



ENERGY AND CLIMATE
PANORAMA

CRAFTING SUSTAINABLE **BUSINESS MODEL** TO DRIVE INDIGENOUS SOLAR PV PANELS MANUFACTURING IN PAKISTAN



Prepared By:

U.S.-Pakistan Center for Advanced Studies in Energy

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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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LAYOUT DESIGN



TABLE OF CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION

1.1 Background

1.2 World Renewable Energy Outlook

1.3 Pakistan's Path to Renewable Energy: Potential and Barriers

1.4 Solar Energy Potential and Expansion in Pakistan

Solar PV Module Manufacturing in Pakistan

2.1 Raw Materials Sourcing

2.2 Pre-Processing Technologies

2.3 Cell Fabrication

2.4 Modules Assembling

Why Solar Panel Assembly is a Strategic Choice over Manufacturing in Pakistan

3.1 Proposed Roadmap for the PV Module Manufacturing Indigenization for Pakistan

3.2 Brief Overview of the Photovoltaic Panel Assembly Process

3.3 100 MW Semi-Automatic PV Panel Assembly Plant Key Considerations

3.4 Approach to Developing the Business Model

3.5 Financial Analysis of the Business Model

1. Capital Expenditure (CapEx)

2. Operational Expenditure (OpEx)

3. Revenue Projections

3.6 Drivers for Developing a Solar PV Manufacturing Industry in Pakistan

CONCLUSION

RECOMMENDATIONS

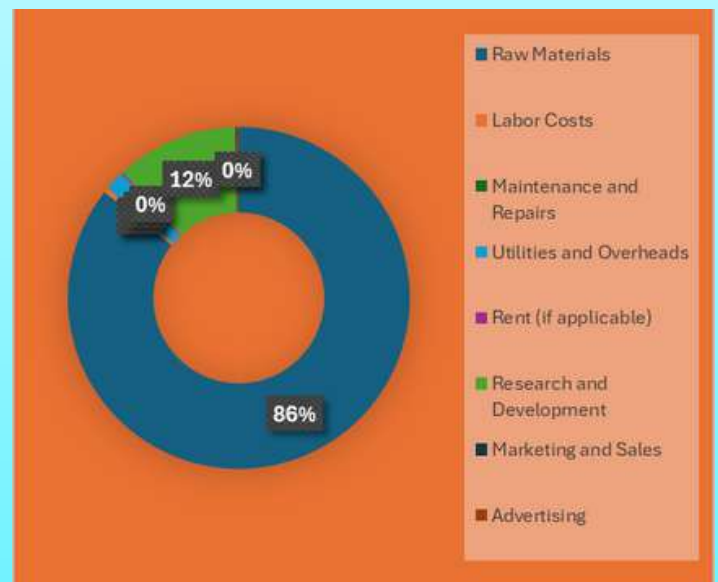
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EXECUTIVE SUMMARY

As the world has turned to the use of renewable energy, especially solar energy as one of the major sources, Pakistan, with its abundant solar potential, has an equal chance to overcome its persistent energy deficits. From the recent statistics of IRENA, Pakistan's solar power capacity reached **1,244 MW** in **2023**, marking a **17%** growth from **2021**. So, IRENA also reported that Pakistani solar energy industry will increase at a compound annual growth rate (CAGR) of **49.68** percent, from **1.3 GW** in **2023** to **9.77 GW** by **2028**. However, there are various issues, which are a constraint in the growth for renewable energy in Pakistan and some of them include regulatory risks and infrastructural development.

The current report extract reveals that silicon which is crucial in producing solar panels is available in abundance in Pakistan, but the current production ability is not promising. All the solar components most crucial in the solar manufacturing processes such as the silicon solar grade are imported, meaning that; any attempts at having localized production are quite economically unviable in the short run. Hence, the report has recommended a more realistic approach of manufacturing of PV modules from imported components instead of the establishment of solar manufacturing plants that require significant capital input and technology.

The assembly of photovoltaic panels follows a structured, multi-step process that involves the supply of raw materials like glass and encapsulants, interconnecting photovoltaic cells, and final assembly involving lamination, framing, and testing. In setting up a **100 MW** semi-automatic PV panel assembly plant, careful planning is required for infrastructure and facility design. The plant should be located in an industrial zone that provides incentives for renewable energy projects, with adequate utilities, transportation networks, and skilled labor available. A modular facility design is recommended to allow for future expansion, while also ensuring compliance with local and international safety standards.



Analysis of potential financial returns for a **100 MW** solar PV assembly plant reveals positive feasibility, having projected capital cost of **\$ 15.4** million, NPV of **\$ 26** million over a **7-year** period with a probable payback period of nearly **3.7** years.

Finally, the report suggests focusing on cooperation with international partners to attract competent technical companies and support technological research and development activities, as well as promoting government initiatives for local manufacturing. Through these measures, Pakistan could reduce its import dependency on solar components to a greater extent, thereby reducing system costs, apart from achieving the status of a competitive and attractive marketplace for renewable energy products in the international market.