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## **The risks of climate disaster demand straight talking**

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These pages often focus on how the eurozone crisis will play out will play out. Yet within a decade, this crisis will resolve itself one way or another. Meanwhile, the more important climate crisis gathers momentum with hardly a word on where it will lead. This is partly because climate change has slipped from the public agenda. But there is also, we suspect, a concern that climate is too contentious and complex a topic for a non-expert commentator to tackle. There may also be a fear that any honest appraisal of the possible course of events risks the charge of alarmism.

In our view, the first is not the case and the second is a poor excuse.

The carbon dioxide concentration in the atmosphere is now almost 400 parts per million and is increasing by 2 ppm each year. Since the rate of emissions is also increasing as the world economy expands, the carbon dioxide concentration is set to reach 550 ppm by mid-century, double the pre-industrial concentration.

Doubling the carbon dioxide concentration will increase the mean near-surface air temperature by about 3 degrees centigrade. This is a crude way to infer the warming effect of emissions without using a climate model. The scientifically accepted range of uncertainty for this increase is 2 to 4.5 degrees. This gives an idea of the risk of coming in higher or lower than the 3 degree estimate would suggest in isolation.

These numbers summarise as succinctly as is possible the mainstream scientific view. A 3 degree rise may sound small, but it compares with a 6 degree difference between the last ice age and the temperate 12 millennia since then.

Disputes about the consequences of continued emissions boil down to how long it will take for a given level of warming to be reached and how high the costs of the associated damage will be. Yet given these numbers, it is clear that the risks of driving temperatures up at least 3 degrees are significant. Moreover, political pledges to limit warming to 2 degrees are manifestly hollow in the absence of rapid steps to decarbonise major economies. None of this is particularly complicated. All of it is discussed in private among senior scientists, business people and government advisers.

Warming doesn't take place uniformly. In particular, the poles warm more quickly, as is evident from the rapid melting of the Arctic ice. Differential warming changes geographic temperature gradients, leading to shifts and changing volatility in weather patterns. The 0.8 degrees of current warming has made more likely the weather extremes that hit Russian wheat in 2010 and are hitting US maize now.

These events give a glimpse of the future. Weather changes and volatility after warming of 3 degrees could cut staple crop yields significantly. This could happen around the world, for

years at a time, despite our best efforts at agricultural adaptation. Damages and human displacements from extreme flooding will add to stresses.

Public discourse is selective. For years, important subjects discussed privately may be publicly shunned for fear of being shouted down. But in time, formerly radical ideas enter the mainstream. This year's weather extremes in the US may have brought that time closer for climate change.

If so, the tacit understanding among responsible commentators that nothing too shocking should be said about climate may end. Climate arithmetic shows that we may be very hungry in a few decades time, irrespective of the other problems climate change will cause. This could take us way beyond adaptation into the realm of crumbling civil order.

The evidence suggests that humanity is locked into a course that it has limited capacity or appetite to alter. Modern economies are built on fossil-fuelled growth. Changing this model materially and quickly has proved to be untenable in the absence of a disaster. Business-as-usual emissions growth is the consequence. This may well produce a disaster that we will be powerless to redress.

Those with a more optimistic view of human behaviour or of the impact of new technologies and practices may see better prospects of meaningful action to prevent such a disaster. They must be encouraged. Yet we must also prepare for the challenging times ahead. The Science Museum in London plans to create a forum for the public to discuss the issues with leading climate scientists. Such efforts are essential. We must begin to discuss the risks and impacts of a climate disaster, since our institutions and processes appear incapable of preventing it.

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