COMMENTARY:

The climate policy narrative for a dangerously warming world

Todd Sanford, Peter C. Frumhoff, Amy Luers and Jay Gulledge

It is time to acknowledge that global average temperatures are likely to rise above the 2 °C policy target and consider how that deeply troubling prospect should affect priorities for communicating and managing the risks of a dangerously warming climate.

When world leaders signed the Copenhagen Accord in 2009, they agreed to limit the increase in global average surface temperature to less than 2 °C above the pre-industrial level, a target then widely viewed as consistent with avoiding dangerous climate change and feasible to achieve through ambitious reductions in heat-trapping emissions. The climate policy agenda has since been dominated by the narrative that swift and deep reductions in emissions are urgently needed to stay below 2 °C (refs 1–4).

This global temperature target has brought a valuable focus to international climate negotiations, motivating commitment to emissions reductions from several nations[5]. But a policy narrative that continues to frame this target as the sole metric of success or failure to constrain climate change risk is now itself becoming dangerous, because it ill-prepares society to confront and manage the risks of a world that is increasingly likely to experience warming well in excess of 2 °C this century.

Inadvertently, the Intergovernmental Panel on Climate Change (IPCC) — the scientific body charged with informing governments about climate change — reinforces the present narrative by failing to provide policymakers with guidance on how to weigh the relative likelihood of the scenarios of future concentrations of heat-trapping gases and other drivers of warming on which its climate change projections are based.

Science and the climate policy narrative

Since Copenhagen, the foundation on which the 2 °C target was built has steadily eroded. Both human populations and natural systems are now understood to face serious risks of substantial climate change damages with less than 2 °C warming[6], leading many of the most vulnerable developing nations to argue, with just cause, that the target should be lowered to 1.5 °C. Indeed, the relatively modest warming experienced so far (0.85 °C increase since 1880)[7] is already driving arguably dangerous impacts, including more deaths from extreme heat[8], widespread forest die-off from climate-driven heat stress and drought[9], and more extreme coastal flooding from higher storm surges resulting from sea-level rise[10]. Such impacts underlie recent demands by developing countries for so-called loss and damage payments, a prevalent topic of negotiations during the COP19 climate meeting in November 2013.

Global carbon emissions have also continued to rise, unabated, on average by 3% per year since 2000, including the years since the Copenhagen Accord was signed[2]. At present, emissions are tracking just above the highest Representative Concentration Pathway (RCP 8.5) used by the IPCC to assess projected climate change; a pathway in which emissions would hurtle past the 2 °C carbon budget before mid-century (Fig. 1). Keeping global temperatures from rising above 2 °C could be achieved by rapidly transitioning to a trajectory similar to RCP 2.6, the lowest concentration pathway used by the IPCC. Following RCP 2.6 would require global carbon emissions to decline by 50% below 1990 levels by mid-century and, according to several models, may well require sustained global net negative emissions a few decades later (Fig. 1). This might, in principle, be achieved by coupling biomass energy production with carbon capture and storage on a massive scale or by other yet-to-be-developed technologies[2].

Such heroic assumptions lead a growing number of analysts to conclude that prospects for limiting warming to 2 °C are becoming vanishingly small[2,11]. One recent study excluded climate model outputs using RCP 2.6 from interscenario comparisons of projected changes on the assumption that RCP 2.6 is currently unfeasible[12]. A projection is not destiny, of course, but some are surely more likely than others. Yet, in its most recent assessment, the IPCC makes no judgement on the relative likelihood of the magnitude of future warming associated with each RCP in presenting climate model projections, implicitly treating all scenarios as equivalently plausible. Some scenarios are also projected to lead to very divergent futures in terms of impacts[1]. This leads to effective responses to manage climate risk heavily depending, in some cases, on the scenario actually realized. Policymakers thus have no clear scientific guidance for confronting and managing the growing risk of high-magnitude warming.

Building on its strong legacy of rigorous and detailed treatments of likelihood and uncertainty of observed trends, attribution of change and model output (including future projections)[13], and on recommendations first made[14] and subsequently elaborated on[15] more than a decade ago, the IPCC should provide policymakers with guidance on the relative likelihood of different magnitudes of future warming. One path forward would be to build on the approach of soliciting expert judgement found on other subjects, such as transient climate response to alternative radiative forcing trajectories[16], eliciting input that considers both climate sensitivities and the biophysical, socioeconomic, technological and policy drivers of future emissions and concentrations.

Towards a new climate policy narrative

An ambitious goal for stabilizing global temperatures must remain a central focus of climate policy within a comprehensive risk-management framework. But calling for swift and deep reductions in emissions, although essential, is not sufficient. Confronting and managing the risks of high-magnitude warming will require a science-based policy narrative that honestly communicates these risks, accounts for potential policy failures

and climate emergencies that may occur, and helps society weigh the adoption of mitigation and adaptation options that themselves pose significant risks, costs and uncertainties.

As in the development of national security strategy, where decisions of great consequence are often made with incomplete and uncertain information, a three-tiered risk-management framework for climate security was formulated[17] that meets these criteria. The so-called ABC framework includes three elements: (1) an ambitious temperature stabilization target; (2) building for (that is, adapting to) a higher magnitude of warming than the stabilization target in case climate sensitivity is underestimated or mitigation policies fail; and (3) contingency planning in case of a future climate emergency in which society opts for crash mitigation measures owing to alarming climate developments.

Using such a framework as a basis for dialogue and planning would help focus attention on the need to consider less-favoured options for temperature stabilization. Recognizing the risks of high-magnitude warming and that expediting carbon emissions reductions on a large scale will require trade-offs, some may increase their willingness to accept some greater risks from suboptimal mitigation options, such as the local biodiversity impacts from renewable energy siting, the environmental and security risks of continued reliance on fossil energy extraction and use should carbon capture and storage technology prove commercially feasible, or the many global risks from potential geo-engineering options for forced cooling of the climate system. The last option has been particularly controversial, but contingency planning signals the need to address the potential efficacy and risks of all prospective responses to a future climate emergency.

The adoption of such a framework should also motivate difficult but much-needed dialogue and planning for the impacts of climate change under high-magnitude warming. Where near-term decisions have long-term consequences, adaptation planning needs to move from the incremental to the transformative as a contingency under scenarios of truly disruptive impacts. Pioneering examples include plans for relocation of development from floodplains around London after 2060 and the creation of water-efficient maize for Africa, both of which require planning and investment now to manage impacts in decades to come[18]. Building a science-based dialogue with the costs and challenges of transformative adaptation may also motivate greater societal investment in mitigation.

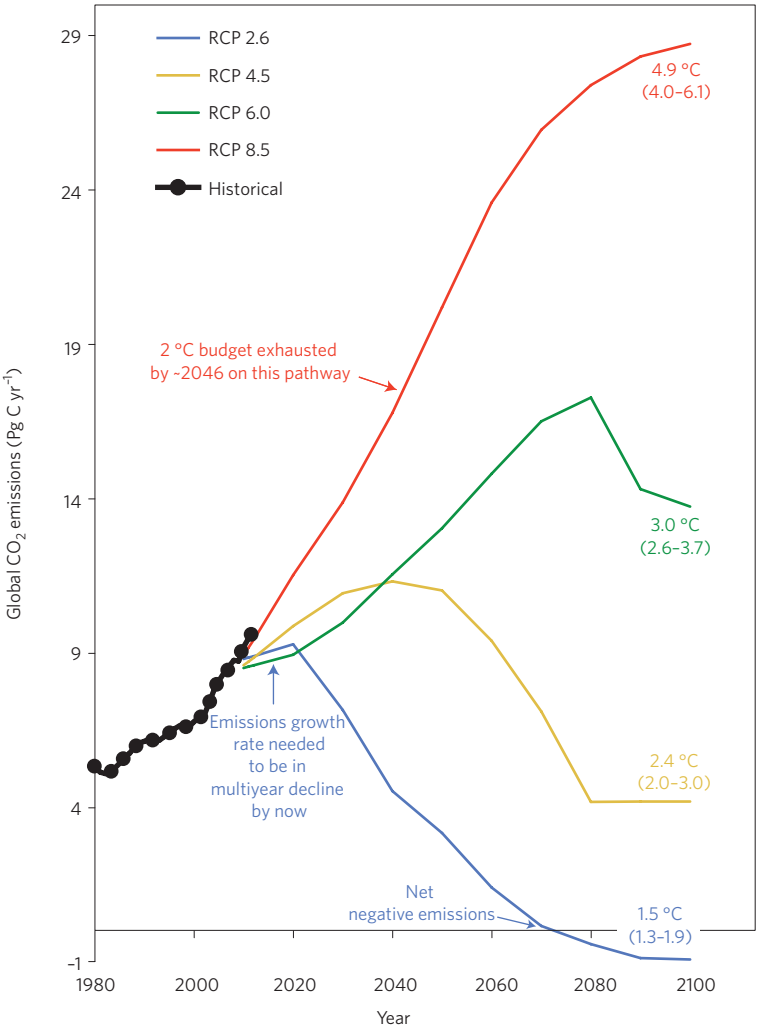

Figure 1 | Observed and projected trends in global CO_2 emissions under four RCP scenarios. Trends are adapted from ref. 2 extended to 2100 and include both fossil fuel and industrial emissions, but not land-use-change emissions, and were accessed at the RCP database version 2.0.5 (http://tntcat.iiasa.ac.at:8787/RcpDb/dsd?Action=htmlpage&page=about). Numbers on the right-hand side represent the median values of global mean surface temperature projections above pre-industrial levels in 2100 and the 66% probability range of the ensemble projections for each RCP scenario[4]. The 2046 budget number is determined from the allowable carbon emissions budget of 1,000 Pg C consistent with a >66% likelihood of limiting warming to less than 2 °C (ref. 7). The remaining available emissions and estimated year when those will be exhausted are based on the total allowable and that already emitted (531 Pg C) as of 2011 (ref. 7) coupled with projected emissions under RCP 8.5 (RCP database, see above). Emissions are reported every ten years in the database and a linear rate of increase was assumed for the intervening years. Deforestation emissions are not included in this calculation.

Climate policymakers committed in Copenhagen and reaffirmed the following year in Cancun to review the case of "strengthening the long-term global goal on the basis of the best available scientific knowledge, including in relation to a global average temperature rise of 1.5 °C" (ref. 19) by 2015. In the wake of news over the continued rise in global carbon emissions, the negotiations in the recent Warsaw Conference of the Parties left the growing emissions gap between national emissions reductions pledges and these temperature targets unresolved[11,20]. However difficult it will be to rethink the present climate policy narrative, to continue to focus on a 2 °C (or more aggressive) temperature target as the singular inviolate metric of long-term success is to engage in a form of climate denial. We support a recent call[4] for this review of the 2 °C target to consider the risks and opportunities of alternative approaches to motivating decarbonization and adaptation.

The sooner that decision makers at all levels of society come to grips with the reality of where the climate is heading, the sooner we will be able to confront, limit and manage the risks of a dangerously warming world. ❐

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Correction

In the Commentary 'Making the most of climate impacts ensembles' (*Nature Climate Change* **4,** 77–80; 2014) the contact details for Philip Thornton and Frant Ewert were exchanged. This has now been corrected in the HTML and PDF versions after print 4 February 2014.