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The Role of Renewable Energy in Confronting Climate Change and Reducing the Environmental Impact of the Apparel Industry

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Abstract:

Time is running out for our resources and our planet, Fossil fuels will soon be depleted, and each day we cause irreversible harm to the environment. The shift to green energy is more urgent than ever, There is a guarantee of the continuous availability of renewable energy, which does not deplete, unlike traditional energy sources. The research problem lies in determining to what extent the use of renewable energy in Apparel factories contributes to environmental preservation and cost reduction. The importance of this research is highlighted by focusing on renewable energy and its benefits, and reducing the environmental pollution caused by conventional energy sources. This research aims to achieve sustainability and climate preservation through the use of renewable energy in Apparel factories, and to reduce electricity consumption costs in these factories. The research hypothesis is as follows: the use of renewable energy preserves the environment and reduces electricity costs in Apparel factories. This research employs a descriptive methodology using analytical techniques to describe and analyze renewable energy and its applicability in Apparel factories. Costs were calculated under three scenarios: electricity-only, On-Grid, and Off-Grid systems.

A case study was conducted for Apparel factory producing men's trousers, analyzing The electrical capacity of the factory under study, Solar energy was selected from renewable energy sources because the Arab Republic of Egypt benefits from abundant solar resources. Unlike wind energy, it does not require relocating factory to the desert, as solar energy is readily available and accessible everywhere. To implement this, the factory's rooftop area was calculated for the installation of solar panels, and it was found to be sufficient to cover the required electrical capacity. The following was done Analyzing the calculating energy costs in three cases: The traditional method - using solar energy in two ways (On Grid, Off Grid).

The results showed that the costs of the On-Grid system, which amounted to 1.66 million L.E, and the current electricity-only system, which amounted to 1.65 million L.E, were equal after 5 years, assuming that the electricity tariff remains constant. However, since electricity tariffs typically increase periodically, the On-Grid system would become more economically advantageous after five years. It is also important to note that the On-Grid system is more environmentally friendly. The Off-Grid system has a higher cost of 2.84 million L.E due to the high initial cost of solar panels and batteries. When calculating the cost after 30 years, the On-Grid system was found to be the most economical, with a cost of 3.72 million L.E, followed by the Off-Grid system at 5.69 million L.E. The electricity-only system came last, with a significant cost difference of 9.88 million L.E, while also being the most polluting to the environment.

We conclude that the most environmentally friendly system is the Off-Grid system, as it relies 100% on solar energy, followed by the On-Grid system, which depends 75% on solar energy.

Transitioning to renewable energy is necessary change, because it is a crucial step that can significantly reduce global GHG (Greenhouse Gas emissions), And Confronting Climate Change.

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Renewable energy, Apparel industry, Sustainable manufacturing, The Environmental Impact Assessment, Climate change

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