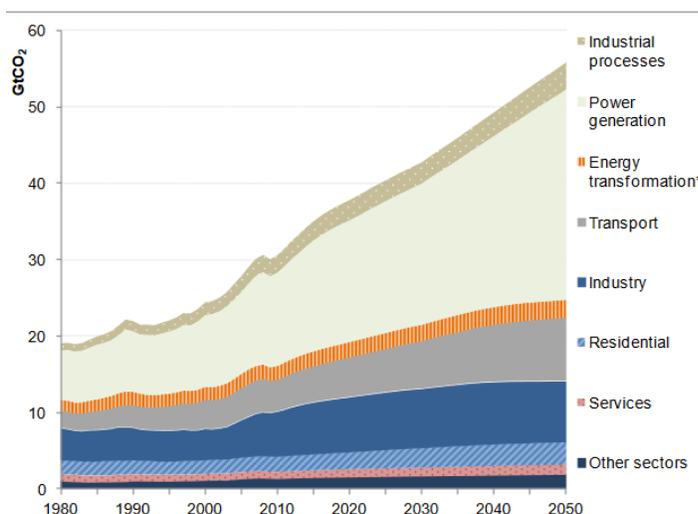


The Climate Conference 2050: Solving the Climate Crisis

History

In 2019, the heatwave across Northern Europe and the devastating fires in the Amazon and Australia presaged a planet that was entering an intense climate crisis. While many activists took these calamities as a call for action, the political situation in both the developed and developing world prevented any meaningful action from being implemented. Over the next 30 years, governments failed to properly address climate change, with the limited reductions made to greenhouse gas output of developed countries more than offset by increased emissions coming from the increasingly prosperous and industries developing world. But the roots of the climate change did not originate in 2019, instead, to fully understand the issue of climate change, emissions and temperature changes must be put in the context of the last 250 years of human history.

Figure 3.7. Global CO₂ emissions by source: *Baseline, 1980-2050*



From 1970 to 2005, global greenhouse gas emissions doubled.¹ While greenhouse gasses have different impacts on climate change, carbon dioxide, methane, and nitrous oxide are the most potent and prevalent greenhouse gas emissions. Carbon dioxide is the most common greenhouse gas and most carbon comes from carbon intensive coal power plants which historically produced the majority of the world's electricity. From 2010 to 2050, the world's electricity demand increased 80%. Since 1980, Carbon dioxide emissions nearly tripled. Even though many developed countries reduced emissions by investing in renewable energies and electric cars, the conversion of forest to cropland,

increases in industrial production, and demand for energy in the developing world more than offset these emission reductions made in the developed world—causing the overall increase in carbon emissions.²

Models of temperature increases have been largely accurate. As of 2050, global temperatures have risen 2.0°C above preindustrial levels. This warming has already triggered a number of disastrous changes to the ecosystem, global health, and sea levels. At current projections of greenhouse gas emissions, temperatures will increase to 4.1°C-4.8°C above pre-industrial levels by 2100, a catastrophic amount that would see the disappearance of the polar ice caps.³ Increased average temperatures have caused an increase in temperature extremes, with most locations breaking their record for the warmest summer on record every couple of years.⁴ Dangerously, the polar regions have experienced the largest amount of warming, this melts the ice caps more quickly, which decreases the planet's albedo effect—or the amount of sunlight reflected to space—further increasing the planet's warming. Increased temperatures have also changed weather patterns, leading to the repeated failure of the monsoon rains in South and Southeast Asia and an increase in drought in the Mediterranean Basin. These changing and

¹ "OECD Environmental Outlook to 2050: Climate Change." *OECD*. <https://bit.ly/38Xkbak>.

² *Ibid.*

³ "Temperatures." *Climate Action Tracker*. <https://bit.ly/2VdXaeV>.

⁴ "A Degree of Concern: Why Global Temperatures Matter." *NASA*. <https://go.nasa.gov/2Td906K>.

unpredictable rainfall patterns make it more difficult for farming and for already arid regions, can make ensuring there is enough drinkable water for everyone a dire challenge.

Perhaps what has changed most over the last 30 years is the increasing desperation that climate change has brought on. At the turn of the millennium, the impacts of climate change had yet to be felt, allowing nations to ignore potential solutions and avoid responsibility. But over the past 30-years, the climate crisis has reached a tipping point. With current temperature increases, the Canadian and Siberian taiga are on the cusp of a massive thaw out. Currently frozen beneath the ice are substantial quantities of methane, which is 35-times more potent than carbon dioxide.⁵ If these were released, the planet would see warming over 2°C above current predictions by 2100.⁶ To make matters worse, the Greenlandic and Antarctic ice sheets are on their last legs. Scientists predict that at the current level of emissions they could completely melt in the next 25 years raising global sea levels 70 meters, enough to swallow Washington DC, New York, and London.⁷ This climate conference of 2050 is the planet's last opportunity to stave off climate changes' most devastating impacts.

But this climate conference is not taking place in a world keen on political compromise. With the devastation wrought by climate change over the past 30 years, many governments are in a desperate financial situation and feel unable to make large commitments to new international endeavors that might not work or might force their country to reduce a large amount of greenhouse gas emissions than another country. Any negotiated deal must ensure that all member countries are in compliance with cutting greenhouse gasses and prevent countries from violating the agreement. Without such provisions that verify a country's compliance, many nations are unlikely to sign an agreement.

Current Politics/Issues

Sea Level Rise

Sea level rise began modestly, before accelerating from 2040-2050. While many low-lying areas remain safely above water, rising seas have made an increasing number of people at risk of storm surges and periodic flooding during high tides. For Kiribati, the Maldives, and other island nations, sea level rise has forced many to flee their homelands. Already, sea levels have risen by 1.1 meters above pre-industrial levels, placing hundreds of millions at risk around the globe, but principally in Asia.⁸

Sea levels rise due to the melting of the polar ice caps as well as the thermal expansion of water. The Greenlandic and Antarctic ice sheets have enough water to increase ocean levels by 70 meters. Luckily, neither has completed melted, but each year the size of ice in both regions decreases more and more as longer summers prevent ice from recovering in the winter months. Additionally, an increased average temperature causes water to expand. This thermal expansion of water will continue to worsen as temperatures rise over the next 50-years. Thermal expansion of water and the melting of the ice caps contribute to sea level rise and will continue to displace people all around the globe. As has already happened in many island nations, some people will be forced to relocating completely, while others will continue to try and move to higher land within their countries.

Climate Refugees

With sea levels rising, residents of island chains around the world are living on borrowed time. In the 2010s, some low-lying islands in the Solomon Islands, Micronesia, and Palau had already been swallowed up by the sea.⁹ Across the planet, larger islands are increasingly threatened. In the Maldives, home to 550,000 people, the homes and yards of residents across the archipelago are flooded during high-tide. Even more concerning, rising sea water has destroyed the drinkable water supply on many islands. This forces these mainly less developed nations to either invest in costly desalination plants so that

⁵ "Why the Arctic is smoldering." *BBC News*. <https://bbc.in/2SQUmTJ>.

⁶ "Arctic Methane Emissions 'Certain to Trigger Warming'." *Climate Change Central*. <https://bit.ly/32jbmMF>.

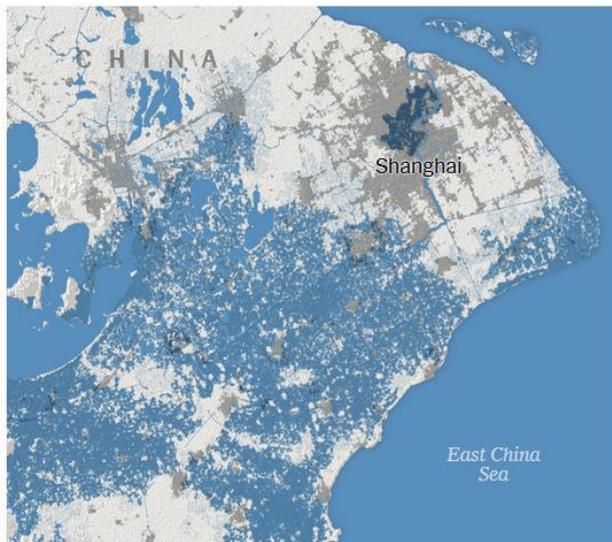
⁷ "SOTC: Contribution of the Cryosphere to Changes in Sea Level." *NSIDC*. <https://bit.ly/32jOeqb>.

⁸ "Shocking New Maps Show How Sea Level Rise Will Destroy Coastal Cities By 2050." *Forbes*. <https://bit.ly/37WomBW>.

⁹ "13 Islands That Will Disappear in the Next 80 Years." *Reader's Digest*. <https://bit.ly/38Q4lhn>.

residents can drink the ocean water, or for residents to permanently move elsewhere.¹⁰ In 2030, faced with a lack of drinking water, thousands began to flee the Marshall Islands for the United States and Australia. As of 2050, only 30% of the population remained on the Marshall Islands, desperately clinging to the islands against seas rising ever higher. Unlike Kiribati, who bought land in Fiji for its residents to relocate

■ Land underwater at high tide ■ Populated area



to, the Marshall Islands had no back-up land.¹¹ In Australia, many refugees are confined to refugee camps, unable to find work in the legal economy and living in abject poverty. Until 2025, climate refugees were not afforded the same protections as refugees fleeing political violence.¹² Since then, international law gives climate refugees the same rights as political refugees. While Australia cannot return refugees to their former island nations, they have also resisted calls to give them citizenship or valid working status.

But non island countries are not immune to rising sea levels. Millions in Bangladesh have been displaced into India, fleeing the rising sea water and the increased erosion of the country's land. India has been poorly equipped to handle these refugees, with many living in squalid refugee camps and periodically coming under ethnically

motivated attacks. In Shanghai, nearly 110 million people live below the high tide line, with their streets, homes, schools and offices regularly flooded.¹³ Cities built by the sea are increasingly seeing populations flee to cities further from the coasts. While the United States has seen only a small number of people relocate from coastal cities, by 2100, nearly 13 million will need to relocate to the interior.¹⁴

Similarly, as climate change has increased the intensity of droughts and altered rain distribution, farmers are being increasingly pushed off of their land. In Guatemala in the 2010s, farmers lost their land to intense drought and subsequently tried to immigrate to the United States.¹⁵ In Africa, farmers who can no longer produce crops on their land have fled to cities, tripling the population of Lagos, Abuja, and Kinshasa.¹⁶ While these former-farmers are not confined to refugee camps, many are stuck living in dense, crime-ridden urban slums on the periphery of the city with few public resources. Climate refugees do not just come from island nations swallowed by the seas, but also from farmers displaced from their land. A solution is needed to better manage the growing number of internally and externally displaced climate refugees.

Global Health Crises

Climate change has also sparked a number of global health crisis. While average yearly temperatures continued to increase, extreme heat events have increased in frequency and intensity over the past 30 years.¹⁷ The summer of 2032 in Northern Europe was the hottest on record and saw temperatures above 100°F in Oslo, Copenhagen, Berlin and Moscow for nearly the entire month of July. Because these countries lack air conditioning, as historically they did not need it, nearly 25,000 people died across the

¹⁰ "Rising sea levels could make thousands of islands from the Maldives to Hawaii 'uninhabitable within decades.'" *The Independent*. <https://bit.ly/2SSKcSy>.

¹¹ "Besieged by the rising tides of climate change, Kiribati buys land in Fiji." *The Guardian*. <https://bit.ly/2HOLJm1>.

¹² "Climate refugees can't be returned home, says landmark UN human rights ruling." *The Guardian*. <https://bit.ly/2Vdy6Vx>.

¹³ "Rising Seas Will Erase More Cities by 2050, New Research Show." *New York Times*. <https://nyti.ms/3bXIWF3>.

¹⁴ "Where America's Climate Migrants Will Go As Sea Level Rises." *CityLab*. <https://bit.ly/3bYVxrr>.

¹⁵ "The unseen driver behind the migrant caravan: climate change." *The Guardian*. <https://bit.ly/2T5oF7X>.

¹⁶ "Lagos: The megacity set to triple by 2050." *BBC News*. <https://bbc.in/2SNClW9>.

¹⁷ "Heat Waves and Climate Change." *Union of Concerned Scientists*. <https://bit.ly/37TANya>.

continent due to heat related stresses.¹⁸ Extreme heat is particularly deadly to older individuals and people with underlying health issues as it weakens the body and lowers air quality, making it harder to breathe. In cities, these impacts are magnified as concrete, steel, and glass absorb heat and hold onto it longer. With nearly 90% of Europeans living in cities, and two-thirds of people living in urban areas globally, heat-related deaths will only continue to grow.

But climate change also has created new threats from infectious diseases. Mosquitos, a known transmitter of diseases such as dengue fever, West Nile virus, and malaria have seen their range grow, allowing them to live more places year around.¹⁹ Each year, around 2 million people die due to mosquito transmitted diseases. Even more concerning is the number of ancient diseases that have been released as arctic permafrost melts. The first case occurred in August 2016 when a previously frozen reindeer that had died of anthrax was thawed, releasing anthrax into the environment, and killing 1 boy and sickening many others.²⁰ In 2031, after the river bank were smallpox victims from the 1890s had been buried eroded, Siberia experienced a small-pox outbreak that killed 15,000 people.

Ecological Crisis

Changing climate change has also brought ecological devastation across much of the planet. In the Arctic region, warming temperatures mean that the region no longer has sea ice during the summer months. The extent of the ice is even less in the winter months as periods of cold weather are shorter than they were in the past. For the animals that rely on the sea ice to survive, this has been devastating. There are an estimated 400 wild polar bears left in existence, with the only other survivors living in captivity in zoos. There have been similar mass die-offs in the Antarctic as well.

In the tropics, the rainforests of the Amazon, Congo basin and Indonesian islands has all but disappeared. In the Amazon, continued demand for wood and farmland and lax enforcement by a series of populist governments caused unprecedented deforestation. Deforestation, repurposing of the land for agriculture, and rising temperatures caused a series of forest fires to rack the Amazon each year summer from 2036-2043, destroying much of the remaining forest and killing thousands of farmers and animals. As it stands in 2050, much of the former Amazon rainforest has turned into a savannah-prairie like landscape.²¹ Ecosystems around the globe have been pushed to the brink, with many species rendered permanently extinct.

Advances in Technology

As the international community failed to cooperate to significantly reduce greenhouse gas emissions, a number of countries and the private sector tried to step in to develop technologies to reduce emissions or to mitigate the increasingly unforgiving impacts of climate change.

What green technologies have been developed to reduce emissions?

Over the past 30 years a number of technologies have been developed to reduce emissions. In 2025, Elon Musk experienced a breakthrough with battery and solar technology. His new solar panels were 60% more efficient than older models and his new battery technology was able to store this power for when the sun was not shining. While this was initially hailed as a game changer that would allow all countries to reduce the amount of greenhouse gases coming from electricity production, ultimately the project was not a complete success. The battery required a type of lithium that could only be mined in Bolivia and the local citizens of the region refused to allow mining companies to conduct business there.²² Ultimately, Musk's company was able to produce the solar panels but not he batteries, allowing many developed countries to decrease their carbon emissions coming from generating electricity. Unfortunately, many developing nations had invested in coal power plants in the 2010s and 2020s and continue to burn carbon-

¹⁸ "113 degrees in France: why Europe is so vulnerable to extreme heat." *Vox*. <https://bit.ly/2uqfvdY>.

¹⁹ "How does climate change affect disease?" *Stanford University*. <https://stanford.io/39SXJPB>.

²⁰ "There are diseases hidden in ice, and they are waking up." *BBC News*. <https://bbc.in/2VaOnup>.

²¹ "The environment in 2050: flooded cities, forced migration – and the Amazon turning to savannah." *The Guardian*. <https://bit.ly/2HP8s1A>.

²² "Exclusive: Bolivia's new lithium tsar says country should go it alone." *Reuters*. <https://reut.rs/2wHoGHP>.

intensive coal to the present day, meaning the reductions in developed nations were largely offset by new coal plants built in the developing world.

Since the 1970s carbon capture has been hailed as the planet's saving grace. By capturing carbon from the air and storing it deep underground, carbon capture reduces the amount of carbon in the air, effectively reversing previous emissions.²³ In theory, this sequestration of carbon will reduce the greenhouse gas effect and help mitigate the impact of climate change. In the 2020s, Exxon Mobil pioneered a revolutionary technique that involved capturing carbon emissions from powerplants that use fossil fuels and reinjecting those emissions into low producing oil fields in order to flush out more oil.²⁴ This allowed Exxon Mobil to sequester 100% of its emissions from powerplants below ground. However, this was extremely expensive with the pipeline transporting the carbon from the power plant to the oil field costing \$2 million per mile. Exxon uses the technology, but has struggled breakeven and few other companies have seem interested in investing in such a pricey technology. But this is not the only carbon capture method discovered. The Norwegian government developed a way to capture carbon emissions and feed them to seaweed and algae; which are then sold as a low-carbon, nutritious food for farm animals. This method is also costly, but has helped make Norway nearly carbon neutral. In order to prevent the worst impacts of climate change by 2100, including a 1-meter rise in sea levels, some of the existing carbon being emitted and that in the air must be captured, but the economic feasibility of large-scale capture remains difficult to argue.

Have any technologies been developed to mitigate current climate impacts?

On a local level, governments were able to develop a number of costly technologies that mitigated climate change's impacts. To combat rising sea levels, a number of countries took a page from Venice's playbook and built massive sea barriers.²⁵ In Denmark, which consists of small islands and a low-lying peninsula, nearly 80% of its citizens live near or along the coast. With waters expected to rise by over a meter above its 2000 levels by 2100, large swaths of Denmark would be underwater and highly vulnerable to storm surges.²⁶ To combat this the Danish government has funded a number of barriers along areas of high population density. These barriers, however, do not come cheap and take a long time to plan and build, the barrier for Venice cost \$10 billion, \$4 billion more than originally predicted and took 25 years to complete; nevertheless, barriers should allow highly populated areas to keep their heads above water.

Additionally, many governments have invested in technology to slow-down climate change. In 2040, realizing that governments had not cut their greenhouse gas emissions sufficiently, Indonesia and Bangladesh announced that they had completed a missile that would release massive quantities of sulfuric acid into the atmosphere. When sulfuric acid combines with water vapor it creates an aerosol that reflects sunlight back into space.²⁷ This missile, called the 'Pinatubo strategy' after the Philippine Volcano Mount Pinatubo erupted in 1991 and reduced global temperatures by 1-degree Fahrenheit, could cheaply and temporarily reduce global temperatures back to their pre-industrial revolution levels, giving the world more time to reduce its carbon emissions and find a permanent solution.²⁸ However, this geo-solar climate engineering is incredibly risky and has yet to be used, so its full effects are not known. In 2045, Indonesia and Bangladesh allegedly developed a working Pinatubo missile, but have never used it. Instead, they threaten to use it to get governments to provide additional humanitarian aid assistance to their countries.

Case Study: Australia 2020-2050

Australia's experience since 2020 encapsulates many of climate changes most dramatic impacts. Over the past 30-years the country has been racked by devastating brush fires, received millions of climate refugees from other countries, seen thousands of its own citizens displaced, watched the Great Barrier reef die, and seen its government fail to take decisive action.

²³ "Humanity's fight against climate change is failing. One technology can change that." *Quartz*. <https://bit.ly/2vSPYdQ>.

²⁴ *Ibid*.

²⁵ "Rising Waters: Can a Massive Barrier Save Venice from Drowning?" *Yale360*. <https://bit.ly/2VeFWy0>.

²⁶ "Coastal Flood Risk Denmark. *Climate Change Post*. <https://www.climatechangepost.com/denmark/coastal-floods/>.

²⁷ A last-ditch global warming fix? A man-made 'volcanic' eruption." *NBC News*. <https://nbcnews.to/2VenkOX>.

²⁸ *Ibid*.

After the devastating 2019-2020 bushfires, which cost over \$2.5 billion and killed an estimated 480 million animals, many hoped that subsequent fire seasons would be less intense.²⁹ While some years saw heavy rains keep the bushfire to a minimum, those years often saw intense flooding. Overtime, the fire seasons grew progressively worse, with costs rising year after year. This devastated the Australian insurance industry which announced in 2035 that it would no longer payout to those impacted by bushfires. For many Australians, this lack of insurance has left them unable to rebuild their homes.

As a developed nation in Oceania, Australia became a destination for the region's climate refugees. Islanders fleeing rising waters in the South Pacific began to arrive *en masse* in the 2030s, with more coming each year. Refugees have also sailed from Vietnam, the Philippines, Indonesia, and as far away as Bangladesh and Pakistan in order to seek refuge in Australia. But Australia has been unwilling to resettle the refugees. A Labor Government, headed by Sheila Buckweiler, refused the United Nation's order to recognize climate refugees as legitimate and instead made efforts to deport them or confine them to refugee camps in the country's arid interior. Buckweiler was vilified for this move internationally, but it proved to be popular domestically as many Australians, the majority of whom live along the coast, were being displaced from their homes. With limited budgetary resources due to the many crises created by climate change, many Australians agreed with Buckweiler's policies of *Australians Always First*.

The Great Barrier Reef entered the 2020s in a weakened state.³⁰ Weakened by generations of poisonous industrial and agricultural runoff, climate change delivered the reef its death knell. Warming waters and ocean acidification (which is caused by the ocean absorbing carbon dioxide) has led to a number of large-scale bleaching events, killing off the corals and leading to ecosystem collapse across the reef.³¹ Only a small section of the reef's corals, which thrive in warm waters and are resistant to the more acidic ocean waters, remains. The economic impacts of the die-off have been immense, with tourism along the coast drying up and the number of fish caught by fishermen plummeting to all-time lows.

From 2020-2050, the Australian government refused to take action to reduce its carbon footprint, stave off environmental collapse, or adapt for future changes in the climate. Once the impacts of climate change began to fully impact the country in the early-2030s, Australia turned inward, refusing to join any international agreements on climate refugees or climate change. During this period, the government careened from crisis to crisis, unable to adequately address raging bushfires, the relocation of hundreds of thousands of Australians away from the coasts, or the massive influx of climate refugees from Southeast Asia and Oceania.

By 2050, climate changes and its impacts have put such a strain on the resources of all governments, making it politically and financially difficult to find a solution to many of the most pressing issues. The myriad of challenges posed to the world's nations in 2050 cannot all be solved, but those that can cannot be solved alone. The international community will have to try and pick those problems it can solve, while seek to mitigate or lessen the impacts of those it cannot through the most cost-effective measures possible.

Questions to Consider

- Given financial and political constraints, what policies can be implemented to prevent the worst of climate change by 2050?
- To what extent should governments consider using climate engineering to give the international community more time to find a solution?
- How should the climate refugee crisis be better managed?
- One may argue that most of the issues and concerns described above are symptoms of climate change. Should it be an international priority to address not only these symptoms but the root causes themselves as well?

²⁹ "Australia fires: How do we know how many animals have died?" *BBC News*. <https://www.bbc.com/news/50986293>; "2019-2020 Australian Bushfires." *Center for Disaster Philanthropy*. <https://bit.ly/2T4IPA9>.

³⁰ "Australia's Great Barrier Reef in 'very poor' condition: government agency." *Reuters*. <https://reut.rs/32kDAiA>.

³¹ "Climate Change is Killing Coral on the Great barrier Reef." *NPR*. <https://n.pr/32gRFh8>.