Project Design Document: Greening of Rural value chains for Turmeric processing plant

Project Background

Rajodak Farmers, a Farmer Producer Organization (FPO) comprising 128 farmers, has established a turmeric processing facility within Rozode village situated in the Jalgaon district. The raw turmeric is sourced from the farmers associated with the FPO and undergoes processing to create the final turmeric powder product. This powder is subsequently marketed and sold within the prominent Sangli market, recognized as the largest turmeric market in Maharashtra.

However, the seamless operation of the turmeric processing plant faces challenges due to frequent interruptions arising from the lack of a consistent electricity supply. This issue results in the plant being underutilized and unable to operate at its full potential.

Project Description

This project aims at solarisation of turmeric processing plant by installing rooftop solar PV at Rajodak Farmers producer company situated in Jalgaon. Electricity in primary energy input to the processing plant which has three electric motor-based machines for destoning, grading and pulverizing. With a total connected load of 15 kW, the daily average operation of the processing plant is considered as 8 hours. The specification of solar PV system is proposed as follows:

20 kW solar photovoltaic panels systems - Cumulative total savings on energy consumption amount to 27,500 units annually, which accounts for 22 tonnes of CO_2 emissions mitigated annually, assuming 5.5 hours of daily generation for 250 days in a year. The initial investment is compensated for by savings in electricity bills for the operation of the plant at an average variable electricity cost of INR 10/kWh.

Summary of Investments

Total project cost is expected to be close to INR 8.8 lakhs that includes design, engineering, procurement, installation. Per kW cost of solar PV is considered 40,000 Rs/kW for a 20 kW system and 10% of system cost is considered to be installation cost.

Table 1: Capital Costs for the project

S. No	Technology	Unit	Capacity	Qty (Nos.)	Cost (Rs/unit)	Value (Rs.)	Cost sharing			Sharing (%)	Relevant schemes
							FPO equity**	Govt subsidy	Loan		
1	Project Cost*				880000	880000	220,000	0	660,000	25::0::75	
	Solar photovoltaic panel system with battery	kW	20	1	880000	880000	220,000	0	660,000		
	Total					**880000**	**220,000**	**0**	**660,000**		

Source: MP Ensystems Research

*Project cost includes all costs (plant and machinery, solar photovoltaic panel costs, et al), excluding land cost

**Based on discussions held on ground and their financial conditions, equity share ranges from 5% to 15%, hence has been assumed at 10%

Barriers addressed in the project implementation:

The FPO has been aspiring to work for improving the income levels of farmers in the region through procurement of their produce locally at remunerative prices and distribution of the profits as dividend at a later stage. It aims to achieve these targets through a low-carbon pathway, which would further improve its sustainability in the long run and doesn't add to the widespread land and air pollution in Raver through its operations. The key barrier addressed through the proposed project implementation is listed below.

Table 2: Barriers addressed through the project

Barrier	How the proposed project will address barriers through net-zero carbon solutions
Frequent power outages, reliance on diesel generator sets as backup, high operation expenses	Installation of a rooftop solar panels which eliminates carbon emissions while ensuring continued power availability at minimal costs

Source: MP Ensystems Research

Financial Analysis

A simple cash-flow analysis is below, with the conservative assumption that the equipment has a lifespan of 10 years.

Project Cost

Project cost includes solar panel equipment cost and installation cost, other components of project cost are taken as zero as the plant is already installed and operational.

Table 3: *Total Project Cost*

Project Cost					
S. No.	**Particulars**	**Unit**	**Qty.**	**Rate (Rs.)**	**Amount (Rs. Lakh)**
1	Solar photovoltaic	kW	20	8,80,000	8.8
	Total				8.8

Source: MP Ensystems Research

Means of Finance

Regarding the implementation of solar rooftop installations for industrial consumers, no subsidies are accessible for this initiative. Consequently, the funding for the project will be undertaken by the FPO. The financial arrangement for this venture entails a 25% equity investment from the FPO and the remaining 75% through a loan arrangement. Additional specifics concerning the financing breakdown can be referenced in Table 5.

Table 5: Means of Financing

Means of Finance		
Total Financing required	INR lakhs	8.8
Equity	%	25%
Grant	%	0%
Debt	%	75%
Interest Rate (Per Annum)	%	12.00%
Moratorium	Years	1
Annual Instalment	Years	5
Equity Component	INR lakhs	2,20,000
Grant Component	INR lakhs	0
Debt Component	INR lakhs	6,60,000

Source: MP Ensystems Research

The financial indicators analysed by discounting cash flow @10% are given in **Annexure I** and the summary is presented in **Table 6**.

Table: 6 Estimated Financial Indicators

Financial Indicators	**Estimated**	**Requirement**
Net Present Worth	4.00	Should be +ve
IRR	26%	> 10%
BCR	1.98	Should be >1.0

Source: MP Ensystems Research

The repayment period has been drawn by considering net surplus available for repayment. The bank loan with interest is repayable within 5 years with a moratorium of one year.

The following specific attributes of ESG can further be achieved through the implementation of this project:

- There are a number of environmental opportunities including mitigation of carbon emissions, reduction of resource depletion. There are direct climate benefits to the project. The installation of roof-top solar results in the mitigation of 22 tonnes of CO_2 emissions every year.

Annexure I: Calculation of financial indicators

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital Cost	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recurring Cost	1.8	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0
Total Cost	4.0	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0
Benefits	1.2	1.4	1.9	2.3	2.4	2.5	2.6	2.6	2.7	2.8
Net Benefits	-2.9	-0.4	0.1	0.4	0.6	2.5	2.6	2.6	2.7	2.8
Discounting Factor	10%									
Net Present Worth	4.00									
IRR	26%									
BCR	1.98									