EasyChair Preprint

№ 11844

The Socioeconomic and Political Factors for Achievement of Net Zero Scenario

Pankaj Tomar

January 22, 2024

The socioeconomic and political factors for achievement of net zero scenario

Pankaj TOMAR[1,2]

[1]IGDTUW, Kashmere Gate, Delhi, India
[2]GGSIPU, Dwarka, New Delhi, India
e-mail ID; pankaj_12343@rediffmail.com

Abstract
The role of friction at rubbing mechanical surfaces had evolved carbon load for modulation of work-life balance in reducing CO_2 loadings. Friction, lubrication, and wear of engineered mechanical contacts accounted for 1/3rd of energy dissipation for researching in a domain of green technology. The mechanical efficiency of transport sector of leading urban cities is gradually enhanced by reinforcement of Hybrid and EVs.

Keywords: Friction, Human thermodynamics, Socioeconomy, Political regulations

1. Introduction

The word tribology was the first time coined by Peter Hans Jost in the writing of a socioeconomic report for saving of economy as a function of rubbing or sliding mechanical contacts [1-2]. The fuel energy consumed in passenger cars to overcome friction with braking friction excluded is 28% of the fuel energy, 21.5% of the fuel energy is expended to move the car, and tribology can save 290 Mt CO_2 emission for strengthening socioeconomic domain [3]. The wear and wear-related failures are the major concern for condition monitoring to be a factor of economic savings by as much as 95% in ten years by tribological solutions, about 74% by friction reduction, and 26% by wear protection [4]. The friction and wear impact of the energy consumption, CO_2 emissions, and costs have been analysed due to the large-scale implementation of new tribological solutions based on the industries, transportation, and other parts of our society [5]. The transport sector alone contributes 25 percent of CO_2 atmospheric growth, in addition to energy, buildings, industries, and residual factors for the advancement of carbon dioxide capture to create economical products [6]. Re-searching for a technological means to utilize environmental CO_2 evolved from mechanical machineries fuel combustion has the potential to reduce emissions as per the advancement of sustainability by electrochemical conversion of CO_2 into hydrocarbons such as ethylene for producing raw materials useful for lubricants [7-8]. The electrochemical conversion equation is interpretated for understanding of sustainability from tribology such as;

$$2CO_2(g) + 2H_2O\ (l) \xrightarrow{\text{Electrochemical Conversion}} C_2H_4\ (g) + 3O_2\ (g) \quad \text{(i)}$$

$$2CO_2(g) + 12H^+ + 12e^- \xrightarrow{\text{Intermediate Equation}} C_2H_4\ (g) + 4H_2O\ (l) \quad \text{(ii)}$$

$$CO_2(g) + 2H^+ + 2e^- \xrightarrow{\text{Intermediate Equation}} CO\ (g) + H_2O\ (l) \quad \text{(iii)}$$

$$CO_2(g) + 6H^+ + 6e^- \xrightarrow{\text{Intermediate Equation}} CH_3OH\ (g) + H_2O\ (l) \quad \text{(iv)}$$

2. Environmental reactions

Friction is not a fundamental type of force and is predicted from the action-reaction hypothesis in consideration of supramolecular chemistry, interface materials properties, state variables, and environmental third bodies for a synergistic materials-energy balance [9]. The supramolecular interactions of nanomaterials over lipid membrane, cytotoxicity, environmental reactions, economy, and sustainability have been observed during political lockdowns [10-11]. The Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme with Phase I & II was initially launched in April 2015 for urban Electric Mobility for providing financial subsidy to electric vehicles manufacturing industries [12-13]. The hybrid technology transforms sink loss into useful mechanical work using electric motor and battery observe macroscopically on roads of India for achievement of environmental sustainability by enhancement of mechanical efficiency of engines [14]. The climate action of anthropogenic fossil fuel combustion has streamlined green technology towards reducing environment harm for achievement of environmental sustainability from CO_2 absorption, storage, and utilization into useful matter [15-17]. The rubbing of surfaces, interfaces, and interphases with environmental influence energy dissipation is included (Table 1) for effective materials and energy interface.

Synergy	Nomenclature
Friction, lubrication, and wear consume ~23% (119 EJ) of the global energy, annual GDP savings amount to 1.4%, and the CO_2 reduction to 3.14 Gt for a longer term by modulation of rubbing contacts of machines from transport, energy, manufacturing, and buildings	**Tribology**
Passengers' cars and transport, fossil fuel-based energy generation, buildings and mixed land use, manufacturing industries altogether evolve	**Carbon Emission**

carbon footprints for creating reactive forces over green health of planet or promotion of green technology and advancement of green tribology	
Environmental reaction of charged and oxidised air suspended particulate matter, black carbon, and nanoparticles evolved from anthropogenic activities in urban atmosphere influencing general health, reactive oxygen species (ROS), and oxidative stress expressed from covid#19 pandemic in India	**Cytotoxicity**
Faster Adoption and Manufacturing of Electric vehicles manufacturing industries adopted the scheme in April, 2019 for electric mobility to reduce carbon emissions in streamline with Paris Agreement for Rs 10,000 crores budget allocation for manufacturing of 500,000 EV3W, 55,000 EV4W and a million two wheelers	**FAME**
The leading manufacturers in India are manufacturing best fuel-efficient cars (≥25 percent mechanical efficiency than conventional engines) have more than one engine (conventional and electric motor), running on either petrol or diesel namely; (i) Toyota Urban Cruiser Hyryder (ii) Maruti Suzuki Grand Vitara (iii) Honda City Hybrid e: HEV (iv) Toyota Camry Hybrid (v) Toyota Vellfire Hybrid	**Hybrid Vehicles**

Table 1 Fundamental nomenclature useful for underlying environmental action and reaction from rubbing mechanical contacts, mechanical contact with natural surface, and health effect of "Cytotoxicity" observed in India during 21st century for advancement of sustainability through tribology by reducing CO_2 loadings with biosphere as per the requirement of good health and well-beings

3. Conclusions

The energy dissipation at rubbing engineered contacts have evolved CO_2 footprints due to industrial revolution for last few decades. The following expression is included for fundamental understanding of friction influence on socioeconomic indicators;

- The socioeconomic frontier of CO_2 emission at rubbing mechanical contacts for achievement of rational mechanical efficiency of machines

- The electrochemical conversion of CO_2 to hydrocarbon such as ethylene/methane for reducing emission to improve sustainability

The human body is a thermodynamic system for consuming fuel energy, delivering mechanical work for achievement of an optimum mechanical efficiency above resting, and release residual energy to environment of biosphere.

Author Contribution
Author wrote paper by inclusion of a few author preprints

Acknowledgements
Author acknowledges JioFiber of Reliance Industries for providing cyber facility and information security useful for academic structuring of the perspective

Conflict of Interests
None conflict of interests to declare

Funding resource
None funding or sponsorship available

Data availability statement
Expressed academic data is borrowed from enumerated references

References

[1] Jost, H.P. (ed.). Lubrication (tribology) education and research: a report on the present position and industry's needs. Department of Education and Science, H. M. Stationary Office, London, UK, 1966.

[2] Jost, P.H., Tribology — Origin and future. Wear, Vol. 136, Issue 1, 1990, pp. 1-17. https://doi.org/10.1016/0043-1648(90)90068-L

[3] Holmberg, K., Andersson, P., Erdemir, A., Global energy consumption due to friction in passenger cars. Tribology International, Vol 47, 2012, pp. 221-234. https://doi.org/10.1016/j.triboint.2011.11.022

[4] Erdemir, A., Holmberg, K., Energy consumption due to friction in motored vehicles and low-friction coatings to reduce it. In: Cha, S., Erdemir, A. (eds) Coating technology for vehicle applications. Springer, Cham, 2015, pp 1–23. https://doi.org/10.1007/978-3-319-14771-0_1

[5] Holmberg, K., Erdemir, A., Influence of tribology on global energy consumption, costs and emissions. Friction, Vol. 5, 2017, pp. 263–284. https://doi.org/10.1007/s40544-017-0183-5

[6] Holmberg, K., Erdemir, A., The impact of tribology on energy use and CO_2 emission globally and in combustion engine and electric cars. Tribology International, Vol. 135, 2019, pp. 389-396. https://doi.org/10.1016/j.triboint.2019.03.024

[7] Canter, N., Conversion of carbon dioxide to ethylene and hydrogen. TLT, Vol. 78, Issue 4, 2022, pp. 12-13. https://www.stle.org/files/TLTArchives/2022/04_April/Tech_Beat_I.aspx

[8] Berkelaar, L., Linde, J., Peper, J., Rajhans, A., Tiemessen, D., Ham, L., Berg, H., Electrochemical conversion of carbon dioxide to ethylene: Plant design, evaluation and prospects for the future. Chemical Engineering Research and Design, Vol. 182, 2022, pp. 194-206. https://doi.org/10.1016/j.cherd.2022.03.034

[9] Tomar, P., "Friction": a supramolecular affinity. EasyChair Preprint No. 9185, 2022. https://easychair.org/publications/preprint/7GLk

[10] Tomar, P., NEMS/MEMS carbon functionalization: A prospective expression. Research Square Preprint, 2022. https://doi.org/10.21203/rs.3.rs-2076638/v1

[11] Lakey, P.S.J., Berkemeier, T., Tong, H., Arangio, A.M., Lucas, K., Pöschl, U., Shiraiwa, M., Chemical exposure-response relationship between air pollutants and reactive oxygen species in the human respiratory tract. Scientific Reports, Vol. 6, 2016, Article number 32916. https://doi.org/10.1038/srep32916

[12] Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) Scheme - Phase I & II. https://www.iea.org/policies/12517-faster-adoption-and-manufacturing-of-hybrid-and-electric-vehicles-fame-scheme-phase-i-ii

[13] Electric Vehicles FAME II subsidy: All you need to know, TVS Motors. https://www.tvsmotor.com/blogs/fame-II-subsidy.html

[14] Top 5 Best Hybrid Cars in India, Tata Capital. https://www.tatacapital.com/blog/vehicle-loan/top-5-best-hybrid-cars-in-india

[15] Reimer, J.A., A molecular perspective on carbon capture. Matter, Vol. 5, Issue 5, 2022, pp. 1330-1333. https://doi.org/10.1016/j.matt.2022.04.005

[16] Tomar, P., Environment Sustainability from CO_2 Absorption in Heterogeneous Mechanochemical Systems: A Green Technology. EasyChair Preprint No. 10947, 2023. https://easychair.org/publications/preprint/TfD3

[17] Tomar, P., Materials and Energy Interface of CO_2 Loadings & Decarbonization. EasyChair Preprint No. 10949, 2023. https://easychair.org/publications/preprint/skPS