Strengthening Rural Economy with Clean and Green Initiatives

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Dr. Harender Raj Gautam

Our natural environment is our most precious inheritance, which we need to preserve for future generations. India is blessed with a wonderful variety of natural landscapes and habitats, and we need to undertake clean and green initiatives on a long-term basis to protect and let them flourish on a sustainable basis for future generations. The World Bank's 2019 'Beyond the Gap' report finds that 940 million people live without electricity, 663 million lack improved sources of drinking water, and 2.4 billion lack improved sanitation facilities. We need to find solutions to these problems through green development initiatives. There is a need to adopt green technologies as more than a quarter of the planet's population rely on forests for their livelihood, while 1.2 billion people in tropical countries rely on nature for their basic needs.

Need for Green and Clean Technologies

India needs to focus on a green economy at the village level that is low-carbon, resource-efficient, and socially inclusive. Global access to clean energy is of paramount importance because, as per the World Health Organization (WHO), about 3.8 million people die prematurely each year from the adverse effects of indoor air pollution, and the vast majority of these deaths occur among the 2.6 billion people in poor countries who still burn wood, coal, charcoal, or animal dung indoors for cooking. Women and children are most vulnerable because, while doing household chores, they are particularly exposed to this toxic smoke, which penetrates deep into the lungs. WHO has lauded the effective initiative of switching to bottled cooking gas promoted on a large scale in India is saving countless lives.

The author is recipient of 'Earth Care Award' and former professor and head, Dr.Y.S.Parmar University of Horticulture and Forestry. Email: hrg_mpp@yahoo.com

Clean and green initiatives are important for improving the overall human development index and ensuring sustainable development. Sanitation, hygiene, and the availability of portable and clean drinking water are all vital for the improvement of the human development index, as 1.4 million people die annually and 74 million will have their lives shortened by diseases related to poor water quality, sanitation, and hygiene (WHO 2022). Further, almost half of the global population, counting up to 3.6 billion people, lacks safe sanitation (WHO/UNICEF 2021). WHO estimates that ensuring safely managed drinking water for all households in the country could avert nearly 400,000 deaths caused by diarrheal diseases and prevent approximately 14 million Disability Adjusted Life Years (DALYs) related to these diseases, which otherwise can immensely contribute to our development. This achievement alone would result in estimated cost savings of up to $ 101 billion. India has made significant interventions to address these vital issues, and WHO has highlighted the substantial benefits of the *Har Ghar Jal* programme in India. There has been an increase in rural tap water connections from 16.64% in 2019 to 62.84% in 2023, which resulted in averting 13.8 million DALYs, which means an improvement in the human development index.

Potential of Renewable Energy Generation- Vision and Mission

Energy is vital for development, and renewable energy can ensure sustainable development in harmony with nature and the environment. The National Institute of Solar Energy has assessed the country's solar potential at about 748 GW, assuming 3 per cent of the waste land area will be used for installing such facilities. The National Solar Mission is one of the key missions in India's National Action Plan on Climate Change, which was launched on 11th January 2010, and it will promote ecologically sustainable growth while addressing India's energy security challenges. The mission's objective is to establish India as a global leader in solar energy, and India's cumulative installed renewable capacity reached 179.322 GW as of July 2023. Among renewable sources, while solar energy maintained its dominance contributing 67.07 GW, wind energy contributing 42.8 GW. India aims for 500 GW of installed renewable energy capacity and five million tonnes of green hydrogen by 2030. India aims to produce five million tonnes of green hydrogen by 2030. This will be supported by 125 GW of renewable energy capacity, for which 57 solar parks with an aggregate capacity of 39.28 GW have been approved.

Renewable energy in India is given a major thrust to advance economic development, enhance energy security, facilitate access to energy, and mitigate the impact of climate change. As some parts of our country receive over 300 days of sunshine every year due to India's natural location along the equator, it lends us a strategic advantage in solar energy production. We also have a similar advantage in wind energy due to our 8,000-kilometre coastline. Additionally, India's vast hydropower potential is estimated at over 100,000 MW due to the wealth of rivers in different parts of the country. These natural bounties have provided India with a unique opportunity to lead the way in renewable energy production and create a green economy. Renewable energy can bring prosperity to our rural landscape. Results are quite visible, as we see Modhera village in Gujarat, which is India's first village to be powered by solar all day, every day, with 1,300 rooftop panels on residential and government buildings that are connected to a power plant. The solar power plant in this village has not only reduced the energy bills of the villagers but is also becoming a source of income as any surplus power they generate is being sold back to the grid. Such initiatives are being taken in many States. The State Government in Himachal Pradesh is progressing on a path to becoming a green energy state with a number of initiatives, including the target of 500 MW of solar energy installation for the financial year 2023-24. The State Government has decided to develop two green Panchayats in each district with the installation of 500 KW to one MW.

Green development initiatives are needed mostly to be focussed on rural areas, as problems contributing to nature and environmental degradation are more prevalent here. Green rural development can stimulate rural economies, create jobs, help maintain critical ecosystem services, and strengthen the climate resilience of the rural poor. According to the joint report of the Council on Energy, Environment and Water (CEEW), the Natural Resources Defense Council (NRDC) India, and Skill Council for Green Jobs (SCGJ), India can create about 3.4 million jobs by installing 280 GW solar and 140 GW wind capacity as it moves towards accomplishing its goal of 500 GW non-fossil electricity generation capacity by 2030. The wind and solar

energy markets have already employed a workforce of 111,400 people. In addition, our renewable energy sector could potentially employ around one million people by 2030, which would be ten times more than the existing workforce. To augment this workforce, our skill development programme is in place, as more than 100,000 people have been trained between 2015 and 2021, and 78,000 trainees have been certified under the national-level solar energy Suryamitra training programme.

Government Policies and Initiatives

The Union Budget 2023 has taken significant steps towards promoting a green energy transition in the country with the allocation of Rs. 35,000 crore for priority capital investment towards energy transition and Net Zero objectives. To strengthen the nation's renewable energy sector, the Government has allotted Rs. 10,222 crore to the Ministry of New and Renewable Energy, which will help reduce reliance on fossil fuels and foster the use of clean and sustainable energy sources. Further, there is an uptick in the budgetary allocation for the solar sector, with an allocation of Rs. 5,331.5 crore in this current budget. Further, Rs. 20,700 crore has been allocated for the inter-state transmission line being created for the evacuation and grid integration of 13 gigawatts of renewable energy from Ladakh.

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Another important Central Government initiative for green and clean technologies is PM-PRANAM (Prime Minister Programme for Restoration, Awareness, Nourishment and Amelioration of Mother Earth), which seeks to incentivise the entire country to promote alternative fertilisers and the balanced use of chemical fertilisers. The programme aims to promote the use of bio-fertilisers and simultaneously reduce the use of chemical fertilisers, which pose multiple risks, including health hazards, by entering our food chains and are responsible for environmental degradation as well. This will help our farmers and the people in rural areas.

Adoption of green hydrogen as an alternative source of energy can enable India to abate 3.6 gigatonnes of CO_2 emissions cumulatively till 2050 and reduce industrial coal imports by 95 per cent. Approval of the National Green Hydrogen Mission is a step ahead to make India a global hub for the production, utilisation, and export of Green Hydrogen and its derivatives. New energy trading platforms specifically for the renewable energy market, i.e., the Green Term Ahead Market (GTAM) and the Green Day Ahead Market (GDAM) have been introduced for selling off the power by the renewable developers in the open market without getting into long-term Power Purchase Agreements (PPAs). The Indian Energy Exchange (IEX) traded 275 million units (MU) of renewable energy in July 2023 alone. The UJALA LED bulb campaign is transforming the energy landscape and reducing emissions by a staggering 40 million tonnes annually. The Skills Council for Green Jobs continues to integrate environmental awareness into job training across skilling programmes through 'Green National Occupation Standards' for the workplace.

Role of Self-Help Groups

Self-Help Groups (SHGs) have become the fulcrum and catalyst for majority of developmental activities. There is a need to rope in these groups in popularisation and adoption of green and clean energy initiatives, as India has around 1.2 crore SHGs, mostly in rural areas and 88 per cent being all-women SHGs. But now their potential is also harnessed through clean and green

initiatives, such as the Swachh Bharat Mission Grameen (SBM-G). SBM-G is currently in its second phase, and its main aim is to sustain India as Open Defecation-Free, alongwith solid and liquid waste management. This comprises bio-degradable waste management, including GOBARdhan, access to improved ways of non-biodegradable waste management, greywater management, and faecal sludge management leading to visual cleanliness. Only the women in our villages can appropriately describe the ordeal of defecating in the open, and being the biggest beneficiaries of the ODF drive, it led to more and more women coming forward to lead this movement and becoming the key to its success. As many as 30 to 40 percent of women volunteers known as 'Swachhagrahis' triggered the process of bringing about collective behavioural changes through the emergence of natural leaders. Women representatives, elected in Panchayati Raj institutions, also played an active role in many places. It was established without doubt that the involvement of women led to the success of SBM-G, in comparison to earlier sanitation drives.

Emerging Opportunities with Green Development Initiatives

- Significant market opportunity exists in India's rural economy for mechanisation through clean energy innovations in the farm sector. Potential uses of these alternative energy options include pesticide spraying, rice transplanting, and harvesting grain crops, all of which cumulatively have a total market potential of about USD 40 billion.
- Clean energy innovations could transform enterprises engaged in activities such as custom tailoring, food processing, poultry, and livestock rearing among others.
- In rural areas, 20 odd livelihood appliances such as solar pumps, solar-powered milking machines, milk chillers, sewing machines, solar charkhas, cold storage, and knapsack sprayer can effectively run on decentralised renewable energy (DRE). As the Government has incentivised these initiatives, it will help in cost cutting in the crop of production with overall gains.

Focus Areas to Accelerate Use of Renewable Energy

- Existing livelihood appliances prevalent in rural areas are not designed for efficiency, but for unreliable and subsidised/flat-priced electricity. Hence, there is need to develop such farming equipment, which are reliant on renewable energy sources with efficiency.
- There is a need for reduction in battery costs and development of cost-effective, super-efficient, small-sized motors, which could significantly improve the economic viability of DRE.
- There is a need to expand the market for smaller livelihood solutions, which are presently significantly fragmented and cluster-based, potentially requiring hundreds of small and medium scale enterprises to capture the same.
- There is need for initial financial support system to the farmers in the rural areas as customer awareness and financing are major barriers to adoption of clean energy solutions for livelihood applications.

Challenges for the Shift to Green Technologies

Change in technology and its adoption are always investment intensive, and globally, at least $ 4 trillion a year is needed to be invested in renewable energy until 2030, including investments in technology and infrastructure to allow us to reach net-zero emissions by 2050. However, this investment will result in the reduction of pollution and climate impact, which alone could save the world up to $ 4.2 trillion per year by 2030. These and other low-carbon technologies could create a market worth up to $ 80 billion in India by 2030. Support from International Organisation like the World Bank and developed nations is essential to Make a shift in India's development onto a low-carbon path. To reach net zero emissions by 2070, the International Energy Agency (IEA) estimates that $ 160 billion per year is needed till 2030, which is three times more of today's investment levels. A recent report by the Institute for Energy Economics and Financial Analysis revealed that India witnessed a record-high investment in renewable energy in the year 2022, with a whopping investment of $ 14.5 billion, depicting a significant increase of 125 per cent from the previous year. The country is poised to attract over $ 20 billion in renewable energy investments in 2023 alone. Therefore, access of low-cost long-term capital is key to achieving net zero. ❑