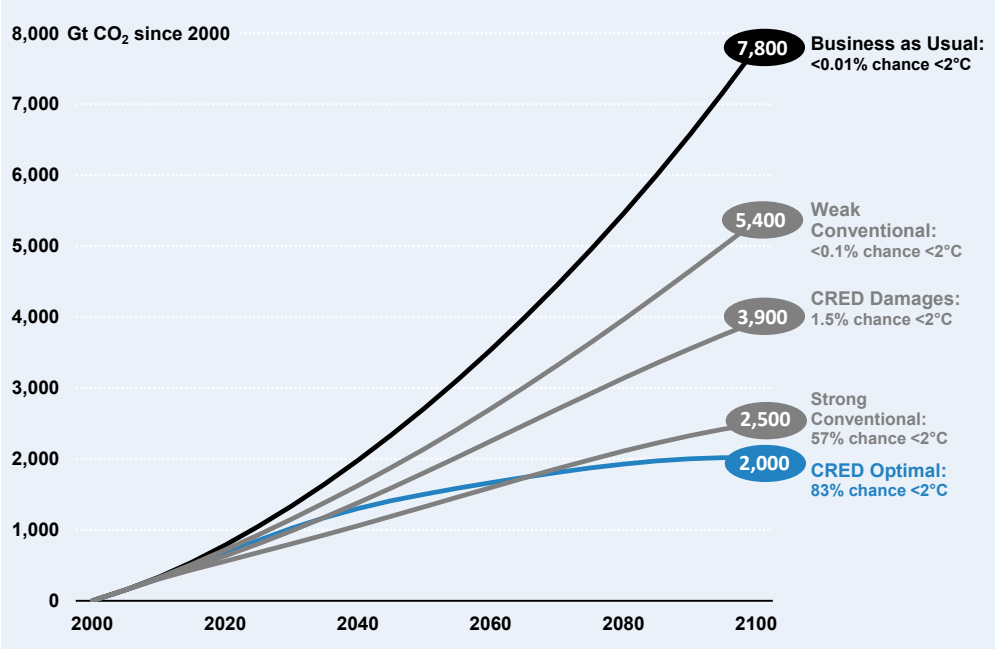
Reason, Empathy, and Fair Play: the Climate Policy Gap

To achieve the greatest possible human welfare, the Stockholm Environment Institute's Climate and Regional Economics of Development (CRED) model calls for a rapid reduction of greenhouse gas emissions, beginning in the next decade and keeping cumulative twenty-first century carbon dioxide (CO_2) emissions below 2,000 Gt (gigatons, or thousand million tons). This brief addresses why CRED recommends such stringent reductions when some other climate-economics models say that very slow emission reductions are the best policy.



Modeling reason, empathy, and fair play in CRED
By including assumptions of reason, empathy, and fair play in the CRED model, a Weak Conventional emissions reduction policy with a less than one in 1,000 chance of keeping temperature increases below 2°C is transformed into the CRED Optimal scenario, with a better than four out of five chance.

Beginning with a **Weak Conventional** policy – which mimicks the basic assumptions used in the well-known DICE model – we make three successive changes to arrive at a recommendation for immediate, steep emission reductions:

- **Reason**: The **CRED Damages** policy brings estimates of the economic damages from climate change in line with the most up-to-date science.
- **Empathy**: The **Strong Conventional** policy adds greater concern about the well-being of future generations.
- **Fair play**: The **CRED Optimal** policy adds a third change – rich countries are able and should be willing to invest in emissions and poverty reduction in poorer countries.

The policy gap

Without a deliberate policy of greenhouse gas reduction, annual CO_2 emissions are expected to more than quadruple over the course of this century. This would imply virtually no chance of keeping temperature increases below 2°C, and a 50/50 chance – a coin toss – that temperatures will have grown by more than 3.7°C by the end of this century. For a good chance of staying below 2°C of warming, a goal that is widely accepted as a threshold for avoiding dangerous climate impacts, cumulative twenty-first century emissions will need to be limited to no more than 2,000 Gt CO_2 – of which more than 300 Gt, 15% of the allowable 100-year total, were emitted by 2010.

Business-as-usual emissions, in the absence of new climate policies, would total 7,800 Gt for the century, with a less than one in 10,000 chance of keeping temperatures below 2.0°C of warming. Thus there is a need for policies that can eliminate a staggering 5,800 Gt, three-fourths of business-as-usual emissions. The daunting challenge of reducing emissions rapidly enough to avoid dangerous climate change is all the more complex because it is inescapably entwined with two other policy dilemmas: how much should we care about, and invest in, the well-being of future generations? And what should we be doing to promote equity and economic development in today's very unequal world economy? Established models of climate economics often seem to ignore both the needs of future generations and the needs of low-income nations today.

Reason

Traditionally, most climate models have treated the effect of emissions on temperature as certain; that is, they assume that the most likely effect – that doubling the amount of CO_2 in the atmosphere will increase long-term temperatures by 3°C – is the only case worth considering. The relationship between emissions and temperature, however, is not at all certain, but there is a pattern to its uncertainty that – at least in broad strokes – is well understood by climate scientists. Our analysis incorporates the best current understanding of the pattern of emissions-to-temperature uncertainty by presenting, for each scenario, the likelihood of varying degrees of warming.

The models that have guided policy-makers also commonly misrepresent another key finding from climate science. Some policy analyses rely on "overshoot" scenarios that show greenhouse gas concentrations and temperatures first becoming too high and then being brought back down to target levels. Overshoot scenarios cannot work because global average temperatures grow much more easily than they decline. Once a peak temperature is reached, new research suggests that it will not fall for several centuries, even if CO_2 concentrations are lowered substantially.

The CRED model also addresses the final disconnect between climate science and climate economics, which is to do with the relationship between global average temperatures and economic damages, often represented by a "damage function." When the DICE damage function is replaced with an estimate that is more in tune with recent research, CRED's recommended emission pathway declines sharply. With a more accurate picture of the economic consequences of rising temperatures, climate-economics models recommend faster, deeper cuts in emissions.

Empathy

The policy recommendations given by climate-economics models depend strongly on the discount rate, a number that contains a hidden ethical judgment. A component of the discount rate, called the "pure rate of time preference", represents modelers' best guess about how much our current generation cares about the impact of their emissions on future generations. The more we are assumed to care, the more quickly emissions are reduced in the optimal scenario. If we care little about future damages, then – from the perspective of today's decision makers – there is little urgency to reduce greenhouse gas emissions.

Fair play

While many climate-economics models contain a hidden assumption, implying that today's huge gap between high-income and low-income countries is here to stay, CRED makes cross-regional transfers an explicit modeling choice. When rich countries invest in emission reduction and economic development abroad, the optimal abatement policy starts out a little slower because more resources are being devoted to raise incomes in the poorest countries. Within a few decades, however, emissions fall sharply enough to meet the cumulative twenty-first century budget, and the likelihood of keeping temperatures below 2°C is greater than in scenarios without cross-regional investment. The competing priorities of poor and rich nations are the centerpiece of current international climate negotiations; a good representation of these dynamics is essential to the policy relevance of climate-economics models.

Closing the gap

There is no easy solution to the climate crisis. Many economic analyses fail to come to grips with the severity of the problem and seem incompatible with the scientific warnings of widespread, serious damages if warming exceeds 2°C. In the CRED model, scientific uncertainties and ethical dilemmas are addressed explicitly, making it possible to test out new values, alone and in combination. The CRED Optimal scenario, incorporating all of these concerns, produces a successful climate outcome (a less than one in five chance of exceeding 2°C) along with a dramatic reduction in global inequality; low-income regions experience rapid growth while high-income regions grow at a slower, gradual pace.

The question then for policy-makers and for the public is: what is an acceptable level of risk? What percentage chance of exceeding 2°C are we willing to take on? There is no single right answer, but rather a continuum of choices; a lower probability of dangerous climate change requires greater and faster reduction in emissions.

A precautionary response – limiting our risk of exceeding 2°C to one in five or even lower – requires that global emissions begin to fall rapidly within the next 10 years. The climate policy gap is not insurmountable, but closing it will require reason, empathy, fair play, and a great deal of political will.

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Key points:

- To make good decisions about an uncertain future, we need to know not only the most likely pace and economic impacts of global warming, but also the worst-case risks. In these crucial areas, the latest findings of climate scientists paint a more ominous picture than conventional climate economics.
- A society that cares about the well-being of future generations will embrace an active policy of climate mitigation. The longer we take to reduce emissions, the more likely we are to bequeath serious climate damages to future generations.
- Unless rich countries are willing to pay for emission-reduction efforts outside their borders, the high cost of lowering emissions will clash with the urgent need for poorer countries to raise living standards. International resource transfers are essential to achieving a good chance of staying below 2°C.

SEI's CRED model addresses these goals in an economic analysis of climate policy options.

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