OPPORTUNITY #26

What if we could recool the planet by saving the ice caps?

ICE UNCAPPED

A multi-pronged effort to restore the Arctic's sea ice, the Antarctic's ice sheet and mountain glaciers around the world leads to the cooling of the planet and oceans and prevents the further release of trapped methane into the atmosphere.

MEGATREND
Saving Ecosystems

TRENDS
Air Pollution
Geoengineering
Ice Cap Shrinkage
New Materials

SECTORS AFFECTED
Agriculture & Food
Materials & Biotechnology
Financial Services & Investment
Infrastructure & Construction
Insurance & Reinsurance
Logistics, Shipping & Freight
Utilities
Government Services
Professional Services

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150 MILLION PEOPLE

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1 METRE

WHY IT MATTERS TODAY

Ice coverage in the polar regions and glaciers is a critical natural climate regulator, melting of which could significantly contribute to sea levels rising by more than a metre by 2100.[477,478] According to projections, close to 150 million people would face a devastating threat to their lives.[479] Residents of coastal areas, in particular, would face the most severe impacts, while the global economy would lose $50 trillion per year.[480]

Melting bodies of ice risk increasing methane emissions and greater concentrations of greenhouse gases in the atmosphere.[481] Melting glaciers could also lead to the extinction of species, both terrestrial and aquatic, who call glaciers their home and that fail to adapt to swiftly changing conditions.[482]

In terms of the world's cities, Guangzhou, Istanbul, Lagos, New York and Tokyo would be the most likely to face severe effects. Populations in tropical coastal regions would also be especially vulnerable,[483, 484] for example rising sea levels threaten the existence of small island states such as Kiribati, the Maldives and the Solomon Islands. These states exist in a fragile condition with heavy reliance on tourism and international trade, underdeveloped communications and infrastructure and a lack of protection against natural disasters.[485]

Besides researching and experimenting with innovative approaches to removing greenhouse gases and reducing emissions, the Centre for Climate Repair at Cambridge in the United Kingdom also focuses on refreezing as one of its core objectives. One approach currently being explored by the centre and other groups is to reflect radiation from the sun back into space through marine cloud brightening, which makes clouds thicker with smaller droplets. Another is to enhance freezing in winter by catalysing the formation of thicker ice sheets around glaciers.[486]

The Middle East and North Africa (MENA) region could be confronted with severe environmental conditions, with some coastal cities becoming inhabitable, notably Alexandria in Egypt.[487] The MENA region could be the first to run out of water, partly because of a climate-change-induced rise of temperature that is estimated to exceed 4°C by 2050, or double the global average, and exceeding the threshold for human adaptability.[488] The warmer climate could result in higher mortality, desertification and food insecurity.[489]

THE OPPORTUNITY

An effort across many fronts could increase ice formation and reverse the retreat of ice at the poles and in mountainous regions, thereby cooling the planet and its oceans and preventing the further release of trapped methane into the atmosphere. Localised geoengineering solutions could include strategies such as deploying wind power to pump colder seawater to the surface to speed freezing[490] and surface modification, which involves using materials on land to deflect heat and light.[491]

Concerted efforts to combine various techniques could restore ice coverage and thickness, allowing ice sheets and caps to regulate atmospheric and ocean temperatures and protect marine and terrestrial biodiversity and limit the risk of sea levels rising.

BENEFITS

Regulation of the climate and reduction in the economic and social costs of climate-related disruption. Protection of biodiversity in marine ecosystems and of livelihoods that depend on those ecosystems. Preserving the ice caps would also prevent the release of methane as the ice retreats.

RISKS

Unforeseeable or unintended consequences from geoengineering for local or even global natural systems.