**Geo-engineering no Holy Grail - study**

*By Mariette Le Roux February 25, 2014 1:08 PM*

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Paris (AFP) - Far from offering a simple fix, sci-fi solutions to global warming may in fact make the problem worse, a probe of "geo-engineering" options said on Tuesday.

Once mocked as unscientific, geo-engineering proposals are gaining traction as carbon emissions soar, placing Earth on track for warming of maybe four degrees Celsius (7.2 degrees Fahrenheit) by 2100.

Ideas, mainly experimental or untested, include building mirrors in space to reflect the Sun's rays or growing plankton to boost absorption of heat-trapping carbon dioxide (CO2).

The goal is to buy time to wean the global economy off the cheap but dirty energy sources driving man-made climate change.

But on current emissions trends, these technologies stand little chance of rolling back warming to the UN-targeted 2 C (3.6 F) and may well make matters worse, according to the most comprehensive study yet.

"Climate engineering alone is not a good solution to prevent climate change," said David Keller of the Helmholtz Centre for Ocean Research in Kiel, Germany, who co-authored the paper.

Reporting in the journal Nature Communications, the team devised a computer model to project the impact of five geo-engineering proposals under a scenario of continuing high carbon emissions.

The five schemes entail:

-- planting large forests to absorb CO2 from the atmosphere and store it,

- fertilising the oceans with iron to stimulate the growth of plankton, which would absorb more CO2 from the sea surface through photosynthesis,

-- using long pipes to pump deep, cold, nutrient-rich water to the surface to fertilise plankton,

-- "alkalising" the ocean with limestone to cause a chemical reaction to absorb more CO2 from the atmosphere, and

-- using solar radiation management (SRM): placing reflective particles in the atmosphere or mirrors in space to reflect the Sun's rays.

Even with the technologies combined and applied to the widest extent possible, these options would not prevent mean surface temperatures from rising beyond 2C target if CO2 emissions continue as they are, the simulation found.

- 'Abject stupidity' –

The side effects "could be as bad as the climate change effects that they are trying to prevent," Keller warned.

The study found that SRM was the only method with the potential to swiftly reduce warming.

But it also had some of the largest potential side effects, such as changing rain patterns -- and could never be stopped without instantly warming the planet.

Geo-engineering could also boost sea levels, reduce the surface reflectiveness (albedo) in some regions of the world and cause higher local temperatures, remove oxygen from the ocean, and deplete the ozone layer.

"Our simulations suggest that the potential for these types of climate engineering to make up for failed mitigation may be very limited," said the study.

The UN's Intergovernmental Panel on Climate Change (IPCC) reported last year that SRM, "if realisable", had the potential to offset a global temperature rise -- but would also modify the global water cycle and fail to reduce ocean acidification.

As well as environmental risks, geo-engineering projects carry an unknown economic cost and face legal and political hurdles, previous research has found.

The authors of the study conclude it would be better to focus on curbing emissions, though engineering could "complement" mitigation efforts.

Their simulation was based on the so-called RCP8.5 emissions scenario, the highest used by the UN's climate panel, which expects average warming of 3.7 C by 2100.

Commenting on the new study, University of Bristol natural hazards lecturer Matt Watson said it was clear no single method or technology would solve the climate change problem.

While more research was needed, "the paper sounds a timely warning about the abject stupidity of relying upon climate engineering solutions when reducing our reliance on carbon-based energy systems is the only sensible option," he said.