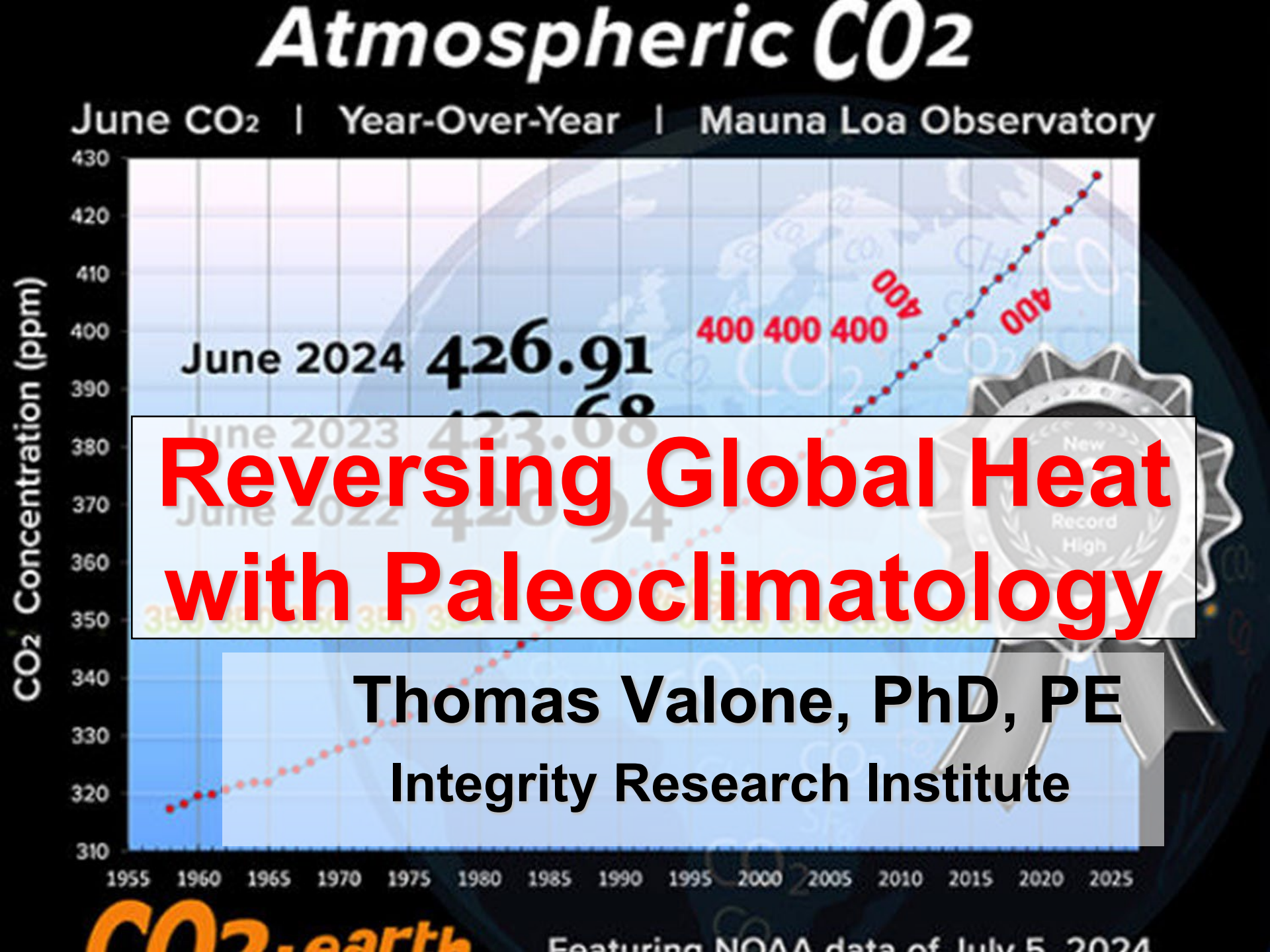
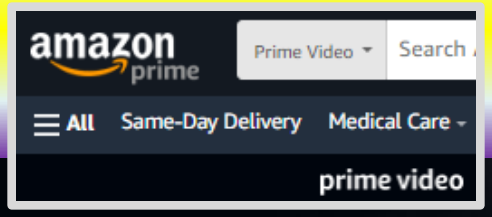

Atmospheric CO2
June CO2 | Year-Over-Year | Mauna Loa Observatory
CO2 Concentration (ppm)
430
420
410
400
390
380
370
360
350
340
330
320
310
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
June 2024 426.91
400 400 400
400
400
New Record High
Reversing Global Heat with Paleoclimatology
Thomas Valone, PhD, PE
Integrity Research Institute
CO2.earth
Featuring NOAA data of July 5, 2024

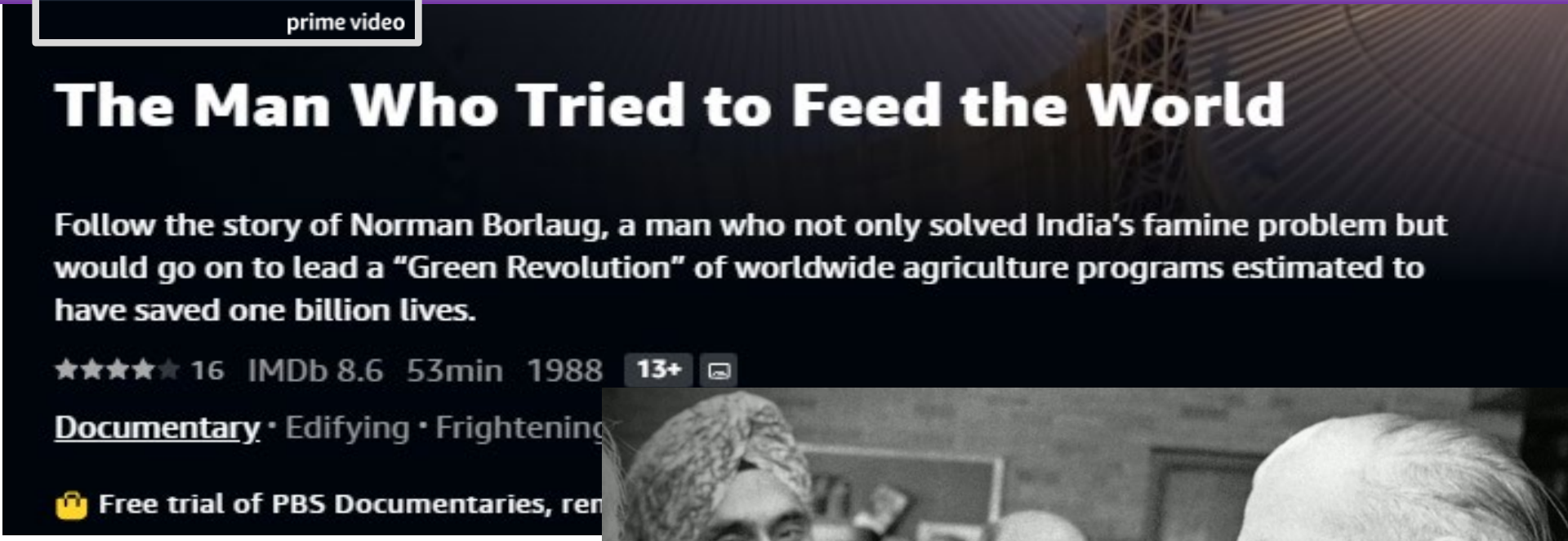
Reversing Global Heat Outline

1. Ethics and Morality as Applied to the World with Consequences
2. Environment and Climate Change Problem and Solution


Ethics and Morality Applied to the World

Dr. Norman Borlaug





1950 – Only 2 billion world pop. **with 1 billion starving**

PhD Biologist Norman Borlaug became a Nobel Prize winner **Hybrid grains that withstand drought and increase yield**

He single-handedly created the "**Green Revolution**"

IEEE ISTAS 2019 **World Population Growth** – conservative est.

Global population has tripled (3x) since 1950; CO_2 emissions have quadrupled (4x); and global energy demand has quintupled (5x), all in the same time period.

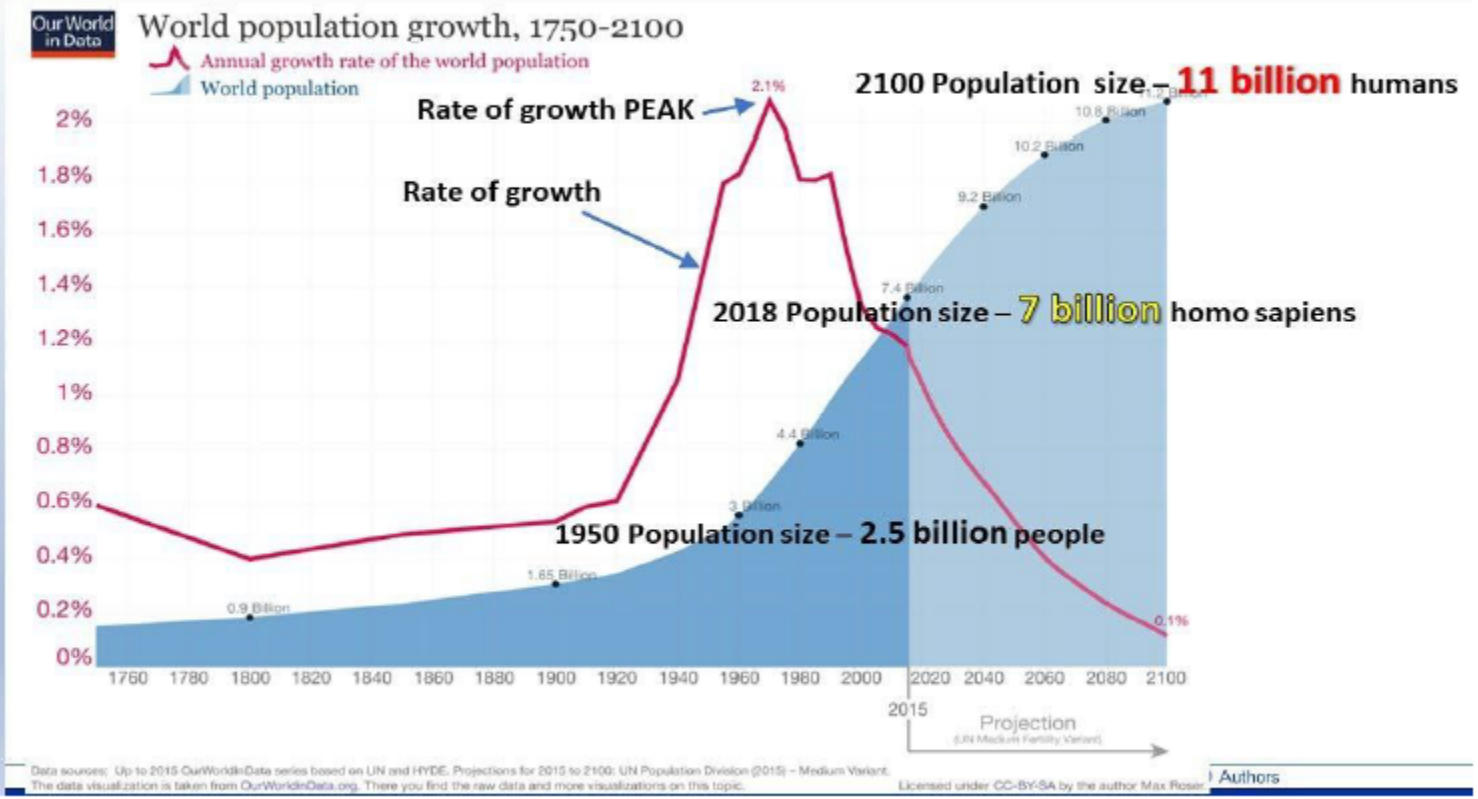


Fig. 1. World population growth [2]


Environment
and
Climate Change

IEEE ISTAS 2019 ALASKA Columbia Glacier ONLY SIX Years Apart

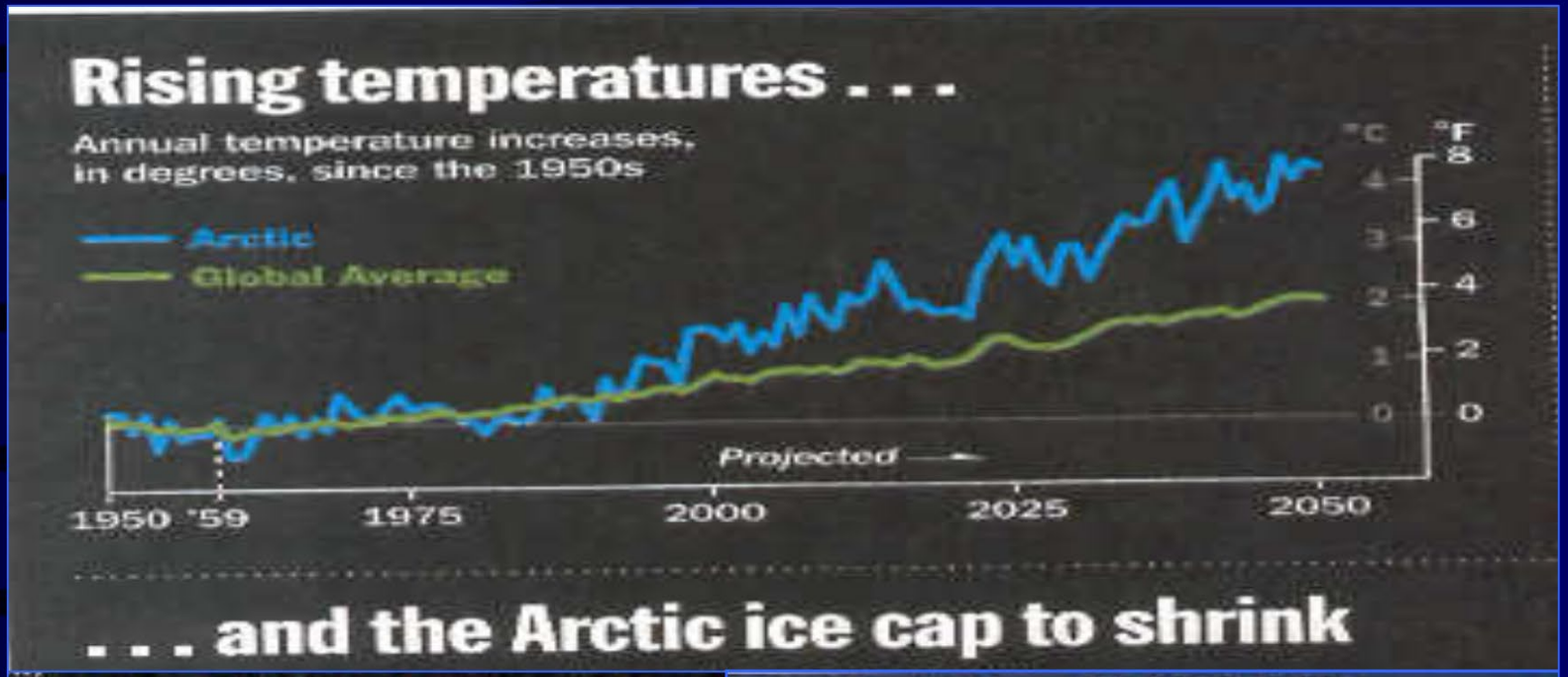
Columbia Bay, Alaska – Photographer James Balog, Nat. Geo. magazine: **Extreme Ice Survey of 18 Glaciers**

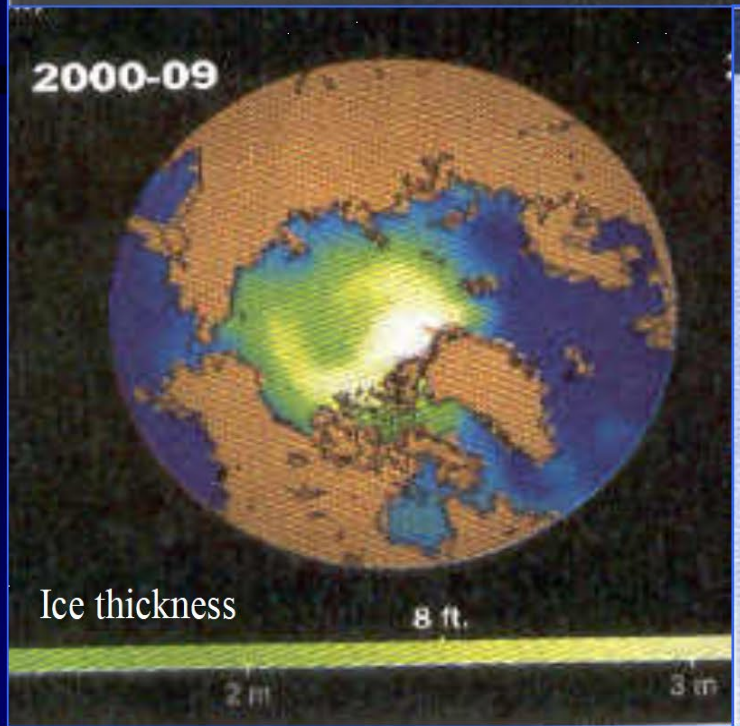
The most extreme: Columbia Glacier is losing one mile every three years – so two miles of loss are shown below.

Since 1980, this glacier has lost height equal to the Empire State Building!

 Copyright 2019 Authors

Fig. 6. Extreme climatic event [9]

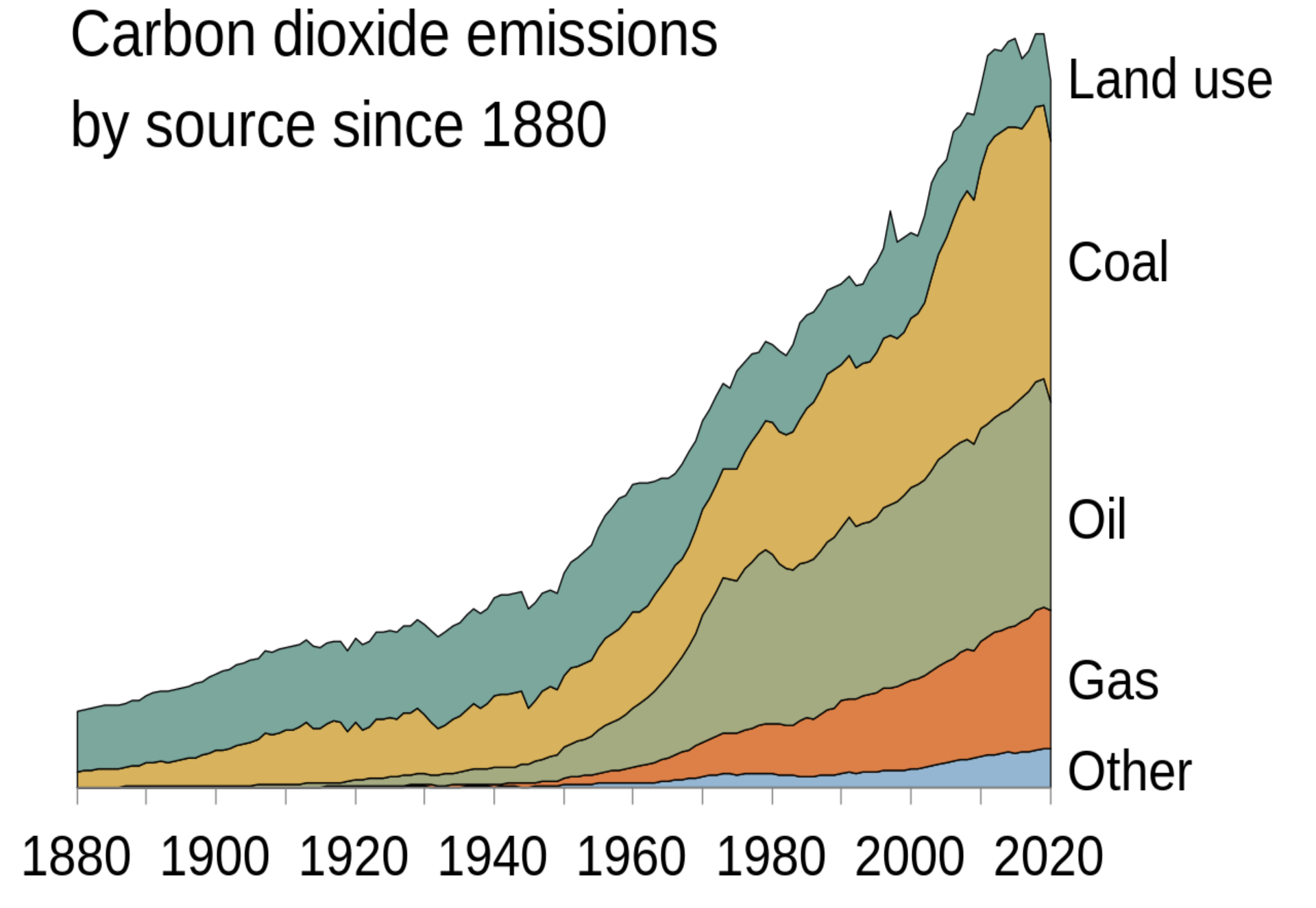


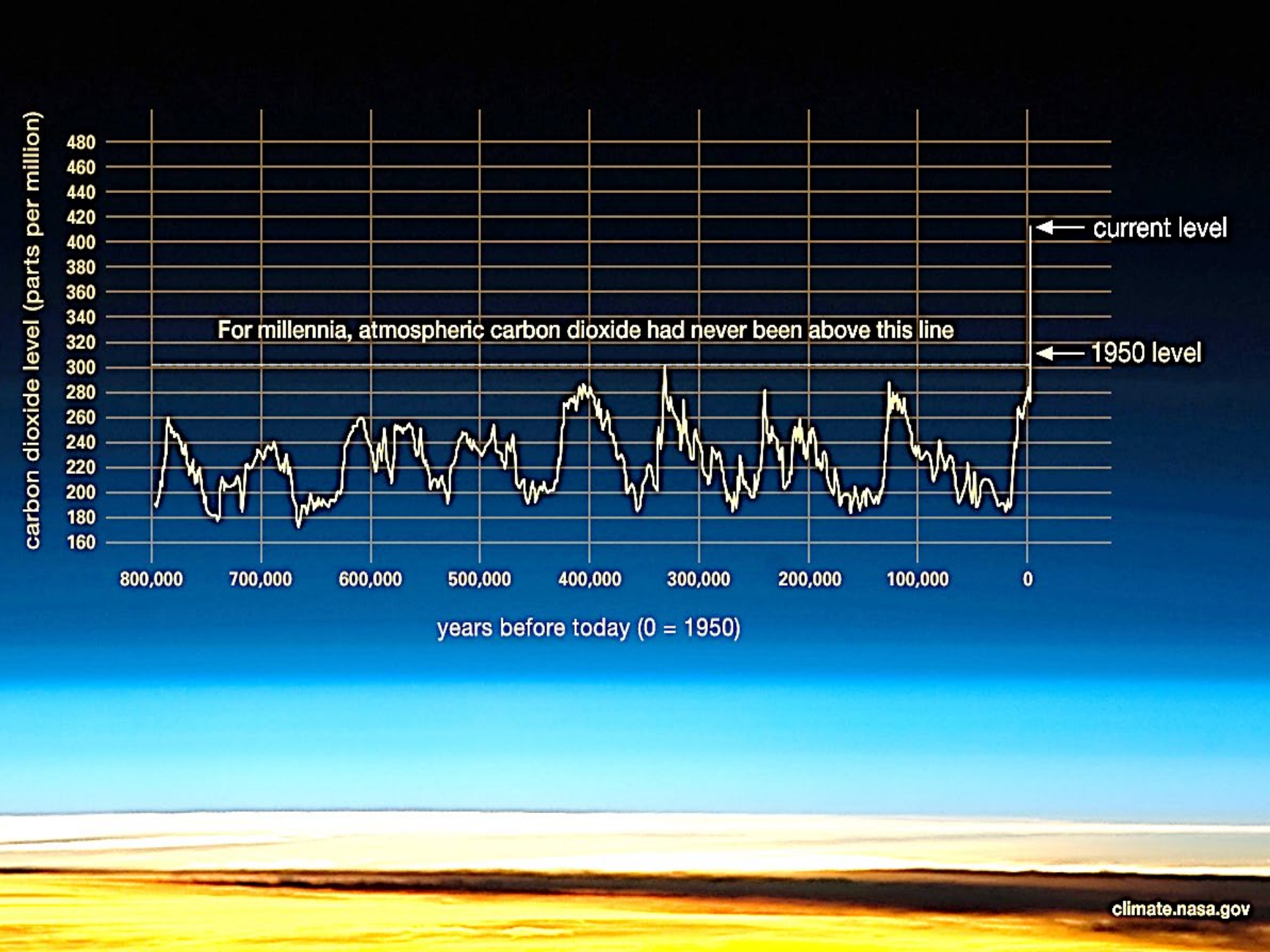


POLAR NOTES

The Hole at 90°N

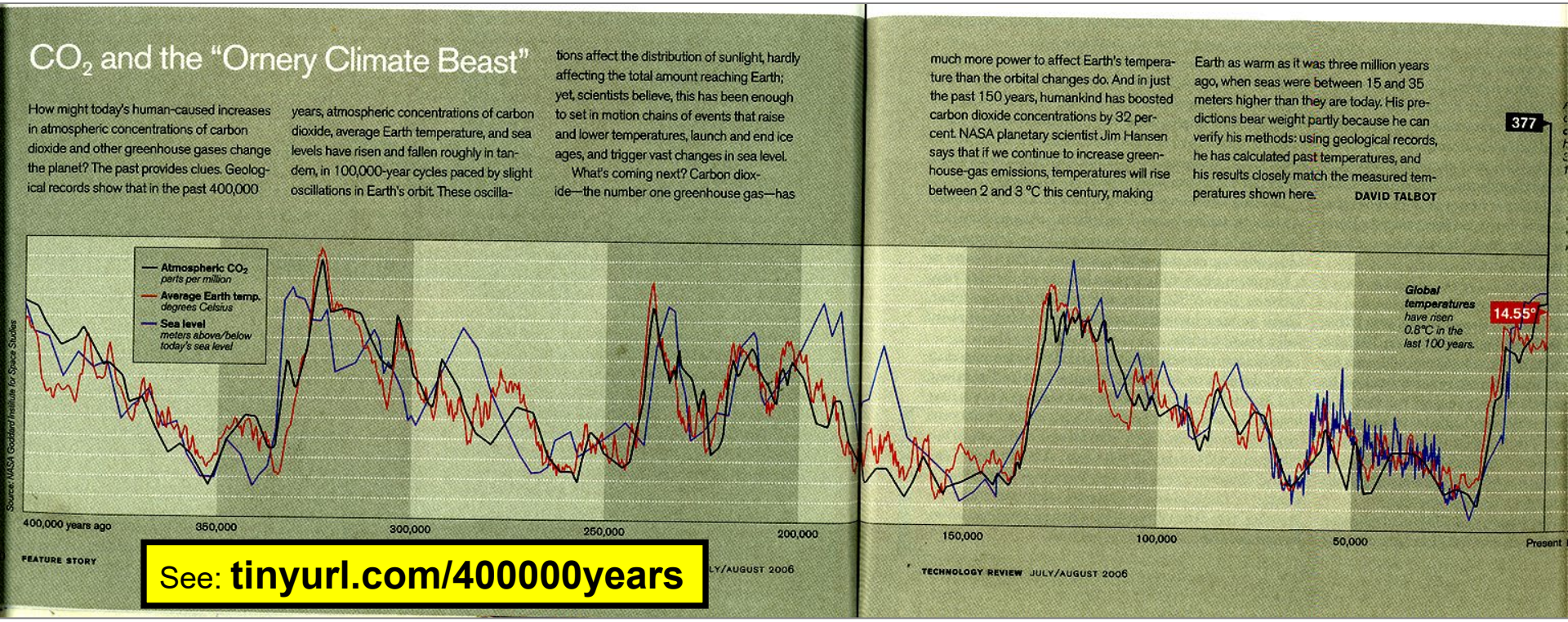
ARCTIC "LAKE": Not all that unusual


Carbon dioxide emissions
by source since 1880
Land use
Coal
Oil
Gas
Other
1880
1900
1920
1940
1960
1980
2000
2020


carbon dioxide level (parts per million)
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
For millennia, atmospheric carbon dioxide had never been above this line
current level
1950 level
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
years before today (0 = 1950)
climate.nasa.gov

Earth's Most Recent 400,000 Year Climate History

credit: Jim Hansen, NASA Goddard Inst. for Space Studies

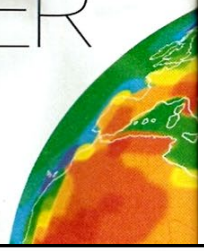


MIT's *Technology Review*, July/August, 2006

SPECIAL REPORT / CLIMATE CHANGE

A WORLD 4 °C WARMER

It may happen in our lifetime. Shanta Barley investigates what life will be like



BY 2055, climate change is likely to have warmed the world by a dangerous 4 °C unless we stop pumping greenhouse gases into the atmosphere the way we do now. This is the startling conclusion of a study by the UK Met Office, unveiled at a conference in Oxford this week.

Why so soon? Because temperature rises caused by greenhouse gas emissions are expected to trigger dangerous feedback loops, which will release ever increasing amounts of greenhouse gases. The nature and scale of these feedback loops is a subject of vigorous debate among climate scientists, but warmer oceans, for instance, may liberate more dissolved CO_2, and plants may decay faster in a warmer climate. The Met Office ran 17 different models with these feedbacks. All concluded a 4 °C world by 2055 was likely if emissions continue to rise. Even if we are lucky, we are still likely to hit 4 °C by 2070.

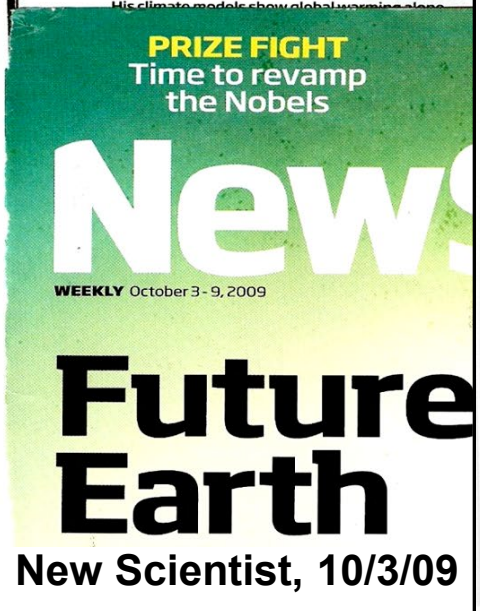
Institute for Climate Impact Research, Germany. Even the less pessimistic estimate of a 0.65-metre rise by 2100 would put at least 190 million people a year at risk from floods, says Rahmstorf's colleague Jochen Hinkel.

The Amazon – gone

In a 4°C world, climate change, deforestation and fires spreading from degraded land into pristine forest will conspire to destroy over 83 per cent of the Amazon rainforest by 2100, according to climatologist Wolfgang Cramer at the Potsdam Institute for Climate Impact Research in Germany.

Then in 2009,
TWO DIFFERENT CLIMATE GROUPS:

SAME PREDICTION



New Scientist, 10/3/09

The Nation

Washington Post, 9/25/09, p. A4

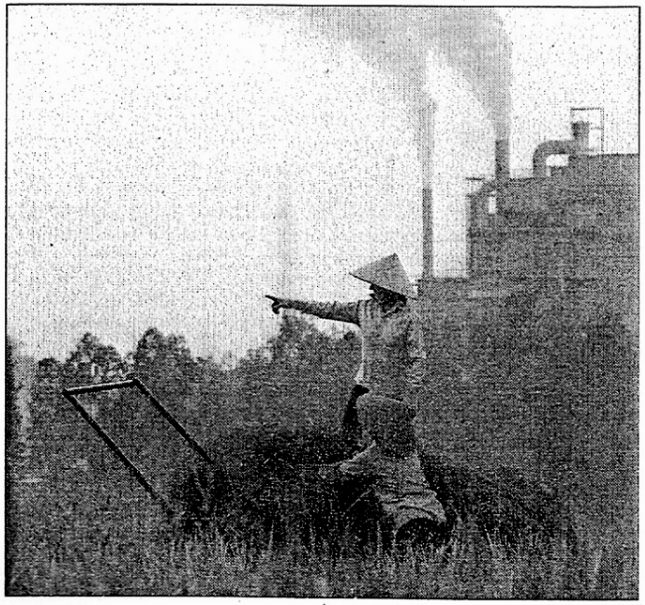
New Analysis Brings Dire Forecast Of 6.3-Degree Temperature Increase

By Juliet Eilperin
Washington Post Staff Writer

Climate researchers now predict the planet will warm by 6.3 degrees Fahrenheit by the end of the century even if the world's leaders fulfill their most ambitious climate pledges, a much faster and broader scale of change than forecast just two years ago, according to a report released Thursday by the United Nations Environment Program.

The new overview of global warming research, aimed at marshaling political support for a new international climate pact by the end of the year, highlights the extent to which recent scientific assessments have outstripped the predictions issued by the Nobel Prize-winning U.N. Intergovernmental Panel on Climate Change in 2007.

Robert Corell, who chairs the Climate Action Initiative and reviewed the UNEP report's scientific findings, said the significant global temperature rise is likely to occur even if industrialized and de-



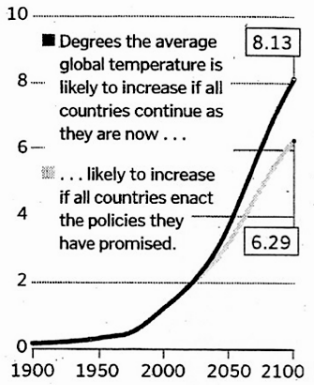
BY KHAM — REUTERS

Farmers are overshadowed by a smoke-belching cement factory outside Hanoi. Even with sharp emissions curbs, temperatures may rise disastrously.

Warming Trend

Researchers say global temperatures as likely to rise more than six degrees by the end of the century even if every country enacts all climate legislation it has promised to enact to date.

Temperature increases, in degrees Fahrenheit



SOURCE: Sustainability Institute

THE WASHINGTON POST

Journal of Geoscience and Environment Protection > Vol.9 No.3, March 2021

Check for updates

Linear Global Temperature Correlation to Carbon Dioxide Level, Sea Level, and Innovative Solutions to a Projected 6°C Warming by 2100

Thomas F. Valone

Integrity Research Institute, Beltsville, USA.

DOI: 10.4236/gep.2021.93007 **PDF** **HTML** **XML** **3,489** Downloads **13,636** Views

Citations

Abstract

Too many climate committees, conferences, articles and publications continue to suggest a one and a half (1.5°C) to two degrees (2°C) Celsius as an achievable global limit to climate changes without establishment of any causal link to the proposed anti-warming mechanism. A comprehensive review has found instead that observationally informed projections of climate science underlying climate change offer a different outlook of five to six-degree (5°C - 6°C) increase as "most accurate" with regard to present trends, climate history and models, yielding the most likely outcome for 2100. The most causative triad for the present warming trend from

CO_2 and the "Ornery Climate Beast"

How might today's human-caused increases in atmospheric concentrations of carbon dioxide and other greenhouse gases change the planet? The past provides clues. Geological records show that in the past 400,000 years, atmospheric concentrations of carbon dioxide, average Earth temperature, and sea levels have risen and fallen roughly in tandem, in 100,000-year cycles paced by slight oscillations in Earth's orbit. These osc

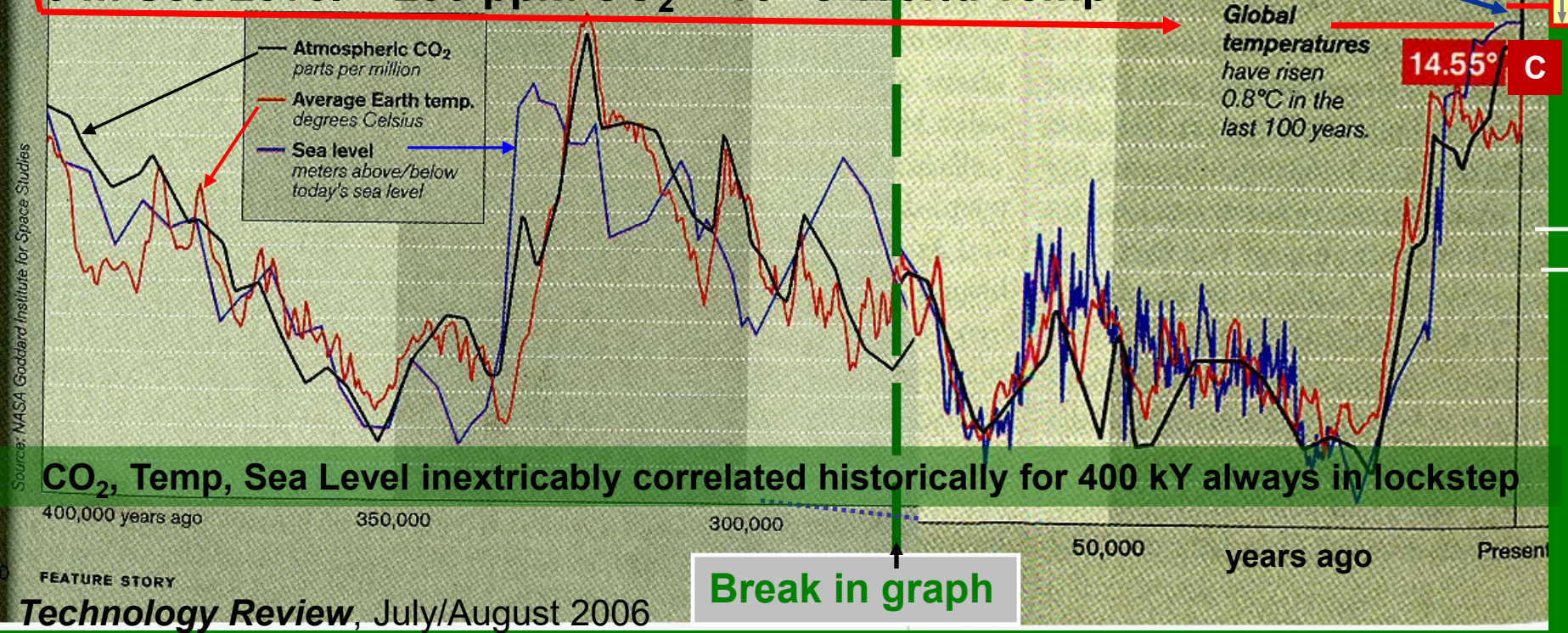
Global CO_2 Level in 2024

420 ppm

Temp Gap: 6°C (10°F)

Sea Level Gap

Baseline:
0 m Sea Level = 290 ppm CO_2 = 15 °C World Temp



CO_2, Temp, Sea Level inextricably correlated historically for 400 kY always in lockstep

Break in graph

FEATURE STORY
Technology Review, July/August 2006

KEY to graph: 20 ppm = 1°C = 20 meters

Projected Sea Level Rise is 80 meters

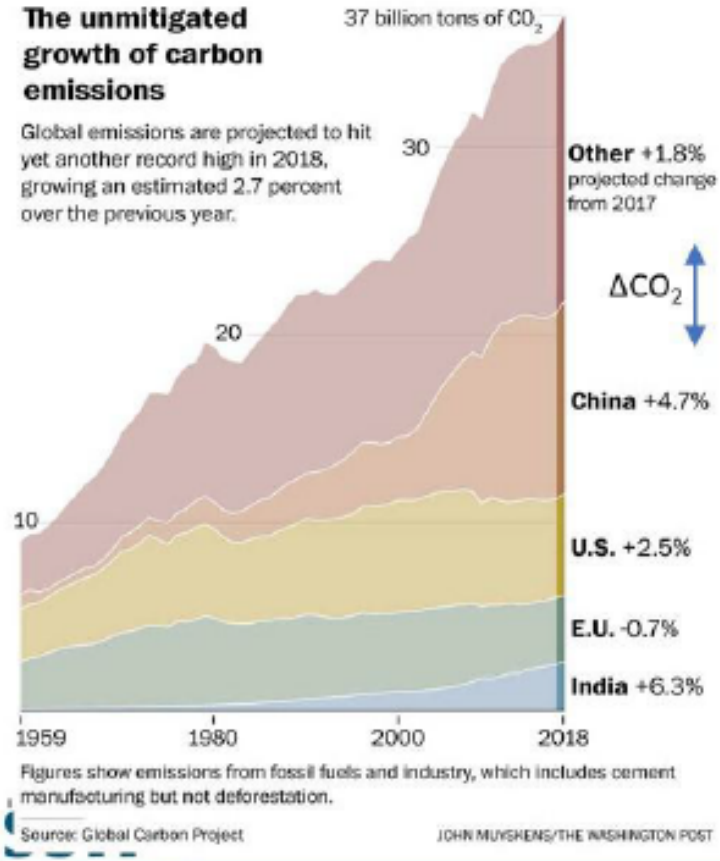
See: **tinyurl.com/400000years**

- Graph enhancements by Thomas Valone, PhD, PE updated 2024

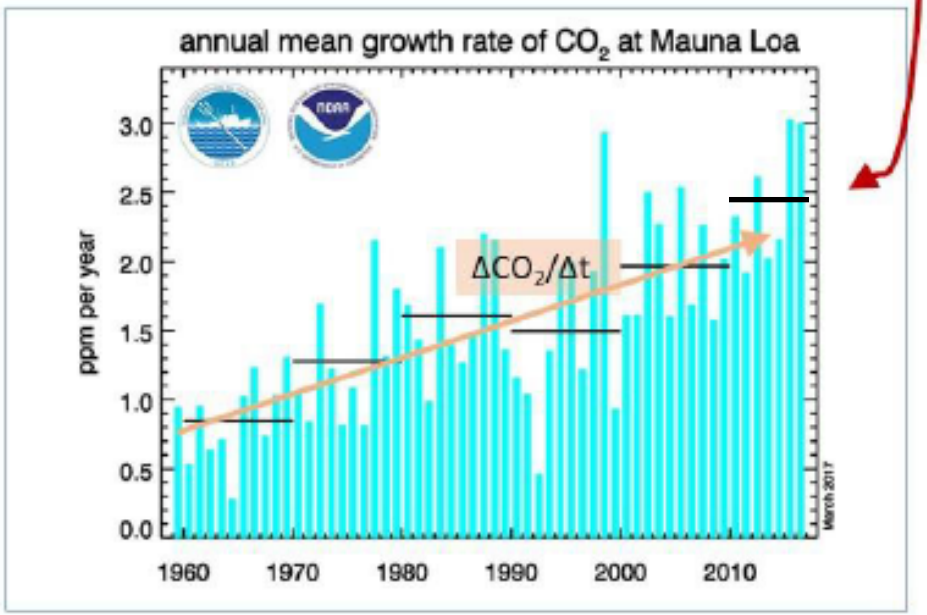
Nat Geo “**Six Degrees Could Change the World**” documentary

WHY 6°C?
(20 ppm=1°C)
So then:
120 ppm x 7.8 = 936 Gt of excess CO2 above our ignorant heads!

CARBON EMISSIONS PER ANNUM



- CO_2 up to 40 gigatons per year worldwide rapidly *increasing rate*
- compared to 30 Gt/yr ten years ago



 Copyright 2019 Authors

Fig. 2. Rate of change for CO2 emissions per year [4]

Since this year's Global Climate Change report states that 0.96 W/m² is the new heat trapping imbalance, TWICE that of 20 years ago (doi.org/m27m),

A Challenging Question asked Greensand in Denmark

Denmark has decided to move ahead with the Greensand carbon capture and storage pilot project in the Danish North Sea. The pilot targets the first offshore injection by late 2022. (CREDIT: Creative Commons)

As early as 2005, carbon capture and storage was identified by the UN's Intergovernmental Panel on Climate Change (IPCC) as one of the solutions for tackling climate change. So why aren't we going full steam with carbon capture?

ProjectGreensand.com

partnered with INEOS company for CDR and DAC

Capable of reaching 8 million tonnes of CO_2 per year by 2030

Already the first carbon storage injects CO_2 in 1800 meters below the North Sea seabed.


BISON
CarbonCapture Inc. announces Project Bison: our five megaton direct air capture project in Wyoming

Gigaton CO_2 Removal

Analysis by the National Academy of Sciences (NAS) and Intergovernmental Panel on Climate Change (IPCC) shows that deployment of carbon removal is critical to achieve U.S. and global emissions reduction targets by 2050. Even with rapid investment in emission reductions, the United States could need to remove about 2 gigatons of CO2 per year by midcentury to reach net-zero — that's about 30% of U.S. 2019 greenhouse gas emissions. Globally, scientists predict that up to 10 GtCO2 will need to be removed annually from the atmosphere by 2050, with increased removal capacity up to 20 GtCO2 per year by 2100.

Dan Lashof, Dir. World Res. Inst.

Anu Khan (She/Her) · 3rd
Science & Innovation at Carbon180
United States · Contact info
500+ connections

Message + Follow

John Kerry's Climate Warning: 'Even If We Get To Net Zero, We Need Carbon Removal'
HuffPost

About

Reformed electrochemist working at the intersection of technology, policy, equity, and justice to bring the carbon removal sector to gigaton scale.

Integrity Res. Inst. wants to help save the world by advocating Gigaton Carbon Dioxide Removal (CDR) or Direct Air Capture (DAC). Will billionaires and Congress help?

SciTechDaily

BIOLOGY | CHEMISTRY | EARTH | HEALTH | PHYSICS | SCIENCE | SPACE | TECHNOLOGY

HOT TOPICS JUNE 28, 2022 | NASA CAPSTONE LAUNCHES SUCCESSFULLY – WILL TEST NEW LUNAR ORBIT FOR

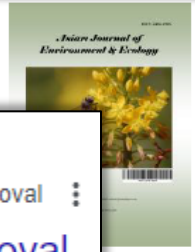
HOME EARTH NEWS

Metals Supercharge Method To Bury Billions of Tons of Harmful Carbon Dioxide Under the Sea for Centuries

TOPICS: Atmospheric Science Carbon Capture Chemical Engineering Climate Change Popular University Of Texas At Austin

Denmark has decided to move ahead with the Greensand carbon capture and storage pilot project in the Danish North Sea. The pilot targets the first offshore injection by late 2022. (CREDIT: Creative Commons)

As early as 2005, carbon capture and storage was identified by the UN's Intergovernmental Panel on Climate Change (IPCC) as one of the solutions for tackling climate change. So why aren't we going full steam with carbon capture?



Asian Journal of Environment & Ecology

Volume 20, Issue 2, Page 42-58, 2023; Article no.AJEE.97404
ISSN: 2456-690X

XPRIZE Foundation
https://www.xprize.org › prizes › carbonremoval

$100M Prize For Carbon Removal

This four-year global competition invites innovators

Gigatonne Carbon Dioxide Removal Can Reverse Global Heating Trend

Thomas F. Valone [a*]

., Suite. 209, Beltsville MD 20705, US.

Author's contribution

erpreted and prepared the manuscript.

Article Information

DOI: 10.9734/AJEE/2023/v20i2436

Research Open

Geology, Earth and Marine Sciences
Volume 4 Issue 3

Research Article

Direct Air Capture and Removal of Gigatons of CO_2 Offers Hope for Climate Recovery

Thomas F. Valone PhD*

Using the Oceans to Help Capture Carbon › How can the deep blue seas fight climate change best?

BY PRACHI PATEL | 15 AUG 2023 | 5 MIN READ |

Alkalinity Generation Constraints on Basalt Carbonation for Carbon Dioxide Removal at the Gigaton-per-Year Scale

Benjamin M. Tutolo*, Adedapo Awolayo, and Calista Brown

Cite this: *Environ. Sci. Technol.* 2021, 55, 17, Article Views | Altmetric | Citations | Share | Add to

Atlantic Council

https://www.atlanticcouncil.org › blogs › energysource

Gigaton carbon removal and the Paris Climate Agreement

May 14, 2021 — **Gigaton-scale removal**, capture, and storage technologies will be

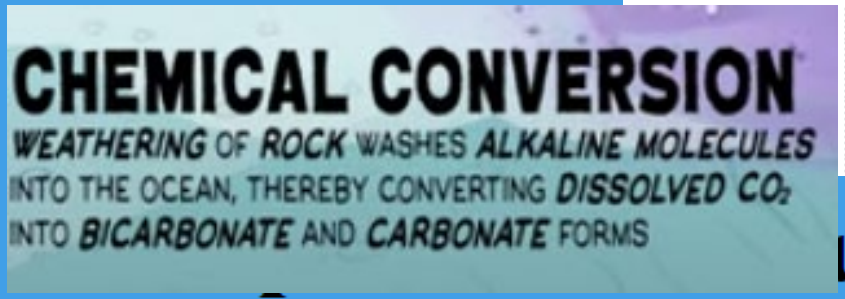
This large-scale Captura facility, shown in an artist's rendering, could capture gigatons of carbon dioxide dissolved in ocean water. CAPTURA CORP.

Scientists Turned Carbon Dioxide into Oxygen by Zapping It with a Laser

climeworks

SCIENTIFIC REPORTS

Disintegration of Carbon Dioxide Molecules in a Microwave Plasma Torch



Air Capture Summit

News | 06.04.2023

Vesta Earth
https://www.vesta.earth › approach

The Approach

From Pilot **Project** to **Gigaton**-scale CO2 Removal.

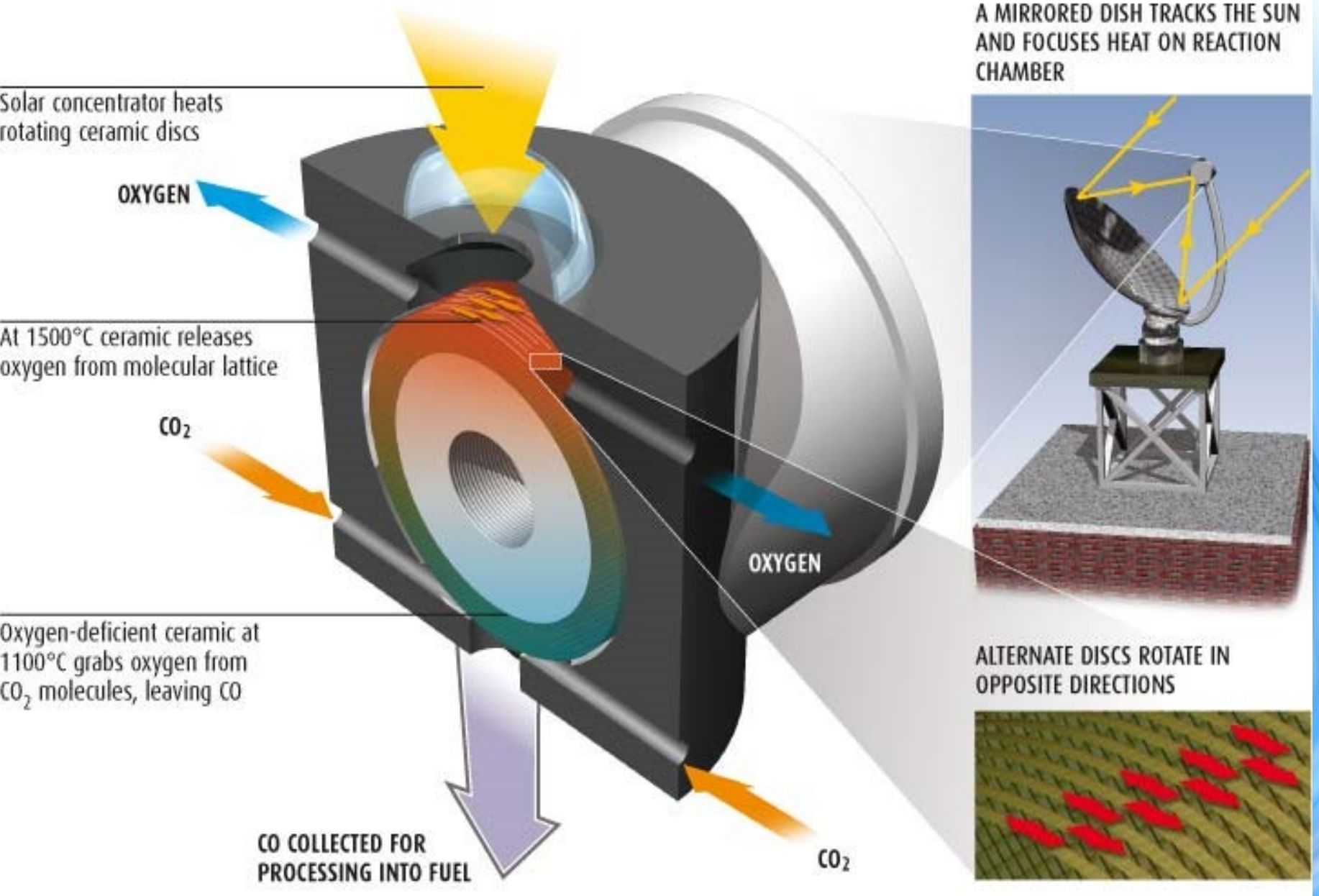
CO2 in Denmark's subsurface on March 8, 2023, at the First Carbon Storage event.

Project Greensand
(megaton CDR)

Top contender: **Enhanced Rock Weathering**, proven in Florida 2022 and Halifax Harbor 2023, as low as **$25/tonne** and up to **15+ billion tonnes/**year (gigatonnes)!

CO_2 SPLITTER

Heat from the sun provides energy to break down CO_2, releasing CO which can then be used to produce synthetic fuels



Gigatonne Carbon Dioxide disposition

Scaling to Billions of Tons of Carbon Capture & Management Infrastructure

Effective decarbonization requires that carbon capture, management and disposition infrastructure and systems be planned and implemented at "**GT scale**" (Giga Tonne scale), and not through a piecemeal project-based approach.

Enabling GT scale carbon capture and management requires common, scalable and seamless carbon disposition infrastructure; commoditized cost of carbon capture, storage and disposition; mechanisms for risk transfer & arbitrage for CO_2; mechanisms for net-back and utilization of carbon credits; and enabling policy design.

DasturEnergy.com – aims at 5 Gtpa CDR soon and over 10 Gtpa later on

climeworks

Act now

Support the scale-up of direct air capture

Join our community of forward-thinking Climate Pioneers who are removing CO_2 from the air.

"almost 1000x more effective than trees on the same land"

https://climeworks.com/subscriptions

Direct air capture supports nature by scaling CO_2 removal

Trees are critical in the fight against climate change for their ability to remove CO_2 from the atmosphere.

JUNE 28

World's largest direct air carbon capture facility will reduce CO2 by .0001%

Jameson Dow - Jun. 28th 2022 12:08 pm PT

134 Comments Facebook Twitter Pinterest LinkedIn Reddit

The world's largest carbon direct air capture facility has started construction in Iceland, run by Swiss startup Climeworks AG.

Integrity Research Institute

"Dedicated to researching scientific integrity in the areas of energy, propulsion, and bioenergetics"

GOALS

40 gigatons CDR/year by 2030

100 gigatons CDR/year by 2050

www.integrity-research.org

www.futurenergy.org

www.BioenergyDevice.org