNATIONAL NEGOTIATIONS

- Governments are agents in the two-level ABM.
- They take part in international negotiations to make regional net-zero pledges.
- They respond to regional constituencies by shifting the path to regional pledge.
- Such shift may conflict (or align) with the regional pledge, hence adding (or easing) pressure in future international negotiations.



Future Work

- Studying the influence of public opinion on the success of climate change mitigation policies.
- Likelihood and conditions for social-tipping points.
- Studying different international negotiations frameworks (Kyoto versus Paris Agreements).
- Integration challenges: Two-level game ABM coupled with the JUSTICE IAM.
- Considering households consumption choices with additional integration of the energy sector.



1 ← LEVEL → 2