To meet international commitments on *'avoiding dangerous climate change'*, wealthy nations must reduce emissions by over 10% each year

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It is now two decades since the first Rio Earth Summit, and despite good intentions at the time, the forthcoming round of climate change negotiations in Doha will be set against the abject failure of the international community to have achieved any control over emissions. In my view and that of many of my colleagues, we are now in the process of going beyond what has traditionally been defined as the threshold between acceptable and dangerous climate change. The numbers and reasoning underpinning this conclusion have brutal repercussions for us all and as such are hard to accept – they are numbers that none of us, politicians, businesses and citizens, want to hear.

Our collective apathy leaves us, in 2012, with only a tenuous hope of making the radical and urgent reductions in our emissions necessary to avoid the severe impacts of a rapidly changing climate. Such reductions demand a fundamental transformation in both how much and the forms of energy we use.

Given the grave situation we have (knowingly) got ourselves into, we need to be honest, direct and clear as to the implications of our analysis. Only if we strip away the rhetoric, the naive technological optimism and the misguided panacea of carbon pricing, can we have some hope of responding appropriately to the challenges we face.

So what are these challenges? The international community, through the slow process of engagement between scientists, policy-makers and civil society, has agreed to hold the increase in the global temperature below 2 degrees Celsius (compared with pre-industrial levels). However, since this 'guard-rail' between acceptable and dangerous levels of climate change was first established the scientific understanding of the impacts of climate change has improved significantly. The latest analysis makes clear that the impacts of even a 2°C rise will be far more serious than previously thought. Consequently, rather than being a guardrail between acceptable and dangerous climate change, 2 degrees represents the threshold between dangerous and *extremely* dangerous climate change.

Despite the political prestige invested in the 2-degree target, its implications for the scale of emission reductions is seldom discussed. It is easy to refer to long-term reduction goals, such as the EU's 80 percent reduction by 2050 or the Swedish "vision" that it should contribute *"no net emissions of GHGs in the atmosphere"* by 2050. Unfortunately such long-term reduction targets have no basis in science; we cannot delay making radical cuts now in the hope that future reductions by future generations will compensate. Emissions of CO_2 today will remain warming the earth for well over 100 years. It is our cumulative

emissions, our *carbon budget*, that matters. Every molecule of carbon dioxide released today simply adds to the already very difficult problem we face. The later we leave it to peak our rising emissions the more drastic the emissions reductions will be to remain within a 2°C carbon budget.

In a seminar presented on Thursday/today at a symposium in Stockholm, I quantify the scale of the challenge we have set ourselves. If global emissions can be brought to a peak by 2020, with poorer nations peaking by around 2025 - to facilitate their ongoing development - reductions of 10-20 percent annually will be required by the wealthier (OECD) nations for even a 50:50 chance of meeting our 2°C commitments. Emission reductions of this size have no historical predecessors; with annual reductions larger than 1 percent having traditionally been associated with economical crisis. The only example of much greater reductions is the Soviet collapse, where, for one decade, annual reductions of 5 percent occurred.
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To put the challenge in context for nations such as the UK and Sweden, national emissions would need to reduce by approximately 40 per cent by 2015, 70 per cent by 2020, and over 90 per cent by 2030 (compared with today). This sounds too difficult perhaps, even impossible, but in response we need to ask ourselves what is the alternative. Given today's trends, we are heading toward a 4°C global average rise sometime after the middle of the century. Such a rise would not be spread evenly – with many parts of the world experiencing impacts well beyond anything they could reasonably adapt to. European heat waves, such as that in 2003, would likely see the hottest days increase by a further 8°C. At lower latitudes, 4°C is predicted to result in reductions of around 30-40 per cent in the yields of important staple crops such as maize and rice, at the same time as the population heads towards 9 billion. Alongside all of this, many, if not the majority of ecosystems, will be seriously threatened – ecosystems that also provide a myriad of services for human development – from nutrient recycling to pollination.

It is fair to say that among climate change researchers there is a widespread view that a 4°C future is incompatible with any reasonable characterisation of an organised, equitable and civilised global community. 4°C is also beyond what many people think we can adapt to. Moreover, and perhaps even more alarmingly, higher temperatures increasingly raise the risk of trigging natural feedbacks that could push temperatures considerably higher still.

The one thing we know about the future is that it will be different. If we do nothing, we will be hit by devastating impacts and unmanageable adaptation needs. If we choose to act to avoid the worst, the mitigation will have to be very significant, which itself will lead to major social change. Therefore, our role now is to think differently, to achieve greater clarity, to foster a greater imagination and stop saying that it is impossible. There remains real hope to instigate meaningful and timely change, but each day we choose apathy over action that hope diminishes. Countries such as the UK and Sweden must show leadership and drastically step up their commitments in line with the brutal reality made all too clear by the science of climate change.

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Professor in energy and climate change, deputy director of Tyndall centre for climate change research, and advisor to the British government. On the 8th of November, he will be presenting his research at a seminar on the Kulturhuset, Stockholm arranged by the green think tank Cogito, and What Next Forum.