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## Solar-Wind: Integrated Dual power Generation System

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Abstract: Wind turbine efficiency improvements can greatly increase power generation while lowering the demand for costly and environmentally harmful power sources. More efficient use of wind could result in lower energy costs for regular consumers because it is a renewable and free resource. Wind energy is a clean substitute for fossil fuels because it emits little to no pollution. Households may experience a significant reduction in their electricity costs with the development of turbine technology and wider adoption. Early windmills were invented in Persia, and people have been using wind power since the 7th century. Grain grinding, irrigation, and milling were the main functions of these early devices, which is probably where the word "windmill" came from. The use of windmills had expanded throughout Europe by the 12th century, with areas like the Netherlands seeing the most growth. Where massive wind farms started to play a crucial role in the generation of energy. But the first windmills weren't very effective. They produced slow, torque-focused machines because they only used half of each sail's rotation and had low tip speed ratios. Notwithstanding their drawbacks, these windmills served as a precursor to the highly engineered, contemporary turbines of today.

**Keywords:** Wind turbine efficiency, renewable energy, wind power, clean energy, energy cost reduction, pollution reduction

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