



FORECASTING OF  
**RENEWABLE ENERGY  
RESOURCES**

Based on Microgrid and Market Access

# ABOUT US

## Who we are

We are a dedicated team of researchers and experts who recognize the urgent need for action in addressing climate resilience and energy transition in Pakistan. Our mission is to develop and implement effective policies for cleaner, renewable energy sources like solar and wind, aligning with Pakistan's 2030 goal of 30% renewable energy in its electricity mix. As a multidisciplinary team, we leverage expertise in three key disciplines of study—Energy Systems Engineering, Thermal Energy Engineering, and Electrical Power Engineering—to drive our mission forward. We are united by a shared vision of creating a sustainable and resilient future for Pakistan, where cleaner energy sources play a pivotal role in reducing the nation's vulnerability to climate-related challenges.

## What we do

We conduct in-depth, evidence-based research to analyze and improve energy policies in Pakistan. Our focus is on advancing renewable energy solutions and engaging stakeholders to ensure effective policy implementation. Our methodology involves a critical examination of current energy policies to pinpoint areas of improvement and formulate strategies for the widespread adoption of renewable energy sources across various levels.

In line with our commitment to fostering sustainable practices, we have established a fellowship program as part of our broader initiatives that aims to facilitate evidence-based research for promoting energy transition in Pakistan. Through research studies, surveys, and forecasting, we plan to assess various aspects of energy transition, including the adoption of renewable energy technologies and their impact on climate change. Our approach involves active engagement with stakeholders to address their concerns and facilitate the effective implementation of policies, fostering the growth of renewable energy manufacturing and marketing facilities.

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# Executive Summary

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The Integrated Generation Capacity Expansion Plan (IGCEP) 2022-2031 outlines the aims and targets for expanding and diversifying Pakistan's generation capacity. It emphasizes renewable energy integration, remote area electrification, energy efficiency, and policy support as key goals to achieve a sustainable and reliable electricity supply. In microgrid deployment, the regulatory framework overseen by the National Electric Power Regulatory Authority (NEPRA) plays a vital role. NEPRA has implemented policies and regulations to facilitate the development and operation of microgrid systems. It has established guidelines for licensing, tariff regulations, net metering, and feed-in tariffs to encourage private investment, fair pricing, and the integration of renewable energy sources in microgrids. The aims and goals of the IGCEP are closely aligned with this work on the techno-economic analysis of microgrid deployment. This study contributes to renewable energy integration, remote area electrification, and energy efficiency objectives by evaluating the feasibility and benefits of widespread microgrid deployment. This analysis provides valuable insights and recommendations to support decision-making processes and guide the implementation of the IGCEP.

The importance of energy access for socioeconomic development is well recognized, and access to electricity has been shown to have a positive impact on productivity and economic growth. While progress has been made in increasing global electrification rates, recent years have seen a slowdown in electrification, particularly in remote areas, partly due to the impact of the COVID-19 pandemic. The study focuses on the

electrification challenges in countries like Pakistan, India, Bangladesh, and Sub-Saharan Africa, where a significant population still lacks access to electricity. Despite having abundant renewable energy resources in Pakistan, the rural areas face major hurdles in terms of electricity access. The study aims to conduct a comprehensive techno-economic analysis of widespread microgrid deployment in Pakistan's electrical power sector. It seeks to address the technical, economic, and environmental aspects of deploying renewable energy-based microgrids and evaluate the social and economic implications of such deployment. The study also explores policy and regulatory frameworks and provides recommendations to promote the adoption and growth of microgrids in Pakistan.

Also overview of Existing Policies and Proposed Potential Business Models for Remote Area electrification are also proposed. It explores potential business models such as community-owned microgrids, pay-as-you-go systems, energy service companies, and hybrid models. The report recommends aligning policies, establishing financial mechanisms, investing in capacity building, and promoting technology adaptation. By implementing these recommendations, policymakers, investors, and stakeholders can accelerate sustainable electrification in remote areas, fostering economic development and improving quality of life.

Overall, this work and the IGCEP share a common objective of achieving sustainable and reliable electricity access in Pakistan. Leveraging microgrid systems and aligning with the regulatory framework and policy goals, this study can contribute to the successful implementation of the IGCEP, promoting renewable energy, improving remote area electrification, and advancing the country's power sector towards a sustainable and resilient future.



## OUR PARTNERS



Pakistan Renewable Energy Coalition  
Together for a Renewables Powered Pakistan.



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