

DETAILED PROJECT REPORT ON VARIABLE FREQUENCY DRIVES FOR COMPRESSOR MOTOR -60 HP (BHIMAVARAM ICE MAKING CLUSTER)



Bureau of Energy Efficiency

Prepared By



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**VARIABLE FREQUENCY DRIVE FOR COMPRESSOR
MOTOR-60 HP**

BHIMAVARAM ICE MAKING CLUSTER

BEE, 2010

Detailed Project Report on VFD for Compressor Motor - 60 HP

Ice Plant SME Cluster, Bhimavaram, Andhra Pradesh (India)

New Delhi: Bureau of Energy Efficiency;

Detail Project Report No.:

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Hyderabad

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Lists of Abbreviations

BEE	- Bureau of Energy Efficiency
DPR	- Detailed Project Report
DSCR	- Debt Service Coverage Ratio
GHG	- Green House Gases
HP	- Horse Power
IRR	- Internal Rate of Return
MoP	- Ministry of Power
MSME	- Micro Small and Medium Enterprises
NPV	- Net Present Value
ROI	- Return on Investment
SIDBI	- Small Industrial Development Bank of India
MoMSME	- Ministry of Micro Small and Medium Enterprises

EXECUTIVE SUMMARY

APITCO Ltd. is executing BEE-SME program in Bhimavaram Ice Plants Cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Bhimavaram is renowned for the sea food business and is a big hub for fish and prawns culture. The prawns and fish are exported to various countries throughout the world. There are about 80 ice making units in the cluster. The major Energy forms used in the cluster are grid electricity and HSD oil. Electricity is used for driving the prime movers of compressors, pumps, agitators, drives and for lighting. HSD is used as fuel in DG sets for electricity generation in the event of failure of power supply.

Majority of the industries located in Bhimavaram are engaged in production of ice blocks required for storage and transportation purpose of the sea food. The cost of energy as a percentage of end product cost (ice) cost varies anywhere between 48 to 54%. The major cost component of the ice production is energy cost next to the labor cost.

Refrigeration Compressors are one of equipment in ice making Industries consumes high energy compare to other equipments. These compressors are driven by electrical driven motors. The energy consumption by compressor varies depending on the refrigerant entering to the compressor. The refrigeration compressor required to operate speed at 400-1000 rpm.

Variable Frequency Drive is an innovative feature for compressor motor that significantly decreases electricity consumption during the unload conditions. VFD controlling the frequency of electrical power supplied to the motor and cuts down on unwarranted energy expenditures while maintaining full functionality. The power consumption by refrigeration compressor during the ice removal from evaporation tank, after completion of ice formation, and filling of fresh water in emptied ice cans is controlled by VFD. The VFD will reduce the speed of the compressor motor during ice removal from evaporation tank, after completion of ice formation, and filling of fresh water in emptied ice cans which leads to energy conservation.

The DPR highlights the details of study conducted for assessing the potential for reducing electricity consumption by installing VFD for compressor motor in various units of the cluster, possible electricity savings and its monetary benefit, availability of the technologies/ design, local service providers, technical features and proposed equipment

specifications, various barriers in implementation, environmental aspects, estimated GHG reductions, capital cost, financial analysis, and schedule of project Implementation.

This bankable DPR also found eligible for subsidy scheme of MoMSME for “Technology and Quality Upgradation Support to Micro, Small and Medium Enterprises” under “National Manufacturing and Competitiveness Programme”. The key indicators of the DPR including the Project cost, debt equity ratio, monetary benefit and other necessary parameters are given in table below:

Sr. No.	Particular	Unit	Value
1	Project cost	(in Lakh)	1.59
2	Electricity Savings	kWh/annum	11690
3	Monetary benefit	(in Lakh)	0.44
4	Simple payback period	Years	3.61
5	NPV	(in Lakh)	0.18
6	IRR	%age	13.28
7	ROI	%age	23.36
8	Average DSCR	Ratio	1.22
9	CO ₂ emission reduction	MT/year	9
10	Process down time	Day	1

The projected profitability and cash flow statements indicate that the project implementation i.e. installation of energy efficient motor will be financially viable and technically feasible solution for the cluster.

ABOUT BEE'S SME PROGRAM

Bureau of Energy Efficiency (BEE) is implementing a BEE-SME Programme to improve the energy performance in 29 selected SMEs clusters. Bhimavaram Ice Making Units Cluster is one of them. The BEE's SME Programme intends to enhance the energy efficiency awareness by funding/subsidizing need based studies in SME clusters and giving energy conservation recommendations. For addressing the specific problems of these SMEs and enhancing energy efficiency in the clusters, BEE will be focusing on energy efficiency, energy conservation and technology up-gradation through studies and pilot projects in these SMEs clusters.

Major activities in the BEE -SME program are furnished below:

Activity 1: Energy use and technology audit

The energy use technology studies would provide information on technology status, best operating practices, gaps in skills and knowledge on energy conservation opportunities, energy saving potential and new energy efficient technologies, etc for each of the sub sector in SMEs.

Activity 2: Capacity building of stake holders in cluster on energy efficiency

In most of the cases SME entrepreneurs are dependent on the locally available technologies, service providers for various reasons. To address this issue BEE has also undertaken capacity building of local service providers and entrepreneurs/ Managers of SMEs on energy efficiency improvement in their units as well as clusters. The local service providers will be trained in order to be able to provide the local services in setting up of energy efficiency projects in the clusters

Activity 3: Implementation of energy efficiency measures

To implement the technology up-gradation project in the clusters, BEE has proposed to prepare the technology based detailed project reports (DPRs) for a minimum of five technologies in three capacities for each technology.

Activity 4: Facilitation of innovative financing mechanisms for implementation of energy efficiency projects

The objective of this activity is to facilitate the uptake of energy efficiency measures through innovative financing mechanisms without creating market distortion.

1 INTRODUCTION

1.1 Brief Introduction about cluster

Bhimavaram is a town in the West Godavari District in the state of Andhra Pradesh, India. It is located 395 kilometers east of state capita Hyderabad. Bhimavaram is renowned for the sea food business and is a big hub for fish and prawns culture. The prawns and fish are exported to various countries throughout the world. There are about 80 ice making units in the cluster. The major Energy forms used in the cluster are grid electricity and HSD oil. Electricity is used for driving the prime movers of compressors, pumps, agitators, drives and for lighting. HSD is used as fuel in DG sets for electricity generation in the event of failure of power supply.

The cost of energy as a percentage of end product cost (ice) cost varies anywhere between 48 to 54%. Majority of the industries located in Bhimavaram are engaged in for the next batch. The removed ice blocks are further cursed into smaller pieces production of ice blocks required for storage and transportation purpose of the sea food.

1.1.1 Production process

Raw water is pumped from local available water bodies such as pond / stream through raw water pump to overhead tank .

The production area of the plant has an Ice tank made of concrete. The ice tank contains the direct expansion coils, equally distributed throughout the tank and these coils are submerged in brine. The tank is provided with a suitable frame of hard wood for support the ice cans and a propeller or agitator for keeping the brine in motion: the brine in the tank acts as a medium of contact only, the ammonia evaporating in the ice coils extracts the heat from the brine, which again absorbs the heat for the water in the cans.

Raw water from overhead tank is filled into the ice cans. Water is chilled for 48 hours for complete ice block formation. The sp. gravity of brine is maintained at 1180 by adding salt of required quantity. Ice cans of fully formed ice blocks are removed from the chilling tank. The cans are emptied of the ice blocks and replaced into the chilling tank with water by ice crushers and loaded into plastic crates for transportation.

Detailed of process flow chart are finished in Figure 1.1 below:

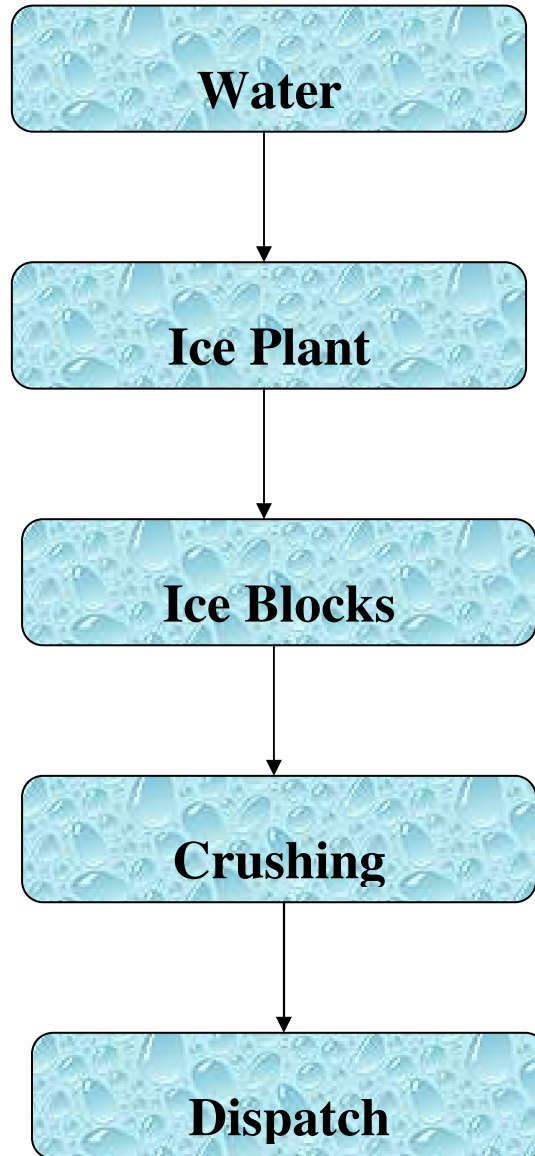


Figure 1.1: General process flowchart of a typical ice making unit

1.2 Energy performance in existing situation

1.2.1 Fuel and electricity consumption of a typical unit in the cluster

The main energy used in a typical ice making unit in the cluster is electricity and HSD. Electricity is used for driving the prime movers of Compressors, pumps, agitators, ice crushers, lighting etc. The HSD is used as fuel in generators for electricity generation during power failures of grid electricity and is used in emergency situations only. The energy consumption of three typical ice making units in the cluster using low efficient compressor motor is furnished in Table 1.1 below:

Table 1.1: Energy consumption of typical units

S.No	Unit Name	Electricity Consumption (kWh/annum)	HSD Consumption (Liters/annum)	Ice Production (tons/annum)
1	Anand Fisheries	387600	4533	5100
2	Dhanalaxami Ice Factory	421583	4931	4109
3	Surya Ice factory	469775	5494	4300
4	Udaykiran Ice factory	535800	7421	4700

1.2.2 Average production by a typical unit in the cluster

The average production in a typical ice making unit is between 4100 to 5100 tons of ice blocks per annum.

1.2.3 Specific Energy Consumption

The major energy source for ice making is electricity taken from grid and DG set. The specific electricity consumption per ton of ice production for typical units is furnished in Table 1.2 below:

Table 1.2: Specific energy consumption for typical units

S. No.	Unit Name	Units	Specific Energy Consumption
1	Anand Fisheries	kWh/tons	80
2	Dhanalaxami Ice Factory	kWh/tons	108
3	Surya Ice factory	kWh/tons	115
4	Udaykiran Ice factory	kWh/tons	120

1.3 Existing technology/equipment

1.3.1 Description of existing technology

Refrigeration Compressors are one of equipment in ice making Industries consumes high energy compare to other equipments. These compressors are driven by electrical driven motors. The energy consumption by compressor varies depending on the refrigerant entering to the compressor. The refrigeration compressor required to operate speed at 400-1000 rpm.

The power required to the refrigeration compressor is less during emptying the ice from evaporation tank, after formation of ice in evaporation tank and during the filling of water in emptied ice cans. During the above situation all ice making industries are operating by switching off the refrigeration cylinders manually and many are not followed. As per the detailed studies undertaken in various units in cluster and also based on discussions with the supervisors and workers, all compressor cylinders are in operation during above conditions also.

To reduce the power consumption during the above situations occurs daily at least 2 hours of operation in all ice plant, VFD is one of feature to adopt in all ice making units. The VFD will reduce the speed of the compressor motor according to the load conditions. The detail of existing Refrigeration and compressor motor is given in the Table 1.3 below:

Table 1.3 Existing motor specifications

S.No	Details	Compressor motor
1	Rated HP	60
2	Voltage	415
3	Rated Amps	84
4	Frequency	50 Hz
5	Power Consumption (kW)	37.10
6	Transmission system	V belt drive
7	RPM	1440
8	Required speed of motor at full load conditions	1000

1.3.2 Its role in the whole process

The refrigeration compressor motor is the major energy consuming equipment of the ice making units. The refrigeration compressor is used to compressor the refrigerant i.e. Ammonia and sent to the evaporator tank. In evaporator tank the low temperature and high pressure refrigerant is absorbed the heat from water in ice tanks through conventional heat transfer.

1.4 Establishing the baseline for the equipment

1.4.1 Design and operating parameters

The present power consumption of a motor is 37.10 kW. The motor is operated for 24

hours in a day and 350 days per year.

1.4.2 Electricity consumption in existing system

The electricity consumption of refrigeration compressor motors in typical cluster units is given in Table 1.4 below:

Table 1.4 Electricity consumption

S. No	Name of the unit	Installed Motor Capacity (HP)	Actual Power Consumption (kW)
1	Anand Fisheries	60	37.80
2	Dhanalaxami Ice Factory	60	37.76
3	Surya Ice factory	60	37.10
4	Udaykiran Ice factory	60	38.14

1.4.3 Operating efficiency of the existing motor

The detailed energy audit studies had been undertaken in various units of the cluster and it was observed that during the partial loads the compressor motor operating at same speed and the cylinders are not switching off. This leads to the lower the operating efficiency of compressor motor.

1.5 Barriers for adoption of new and energy efficient technology / equipment

1.5.1 Technological Barriers

The major technical barriers that prevented the implementation of the VFD in Compressor motors in the cluster are:

- Lack of awareness on VFD Drives and functions
- Lack of awareness benefits to implement and technology to be adopt

1.5.2 Financial Barrier

Availing finance is not the major issue. Among the SMEs, the larger units, if convinced they are capable of either financing it themselves or get finance from bank. The smaller units will require competitive loan and other support to raise the loan. However as most of them have been able to expand their setup and grow, there is readiness to spend for energy efficiency technologies which have good returns. Energy Efficiency Financing Schemes such as SIDBI's, if focused on the cluster, will play a catalytic role in implementation of identified energy conservation projects & technologies.

1.5.3 Skilled manpower

Not applicable

1.5.4 Other barrier(s)

Information on the energy savings equipments like VFD Drives are not available among cluster unit owners, local suppliers are not available with in the cluster and also they don't know the benefits by adopting the VFDs adopting in Ice Units.

2. TECHNOLOGY/EQUIPMENT FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1 Detailed description of technology/equipment selected

2.1.1 Description of equipment

VFD is an innovative feature for compressor motor that significantly increases energy efficiency and minimize the energy consumption during the part load conditions. VFD controls the frequency of electrical power supplied to the motor according to the load requirement, which drastically cuts down on unwarranted energy expenditures while maintaining full functionality.

2.1.2 Technology /Equipment specifications

The detailed specification of the VFD suggested is furnished in table 2.1 below:

Table 2.1: Variable Frequency Drive Specifications

S. No.	Parameter	Unit	Value
1	Drive Name	Name	VSC Drive
2	Voltage	V	380-480
3	Rated Current	A	90
4	Phase		3
5	Maximum Frequency	Hz	400
6	Allowable Voltage Fluctuations	Range	10 to10 %
7	Control method	Name	V/F Control
8	Speed Control Range	Range	1:50 V/F mode

2.1.3 Justification of the technology selected & Suitability

The refrigeration compressor motors are major energy consuming equipment in Ice Making Cluster at Bhimavaram. Based on the detailed energy audits conducted for various motors installed in cluster units, during the part load conditions the compressor motors are running at same speed and consuming the same power.

This technology has been selected because of the following reasons

- At least two hours of operation during the part load conditions
- During the part load condition the power consumption will be low

- Higher Motor life
- It reduces the GHG emissions

2.1.4 Superiority over existing technology/equipment

Installation of VFD reduces electricity consumption as well as increase life of the system. It also provides flexibility in compressing speed without any expenses.

2.1.5 Availability of the proposed technology/equipment

The VFD suppliers are available at major cities in Andhra Pradesh. The companies are manufacturing VFD Drives and supplying through their dealers in all over Andhra Pradesh. The details of the suppliers are provided in Annexure-6.

2.1.6 Source of technology/equipment for the project

The source of the technology is indigenous and is locally available.

2.1.7 Service/technology providers

A detail of VFD Drives suppliers has been furnished in Annexure 6.

2.1.8 Terms of sales

No any specific terms and conditions

2.1.9 Process down time during implementation

The process down time for installation of energy efficient motor is considered one day.

2.2 Life cycle assessment and risks analysis

Life of the equipment is about 10 years. Risk involves in the installation of proposed project are as follows:

- Lack of initiative of the unit owner
- Fear of affecting the quality of product because of replacement.
- Availability of skilled manpower in industry

2.3 Suitable unit/plant size in terms of capacity/production

All ice making industries in the cluster are suitable for implementation of this technology having 60 HP motors for refrigeration compressors.

3. ECONOMIC BENEFITS OF NEW ENERGY EFFICIENT TECHNOLOGY

3.1 Technical benefits

3.1.1 Fuel savings per year

No fuel saving is possible due to implementation of proposed system.

3.1.2 Electricity savings per year

The power savings due to installation of VFD to compressor motor in a typical unit is 11690 kWh per annum. Details of electricity saving calculation are given at Annexure 2.

3.1.3 Improvement in product quality

There is no significant impact on the product quality.

3.1.4 Increase in production

There is no significant effect on production capacity.

3.1.5 Reduction in raw material consumption

Not Applicable

3.1.6 Reduction in other losses

Reduce wear and tear loss in machine due to reduction in speed of motor during unloading period.

3.2 Monetary benefits

The monetary benefit due to installation of VFD to Compressor motor is ` 0.44 lakh per annum due to reduction in electricity consumption. Details of monetary saving calculation are furnished in Annexure 2.

3.3 Social benefits

3.3.1 Improvement in working environment in the plant

No improvement on the working environment in the plant.

3.3.2 Improvement in skill set of workers

Technical skills of persons will definitely be improved. As the training will be provided by equipment suppliers which improve the technical skills of manpower required for operating of the equipment and also the technology implementation will create awareness among the workforce about energy efficiency and energy saving.

3.4 Environmental benefits

3.4.1 Reduction in effluent generation

None

3.4.2 Reduction in GHG emission such as CO₂, NO_x, etc

The major GHG emission reduction source is CO₂. The technology will reduce grid electricity consumption and emission reductions are estimated at 9 tons of CO₂ per annum due to implementation of the project activity.

3.4.3 Reduction in other emissions like SO_x

No significant impact on SO_x emissions.

4. INSTALLATION OF VFD FOR COMPRESSOR MOTOR

4.1 Cost of technology/equipment implementation

4.1.1 Cost of technology/equipments

The total cost for VFD is estimated at ` 1.54 lakh, which includes VFD cost and other charges and discounts as per the Quotation in Annexure 7.

4.1.2 Other costs

Other charges include cabling and panel modification. Project cost details are furnished in Table 4.1 below:

Table 4.1: Project detail cost

S. No.	Particular	Unit	Value
1	Cost of VFD	in lakh	1.54
2	Panel, Switch & Cabling, Elec. and Modifications etc.	in lakh	0.05
3	Total Investment	in lakh	1.59

4.2 Arrangement of funds

4.2.1 Entrepreneur's contribution

The entrepreneur's contribution is 25% of total project cost, which works out at ` 0.40 lakh.

4.2.2 Loan amount

The term loan is 75% of the total project cost, which is ` 1.19 lakh.

4.2.3 Terms & conditions of loan

The interest rate is considered at 10.0% which is prevailing interest rate of SIDBI for energy efficiency related projects. The loan tenure is 5 years and the moratorium period is 6 months.

4.3 Financial indicators

4.3.1 Cash flow analysis

Considering the above discussed assumptions, the net cash accruals starting with ` 0.22 lakh in the first year operation and increases to ` 0.92 at the end of eighth year.

4.3.2 Simple payback period

The total project cost of the proposed technology is ₹ 1.59 lakh and monetary savings due to reduction in electricity consumption is ₹ 0.44 lakh and the simple payback period works out to be 3.61 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10.0% interest rate works out to be ₹ 0.18 lakh.

4.3.4 Internal rate of return (IRR)

The after tax Internal Rate of Return of the project works out to be 13.28%. Thus the project is financially viable.

4.3.5 Return on investment (ROI)

The average return on investment of the project activity works out at 23.36%. The average DSCR is 1.22.

4.4 Sensitivity analysis in realistic, pessimistic and optimistic scenarios

A sensitivity analysis has been worked out to ascertain how the project financials would behave in different situations like there is an increase in power savings or decrease. For the purpose of sensitive analysis, two scenarios are considered are.

- Increase in power savings by 5%
- Decrease in power savings by 5%

In each scenario, other inputs are assumed as constant. The financial indicators in each of the above situation are indicated along with standard indicators.

Table 4.2: Sensitivity analysis

Particulars	IRR %	NPV ₹ in lakh	ROI %	DSCR
Normal	13.28%	0.18	23.36%	1.22
5% increase in power savings	14.80%	0.26	23.75%	1.28
5% decrease in power savings	11.74%	0.09	22.93%	1.17

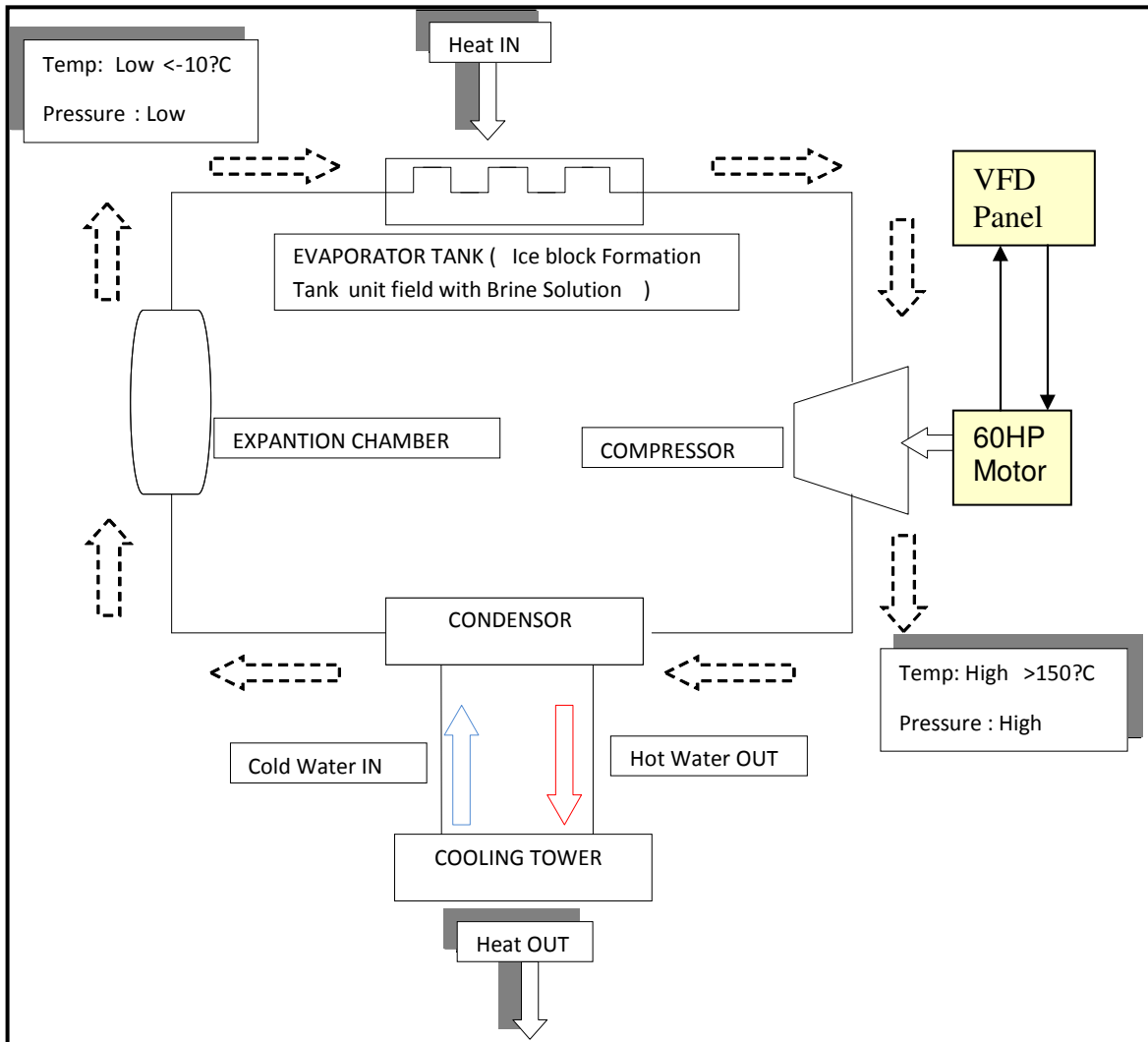
4.5 Procurement and implementation schedule

The project is expected to be completed in 4 week from the date of release of purchase order. The detailed schedule of project implementation is furnished in Annexure 5.

ANNEXURE

Annexure 1: Process Flow Diagram

Process flow diagram will remain the same after implementation of proposed energy efficient motor.

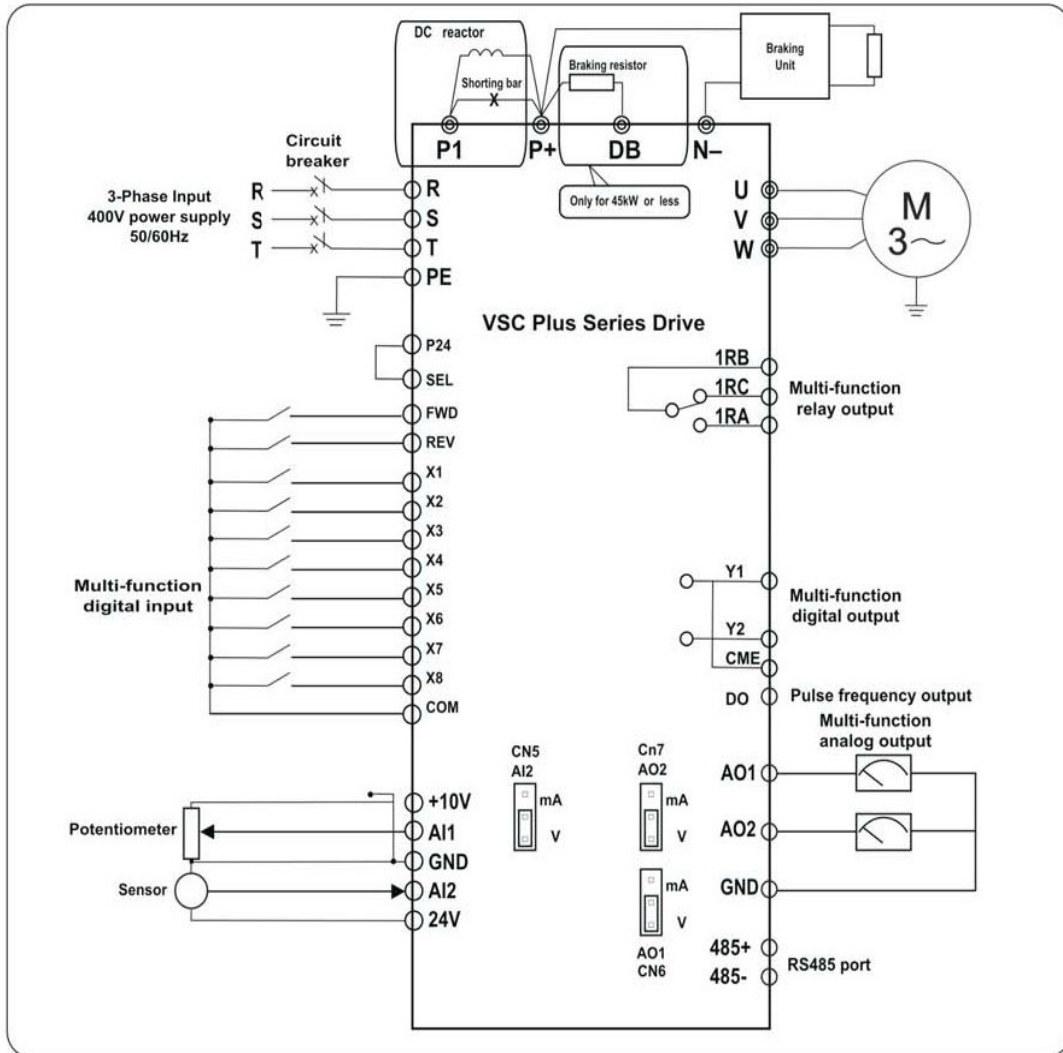


Annexure 2: Detailed technology assessment report – VFD to Compressor Motor

S.No	Parameter	Unit	With Out VFD	With VFD
1	Capacity of Compressor Motor	kW	45	45
2	Speed of motor During part load	rpm	700	400
3	Power Consumption (Surya Ice factory)	kW	37.1*	20.4*
4	Total operating hours at under loaded condition	hr/day		2
5	Speed Reduction	rpm		300
6	Power reduction per day	kWh/day		33.4
7	No. of Working Days	days/year		350
8	Total electricity saving	kWh/Year		14280
10	Power tariff	₹/kWh		3.75
11	Cost of Energy savings	₹ in lakh/Year		0.44
12	Investment cost	₹ in lakh		1.59
13	Payback Period	Years		3.61

* Power consumption is based on actual measurement at full load condition and at no load condition when only one cylinder is in operation.

Annexure 3: Detailed electrical drawing required



Annexure 4: Detailed financial calculations & analysis**Assumptions**

Name of the Technology	Variable Frequency Drive (VFD)		
Rated Capacity	60 HP		
Details	Unit	Value	Basis
Installed Capacity	HP	60	
No of working days	Days	350	
No of operating hours	Hrs	24	
Proposed Investment			
Plant & Machinery	` (in lakh)	1.54	
Panel, Switch & Cabling etc.	` (in lakh)	0.05	
Total Investment	` (in lakh)	1.59	
Financing pattern			
Own Funds (Equity)	` (in lakh)	0.40	Feasibility Study
Loan Funds (Term Loan)	` (in lakh)	1.19	Feasibility Study
Loan Tenure	Years	5.00	Assumed
Moratorium Period	Months	6.00	Assumed
Repayment Period	Months	66.00	Assumed
Interest Rate	%age	10.00%	SIDBI Lending rate
Estimation of Costs			
O & M Costs	% on Plant & Equip	1.00	Feasibility Study
Annual Escalation	%age	1.00	Feasibility Study
Estimation of Revenue			
Electricity Saving	kWh/Year	11690	
Cost of electricity	`/kWh	3.75	
St. line Depn.	%age	5.28	Indian Companies Act
IT Depreciation	%age	80.00	Income Tax Rules
Income Tax	%age	33.99	Income Tax

Estimation of Interest on Term Loan**`(in lakh)**

Years	Opening Balance	Repayment	Closing Balance	Interest
1	1.19	0.06	1.13	0.14
2	1.13	0.16	0.97	0.11
3	0.97	0.20	0.77	0.09
4	0.77	0.24	0.53	0.07
5	0.53	0.28	0.25	0.04
6	0.25	0.25	0.00	0.01
		1.19		

WDV Depreciation**`(in lakh)**

Particulars / years	1	2
Plant and Machinery		
Cost	1.59	0.32
Depreciation	1.27	0.25
WDV	0.32	0.06

Projected Profitability

` (in lakh)

Particulars / Years	1	2	3	4	5	6	7	8
Fuel savings	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Total Revenue (A)	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Expenses								
O & M Expenses	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Total Expenses (B)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
PBDIT (A)-(B)	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
Interest	0.14	0.11	0.09	0.07	0.04	0.01	0.00	0.00
PBDT	0.28	0.32	0.33	0.36	0.38	0.41	0.42	0.42
Depreciation	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
PBT	0.20	0.23	0.25	0.27	0.30	0.33	0.34	0.34
Income tax	0.00	0.02	0.11	0.12	0.13	0.14	0.14	0.14
Profit after tax (PAT)	0.20	0.21	0.14	0.15	0.17	0.19	0.19	0.19

Computation of Tax

` (in lakh)

Particulars / Years	1	2	3	4	5	6	7	8
Profit before tax	0.20	0.23	0.25	0.27	0.30	0.33	0.34	0.34
Add: Book depreciation	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Less: WDV depreciation	1.27	0.25	-	-	-	-	-	-
Taxable profit	(0.99)	0.06	0.33	0.36	0.38	0.41	0.42	0.42
Income Tax	-	0.02	0.11	0.12	0.13	0.14	0.14	0.14

Projected Balance Sheet

` (in lakh)

Particulars / Years	1	2	3	4	5	6	7	8
Share Capital (D)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Reserves & Surplus (E)	0.20	0.41	0.55	0.70	0.86	1.05	1.25	1.44
Term Loans (F)	1.13	0.97	0.77	0.53	0.25	0.00	0.00	0.00
Total Liabilities (D)+(E)+(F)	1.73	1.78	1.72	1.63	1.51	1.45	1.65	1.84
Assets	1	2	3	4	5	6	7	8
Gross Fixed Assets	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
Less Accm. Depreciation	0.08	0.17	0.25	0.34	0.42	0.50	0.59	0.67
Net Fixed Assets	1.51	1.42	1.34	1.25	1.17	1.09	1.00	0.92
Cash & Bank Balance	0.22	0.36	0.38	0.37	0.34	0.37	0.65	0.92
TOTAL ASSETS	1.73	1.78	1.72	1.63	1.51	1.45	1.65	1.84
Net Worth	0.60	0.81	0.94	1.09	1.26	1.45	1.64	1.84
Debt Equity Ratio	2.85	2.45	1.94	1.34	0.64	0.01	0.01	0.01

Projected Cash Flow

` (in lakh)

Particulars / Years	0	1	2	3	4	5	6	7	8
Sources									
Share Capital	0.40	-	-	-	-	-	-	-	-
Term Loan	1.19								
Profit After tax		0.20	0.21	0.14	0.15	0.17	0.19	0.19	0.19
Depreciation		0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Total Sources	1.59	0.28	0.29	0.22	0.23	0.25	0.27	0.28	0.28

Application									
Capital Expenditure	1.59								
Repayment Of Loan	-	0.06	0.16	0.20	0.24	0.28	0.25	0.00	0.00
Total Application	1.59	0.06	0.16	0.20	0.24	0.28	0.25	0.00	0.00
Net Surplus	-	0.22	0.13	0.02	-0.01	-0.03	0.02	0.28	0.28
Add: Opening Balance	-	-	0.22	0.36	0.38	0.37	0.34	0.37	0.65
Closing Balance	-	0.22	0.36	0.38	0.37	0.34	0.37	0.65	0.92

IRR

(in lakh)

Particulars / months	0	1	2	3	4	5	6	7	8
Profit after Tax		0.20	0.21	0.14	0.15	0.17	0.19	0.19	0.19
Depreciation		0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Interest on Term Loan		0.14	0.11	0.09	0.07	0.04	0.01	-	-
Cash outflow	(1.59)	-	-	-	-	-	-	-	-
Net Cash flow	(1.59)	0.42	0.40	0.31	0.30	0.29	0.28	0.28	0.28
IRR	13.28%								
NPV	0.18								

Break Even Point

(in lakh)

Particulars / Years	1	2	3	4	5	6	7	8
Variable Expenses								
Oper. & Maintenance Exp (75%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Sub Total (G)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fixed Expenses								
Oper. & Maintenance Exp (25%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest on Term Loan	0.14	0.11	0.09	0.07	0.04	0.01	0.00	0.00
Depreciation (H)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sub Total (I)	0.23	0.20	0.18	0.15	0.13	0.10	0.09	0.09
Sales (J)	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Contribution (K)	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Break Even Point (L= G/I)	53.04%	45.80%	41.64%	36.23%	30.60%	22.50%	20.71%	20.73%
Cash Break Even {(I)-(H)}	33.35%	26.11%	21.95%	16.53%	10.89%	2.78%	0.99%	1.00%
Break Even Sales (J)*(L)	0.23	0.20	0.18	0.16	0.13	0.10	0.09	0.09

Return on Investment

(in lakh)

Particulars / Years	1	2	3	4	5	6	7	8	Total
Net Profit Before Taxes	0.20	0.23	0.25	0.27	0.30	0.33	0.34	0.34	2.25
Net Worth	0.60	0.81	0.94	1.09	1.26	1.45	1.64	1.84	9.64
									23.36%

Debt Service Coverage Ratio

(in lakh)

Particulars / Years	1	2	3	4	5	6	7	8	Total
Cash Inflow									
Profit after Tax	0.20	0.21	0.14	0.15	0.17	0.19	0.19	0.19	1.05
Depreciation	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.50
Interest on Term Loan	0.14	0.11	0.09	0.07	0.04	0.01	0.00	0.00	0.45
Total (M)	0.42	0.40	0.31	0.30	0.29	0.28	0.28	0.28	2.01

DEBT

Interest on Term Loan	0.14	0.11	0.09	0.07	0.04	0.01	0.00	0.00	0.45
Repayment of Term Loan	0.06	0.16	0.20	0.24	0.28	0.25	0.00	0.00	1.19
Total (N)	0.20	0.27	0.29	0.31	0.32	0.26	0.00	0.00	1.64
	2.13	1.50	1.07	0.98	0.91	1.09	0.00	0.00	1.22
Average DSCR (M/N)	1.22								

Annexure 5: Details of procurement and implementation plan

S. No	Activity	Weeks			
		1	2	3	4
1	Placement of Orders for Equipment				
2	Supply of VFD				
3	Installation of the VFD				
4	Trial runs				

Annexure 6: Details of technology/equipment and service providers

<i>Equipment details</i>	<i>Source of technology</i>	<i>Service/technology providers</i>
Variable Frequency Drives(VFD)	India	Win Win Distribution comp. Win Win house 5-4-72 Opp. Sundaram motor M.G.Road Secunderabad 500003

Annexure 7: Quotation or techno-commercial bid

Quotation		Win Win					
Ref	19-05-2011	Distribution Co.				Ph :27537540/41/42 ,64502294 ,6524957	
		(Group company of Upadrasta & sons)				Fax No.040-27537539	
To						Email:sales@winwindistribution.in	
M/s:Aptico		WIN WIN HOUSE ,5-4-72,					
Hyderabad		Opp.Sundaram Motors, M.G.Road,				TIN:28492275701	
		Secunderabad-500003.					
						OPP.SUNDARAM MOTORS	
						RANIGUNJ,M.G.ROAD	
Dear Sir's						Secunderabad - 500003.	
		Kind Attn. MR.Ganguly					
With reference to the above, we are pleased to quote for your requirements as follows:							
Item	Qty	Particulars		Unit	Dis	Excise	VAT
	No's			Price	count	Duty	Total
							Unit Price
		CG Make Energy efficient Motors					
		TEFC NFLP Suitable for AC,3-PH					
1	1	5HP 1440rpm 4 Pole		24670	55.00%	EXT	EXT
2	1	7.5HP 1440rpm 4 Pole		33990	55%	EXT	EXT
3	1	60HP 1440rpm 4 Pole		228380	55%	EXT	EXT
4	1	75HP 1440rpm 4 Pole		313880	55%	EXT	EXT
5	1	150HP 1440rpm 4 Pole		539080	55%	EXT	EXT
6	1	60HP 960rpm 6 Pole		378780	55%	EXT	EXT
7	1	75HP 960rpm 6 pole		429240	55%	EXT	EXT
		CG Make VFD'S					
1	1	60HP		280000	45%	EXT	EXT
2	1	75HP		320000	45.00%	EXT	EXT
3	1	150HP		528000	45.00%	EXT	EXT
							Your's Truly
Delivery : 8-10Weeks						WIN WIN Distribution Co.	
Payment : AGN PROFORMA INVOICE						Arun Kumar	
Insurance : At your scope						7702296601	



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(Ministry of Power, Government of India)

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Websites: www.bee-india.nic.in, www.energymanagertraining.com



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