

Concept Note

Harnessing the Potential of Small Wind Turbines in India: Opportunities, Challenges, and Way Forward

Introduction

India has made significant strides in renewable energy (RE) with a cumulative installed capacity of over 201 GW as of September 2024. With ambitious targets of achieving 500 GW RE capacity by 2030 and net-zero emissions by 2070, the nation is focused on diversifying its energy portfolio. While large-scale wind and solar projects have dominated the RE landscape, the potential of small wind turbines (SWTs) remains underexplored.

Role of SWTs in India's RE Transition

As SWTs offer several advantages, they can contribute significantly to India's RE transition. With capacities ranging from a few hundred watts to several kilowatts, SWTs offer a decentralised solution to meet local energy demands. They can be deployed in different locations such as rooftops and telecom towers. Moreover, they can be integrated with buildings, making them versatile options for both urban and rural energy needs. By providing reliable power to remote and underserved areas, SWTs can enhance energy access where grid connectivity is limited or unavailable.

Further, India can utilise SWTs to supplement solar power in hybrid systems, providing reliable energy during non-sunny periods and reducing peak power purchases for distribution companies (DISCOMs) and consumers. Local generation from SWTs will minimise transmission and distribution losses for DISCOMs. It will also reduce the load on the DISCOM's grid, contributing to grid stability. Moreover, the country can deploy SWTs in areas with good wind resources. Systems installed in such areas will have a high capacity utilisation factor (as high as 30%), thereby lowering the cost of energy and the need for storage.

India can also leverage global technological advancements in SWTs that have made them more efficient, reliable, and cost-effective. This will enhance the reliability of electricity supply, improve RE penetration in rural electrification, and contribute to the overall RE targets.

Objectives

Recognising the potential of SWTs, the Center for Study of Science, Technology and Policy (CSTEP), in partnership with the Ministry of New and Renewable Energy (MNRE), is conducting a workshop with the following objectives:

- Exploring global technological advancements in SWTs, including design improvements, enhanced efficiency, and new turbine types, and discussing their applicability in the Indian context.
- Facilitating discussions with manufacturers, practitioners, academia, and industry experts to understand the on-ground challenges and arrive at solutions for the same.
- Identifying the key policy and regulatory challenges facing the SWT sector and exploring the kind of support required from the government, such as incentives, subsidies, and streamlined approval processes, to accelerate SWT adoption in India.
- Gaining insights into MNRE plans, policies, and future initiatives aimed at promoting SWTs as a crucial component of India's RE strategy.