

**COP 26: Relevance and Difficulties in  
Solar Power Dependency****UMESH CHANDRA KULSHRESTHA**

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Dear Readers


It is my pleasure to present before you the current issue of Current World Environment. This issue includes articles on air pollution, water pollution, ecosystem, climate change impacts, bio diversity, soil nutrients, and energy etc. Recently, COP 26 meeting has been concluded pledging for phase down of coal. IPCC AR6 (IPCC, 2021) also emphasises upon adoption of clean technologies for cleaner air. The energy sector has to align with climate change solutions in the centre of strategy formulation (WEO, 2021). India has coal reserves for almost 111 years (Worldometers, 2021). India has committed to Net Zero emissions by 2070 which also means that the country would be shifting to clean energy sources earlier than the coal reserves last. Out of available options of clean energy viz. wind, solar, nuclear and hydrogen, solar is the best feasible option at present. It also completes the mandate of International Solar alliance (ISA) which is headed by India. There has been a considerable growth in solar energy production in last few years in India. The annual production of solar power is increased from 1.9 GW in 2015 to 9.3 GW in 2019. Government plans to achieve 114 GW solar power by 2022 (IBEF, 2021).

There are some favourable factors for promotion of solar power which include slashing price and increasing efficiency of energy conversion. The other major concerns have been cost and efficiency of cell but these are not major hurdles. At present, cost of solar power is significantly reduced from Rs2.6/k Wh in 2019 and 2.36 in June 2020 to 1.99/k Wh in December 2020 (PVM, 2020). The energy conversion efficiency of photo voltaic cell from solar radiation is enhanced. At present 22.8% conversion efficiency cells are available which is expected to improve further as a German researcher's group has achieved 44.7% conversion efficiency using new material which will further reduce the cost of solar energy in near future.

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The materials and metals for solar power production include silicon wafers of 99.99999% purity. Other metals include germanium, selenium, tellurium, indium, molybdenum, tin and gallium for solar cells; silver, titanium dioxide indium, iron for solar panel; copper and cadmium and for wiring and thin film; and lead for batteries. Most of these raw materials are not found in India (EQ, 2021). Thus, India needs to focus upon process and development of new metals and materials for solar power self-reliance.

Though the solar is the most appropriate option at present, it has certain concerns related to energy intensity in future. A solar panel has a life of 20 years approximately. After its use, around 20 years, how the solid waste generated will be managed on its discard? Already there are existing problems of municipal solid waste and e-waste disposal in most of the developing countries. The solar cell waste disposal will be another serious problem. Secondly, the manufacturing of solar modules takes place using coal as an energy source which itself a polluting process. Thirdly, most of the raw material of solar cell and related items is not available in India. Other adverse factors impacting solar power production include-

a). Use of coal for production of solar panels and other devices which is not a green pathway; b). Deposition of carbon dust on solar panels as the dustfall is common phenomenon in India especially in north India. In urban areas, the dust is mixed with the carbon particles emitted by combustion sources and resuspended into the atmosphere (Mishra and Kulshrestha, 2017). Around 3.6kgC/ha per year carbon rich dust fall is reported in Delhi. The deposition of blackish dustfall may affect energy conversion efficiency of solar cells significantly (Kulshrestha, 2020).

c). The carbon rich dust reduces incoming solar light further reducing the efficiency of cell. In addition, the incoming radiation is also affected by clouds especially in monsoon season which may reduce the effective hours battery charging. Therefore, solar-wind hybrid source may be an appropriate option of energy during monsoon season.

In a nutshell, while deciding on renewable energy sources, we need to consider-i). raw material availability, ii). consumer cost, iii). pollutants, iv). wastes disposal, and v). national security. During the present energy transition, we can depend on the batteries as a cleaner energy source for transports, and solar+ wind for power generation but our ultimate goal should be hydrogen and nuclear energy as long term sources.

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