The killer smog in China (and India) - a lot like 60 years ago in the west

Rapid industrialization requires abundant, cheap energy!

China leads the world in 2015 with a growth of 7%. India is not far behind at 5.5%. As China and India have spurred growth to become centers of industry, they have employed cheap energy such as coal without, in many cases, the investment in scrubbing or removal of particulates and chemicals from the effluence that the industrialized west has invested in after similar pollution episodes 60 years ago.

In winters, a cold air settles in, inversions often form in the long nights and daytimes of feeble sun when the winds are light, trapping the pollution. Areas of China and India are suffering from severe pollution episodes this month. In places like Beijing and other populous areas or eastern China, a cold outbreak with snow helped to ensure the inversions when the cold air aloft moved on.



See the snow cover extending into eastern China including Beijing.





See the cold air that invaded eastern China in recent weeks.



NCEP CFSv2 Temperature (2-meter) Anomaly [°C] 12Z20N0V2015 --> 12Z10DEC2015 | Last 20 -days Average

NCEP CFSR 1981-2010 Climatology | T574 CFSv2 Analysis Grid | Ryan N. Maue | WeatherBELL Source: Weatherbell.com

The high-pressure overhead gets replaced with gusty northwest winds will clean out the air the next week but then cresting of high pressure overhead by week 2 will allow fog and smog to return.

Even with the attention to China, India is suffering too. Of the top 10 most polluted cities in the world, six are in India.

Though environmentalists make a big deal about the small particulate matter content as the problem because that is the 'carbon pollution' that are riding to their hoped for Paris agreement, in reality the real damage comes from chemical reaction of effluent gases like sulfur dioxide with water droplets in the 'fog/smog' that forms sulfuric acid mist. It is joined by hydrochloric acid. You will read that it is a CO2 problem but one has to remember with every breath we emit 40,000ppm into air with around 400 ppm CO2 and that CO2 is 0.04% of the atmosphere.

In Europe and North America, we went through similar incidents that forced necessary changes to our air quality control. That improvement continues. We have decreased the small particulate loading of the air by 50% the last two decades to well below the target standards.



Source: EPA

That brings to mind some of those trigger incidents.

THE GREAT LONDON SMOG OF DECEMBER 1952

As the UKMO described it "The weather in November and early December 1952 had been very cold, with heavy snowfalls across the region. To keep warm, the people of London were burning large quantities of coal in their homes. Smoke was pouring from the chimneys of their houses.

Under normal conditions, smoke would rise into the atmosphere and disperse, but an anticyclone was hanging over the region. This pushes air downwards, warming it as it descends. This creates an inversion, where air close to the ground is cooler than the air higher above it. So when the warm smoke comes out of the chimney, it is trapped. The inversion of 1952 also trapped particles and gases emitted from factory chimneys in the London area, along with pollution, which the winds from the east had brought from industrial areas on the continent.

Fog formed in the calm air as the ground cooled. During the period of the fog, huge amounts of impurities were released into the atmosphere and trapped in the fog beneath the inversion. On each day during the foggy period, in addition to the small particulates from the combustion of coal, the UKMO estimates 140 tonnes of hydrochloric acid and 14 tonnes of fluorine compounds.

In addition, and perhaps most dangerously, 370 tonnes of sulphur dioxide were converted into 800 tonnes of sulphuric acid."

That acid fog is what did most of the damage.



Government medical reports in the following weeks estimated that up until 8 December 4,000 people had died prematurely and 100,000 more were made ill because of the smog's effects on the human respiratory tract. More recent research suggests that the total number of fatalities was considerably greater, at about 12,000.

As the UKMO reports "This kind of smog has now become a thing of the past, thanks partly to pollution legislation and also to modern developments, such as the widespread use of central heating."

DONORA PA SMOG EVENT OF 1948



Noontime smog in Donora, PA 1948

The Donora killer smog event of 1948 was the result of a low level inversion in late October of 1948 resulting in a wall of particulate and chemical laden fog that killed 20 people and sickened 7,000 more in Donora, Pennsylvania" a mill town on the Monongahela River, 24 miles southeast of Pittsburgh. Sixty years later, the incident was described by the New York Times as "one of the worst air pollution disasters in the nation's history". The Donora smog event, the worst air pollution disaster in U.S. history, let the public know that industrial pollution could kill. It eventually led to the Clean Air Act.

No one is opposed to clean air. I did my doctoral studies grant work on air resources (after a masters on explosive development in east coast storms). We had real pollution issues back then (CO, SO2, NOx, hydrocarbons), largely resolved now. They need to do the same in China and India.

But it is NOT carbon dioxide that is the killer. CO2 is a plant fertilizer that has helped feed the growing world population.

Is CO2 Plant Food? Here is what happens with more CO2



385 ppm

535 ppm

685 ppm

835 ppm

Source: CO2 Science

Clean coal plants are being built now in China and in places like Japan and Germany as they have discovered that renewables are unreliable and expensive energy sources for not only the populace but also for industry that requires steady, dependable and economical energy sources to compete in the global economy.