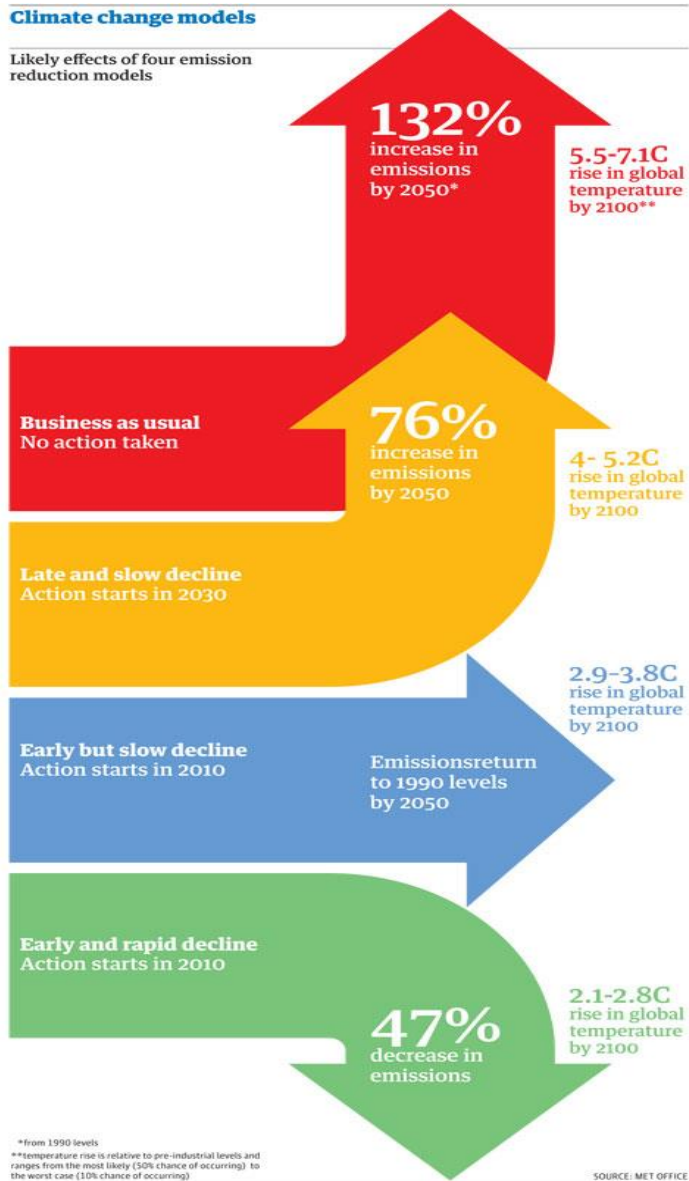


# Met Office's bleak forecast on climate change (risk)

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<http://www.guardian.co.uk/environment/2008/oct/01/climatechange.carbonemissions>



## Dr Vicky Pope, Head of Climate Change Advice

The latest climate model projections from the Met Office Hadley Centre show clearly that such failures could have worrying and significant consequences for the world's climate. Even with large and early cuts in emissions, these projections indicate that temperatures are likely to rise to around 2 °C above pre-industrial levels by the end of the century. If action is delayed or is slow, then there is a significant risk of much larger increases in temperature. The uncertainties in the science mean that even if the most likely temperature rise is kept within reasonable limits, we cannot rule out the possibility of much larger increases. Adaptation strategies are, therefore, needed to deal with these less likely, but still real, possibilities.

Dr Jason Lowe and other colleagues at the Met Office have conducted a series of 'what if' climate projections, to give a better understanding of the temperature rises we could expect if action on reducing greenhouse gas emissions is slow or delayed. In the first scenario, emissions continue to rise throughout the century. In the other scenarios, emission reductions have been imposed at various times and at various

In the most optimistic scenario, emissions start to decrease in 2010, and reductions quickly reach 3% per year. This contrasts sharply with current trends, where the world's overall emissions are increasing at 1%

per year – faster than even the worst cases used in the Intergovernmental Panel on Climate Change (IPCC) emissions scenarios.

What is very clear is that some increase in temperature is inevitable in the next century, and that the decisions and actions that the world takes now will have a profound impact on the climate later this century. Even if emissions start to decrease in the next two years and reach a rapid and sustained rate of decline of 3% per year, temperatures are likely to rise to 1.7 °C above pre-industrial levels by 2050 and to around 2 °C by 2100. This is because carbon dioxide already in the atmosphere will be around for many years to come and the climate takes some time to respond to these changes. Only an early and rapid decline in emissions gets anywhere close to the target of 50% reduction in emissions by 2050 put forward by the G8.

Contrast that with a world where no action is taken to curb global warming. Then, temperatures are likely to rise by 5.5 °C and could rise as high as 7 °C above pre-industrial values by the end of the century. This would lead to significant risks of severe and irreversible impacts.

Dr Lowe's two other scenarios are also significant. The consequences of a late decline in emissions are apparent by 2050. Delaying reduction of emissions until 2030, results in a further 0.5 °C of warming by 2050 compared with early, if slow, reduction from 2010. By the end of the century the differences are even greater – more than 1 °C.

The consequences of an early but slow decline in emissions of 1% per year, compared with a rapid decline, appear to be small in 2050. However, they increase to 0.8 °C by the end of the century. Overall, a delayed and slow decline in emissions would probably lead to nearly 2 °C more warming than an early and rapid decline in global emissions – a total temperature rise of 4 °C above pre-industrial levels. The implications of these levels of temperature change are very serious, but the central projections are not the only things we should be worried by. When commentators look at these projections, they tend to concentrate on the most likely temperature rises. However, if we are concerned about keeping the risks of avoiding dangerous climate change to a minimum, we should also consider the worst-case outcome. This will occur if the climate turns out to be particularly sensitive to increases in greenhouse gases and the Earth's biological systems cannot absorb very much carbon.

### **Dangerous impacts**

The risks for worst-case outcomes amplify much more quickly than the risks for most likely outcomes. For an early and rapid decline in emissions, the worst-case outcome is around 0.7 °C higher than the most likely temperature rise. With much slower action taken much later, the difference between the most likely and worst-case outcome is almost twice as wide, at 1.2 °C. This takes a worst-case temperature rise of less than 3 °C to one just above 5 °C by the end of this century, bringing with it significant risk of dangerous impacts to our environment, society and economy.

A major reason for this amplification is the so-called 'carbon cycle effect'. Plants, soils and oceans currently absorb about half of the carbon dioxide emitted by human activities, limiting rises in atmospheric CO<sub>2</sub> and slowing global warming. As temperatures increase, this absorption is very likely to decrease. For example, plant matter in the soil breaks down more quickly at higher temperatures, releasing carbon more quickly, and amplifying the warming trend. Methane released from the thawing of permafrost will add to the warming. This methane release is currently not included in the calculations, and becomes more of a risk for larger temperature rises.

Hence, the risks of dangerous climate change will not increase slowly as greenhouse gases increase. Rather, the risks will multiply if we do not reduce emissions fast enough.