



FROM THE DESK OF RATTAN LAL Viewpoint 8.2018

1st August 2018

Subject: Did the Stone Age End Because the World Ran Out of Stones?

Fellow Soil Scientists,

Similar to the Stone, Bronze and Hydric ages, the era since circa 1750 is known as “The Carbon Civilization.” With a continuous increase in human population and the ever-growing economic affluence, the global energy demand has increased from 299 EJ in 1980 to 575 EJ in 2015, at an average rate of 8.8 EJ/yr. The energy consumption is projected to increase to 627 EJ by 2020, 700 EJ by 2030 and 776 EJ by 2040. The annual rate of increase in energy consumption between 2015 and 2040 is estimated at 6.8 EJ/yr. In 2012, with 553 EJ of global energy consumption, 80% was supplied through fossil fuel combustion, 11.3% through biofuels (mostly wood), 5.5% through nuclear, 2.2% through hydro and 0.4% through other sources. In 2015, with 607 EJ of energy consumption, 86% was supplied through fossil fuel consumption (oil, coal, and gas). In comparison with the total energy consumption, the direct agricultural use of energy has also increased steadily and is expected to increase even at a higher rate in the future. Direct energy use in agriculture comes from diesel consumption, use of agricultural chemicals, irrigation, heating /cooling and grain drying. On average in the U.S. Corn Belt, producing one bushel of corn grains (25.4 kg) requires 0.5 gallon of diesel (68.9 MJ). By 2040, the global energy demand will increase by 30% compared with that of 2017, which is equivalent to adding another China and India into today’s consumption. Despite the high environmental footprint, fossil fuel will remain to be among major sources of energy until 2050s, and will thus continue to exacerbate the anthropogenic climate change. The cumulative C emission between 1750 and 2015 is estimated at ~600 Pg (billion metric ton) of which 410 Pg was from fossil fuel combustion and ~190 Pg from the land use change. Total emission from land use change since the beginning of agriculture to the onset of Industrial Revolution may be as much as 320 Pg. Of the total anthropogenic emissions (600 Pg) since 1750, 260 Pg remained in the atmosphere. Furthermore, global reserves of fossil fuel are estimated at 4130 Pg of C comprising of 3510 Pg as coal, 230 Pg as oil, 140 Pg as gas, and 250 Pg as others (i.e., shale). Thus, C addiction of the humanity with consumption of ~10 Pg of C per year at present is not likely to be restrained by depletion of the world’s fossil fuel reserves in the near future. Just as the Stone Age did not end because the world ran out of stones, similarly, it is hoped that the Carbon Civilization must also end long before the world runs out of fossil fuel. All soil and environmental problems of the 21st century are directly or indirectly related to humanity’s addiction to fossil fuel. Therefore, decoupling the humanity’s wellbeing from fossil fuel C and identifying no-C fuel sources is a high priority. **Humanity needs a fuel source that is safe, secure, healthy, renewable, economic and environment friendly (e.g., solar, wind). This is the right time to transition to no-C energy not because the world is running out of fossil fuel, but because of its high environmental footprint. As Carl Sagan (astronomer) said “Anything else you are interested in is not going to happen if you can’t breathe the air and drink the water. Don’t sit this one out. Do something.”**

Sincerely,

Rattan Lal,
President, International Union of Soil Sciences

