

Technology Options: The Alternatives to Unconstrained Climate Change

Scott Barrett

Columbia University

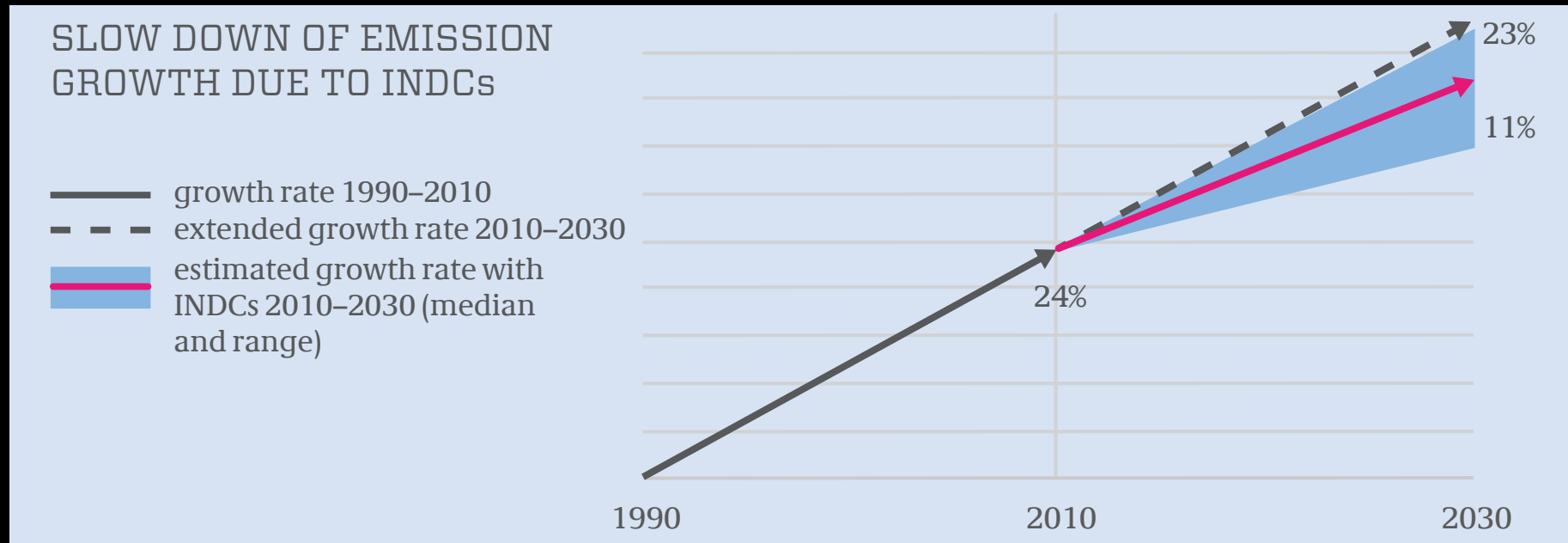
“Can National Policies and INDCs Alone Lead to a Workable and Effective Climate Regime?”

COP21 Paris, 8 December, 2015

Can National Policies and INDCs Alone Lead to a Workable and Effective Climate Regime?

- Emission reductions pose an immense collective action problem.
 - Free riding, assurance, leakage.
 - Countries have incentives to do *something* unilaterally; they don't have incentives to do *enough* unilaterally.
 - INDCs are voluntary pledges. Do they go beyond what countries would be willing to do unilaterally?
 - Assessment and review: will it mean that countries set high pledges and then meet them?

Effect of the INDCs



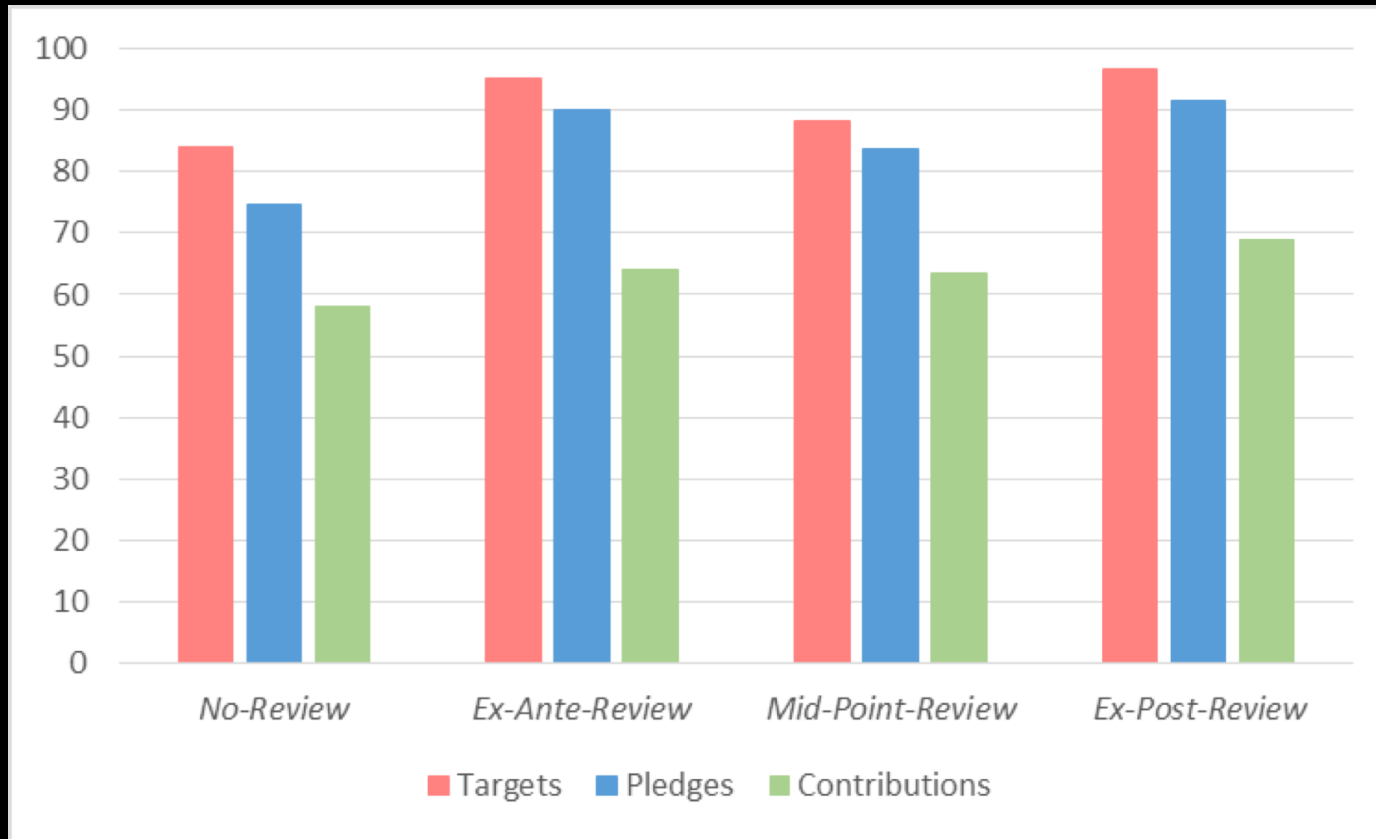
- It's hard to say whether the INDCs coupled with a review process will help, without knowing the counterfactual.

Experiment on the effect of assessment and review

- 5 players per group.
- Every player starts with 5 “cheap” poker chips and 15 “expensive” chips.
- Every chip contributed benefits everyone, but given the contributions of others, each player loses by contributing.
- If the players contribute “too little” in total, and a critical threshold is breached, everyone loses.
- The value of the threshold is unknown, but lies between 50 and 100 chips.

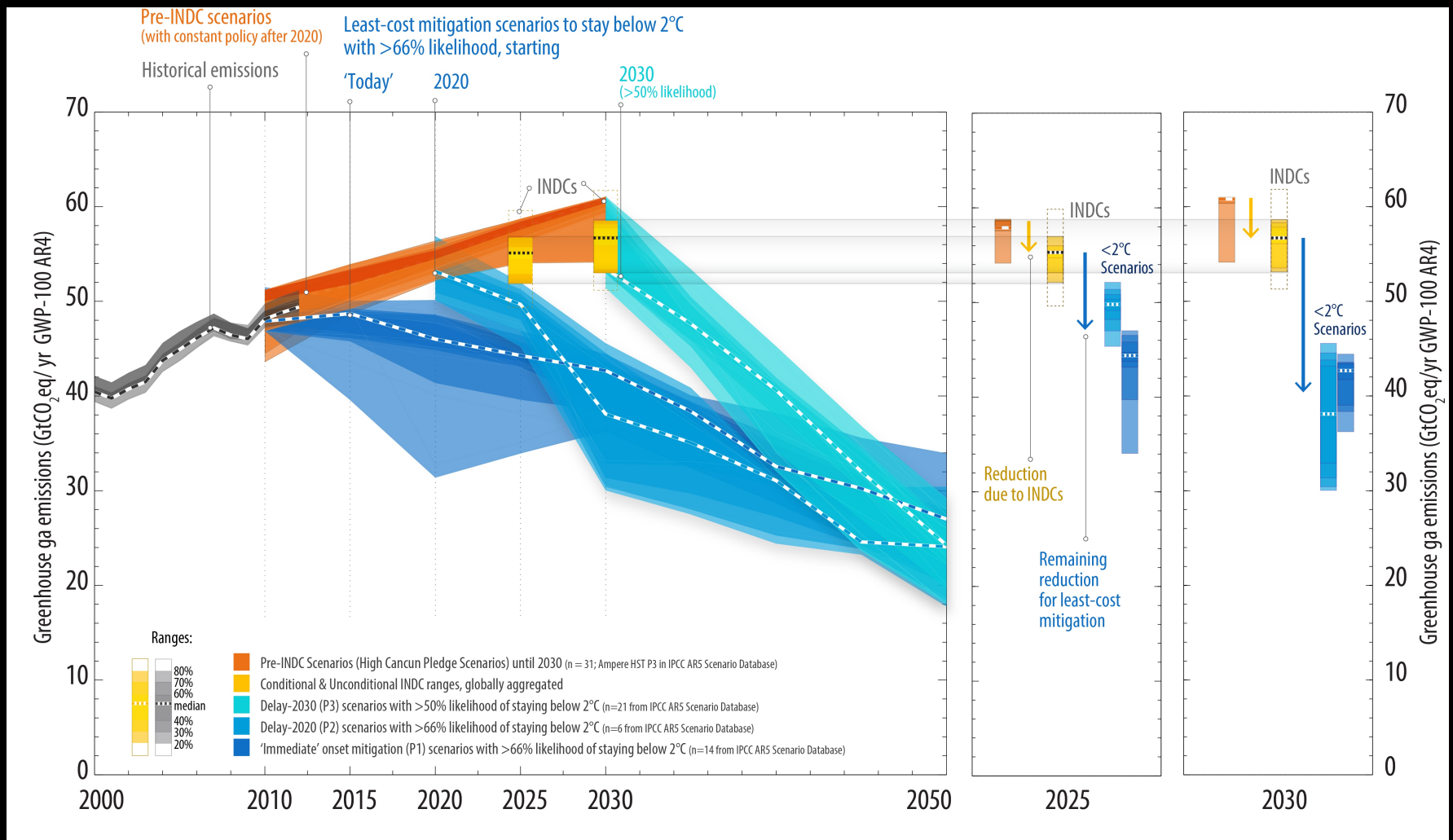
An experiment

with Astrid Dannenberg, University of Kassel



1. Full Cooperative > Group Target > Sum Pledges > Sum Contributions
2. Values are just a little higher for the Review treatments.
3. Review does not significantly increase contributions.

Will the INDCs meet the 2 °C goal?



INDCs combined with “assessment and review” is not enough

- Even if INDCs achieve something, they won't lead to the collective goal being met.
- Doing more requires stronger enforcement.
- Paris could lay a foundation for this:
 - Measurement/Reporting/Verification is a precondition for enforcement by any means.
 - Assessment and review will not be sufficient, but it can provide a foundation for strengthening enforcement.

Another insight from the experiment

- Some groups do better than others.
- The groups that do well have few free riders.
- Clubs
 - Clubs to reduce emissions must provide leverage.
 - Clubs can also do “projects.”

How to provide leverage?

- Starting now, countries can negotiate coordination treaties for individual gases and sectors (Barrett 2003).
- Begin to consider other approaches, including generalized trade restrictions (Nordhaus 2015).

Alternatives to emission reductions

with Juan Moreno-Cruz, Georgia Institute of Technology

- Carbon geoengineering
 - Bioenergy with CCS
 - Industrial air capture—the “backstop” technology for limiting concentrations.
- Solar geoengineering
 - “Fallback” technology for limiting global temperature change.

Comparison of the Options for Limiting Climate Change

Options	Objective	Costs	Risks	Unknowns	Collective Action
Unconstrained climate change	Not an intended outcome but a consequence of failure to limit emissions	Low	High	Many	Not achieved
Substantial emission reductions	Reduce the flow of CO ₂ into the atmosphere	High	Low	None	Difficult
Carbon geoengineering	Reduce the concentration of CO ₂ in the atmosphere	Very high	Moderate	Few	Coalition of the willing
Solar geoengineering	Limit solar radiation reaching the lower atmosphere	Low	High	Many	Easy, apart from governance