

Restoring a Safe Climate

Nature Shows How with Iron Fertilizer for the Ocean

Toward a safe climate

A safe climate is one that has sustained humanity over the long term, with CO₂ levels below 300 ppm. Reaching net zero is not enough. To allow humanity and current ecosystems to flourish, a trillion tons of excess CO₂ will need to be removed by 2050, while Earth systems are still functioning.

The most effective way to restore a safe climate is to follow Nature's lead. Nature has removed about a trillion tons of CO₂ ten times in the last million years, before ice ages. Thanks to decades of research, we can replicate this natural process.

How does Nature remove CO₂ on a grand scale?

Leading into ice ages, Nature boosts photosynthesis — in the ocean, which covers most of the planet. How? More iron-bearing dust blows off drylands and out to sea. This iron “fertilizer” enables fast growth of healthy phytoplankton — tiny green plants that form the base of the marine food web.

Phytoplankton pull down enormous amounts of CO₂. They're also the base of the marine food web. So restored phytoplankton can revive sea life, including fisheries and whales.

When the plankton and creatures that eat them die they sink to the depths, taking their carbon along, where it will stay for thousands of years.

We can do the same--and speed it up

Intentional OIF replicates the effects of natural dust storms. We can also think of it as giving an iron supplement to iron-poor waters, just as we might take one if anemic. We know it's safe because Nature does this regularly, so the biosphere is adapted to it.

Implementers mete out trace amounts of reddish high-iron dust from aboard a ship, in a carefully selected ocean eddy or “pasture,” about 100 km in diameter.

To remove a trillion tons of CO₂ (plus zero out continuing emissions), OIF could be scaled to remove 60 Gt of CO₂ a year. That would take adding minute amounts of iron fertilizer 500 eddies each year — less than 1% of the ocean's area. The quantities involved are about that of a grain of salt per square meter per year. That's 1/2,000th of the amount of iron fertilizer many suburbanites put on their lawn.

By 2050, the job would be done and safe CO₂ levels restored.

Why iron?

Unlike other ocean nutrients, iron tends to sink. It's even rarer at upper levels than in the past, as mineral dust blowing from land has decreased.

Not only that, whales used to surface iron used to restore iron and phytoplankton. Before the last century, large pods of whales raised iron from the deep as they ate iron-rich food at the bottom, then surfaced to poop—leading to a profusion of photosynthesis and marine life. But whale populations are down 90 percent. OIF replenishes some of the iron and phytoplankton in the oceans with methods that nature has used for eons.

Climate Restoration: Reclaiming a Pre-Industrial Climate by 2050

Everyone wants to restore a safe climate, one that humans have actually survived and thrived in long-term, with CO2 levels below 300 ppm. Reaching a safe climate will require more than net zero emissions: we also need to pull a trillion tons of legacy carbon from the atmosphere by 2050. We can do this by copying nature. Nature pulls massive amounts of CO2 from the atmosphere by two major pathways: Boosting photosynthesis, particularly in the ocean; and forming limestone from the calcium carbonate shells of sea animals.

Next steps for 2024

- Island and coastal communities are exploring OIF for climate restoration, fisheries restoration, and economic development.
- Projects will be submitted to the Climate Restoration Safety and Governance Board (CRSGB), to be vetted for safety, effectiveness, and ethics.
- Technologists are developing data analysis for satellite imagery to measure the amount of CO2 that projects remove.
- We aim to secure \$20 - 100 million to develop several three-year public/private partnerships for OIF

Who will pay for OIF?

Intentional OIF is so simple and effective that it can be financed by investment or philanthropy, with or without government funding.

In fact, the process is likely to produce revenue and taxes from revived fisheries. OIF is expected to cost roughly \$2 million per eddy per year.

For more info, see [PeterFiekowsky.com/resources](https://peterfiekowsky.com/resources).

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