What is on the horizon for global carbon emissions?

December 6 2018, by Lois Yoksoulian

The annual Global Carbon Budget report found that, although fossil fuel emissions remained steady for three years ending in 2016, atmospheric concentrations of carbon dioxide are at an all-time high and emissions are on the rise again, says atmospheric sciences professor Atul Jain. Credit: L. Brian Stauffer

On Dec. 5, the Global Carbon Project published the Global Carbon Budget 2018, giving world leaders access to data on atmospheric carbon concentrations, emissions and trends. Illinois atmospheric scientist Atul Jain was among the many scientists worldwide who contributed data to the report. Jain talked about the carbon budget and this year's findings with News Bureau physical sciences editor Lois Yoksoulian.

What is the global carbon cycle and how does it relate to climate change?

The global carbon cycle governs the buildup of atmospheric carbon dioxide, the single most important greenhouse gas produced by human activities. Due to man's interference with it, the carbon cycle has become the most important biogeochemical cycle of the earth-atmosphere system. This cycle relates to climate change, because carbon dioxide currently accounts for about 60 percent of the net heat-trapping effects of all greenhouse gases and has a strong potential to affect Earth's future biosphere and climate.

When we compare historical temperature data and carbon dioxide concentrations, we see that they are changing in tandem. This observed relationship is likely to continue. Therefore, understanding how the carbon cycle works is critical for predicting the evolution of atmospheric carbon dioxide and Earth's future climate.

What is the Global Carbon Project? How does it help us better understand the global carbon cycle?

The Global Carbon Project is an international research project of the Future Earth research initiative on global sustainability and a research partner of the World Climate Research Program. It aims to develop a thorough understanding of the global carbon cycle, including both its

biophysical and human dimensions and the interactions between them.

The latest GCP report suggests that the buildup of global atmospheric carbon dioxide emissions slowed significantly for three years ending in 2016, and then began to rise again. How do you explain this?

That's correct. Fossil CO_2 emissions saw slow growth from 2014 to 2016 as a result of significant reductions in coal use in the U.S. and China. China reduced its investment in energy-intensive construction and the U.S. saw a shift from coal to gas, solar and wind power.

However, fossil carbon dioxide emissions have now risen for two years in a row, reaching a record high of about 37 billion tons of carbon dioxide this year. The 2018 increase appears primarily driven by the growth in coal use in China (which rose 4.5 percent) and India (7.1 percent). The report suggests that global coal use is still at least 3 percent lower than its historical peak in 2013. But if the levels of growth seen in the last two years continues, the 2013 peak will soon be passed. In that scenario, global carbon dioxide emissions that result from the burning of fossil fuels will continue to rise in the next decade, but at much slower rates than seen during the 2000s. The expectation is that the nations will follow their emission pledges submitted to the Paris Agreement. The United Nations Environment Programme Emissions Gap Report and International Energy Agency concur on this point.

The 2018 report suggests that renewable energy is growing exponentially. Given this trend, why do you expect emissions to continue to increase in the near future?

Energy from renewables is growing exponentially but from a low base. The biggest winner is electricity generation, which is growing at 15 percent per year on average over the last decade. However, the growth in renewables has so far been too low to offset the growth in fossil energy. So, if we really want to see the decreasing trends in CO_2 emissions in the near future, carbon reduction needs to take place at a much higher rate in the energy sector – not only in the electricity sector, but also in the transportation, construction and industrial sectors.

How are deforestation and other land-use changes affecting carbon dioxide emissions?

Carbon dioxide fluxes from the land change as a result of human activities. Changes in forest management for wood harvest and changes in land-cover type (for example, deforestation or the conversion of grasslands to pastureland) all affect the carbon cycle. According to the report, global carbon dioxide emissions from deforestation and land use activities add an additional 5 billion tons of carbon dioxide to the atmosphere, accounting for 10 percent of total CO_2 emissions.

If CO_2 emissions are not reduced enough, are there other ways to accomplish the goals of the Paris Agreement?

There are no easy solutions to accomplish the Paris Agreement goal. According to the Intergovernmental Panel on Climate Change, to limit warming to 2 degrees Celsius, carbon dioxide emissions should decline by about 20 percent by 2030 and reach net zero around 2075. To limit warming to 1.5 degrees, CO_2 emissions should decline by 50 percent by 2030 and reach net zero around 2050.

Current country commitments lead to 3 degrees of warming, well above the Paris Agreement goals. No doubt, the goal of reaching a

decarbonized economy by 2050 seems far-fetched today, given the increasing trend in the high-carbon technologies and economic constructs of the 21st century.

However, not everything looks so bleak. While progress seems slow now, it is on track to deliver a very different decade – and century – ahead. For example, we are at the beginning of new exponential curves on renewable energy, electric vehicles and green finance. Serious deployment of solar or wind energy was unthinkable just 10 years ago, but the world started commissioning more gigawatts of clean energy than fossil fuels starting in 2015. Today, more than 50 percent of new electric generation capacity is renewable. In 2017, renewables accounted for the majority of all new power-generating capacity in developing countries, a remarkable turnaround from just a decade ago. Total historical renewable energy production hit 1 trillion watts of capacity three years ago. The next 1 trillion will be added in just four years. If these trends continue, renewables will produce half of the world's electricity by 2030. In addition to all these efforts with emerging technologies to deliver reductions in emissions, strong policy support is needed. With over 100 co-signatories from political, civil and industrial sectors of society, it is clear that a shared purpose and optimism will help us meet this monumental challenge.

Provided by University of Illinois at Urbana-Champaign

Citation: What is on the horizon for global carbon emissions? (2018, December 6) retrieved 27 April 2024 from https://phys.org/news/2018-12-horizon-global-carbon-emissions.html