



Pre-Feasibility Report for a Renewable Energy Project

1. Executive Summary

This pre-feasibility report outlines a proposal to establish a 100 MW renewable energy project in the state of Gujarat, India. The project will primarily leverage solar and wind energy sources to generate clean, sustainable electricity. Given Gujarat's abundant solar and wind resources, coupled with its supportive government policies, the project presents a promising investment opportunity.

Objective:

To contribute to India's renewable energy goals by establishing a 100 MW hybrid solar and wind power plant in Gujarat.

To generate clean, sustainable electricity and reduce dependence on fossil fuels.

To promote energy security and mitigate the impacts of climate change.

To create economic opportunities and contribute to local development.

Scope:

Project Development: Conduct feasibility studies, obtain necessary permits and approvals, and finalize the project design.

Land Acquisition: Acquire suitable land parcels for the solar and wind power plants.

Infrastructure Development: Construct power generation facilities, transmission lines, and grid connection infrastructure.

Equipment Procurement: Procure high-quality solar panels, wind turbines, and other necessary equipment.

Operation and Maintenance: Establish and implement efficient operation and maintenance procedures.

Community Engagement: Foster positive relationships with local communities and address their concerns.

Environmental Compliance: Adhere to environmental regulations and minimize the project's ecological footprint.

Financial Management: Ensure the project's financial viability and sustainability.

Project Site Selection:

Objective: Identify a suitable location for the solar power plant.- Activities: - Conduct site visits - Assess solar irradiance - Evaluate land availability and accessibility - Consider environmental and social factors - Determine proximity to transmission lines and infrastructure.

Technical design and Layout:

Activities: - Determine solar panel type and capacity - Select inverter and transformer types - Design mounting structures and tracking systems - Plan electrical and mechanical infrastructure - Ensure compliance with industry standards.

Financial Model and Risk Mitigation:

Revenue Projections: Detailed analysis of potential revenue streams, including power purchase agreements, carbon credits, and government incentives.

Cost Estimation: Accurate estimation of capital expenditure, operational costs, and maintenance expenses.

Financial Viability: Calculation of key financial metrics like Internal Rate of Return (IRR), Net Present Value (NPV), and Payback Period.

Risk Assessment and Mitigation: Identification of potential risks (e.g., regulatory changes, natural disasters, market fluctuations) and development of strategies to mitigate them.

Government Policies and Incentives:

Regulatory Framework: Review of relevant government policies and regulations at both central and state levels.

Incentives and Subsidies: Analysis of available incentives, such as capital subsidies, feed-in tariffs, and tax benefits.

Grid Parity: Assessment of the project's potential to achieve grid parity, where the cost of renewable energy becomes competitive with traditional sources.

Community Engagement and Stakeholder Management:

Local Engagement: Development of a community engagement plan to address concerns and build support for the project.

Stakeholder Mapping: Identification of key stakeholders (e.g., local communities, landowners, government agencies) and their interests.

Corporate Social Responsibility (CSR) Integration of CSR initiatives to benefit local communities and create positive social impacts.



Renewable Energy Market in Rajasthan

Rajasthan, a state known for its vast stretches of desert, is fast becoming a leader in renewable energy. With abundant sunshine and wind resources, Rajasthan is harnessing its natural potential to create a sustainable energy future. This presentation delves into the state's renewable energy landscape, exploring its current state, future potential, and the challenges it faces.

Untapped Potential: Renewable Resources

Solar Radiation

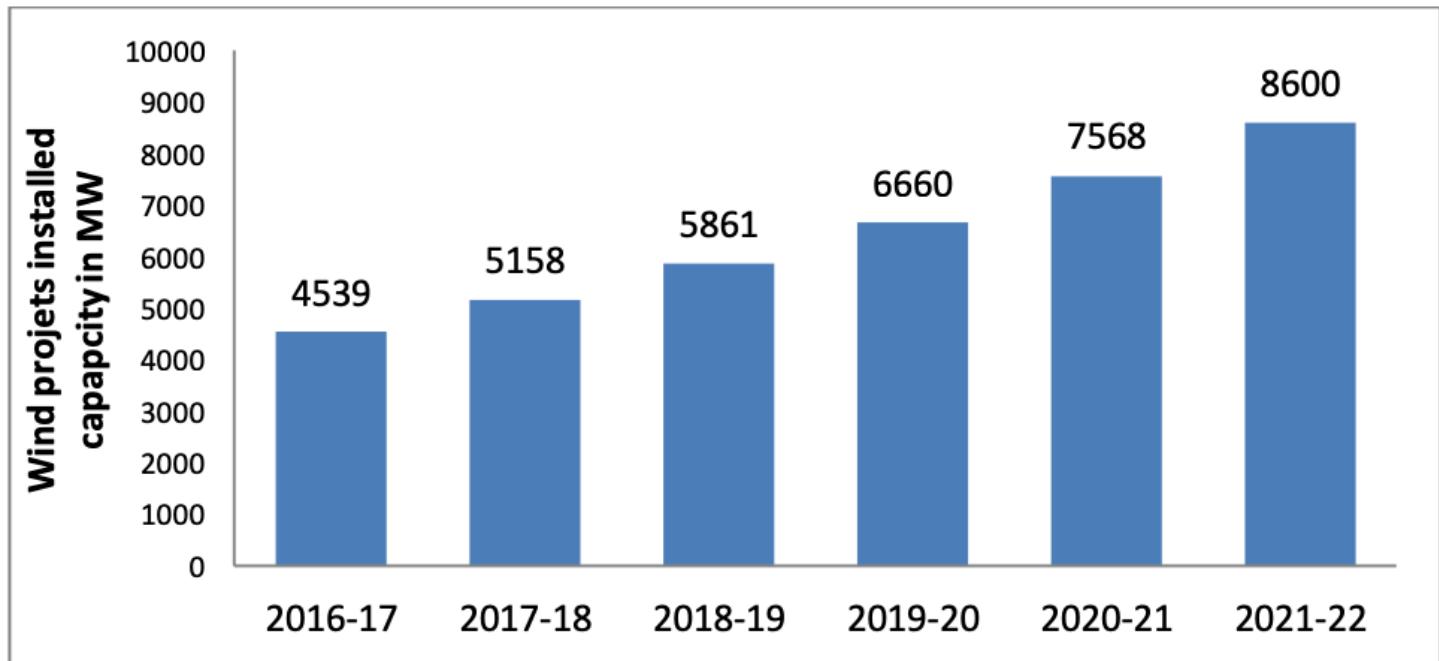
Rajasthan receives ample sunlight throughout the year, making it ideal for solar power generation.

Wind Speed

The state's coastal areas and desert regions experience strong, consistent winds, suitable for wind energy projects.

Biomass Resources

Agricultural waste and forestry residues provide a sustainable source of biomass for energy production.



Yearly Wind Energy generation by Rajasthan

this graph has been shown the yearly increment of Wind energy in the Rajasthan state. It is observed that in 2016-17 the state is generating approximately 4539 MW Electricity and there plan of future is to increase the generation to 8600 MW till 2022

Solar Energy Hub in Rajasthan

Trade and industry organisations in Rajasthan have urged the government to establish the state as a hub for manufacturing **solar panels**.

Rajasthan is among the top states in India for generating solar energy.

Key Points

- The state's electricity demand is rising by 8 to 10% annually. The government aims to have 43% of total electricity consumption come from solar energy by 2030.

- In 2023, solar power plants with a combined capacity of 15,195.12 megawatts (Mw) were set up in the state.
- According to the **Federation of Rajasthan Trade and Industry (FORTI)**, considering the scope in the field of solar energy, the **state government should promote solar panel manufacturing** in the state.

Solar Panels

- Solar Photovoltaic (PV) technology converts sunlight directly into electricity through the **photovoltaic effect**.
 - The term "photovoltaics" is derived from the conversion of **light (photons)** into **electricity (voltage)**, a phenomenon known as the photovoltaic effect.
- PV cells are made of semiconductor materials like **silicon**. When sunlight strikes the cell, electrons are knocked loose from the atoms, generating electricity.
 - **Grid-connected systems** feed surplus electricity back into the grid.
- In many regions, photovoltaic systems are being deployed at large scales to help power the electric grid.
- **Methods:** PV systems come with small rooftop solar installations, solar pumps, off-grid lighting systems, and large utility-scale solar power plants.
- **Cost-effective:** The costs of PV systems have **fallen dramatically**, making solar power cost-competitive.
 - With weatherproof panels and no moving parts, PV systems require **minimal maintenance** and have **long lifespans**.
- **Drawback:** Solar PV generation relies on **sunny weather** and output varies throughout the day.



Solar Power: Rajasthan's Emerging Powerhouse

Largest Solar Capacity

Rajasthan boasts the largest solar capacity in India, a testament to its commitment to solar energy.

Government Initiatives

Policies like the Solar Policy 2019 incentivize solar power generation and attract investments.

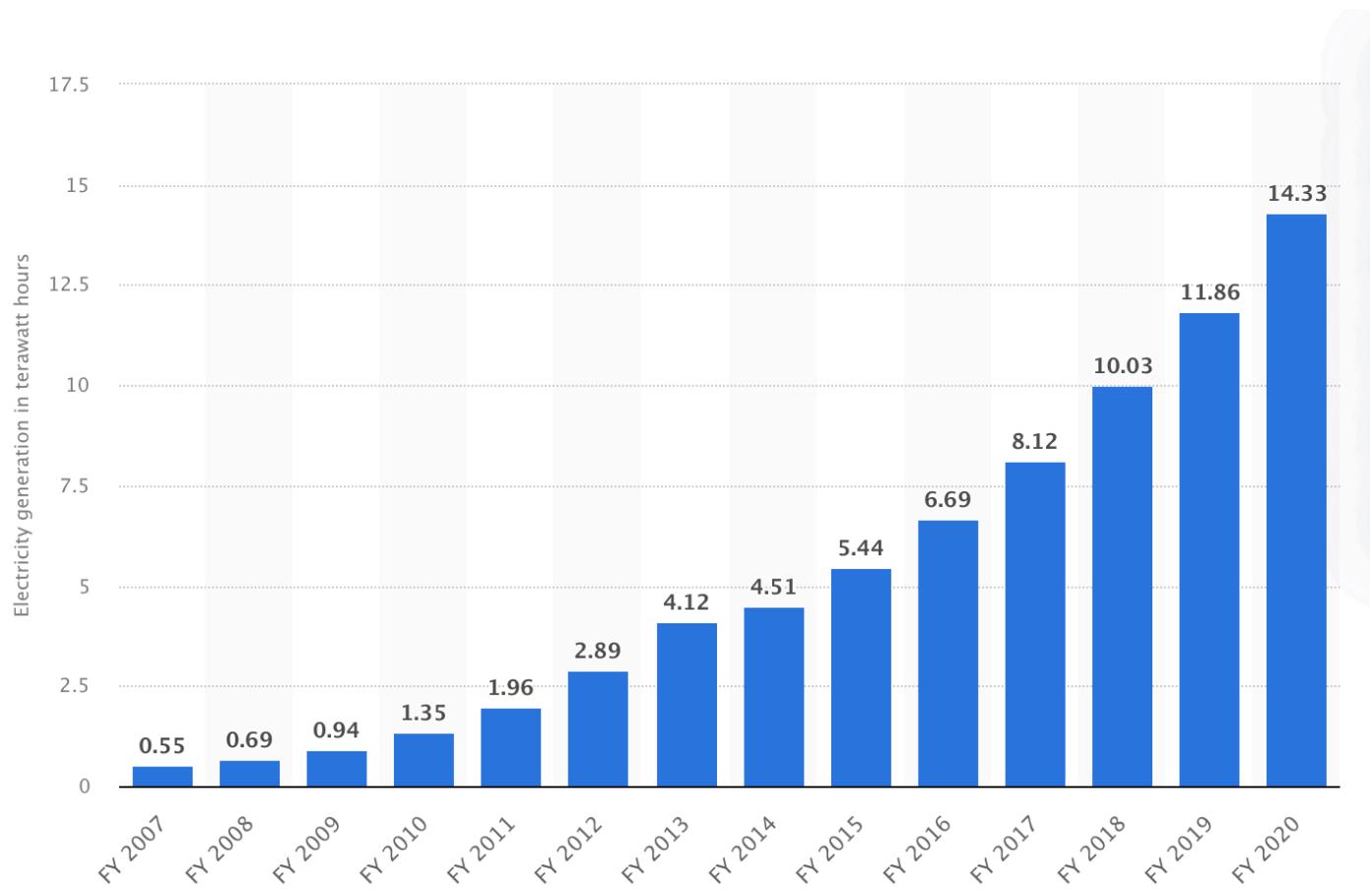
Private Sector Involvement

Private companies play a significant role in the development and operation of solar power projects.

Rooftop Solar

Rooftop solar installations are gaining popularity, empowering households and businesses to generate clean energy.

Electricity generation from renewable sources across Rajasthan in India from financial year 2007 to 2020



List of solar power plant in Rajasthan

Rajasthan shows its strong support for solar energy with many solar parks. These parks add a lot to the state's renewable energy output. Here's a detailed *comprehensive list of solar power plants in Rajasthan*. They show how much power each can make. Together, they boost the state's green power production.

Solar Park	Capacity (MW)
Bhadla-II Solar Park	680
Bhadla-III Solar Park	1,000
Phalodi-Pokhran Solar Park	750
Fatehgarh Phase-1B Solar Park	421
Nokh Solar Park	925
Pugal Solar Park Phase-I	725
Pugal Solar Park Phase-II	725

Government Initiatives

The government of Rajasthan has introduced many initiatives to support solar energy. They include encouraging foreign investment and dropping some fees. These actions help grow Rajasthan's solar production and its future growth. Government actions are key to Rajasthan's role as a model in sustainable energy.

"Rajasthan's commitment to solar energy serves as a blueprint for large-scale renewable projects in arid regions," remarked Minister R.K Singh.

Fenice Energy offers clean energy solutions, like solar and EV charging. They bring over 20 years of experience to the table.

Key Metrics	Details
Current Solar Capacity	16 GW
Future Goals	11,000 MW addition by 2023
Government Initiatives	FDI promotions, Transmission charge waivers

Challenges and Barriers to Overcome

Grid Integration	Integrating large-scale renewable energy projects into the existing grid infrastructure poses challenges.
Land Acquisition	Securing land for renewable energy projects can be complex due to land ownership and environmental concerns.
Financial Investment	Attracting sufficient investment for large-scale projects, especially in the early stages, remains a hurdle.
Intermittency	Solar and wind energy are intermittent, requiring backup energy sources to ensure consistent power supply.



Untapped Potential: Renewable Resources

Solar Energy

Rajasthan receives ample sunlight throughout the year, making it an ideal location for large-scale solar power projects.

Wind Energy

Strong winds blowing across the state create vast potential for wind power generation, contributing to a sustainable energy future.

Biomass and Biofuels

Agricultural waste and forestry residues can be utilized for energy production, promoting a circular economy in rural areas.

Risk Analysis

Regulatory Risk

Changes in government policies or regulations can impact the feasibility of renewable energy projects.

Technical Risk

Technical challenges associated with the deployment and maintenance of renewable energy technologies can pose risks.

Financial Risk

Fluctuations in energy prices and the availability of financing can affect the financial viability of renewable energy investments.



Regulatory Risk

Policy Volatility

Changes in policies related to feed-in tariffs, land acquisition, and grid connectivity can impact project viability

Permitting and Approvals

Complex permitting processes and delays can hinder the timely development of renewable energy projects.

Environmental Regulations

Strict environmental regulations, while necessary, can increase costs and complexity for project developers.

Technical Risk

Technology Advancement

Rapid advancements in renewable energy technologies can lead to obsolescence of older systems.

Grid Integration

Challenges in integrating intermittent renewable energy sources into the existing grid can affect reliability.

Maintenance and Operations

Ensuring efficient and reliable operation of renewable energy assets requires skilled personnel and robust maintenance programs.

Financial Risk

Risk	Description
Financing Costs	High interest rates and limited access to financing can increase project costs.
Energy Price Volatility	Fluctuations in energy prices can affect the profitability of renewable energy projects.
Currency Fluctuations	Changes in exchange rates can impact the costs of imported equipment and technology.



Challenges of Renewable Energy in Rajasthan

There are various types of challenges that Rajasthan faces in Renewable Energy Generation. They are different – different for Solar, Wind and Biomass. Some of them are as follows:

For Solar Energy:

1. It's clear that Rajasthan has 325 sunny days, but due to high temperature there is lot of loss in photovoltaic Energy.
2. Open access, wheeling charges and grid availability are major problems for solar projects in Rajasthan.
3. Cleaning of solar panel in large solar farm is wastage of lots of water.

For Wind Energy:

1. The main problem is the stability of grid and also conductivity of wind projects to the grids. Due to high penetration level of Wind generated electricity it's not possible for grid to absorb electricity.
2. There is also a challenge of Initial Investment on the projects of Wind. There is lot of risk in it.
3. The undetermined requirement of load affected the quality of supply. This is also a major

problem.

For Biomass Energy:

- 1. The Biomass Energy is not available for the whole year it only available mostly after the Harvesting Period.**
- 2. There is another major challenge that is Transportation cost. Transportation has significant portion of the cost associated with the Establishment and running of Biomass plant**

Conclusion

After all these studies we can conclude that how Renewable sources are important for us and for environment also. There are lot of advantages in Renewable energy as compare to conventional sources. As we can say that there is lot of work has been done and still ongoing in the Rajasthan state in the sector of Renewable Energy. Most of work is done in the sector of Renewable Energy Specifically in solar and wind power. There are various schemes and policy has been developed by Rajasthan state and Ministry of new and Renewable energy sources (MNRE) to promote the Renewable energy projects in different – different cities of Rajasthan. The state has set a target of 22000MW energy in the year of 2022 by solar and wind. But to achieve these targets there are some challenges also regarding Solar and wind. Some of challenges are high temperature, high penetration level of wind and lack of waste material according to solar, wind and Biomass Energy. So there is demand to speed up the generation of electricity from the Renewable Energy sources to get the target.

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