



# Climate Change

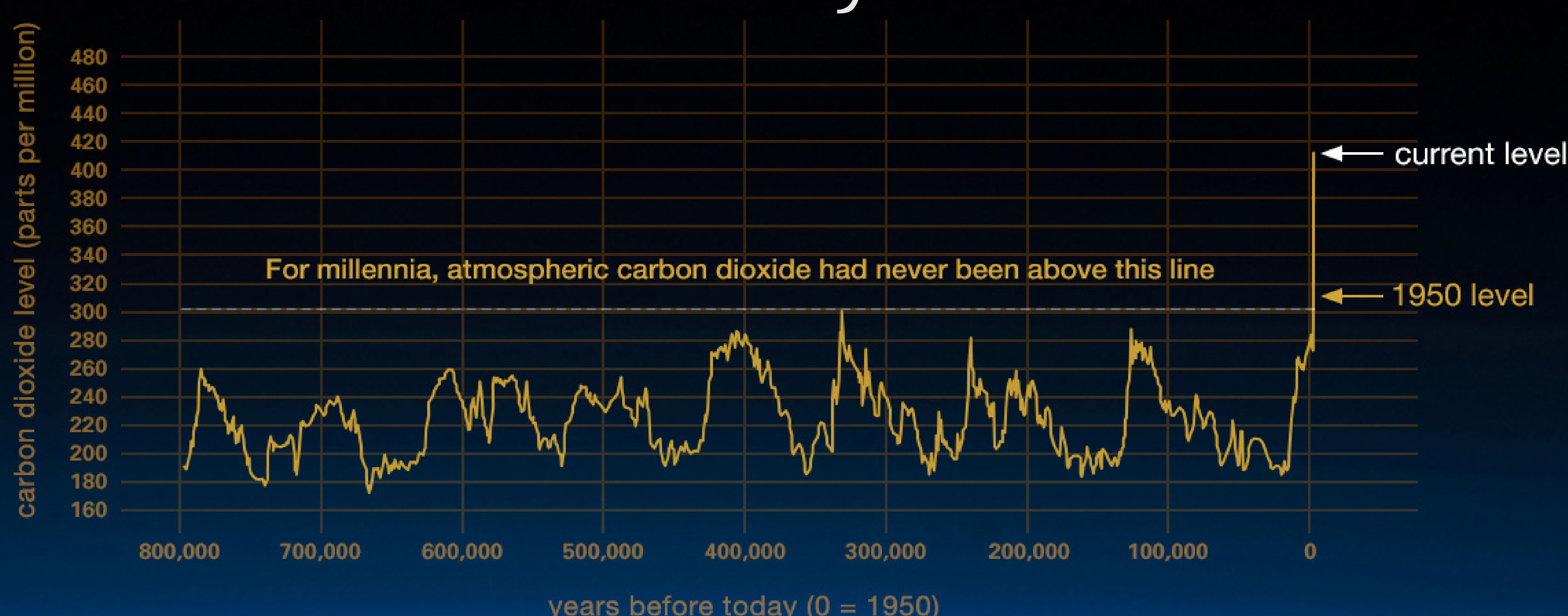


By Telvin Benjamin

For many eons, the climate has naturally been changing between warm and cool periods. The Earth has faced global warmings, ice ages, and several mass extinctions. Until recently in the past 100 years, humans have been interfering with this cycle increasing CO2 levels in the atmosphere, thus, elevating global temperatures. The amount of evidence for climate change is overwhelming, so here is a brief introduction into the history, short and long term impacts, and solutions to this important matter.

Care for our planet for many generations to come!

## History



- > Temperature has correlated with CO2 levels.
- > CO2 levels at highest in at least 650,000 years.
- > Due to industrial revolution, CO2 in the atmosphere are at levels that has not been seen for eons.
- > Annual average anomaly, 2019: 0.98 C (1.76 F)
- > Global mean surface temp.(normal): 15 C (59 F)
- > As of May 2020: 413.61 ppm CO2 level ↑

climate.nasa.gov

## Short Term Impacts

- > Timeline: present - 2040s
- > Droughts, floods, and wildfires are occurring more frequently.
- > Greenland ice sheets loses ~279 gigatonnes per year.
- > Arctic ice minimum occurs every September and now its declining rate is 12.85% per decade.



The New York Times



Drought vs Flood

- > Sea levels rise by 3.3 mm per year (now).
- > Due to increased CO2 levels, the pH levels of the oceans are decreasing affecting marine life.
- > Due to ice melting, freshwater released into the ocean at high latitudes decrease the salinity.

Boston Harbor



TeBe Photographs

A glimpse into the future for coastal cities.

- > King tides (like image above) likely becomes the norm for high tides by end of century.
- > By 2100, global sea levels are projected to rise 0.3 to 2.4 m (1 - 8 ft.).
- > Lots of species may go extinct by 2100. →

## Long Term Impacts

- > Timeline: up to 2100+
- > Stronger, intense, and more frequent storms.
- > By mid-century, Arctic to become ice-free during the summer.
- > Global temperatures projected to rise 0.4 to 5.6 C (2.5 - 10 F) over the next century.

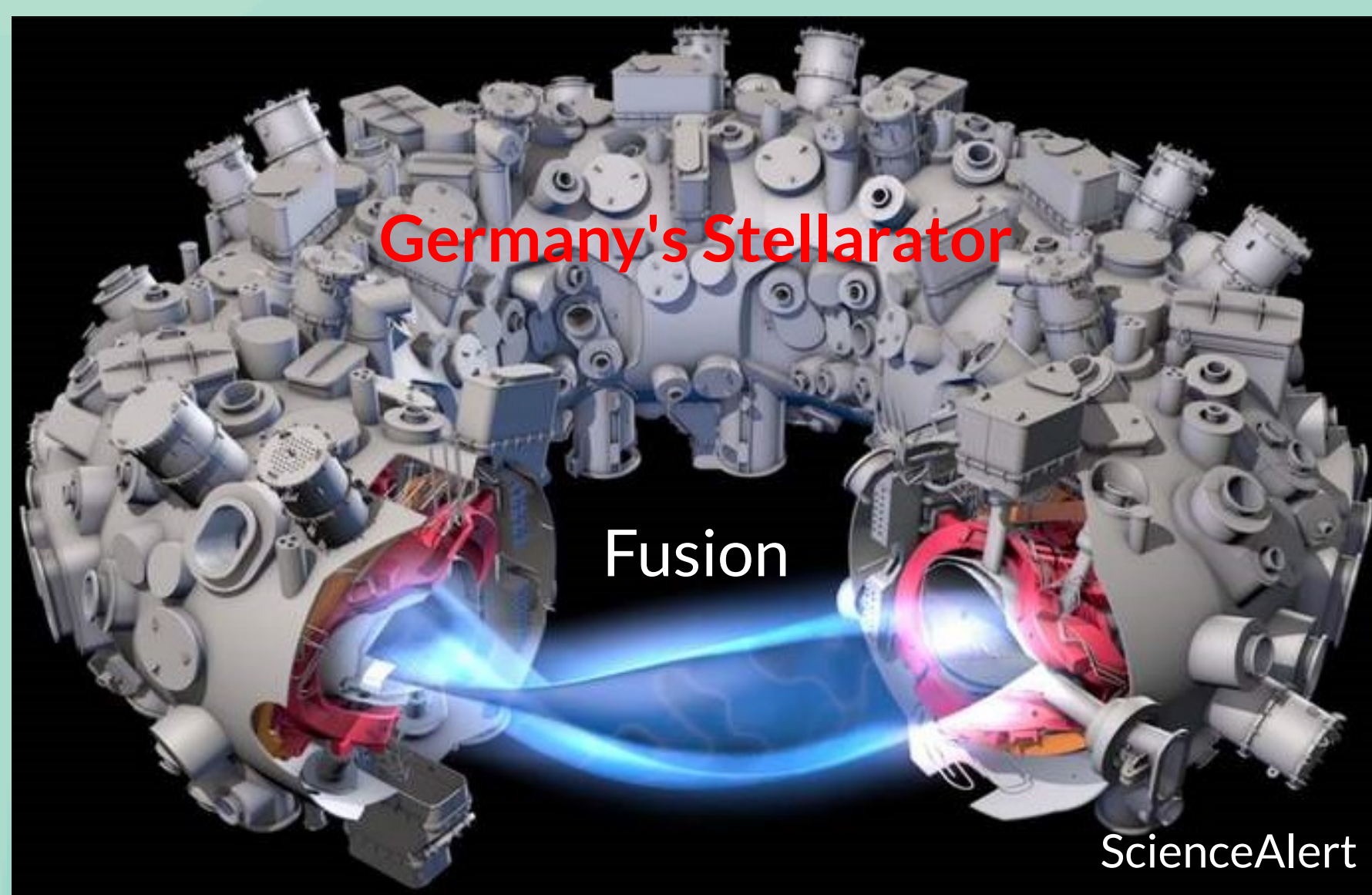
6th Mass Extinction?



Scene from Cosmos: A Spacetime Odyssey

For the past century, our world has been running on fossil fuels (non-renewable energy): oil, coal (no such thing as "clean"), and natural gas. All these forms release greenhouses into the atmosphere and are limited in supply, meaning they will not last forever. The push now is to convert our dependence to renewable energy such as solar, wind, and nuclear fusion (not fission).

## Solutions!



Further solutions include extracting CO2 from the atmosphere in a closed-loop industrial process and storing it to be converted into fuel that is compatible with today's technology. Additionally, synthetic photosynthesis is being developed to convert CO2 into organic compounds faster than plants. As always, trees should be replanted with wetlands being restored to help increase absorption of CO2.

Solar Plant in Texas



NewsWest9

Solar arrays can be placed in vast open land, such as deserts, and in space beaming back energy to Earth potentially producing gigawatts of power. Wind farms can be placed in open fields and seas producing megawatts of power. Fusion reactors would be near water (as the fuel) producing unlimited amounts of energy. The goal is to sustain 100% renewable energy within this century.

Wind farm in Wyoming



Green Chip Stocks

## Sources

- <https://climate.nasa.gov/evidence/>
- <https://climate.nasa.gov/causes/>
- <https://climate.nasa.gov/effects/>
- <https://climate.nasa.gov/solutions/adaptation-mitigation/>
- <https://www.epa.gov/climate-change-science/future-climate-change>
- <http://carbonengineering.com/air-capture/>