



Kheda Satellite Dairy, Khatraj
A Unit of Kaira District Cooperative Milk Producers' Union Ltd., Anand

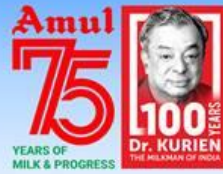
**23rd National Award
for
Excellence in Energy Management 2022**

Team Members:

Mr. Amit Vyas – Managing Director
Mr. Dalveer Singh- Factory Manager (KSD)
Mr. Aditya Laharaya - Manager (Maintenance)



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



- ❖ KDCMPUL is having 47 Units across 13 states.
- ❖ Milk Handling Capacity : 5.2 Million liters per day.
- ❖ Milk Procurement : 1500 Millions Kg (F.Y. 2021-22).
- ❖ Sales Turnover : **Rs. 102,290 Millions** (F.Y. 2021-22).



Kheda Satellite Dairy, Khatraj

- ❖ Milk Handling Capacity : 0.75 Million liters per day.
- ❖ KSD Sales Turnover : **Rs. 9,511 Millions.** (F.Y. 2021-22).
- ❖ Products : Cheddar Cheese, Processed Cheese, Mozzarella, Paneer, Skimmed Milk Powder & Whey Powder.





Energy Efficient Products Manufacturing Plant



Milk Processing : 750 KLPD



Cheddar Manufacturing: 53 MTPD



Continuous Cheese Cooker : 150 MTPD



Mozzarella Plant: 10 MTPD



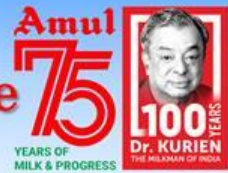
Whey Processing Plant: 1000 KLPD



Paneer Plant: 20 MTPD



Automatic & Energy Efficient Storages for Cheese



Mobile Racking System:
Capacity: 6000 MT



ASRS (Robotic Technology):
Capacity: 370 MT



EESS (Energy Efficient Smart Shuttle System):
Capacity: 2500MT
Dense Storage- less space more storage
less refrigeration consumption with precise
temperature control



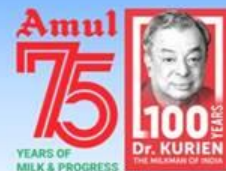
Cooling Fan (HVLS)



Shuttle



Production - FY 2019-20 to 2021-22



25000

20000

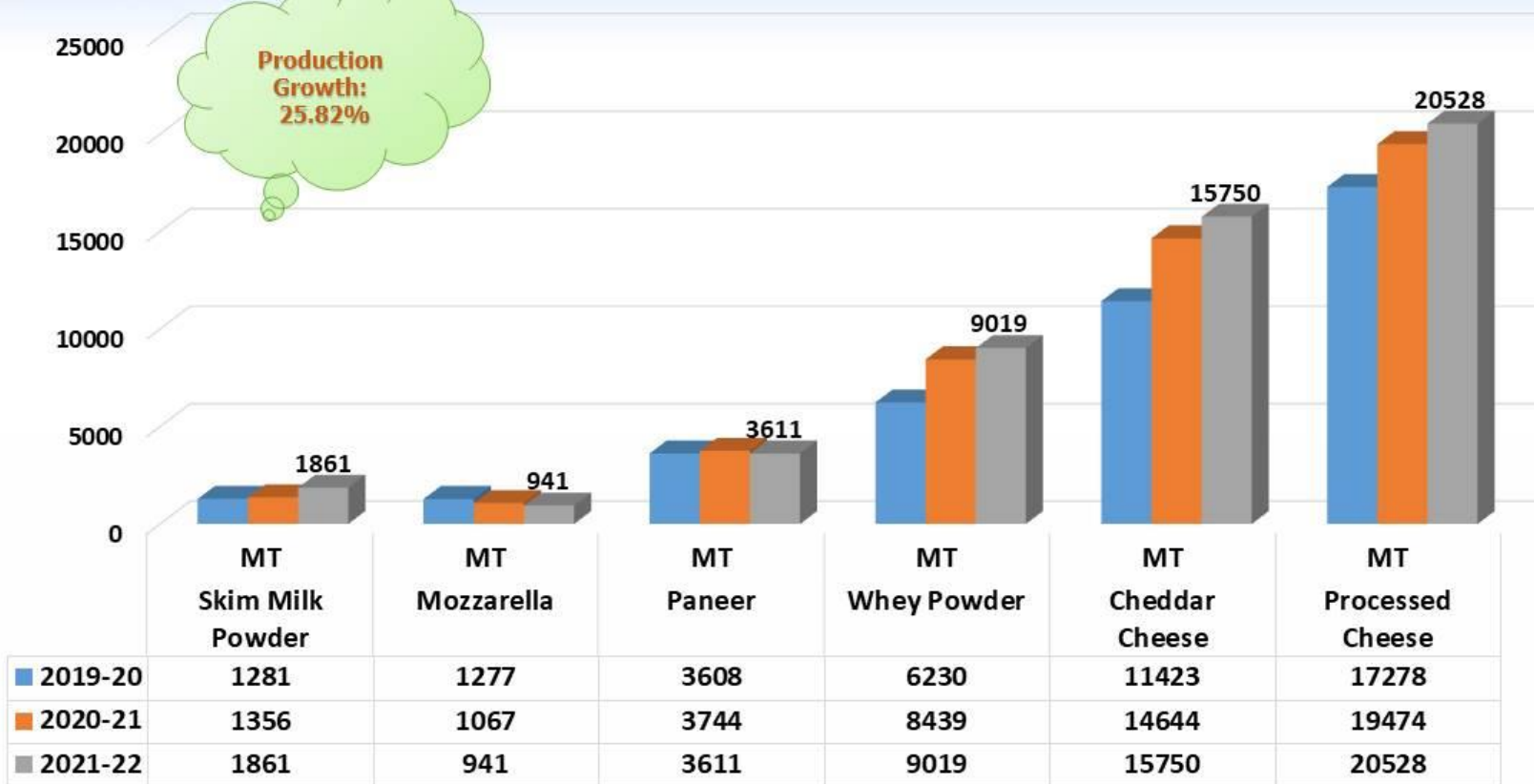
15000

10000

5000

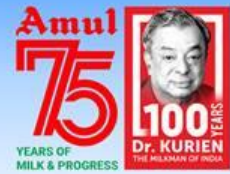
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Production
Growth:
25.82%





Energy Consumption Pattern

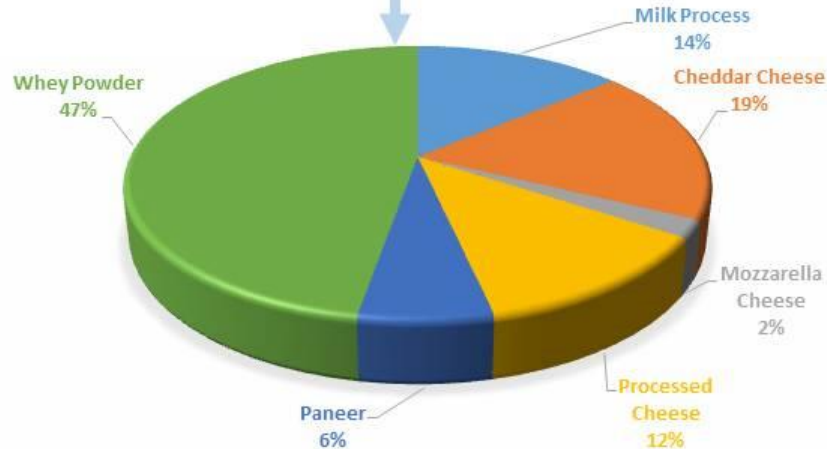


THERMAL ENERGY (NATURAL GAS/ LDO)

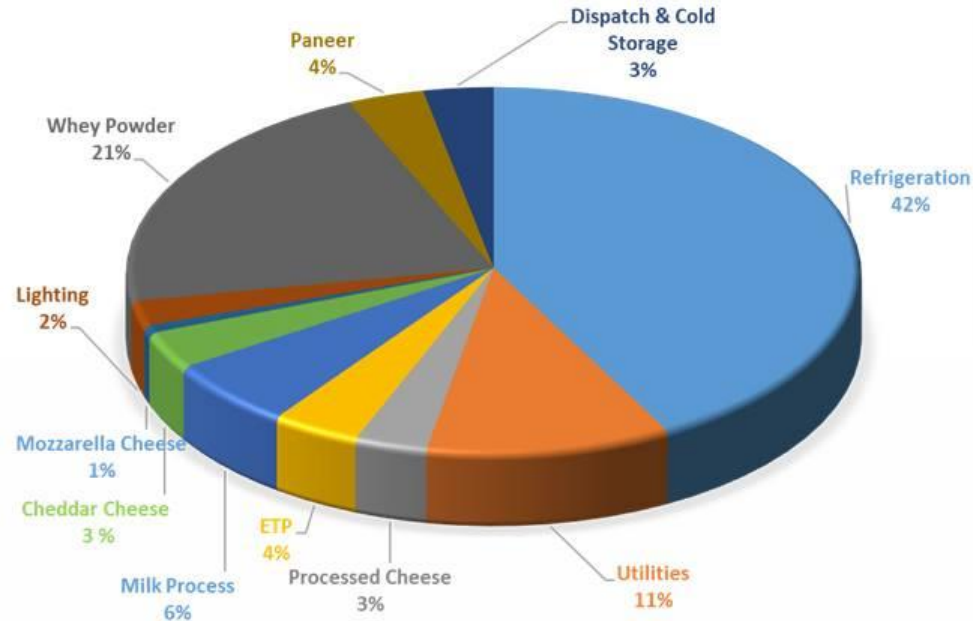
Whey Powder
(Natural Gas
Cons)
[PERCENTAGE]

Boiler
Consumption
[PERCENTAGE]

STEAM CONSUMPTION SECTION WISE



ELECTRICAL ENERGY

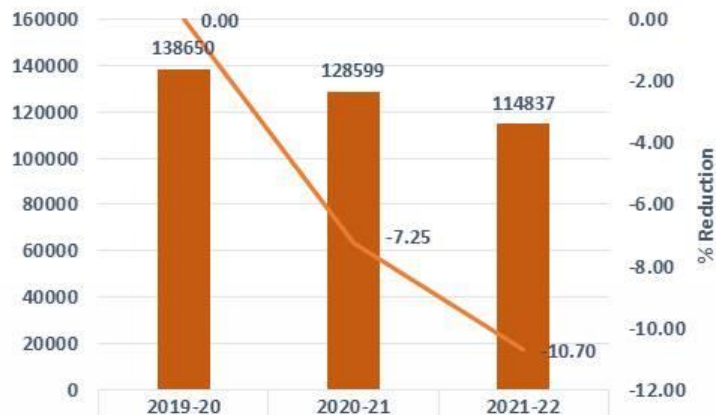




Specific Thermal / Electrical Energy Consumption (FY 2019-20 to 2021-22)

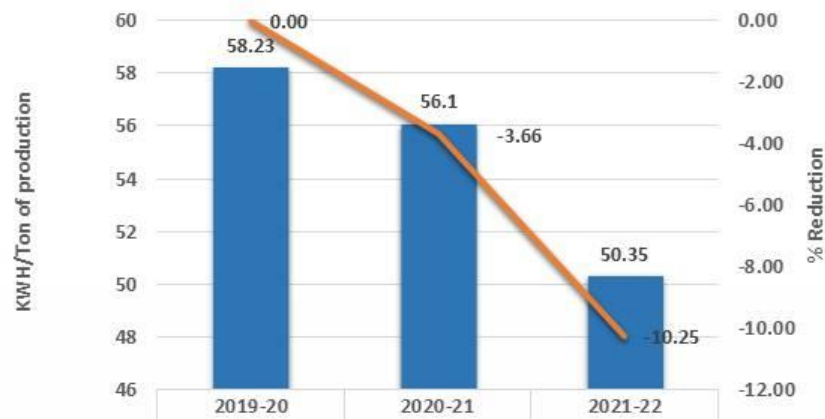


Specific Thermal Energy Consumption
(Kcal/Ton of Production)



Specific thermal energy consumption	138650	128599	114837
Reduction	0.00	-7.25	-10.70

Specific Electrical Energy Consumption
(Kwh/Ton of Production)



Specific electrical energy consumption	58.23	56.1	50.35
Reduction	0.00	-3.66	-10.25



Energy Saving Projects Implemented in last 3 years (FY 2019-20 to 2021-22)

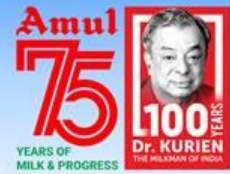


Year	No of Energy Saving Projects	Investment s (in Millions)	Electrical Savings (Million kWh)	Thermal Savings (Million Kcal)	Savings (INR Millions)	Payback Period	Impact on SEC in % (Electrical / Thermal)
FY 2019-20	3	3.1	0.86	313.1	7.79	5 Months	4.91 / 0.75
FY 2020-21	2	14	3.22	286	38.54	4 Months	17.57 / 0.68
FY 2021-22	4	28	0.79	840	41.2	8 Months	3.96 / 1.84





Encon Projects Planned in FY 2022-23



Condensate recovery
Investment:- Rs. 1.0 Million
Savings- 87.50 M Kcal/Annum



Evaporative Condenser
Investment:- Rs 2.0 Million
Savings- 0.004 M kWh/Annum



Biogas generation at Canteen
Investment:- Rs. 0.5 Million
Savings- 16.43 M Kcal/Annum



Economizer for Boiler
Investment:- Rs. 1.0 Million
Savings- 450 M Kcal/Annum

Hot water generator
Investment:- Rs. 2.0 Million
Savings- 2190 M Kcal/Annum



Regenerative PHE(Mozz)
Investment:- Rs1 Million
Savings- 598 M
Kcal/Annum & 0.3 M
kWh/Annum

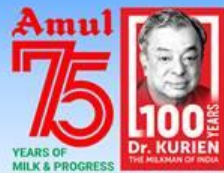


Replacement of RO with Soft water
Investment:- Rs 0.2 Million
Savings- 0.032 M kWh/Annum





Innovative Projects Implemented



Regenerative Heat Exchanger in Cheddar Cheese Section

Trigger Point

Earlier cheese whey chilling & milk heating was consuming,

- ❖ 30 % of electrical power of refrigeration.
- ❖ 15 % of thermal energy of total plant.

Technical Details

- ❖ Installed 20KLPH regenerative type heat exchanger
- ❖ Milk processing of 4,50,000 Ltr/day
- ❖ Whey processing of 4,00,000 Ltr/day
- ❖ Annual savings: Thermal Energy: 286 million Kcal
Electrical Energy: 0.86 million Kwh
Rs. 20.82 million

Replication Potential

- ❖ This can be replicated in similar kind of industry



Regenerative Heat Exchanger



Innovative Projects Implemented



Heat Recovery from RO Polished water

Trigger Point

- ❖ Chilled RO polished water was drained out which was having 10% of electrical power of refrigeration

Technical Details

- ❖ The generation of RO polished water is 0.3 million lit/day at 15 °C.
- ❖ RO polished water is being used for chilling of whey from Paneer & Mozzarella plant.
- ❖ Used in Evaporative condensers / Cooling Towers

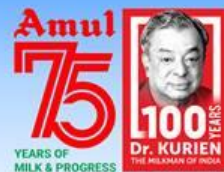
Replication Potential

- ❖ This can be replicated in similar kind of industry





Innovative Projects Implemented



Hot Water Generator (5 Lac Kcal/Hr.)

Trigger Point

- ❖ Biogas generated 1000 SCM/day from ETP is being flared.
- ❖ Sudden rise in fuel prices.
- ❖ Government restricted for use of Furnace Oil.

Technical Details

- ❖ Biogas generated 1000 SCM/day from ETP is being flared which will be increased up to 2000 SCM/day after ETP plant expansion.
- ❖ Biogas will be used to heat boiler feed water from 60 °C to 95 °C.
- ❖ Saving of 5 % of total fuel consumption.

Replication Potential

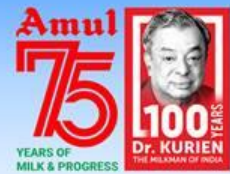
- ❖ It can replicate in other industries.



Hot Water Generator



Minor Improvements Implemented



Conventional



Insulation



Pump



Steam trap



Starter



Agitator



CIP Nozzle



Wash Point



Light

Energy Efficient



Correct Insulation



Energy efficient pump



APT Steam trap



Soft Starter/VFD



Energy efficient Agitator



Turbine type CIP Nozzle



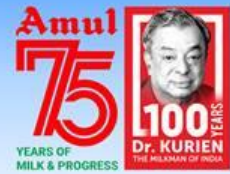
High Pressure Wash Point



LED Light



Waste Heat Utilization



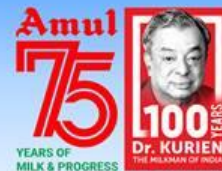
Sr. No.	Year	Types of Waste	Qty. (Ltr/day)	GCV (Gross Calorific Value)	Waste as % of Total Fuel
1	2019-20	1 st stage condensate from Whey Powder plant	1,05,000	40 Kcal/Ltr	3.50
2	2020-21	RO polished water from Nano filtration of Whey Powder plant	3,00,000	15 Kcal/Ltr	9.98
3	2020-21	2 nd Stage condensate (Cow Water) from Whey Powder plant	1,00,000	30 Kcal/Ltr	2.50

*Ground water temperature is considered 30 °C.

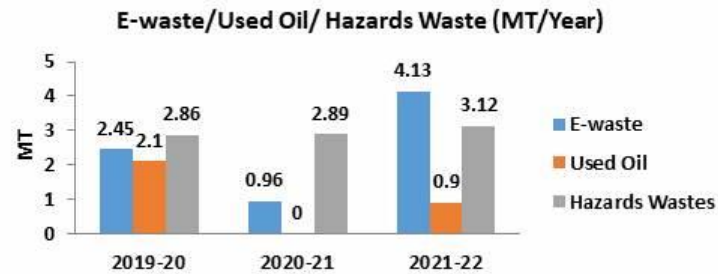
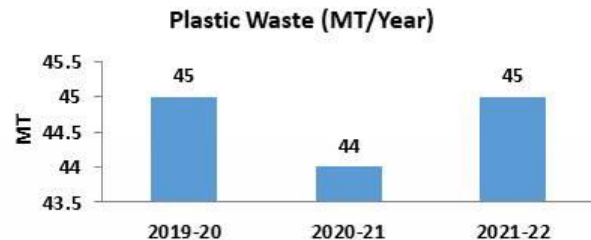
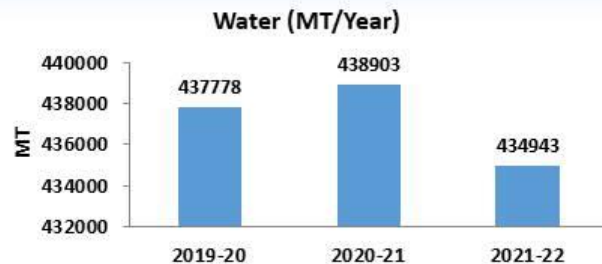




Waste Utilization and Management

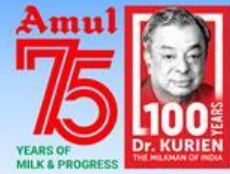


S. No.	Year	Types Of Waste Generated	Qty of Waste Generated (MT/Year)	Disposal Method
1	2019-20	Wastewater	437778.00	Gardening/cleaning
2	2019-20	Plastic Waste	45.00	GPCB approved vendor
3	2019-20	E-waste	2.45	GPCB approved vendor
4	2019-20	Used oil	2.10	GPCB approved vendor
5	2019-20	Hazards Wastes	2.86	GPCB approved vendor
6	2020-21	Wastewater	438903.00	Gardening/cleaning
7	2020-21	Plastic Waste	44.00	GPCB approved vendor
8	2020-21	E-waste	0.96	GPCB approved vendor
9	2020-21	Used oil	0.00	GPCB approved vendor
10	2020-21	Hazards Wastes	2.89	GPCB approved vendor
11	2021-22	Wastewater	434943.00	Gardening / cleaning
12	2021-22	Plastic Waste	45.00	GPCB approved vendor
13	2021-22	E-waste	4.13	GPCB approved vendor
14	2021-22	Used oil	0.90	GPCB approved vendor
15	2021-22	Hazards Wastes	3.12	GPCB approved vendor





Waste Management



- ❖ Baling Machine to reduce transportation/CO₂ footprints (transfer 3 trucks load in 1 truck load).



Before Pressing



Baling Machine



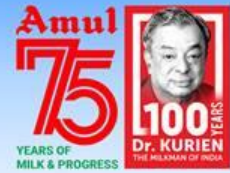
After Pressing



Bundling of Waste



GHG (Green House Gas) Inventorisation



Short Term Goal:

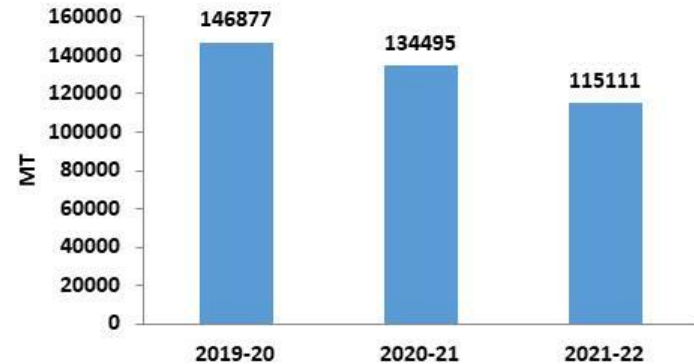
1000 MT of CO₂ reduction in each year.

Long Term Goal:

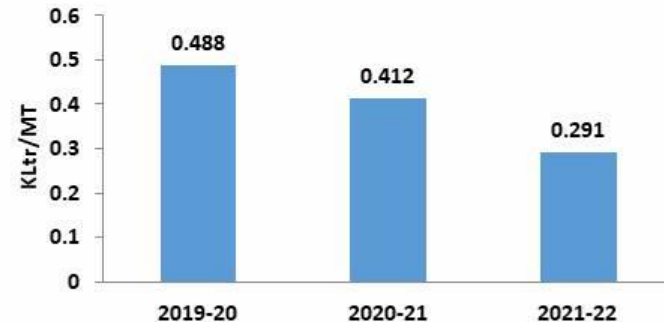
5000 MT of CO₂ reduction in next four years on absolute fuel consumption by more use of renewable energy.

Use of biogas generated from ETP as fuel to replace natural gas, which have less CO₂ generation per unit. The potential saving in CO₂ footprint will be 1.150 MT per day.

Total Absolute Emission (MT)

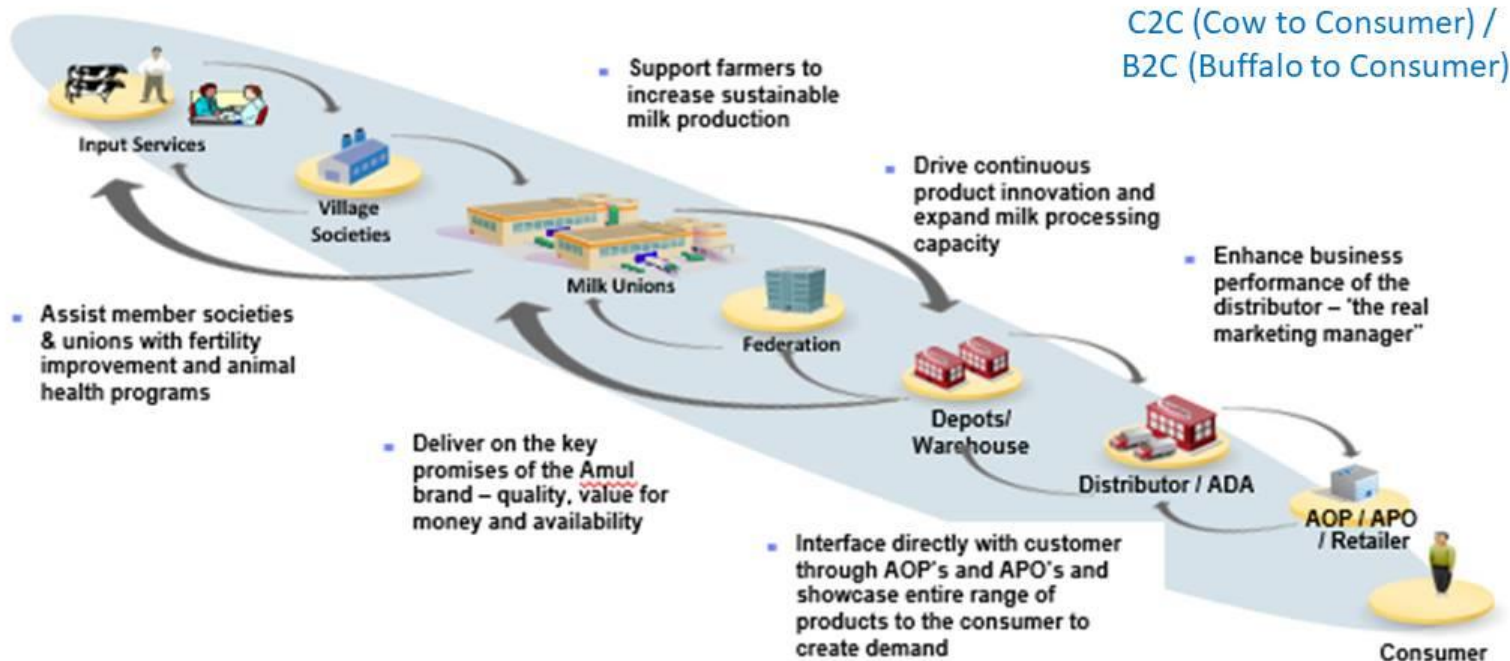
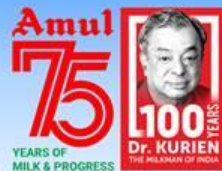


Emission intensity (MT/KL of Milk & Whey)



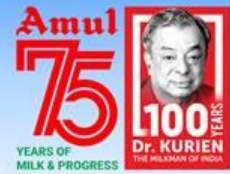


Green Supply Chain





Green Energy at Village Level



Slurry tank



Biogas Balloon



Utilization in Cooking



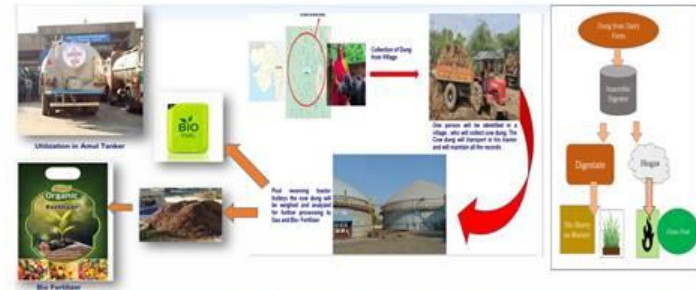
Biogas Balloon Trolley



Electric Bike for Milk Collection



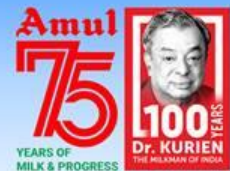
Rain Gun for irrigation



Bio Fuel and Bio Fertilizer



Sustainability



Solar Hot Water generator installed at 60 DCS (District Cooperative Societies) for CIP (replaced electric heaters with solar system).

- Installed **Solar BMC (without Battery)** at Village Society.
- Daily electrical energy savings 10 KWH/Day



Solar Hot Water generator



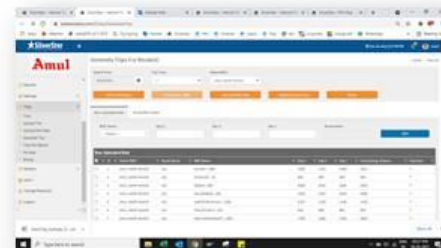
Solar BMC (without Battery)



Route Optimization



- Route allocation on rotational basis through Tracking system.
- Tanker allocation on Route milk capacity
- Tanker capacity utilization > 95%.
- Reduction in tanker Kms by **1,12,000 km** in year 2021-22



Reduction in CO2 Emission reduced **89.60 MT/Annum**



Teamwork / Employee Involvement & Monitoring



Daily monitoring of energy consumption through Whatsapp, SMS, Kaizala and Email

More than 150 energy meters installed for measuring system




Power Consumption, Utilities, Production & OEE Data			
Date: 08-08-2022			
Power	64200.0	Total Production	174.05
md	3014.4	Raw Milk	5,39,900
Avg. PF	1.0	Skim Milk	0
Daily P.F	1.0	Whey	7,45,000
Refrigeration	23195.0	Total	12,84,900
Whey Powder	14462.0	Machine OEE	
Service	7375.0		
Paneer	5324.0		
New. Ref	3287.0	Sapal	81
Milk Process	3599.0	Corozza Chiplet	79.31
Cheese Pkg	2071.0	Old Corozza	86.25
Lighting	1357.0	New Corozza	84.72
ESS	2030.0	GBM	84.47
Cheddar	1704.0	Ishida 1 Kg	0
ETP	1954.0	Ishida 100 Gm	0
ETP inlet	1082000	Ishida 200 Gm	93.23
Borewell Water	1014000	Ishida 500 Gm	0
Gas	18512	Bactofuge	99.4
Sp power-milk+whay	80.0	Nano	100
Sp Refri	18.1	Whey Pasteurizer	99.91
Oil	0.0	Powder Dryer	72.29
New PCC Incomer 2	28900	Evaporator	95.7
Incomer-1	14232		

AMUL KSD ETP ANALYSIS REPORT DATE:- 08 08 2022											
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
INLET	7.94	8040	8633	4980	1140	1033					
EQUALIZATION	7.90	3480									
UASB-1	7.41	480							18.2	40	0.42
UASB-2	7.43	488							18.1	41	0.39
UASB-3	7.38	579							18.2	39	0.42
NEW AERATION	7.72			4480				970	1.8		
OLD AERATION	7.69			4440				980	1.8		
NEW CLARIFIER		80									
OLD CLARIFIER		81									
FINAL	7.80	84			2210	790					
CHEDDAR	8.48	1180									
PANIEER	7.51	4220									
WPP	8.18	5840									
CIP	8.80	4600									
CH PKG	8.13	4280									
SLUDGE				6.22%							
SCREW PRESS	8.01	21	WIPURE	79							

Weekly Monitoring Meeting

Amul Engineering											
PARTICULAR	CURRENT WEEK			LAST WEEK			July - 2022			July - 2021 SPECIFIC	
	25 to 31			18 to 24			Till Date				
	Total	Average	Specific	Total	Average	Specific	Total	Average	Specific		
POWER	395920	56560	48.01	428920	61274	47.30	1858920	59965	47.91	53.73	
THERMAL (Gas)	98097	14014	98251	121403	17343	111121	462048	14905	101083	105560	
THERMAL (LDO)	0	0.00		0	0.00		17800	574			
RAW WATER	6400000	927571	787	6157000	879571	629	29615000	9871667	763	1300	
ETP WASTE WATER	8753000	1250429	1061	9181000	1311571	1012	38133000	1230097	983	1259	
MILK (KG) + Whey	8247000	1178143		9068030	1295433		38797628	1251536		101432(Avg.)	
INLET COD TO ETP (PPM)	44040	6291		42720	6183		190600	6148		6957(Avg.)	
WTS LOSS	40.01	5.72		3.94	0.56		17.53	0.57		0.63(Avg.)	

Monthly Monitoring

Specific Consumption (Milk + Whey)

Sr. No	Description	Unit	June-22	June-21	May-22	% Diff June-22 Vs June-21	Co2 Emission Reduction in MT
1	Electricity KWH/1000 liters	KWH/KL	44.71	55.86	44.74	-19.67	344
2	Fuel Consumption/1000 liters	KCal / KL	98.382	1,09,441	90,493	-10.10	166
3	Water Consumption /1000 liters	Ltrs / KL	815	1,180	835	-30.93	16
4	Power in Refri /1000 liters	KWH / KL	16.46	19.95	16.33	-17.49	144
5	(Milk + Whey)	Ltrs/Day	1293,669	9,62,685	12,55,388	34.38	510

- Total Saving in Co2 emission at KSD plant for the month of June 22 is 510 MT
- Total Saving in Co2 emission at KSD plant till June.2022 is 3200 MT



Ammeter



Voltmeter



Milk Mass Flow Meter



Water Flow Meter



Multifunction meter



Power Factor Meter



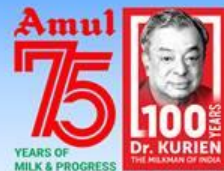
Gas Flow Meter



Steam Flow Meter



Energy Conservation Through Kaizen

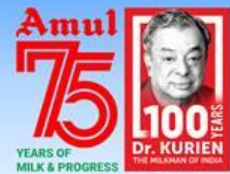


- ❖ Kaizen drive is continued.
- ❖ Kaizen rewards awarded to each participant
- ❖ Best kaizen monthly reviewed by team
- ❖ Energy savings through Kaizen activities -
 1. Evaporative Condenser
 2. RO Polisher
 3. Screw press
 4. Treatment of second stage condensate
 5. Economizer of steam boiler
 6. Falling film evaporator
 7. Replacement of old motors with energy efficient motors
 8. Installation of LED with motion sensors and so on
- ❖ Periodic training organized by industrial experts

 Kaizen Summary of KSD, Khatraj - April 2022 to June 2022										
Sr. No.	Department	Apr-22			May-22			Jun-22		
		Empl	Kaizen	Avg.	Empl	Kaizen	Avg.	Empl	Kaizen	Avg.
1	Plant Admn & FMO	11	19	1.73	11	23	2.09	11	32	2.91
2	Cheddar Cheese	19	66	3.47	17	34	2.00	17	40	2.35
3	QA (KSD)	24	113	4.71	24	65	2.71	24	131	5.46
4	Cheese Pkg.	62	171	2.76	60	185	3.08	63	143	2.27
5	Paneer Plant	27	90	3.33	27	85	3.15	27	105	3.89
6	WPP	31	118	3.81	32	152	4.75	32	139	4.34
7	Utilities	22	54	2.45	23	50	2.17	23	96	4.17
8	Engineering	30	145	4.83	30	79	2.63	32	203	6.34
9	Dispatch & Stores	17	98	5.76	17	61	3.59	16	80	5.00
11	Mozzarella	14	22	1.57	14	38	2.71	14	69	4.93
12	VCU	7	17	2.43	6	0	0.00	8	14	1.75
13	Milk Process	17	32	1.88	17	33	1.94	17	64	3.76
Total		281	945	3.36	278	805	2.90	284	1116	3.93

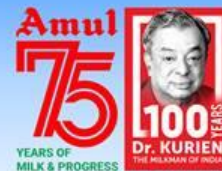


Teamwork / Employee Involvement





Implementation Of ISO 50001



- We have applied for ISO : 50001:2018 Certification through our apex organization M/s GCMMF Ltd, Anand and allied implementation process is going on for training, Documentation, Audit & implementation.
- Investment of energy saving projects on total turnover of the company for FY21-22 is 0.3 %.
Turnover : Rs. 9511 millions.
Investment : Rs. 28.4 millions.



ISO 14001 : ENVIRONMENT MANAGEMENT SYSTEM CERTIFICATE



FSSC 22000 : FOOD SAFETY SYSTEM CERTIFICATION CERTIFICATE



ISO 45001:2018 : OCCUPATION HEALTH AND SAFETY MANAGEMENT SYSTEM



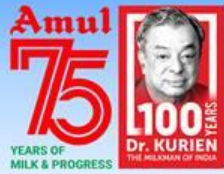
EXPORT INSPECTION COUNCIL CERTIFICATE OF APPROVAL



HALAL CERTIFICATE



Learning from CII Energy Award or Any other Award Program

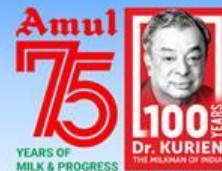


- Employees Motivation.
- Learning from other fellow participating companies.
- Kaizen - Improvements at workplace for ease of work.
- Kaizen activities enhancing the involvement of workforce to get desired output.
- Sense of ownership among workforce.
- Increased recognition of the organization.
- Learning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



Amul

Road Map Ahead



2024-25

- Installation of Solar thermal plant
- Utilization of treated effluent water
- 250 kw solar panel installation
- Use of 30% E-Vehicle for milk transport

2023-24

- 250 kw solar panel installation
- Utilization of RO reject water
- Sludge reactor for Biogas generation

2022-23

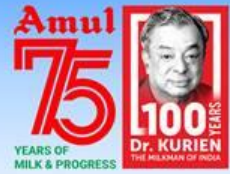
- Hot Water Generator
- Biogas generation form Kitchen Waste
- Additional 8 Nos of Rain Water Harvesting
- Economizer for Boiler

2030-31

- Water surplus Organization
- 30 % Electricity from Renewable Energy



Sustainability



- Total 79 Rainwater Harvesting systems are installed across 8 locations.



Sustainability



Amul

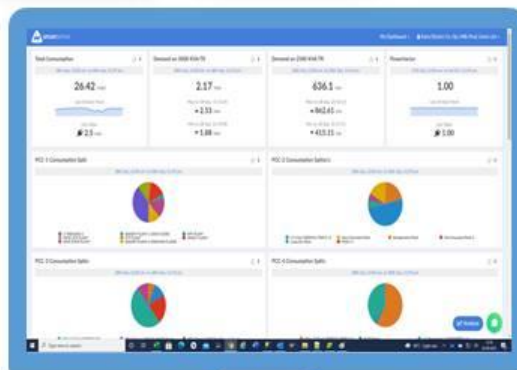


- Started tree plantation in the year 2007 on 15th Aug.
- Last year on 15th August total No. of Sapling planted - 792358 with a present survival rate 66.76%





- ✓ Amul Vehicle Tracking System
- ✓ Paperless Documentation through online Log-sheets (digiREPORTS)
- ✓ Online Power Monitoring System
 - Monitoring & analysis of power data through portal.
 - Critical alerts
- ✓ Online Plant Monitoring System
 - We can monitor plant data like Tank wise Inventory, Age of Milk, CIP Status, OEE, Packing Data, Utility consumption through portal.
 - Shift Report Alert on email.





- Drilled down feature that will show information form Region level summary to farmer level.

<https://dashboard.amuldairy.com/>

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Thank you all