

Averting Catastrophic Climate Change: Staying Below 2°C

Greenpeace Briefing, June 2009

Avoiding the most catastrophic impacts of climate change demands that global temperature increase is kept as far below 2°C as possible. This is still possible, but time is running out and we are in danger of overshooting.

To stay within this limit, global greenhouse gas emissions will need to peak by 2015 and decline rapidly, reaching as close to zero as possible by mid-century.

'Safe levels' of warming?

Holding global temperature increase to 2°C is often referred to as a 'safe level' of warming but this does not reflect the reality of the latest science, which shows that a warming of 2°C above pre-industrial levels would pose unacceptable risks to many of the world's key natural and human systems.¹

With even a 1.5°C warming, increases in drought, heat waves and floods, along with other adverse impacts including increased water stress (for 0.4 to 1.7 billion people), wildfire frequency and flood risks, are projected in many regions. Neither does staying below 2°C rule out large-scale 'discontinuities' (such as melting ice sheets). At least partial de-glaciation of the Greenland ice sheet, and possibly the West Antarctic ice sheet can occur from additional warming of 0.8 – 3.8°C above current levels.²

Therefore, based on scientific findings, Greenpeace calls for emission reduction pathways that peak global temperature increase as far below 2°C as possible and then reduce the warming as fast as possible.

Scale and Timing

To stay within these limits, global greenhouse gas emissions must be brought as close as possible to zero by 2050. While a cut of 85% (below 1990 levels) globally by mid-century would provide a good chance of staying within the 2°C limit, it would not eliminate all serious risks and damages.³

Greenpeace therefore believes that the ambition should be to reach zero emissions globally by 2050, with 85% as the absolute minimum goal for global reductions.

¹ W. L. Hare. A Safe Landing for the Climate. State of the World. Worldwatch Institute. 2009.

² Joel B. Smith, Stephen H. Schneider, Michael Oppenheimer, Gary W. Yohe, William Hare, Michael D. Mastrandrea, Anand Patwardhan, Ian Burton, Jan Corfee-Morlot, Chris H. D. Magadza, Hans-Martin Füssel, A. Barrie Pittock, Atiq Rahman, Avelino Suarez, and Jean-Pascal van Ypersele: *Assessing dangerous climate change through an update of the Intergovernmental Panel on Climate Change (IPCC) "reasons for concern"*. Proceedings of the National Academy of Sciences. Published online before print February 26, 2009, doi: 10.1073/pnas.0812355106. The article is freely available at: <http://www.pnas.org/content/early/2009/02/25/0812355106.full.pdf> A copy of the graph can be found on Appendix 1.

³ M. Parry et al., "Squaring Up to Reality", Nature Reports Climate Change, 29May 2008, pp. 68–71.

It is not only the level of emissions in 2050 that counts. The amount of emissions accumulated in the atmosphere *by then* is as crucial a factor, as CO₂ remains in the atmosphere for around a century. There is approximately a 25 to 30 year time-lag between greenhouse gases being released into the atmosphere and their full heat-trapping potential taking effect. Most of the increase of 0.8°C during the last century is not caused by current levels of carbon dioxide but by **what was already in the atmosphere in the 1970s**. On top of the extra heat we are already experiencing there is another 30 years of accelerating warming built into the climate system.

The faster emissions peak, the less emissions will accumulate in the atmosphere, and the more achievable the annual emission reduction rate in the coming decades will be.⁴

Global emissions must peak by 2015 - and be reduced to 1990 levels by 2020

Greenpeace believes that governments must aim at peaking global emissions before 2015 and returning them close to 1990 levels by 2020. This is achievable with energy efficiency and renewable energy measures – as described in the global Energy [R]evolution scenario produced by Greenpeace and the European Renewable Energy Council (EREC)⁵ - and by reaching zero tropical deforestation by 2020⁶. These measures will deliver major benefits in terms of employment, reduction of fossil fuel dependence and the protection of invaluable biodiversity.

To establish a rapidly declining emissions trend before 2015, industrialised countries need to be on an emissions pathway that will lead to reductions of at least 40% below 1990 levels by 2020. Simultaneously, fossil emissions growth in developing countries needs to be reduced to 15 - 30% below predicted levels in 2020, with enabling technology and finance from developed countries. Tropical deforestation emissions need to be reduced to zero by 2020.

Delaying action is not an option

The domestic targets announced to date by industrialised countries fall far short of what the science shows is needed. The combined effort of the targets announced so far (including President Obama's target of bringing the US emissions down to 1990 levels by 2020) would roughly lead to an overall industrialised country reduction of 4 -14% from 1990 levels by 2020⁷. This would put pressure on developing countries to reduce their emissions more significantly. As the former is unlikely to be politically and morally acceptable to developing countries, the result would be the latter.

If industrialised countries fail to take on adequate emission reduction targets and finance commitments to support emission reductions in developing countries, global peak in emissions may be delayed well beyond 2020.

Analysis shows that delaying the emissions peak by just five years could lead to global emissions being *40% above 1990 levels* in 2020. Consequently, the rate at which emissions would have to be reduced between 2020 and 2035 would have to be significantly higher to reach the same 2050 goal.⁸ Today's governments could continue to build, for example, more coal-fired power stations, leaving future governments with both the decisions on having to take deeper emissions cuts and a whole new generation of fossil fuel infrastructure to deal with (the so-called lock-in effect). This would be a very dangerous road to take.⁹

⁴ W. L. Hare, M. Schaeffer and M. Meinshausen: Emission reductions by the USA in 2020 and the risk of exceeding 2°C warming. P. 13-14. Climate Analytics discussion paper. March 2009.

⁵ <http://www.energyblueprint.info/>

⁶ Greenpeace has developed a proposal showing that tropical deforestation in countries like Brazil can be halted by 2015. Similar plans must be developed in other countries and regions affected by deforestation. Agreement on Acknowledging the Value of the Forest and Ending Amazon Deforestation, 3 October 2007, www.greenpeace.org/raw/content/content/international/press/reports/amazon-deforestation-agreement.pdf

⁷ This estimation includes all target ranges announced by Annex I countries so far (as of 4.4.2009). For those that haven't announced any targets yet, two different assumptions have been made: one where they stick to their existing Kyoto targets (for 2008-2012) and another where they are assumed to take on targets comparable to those put on table by other countries so far.

⁸ W. L. Hare, M. Chaeffer and M. Meinshausen: Emission reductions by the USA in 2020 and the risk of exceeding 2°C warming. P. 13-14. Climate Analytics discussion paper. March 2009.

⁹ W. L. Hare, M. Chaeffer and M. Meinshausen: Emission reductions by the USA in 2020 and the risk of exceeding 2°C warming. P. 13-14. Climate Analytics discussion paper. March 2009. See Figure 3 and table 2.

Even if the future leaders acted more responsibly and still managed to achieve reductions of minus 80% by 2050, the likelihood of exceeding 2°C, would be about 40-50% higher than for a pathway that peaked before 2015 and reached 80% by 2050.¹⁰

Five-year commitment periods needed

The fast developing climate science and the need for an emissions peak by 2015 requires the continuation of the existing five-year commitment period cycle in the Copenhagen climate agreement. For the second commitment period (2013-2017) industrialised countries should reduce their emissions by 23% to be on course to reach 40% by 2020. In order to provide certainty for green private investors, the Copenhagen agreement should stipulate that linear emission reductions should continue beyond 2017 in case governments fail to agree on new targets for the third commitment period (2018-2022) before the end of 2015.

Greenpeace calls for immediate action. Industrialised countries, as a group need to take responsibility for 40% reductions below their 1990 emissions by 2020. The industrialised country targets announced so far would make limiting dangerous warming to even 2°C - let alone anything below that – unlikely.

For more information about global carbon budgets and pathways related to 2°C temperature goal, see paper in Nature: http://www.pik-potsdam.de/news/press-releases/files/qanda_meinshausen_etal_2009_ghgtargets-2c_pik-press.pdf

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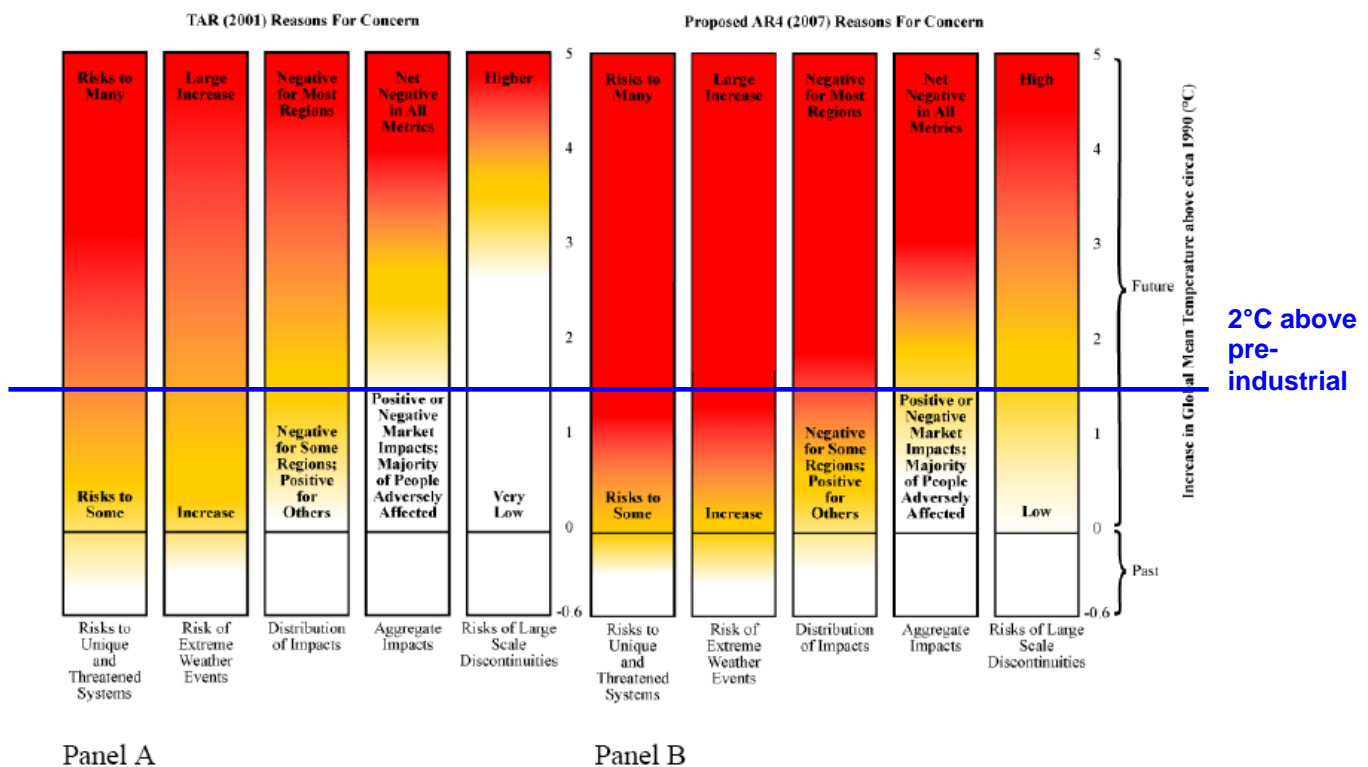
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¹⁰ Ibid.

Appendix 1

Graph from the article *Assessing dangerous climate change through an update of the Intergovernmental Panel on Climate Change (IPCC) 'reasons for concern'*¹¹ **The blue line does not belong to the original graph. It has been added by the author of this memo to mark the line of 2°C warming above pre-industrial levels, which is the stated goal of 109 countries.**

Figure 1: A Comparison of the Updated Embers with those Presented in the TAR



Caption for Figure 1

Risks from climate change, by reason for concern – 2001 compared with 2007. Climate change consequences are plotted against increases in global mean temperature (°C) after 1990. Each column corresponds to a specific RFC, and represents additional outcomes associated with increasing global mean temperature. The colour scheme represents progressively increasing levels of risk, and should not be interpreted as representing 'dangerous anthropogenic interference', which is a value judgement. The historical period 1900 to 2000 warmed by about 0.6°C and led to some impacts. It should be noted that this figure addresses only how risks change as global mean temperature increases, not how risks might change at different rates of warming. Furthermore, it does not address when impacts might be realised, nor does it account for the effects of different development pathways or vulnerability. Panel A displays the RFCs from the IPCC TAR as described in section 1. Panel B presents updated RFC's derived from IPCC AR4 as supported by the discussion in section 2.

¹¹ Joel B. Smith et al.: *Assessing dangerous climate change through an update of the Intergovernmental Panel on Climate Change (IPCC) 'reasons for concern'*. Proceedings of the National Academy of Sciences. Published online before print February 26, 2009, doi: 10.1073/pnas.0812355106. The article is freely available at: <http://www.pnas.org/content/early/2009/02/25/0812355106.full.pdf>