Current Global Warming

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I am constantly surprised and concerned how so many who write letters to the Roanoke Times about global warming understand so little about it.

Until about 1970, global warming was largely masked by air pollution (small particulates and noxious gases) that cooled the atmosphere. Coal extraction in the United Kingdom peaked in 1910; the United Kingdom enacted a Clean Air Act in 1956, and the United States enacted a Clean Air Act in 1963.

Since 1970 the average global temperature has risen rapidly, averaging 0.29 ºC (0.52 ºF) per decade, because cooling by air pollution had been greatly reduced. Call this "current global warming" or "Modern Global Warming."

To discuss current global warming, attention should be paid to dates after 1970, not so much to earlier dates when it is difficult to untangle the atmospheric heating of global warming and the cooling of air pollution.

It is ironic that current temperature increases could be temporarily reduced by canceling the various Clean Air Acts, thereby allowing industries to return to polluting the air with small particulates and noxious gases that cool the atmosphere. However, the ensuing premature deaths would be added to the eventual future deaths due to global warming.

Current global warming is mostly caused by burning fossil fuels (coal, crude-oil liquids and natural gas, in order of decreasing causation magnitude), which releases carbon dioxide into the atmosphere for a long stay. Sunshine passes mostly unimpeded through the carbon dioxide, and it is converted by the Earth to lower light frequencies emitted back up into the atmosphere. These lower light frequencies are reflected back to the Earth by carbon dioxide, warming the atmosphere and Earth.

Besides releasing carbon dioxide when burned, natural gas, which is largely methane, often leaks into the atmosphere where it is a more powerful reflector of low frequency light than carbon dioxide. Since the methane atmospheric concentration is about 1,000 times less than the carbon dioxide concentration, the global warming effect of methane is about one-fourth of the carbon dioxide effect. So, carbon dioxide emissions from burning fossil fuels cause most of global warming.

There are other contributors to global warming. One of the most important is the destruction of forests, since trees convert carbon dioxide into oxygen.

Since 1960 the concentration of carbon dioxide in the atmosphere has been accurately measured; it has increased over time according to a quadratic equation, faster than linearly. Currently, it is 421-ppmv (parts per million by volume). We know that this carbon dioxide concentration in the atmosphere occurs mostly from burning fossil fuels, because it mainly consists of carbon-12 instead of carbon-13, which was mostly the carbon dioxide in the atmosphere before the industrial revolution.

The question is: "How much longer will the atmospheric concentration of carbon dioxide increase quadratically?" One answer is: "not forever," because the amount of fossil fuels economically extractable from the Earth is finite.

From decades of collecting data for fossil fuels extraction, I estimate that the atmospheric concentration of carbon dioxide will peak at about 500-ppmv at about year 2050.

It would save much agony and many human lives if humanity would choose to reduce burning fossil fuels soon. I am not optimistic that it is going to happen soon enough, despite the current fast global development of renewable energy.

The current global average temperature is about 14 ºC (57 ºF); it is rising at about 0.29 ºC (0.52 ºF) per decade. If atmospheric concentration of carbon dioxide peaks at about 500-ppmv at about year 2050, the global average temperature

will probably peak at about 15 ºC (59 ºF) — dangerously high!

It is interesting and important to know that global ocean surface temperature of about 17 ºC (63 ºF) is rising at about 0.135 ºC (0.243 ºF) per decade. It will probably peak at about 17.5 ºC (63.5 ºF) at about year 2050. High ocean surface temperature and other factors are responsible for formation and strength of ocean cyclones (hurricanes). Such high ocean surface temperatures indicate that huge amounts of energy are being stored in the deep oceans, which eventually will feed back into the atmosphere, keeping the atmosphere from cooling as fast as it would otherwise in the future.

Data show that atmospheric temperatures in the cold Arctic are increasing much faster than at other latitudes. Such reduction in temperature differences between the north middle latitudes and the Arctic cause erratic movement of the jet stream, which movement often creates extreme weather events in north middle latitudes, such as the U.S. location.

All of these facts are further detailed in a document that deals with the basic data citizens should understand about global warming: tinyurl.com/GlobalWarming2022.