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IPCC says limiting global warming to 1.5 °C will require drastic action

Humanity has a limited window in which it can hope to avoid the worst effects of climate change, according to climate report.

Jeff Tollefson



Glaciers and sea ice won't be safe in a world that warms to 2 °C above pre-industrial levels. Credit: NASA/eyevine

Limiting global warming to 1.5 °C above pre-industrial levels would be a herculean task, involving rapid, dramatic changes in how governments, industries and societies function, according to the Intergovernmental Panel on Climate Change (IPCC). But even though the world has already warmed by 1 °C, humanity has 10–30 more years than scientists previously thought in which to kick its carbon habit.

The world would have to curb its carbon emissions by at least 49% of 2017 levels by 2030 and then achieve carbon neutrality by 2050 to meet this target, according to a summary of the latest IPCC report, released on 8 October. The report draws on research conducted since nations unveiled the 2015 Paris climate agreement, which seeks to curb greenhouse-gas emissions and limit global

temperature increase to between 1.5 and 2 °C.

The world is on track for around 3 degrees of warming by the end of the century if it doesn't make major reductions in greenhouse-gas emissions. It could breach 1.5 °C some time between 2030 and 2052 if global warming continues at its current rate.

A world of hurt

Scientists have “high confidence” that 1.5 °C of warming would result in a greater number of severe heat waves on land, especially in the tropics, the report says. They have “medium confidence” that there will be more extreme storms in areas such as high-elevation regions, eastern Asia and eastern North America. The risk of such severe weather would be even greater in a 2 °C world.

Temperatures on extreme hot days in mid-latitudes could increase by 3 °C with 1.5 °C of global warming, versus 4 °C in a 2 °C world.

Two degrees of warming could destroy ecosystems on around 13% of the world's land area, [increasing the risk of extinction for many insects, plants and animals](#). Holding warming to 1.5 °C would reduce that risk by half.

The Arctic could experience ice-free summers once every decade or two in a 2 °C world, versus once in a century at 1.5 °C. Coral reefs would almost entirely disappear with 2 degrees of warming, with just 10–30% of existing reefs surviving at 1.5 °C.

Without aggressive action, the world could become an almost impossible place for most people to live in, says Ove Hoegh-Guldberg, director of the Global Change Institute at the University of Queensland in St Lucia, Australia. “As we go toward the end of the century, we have to get this right.”

Impossible dream

Given that current [national commitments on greenhouse-gas emissions](#) fall well short of the goals laid out in the Paris climate agreement, many scientists have argued that meeting even the [2 °C goal is virtually impossible](#). But the IPCC report sidestepped questions of feasibility and focused instead on determining what governments, businesses and individuals would need to do to meet the 1.5 °C goal.

Measures include ramping up installation of renewable energy systems such as wind and solar power to provide 70–85% of the world's electricity by 2050, and expanding forests to increase their capacity to pull carbon dioxide from the atmosphere.

Most scenarios in the report suggest that the world would still need to extract massive amounts of carbon from the atmosphere and pump it underground in the latter half of this century. The technology to do this is in the early stages of development and many researchers say it could be difficult to develop it for use on a global scale.

Other proposed options involve changing lifestyles: eating less meat, riding bicycles and flying less. The report also waded into murky questions about ethics and values, stressing that governments must address climate change and sustainable development in parallel, or risk exacerbating poverty and inequality.

A bigger budget

The IPCC report incorporates recent research suggesting that the amount of carbon that humanity can emit while limiting warming to 1.5 °C might be larger than previously thought. The previous IPCC assessment, released in 2014, estimated that the world would breach 1.5 °C by the early 2020s at the current rate of emissions. The latest report extends that timeline to 2030 or 2040 on the basis of studies¹ that [revised the amount of warming](#) that has already occurred.

“Every extra tonne of carbon that we dump into the atmosphere today is a tonne that will have to be scrubbed out at the end of the century,” says Myles Allen, a climate scientist at the University of Oxford, UK, and one of the lead authors of the report.

“I think we need to start a debate about who is going to pay for it, and whether it’s right for the fossil-fuel industry and its customers to be enjoying the benefits today and expecting the next generation to pay for cleaning it up,” Allen says.

But scientists have only “medium confidence” in the revised carbon budgets, says Thomas Stocker, a climate scientist at the University of Bern in Switzerland. He says that researchers will provide a more comprehensive look at the numbers in the next full climate assessment, which is scheduled to be released in 2021.

In the meantime, the newer and larger carbon budget could send the wrong message to policymakers, says Oliver Geden, a social scientist and visiting fellow at the Max Planck Institute for Meteorology in Hamburg, Germany. He fears that the IPCC report undersells the difficulty of achieving the 1.5 °C goal. “It’s always five minutes to midnight, and that is highly problematic,” he says. “Policymakers get used to it, and they think there’s always a way out.”

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Climate report: Scientists politely urge 'act now, idiots'

By Matt McGrath
Environment correspondent, Incheon, South Korea
1 hour ago



It's the final call, say scientists, the most extensive warning yet on the risks of rising global temperatures.

Their **dramatic report on keeping that rise under 1.5 degrees C** states that the world is now completely off track, heading instead towards 3C.

Staying below 1.5C will require "rapid, far-reaching and unprecedented changes in all aspects of society".

It will be hugely expensive, the report says, but the window of opportunity is not yet closed.

After three years of research and a week of haggling between scientists and government officials at a meeting in South Korea, the Intergovernmental Panel on Climate Change (IPCC) has issued a special report on the the impacts of global warming of 1.5C.

The critical 33-page Summary for Policymakers certainly bears the hallmarks of difficult negotiations between climate researchers determined to stick to what their studies have shown and political representatives more concerned with economies and living standards.



Coral reefs face extinction in a 2-degree world

Despite the inevitable compromises, there are some key messages that come through loud and and clear.

"The first is that limiting warming to 1.5C brings a lot of benefits compared with limiting it to 2 degrees. It really reduces the impacts of climate change in very important ways," said Prof Jim Skea, who is a co-chair of the IPCC.

"The second is the unprecedented nature of the changes that are required if we are to limit warming to 1.5C - changes to energy systems, changes to the way we manage land, changes to the way we move around with transportation."

What's the one big takeaway?

"Scientists might want to write in capital letters, 'ACT NOW IDIOTS', but they need to say that with facts and numbers," said Kaisa Kosonen, from Greenpeace, who was an observer at the negotiations. "And they have."

The researchers have used these facts and numbers to paint a picture of the world with a dangerous fever, caused by humans. We used to think if we could keep warming below 2 degrees this century then the changes we would experience would be manageable.

Not any more. This new study says that going past 1.5C is dicing with the planet's liveability. And the 1.5C temperature "guard rail" could be exceeded in just 12 years in 2030.

We can stay below it but it will require urgent, large-scale changes from governments and individuals, plus we will have to invest a massive pile of cash every year, around 2.5% of global GDP, for two decades.

Even then, we will still need machines, trees and plants to capture carbon from the air that we can then store deep underground. Forever!



Five steps to 1.5

- . Global emissions of CO2 need to decline by 45% from 2010 levels by 2030.
- . Renewables are estimated to provide up to 85% of global electricity by 2050.
- . Coal is expected to reduce to close to zero.
- . Up to 7 million sq km of land will be needed for energy crops (a bit less than the size of Australia).
- . Global net zero emissions by 2050.

How much will all this cost?

It won't come cheap. The report says that to limit warming to 1.5C, it will involve "annual average investment needs in the energy system of around \$2.4 trillion" between 2016 and 2035.

Experts believe that this number needs to be put in context.

"There are costs and benefits you have to weigh up," said Dr Stephen Cornelius, a former UK IPCC negotiator now with WWF, who says that cutting emissions hard in the short term will cost money, but is cheaper than paying for carbon dioxide removal later this century.

"The report also talks about the benefits as there is higher economic growth at 1.5 degrees than there is at 2C, and you don't have the higher

risk of catastrophic impacts at 1.5 that you do at 2."



The report follows tough negotiations in Incheon

What happens if we don't act?

The researchers say that if we fail to keep temperatures below 1.5C, we are in for some significant and dangerous changes to our world.

You can kiss coral reefs good-bye, as the report says they would be essentially 100% wiped out at 2 degrees of warming.

Global sea-level will rise around 10 centimetres more if we let warming go to 2C. That may not sound like much but keeping to 1.5C means that 10 million fewer people would be exposed to the risks of flooding.

There are also significant impacts on ocean temperatures and acidity, and the ability to grow crops like rice, maize and wheat.

"We are already in the danger zone at one degree of warming," said Kaisa Kosonen from Greenpeace.

"Both poles are melting at an accelerated rate; ancient trees that have been there for hundreds of years are suddenly dying; and the summer we've just experienced - basically, the whole world was on fire."



Renewables will have to provide up to 85% of electricity by 2050

Is this plan at all feasible?

That all depends on what you mean. The IPCC scientists are not allowed to prescribe what should be done; they can only outline what the options are. But those involved with this study believe it shows realistic paths to staying under 1.5C.

"It is feasible if we all put our best foot forward, and that's a key message of this report. No-one can opt out anymore," said Dr Debra Roberts, who's a co-chair of the IPCC.

"We all have to fundamentally change the way we live our lives; we can't remain remote from the problem anymore.

"The report is very clear, this can be done, but it will require massive changes, socially and politically and accompanied by technological development."

Is all this about saving small island states?

The idea of keeping the global temperature rise to 1.5 is something very close to the hearts and minds of small island and low-lying states who fear they will be inundated with flooding if temperatures go to 2 degrees.

But over the three years that the report was in preparation, more and more scientific evidence has been published showing that the benefits of staying close to 1.5C are not just for island nations in the Pacific.

"If you save a small island country then you save the world," said Dr Amjad Abdulla, who's an IPCC author from the Maldives. "Because the report clearly states that no-one is going to be immune. It's about morality - it's about humanity."

How long have we got?

Not long at all. But that issue is now in the hands of political leaders. The report says that hard decisions can no longer be kicked down the road. If the nations of the world don't act soon, they will have to rely even more on unproven technologies to take carbon out of the air - an expensive and uncertain road.

"They really need to start work immediately. The report is clear that if governments just fulfil the pledges they made in the Paris agreement for 2030, it is not good enough. It will make it very difficult to consider global warming of 1.5C," said Prof Jim Skea.

"If they read the report and decide to increase their ambitions and act more immediately then 1.5C stays within reach - that's the nature of the

choice they face."

Campaigners and environmentalists, who have welcomed the report, say there is simply no time left for debate.

"This is the moment where we need to decide" said Kaisa Kosonen.

"We want to move to clean energy, sustainable lifestyles. We want to protect our forests and species. This is the moment that we will remember; this is the year when the turning point happened."

What can I do?

The report says that there must be rapid and significant changes in four big global systems - energy, land use, cities and industry.

"This is not about remote science; it is about where we live and work, and it gives us a cue on how we might be able to contribute to that massive change," said Dr Debra Roberts.

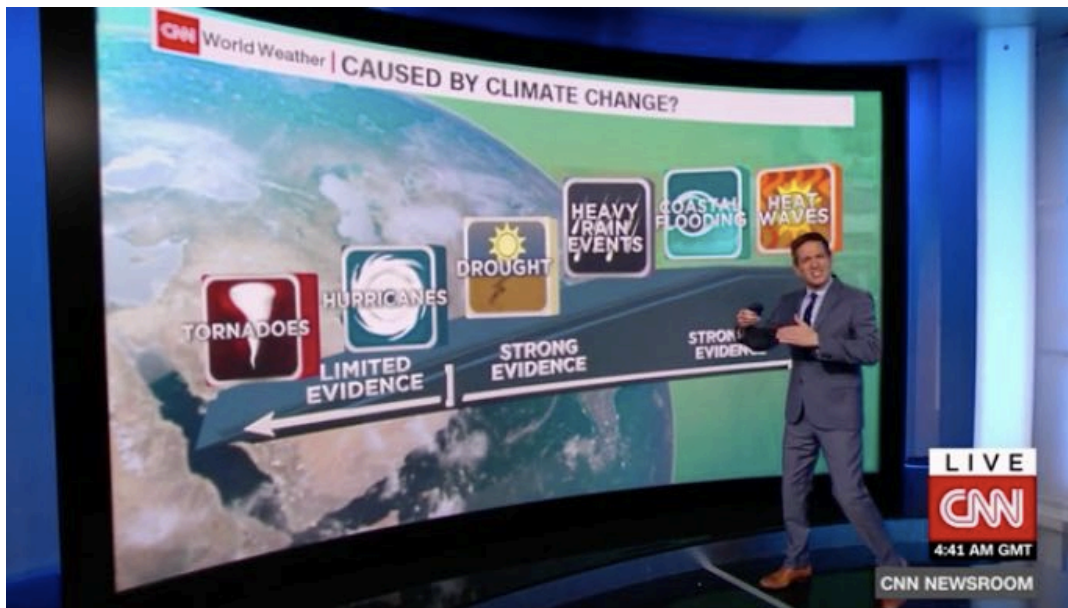
"You might say you don't have control over land use, but you do have control over what you eat and that determines land use.

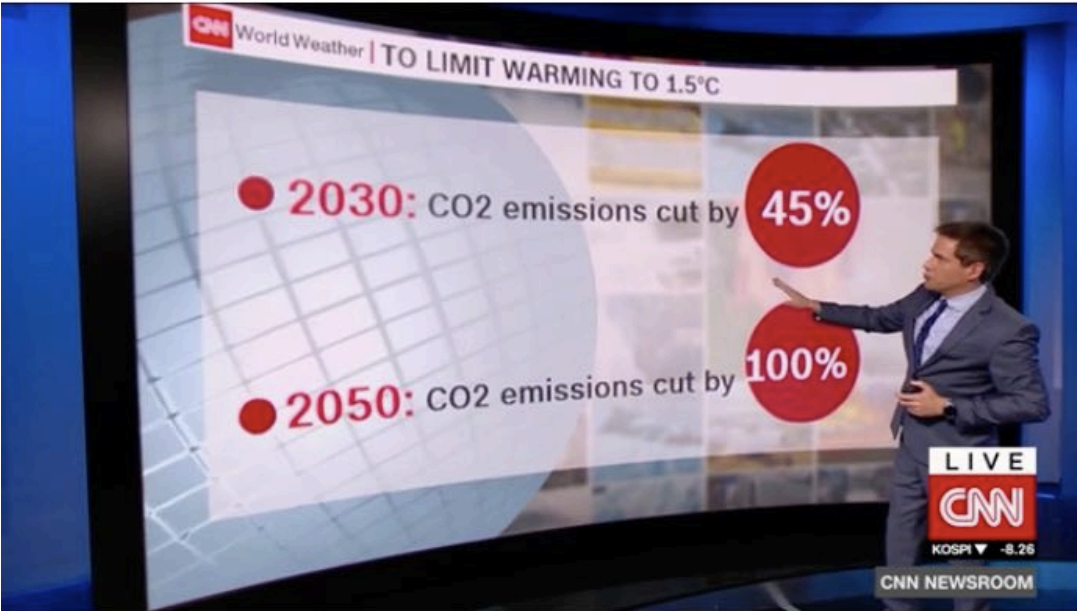
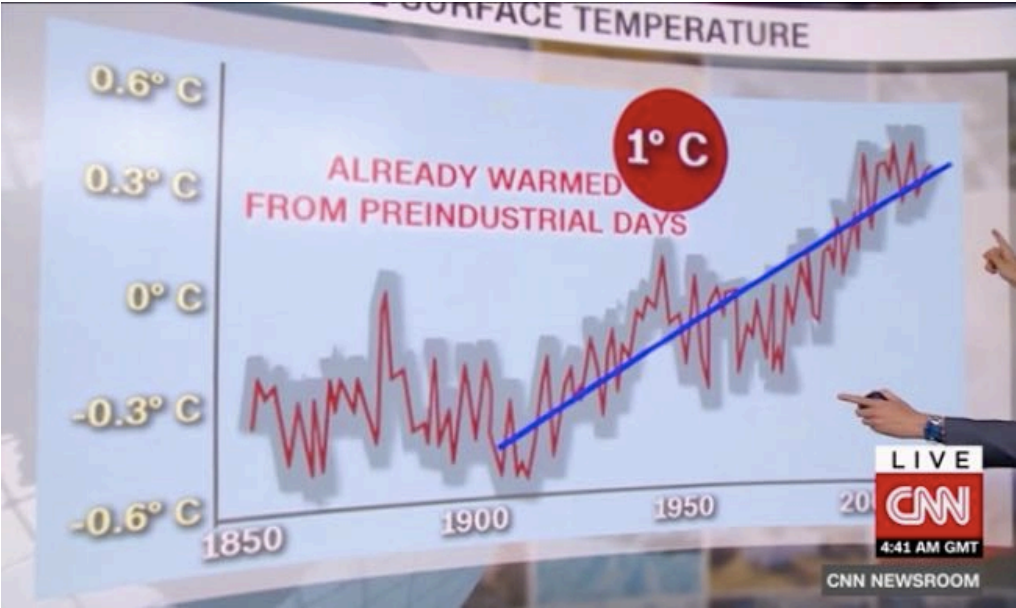
"We can choose the way we move in cities and if we don't have access to public transport - make sure you are electing politicians who provide options around public transport."

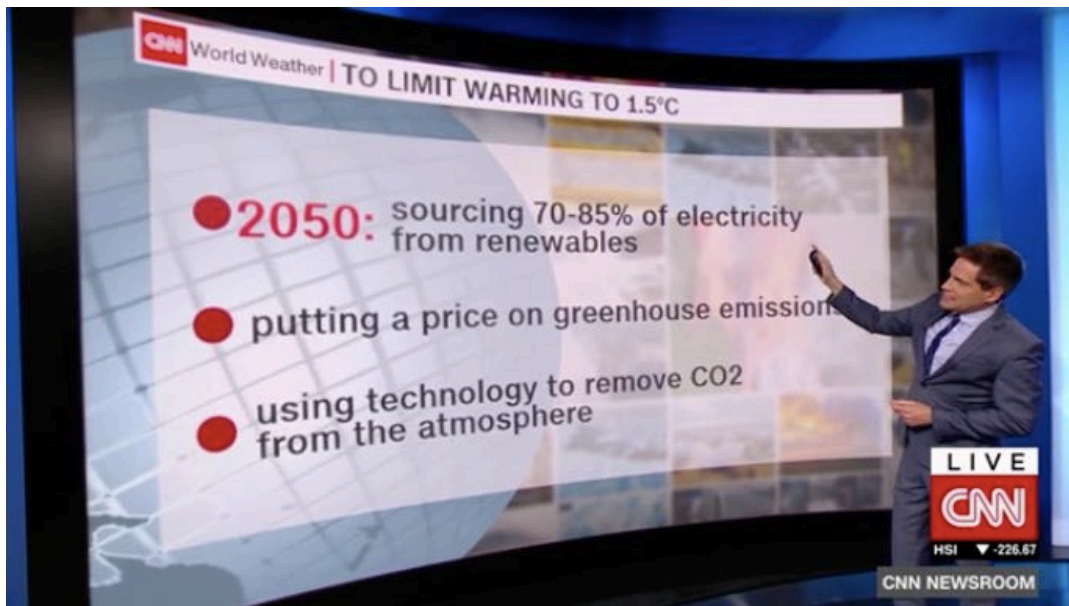
Planet has only until 2030 to stem catastrophic climate change, experts warn

By [Brandon Miller](#) and Jay Croft, CNN

Updated 0818 GMT (1618 HKT) October 8, 2018







(CNN) Governments around the world must take "rapid, far-reaching and unprecedented changes in all aspects of society" to avoid disastrous levels of global warming, says a stark new report from the global scientific authority on climate change.

The report issued Monday by the UN Intergovernmental Panel on Climate Change (IPCC), says the planet will reach the crucial threshold of 1.5 degrees Celsius (2.7 degrees Fahrenheit) above pre-industrial levels by as early as 2030, precipitating the risk of extreme drought, wildfires, floods and food shortages for hundreds of millions of people.

The date, which falls well within the lifetime of many people alive today, is based on current levels of greenhouse gas emissions.

The planet is already two-thirds of the way there, with [global temperatures having warmed about 1 degree C](#). Avoiding going even higher will require significant action in the next few years.

"This is concerning because we know there are so many more problems if we exceed 1.5 degrees C global warming, including more heatwaves and hot summers, greater sea level rise, and, for many parts of the world, worse droughts and rainfall extremes," Andrew King, a lecturer in climate science at the University of Melbourne, said in a statement.

Global net emissions of carbon dioxide would need to fall by 45% from 2010 levels by 2030 and reach "net zero" around 2050 in order to keep the warming around 1.5 degrees C.

Lowering emissions to this degree, while technically possible, would require widespread changes in energy, industry, buildings, transportation and cities, the report says.

"The window on keeping global warming below 1.5 degrees C is closing rapidly and the current emissions pledges made by signatories to the Paris Agreement do not add up to us achieving that goal," added King.



Sea ice is seen from NASA's Operation IceBridge research aircraft off the northwest coast of Greenland. Scientists say the Arctic has been one of the regions hardest hit by climate change.

Consequences of past inaction

The report makes it clear that climate change is already happening -- and what comes next could be even worse, unless urgent international political action is taken.

"One of the key messages that comes out very strongly from this report is that we are already seeing the consequences of 1 degree C of global warming through more extreme weather, rising sea levels and diminishing Arctic sea ice, among other changes," said Panmao Zhai, co-chair of IPCC Working Group I.

Even if warming is kept at or just below 1.5 degrees C, the impacts will be widespread and significant.

Temperatures during summer heatwaves, such as those just experienced across Europe this summer, can be expected to increase by 3 degrees C says the report.

More frequent or intense droughts, such as the one that [nearly ran the taps dry in Cape Town, South Africa](#), as well as more frequent extreme rainfall events such as [hurricanes Harvey and Florence in the United States](#), are also pointed to as expectations as we reach the warming threshold.

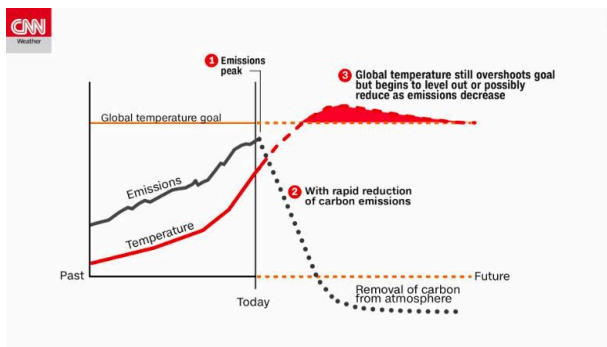
Coral reefs will also be drastically effected, with between 70 and 90% expected to die off, including Australia's Great Barrier Reef.

Countries in the southern hemisphere will be among the worse off, the report said, "projected to experience the largest impacts on economic growth due to climate change should global warming increase."

The report underlines how even the smallest increase in the base target would worsen the impact of recent natural disasters. "Every extra bit of warming matters, especially since warming of 1.5 degrees C or higher increases the risk associated with long-lasting or irreversible changes, such as the loss of some ecosystems," said Hans-Otto Pörtner, Co-Chair of IPCC Working Group II.

The report cites specific examples of how impacts of global warming would be lessened with the 1.5 degrees C increase, compared to the 2 degrees C increase:

- Global sea levels would rise 10 cm lower by 2100.
- The likelihood of an Arctic Ocean free of sea ice in summer would be once per century, instead of at least once per decade.
- Coral reefs would decline by 70% to 90% instead of being almost completely wiped out.



This chart from the IPCC shows how global temperatures would respond to a sudden and drastic reduction of greenhouse gas emissions. Even with immediate action, global temps will still overshoot the goal, but could reduce back to the target over time.

'Possible with the laws of chemistry and physics'

Monday's report is three years in the making and is a direct result of the [2015 Paris Climate Agreement](#). In the Paris accord, 197 countries agreed to the goal of holding global temperatures "well below" 2 degrees C above pre-industrial levels and to pursue efforts to limit it to 1.5 degrees C.

The United States was initially in the agreement, but [President Donald Trump pulled the country out](#) a year and half later, claiming it was unfair to the country.

To limit global warming to 1.5 degree C is "possible within the laws of chemistry and physics," said Jim Skea, co-chair of IPCC Working Group III. "But doing so would require unprecedented changes."

"International cooperation is absolutely imperative to limit emissions and therefore global warming and its impacts, as well as coordinating effective and widespread adaptation and mitigation," said Sarah Perkins-Kirkpatrick, a fellow at the Climate Change Research Center at the University of New South Wales. "The next few years will be critical in the evolution of these efforts."

One key issue will be negative emissions, large scale carbon-scrubbing technologies that can reduce the amount in the atmosphere and act to counter continued pollution.

According to the report, there are two main ways of removing carbon from the atmosphere: increasing natural processes that

already do this, and experimental carbon storage or removal technologies.

However, all methods "are at different stages of development and some are more conceptual than others, as they have not been tested at scale," the report warned.

They will also require considerable political engagement globally, as will reducing the amount of carbon being emitted.

Despite the report's dire warnings, there is no indication such cooperation will be doable, particularly given the Trump administration's stance on this issue.

"Today the world's leading scientific experts collectively reinforced what mother nature has made clear -- that we need to undergo an urgent and rapid transformation to a global clean energy economy," former US Vice President Al Gore said.

"Unfortunately, the Trump administration has become a rogue outlier in its shortsighted attempt to prop up the dirty fossil fuel industries of the past. The administration is in direct conflict with American businesses, states, cities and citizens leading the transformation."

Trump expresses suspicion about UN climate report, but says he will look at it

By [Kevin Liptak](#), CNN

Updated 2116 GMT (0516 HKT) October 9, 2018

Washington (CNN) President Donald Trump expressed suspicion Tuesday about a [United Nations report warning of dire consequences](#) of unchecked climate change in the next two decades, but said he will look at it.

"It was given to me. And I want to look at who drew it. You know, which group drew it. I can give you reports that are fabulous and I can give you reports that aren't so good," Trump told reporters on the South Lawn.

It was his first comment about the landmark study that evaluates consequences the world will face if global temperatures increase by 1.5 or 2 degrees Celsius -- 2.7 or 3.6 degrees Fahrenheit.

Trump's administration has largely ignored calls to take steps toward reducing harmful carbon emissions and Trump said last year he would withdraw the United States from the landmark Paris climate agreement. Instead, Trump has advocated for more coal energy and loosened regulations on vehicle emissions.

Planet has only until 2030 to stem catastrophic climate change, experts warn

Still, the President said Tuesday he would read the report, which was unveiled over the weekend.

"I will be looking at it, absolutely," Trump said.

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