RIFLE FACTORY ISHAPORE

First licensee of BIS in India for Energy Management System on 21st July 2014.

1. Following External and Internal Issues identified by RFI:

SL No.	Issues	Type	Overcoming strategies
1	Power shutdown due to CESC	External	beyond control,
2	Increasing trend in energy cost	External	identification and implementation of energy conservation projects, creating awareness to reduce wastage of energy.
3	Hot and humid climate increase AC load	External	arresting of leakages in AC enclosure, installation of power saver
4	More than 90% energy is from fossil fuel increase GHG emission.	External	Increase use of renewable energy through installation of solar power plant, utilisation of day light.
5	After installation of 1MWp solar plant maximum demand achieved is lower than minimum billing demand.	Internal	Review of agreement with CESC.
6	Power shutdown due to RFI	Internal	Routine Maintenance of Switchgear & Transformer, Transformer oil testing, relay testing.
	Failure of Energy Meters due to presence of harmonics in the power supply line.	Internal	study of harmonics and Installation of harmonic filter.
7	Delay in implementation of ENCON project due to lack of fund.	Internal	The matter has been taken up with CMD, AWEIL for availability of fund.
8	DG set is capable to power supply only to Admin building	Internal	beyond control
9	SEUs like furnace, compressors and centralised AC plants are very old, resulting higher energy consumption.	Internal	Preventive Maintenance of SEUs and procurement of new energy efficient furnace, compressors and AC plant.
10	centralised compressed air system having long distribution line	Internal	Decentralisation of compressors and arresting of leakages in compressed air line.
11	In-house training is postponed due to non-availability of fund.	internal	The matter has been taken up with CMD, AWEIL for incidental expenditure and rate of faculty honorarium for FTI on 16.12.2021 and on 07.02.2022.

2. Risk Management:

Through its risk management practice RFI identified 112 number of risk associated with its Integrated Management system (EnMS, EMS, OHSMS, QMS & SAMS). Out of which 19 are identified for its Energy Management system.

ISSUE	PRESENT RISK APPETITE (2022-23)						AVERAGE RISK POTENTIAL NUMBER			
	Intolerable	Substantial	Moderate	Tolerable	Trivial	Total	2019-20	2020-21	2021-22	2022-23
Energy Management	**0**	**1**	**1**	**11**	**6**	**19**	**16**	**15**	**12**	**10**

Risk Identified for Energy Management System

Activity / Process	$ Energy Aspect	Associated Energy Risks (Potential events)	Details of Existing Control	A (1-5) Probability,	B (1-5) Severity,	Effectiveness of the existing control, C (1-5)	Risk Level R = (A X B X C)	Risk Classification (Tr/T/M/S/I)	$ Risk Response	Risk Management Plan
Power Supply system	Uninterrupted power supply to all user shops & offices under RFI jurisdiction.	Interruption in power supply causing power off of machines/ processes leading to loss of Defence production.	Ensuring function ability of Ring-Main supply system & readiness of DG set through Periodical maintenance & trial run/ mock run.	1	5	2	10	Tolerable	Mitigate	Periodical checking of dielectric strength of transformer oil, power panels including gears' contact points & cable termination.
Protection System	Confirmation of Active function ability of Protective devices.	Loss/ damage/ burning/ bursting etc. of electrical supply system network & it's associated gear(s) & cables which may cause electrical fires.	Ensuring function ability of Over/ under voltage protection, Surge & short -circuit protection, Earth & neutral fault protection of associated device(s) through Periodical maintenance & trial run/ mock run.	2	5	2	20	Moderate	Mitigate	Periodical relay logic checking for associated safety/ protection relays.

Activity / Process	$ Energy Aspect	Associated Energy Risks (Potential events)	Details of Existing Control	Probability,	Severity,	Effectiveness of the existing control, C (1-5)	Risk Level R = (A X B X C)	Risk Classification (Tr/T/M/S/I)	$ Risk Response	Risk Management Plan
Energy Consumption	Measurement and monitoring of energy consumption.	Error incorporation in associated measuring instruments / meters.	Validation of measuring instruments/ meters w.r.t. Calibrated master equipment (Power Analyser, Make: Krycard, Model: ALM-30 , Sl. No.: 126223 KDH) as per predefined periodicity.	3	2	2	12	Tolerable	Accept	Periodical Monitoring
		Monitoring schedule not being followed.	By ensuring joint verification with representative of user section(s) as per monitoring schedule & logging of reading data in meter-card with sign.	2	2	3	12	Tolerable	Accept	Periodical Monitoring
Quality of Power	Maintaining quality of supplied power.	High/ Low Operating Voltage Band	By installing & maintaining Voltage stabilizer, in power supply system & Ensuring function ability through Periodical maintenance	2	1	3	6	Trivial	Accept	Periodical Monitoring
		High/ Low Operating Frequency Band	By installing & maintaining Frequency Controller in power supply system & Ensuring function ability through Periodical maintenance.	2	3	2	12	Tolerable	Accept	Periodical Monitoring
		Deviation from unity power factor	By installing & maintaining Power-factor controller, in power supply system & Ensuring function ability through Periodical maintenance.	1	2	2	4	Trivial	Accept	Periodical Monitoring
		Superimposition of Harmonics. (THD> 3%)	By installing & maintaining Harmonic suppressor circuit in power supply system & Ensuring function ability through Periodical maintenance.	2	2	4	16	Tolerable	Mitigate	Feeder-wise harmonic study (conducted through Ext. Energy Audit) for planning & designing suppressor ckt.

Activity / Process	$ Energy Aspect	Associated Energy Risks (Potential events)	Details of Existing Control	Probability,	Severity,	Effectiveness of the existing	Risk Level R =	Risk Classification (Tr/T/M/S/I	$ Risk Response	Risk Management Plan
Legal	Fulfilment of Legal Requirements	Lack of knowledge of Regulatory requirements & other requirements	List of Legal & other requirements with Owner and source details. Reviewed in MRC meeting.	2	5	1	10	Tolerable	Mitigate	Periodical Monitoring
Energy conservation projects	Planning, Installation & maintaining Energy conservation projects along with renewable energy application within RFI jurisdiction.	Low/ No output as per designed/ desired optimization.	By reviewing the obtained output through reviewing schedules & Ensuring function ability of the energy projects through Periodical checking & maintenance.	2	2	2	8	Trivial	Accept	Periodical Monitoring
		Failure in reviewing system	Strict adherence to monitoring & reviewing system along with associated failure analysis through internal audit.	1	3	2	6	Trivial	Accept	Monthly review through monthly Maintenance meeting
Cost of (Electrical) Energy	Reduction in the per unit average Electrical energy cost. (Rs./KWH)	Low/ No Power factor Rebate.	By incorporating & maintaining load-side power factor management thhrough APFC application	1	2	2	4	Trivial	Accept	Periodical Monitoring
		Penalty on Maximum Demand for excess demand over contractual value.	By incorporating & maintaining Maximum Demand management through MD controller.	2	3	2	12	Tolerable	Mitigate	Periodical Relay logic & functionability testing for relays associated wth MD controller.
		Max. Demand is below the min. Billing Demand	Reviewing the Max. Demand Contract depending on past data history & present load pattern through MRC meeting	2	3	2	12	Tolerable	RMP	Monthly review through monthly Maintenance meeting

Activity / Process	$ Energy Aspect	Associated Energy Risks (Potential events)	Details of Existing Control	Probability,	Severity,	Effectiveness of the existing	Risk Level R =	Risk Classification (Tr/T/M/S/I	$ Risk Response	Risk Management Plan
Energy loss	Identification of Significant energy loss areas	Energy loss through furnaces	By skin temp. monitoring through thermal imager & by arresting leakage through heat insulators,	2	4	1	8	Trivial	Accept	Periodical Monitoring
		Energy loss for compressed air leakage & condensation.	By incorporating Leak-tag system in compressed air line Through MM section.	2	4	2	16	Tolerable	Accept	Periodical Monitoring, iF any deviation
		Energy losses in Centralized AC Plant	By incorporating effective heat exchange through periodical descaling of cond. circuits & regeneration in softener's resin bed.	2	3	2	12	Tolerable	Accept	Periodical Monitoring
		Poor Maintenance	Maintenance Management Procedure, Preventive Maintenance Schedule, Monthly Maintenance Meeting	2	4	2	16	Tolerable		
Global Worming	Use of renewable energy	No Practice for Renewable Energy application	1 MWp Solar Plant, 30 Light pipe, 75 Turbo ventilators, 1 Biogas Plant, 3100 LPD Solar Water Heater	3	3	3	27	Substantial		Installation of 650 kWp rooftop solar plant
						Average	11.3	Tolerable		

3. Project implemented after Certification:

Year	Number of Project Implemented	Energy Saved (Lakh kWh)	Cost savings (Rs. Lakhs)	Investment incurred (Rs. Lakhs)
2014-15	25	39.68	292.72	83.82
2015-16	20	14.12	165.09	93.76
2016-17	7	9.87	106.17	14.75
2017-18	7	4.47	33.70	50.23
2018-19	5	5.70	44.45	632.51
2019-20	2	0.57	4.02	12
2020-21	0	0	0	0
2021-22	3	1.02	6.32	14.45
Total	**69**	**75.43**	**652.47**	**901.52**

4. New projects are identified and under implementation as follows:

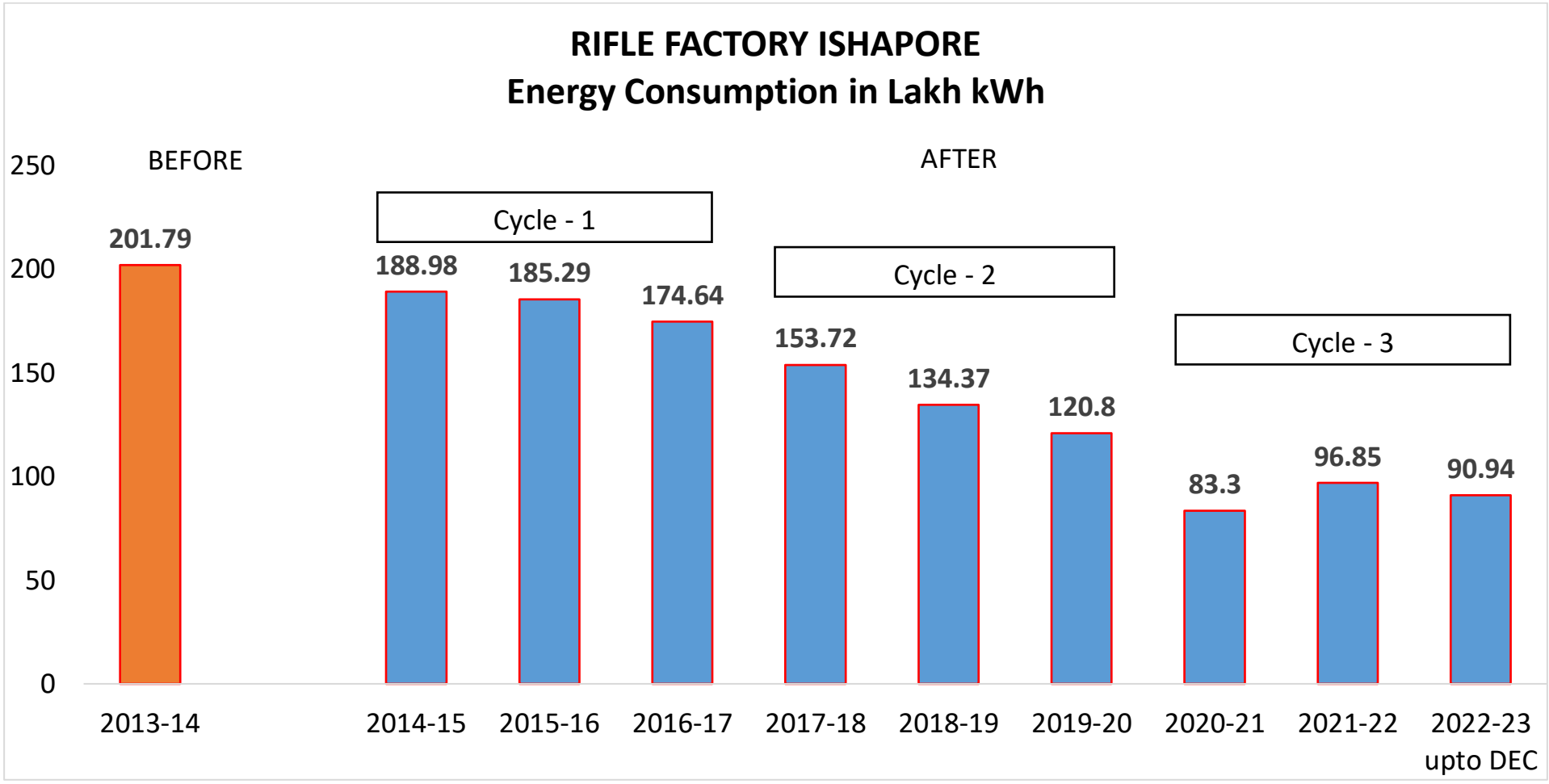
SL	Particular	Status
1	Analysis of Harmonic at Sub-station feeder wise for significant load end	Completed
2	Old 150 Watt Stand fans to be replaced with 50 Watt Energy Efficient Stand Fan. 20/30	Completed
3	Under RR grant Condemned 3 nos. Blue star Chiller units to be replaced with energy efficient (Lower IKW/TR) Kirlosker Chiller units/	Completed
4	Review of Contract demand with CESC from	Completed
5	Switching OFF alternate street lights after 12.00 midnight to save electrical energy without compromising security and safety aspect.	Under implementation
6	Installation of New 460 kWp Solar Power Plant of on Rooftop of Museum, TR, PS, EO/CDD,ITC/ GS, Store building.	Under implementation

Projects already implemented in last 5 years:

1. Adoption of LED luminaries to replace previous Gen. lighting system.
2. Installation of Turbo ventilators to replace Electrical Exhaust fans.
3. Installation of Day light utilization system (i.e. Light pipes) in shop floors.
4. Load side power factor management for large fluctuating inductive loads through installation of APFC & associated Capacitor banks for achieving optimized PF-rebate in monthly electricity bills.
5. Review & revision of Maximum Demand contract with Supplier for optimizing Demand charge in monthly electricity bills.
6. Incorporation of Maximum demand controller at LT gears to avoid penalty/ surcharge in electricity bills i.r.o. excess drawl over the contractual demand.
7. Installation & commissioning of 1000 kWp Roof mounted Grid interactive solar power plants.
8. Installation & commissioning of Roof mounted solar water heater for Industrial Canteen.
9. Incorporation of LDR (Light detected Resistors) circuit for switching ON-OFF of Security lights.
10. Re-insulation of Furnace walls & roofs in order to reduce screen temperature & in turn to minimize heat-losses.
11. Decentralization of centralized compressed air supply system to minimize line losses & pressure drops at extreme ends of usages.
12. Incorporation of Thermo-static control of cooling tower fans.
13. Incorporation of FRP blades for cooling tower fans.
14. Incorporation of Temp. controlled motorized valves for AHU cooling coils for lower the loads on AC Compressor.

5. Energy Consumption of RFI:

Energy Consumption (Lakh kWh)									
	Electrical			Thermal				Energy Total	Average
Year	Grid	Solar	**Total**	LPG	Diesel	Petrol	**Total**		
2018-19	128.73	2.40	**131.13**	2.11	0.92	0.20	**3.24**	**134.37**	11.20
2019-20	108.06	9.24	**117.30**	2.06	1.27	0.19	**3.53**	**120.83**	10.07
2020-21	75.11	6.41	**81.52**	0.72	0.92	0.14	**1.78**	**83.30**	6.94
2021-22	87.01	7.85	**94.86**	1.05	0.78	0.15	**1.99**	**96.85**	8.07
2022-23 up to Dec	82.07	6.84	**88.91**	1.24	0.57	0.22	**2.03**	**90.94**	10.10


RIFLE FACTORY ISHAPORE
Energy Consumption in Lakh kWh
BEFORE
AFTER
Cycle - 1
Cycle - 2
Cycle - 3
250
200
150
100
50
0
201.79
188.98
185.29
174.64
153.72
134.37
120.8
83.3
96.85
90.94
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23 upto DEC