

Upcoming climate talks just latest chapter in a long history

November 4 2015, by Seth Borenstein



This photo provided by Scripps Institution of Oceanography, UC San Diego, taken Oct. 19, 1988, shows Charles David Keeling working with the Scripps manometer, which is used to measure amounts of CO₂ by freezing it out of air. He's pouring liquid nitrogen which chills the glass chamber to do the CO₂ freezing. His Keeling Curve showed that carbon dioxide levels are rising steadily, trapping heat in Earth's atmosphere. (Susan Green/Scripps Institution of Oceanography, UC San Diego via AP)

You can't say we haven't been warned.

The upcoming climate summit in Paris is just the latest chapter in the surprisingly long history of grappling with global warming, a history that began with the discovery of the greenhouse effect in the 19th century—before the telephone, the radio or Al Gore. And the first government warning that the world was warming came exactly a half century ago.

On Nov. 5, 1965, President Lyndon B. Johnson's science advisory committee told him that "Man is unwittingly conducting a vast geophysical experiment," and that by the year 2000, carbon dioxide levels would increase enough to "almost certainly cause significant changes in the temperature and other properties of the stratosphere."

The upshot? Not much. The world warmed about 1.4 degrees (0.8 degrees Celsius) in the next 50 years, according to the National Oceanic and Atmospheric Administration.

Now, says United Nations climate chief Christiana Figueres, "the urgency is truly on our doorstep."

Studies show heat waves, droughts and floods are more frequent and worse. Seas are rising and getting more acidic. And some scientists fear unstoppable melting of ice sheets in Greenland and West Antarctica.

"We've known just about everything we need to know to do something about this issue for a very long time," said Texas Tech climate scientist Katharine Hayhoe. "We knew there was one simple but terrible solution: Stop. We knew that 50 years ago."

The story of global warming started with a mystery. In the 1820s, Joseph Fourier figured that Earth should be colder than it actually was.

Something was warming it, trapping heat, but he couldn't quite figure out what.

In 1859, British physicist John Tyndall answered that question. Using lab experiments, he proved that water, carbon dioxide and other gases trap heat in the atmosphere.

"Tyndall was the first person to understand greenhouse effect in a crude way," said Spencer Weart, director emeritus of the American Institute of Physics history program and a physicist himself. "Ever since Tyndall, no knowledgeable scientist has denied the existence of a greenhouse effect."

Then Swedish scientist Svante Arrhenius dug into the issue in the 1890s and figured that man-made emissions from fossil fuels could really change the climate. He calculated that if the level of heat-trapping carbon dioxide doubled, it would raise the world's temperature about 7 to 9 degrees Fahrenheit (4 to 5 degrees Celsius).

Arrhenius thought it would take centuries, maybe millennia, for that to happen, Weart said. But he didn't know how the world's population and people's energy needs would soar. If emissions continue to rise at the current pace—which is starting to look less likely, with international pledges to slow the growth—it may be only 50 years or so before the amount of carbon dioxide roughly doubles.

For decades, the greenhouse effect seemed distant and of little concern—until the mid-1950s, when Roger Revelle, Hans Suess and Charles David Keeling started to notice rising carbon dioxide levels. They weren't quite sure just how to measure them accurately until Keeling established a monitoring system on top of a Hawaiian volcano.

The scientists figured it would take a decade or so before they could see

a trend, but the increase was so steady that it was noticeable in just 18 months, said NASA historian Erik Conway.

Revelle then pushed for carbon dioxide concerns to be included in the 1965 environmental report from the president's science advisers. They were, albeit near the end.

The 1970s "become complicated," Conway said. Because of a number of factors—including the orbital dynamics of the planet, which dictate ice ages—had all things been equal, the Earth would have been heading into a cooling period. Soot and smog pollution had a cooling effect on the air, before it was cleaned up in later decades.

Still, most scientists figured the Earth was warming, not cooling. A survey of peer-reviewed scientific studies from 1965 to 1979 found that 44 of them found warming, 20 found no trend and only seven found cooling.

A seminal moment in the United States was when James Hansen, head of NASA's Goddard Institute of Space Studies, presented dire testimony before Congress on a hot June day in 1988. His warning "that the evidence is pretty strong that the greenhouse effect is here" made front page news.

That year, the United Nations created the Intergovernmental Panel on Climate Change, an international group of climate scientists to come up with consensus reports on the problem.

The year 1990 "is the point where we really knew enough scientifically justify" the kind of action that nations are talking about taking now, said current White House science adviser John Holdren. It's also about the time climate change became an international political issue.

In 1992, world leaders met in Rio de Janeiro and set a goal of preventing dangerous global warming, with President George H.W. Bush signing on. That led to a treaty five years later in Kyoto, and eventually to the climate negotiations that begin later this month in Paris.

More information: American Institute of Physics history of climate science: bit.ly/1ynnK3c

The 1965 "Restoring The Quality of Our Environment" report to President Johnson: stanford.io/19ZGN67

Study on 1970s research and media coverage on warming, cooling: bit.ly/1yxemLU

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