



Kaira District Cooperative Milk Producers' Union Ltd., Anand (Amul Dairy)



**CII National Award
for
Excellence in Energy Management 2024**

**Sandeep Rai-Factory Manager
Aditya Laharaya- Head Engineering
Kheda Satellite Dairy, Khatraj**

Kaira District Cooperative Milk Producers' Union Ltd., Anand (Amul Dairy) FY 2023-24



12 States - 45 Units

Capacity – 8.4 Million Kgs/Day

Milk Producers - 0.7 Million

1.45 Million Milch Animals



One in USA

DCS - 1269 Numbers

Milk Procured - 1640 Million Kgs
(Year 2023-24)

Sales Turnover - Rs 129,110 Millions



Kheda Satellite Dairy , Khatraj (A Unit of Amul Dairy, Anand)

Established – Year 1996

Capacity – 1.6 Million Kgs/day

Milk Procured - 206 Million Kgs/Year

Sales Turnover - Rs 12,893 Millions



Cheddar Cheese, Processed Cheese,
Mozzarella, Paneer, Skimmed Milk Powder,
Whey Powder



Yoghurt, UHT & Shrikhand.



Yoghurt Production



Yoghurt Packing

NEW!

Energy Efficient Equipment



UHT Pre-Processing



UHT Packing

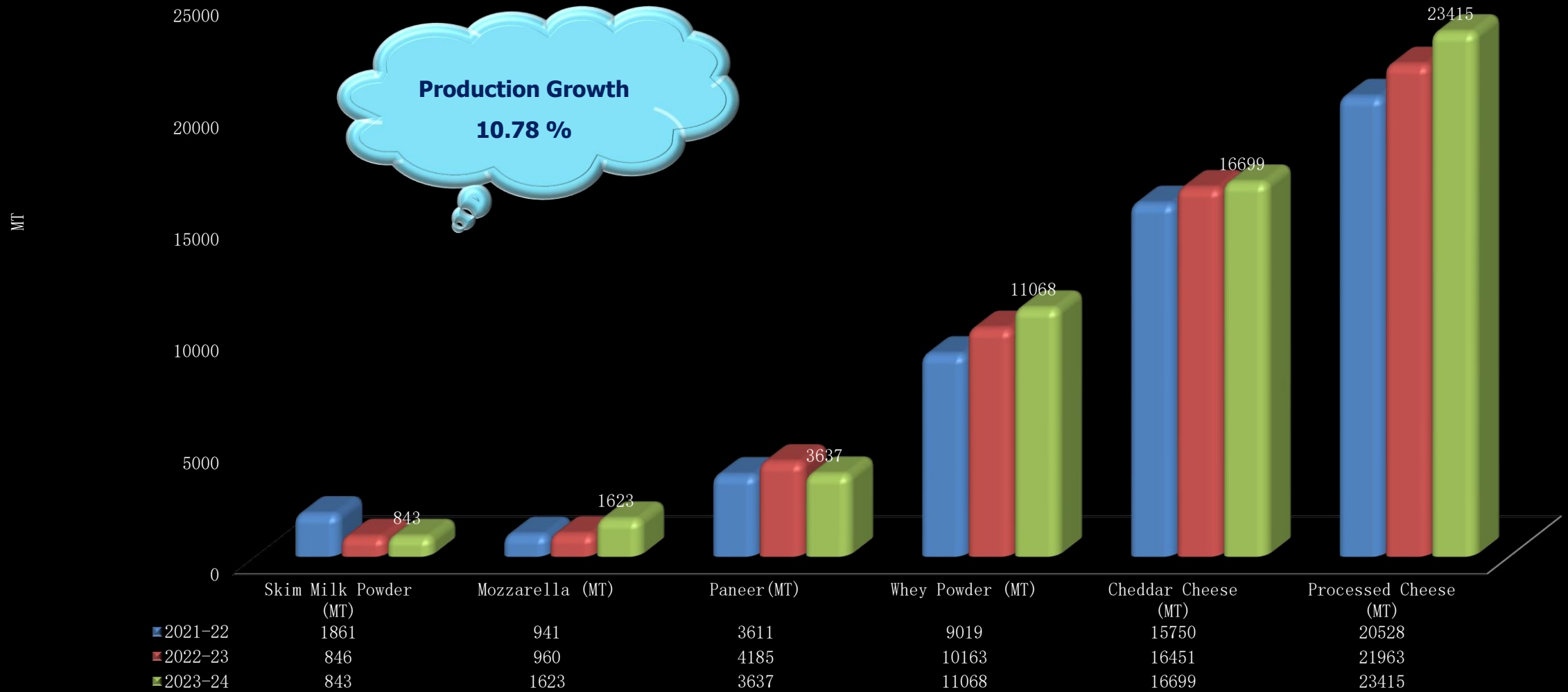
NEW!

Energy Efficient Equipment



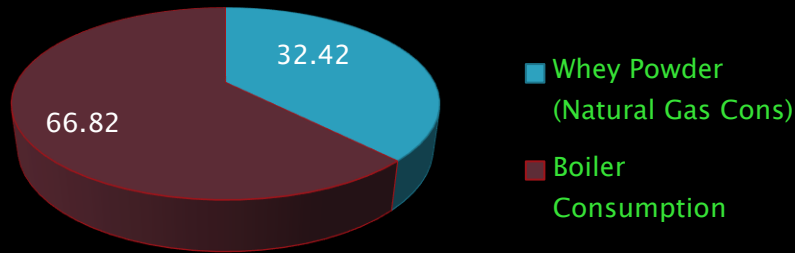
Mozzarella Cheese Plant

Production - FY 2021-22 to 2023-24

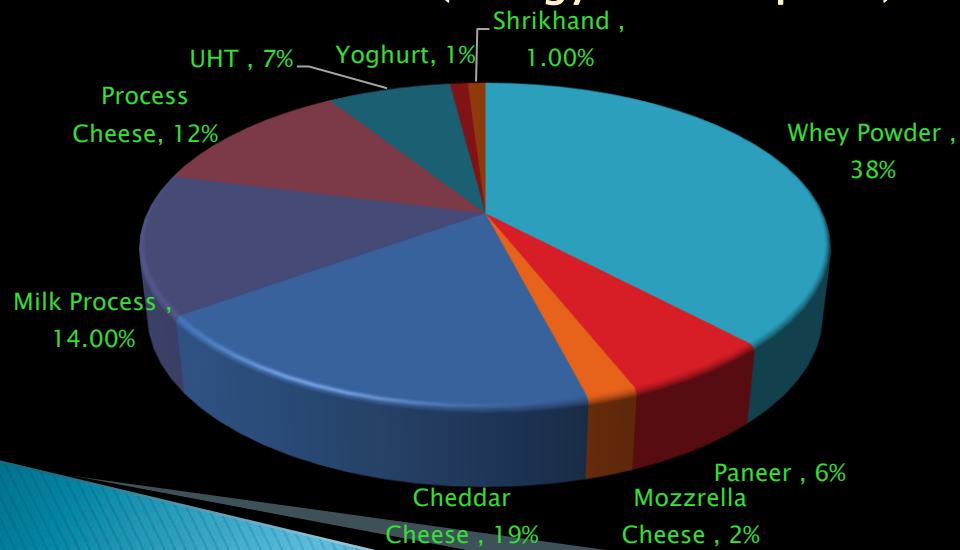


Energy Consumption Pattern

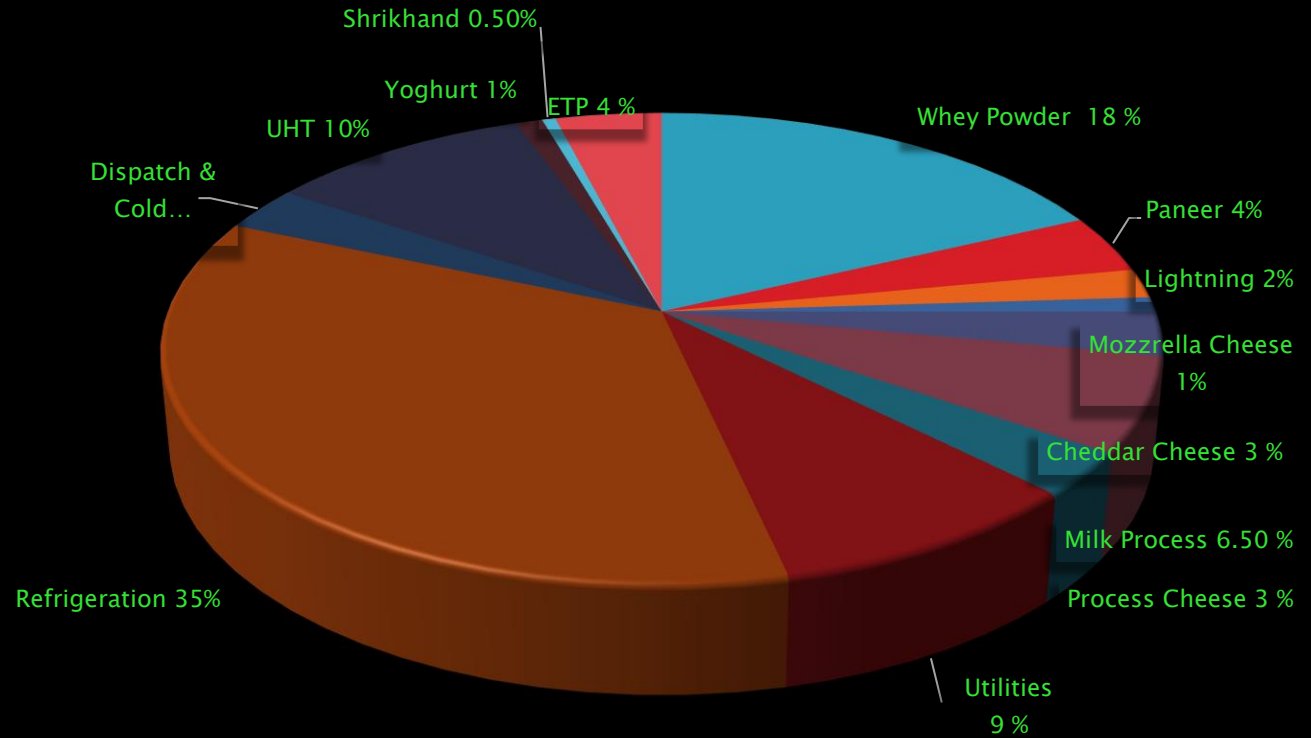
Thermal Energy



Section wise (Energy Consumption)

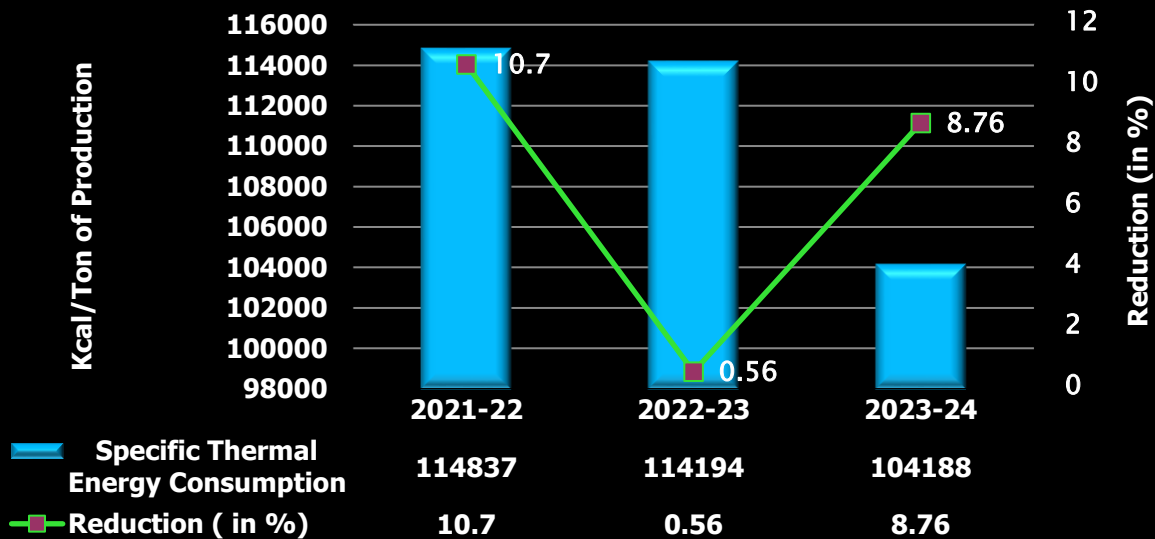


Electrical energy

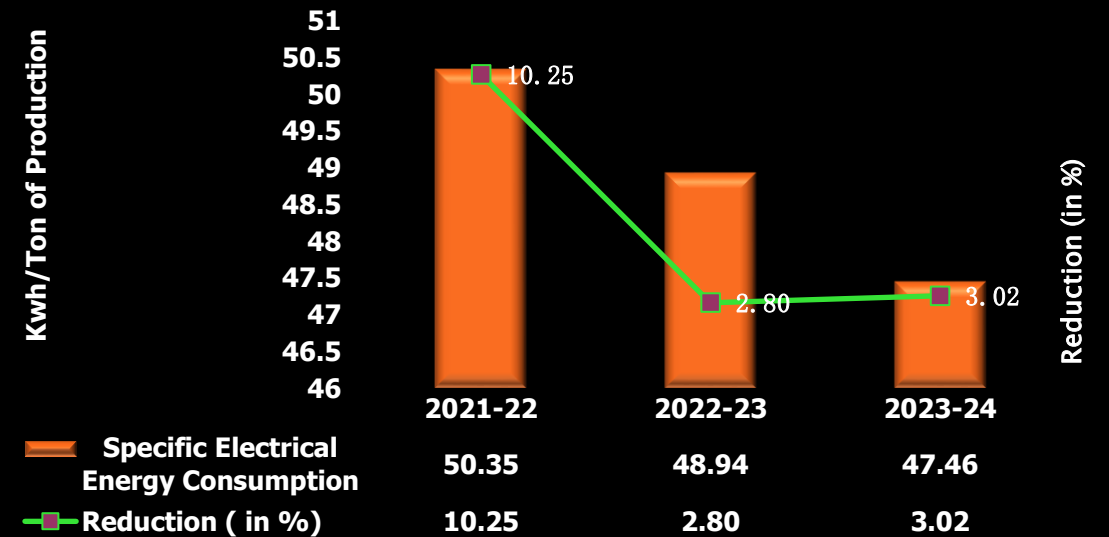


Specific Thermal / Electrical Energy Consumption (Last three years)

Specific Thermal Energy Consumption (Kcal/Ton of Production)

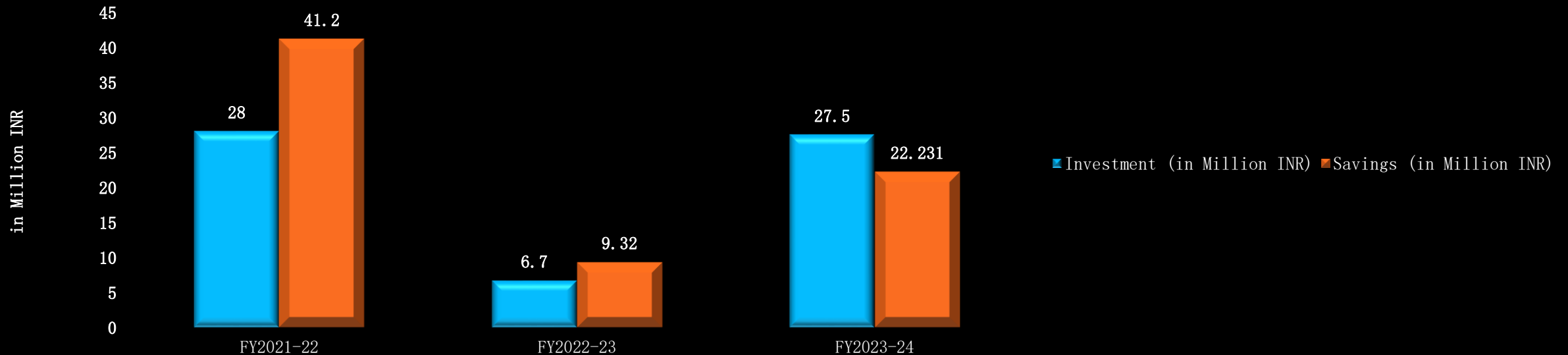


Specific Electrical Energy Consumption (Kwh/Ton of Production)



Energy Saving Projects Implemented in last 3 years (FY 2021-22 to 2023-24)

Year	No of Energy Saving Projects	Investments (in Millions)	Electrical Savings (Million kWh)	Thermal Savings (Million Kcal)	Savings (INR Millions)	Payback Period	Impact on SEC in % (Electrical/Thermal)
FY 2021-22	4	28	0.79	840	41.2	8 Months	3.96 / 1.84
FY 2022-23	6	6.7	0.07	1270.82	9.318	17 Months	0.33/2.63
FY 2023-24	5	27.5	0.31	2895	22.231	15 Months	1.37/5.84



Major energy Saving projects implemented in last three years

Year	Name of Energy Saving Projects	Investments (in Millions)	Electrical Savings (Million kWh)	Thermal Savings (Million Kcal)	Savings (INR Millions)	Payback Period (in months)
2021-22	Regenerative PHE (Cheddar-Milk & Whey)	2	1.46	3150	208	1
2021-22	Three stage cooling system for whey	10	0.47	0	3.55	40
2021-22	Ro Polisher water for heat & water recovery	15	0.21	0	1.64	110
2022-23	Hot water generator	2	0	71.69	4.15	6
2022-23	Evaporative Condenser	2	0.04	0	0.35	69
2022-23	Economizer for boiler	1	0	450	3.23	4
2023-24	Regenerative PHE (Mozzarella-Milk & Whey)	1	0.3	598	6.58	1.82
2023-24	Installation of Motion & Day Night Sensors	0.5	0.09	0	0.82	7.32

Falling Film Chiller



Energy efficient Smart shuttle Cold store



Rain Water Harvesting



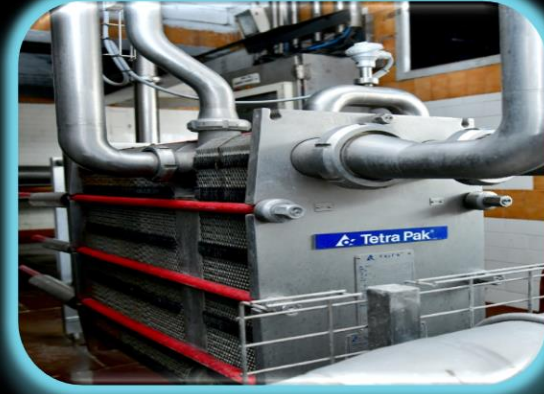
Boiler Economizer



Three stage cooling system for Whey



Regenerative Heat Exchanger



Hot Water Generator



Evaporative Condenser



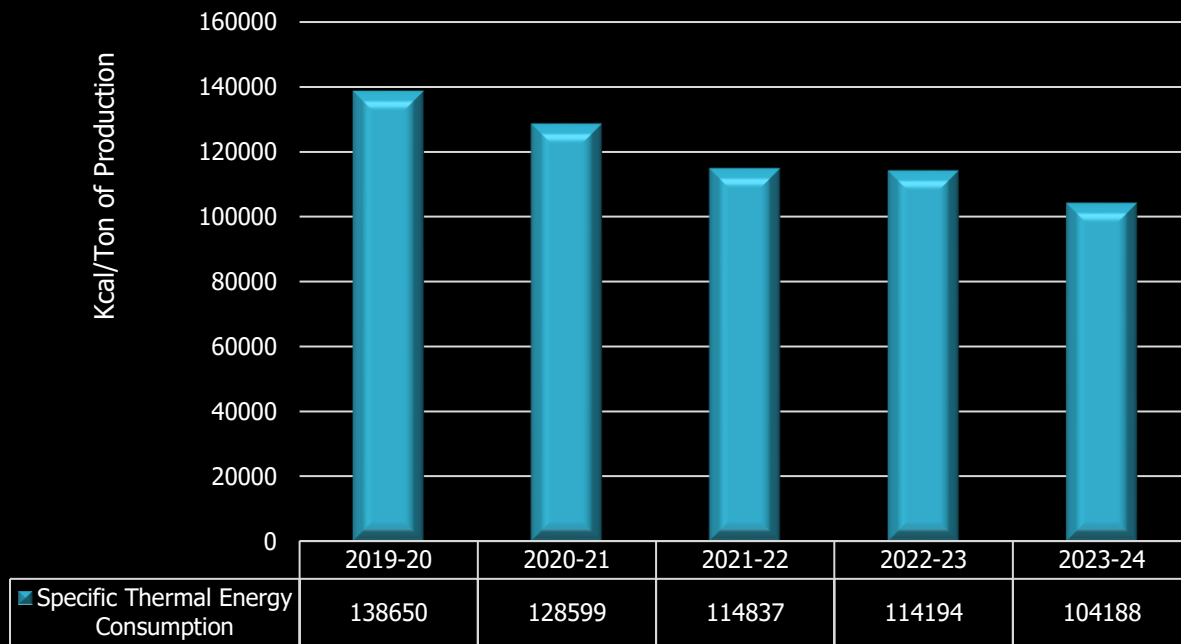
RO Polish Water



**Major Energy
Efficient
Equipment
Year 2021-
2024**

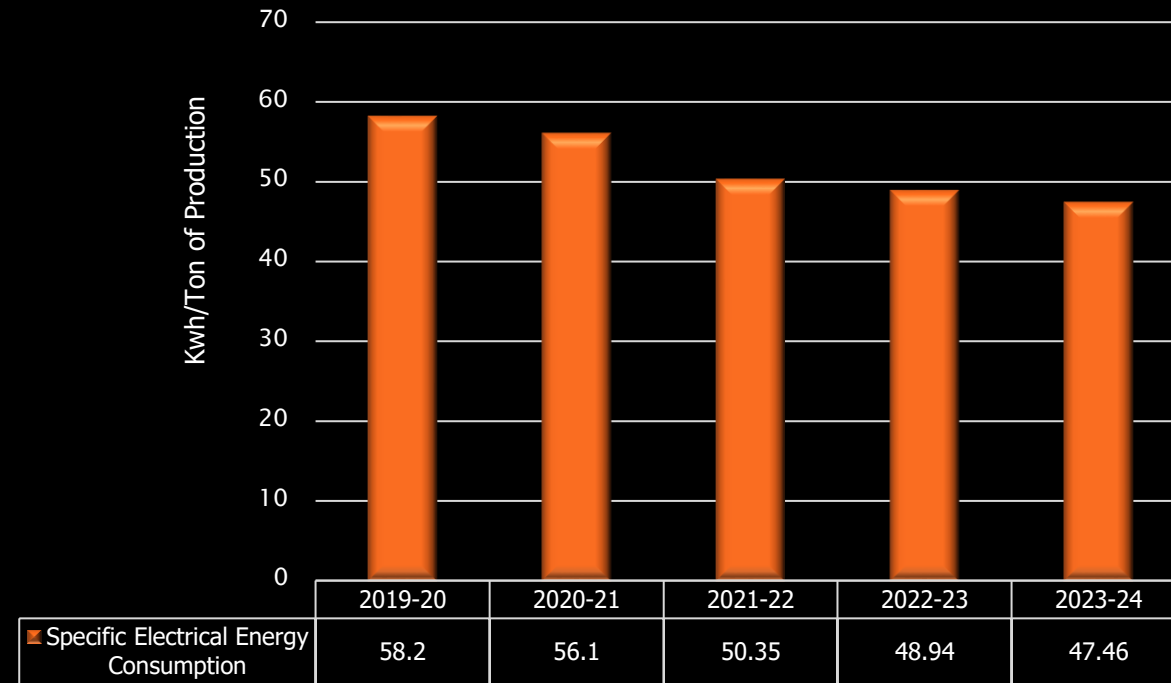
Benchmarking self Assessment last five years

Specific Thermal Energy Consumption (Kcal/Ton of Production)



Reduction in five years 24.88 %

Specific Electrical Energy Consumption (Kwh/Ton of Production)



Reduction in five years 18.45 %

Encon Projects Planned in FY 2024-25



Hot water recovery from 50 KI
Milk Process line
Investment:- Rs. 0.3 Million
Savings- 336 M k cal/Annum



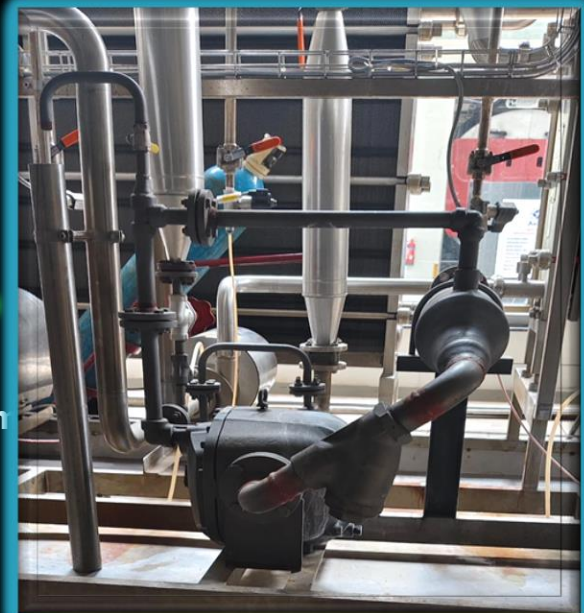
Installation of new soft water
pumps
Investment:- Rs. 0.4 Million
Savings- 0.0042 M kWh/Annum

Year
2024-25



modification work
Investment:- Rs. 1 Million
Savings- 0.0084 M kWh/Annum

Steam Condensate recovery
from UHT Section
Investment:- Rs 0.5 Million
Savings- 1120 M Kcal/Annum



Innovative Projects Implemented

Screw Press Sludge de-watering system in ETP Section

Trigger Point

Earlier Decanter sludge de water system was consuming,

- ❖ 20 % of electrical power of ETP.
- ❖ Higher Maintenance /Frequent break down.

Technical Details

- ❖ Installed Screw Press Sludge de–watering System
- ❖ Capacity :7000 Liters/hour
- ❖ Annual savings: Electrical Energy: 0.16 million Kwh
Rs. 15 million

Replication Potential

- ❖ This can be replicated in different industries having ETP.



Decanter



Screw Press

Innovative Projects Implemented

Automation of Vacuum Pump

Trigger Point

Continuous operation of vacuum pump in cheddar vacuum sealing machine

- ❖ Continuous Operation of Vacuum pump of 30 KW
- ❖ Higher Maintenance /Frequent break down.

Technical Details

- ❖ Modification in automation
- ❖ Annual savings: Electrical Energy: 0.055 million Kwh
Rs. 0.5 million

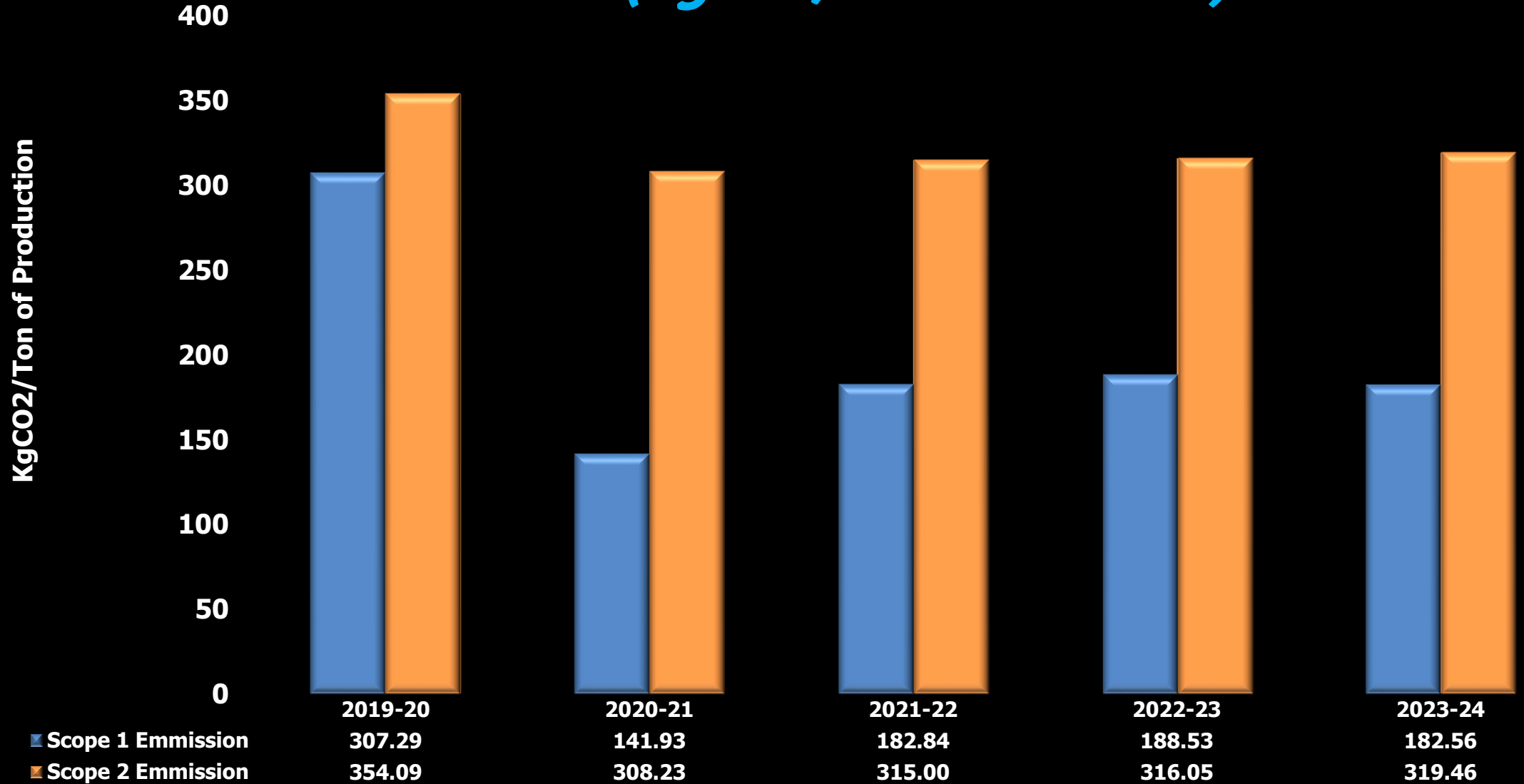
Replication Potential

- ❖ This can be replicated in dairy industries having Cheddar manufacturing .



Vacuum sealing Machine

GHG Emission (KgCO2/Ton of Product)



GHG Emission - Methodology

- **Dairy Plants GHG reporting/accounting** – *to reduce emissions under Scope 1 & 2 and also working on Scope 3.*

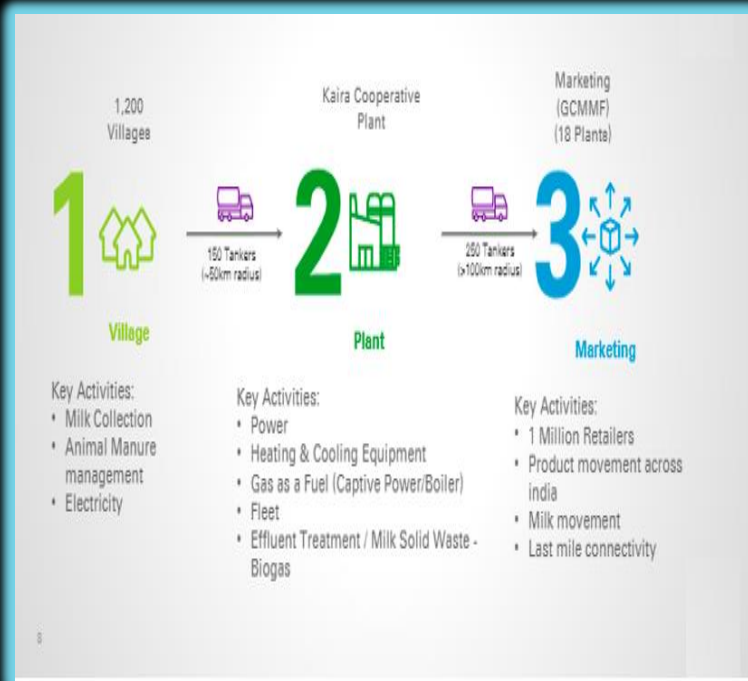
- *Utilization of water received from Milk During different process (0.6 Million Ltrs/Day)*

- **Solar installations** (Carbon project) – *working for way forward. Plant Level & Village level*

- **Organic fertilizer** (Carbon project) – *Solid waste from Animal Dung*

- *Biogas as Fuel (Cooking application)– Gaseous waste from Animal Dung, Canteen waste & Effluent treatment plant*

- *Transport Route Optimization*



Solar Powered Plants/Bulk Milk Coolers / Societies

137 Village Societies running on Solar

50 % Energy Savings

Order placed for rest all societies



Organic Fertilizer Production Facility



Amul Organic Fertilizer

50 kg 50 kg 1 kg

1 Ltr

Amul Organic Fertilizer

"किसानों का है संकल्प
अमूल ही एकमात्र विकल्प"

POWER
Phosphate Rich Organic Manure

Enriched with

- Amino Acid
- Humic Acid
- Micro Algae

Amul Organic Fertilizer

"किसानों का है संकल्प
अमूल ही एकमात्र विकल्प"

RICH PLUS NPK CONSORTIUM
रिच प्लस नपके पत्रुडी
करी कसवते के लिए वाक्यतः

Clean Energy Production at Dairy Farm

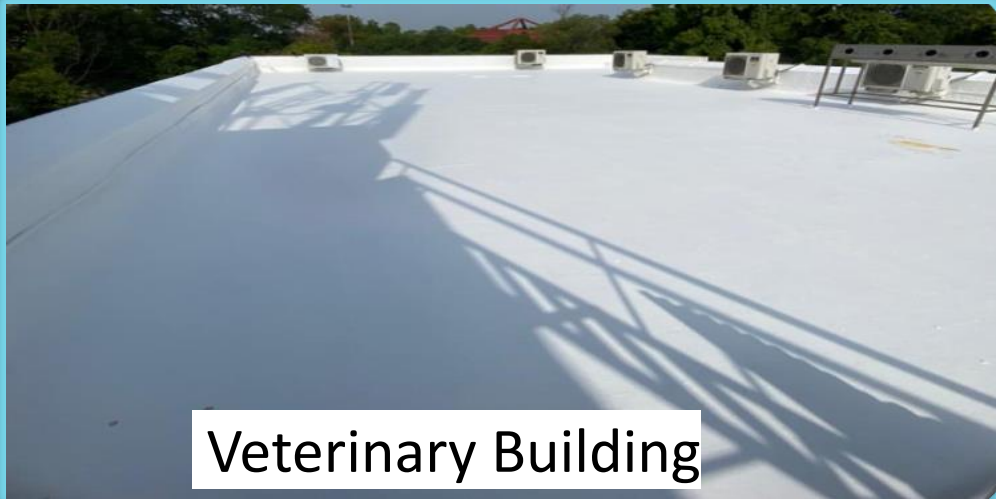
(BioGas for Small & Marginal Farmers)

- 600 Biogas plants of 2M3 installed and Functional
- > 2000 biogas plant under planning for execution
- Tie up with Energy Listed company firm for carbon credit trading and giving new income source



Refractive Roof Coating System

- Therma cool Flooring at Various Building & Cow Shed
- Reduce Air-conditioning power consumption



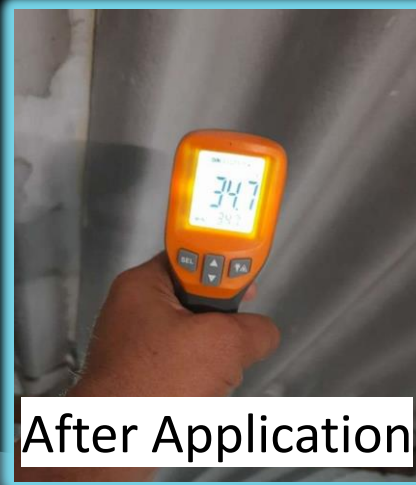
Veterinary Building



Before Application



Admin Building



After Application



Cow Shed

Digital Document Management System

- 100% Paper Less Office
- Fast movement of document
- Digitally signed documentation
- Easy to retrieve

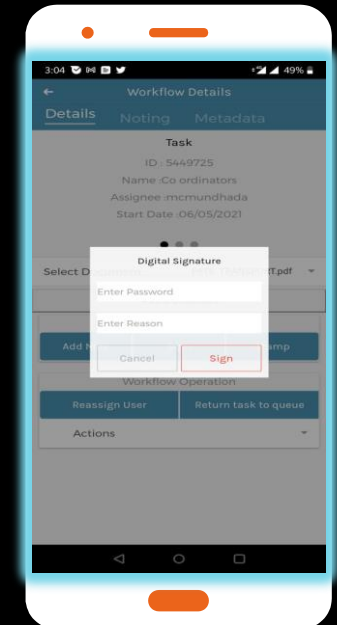
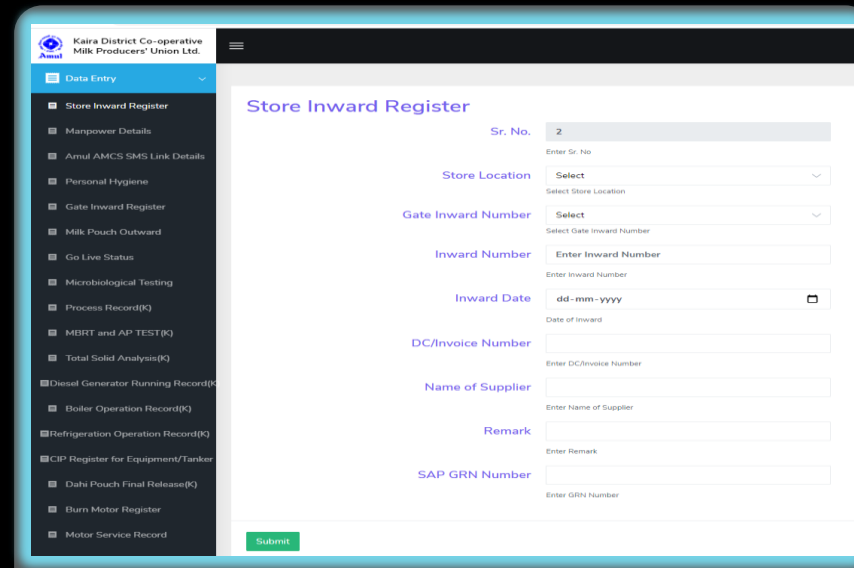
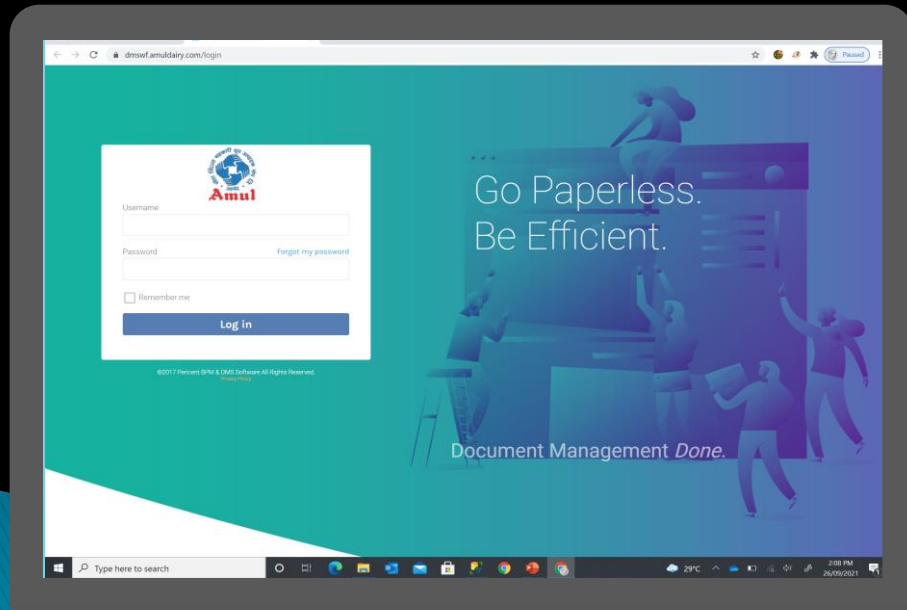
1 sheet of paper requires around 5 liters of water & 10,000 trees are needed to make 1 tonne of paper.



Paper
1,42,82,480 Sheets

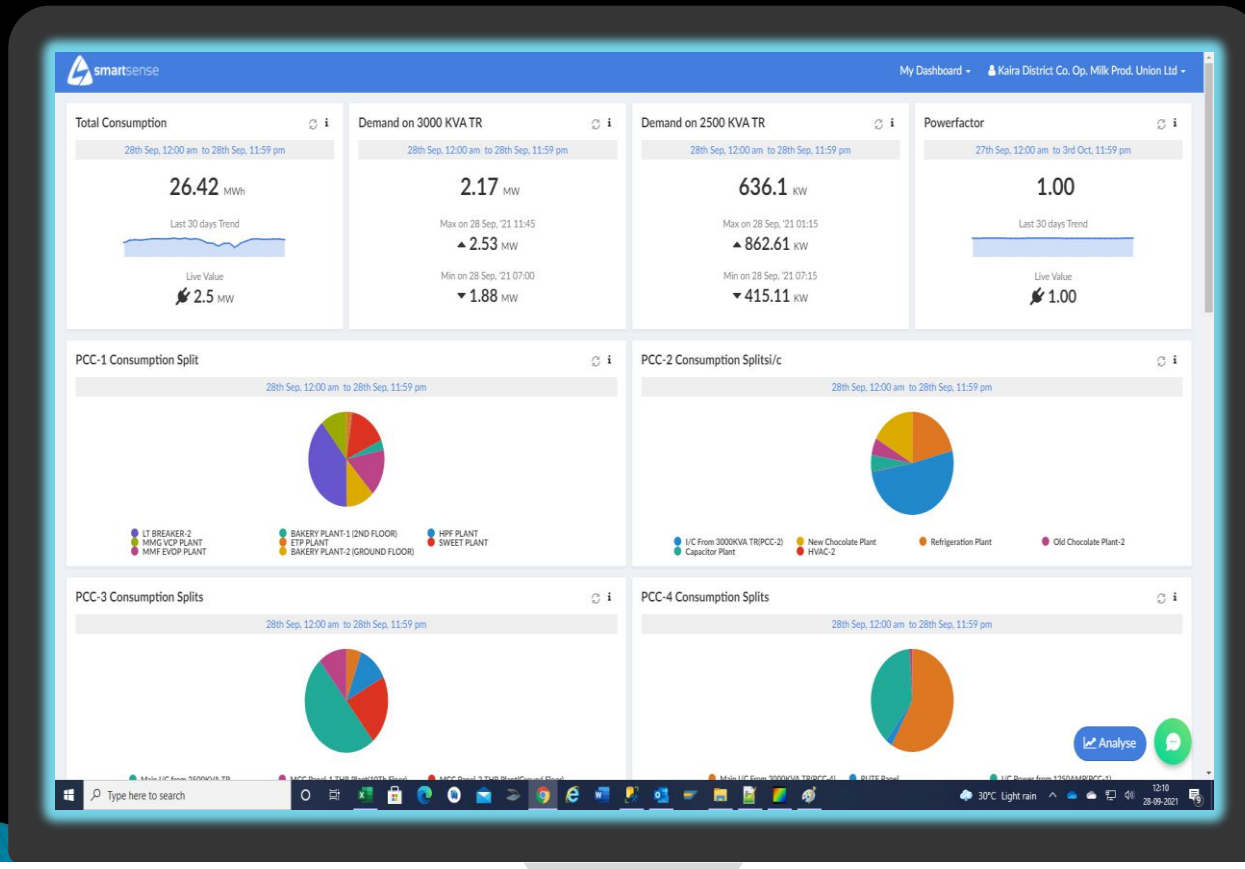
Water
7,14,12,400 Ltrs

Trees
6,68,628 Nos.



Online Power Monitoring System

- Monitoring & analysis of power data through portal.
- Critical alerts



STATUS	EVENT NAME	SENSOR NAME	SMS	EMAIL	ACTION
●	11 kv Tripped	11 KV MAIN HT INCOMER	7990312284 +2	projects@powertechindia.co.in +1	🔗 🗑️
●	Low Power Factor	11 KV MAIN HT INCOMER	7990312284 +2	projects@powertechindia.co.in +1	🔗 🗑️
●	MD ABOUT TO BREACH	11 KV MAIN HT INCOMER	7990312284 +1	projects@powertechindia.co.in +1	🔗 🗑️
●	CURRENT THD IS HIGH	ETP PLANT	7990312284 +1		🔗 🗑️
●	CURRENT THD IS HIGH	RUTF Plant	7990312284 +1	swetangpatel@amuldairy.com	🔗 🗑️
●	CURRENT THD IS HIGH	RUTF PLANT HVAC	7990312284 +1	swetangpatel@amuldairy.com	🔗 🗑️
●	High Current THD	OLD CHOCOLATE PLANT-1	7990312284 +1	swetangpatel@amuldairy.com	🔗 🗑️
●	CURRENT THD IS HIGH	NEW CHOCOLATE PLANT	7990312284 +2	swetangpatel@amuldairy.com +1	🔗 🗑️
●	CURRENT THD IS HIGH	2500 KVA TRANSFORMER HT SIDE	7990312284 +1	swetangpatel@amuldairy.com	🔗 🗑️

Waste Management at Amul

For Packaging Material Plastic Waste



Waste to Energy

Biogas Generation in ETP



- 1000 SCM/day Biogas is generated from ETP

Hot Water Generator



- Biogas used to heat boiler feed water up to 95 deg C
- Current saving is 5% of total fuel

Biogas plant of 15 M3



- Biogas Generation at Canteen resulting in annual thermal Saving of 16.43 M Kcal.

Teamwork/Employee involvement & Monitoring

Monthly Monitoring

Amul Specific Consumption (Milk + Whey)							
Sr. No	Description	Unit	July-24	July-23	Jun-24	% Diff July-24 Vs July-23	Co2 Emission MT
1	Electricity KWH/1000 liters	KWH/KL	55.50	53.20	63.20	4.32	-72
2	Fuel Consumption/1000 liters	KCal / KL	1,15,965	1,10,326	1,18,407	5.11	-21
3	Water Consumption /1000 liters	Ltrs / KL	1199	895	1343	33.94	-14
4	Power in Refri /1000 liters	KWH / KL	17.23	16.67	17.66	3.39	-18
5	(Milk +Whey)	Ltrs/Day	12,32,844	11,57,676	12,30,628	6.49	-93

• Total Saving in Co2 emission at KSD plant for the month of July 24 is - 93MT
 • Total Saving in Co2 emission at KSD plant till July.2024 is -2797 MT

Daily monitoring

AMUL KSD ETP ANALYSIS REPORT DATE- 13 08 2024												
SAMPLE	pH	B.O.D.	C.O.D.	T.S & MLSS	F.O.G.	T.D.S.	CHLORIDE	SETTLING	D.O.	V.F.A.	ALKALINITY	RATIO
INLET	5.88		6000	5570	4580	2000	540					
EQUALIZATION	6.98		3680									
UASB-1												
UASB-2	7.58		456							15.2	40	0.38
UASB-3	7.35		560							19.2	38	0.51
UASB-4	7.44		512							18.1	40	0.45
NEW AERATION	7.90			3540				560	1.1			
OLD AERATION	7.80			3600				930	0.8			
NEW CLARIFIER			88									
OLD CLARIFIER			84									
FINAL	7.99		86			2040	560					
MOZZARELLA	6.39		4280									
CHEDDAR	6.16		5960									
PANEER	6.75		4320									
WPP	5.72		6280									
CIP	6.62		4640									
CH PKG	6.91		3280									
SLUDGE				6.14%								
SCREW PRESS	SOLIDS	20	MOISTURE	80								

Weekly Monitoring Meeting

PARTICULAR	01.08.2024 TO 07.08.2024		25.07.2024 TO 31.07.2024		AUG.2024			AUG - 2023 SPECIFIC		
	Average	Specific	Average	Specific	Total	Average	Specific			
POWER	551800	78829	60.44	462377	66054	59.98	551800	78829	60.44	52.69
THERMAL (Gas)	126688	18098	117110	95410	13630	104465	126688	18098	117110	113919(AVG)
THERMAL (LOO)	0	0	0	0	0	0	0	0	0	0
BOREWELL WATER	11207000	1601000	1227	9505000	1357857	1233	11207000	1601000	1227	865
TOTAL WATER	14192000	2027429	1554	11355000	1622143	1473	14192000	2027429	1554	1435
ETP WASTE WATER	10653000	1521857	1167	10761000	1537286	1396	10653000	1521857	1167	923
MILK (KG) + Whey	9130260	1304323		7708390	1101199		9130260	1304323		1179721 (Avg)

Learning from CII Energy Award or Any other Award Program

- **Employees Motivation.**
- **Increased recognition of the organization.**
- **Learning from other fellow participating companies.**
- **Kaizen activities enhancing the involvement of workforce to get desired output.**
- **Sense of ownership among workforce.**
- **Kaizen - Improvements at workplace for ease of work.**
- **Learning about environmental aspects and devices for energy savings.**

Progressive Roadmap of Amul

2030-31



Water surplus Organization
100 % Electricity from Renewable Energy

2024-25



Utilization of treated effluent water
1250 kw solar panel installation
All DCS (1269 Nos) will be solar operated

2023-24



1105 KWH Solar panel installed with investment of Rs 31.65 Million
Utilization of RO reject water
Sludge reactor for Biogas generation
Motion Sensors installation

Award & Achievement



CII National Award for Excellence in Energy Management 2022



CII National Award for Excellence in Energy Management 2023



Gujarat State Shram Bhushan Award 2023



IDA Best Dairy Plant Runner up Award 2024

Aug 17, 2024, 12:37

LATEST



IDA Best Dairy Plant Runner up Award 2024

Amul

Thank you all

