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DETAILED PROJECT REPORT ON 30kWp SOLAR ROOFTOP

M/s Sumul Dairy, Surat – Gujarat Dairy Cluster



Submitted to
(Prepared under GEF- UNIDO- BEE Project)



Bureau of Energy Efficiency
4th Floor, Sewa Bhawan, Sector – 1, R. K. Puram, New Delhi - 110066

Prepared by



Confederation of Indian Industry
CII – Sohrabji Godrej Green Business Centre
Survey No. 64, Kothaguda Post, Near HITEC City
Hyderabad 500064

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List of Abbreviations

BEE	Bureau of Energy Efficiency
CS	Capital Structure
°C	°Celsius
CO ₂	Carbon dioxide
DPR	Detailed Project Report
Dhd	Daily sum of diffuse irradiation [kWh/m ²]
EE	Energy Efficiency
Esm	Monthly sum of specific electricity prod. [kWh/kWp]
Esd	Daily sum of specific electricity prod. [kWh/kWp]
Etm	Monthly sum of total electricity prod. [MWh]
Eshare	Percentile share of monthly electricity prod. [%]
FI	Financial Institution
GEF	Global Environmental Facility
Ghm	Monthly sum of global irradiation [kWh/m ²]
Ghd	Daily sum of global irradiation [kWh/m ²]
HSD	High Speed Diesel
IRR	Internal Rate of Return
kW	Kilo Watt
kWp	Kilo Watt Peak
LSP	Local Service Provider
MSME	Micro and Medium Scale Industries
NPV	Net Present Value
OEM	Original Equipment Manufacturer
RE	Renewable Energy
SBI	State Bank of India
SIDBI	Small Industrial Development Bank of India
T24	Daily (diurnal) air temperature [°C]
TOE	Tonnes of Oil Equivalent
UNIDO	United Nations Industrial Development Organisation
WACC	Weighted Average Cost of Capital

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We also take this opportunity to express our appreciation to the Original Equipment Suppliers and Local Service Providers for their support in giving valuable inputs and ideas for the completion of the Detailed Project Report.

We would also like to mention that the valuable efforts being taken and the enthusiasm displayed towards energy conservation by the Gujarat Dairy Cluster is appreciable and admirable.

1. EXECUTIVE SUMMARY

Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India, in collaboration with United Nations Industrial Development Organization (UNIDO) is executing a Global Environment Facility (GEF) funded national project “Promoting energy efficiency and renewable energy in selected MSME clusters in India”.

The overall aim of the project is to develop and promote a market environment for introducing energy efficiency and enhanced use of renewable energy technologies in process applications in 12 selected energy-intensive MSME clusters across 5 sectors in India (with expansion to more clusters later). This will enable improvement in the productivity and competitiveness of units, as well as reduce overall carbon emissions and improve the local environment.

Key activities involved in the project are shown below

- **LSP MAPPING:** Detailed Mapping of LSPs in the cluster.
- **TECHNOLOGY FEASIBILITY STUDIES:** Preparation of 10 bankable DPRs.
- **TRAINING MATERIALS:** Development of 5 customized training material based on mapping
- **TRAINING PROGRAM:** Conduct 4 training programs in the cluster for the capacity building of local service providers.
- **LSP’s AS LOCAL DISTRIBUTORS:** Mapping of LSPs and OEMs so that LSPs can be local dealers for major OEMs.

1.1 Brief Unit Profile

Table 1: Unit Details

Particulars	Details
Name of Plant	Surat District Co-operative Milk Producers Union Ltd. , Surat
Name(s) of the Plant Head	Mr. S.V. Chaudhary
Contact person	Mr. A.B. Shah
Constitution	Cooperative Society
MSME Classification	Large Scale
Address:	Sumul Dairy, Near Surat Railway Station Post Box no. 501
Industry-sector	Dairy

1.2 Proposed EE Measure

After the discussion with the plant team, it has been decided to install 30 kWp solar roof top as a part of green initiative in the plant. The details of the proposed EE measure are given in below table:

Table 2: Proposed EE Measure

Sl. No	EE Measure	Annual Energy Savings		Monetary Savings (Rs. Lakhs)	Investment (Rs. Lakhs)	Payback (Months)	AnnualCO ₂ reduction
		kWh	TOE				
1	Installation of 30kWp Solar Roof Top	45,990	3.96	3.72	14.61	47	37.71

1.3 Means of Finance

The details of means of finance for the proposed EE measure are as under:

Table 3; Project Finance

Sl. No.	Particulars	Unit	Value
i	Total Investment (Incl of Tax)	Rs. Lakh	14.6
ii	Means of Finance	Self / Bank Finance	Self
lii	IRR	%	38.94
lv	NPV at 70 % Debt	Rs. Lakh	12.17

2. INTRODUCTION ABOUT SUMUL DAIRY PLANT

2.1 Unit Profile

Sumul or Surat Milk Union Limited, which is now renamed as The Surat District Co-operative Milk Producers' Union Ltd, is one among the 17 district unions which acts as manufacturing units of dairy products for Gujarat Co-operative Milk Marketing Federation Limited, the marketers of Amul brand of products. Surat District Co. operative Milk Producers' Union Ltd., SUMUL is a trade name and literally meaning sound price, came into existence on August 22, 1951. The dairy has a daily average processing capacity of 15 lakh litres of milk per day.

Table 4: Unit Profile

Particulars	Details
Name of Plant	Surat District Co-operative Milk Producers Union Ltd. , Surat
Name(s) of the Plant Head	Mr. S.V. Chaudhary
Contact person	Mr. A.B. Shah
Contact Mail Id	abs@sumul.coop
Contact No	099798 88018
Constitution	Cooperative Society
MSME Classification	SME
No. of years in operation	50
No of operating hrs/day	24
No of operating days/year	365
Address:	Sumul Dairy, Near Surat Railway Station Post Box no. 501
Industry-sector	Dairy
Type of Products manufactured	Milk ,Ghee, Dahi and Butter

2.2 Production Details

The various products manufactured in Sumul dairy are liquid milk, ghee, dahi and butter. The graph below shows the milk processed during last one year:-

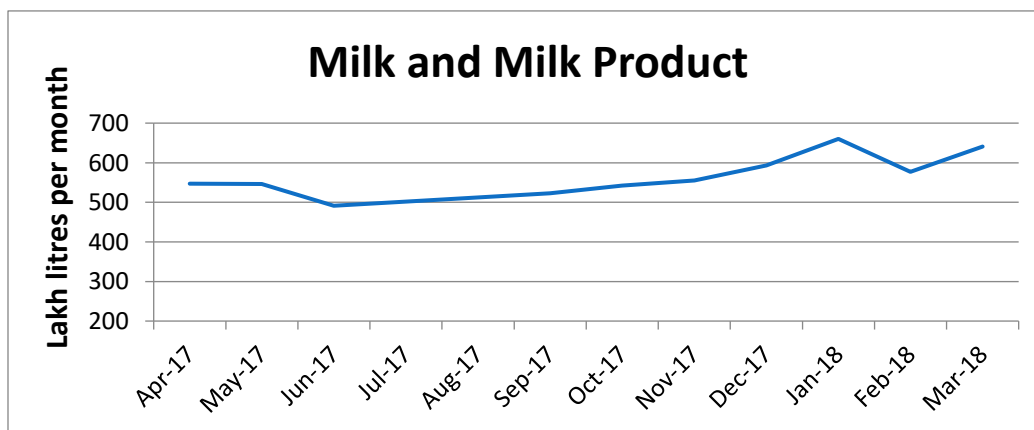


Figure 1: Milk Processed

2.3 Typical Dairy Process Flow Diagram

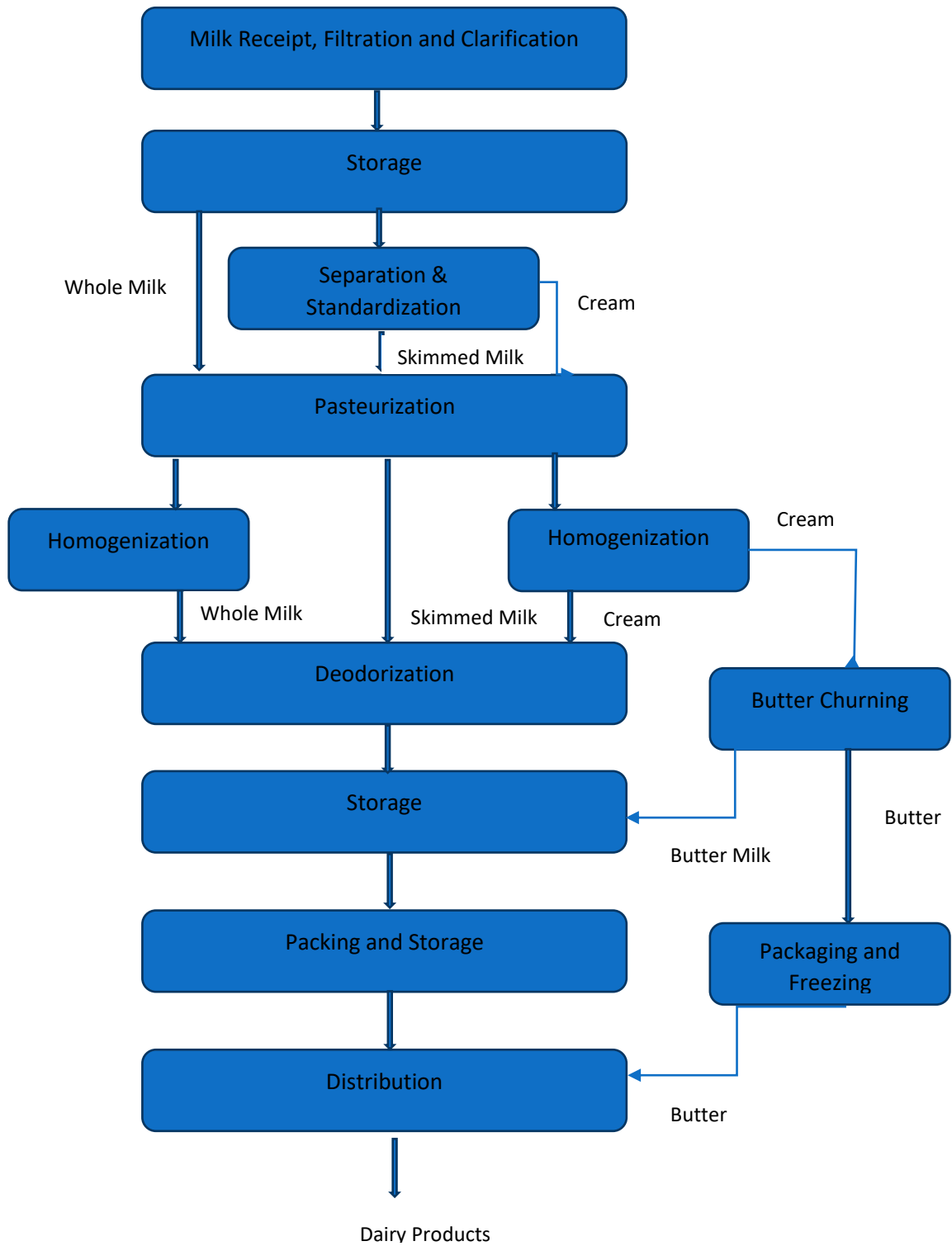


Figure 2: Typical process flow of Milk manufacturing

The processes taking place at a typical milk plant after receiving and filtration of milk from the chilling units includes:

Separation: After being held in storage tanks at the processing site, raw milk is heated to separation temperature in the regeneration zone of the pasteurizer. The milk (now hot) is standardized and homogenized by sending it to a centrifugal separator where the cream fraction is removed. The skim is then usually blended back together with the cream at predefined ratios so that the end product has the desired fat content. Surplus hot cream is cooled and usually processed in a separate pasteurizer ready for bulk storage and transportation to a cream packing plant.

Pasteurization is a process of heating milk to 72°C for 16 seconds then quickly cooling it to 4°. This process slows spoilage caused by microbial growth in the food. Unlike sterilization, pasteurization is not intended to kill all micro-organisms in the food. Instead, it aims to reduce the number of viable pathogens so they are unlikely to cause disease.

Homogenization (if required): Milk must then be homogenized. Without homogenization, the milk fat would separate from the milk and rise to the top. Milk fat is what gives milk its rich and creamy taste. Homogenization makes sure that the fat is spread out evenly in the milk so that every sip of milk has the same delicious flavor and creamy texture. Milk is transferred to a piece of equipment called a homogenizer. In this machine the milk fat is forced, under high pressure, through tiny holes that break the fat cells up in to tiny particles, 1/8 their original size. Protein, contained in the milk, quickly forms around each particle and this prevents the fat from rejoining. The milk fat cells then stay suspended evenly throughout the milk

Packaging and storage: Milk is pumped through automatic filling machines direct into bags, cartons and jugs. The machines are carefully sanitized and packages are filled and sealed without human hands. This keeps outside bacteria out of the milk which helps keep the milk stay fresh. During the entire time that milk is at the dairy, it is kept at 1°-2°C. This prevents the development of extra bacteria and keeps the milk fresh.

The table below shows the production capacity of various section in plant daily

Table 5: Production Capacity

SI No	Product	UOM	Quantity
1	Milk Processing	Lakh Litres per Day	15
2	Milk Packaging in Poly Pouches	Lakh Litres per Day	27
3	Ghee Manufacturing and Packaging	MT/day	15
4	Dahi Milk Product	MT/day	15.5
5	Butter plant	MT/day	20

2.3 Energy Profile

Both electricity and thermal energy are used for carrying out various dairy processing activities. The following fuels are used in the plant:-

Table 6: Type of fuel used

Sl. No.	Type of fuel/Energy used	Unit	Tariff	GCV
1	Electricity	Rs./kWh	8.09	
2	Natural Gas	Rs/SCM	35	8500 (kCal/m ³)
3	FO	Rs/kg	42	9600 (kCal/kg)

The steam cost in the plant is Rs 2.42/kg. The table below shows the monthly consumption of various fuels used in the plant during the last one year.

Table 7: Fuel Consumption Details

Month	Electricity Consumption (kWh)	Fuel Consumption – NG (SCM)	Fuel Consumption- FO (kg)
Apr-17	13,77,750	14,20,576	31,060
May-17	15,38,610	15,81,466	1,01,820
Jun-17	14,12,205	14,55,092	9,710
Jul-17	13,07,250	13,50,167	16,300
Aug-17	13,26,495	13,69,443	25,400
Sep-17	13,22,505	13,65,484	21,760
Oct-17	13,44,700	13,87,709	35,030
Nov-17	12,66,520	13,09,560	34,130
Dec-17	12,41,180	12,84,250	50,570
Jan-18	12,87,520	13,30,621	66,840
Feb-18	12,31,860	12,74,992	48,100
Mar-18	14,55,140	14,98,300	38,020
Total	5,98,25,085	1,66,27,660	4,78,740

The major form of energy used in the plant is electricity which is from UGVCL grid. For thermal plant is using NG as the major fuel along with furnace oil. The percentage share of fuel cost is shown in Figure 3.

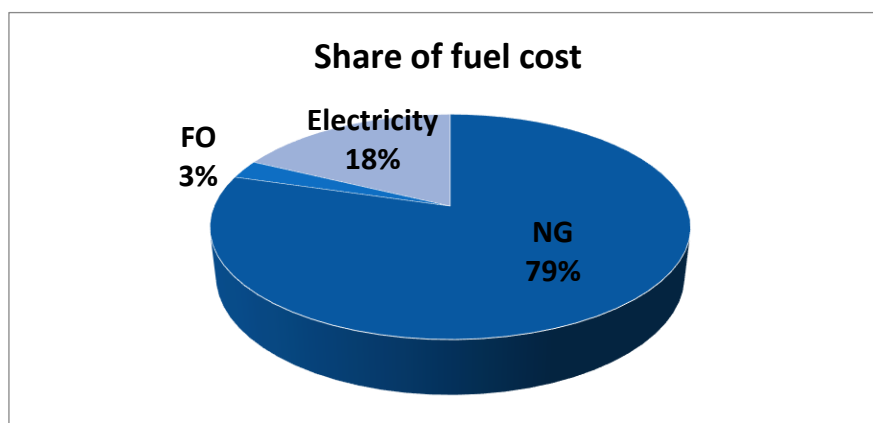


Figure 3: Share of fuel cost

Based on the data collected from the plant, the graph above shows the variation of fuel cost over the last one year. Average electricity cost is Rs 1.08 Crore/month whereas the average thermal energy cost is Rs 5.00 Crore/month.

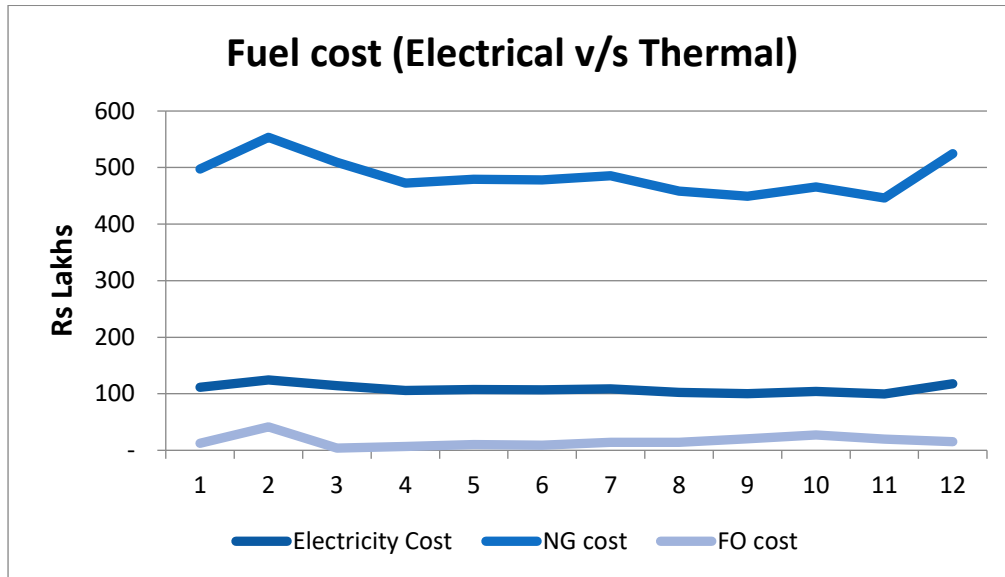


Figure 4: Fuel Cost Electrical v/s Thermal

3. PROPOSED EE MEASURE – 30 kWp Solar Roof Top

3.1 Present System

Sumul Dairy Plant is purchasing electricity from grid for the operation of various equipments in the plant. The contract demand of the plant is 3000 kVA with electricity price of Rs 8.09/kWh with an average load of 1.86 MW

Observation

During the course of study it was observed that plant has enough roof top area which can be utilized to install solar PV panel to harness solar energy and generate electricity.



Figure 5: Rooftop area for solar

Table 8: Site Specifications

Parameters	
Effective Rooftop available ,sq ft	3000
Location	Latitude: - 21° 13' 0.67" N Longitude: - 72° 50' 24.62" E
Altitude above sea level, m	16
Annual in plane irradiation	2112 kWh/m2

Terrain Horizon and day length of Sumul Dairy

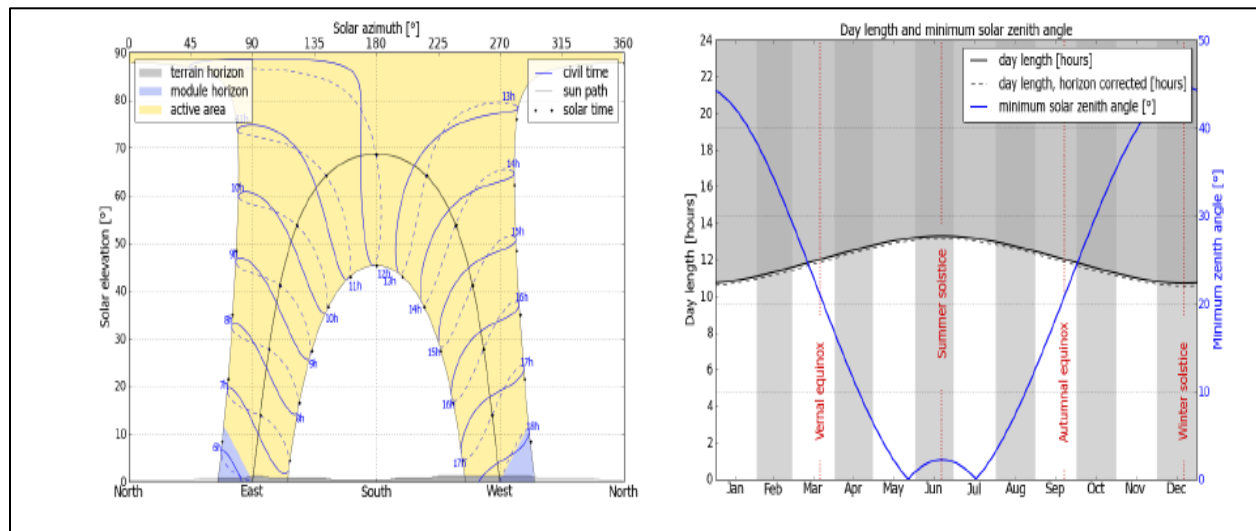


Figure 6: Terrain Horizon and day length

Global horizontal irradiation and air temperature – Sumul Dairy

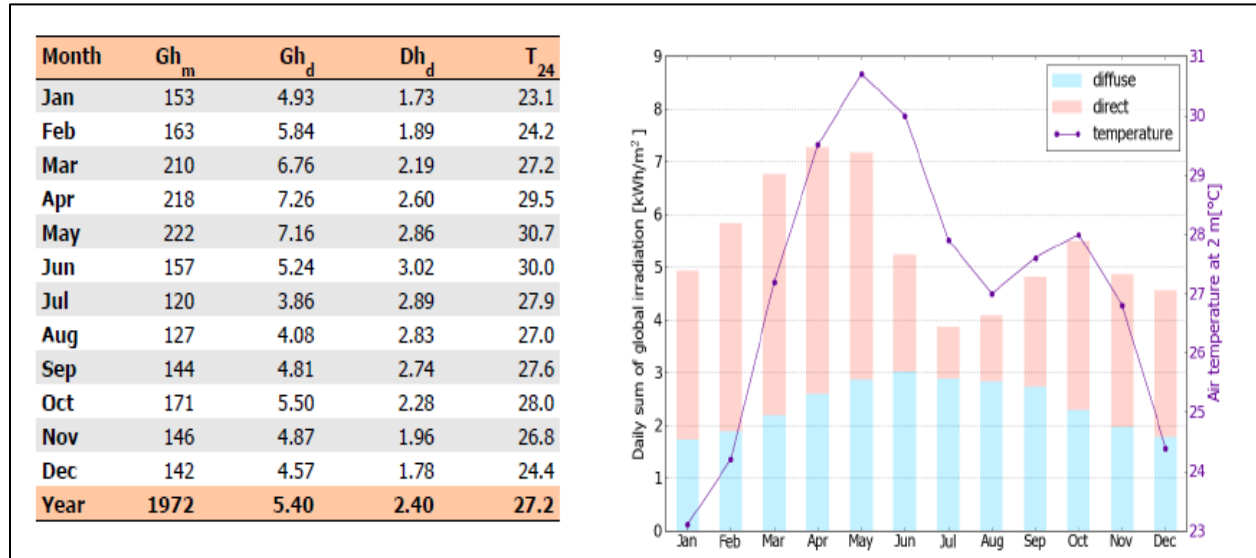


Figure 7: Global horizontal and air temperature

Global in-plane irradiation – Sumul Dairy

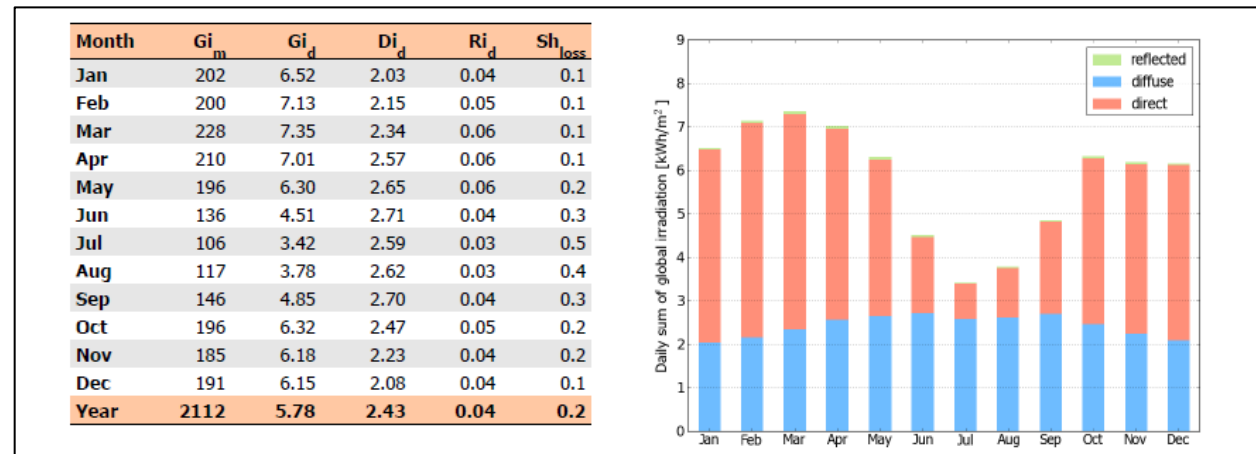


Figure 8: Global in-plane irradiation Surat

Net Metering Business Model

The net metering based rooftop solar projects facilitate the self-consumption of electricity generated by the rooftop project and allows for feeding the surplus into the grid network of the distribution by licensee. The type of ownership structure for installation of such net metering based rooftop solar systems becomes an important parameter for defining the different rooftop solar models. A rooftop photovoltaic power station, or rooftop PV system, is a photovoltaic system that has its electricity-generating solar panels mounted on the rooftop

Industry building. The various components of such a system include photovoltaic modules, mounting systems, cables, solar inverters and other electrical accessories. Rooftop mounted systems are small compared to ground-mounted photovoltaic power stations with capacities in the megawatt range. A grid connected rooftop photovoltaic power station, the generated electricity can sometimes be sold to the servicing electric utility for use elsewhere in the grid. This arrangement provides payback for the investment of the installer. Many consumers from across the world are switching to this mechanism owing to the revenue yielded. A commission usually sets the rate that the utility pays for this electricity, which could be at the retail rate or the lower wholesale rate, greatly affecting solar power payback and installation demand.

3.2 Recommendation

As per the site feasibility study it was found that plant can install a 30 kWp Solar PV power plant which will generate an average of around 0.45 Lakhs electrical units annually. It is a grid connected net metering based rooftop solar system which is a new concept for MSME industries and in grid connected rooftop or small SPV system, the DC power generated from SPV panel is converted to AC power using power controller and is fed to the grid either of 33 kV/11 kV three phase lines or of 440V/220V three/single phase line depending on the local technical and legal requirements. These systems generate power during the day time which is utilized by powering captive loads and feed excess power to the grid. In case, when power generated is not sufficient, the captive loads are served by drawing power from the grid.

The net metering based rooftop solar projects facilitates the self-consumption of electricity generated by the rooftop project and allows for feeding the surplus into the network of the distribution licensee. The type of ownership structure for installation of such net metering based rooftop solar systems becomes an important parameter for defining the different rooftop solar models. In the international context, the rooftop solar projects have two distinct ownership arrangements.

3.3 Supplier Details

Table 9: Supplier Detail

Equipment Detail		Solar Rooftop 30 kWp
Supplier Name	Varizone Solar Pvt. Ltd.	
Address	Shop no. 2/3, Amrut Nagar, Hari Nagar-2, Opp. Swaminaryan Temple, Udhna, Surat	
Contact Person	Mr. Parshwa Shah	
Mail Id	varizonesolar@gmail.com	
Phone No	+91 9426111113	
Supplier Name	Powertrac Solar Projects	
Address	601/Regency Plaza, Above Gloria Restaurant, Near Rahul Tower, Anand Nagar Cross Road, Satellite, Ahmadabad	

Contact Person	Mr. Sanjay A Patel
Mail Id	bdm.project@powertracsolar.com
Phone No	+91 7573014610

3.4 Savings

The expected savings by installation of 30 kWp solar roof top is 45,990 units of electricity annually. The annual monetary saving for this project is **Rs 3.72 lakhs with an investment of Rs 14.61 lakhs and payback for the project is 4 years.**

Detailed savings calculations is given in below table

Table 10: Savings Calculation

Parameters	UOM	
Proposed Roof top Solar installation	kW	30
Area Available in roof top	Sq ft	3000
Annual units generation per kW of Solar PV	kWh per kW/year	1533
Total Energy Generation Per Annum	kWh/year	45,990
Electricity Cost	Rs/kWh	8
Cost Savings	Rs Lakhs	3.7
Investment	Rs Lakhs	14.6
Payback period	Months	47

4. FINANCIAL ANALYSIS

4.1 Project Cost

Table 11: Project Cost

Parameter	Amount in Rs Lakhs
Solar Roof Top – 30 kWp Module	13.8
GST Charges @ 5%	0.69
GEDA application fees	0.11
Total Project Cost	14.61

4.2 Assumptions for Financial Analysis

- Interest rate taken as 12 %
- Yearly increase in electricity cost by 2% for cash flow analysis
- Life cycle of the project is taken as 7 years
- Three different Capital Structure considered
 - CS1 – 70:30 Debt Equity Ratio
 - CS2 – 50:50 Debt Equity Ratio
 - CS3 – 100 % Equity
- Return on equity is taken as 15 %
- Depreciation – 40 %
- Operation and Maintenance Cost taken as 5% of Initial investment
- For calculating weighted average cost of capital, tax rate is assumed as 30 %

4.3 Cash Flow Analysis

Table 12: Cash flow of the project

Cash flow for the project	1 2 3 4 5 6 7							
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Required Investment	14.61							
Energy Savings		3.72	3.80	3.87	3.95	4.03	4.11	4.19
O&M Cost		-0.73	-0.73	-0.73	-0.73	-0.73	-0.73	-0.73
Depreciation		5.8	3.5	2.10	1.3	0.8	0.5	0.3
Net Cash Flow	-14.61	8.83	6.57	5.24	4.48	4.05	3.83	3.73

The table below shows the various capital structure assumed for the project finance

Table 13: Capital Structure

Capital Structure			
Particulars	CS 1	CS 2	CS 3
Debt	70	50	0
Cost of Debt	0.12	0.12	0.12
Equity	30	50	100
Cost of Equity	0.15	0.15	0.15
WACC	10.38	11.7	15

Table 14: NPV Calculation

NPV Calculation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	NPV
NPV at CS 1 (70:30)	-14.61	8.0	5.4	3.9	3.0	2.5	2.1	1.9	12.2
NPV at CS 2 (50:50)	-14.61	7.9	5.3	3.8	2.9	2.3	2.0	1.7	11.2
NPV at CS 3 (100% Equity)	-14.61	7.7	5.0	3.4	2.6	2.0	1.7	1.4	9.1

The IRR of the project is low because of the low electricity tariff of Rs 8.09/kWh. But still the plant is interested in implementing the project by considering it solar roof top as a green initiative and they can reduce the dependence on Grid electricity.

4.3 Sensitivity Analysis

A sensitivity analysis has been carried out to ascertain how the project financials would behave in different situations such as

- Change in energy savings
- Change in operating hours
- Change in interest rate

A good sensitivity analysis will help to estimate the behavioral nature thereby helping to understand the financial viability over a long period of time.

Table 15: Sensitivity analysis: based on energy savings

Based on Savings	at 100% Savings	at 75% Savings	at 50% Savings
NPV at CS 1 (D70:E30)	12.2	7.5	2.7
NPV at CS2 (D50:E50)	11.2	5.8	1.5
NPV at CS3 (D0:E100)	9.1	5.1	1.0
IRR	39%	29%	18%

Table 16: Sensitivity analysis: change in operating hrs

Based on Operating Hours	at 100% operating hours	at 90% Operating hours	at 80% Operating hours
NPV at CS 1 (D70:E30)	12.2	10.3	8.4
NPV at CS2 (D50:E50)	11.2	9.4	7.6
NPV at CS3 (D0:E100)	9.1	7.5	5.9
IRR	39%	35%	31%

Table 17: Sensitivity analysis: change in interest rate

Based on Interest Rate	at 9.5% interest rate	at 10.05% interest rate	at 11% interest rate	at 12% Interest Rate	at 12.5% Interest Rate	at 13% Interest Rate
NPV (70:30)	13.1	12.7	12.5	12.17	11.99	11.81

5. ENERGY EFFICIENCY FINANCING IN MSMEs

Financing plays a key role in facilitating procurement and implementation of energy efficient technologies and products in any industry. Government has given EE financing in MSMEs top priority since the sector contributes significantly towards India's economic growth. However, existing financing options are not sufficient to meet the financing requirement in the sector due to the large size of the sector. MSMEs using various financing schemes for technological up-gradation are still very less, as most of them use their own capital fund rather than making use of external financing models. Although financing models were very successful in some clusters, the scale-up of such activities is rather slow. This slow pace in implementation of energy efficiency financing in MSMEs is due to the various sector specific challenges in the sector.

Some of the key barriers to finance EE projects in the sector are:-

- Lack of available capital for investment as EE interventions being small may not get financed through FIs as they do not qualify as term loans
- Lack of clarity on financing schemes- repayment mechanism and complex procedural requirements
- Lack of availability of financing model that cater to the particular requirement of the MSME
- Lack of awareness among MSMEs with respect to benefits of implementing EE technologies
- FIs consider MSMEs as a high risk category due to low credit flow to this sector. This is due to several factors such as poor book-keeping practices, weak balance sheets, poor credit history and smaller sizes of MSME loans.
- Collateral based lending, advocated by FIs, restricts MSMEs from availing loans
- No formal M&V procedure available to estimate the savings achieved by implementing EE measure
- Risks associated with repayment of loans which include technical, commercial and performance risks

5.1 FI Schemes in Gujarat

Table 18: FI schemes in Gujarat

Sl.N o	Name of Scheme	Purpose	Financial Details	Contact Address
1	SIDBI Make in India Soft Loan Fund for Micro, Small & Medium Enterprises (SMILE)	<ul style="list-style-type: none"> The focus of the scheme is on technology upgradation which helps in reducing the impacts from process and operations as the reduction in resource consumption and productivity improvements are major outcome of technology upgradation The program aims to bridge the gap by providing financial support to the companies. 	<ul style="list-style-type: none"> Rate of interest is according to credit rating Interest rates for soft loans are from (8.90 % to 8.95 % pa) and term loans are in the range of (9.45% to 9.60% pa) Min loan amount: Rs 25 Lakhs Term Loan: 75% of the project cost as debt 	Mr. Chandan SIDBI, Bhavan, 1st Floor, P.B.No. 10, Navjivan P.O., Ahmedabad Ph No : : 8769436639 Mail Id: ahmedabad@sidbi.co.in
2	4E scheme (End to End Energy Efficiency Financing scheme)	<ul style="list-style-type: none"> The 4E scheme promoted by SIDBI aims to assist the industries in implementation of energy efficiency and renewable energy projects. The scheme addresses all aspects of energy efficiency in a company from assessment and identification of energy efficiency interventions to facilitating implementation by providing technical and financial support 	<ul style="list-style-type: none"> Interest rate - 2.5% below market interest rate Min loan amount: Rs 10 Lakhs Max loan amount: Rs 150 Lakhs 90% of the project cost as debt 	Mr. Chandan SIDBI, Bhavan, 1st Floor, P.B.No. 10, Navjivan P.O., Ahmedabad. Ph No : 8769436639 Mail Id: ahmedabad@sidbi.co.in
3	Partial Risk Sharing Facility for Energy Efficiency project (PRSF)	<ul style="list-style-type: none"> The partial risk sharing facility aims at transforming the energy efficiency market in India and promotion of Energy Service Contracting Model for the Energy Efficiency. The scheme address barrier related to the financing aspects for energy efficiency 	<ul style="list-style-type: none"> Term Loan: 12%-15% Min loan amount: Rs 10 Lakhs Max loan amount: Rs 15 Cr Total Project funding of – USD 43 million Risk Sharing facility component of USD 37 million to be managed by SIDBI Technical assistance component of USD 6 billion to be managed by SIDBI and 	Mr. Chandan SIDBI, Bhavan, 1st Floor, P.B.No. 10, Navjivan P.O., Ahmedabad. Ph No : 0562-2521023 Mail Id: ahmedabad@sidbi.co.in

Detailed Project Report

			EESL	
4	Bank of Baroda's Scheme for Financing Energy Efficiency Projects		<ul style="list-style-type: none"> Loans of up to 75% of the total project cost, subject to maximum of Rs. 1 crore, will be provided. (Minimum amount of loan Rs. 5 Lakhs) Collateral will be required for all loans. An interest rate of bank base rate + 4% will be applicable, to be paid back over a period of 5 years. 	Bank of Baroda SME Loan Factory 2 nd Floor Baroda Towers, Ellisbridge, Ahmedabad Ph No : 9979867501 Mail Id : cpc.sme.ahmedabad@bankofbaroda.com
5	Canara Bank's Loan scheme for Energy Savings for SMEs	All these Schemes from various banks (SBI, Bank of Baroda, Canara Bank) have their focus towards technology upgradation. Technology upgradation can lead to improvement in energy, productivity, and lower emission from the MSME company. As technology upgradation could be capital intensive most of the schemes from banking institutions aim at bridging the gaps for access to finance for MSME sector	<ul style="list-style-type: none"> The scheme covers up to 90% of project costs of up to INR 1 million (EUR 13,000). Max. loan: INR 10 million (EUR 130,000) Security: collateral free up to INR 5 million (EUR 65,000), beyond INR 5 million collateral required as determined by the bank Margin: 10% of project costs 	Swaraj Arcade, Kumudvadi Opp.Lal Tanki, Chitra Road,Bhavnagar-364002 Ph No : 0751-2233141/ 2431541 Email Id : cb4831@canarabank.com
6	SBI's Project Uptake for Energy Efficiency		<ul style="list-style-type: none"> SBI identifies industrial clusters with potential for quick technology upgradation and a supporting environment. Based on studies in interested units, technology upgradation is undertaken if the same is viable. With a ceiling of INR 1 lakh, an amount equal to that invested by the unit is provided under this loan. There is a start-up period of 3 years, with a repayment period of 5-7 years, at zero interest. 	SBI SMECC Ground Floor, Zodiac Avenue, Opp Commisionar Bunglow, Navrangpura, Ahmedabad, Gujarat Ph No : 022 22029456 Email Id : sbi.60438@sbi.co.in
7	Solar Roof Top Financing Scheme IREDA	The loan scheme is applicable to grid interactive, rooftop solar PV plants for industries, institutions and commercial establishments. Financing can be	<ul style="list-style-type: none"> Interest rate: 9.9% - 10.75% Max. repayment time: 9 years Minimum promoter's contribution: 30% The applicant's minimum capacity needs to be 1MW 	IREDA Camp Office 603, Atlanta Towers Near Panchvati Circle, Gulabi Tekra Ahmedabad

Detailed Project Report

		accessed for single or aggregated investments.		Ph No : 9811889805 Email Id : ashokyadav@ireda.in
8	SBI - World Bank: Grid Connected Rooftop Solar PV Program	Loans for financing grid connected rooftop solar photovoltaic (GS- RSPV)	<ul style="list-style-type: none"> • Loan amount is 75% of the project cost • Fixed Asset coverage ratio: >1.25 • Moratorium period: upto 12 months from date of commencement of commercial operations • Guarantee: in case of sole proprietorship/partnership firm/personal guarantee of partners 	SBI SMECC Ground Floor, Zodiac Avenue, Opp Commisionar Bunglow, Navrangpura, Ahmedabad, Gujarat Ph No : 022 22029456 Email Id : sbi.60438@sbi.co.in

6. ENVIRONMENTAL AND SOCIAL BENEFIT

6.1 Environmental Benefit

A resource-efficient business demonstrates a responsibility towards the environment. Energy and the environment are so closely linked, that, in addition to saving energy and reducing utility expenses, there are additional and often unreported benefits from conserving energy, saving natural resources being an important benefit.

Energy efficiency plays a major role, even where company output is increased, energy efficiency improvements can contribute significantly in most cases to reducing the negative impact of energy consumption per unit of output. Any increase in pollutant emissions will thus be minimized. Significant environmental benefits gained by adopting energy efficient technologies and processes may include lowering the demand for natural resources, reducing the emission of air pollutants, improving water quality, reducing the accumulation of solid waste and also reducing climate change impacts. Improving energy conservation at the facility can improve the facility's overall efficiency, which leads to a cleaner environment.

Reduction in Pollution Parameters

The proposed EE measure of installing 30 kWp solar roof top would result in annual electricity savings of 45,990 units which is equivalent to 3.96 TOE per annum. The proposed EE measure will result in decrease of CO₂ emissions by 37.71 TCO₂ annually, thus resulting in reduced GHG effect.

6.2 Social Benefit

Work Environment

The Factories Act, 1948 covers various aspects relating to working environment maintenance and improvement. The good maintenance practices, technology up gradation, efficient use of energy and resource conservation not only contribute to energy and pollutant reduction but also contribute in ensuring safe and clean working environment to the employees of the organization. Many units have also been doing review of safety process and have provided access to safe working environment to the workers. Basic facilities such as first aid kit, PPE gears and many others have been made available

Skill Improvement

Implementing energy efficiency measures requires mix of people and skills. It involves up skilling workers at all levels from the shop floor to the board room to understand how companies manage their energy use—and to identify, evaluate and implement opportunities to improve energy performance. As the project involved identifying energy saving projects, implementing and verifying the savings, the unit has understood how to estimate energy savings with respect to energy saving proposals and also energy wastage have been identified.

The activity has been successful in bringing the awareness among workers on energy wastage reduction, technology up gradation possible, etc. Each new technology implemented in a dairy plant will create an impact on the entire Gujarat Dairy cluster as each dairy unit can replicate the new technology and promote the concept of energy efficiency in entire Gujarat Dairy Cluster and thus reduce the overall energy consumption of the cluster as a whole.

Technical skills of persons will be definitely improved. As the training provided by the OEMS on latest technology will create awareness among the employees on new trends happening in market. The training also helps in improving the operational and maintenance skills of manpower required for efficient operation of the equipment.

7. CONCLUSION

Energy efficiency is an instrument to address the issue of energy crisis and also be employed as a cost effective means to attain sustainability and business. Cost of energy is considered as a vital component for industries and warrant judicious use of energy. Amid spiraling power cost energy efficiency assumes at most importance for the sector to remain competitive.

The GEF, UNIDO and BEE project through its various engagements is able to demonstrate energy efficiency potential in Gujarat Dairy cluster. The project is able to promote the concept of energy efficiency and renewable energy in dairy cluster through various capacity building programs for local service providers, technology feasibility studies in dairy units, training programs on EE/RE technologies and also helped in penetrating new /latest technologies into the cluster.

The DPR for installation of 30 kWp has been prepared after the discussion with the OEM who installed boiler in the plant. The implementation of this measure significantly will result in an annual electricity savings of 45,990 units with 37.71 TCO₂ reduction. The following table gives the overall summary of the savings achieved:-

Table 19: Proposed EE Measure

SI No	EE Measure	Annual Energy Savings		Monetary Savings (Rs. Lakhs)	Investment (Rs. Lakhs)	Payback (Months)	Annual TCO ₂ reduction
		kWh	TOE				
1	Installation of 30kWp Solar Roof Top	45,990	3.96	3.72	14.61	47	37.71

The summary of financial analysis given in the below table clearly indicates that the project is financial viable with a payback of 4 years. The plant is ready to implement this project by considering solar as a green initiative and thereby reducing the dependence of Grid electricity.

Table 20: Financial Analysis


Sl. No.	Particulars	Unit	Value
i	Total Investment (Incl of Tax)	Rs. Lakh	14.61
ii	Means of Finance	Self / Bank Finance	Self
lii	IRR	%	38.94
lv	NPV at 70 % Debt	Rs. Lakh	12.17

7.1 Replication Potential


Solar Roof top has a good potential in Gujarat Dairy Cluster. The system can be easily replicated in the dairy plants of Gujarat Dairy Cluster. Also in the implementation of this project will inspire other units in Gujarat to take up similar energy efficiency initiatives which eventually will lower the bottom line and increase the top line therefore the margin increases. Secondly, the very clear specifications on vendor and the cost base is already available which makes it easy for other units in the Gujarat Dairy cluster to access the technology and gives them a very good idea about the cost and benefits associated with the projects. Overall, the holistic approach adopted by the project will be extremely useful in achieving the goal of improving EE in the cluster.

8. ANNEXURE

8.1 Financial Quotation




Varizone
SOLAR PVT. LTD.





WAAREE[®]
One with the Sun

TECHNO-COMMERCIAL PROPOSAL


Surat, Gujarat.








Engineering, Procurement & Construction (EPC)





PROPOSED SITE SPECIFICATION			
LOCATION :		SURAT	
TYPE OF ROOFTOP :		ROOFTOP SYSTEM	
SOLAR PV SYSTEM SPECIFICATION			
SYSTEM DC CAPACITY :		30 kWp	
MODULE TECHNOLOGY :		Poly - crystalline silicon technology	
INVERTER TYPE :		String Inverter	
MOUNTING STRUCTURE TYPE :		Fixed Tilt	
SAFETY :		As per final structure	
POWER EVACUATION :		415 VAC	
PROJECT SCHEME :		Turnkey EPC Project	
DEVELOPER DETAILS			
NAME OF THE CUSTOMER :		Surat District Co-Operative Milk Producers' Union Ltd.(Sumul Dairy)	
OFFER DATE :		17.05.2018	
OFFER VALIDITY :		15 days	
TECHNICAL DETAILS			
COMPONENT	SPECIFICATION	QUANTITY	MAKE
PV MODULES	Poly - Crystalline 72 cells, P _{max} >= 300W	30 kWp	WAAREE ENERGIES
INVERTER	On grid, String Inverter Output: Three Phase, Efficiency : >98%	30 kWp	K STAR/WAAREE
MOUNTING STRUCTURE	GI	As Per Design	Reputed Make
EARTHING KIT	Chemo Maintenance Type	As Per Design	Reputed Make
LIGHTING ARRESTOR	Reputed Make	As Per Design	Reputed Make
AC & DC CABLES, JUNCTION BOXES	U. V. Resistant, Halogen Free, Fire Resistant Cables, Fixed Piping. Protection devices, switches	As Per Design	DC Wire: Polycab AC Wire: Polycab/ Havell's / equivalent.
PRODUCT PRICE			
TYPE OF RATE :		Commercial Rates	
TOTAL PRICE :		INR 13,80,000/- (Rs. 46/Watt)+ GST 5% + GEDA Application Fees(Rs. 11800/-) + Torrent Net Meter Charges (as per torrent)	

Note: Prices Subject to above mentioned materials.
Prices are subject to Standard terms for Structure & Wiring.



The area marked in the above image is considered for the installation of the solar system

Scope of Work:

- Solar Power plant Design & Engineering.
- Supply of all equipment of solar PV power plant (including Packaging, Forwarding, freight & transit insurance)
- Project Management for smooth execution of the project within scheduled time line.
- On-site Installation & Commissioning of the system.
- Comprehensive Insurance for supplied items and Waaree's equipment during project erection and until commissioning of the project.
- Performance Testing of the Complete System after Installation & Commissioning.

Assumptions & Considerations:

- The Module Mounting Structures (MMS) to suit the Customer's requirements. MMS shall be penetrative type, suitable for Flat RCC slab.
- Power Evacuation from solar plant will be at 415V. The Tapping point with Suitable Feeder - in Existing Panel will be in customer's scope.
- Indoor Space provision for all control panels (if applicable) and Inverters supplied by Waaree & Discom will be in Customer's scope.
- The distance between ACDB and Existing Evacuation point is assumed at max. 20 Meters.
- The construction Power and Water shall be provided by client at Free of Cost.
- The client shall make necessary provision of Internet connection with static IP Address (if needed) for the Remote monitoring system.
- System Size will be subject to change after detailed engineering or upon submission of CAD Drawings.

Benefits:

- No Maintenance & Easy to Install.
- Real time system assessment by Online Monitoring.

- Nearly 50% money back in first year itself.
- Savings in Electricity bill.
- Net metering facility provided by state government with “Zero Tax on income generated through Feed in Net- meter” for 10 years.
- For Taxable Consumer only Accelerated depreciation is provided i.e. 40 % in 1st year, 40 % in 2nd year and 20 % in 3rd year.

Project Execution:

The project execution shall be done by highly experienced Varizone Solar pvt. Ltd. engineers and Qualified contractors selected by Varizone Solar Pvt. Ltd.

The following aspects shall be taken care during the project execution:

- Preparation of installation and detailed construction documentation
- Specialist site management and monitoring
- Logistics coordination, Safety coordination & Interface coordination
- End to end quality management on service and product during construction of a project with quality check reports
- Reliable & sustainable quality check reports
- Commissioning and performance test
- Documentation (As built & vendor drawings)

Total execution plan shall be finalized in consultation with client and resource mobilization shall be done accordingly.

Delivery Period for Dispatch of Materials:

- ❖ 8 Weeks on receipt of Purchase Order (PO) & Advance Payment. To be decided mutually at the time of finalization of project.

Completion Period:

- ❖ 12 Weeks subject to release of payments as per payment terms. To be decided mutually at the time of finalization of project.

Payment Terms:

- 50% advance against Purchase Order.
- 40% against the delivery of materials.
- 10% against the net meter installation.

Product Warranty / Manufacturing Defect Warranty

SR. NO.	COMPONENT	WARRANTY
1.	Solar Modules	10 years manufacturing defect, Power: 90% for first 10 Years, 80% for next 15 Years.
2.	Inverter	5 years It Can be Extended further with additional cost, at the time of purchase or before ending warranty date of inverter.
3.	Other Balance of System	1 year

Note:

- Varizone Solar Pvt. Ltd. design and engineering is based on standard codes and practices applicable and is subject to scrutiny by owner at their own cost. Quality practices and plans will be shared for owner's/lender's study.
- All drawing and documents shall be prepared during detailed engineering only after receiving the confirm order and advance payment.
- Kindly note if during site visit we found any changes in location or any changes in our standard design consideration for customer / site requirement & if this affecting cost will ultimately lead to proportionally change in final Value of proposal and need to consider for finalization of any order related to this proposal.

Thanking you



Shop No. 2/3, Amrut Nagar, Hari Nagar-2,
Opp. Swaminaryan Temple, Udhna, Surat.
Mobile No. 9426111113/ 9374592727/ 8735090506
Email: varizonesolar@gmail.com