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Foreword of the Special Issue “Advances in Bioenergy and Biomass—Effects on Green Transition”

Donald Huisingh

Institute for a Secure and Sustainable Environment, University of Tennessee, USA

E-mail: dhuising@utk.edu.

This special issue’s articles highlight valuable advances in bio-energy and bio-mass energy sources which can help societies to make the “Green Transition,” and to accelerate the transition from fossil carbon-based energy sources.

Why is it urgent for societies to transition to post-fossil carbon-based energy sources?

The 2015 Paris Agreement, which is a legally binding international treaty on climate change was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. It was entered into force on 4 November 2016.

Its overarching challenge is for those parties to co-work to keep “the increase in the average global temperatures to well below 2 °C above pre-industrial levels” by engaging in efforts “to limit the temperature increase to 1.5 °C above pre-industrial levels.”

Based upon data from the Mauna Loa Observatory in Hawaii, in 1960 the carbon dioxide concentration was 421 PPM and as of 4 June 2023 it was 424 PPM, which was a 3 PPM increase from June 2022.

As a consequence of increasing carbon dioxide concentrations in the atmosphere, the temperature has risen by an average of 0.14 °F (0.08 °C) per decade since 1880, or about 2 °F in total. The rate of warming since 1981 was more than twice as fast at 0.32 °F (0.18 °C) per decade.

The 2022 surface temperature was an average of 1.55 °F (0.86 °C) warmer than the 20th century average of 57.0 °F (13.9 °C) and 1.90 °F (1.06 °C) warmer than the pre-industrial period (1880–1900).

In this context, it is increasingly clear that an integrated array of societal policies, procedures and practices will have to be implemented to help to ensure that we do not exceed the 2 °C degrees increase above the preindustrial temperature average that was agreed upon in 2015 the Paris Climate Treaty on Climate Change. The articles in this special issue provide valuable inputs for making progress toward that goal.

However, additional changes also need to be made. For example, switching from fossil carbon-based systems to wind, photovoltaic, geo-thermal, nuclear and wave-energy based systems should be complemented with bio-based energy sources.



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However, there is another, very important dimension that must be addressed, namely human population growth.

In 1800 the global human population was estimated to have been one billion. On 15 November 2022, the population reached eight billion! Currently, there is a *net annual increase* of 81,000,000 people on planet earth! At this rate, it is projected that there will be 9.5 billion humans on earth by 2100. One contributor to the increasing population is that currently there are 281 million women in developing countries who have unmet, needs for contraceptives and related information!

The six articles in this Special Issue have directly and indirectly focussed upon ways to de-fossilize society by using bio-based energy sources.

Prof. Koukios and I invite all readers to carefully read these articles. We hope you to apply the authors' knowledge in your research and teaching as you help societies to achieve equitable, livable, post-fossil carbon societies via the "*Green Transition*."

We suggest that you remember that the "*Green Transition*" should be designed to achieve:

- a. transition to post-fossil carbon societies;
- b. reductions of wastage, currently 30+% of all food is wasted;
- c. integrations of *bio-based* energy sources with solar, wind, geo-thermal, nuclear and wave-based energy sources;
- d. stabilization of the human population within this century;
- e. achieving the Paris Agreement climate-related goals.

Please remember our shared responsibilities to help to ensure that Planet Earth and its biospheric inhabitants will have livable and sustainable conditions for present and future generations. Please reflect upon where we still fall short of our commitments to one another and seek to find ways to fulfill our ethical responsibilities.