

# Innovative Solar Technologies for a Sustainable Future

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**Abstract:** Renewable energy resources are gaining unprecedented attention due to their pivotal role in mitigating harmful environmental impacts such as air pollution, climate change, and the depletion of natural resources. Among these, solar energy stands out as a game-changer in the global transition toward sustainable energy solutions. With the escalating human population and soaring energy demands, advancements in solar energy technologies have become imperative. Traditional solar cells face significant limitations, particularly their inability to generate electricity at night, creating a pressing need for innovation in this domain. The solar energy sector is now witnessing a wave of groundbreaking innovations that promise to revolutionize energy generation and integration into various environments. Among these advancements, floating solar farms, solar paints, and solar windows are making headlines. This study delves into the transformative potential of solar windows, a cutting-edge technology that integrates photovoltaic systems directly into transparent glass surfaces, enabling buildings to generate electricity without compromising aesthetics or functionality. By harnessing the power of solar windows, modern architecture can seamlessly incorporate renewable energy solutions, paving the way for more sustainable urban landscapes. In this paper we examine the technology, applications, benefits, challenges, and future prospects of solar windows, shedding light on their role in shaping the future of renewable energy.

**Keywords:** Solar energy, solar window, Photovoltaic systems, Renewable energy