

APRIL 22, 2021

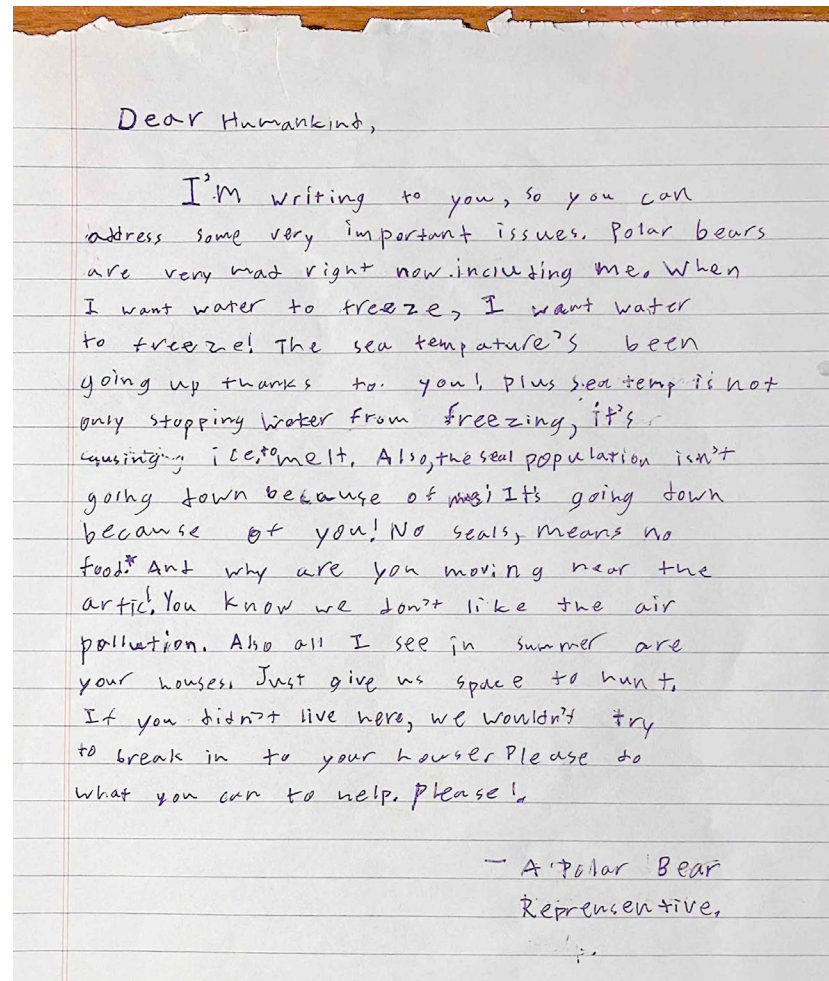
## Dear Humankind,

I'm writing to you so you can address some very important issues. Polar bears are very mad right now, including me. When I want water to freeze, I want water to freeze! The sea temperature's been going up thanks to you. Plus, sea temp is not only stopping water from freezing, it's causing ice to melt. Also, the seal population isn't going down because of me—it's going down because of you! No seals means no food. No food means no fat. No fat means death!

And why are you moving to the Arctic? You know we don't like your air pollution. It's hard to breathe because of your cars, gas stations and smoke from chimneys. All I see in the summer are your houses. Just give us space to hunt. If you didn't live here we wouldn't break into your houses. Please do what you can to help. Please!



Sincerely,  
A Polar Bear Representative

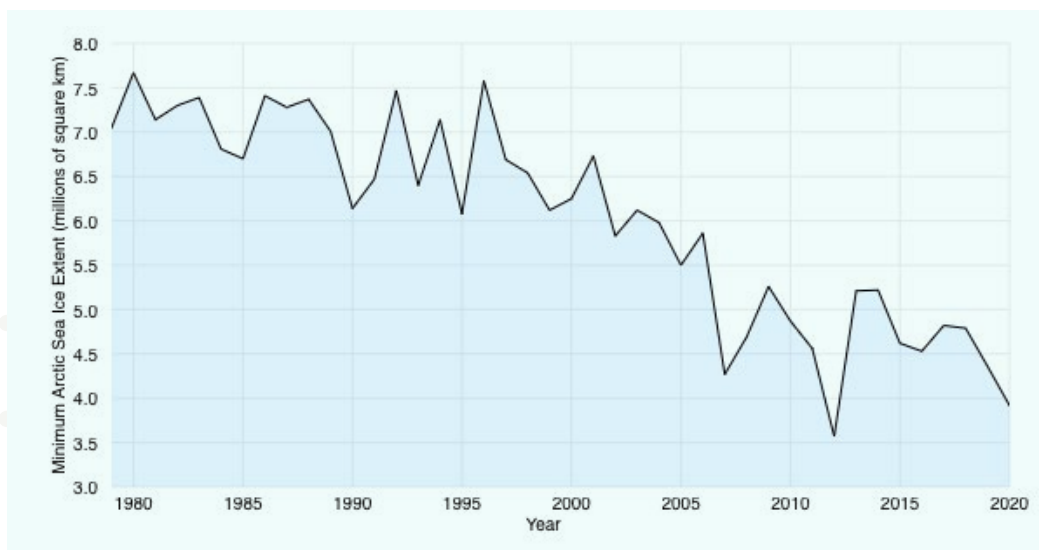


*(Writing piece taken from Grupology's Poetry & Perspective Class, Student: 5th grade, 10 years old)*

April 22, 2021

## Dear Polar Bears,

I was horrified after reading your letter and immediately did some research on the matter. Scientists can confirm that the extent of the Arctic summer sea ice has almost halved. Refer to the following Figure 1:



*Fig. 1: The extent of Arctic sea ice in September (end of summer) has decreased from 7.7 million square km in 1980 to 3.9 million square km in 2020 (almost halved).*

**[SOURCE: WWW.CLIMATE.GOV/NEWS-FEATURES/UNDERSTANDING-CLIMATE-CLIMATE-CHANGE-MINIMUM-ARCTIC-SEA-ICE-EXTENT](https://www.climate.gov/news-features/understanding-climate/climate-change-minimum-arctic-sea-ice-extent)**

Research tells us that the sea is getting warmer and often the ice is not even thick enough to form solid sheets. As a result, you polar bears are not able to hunt for seals through their breathing holes in the ice like you've always done. Seals do not need to breathe through breathing holes when the ice is all broken up. This is an alarming situation for you. We think that human reliance on fossil fuels bears much of the responsibility for the recent global warming, and this increase in sea temperature is especially disturbing in the Arctic region.

Before the industrial revolution, people traveled by walking, riding horseback, and in horse-drawn carriages. They burned wood to warm themselves, and to cook, and they

lit their homes with lamps that burned animal or vegetable fats. Then, by the mid-19th century, the industrial revolution brought new technologies that moved civilization into the modern era. The use of trains and electric lights, and later cars and planes, exploded. These require much more fuel than what we can get from burning wood and fats.

People began to dig up buried fuels like coal, oil, and natural gas to run all of our modern machines. These are called fossil fuels because they are from fossilized trees and marine animals which were buried in the earth a very long time ago, just like dinosaur fossils. Fossil fuel deposits were plentiful and cheap to dig up. At that time, people did not realize that burning these fossil fuels would release extra carbon dioxide and other greenhouse gases into the air which could eventually lead to the condition we now refer to as global warming. Sometime in the mid-20th century, people started becoming aware that the accumulating carbon dioxide was increasing the temperature of the earth. Carbon dioxide concentration in the air was about 280 parts per million before the industrial revolution. This has increased to 415 ppm in 2020. See Figure 2 below.

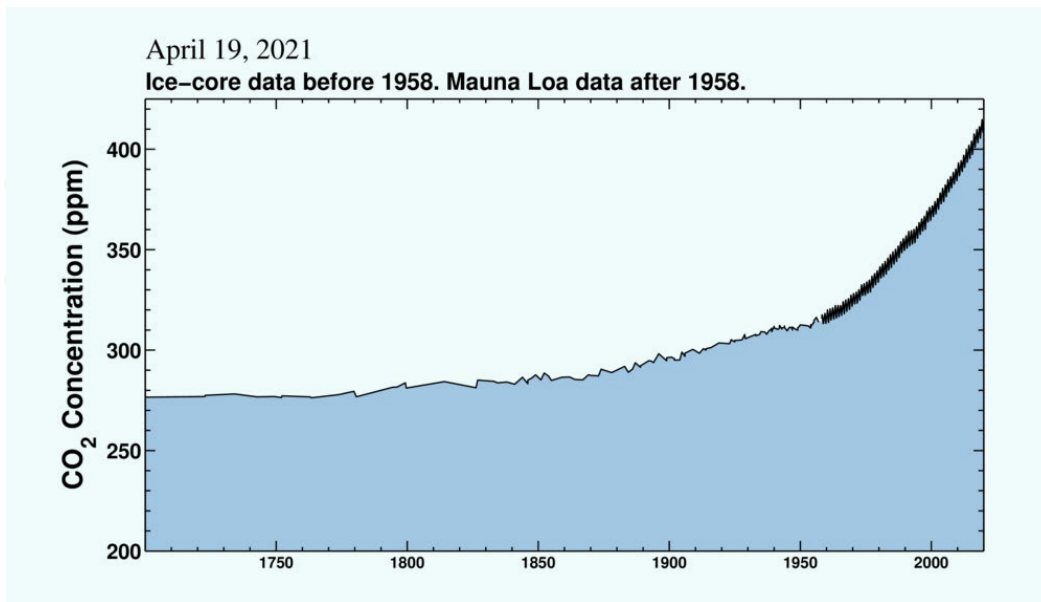
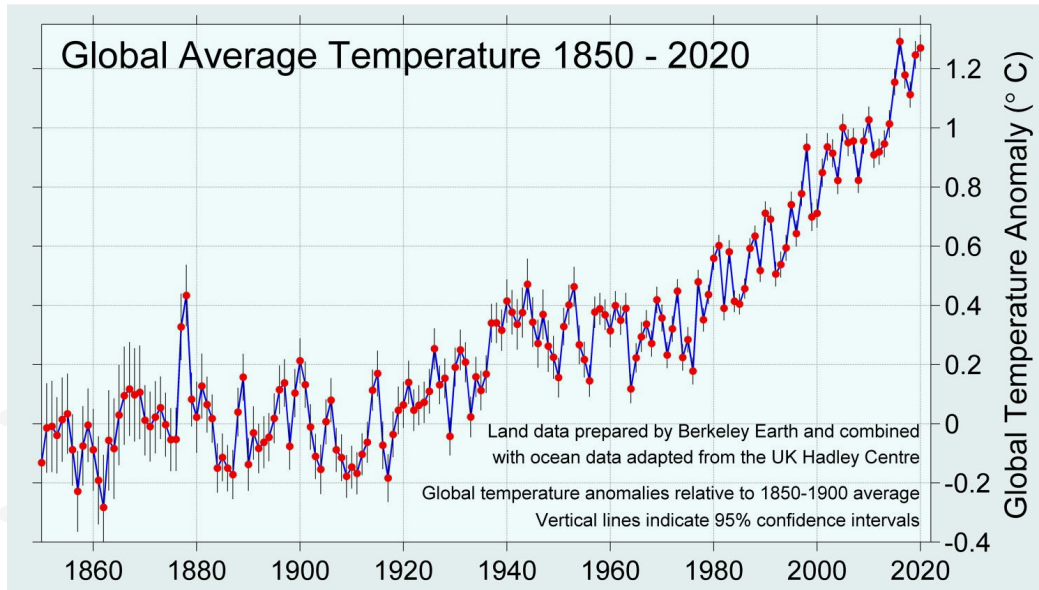


Fig. 2: Atmospheric carbon dioxide concentration has increased from about 280 ppm in 1850 to 415 ppm in 2020.

SOURCE: [KEELINGCURVE.UCSD.EDU/](https://keelingcurve.ucsd.edu/)

As a result, the average temperature has increased by about 2.16° F (1.2°C) from the pre-industrial average.



*Fig. 3: Average temperature has gone up by 1.19 C (2.14 F).*

**SOURCE: [BERKELEYEARTH.ORG/GLOBAL-TEMPERATURE-REPORT-FOR-2020/](https://berkeleyearth.org/global-temperature-report-for-2020/)**

Scientists are able to predict approximately how life might change if the earth continues to warm at this current pace. Many of us realize that we must slow down and eventually stop using fossil fuels or our global environment will be irreversibly altered to one that is inhospitable to animals, plants, and to human civilization. World leaders have agreed that we should limit global warming to well below 2° C (or 3.6° F), preferably to 1.5° C (or 2.7° F) above pre-industrial temperature levels. This is a challenging goal. It demands that we drastically cut-down our fossil fuel use, eventually reaching net zero fossil carbon emissions by around 2050. This difficult course of action is made even more difficult by the fact that many people do not believe in global warming and the science behind it. If they do not believe, they will not act—and fossil fuel use will tragically continue!

Fossil fuels permeate our energy infrastructure and form the backbone of everything we do. We use gasoline/diesel in our cars and trucks and aviation fuel in our planes. These are derived from dug up crude oil. We use electricity for lights, heating, cooling, and powering all of our gadgets. Electricity is still produced using mostly coal and

natural gas in most parts of the U.S. California is one of the exceptions, but we still use natural gas for half of our electricity generation. So, when we turn on the lights, drive a car, take a flight, or eat a fruit from another country (which was imported in), we are actively contributing to the emission of fossil carbon dioxide.

Because it is impossible to stop all these activities abruptly, we need to first focus on slowing down our fossil fuel use, gradually switching over to non-fossil sources of energy. We cannot go back to wood burning stoves and oil lamps, but we do have many renewable fuel alternatives to choose from. Governments and private companies all over the world are investing in developing renewable energy technologies for the 21st century and beyond. Looking forward, it is possible to keep global warming to less than 2°C if the human population works together toward this common and essential goal.

Each of us can take steps today to reduce our personal carbon footprints. An individual's personal carbon footprint represents the total amount of carbon dioxide (and other greenhouse gases) emitted as a result of all the things that person uses or produces.

## REDUCING ONE'S PERSONAL CARBON FOOTPRINT

Humans are used to living in a particular way, taking certain conveniences for granted. Reducing our carbon footprints will require us to change certain behaviors and habits through conscious effort. This will not always be easy.

We can begin by listing the categories of the things we use, and in each category fill in as many individual items that we can think of. This will ensure that we don't miss things. Here is an example list:



### TRAVEL

car, bus, train, airplane, bike, walk, etc.



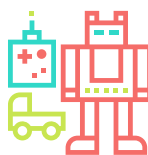
### IN THE HOME

heating, A/C, lights, washer, dryer, dishwasher, refrigerator, coffee maker, blender, Alexa, etc.



### FOOD & DRINK

foods/beverages we usually eat from each food group



### PERSONAL ITEMS

toys, blow dryer, laptop, tablet, clothes, electric toothbrush & razor, phone, video games, gadgets, etc.



## JUMP START

We can shrink our carbon footprints by identifying a few things from our list that have the most impact and are easiest to change. These will be different for different people. Here are some helpful guidelines and useful facts to focus on and consider:



**Travel** produces the largest fraction of greenhouse gas emissions in the U.S. An average car produces about 5 US tons of carbon dioxide per year. Making changes in how we travel can significantly reduce our carbon footprints. We can take steps to reduce driving, for example, by carpooling, using public transit, biking or walking when possible. An average return flight from California to New York produces almost three quarters of a US ton of carbon dioxide. We should avoid flying if possible. When we absolutely need to fly, we can buy carbon offsets. These reduce greenhouse gases elsewhere, e.g., by planting more trees that absorb carbon dioxide.

*Check this out:* [WWW.THEGUARDIAN.COM/ENVIRONMENT/2011/SEP/16/CARBON-OFFSET-PROJECTS-CARBON-EMISSIONS](http://WWW.THEGUARDIAN.COM/ENVIRONMENT/2011/SEP/16/CARBON-OFFSET-PROJECTS-CARBON-EMISSIONS)



**In the home** we can reduce heating and cooling. We can also take steps like the following. Turn off lights and electronics when they are not in use. Don't run the dishwasher or washer/dryer until they are full. We can commit to using energy efficient appliances and lights and install solar panels on the roofs of our houses to replace some of the grid electricity we use.

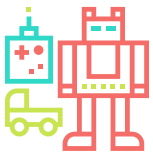


**Food production and transport to your table** emits greenhouse gases and adds to our carbon footprint. All foods are not created equal. Foods higher up on the food chain usually require more resources and energy to produce, so they have larger carbon footprints. For example, by some measures, the carbon footprint of beef is about four times that of chicken and 13 times that of beans/tofu and veggies, on a pound for pound basis. This does not mean that we all must be vegetarian or vegan all the time. We can reduce our food carbon footprint by decreasing the amount of meat and dairy in our diets.

*Check this out:* [WWW.MONDAYCAMPAIGNS.ORG/MEATLESS-MONDAY](http://WWW.MONDAYCAMPAIGNS.ORG/MEATLESS-MONDAY)

Foods that are produced non-locally are transported by ship, air, trains or trucks. All these modes of transportation use fossil fuels which emit carbon dioxide. We can reduce our carbon footprints by eating locally grown foods. This means that we may need to adjust our diets to things that are in- season where we live.

Food packaging is another culprit. Avoiding disposable food packaging and committing to reusable bags and containers to carry and store food would also reduce carbon print. As would avoiding buying disposable drink bottles.



**Personal items** have carbon footprints too -- just like food! We need to be mindful about buying fewer new items and reuse what we already own for a longer time. Recycling used items and buying recycled items when possible is also a good strategy.

## SUSTAIN

Our carbon footprints shrink when the changes we make become habits and an unconscious part of our daily routines. When we buy something, its effect on our carbon footprint should come to mind just like its price does.

We can fine-tune our carbon footprint reduction by calculating the effect of individual activities and items. We have the ability to compare activities and commodities in a more informed manner. For example, suppose one of us wants to eat a mango that is imported from Mexico, can we offset its transportation carbon footprint by walking to the grocery store instead of driving there or by eating less meat?

There are many online carbon footprint calculators that can help us with these types of comparisons. One example:

[WWW.NATURE.ORG/EN-US/GET-INVOLVED/HOW-TO-HELP/CARBON-FOOTPRINT-CALCULATOR/](http://WWW.NATURE.ORG/EN-US/GET-INVOLVED/HOW-TO-HELP/CARBON-FOOTPRINT-CALCULATOR/)



## **TRYING IT TOGETHER**

Human beings are basically a successful species because we work together in groups. Because of this useful social trait, we have the ability to learn from each other rather than reinventing the wheel individually. So, let us share what we learn and understand about climate change so we can slow it down by shrinking our collective carbon footprint.

And to you, the polar bears, we bow our heads in respect. We regret the predicament we have put you in and promise to commit to the actions outlined above in hopes of reversing this tragic trajectory. We salute your beauty and promise to do all we can to restore the awe inspiring elements of your natural Arctic habitat.

With regret and renewed commitment,

Mandira Roy

*Education Advisor at Grupology*