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Saving the Arctic with Geoengineering only Costs 24 million Euros

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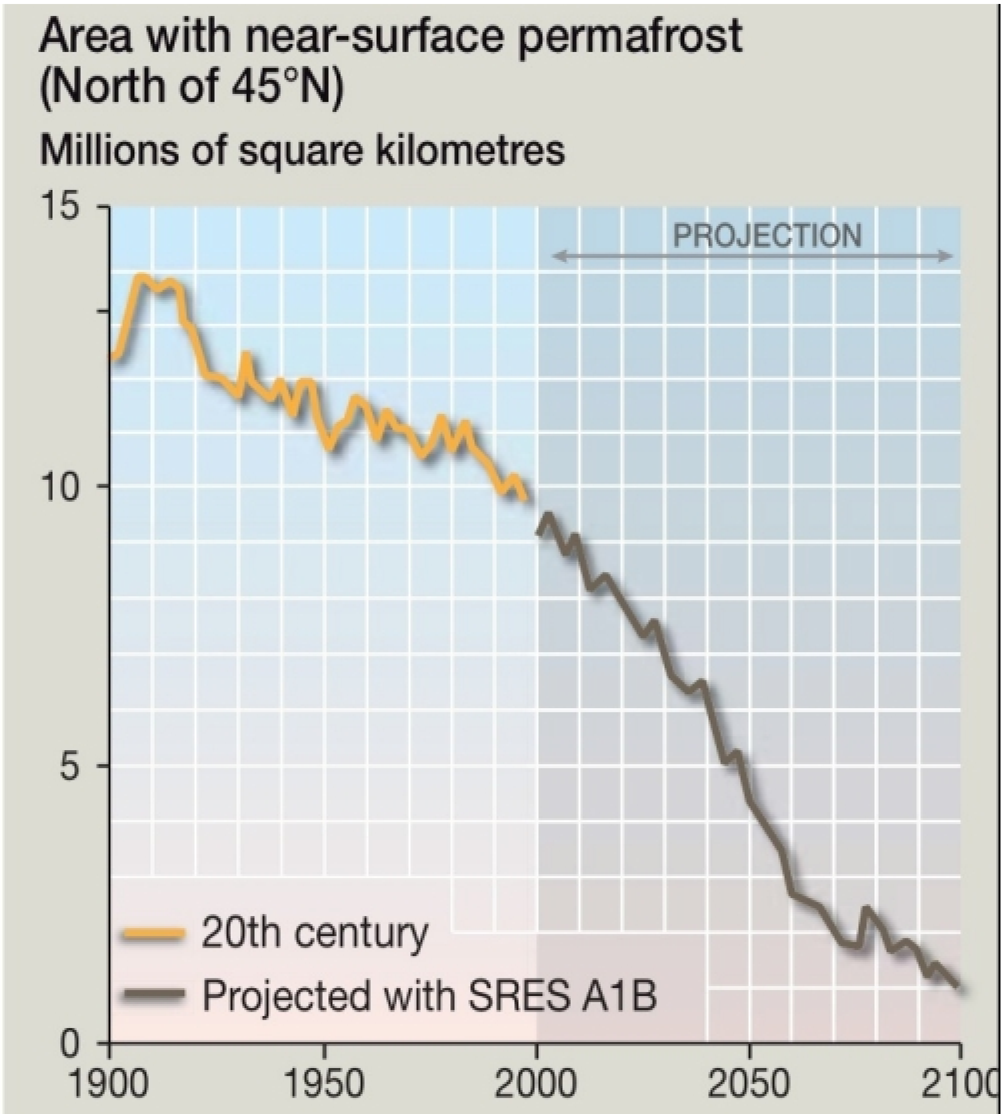
But not to linger, waiting till tomorrow will cost much, much more:



When the sea ice goes, so does the permafrost. Don't take specific dates in such model projections too literally for the High North – observations clearly show they still have difficulty incorporating the actual force of active climate feedbacks. Credit: Riccardo Pravettoni, UNEP/GRID-Arendal.

Sometimes we honestly don't quite know where we stand. We started the globalising a planet series to illustrate that our seeming desire as human beings to live at ever-larger scales simply, almost by definition, causes widespread damage.

Then again the scale of some of today's world's sustainability problems is already so large that the hunt for solution routes at even higher scale levels is not only *tempting*, but in case of climate control, already very close to necessary.

Indeed, geoengineering. Not to advocate any such measures, but to show geoengineering can be about more than 'simple' [geoengineering is never simple] carbon dioxide removal (CDR) or global cooling (through planetary solar radiation management – SRM) we´ve started another special series a while back: geoengineering the world.

In that series we focus on specific geographical locations* around the globe that may be considered hotspots of climate change, regions where climate damage is expected to be largest and for which this damage may already be unacceptable under the 450 ppm emission reduction scenarios.

To name one clear example of hotspot geoengineering: probably even under the current greenhouse gas concentrations the Greenland ice sheet is 'already' gone. Once the Greenland bedrock is reached there is very little in terms of engineered snowfall increase that we may even theoretically have at hand, to – under unabated melting conditions! – recreate a three kilometer thick ice sheet.

SRM geoengineering Greenland may however – also theoretically – help prevent further melting of the still-existing ice sheet.

And perhaps likewise at some stage geoengineering La Niñas and El Niños and cyclone geoengineering may alleviate much climate damage in the tropics – in ways similar to the current (unwanted and unintentional) anthropogenic Indian monsoon blocking. SRM crop geoengineering may in many places help compensate for some of the local summer heat damage – probably of larger significance than methods for urban rooftop SRM geoengineering.

[*) Typically geoengineering proposals focusing on climate hotspots would be local applications of SRM, although not necessarily through attempts to directly influence Earth's radiation balance (albedo) with aerosols (via sulfur or cloud albedo), but theoretically also through measures that aim to influence other characteristics of the climate system, like precipitation and other hydrological cycles (vegetation cover and density), ocean currents, ocean salinity – and perhaps most importantly, a focus on the stabilisation of climate feedbacks. At this point we can't resist to point you to one such example, the Bering Sea Dam – admittedly a plan in the upper ranks of 'probably worst geoengineering proposals to actually execute' – but one that may help eventually get us to the actual focus of this article: saving the Arctic – and its unique selling point to help some geoengineering critics reconsider: Arctic emission reductions, through methane feedback prevention.]

Earth has many small climate hotspots – but only a single very large one: the Arctic.

As a characteristic of Earth's climate system, climatic changes are amplified towards to the poles [not just in today's world, also for instance in the Pliocene climate]. This is a direct consequence of climate feedbacks like the albedo effect. The locally increased temperature rise is bad enough in itself, as it has a direct disturbing influence in other boreal climate zones, because it influences the stability of the Greenland ice sheet and because it may influence the stability of the world's entire Meridional Overturning Circulation.

But perhaps even more important still are possible feedbacks on the carbon cycle – tundra methane release specifically.

All in all the fact that under the 450 Scenario complete summer melting of Arctic sea ice may be *inevitable*, does not make that acceptable. And once the layer of protective permafrost is removed and clathrates are disturbed – after you release them those gigatonnes of methane and CO2 will never get back in that soil.

That's why one British climate engineer, Stephen Salter (Emeritus Professor of Engineering Design at Edinburgh University), states we should already consider to stabilise the Arctic climate through locally applied SRM geoengineering.

You may recall his name as a companion of John Latham and coauthor of several of his marine cloud seeding geoengineering publications.

Mr Salter has come up with an application of the existing cloud seeding concept, but not with a fleet of unmanned floating ships [what again was the reason to make the cloud seeding proposal *extra* spooky?] – but with fixed locations where large chimneys would create a fine haze of droplets – with concern for the exact size, as earlier we learned that cloud geoengineering is in fact a delicate business – with a fine balance between geoengineered cooling or warming.

The land-based towers, of which around a hundred would be needed, would have to be built in a circle around the Arctic Ocean, some on islands, some on the continental tundra. Stephen Salter recently elaborated on the idea while addressing British MPs.

The reason he thinks the earlier envisioned cloud seeding ships should be bypassed is a simple lack of time to save the Arctic permafrost (both in tundra and offshore, in the seabed) from melting.

There are other good reasons to pinpoint a geoengineering effort to the Arctic. Global SRM geoengineering measures may be counterproductive, Salter warns. He estimates full-scale stratospheric aerosol geoengineering with sulfates may even exacerbate Arctic climate warming by 10 degrees Celsius – which of course helps to indicate the large uncertainties still surrounding the research field.

Perhaps the most notable figure however could be the cost estimate. Salter thinks setting up the required geoengineering infrastructure would cost something in the order of 200,000 pounds (240,000 euros, 315,000 dollars) per tower.

Indeed. That is 20 million pounds, 24 million euros, 32 million dollars – or for that matter 2 billion yuan, 26 million yen, 1.2 billion shekel or 1.8 billion Danish krones – as we now know literally *anyone* could afford to save the polar bear and the entire Arctic ecosystem.

An interesting thought, don't you think?