Techno-Economic Feasibility and Environmental Impact Mitigation Assessment of On Grid-Solar PV Solution for Nano Entrepreneurs in The City of Bangalore

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Abstract

One of the most significant issues of the 21st century, is global warming, which is primarily caused due to the emission of Green House Gases (GHG). While most climate actions are targeted to cut back on GHG emissions from large industries and transportation sector, small scale solutions to achieve the same have been overlooked, especially in developing countries such as India. The paper analyses the economic and environmental impacts of one such solution, which proposes the use of electric iron powered by grid connected roof-top Solar PV system, across 40,000 plus manual clothes pressing service stores currently using charcoal-based iron in the city of Bangalore. An incentive of subsidized power, resulting in free supply of 200 kWh/month and low-interest capital loan at 5% is proposed as an implementation catalyst, for faster adoption of the technology. The proposed solution and incentives help in the entrepreneurs gaining a monthly profit of ₹27,819 which is equal to the LPG based option, a 48% increase from current profits of ₹18,686 using a charcoal-based iron. Subsequently, the proposed solution helps in annual reduction of GWP by 344,407 and 32,722 Tonnes of CO_2eq, when compared against charcoal and LPG options. It also leads to a maximum savings of ₹280.9 million and ₹8.433 million in external costs, against charcoal and LPG based irons respectively, across the city of Bangalore. The work further analyses the emissions and cost of operation for various levels of incentives and energy mix, to provide a comprehensive study of the solution.

Keywords: External costs; Global Warming; Environmental Economics; Emissions; Climate Change