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How to reduce future climate risk

Viewpoint

By Daniel P Schrag

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Human society is performing a remarkable and uncontrolled experiment on the Earth.

Because of the combustion of coal, oil and gas, carbon dioxide (CO₂) levels are already higher than they have been for at least 430,000 years.



Time is short, argues Professor Schrag

If such activities continue, CO₂ will rise to levels not seen on the Earth for 30 million years or more.

CO₂ is not the only cause of global climate change, but it is the primary cause. Reducing CO₂ emissions is a necessary step to avert a potentially catastrophic future.

Many countries have adopted a global target of 550 parts per million (ppm), roughly a doubling of the pre-industrial value, as a safe and reasonable level that can be achieved over the next century.

The truth is that no scientist really knows what CO₂ level is safe. What we do know is that even if CO₂ levels stabilised today, the Earth would continue to warm as oceans and ice sheets gradually adjust over decades and centuries to their new atmospheric boundary conditions.

“ It seems unlikely that substantial and effective actions will be sustained if the US is not engaged in the process ”

Because the response times of the oceans and glaciers are so long, by the time we see a catastrophe on the horizon, such as the collapse of the Greenland ice sheet (equivalent to six metres of sea level rise), it will likely be impossible to stop it.

The coal issue

Even a stabilisation level of 550 ppm may be very difficult to achieve. Once released from a smokestack or tailpipe, CO₂

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remains in the atmosphere and surface ocean for centuries.

Moreover, the lifetime of a coal-burning power plant can be 50 years or more, so energy choices we make today will determine our path for the next many decades.

With the ratification of the Kyoto Protocol by Russia, the world sits at a crossroads.

Many developed countries are taking bold actions to reduce their own greenhouse gas emissions. However, it seems unlikely that substantial and effective actions will be sustained if the US is not engaged in the process.

Certainly it will be difficult to persuade developing countries to participate without US involvement.

Do the political and economic incentives or the relatively minor emissions reductions introduced by the Kyoto Protocol lead to the long-term investments in infrastructure that are required to stabilise carbon dioxide below 550 ppm? I suspect not.

Although it is good for countries to agree to work on the problem together, I fear that the Kyoto Protocol does little to face our major challenge: how to get energy from coal without releasing CO₂ to the atmosphere.

Coal has the highest CO₂ emissions per unit of energy, and coal will remain inexpensive long after the supplies of cheap oil and gas diminish over the next few decades.

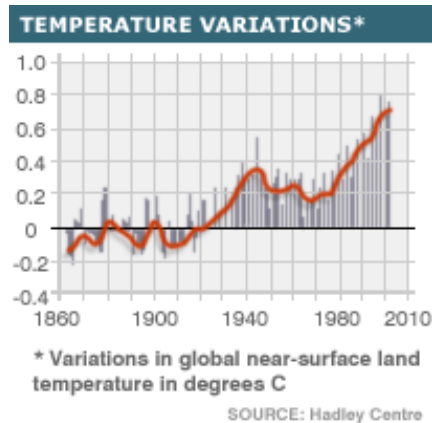
Even with more widespread use of renewable energy technology and nuclear power, coal will remain a major source of energy, particularly in those countries with the highest energy demands.

Thus, it is not a question of whether China, India, and the US will use their vast coal reserves but rather how they will use them.

In the rapidly growing economies of China and India, new pulverised coal plants are being built at an alarming rate.

US opportunity

There are some alternatives on the horizon, including coal gasification technology that produces a concentrated effluent of CO₂ that is easier to capture and store underground.



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But whatever technology is used, the developed world must work with the developing world to prevent the release of CO₂ from coal combustion into the atmosphere if the goal of CO₂ stabilisation is to be achieved.

This analysis identifies a new opportunity for the US to play a leadership role in reducing our exposure to future climate change.

[Animated guide: Climate change](#)

One could envision bilateral agreements between the US and China, for example, in which the US provides financial assistance to US companies who produce energy in China without emitting CO₂, while China provides access to its rapidly growing energy market.

Whatever the specific strategies may be, the time to act is now. There is a window of opportunity for the US to work on this problem, but it will not last long.

After the next several decades, so much investment will have been made in traditional energy generation technology in the rapidly developing world that reducing global emissions will be much more difficult.

The author is Professor of Earth and Planetary Sciences at Harvard University. He is director of the institution's Laboratory for Geochemical Oceanography. He uses geochemistry techniques to work out what the Earth's climate was like thousands, or even millions, of years ago.

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