From: **Douglas Grandt** answerthecall@mac.com
Subject: My comments during the September 30 Climate Action Plan public event
Date: October 1, 2021 at 11:26 AM
To: Johanna Miller jmiller@vnrc.org, Ian Hitchcock ihitchcock@vnrc.org
Cc: John Nissen johnnissen2003@gmail.com

Johanna and Ian,

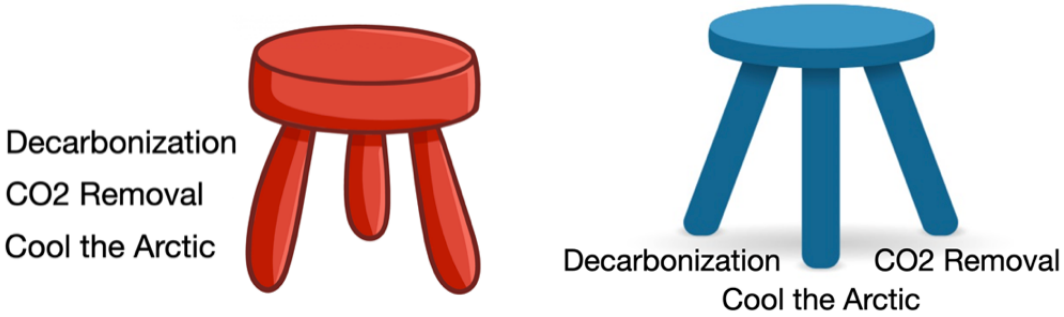
Thank you and the Climate Council for conducting public comment zooms.

As I mentioned, I see the emphasis exclusively on CO2 emissions from energy consumption and agricultural and waste emissions of methane, which I are one leg of a three legged stool—Carbon removal and Arctic cooling being the other two legs.

I would like to elaborate on my closing comment about Vermont's inability to actually implement carbon removal and Arctic cooling measures. The other two legs of the three-legged stool must be addressed with international engagement of the world community, but Vermont should acknowledge the fact that simply reducing fossil fuel and agricultural and waste emissions is insufficient to effectively curtail the accelerating increase of global temperature and curtail the extreme weather events caused by the meandering jet stream and accentuated polar vortex.

Vermont's acknowledging the deficiency of our Climate Action Plan and expressly calling on the international community to simultaneously implement steps to address the other two legs of the three-legged stool would be in line with our self proclamation of being the Brave Little State who is a giant among among global leaders.

To help this sink in, I have created a couple of visuals … choose your color:



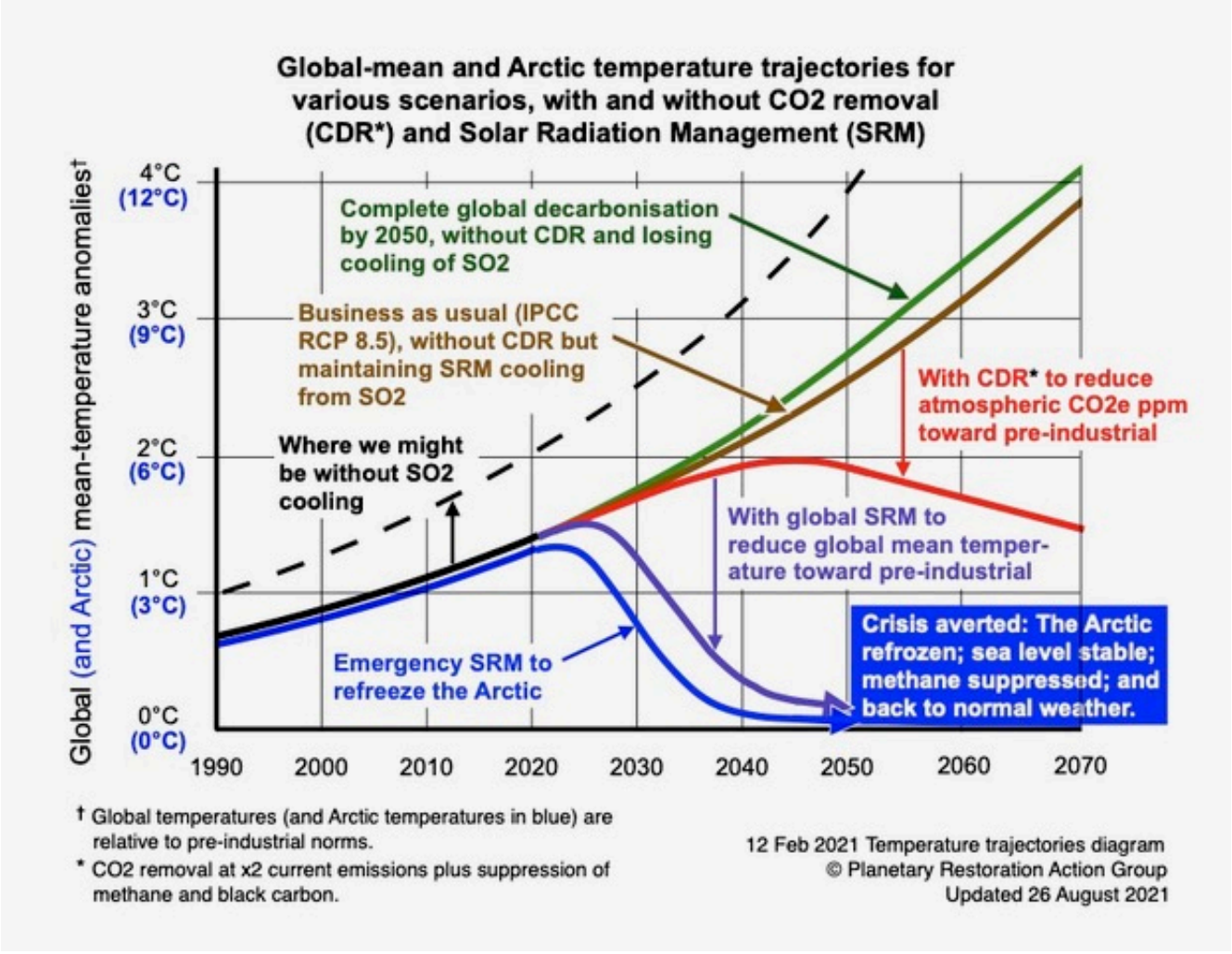
Following are the comments I added to the chat and the google doc ...

> ## Efficient transportation systems and vehicles
>
> ## What should be prioritized?
>
> **Following from Doug Grandt (Putney)**
> **Put a hard cap on fossil fuel imports into the state, declining at a specific rate annually so that we reach a zero import target by date certain.**
>
> **Put a hard cap on internal combustion engine vehicles (heavy duty big rigs, light duty delivery trucks, automobiles, buses, etc.) allowed to be registered and to transit the state, declining at a specific rate annually so that we reach a zero import target by date certain.**
>
> **Require purveyors of fossil fuels to be responsible for the funding of removing double the emissions associated with their products delivered in the future (TIMES 2) in order to draw down the equal amount of past (legacy) emissions in order to curtail and reverse the present unabated increase of atmospheric CO2, CH4 and other GHGs and begin cooling the planet. Removing gigatons of carbon annually and cooling the Arctic are necessary supplements to decarbonization.**
> **Preceding from Doug Grandt (Putney)**
>
> > Me to Everyone (6:31 PM)

> It seems that reducing fossil fuel combustion is the primary goal, so atmospheric concentrations of CO2 and CH4 as well as other GHG will increase at a slower and slower rate, but continue to increase until the economy is decarbonized, or net zero is achieved. Do we really want the CO2e to continue to rise unabated, and thereby global temperature to continue to rise unabated? To begin reducing CO2e in the atmosphere, and begin cooling the planet, we must remove CO2 and CH4 associated with all current and future fossil fuel combustion … but the temperature will continue to rise unless we begin to remove past (legacy) emissions as well. I have proposed that purveyors of fossil fuels take responsibility to fund the removal of double future GHG emissions in order to actually begin reducing the atmospheric concentrations. #RemoveCO2 and #RemoveCH4. Finally, to curtail the extreme weather brought on by the accentuated movement of the polar vortex, the meandering of the jet stream must be reversed (continued)
>
> Me to Everyone (6:35 PM)
> Continued … to curtail the extreme weather brought on by the accentuated movement of the polar vortex, the meandering of the jet stream must be reversed by restoring the polar-to-tropics temperature gradient which will strengthen the jet stream. Lest we include cooling of the Arctic as the third leg of the stool, observed damage from extreme weather, heat domes, deep freeze and drought in the south west, flooding, etc. will continue. Vermont cannot do this on our own, so we must simply make the issue of cooling the Arctic an international topic of research, testing and implementation on a global basis.

In addition, I would like to supplement the comments that I made in the chat and google doc, as well as verbally, with this diagram and explanation:

TEMPERATURE TRAJECTORY DIAGRAM



TEMPERATURE TRAJECTORY EXPLANATION

Global-mean and Arctic temperature trajectories for various scenarios, with and without CO2 removal

(CDR) and Solar Radiation Management (SRM)

Arctic temperature

The blue line is the trajectory of Arctic temperature, with scale shown in blue on the y-axis. We consider this independently of global temperature, whose scale is shown in black. The blue line is curved downward to show how cooling the Arctic might avoid catastrophes arising from continued warming and melting:

- multi-metre sea level rise from glacier and ice sheet meltwater;
- potentially irreversible loss of sea ice with associated disruption of ocean circulation (the AMOC);
- a multi-gigaton outburst of methane from permafrost potentially boosting global temperature by over 1°C.
- a reducing temperature gradient between Arctic and tropics, accelerated by albedo loss from retreating snow and sea ice, causing increasing disruption to jet stream behaviour (see below).

From 1970 to 2021 the Arctic temperature (shown in blue) has been rising 3 times faster than the global mean (shown in black). This has resulted in an ever decreasing temperature gradient between the Arctic and the tropics. This has disrupted jet stream behaviour causing the increase in extreme weather events which is now considered a climate emergency. If the Arctic temperature rise can be halted and reversed (as shown by the blue line bending downwards) the increase in extreme weather events can be halted and reversed. **This is the emergency Arctic cooling we urge G20 leaders to get done, using the most powerful cooling technology available: SRM at surface, cloud and stratospheric levels**.

Global temperature

The current strategy, espoused by IPCC and most environment activists, is to go for near 100% decarbonisation by 2050. The cooling effect of the SO2 emitted from coal and oil burning would be lost. The result, without any CDR or SRM intervention, would be catastrophic global warming (see green curve). Even business as usual would be better assuming it maintained the SO2 cooling (see brown curve). To avoid dangerous sea level rise from ocean expansion, the global mean temperature needs to be reduced to near the pre-industrial norm within two or three decades, using a combination of CDR and SRM. The diagram shows a lag of 5 years of global cooling behind Arctic cooling (see purple curve to right of blue curve). Note that CDR alone would be too slow to reduce the global temperature (see red curve). SRM without CDR would be unsustainable in the longer term; the SRM intervention could be phased out completely as CO2e ppm approaches the pre-industrial 280 ppm. By this time, planetary restoration could be complete.

Diagram file name: PRAG 12 Feb 2021
Temperature trajectories diagram
Updated 26 August 2021

PRAG Temperature trajectories explanation

Updated 27 August 2021

Finally, in response to Jerry Duval's explanation that a Social Cost of Carbon will be used in assessing the various measures of the Climate Action Plan, and that a range of Discount Rates will demonstrate the range of impact on future generations, I would like to state that Discount Rate is a concept to take into account the current value of future expenses taking into account the impact of inflation, that future revenues and expenses have less value to business an d banking centered economic analysis under inflation. The concept devalues or underestimates the real impact of future financials in determining a Return on Investment. Since Climate decisions are not business investment decisions and there is really no analogy to financial decisions or Return on Investment, a discount rate is inappropriate, even a very low rate.

An MBA or a responsible engineer or corporate planner would disagree, but I argue that if any discount rate were used in a climate damage assessment, it should be a negative rate such that future impacts are given more weight in the assessment.

The idea is that we do not want to defer extreme damage to future generations, rather accelerate our actions to avoid kicking the can down the road into the future. Hence, current estimates of calculated Social Cost of Carbon are way too low and should be several times greater than the White House has declared—Obama's as well as Biden's recent increase are both understated by an order of magnitude in my opinion.

Best regards,

Doug Grandt
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