Climate change experts argue for international geoengineering effort

January 27 2010

Internationally coordinated research and field-testing on 'geoengineering' the planet's atmosphere to limit risk of climate change should begin soon along with building international governance of the technology, say scientists from the University of Calgary and the United States.

Collaborative and government-supported studies on solar-radiation management, a form of geo-engineering, would reduce the risk of nations' unilateral experiments and help identify technologies with the least risk, says U of C scientist David Keith, in an article published in the Jan. 27 online edition of *Nature*. Co-authors of the opinion piece are Edward Parson at the University of Michigan and Granger Morgan at Carnegie Mellon University.

"Solar-radiation management may be the only human response that can fend off rapid and high-consequence climate change impacts. The risks of not doing research outweigh the risks of doing it," says Keith, director of the Institute for Sustainable Energy, Environment and Economy's energy and environmental systems group and a professor in the Schulich School of Engineering.

Solar-radiation management (SRM) would involve releasing megatonnes of light-scattering aerosol particles in the upper atmosphere to reduce Earth's absorption of solar energy, thereby cooling the planet. Another technique would be to release particles of sea salt to make low-altitude clouds reflect more solar energy back into space.

SRM should not take the place of making deep cuts in industrial greenhouse gas emissions and taking action to adapt to climate change, Keith and his American colleagues stress. However, they say: "We must develop the capability to do SRM in a manner that complements such cuts, while managing the associated environmental and political risks."

The scientists propose that governments establish an international research budget for SRM that grows from about $10 million to $1 billion a year between now and the end of 2020. They urge that research results be available to all and risk assessments be as transparent and international as possible to build sound norms of governance for SRM.

Long-established estimates show that SRM could offset this century's predicted global average temperature rise more than 100 times more cheaply than achieving the same cooling by cutting emissions, Keith notes. "But this low price tag raises the risks of single groups acting alone, and of facile cheerleading that promotes exclusive reliance on SRM."

SRM would also cool the planet quickly, whereas even a massive program of carbon dioxide emission cuts will take many decades to slow global warming because the CO2 already accumulated in the atmosphere will take many years to naturally break down. The 1991 eruption of Mount Pinatubo, for example, cooled the planet by about 0.5 degrees Celsius in less than a year by injecting sulphur into the stratosphere.

But a world cooled by managing sunlight will present risks, the scientists note. The planet would have less precipitation and less evaporation, and monsoon rains and winds might be weakened. Some areas would be more protected from temperature changes than others, creating local 'winners' and losers.'

"If the world relies solely on SRM to limit (global) warming, these

problems will eventually pose risks as large as those from uncontrolled emissions," they warn.

Field tests of SRM are the only way to identify the best technologies and potential risks, Keith says. He and the American scientists propose carefully controlled testing that would involve releasing tonnes - not megatonnes - of aerosols in the stratosphere and low-altitude clouds.

"If SRM proves to be unworkable or poses unacceptable risks, the sooner we know the less moral hazard it poses; if it is effective, we gain a useful additional tool to limit climate damages.".

Responsible management of climate risks requires deep emission cuts and research and assessment of SRM technologies, the scientists say. "The two are not in opposition. We are currently doing neither; action is urgently needed on both."

Provided by University of Calgary