



OIAD-571

Neville McFarlane
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Dear Neville McFarlane

Thank you for your email of 5 March 2023 requesting the following under the Official Information Act 1982 (the Act):

1. Are there any ongoing solar geoengineering research projects or initiatives in New Zealand?
2. Are there any policy or regulatory frameworks in place in New Zealand regarding solar geoengineering?
3. Are there any potential risks or unintended consequences associated with solar geoengineering in New Zealand?
4. Is there a public debate or discussion around solar geoengineering in New Zealand, and if so, what are the main arguments for and against it?

I respond to each of your questions below.

1. Are there any ongoing solar geoengineering research projects or initiatives in New Zealand?

The Ministry is unaware of any specific ongoing solar geoengineering research projects or initiatives in New Zealand. However, it is likely solar geoengineering is an active field of research both inside and outside of Aotearoa.

To our knowledge there have been no briefings to the minister from ministry staff regarding the potential to use solar geoengineering to tackle climate change.

2. Are there any policy or regulatory frameworks in place in New Zealand regarding solar geoengineering?

Solar geoengineering or solar radiation modification, and other types of climate engineering, are emerging technologies. While possible, they are not currently a part of global responses to climate change, nor are they a part of the New Zealand Government's response to climate change.

Solar geoengineering refers to interventions which increase the reflection of short-wave radiation back to space to reduce the anthropogenic warming effects on the planet. While

this technology could help reduce the greenhouse gas effect, it also introduces risks around different actors using this in a non-coordinated way, which may result in geopolitical tension.

New Zealand, along with 195 other Parties (or countries) have signed the legally binding international treaty on climate change, commonly referred to as the Paris Agreement. This aims to limit the increase in global average temperatures to 1.5°C above pre-industrial levels. This is a landmark in multilateral climate change responses in that for the first time a binding agreement brings all nations together to combat climate change. Through this, rules-based international order can be maintained in our response to climate change.

The United Nation's Intergovernmental Panel on Climate Change (IPCC) states in their AR6 WGIII report [1] that we have options in all sectors to reduce global emissions by half by 2030. While this report references climate engineering as a potential solution, it also states that there is high agreement internationally that it cannot be the main policy response to climate change, and that at best it could be a supplement to achieving sustained net zero carbon dioxide emission levels globally. Other research also suggests that if solar geoengineering is to be considered as a mitigation solution, that it forms part of a broader, mitigation centred portfolio of climate change responses [2].

As a part of the Paris Agreement, New Zealand has set National Domestic Contributions (NDC) of emissions to limit the amount of warming experienced. The first NDC commits New Zealand to reducing our net greenhouse gas emissions to 50 percent below gross 2005 levels by 2030. This involves international cooperation such as purchasing offshore emissions reduction, as well as domestic emissions budgets.

To achieve these targets, the Ministry for the Environment published Aotearoa New Zealand's first emissions reduction plan in 2022 [[Aotearoa New Zealand's first emissions reduction plan | Ministry for the Environment](#)] which sets out our first three emissions budgets and sets us on course to achieve our future emissions reduction goals successfully. It combines a series of actions across our economy to transition us to a low emissions future. This does not include any actions related to solar geoengineering.

Three emissions budgets are currently set to help Aotearoa New Zealand reach our NDC commitments and commitment to net zero long-lived gases by 2050 as part of the Climate Change Response (Zero Carbon) Amendment Act 2019. These emissions budgets set out the total amount of emissions Aotearoa New Zealand can produce over set time periods.

The Ministry have also recently published Aotearoa New Zealand's first national adaptation plan (<https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/adapting-to-climate-change/national-adaptation-plan/>). It looks at the impacts of climate change with us now and into the future and sets out a list of actions for how Aotearoa New Zealand can adapt to a changing climate.

3. Are there any potential risks or unintended consequences associated with solar geoengineering in New Zealand?

There are many methods for solar geoengineering, including marine cloud brightening, ground based albedo modifications and stratospheric aerosol injections. Each of these has its own benefits and associated risks, the assessment of which mostly relies on modelling methods instead of ground based observational testing. This creates difficulty in stating what some of the potential risks or unintended consequences associated with solar geoengineering are. The IPCC WG3 AR6 [1] report discusses some of the other potential impacts of solar geoengineering outside of reduced warming. These include:

- Changes to precipitation and run off patterns;
- Changes to direct and diffuse sunlight patterns;
- Changes to stratospheric dynamics and chemistry;
- Changes to crop yields and ecosystem productivity;
- Acid rain (if using sulphates);
- Increased geopolitical tensions depending on deployment strategies;
- Altered photosynthesis and carbon uptake by biodiversity; and
- Depending on degree of use and suddenness of termination, rapid warming and abrupt changes to water cycle.

4. Is there a public debate or discussion around solar geoengineering in New Zealand, and if so, what are the main arguments for and against it?

While The Ministry is aware of recent media reports on solar geoengineering, it has not undertaken public sentiment research on the topic.

[1] - IPCC, 2022: *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926

[2] - Nicholson, S., S. Jinnah, and A. Gillespie, 2018: Solar radiation management: a proposal for immediate polycentric governance. *Clim. Policy*, 18(3), 322–334, doi:10.1080/14693062.2017.1400944

You have the right to seek an investigation and review by the Office of the Ombudsman of my response relating to this request, in accordance with section 28(3) of the Act. The relevant details can be found on their website at: www.ombudsman.parliament.nz.

Please note that due to the public interest in our work the Ministry for the Environment publishes responses to requests for official information on our [OIA responses page](#) shortly after the response has been sent. If you have any queries about this, please feel free to contact our Ministerial Services team: ministerials@mfe.govt.nz.

Yours sincerely

Electronically approved by Sophie Heighway

Sophie Heighway
Manager – Climate Impacts