

Presentation on

Energy Efficiency Opportunities in

Indian Dairy Industry

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Umang Dairies Ltd. - One of the Leading Companies of JK Organisation

Cement



Paper



Tyre



Agri Genetics



J.K. ORGANISATION

USD 4 Billion

23 manufacturing plants

Present in 100 countries

More than 30,000 employees

V-Belts- Oil Seals & Power Transmission Systems



Dairy Products



Clinical Research



Education



Hospital & Health services



Defence Electronics



UMANG DAIRIES LIMITED



Plant with State of the Art Technology & Minimal Environmental impact



Capacity : 4.5 Lakh Liter / Day



Drying Plant

Capacity : 7 Lakh Liter / Day

**Liquid Milk Plant /
Culture Products Plant**



Umang Dairies Ltd. - Certifications

❖ HACCP

❖ FSSC 22000:2011

❖ ISO 14001:2004

❖ ISO 9001:2008

❖ OHSAS 18001:2007



Umang Dairies Ltd. - Brands

Own Brands



Pvt Labels



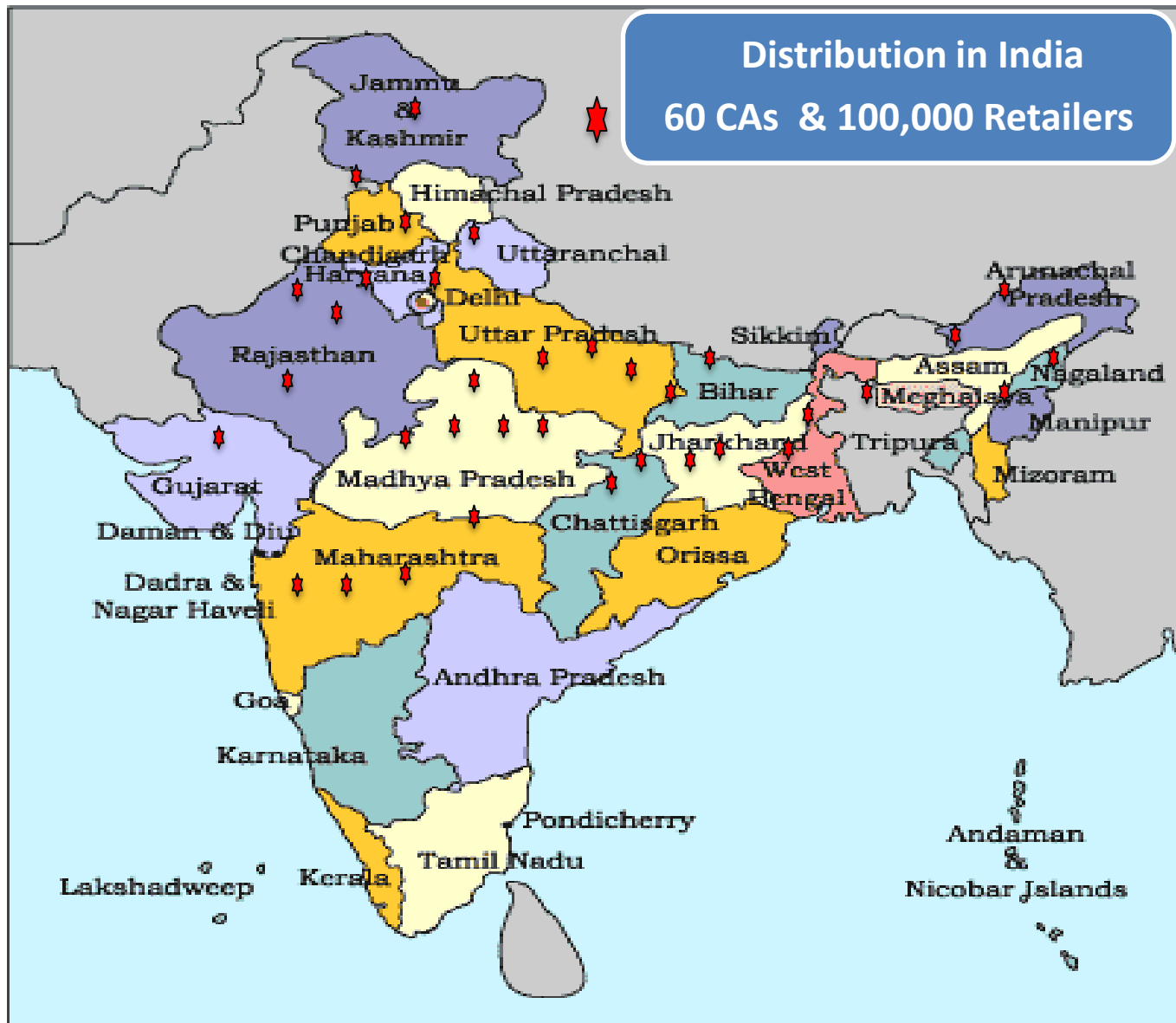
Job Work – Mother Dairy



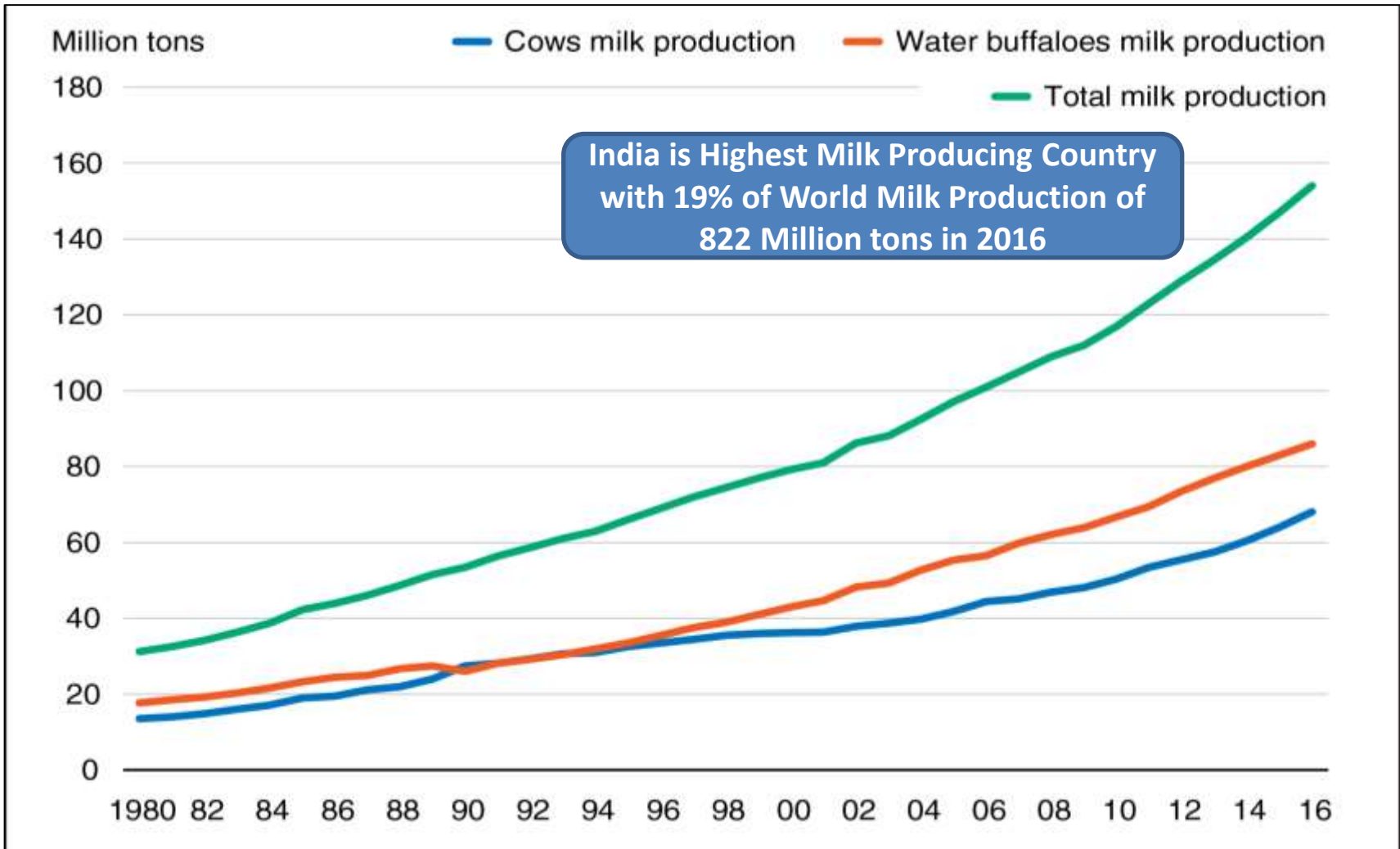
Umang Dairies Ltd. – Proud to be Associated with...



Umang Dairies Ltd. – Distribution Network



Milk Production in India

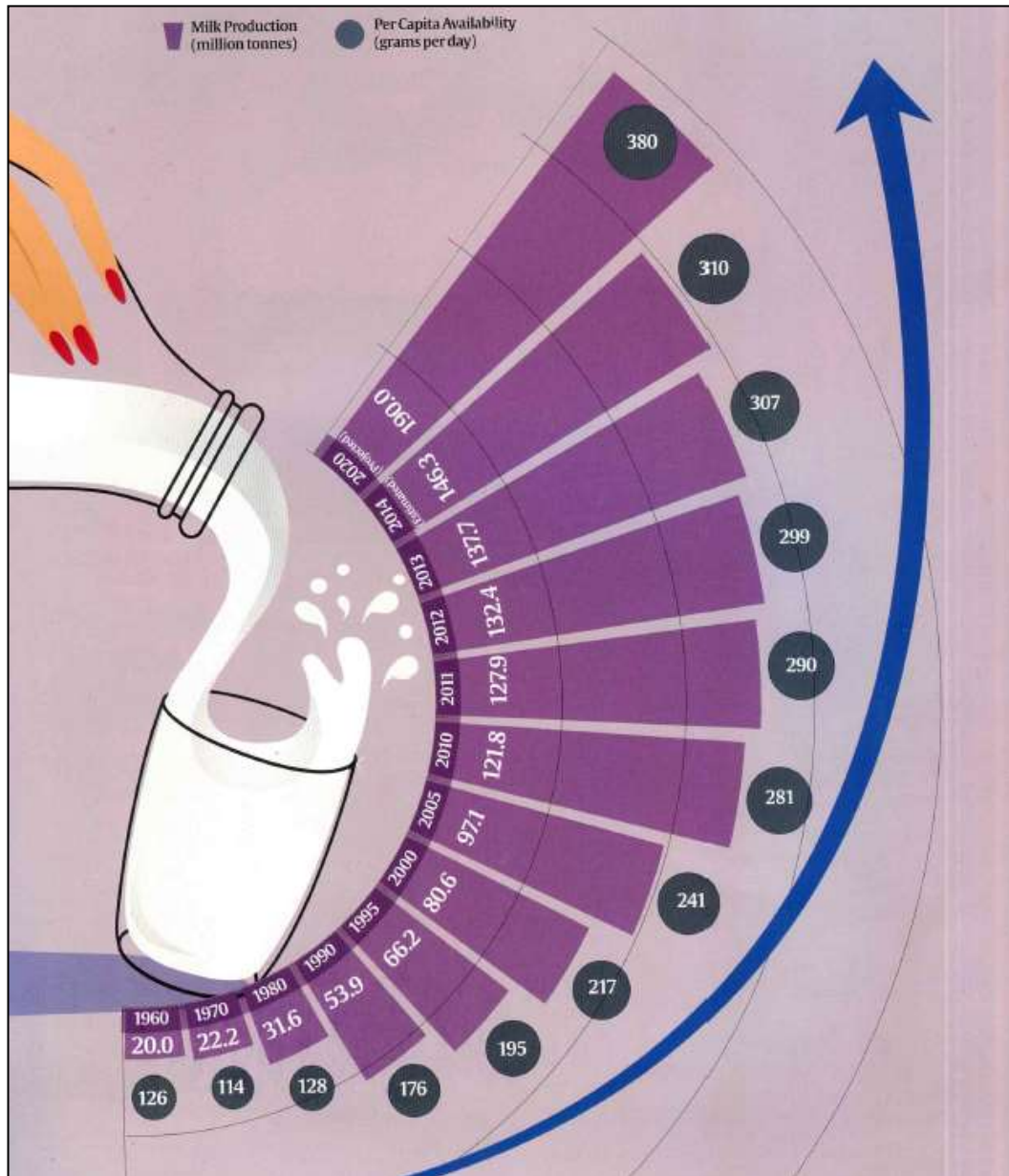


Projected Production in 2020 = 190 Million tons @ CAGR = 4.5%

Source : USDA Economic Research Service using USDA, Foreign Agriculture Service PSDonline Dataset & FAO Food Outlook Nov,17



Milk Availability in India – Per Capita



Year 2016 (grams/day)

Avg. per Capita (US, Europe, Australia, Argentina) > 410

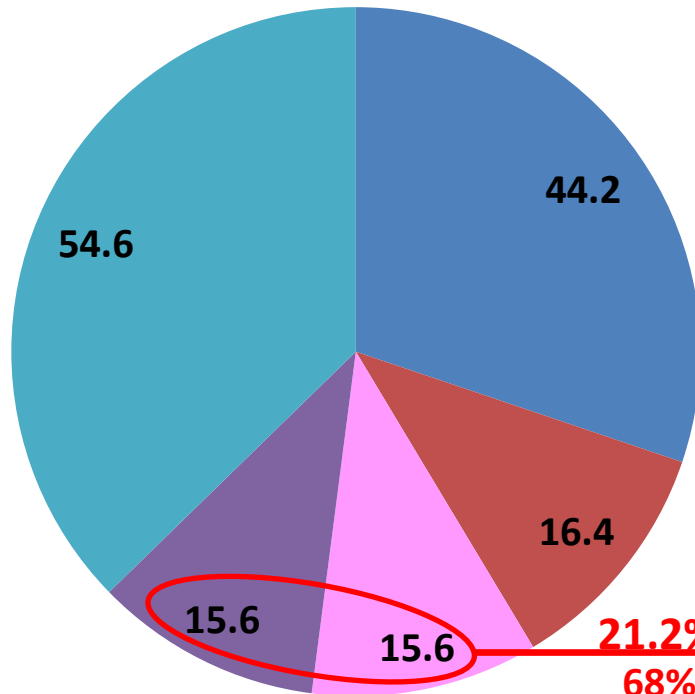
India Avg. per Capita = 344

Source : Dairy India (Seventh Edition)



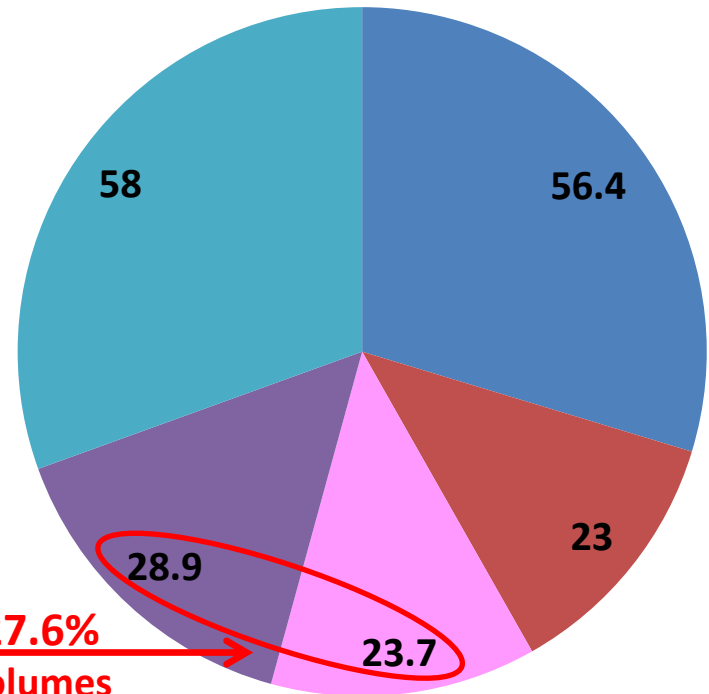
Milk Processing in India

Milk Production (146.3 million tons) - 2015



- Retention (Producer)
- Retention (Consumer)
- Organised Processing (Coop/Govt)
- Organised Processing (Pvt)
- Traditional Processing / Sale

Milk Production (190 million tons) - 2020



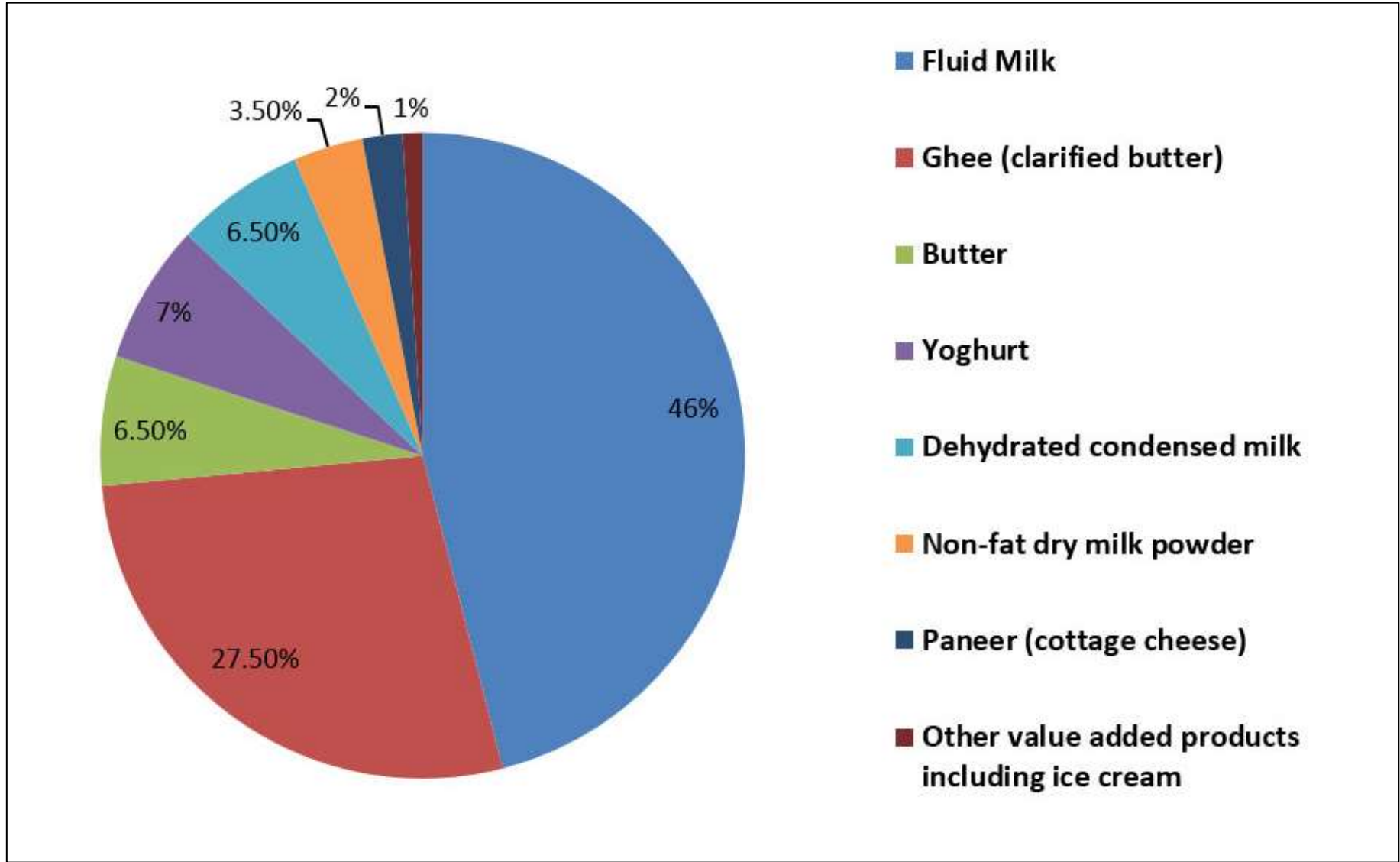
- Retention (Producer)
- Retention (Consumer)
- Organised Processing (Coop/Govt)
- Organised Processing (Pvt)
- Traditional Processing / Sale

21.2%
27.6%
68% increase in Volumes

Source : Dairy India (Seventh Edition)



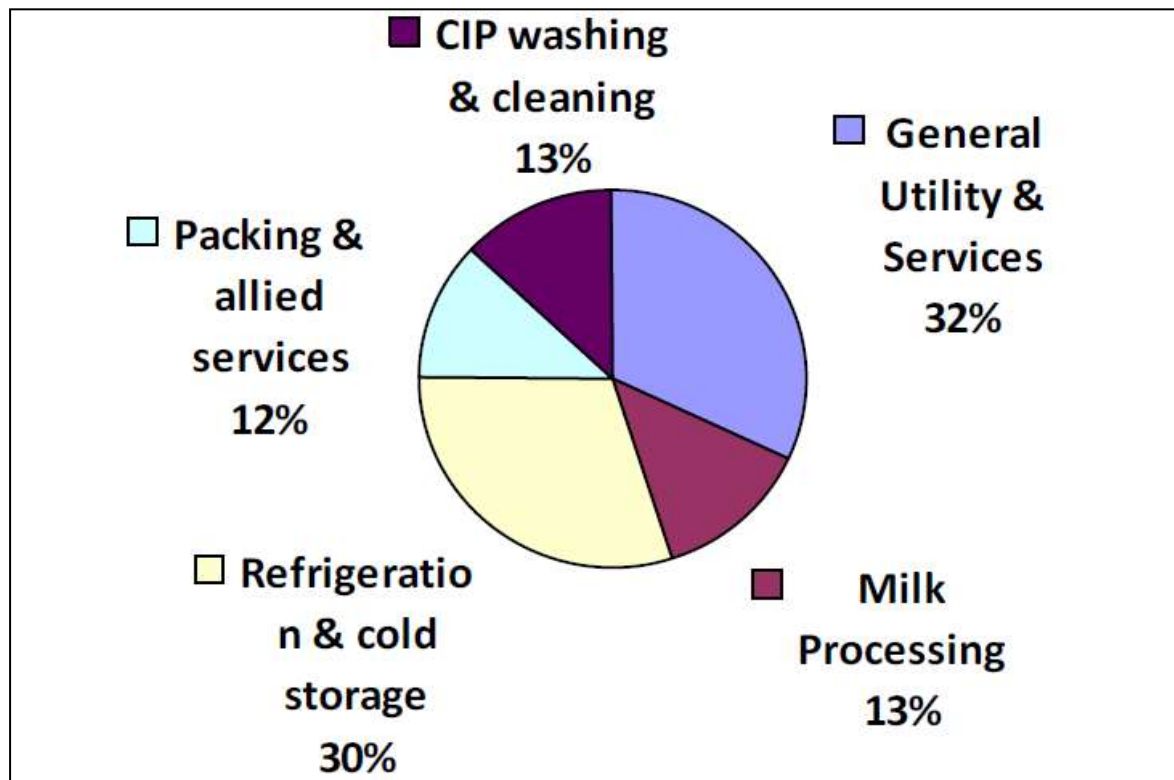
Indian Dairy Consumption – by Product Type



Source : Report by CII & Shakti Sustainable Energy Foundation on Indian Dairy Industry, Dec-2013



Typical Energy Consumption in Milk Processing Plants



Major Energy Consuming Equipments :

1. Refrigeration System
2. Evaporators & Spray Dryers
3. Homogenizers
4. Separators & Clarifiers
5. Pasteurizers
6. Air Compressors
7. ETP
8. CIP Boilers

Source : Report by CII & Shakti Sustainable Energy Foundation on Indian Dairy Industry, Dec-2013



Energy Consumption & Savings Potential in Indian Dairy Industry

Specific Energy Consumption	Range	Weighted Average
Electrical (kWh/MT)	25-60	40
Thermal (kCal/MT)	20,000-90,000	60,000

Dairy Companies in India (2015) = Around 925
 Dairy Plants in India (2015) = >1150
 Installed Processing Capacity - Dairy Industry (2015) = 130,000 Tons/Day (TPD)
 Actual Processing of Dairy Industry (2015) = 85,479 TPD (66% Cap Utilization)
 = 31.2 Million tons
MTOE in 2015 = 0.30 Million MTOE

Projected Processing of Dairy Industry (2020) = 52.6 Million tons
MTOE in 2020 = 0.50 Million MTOE

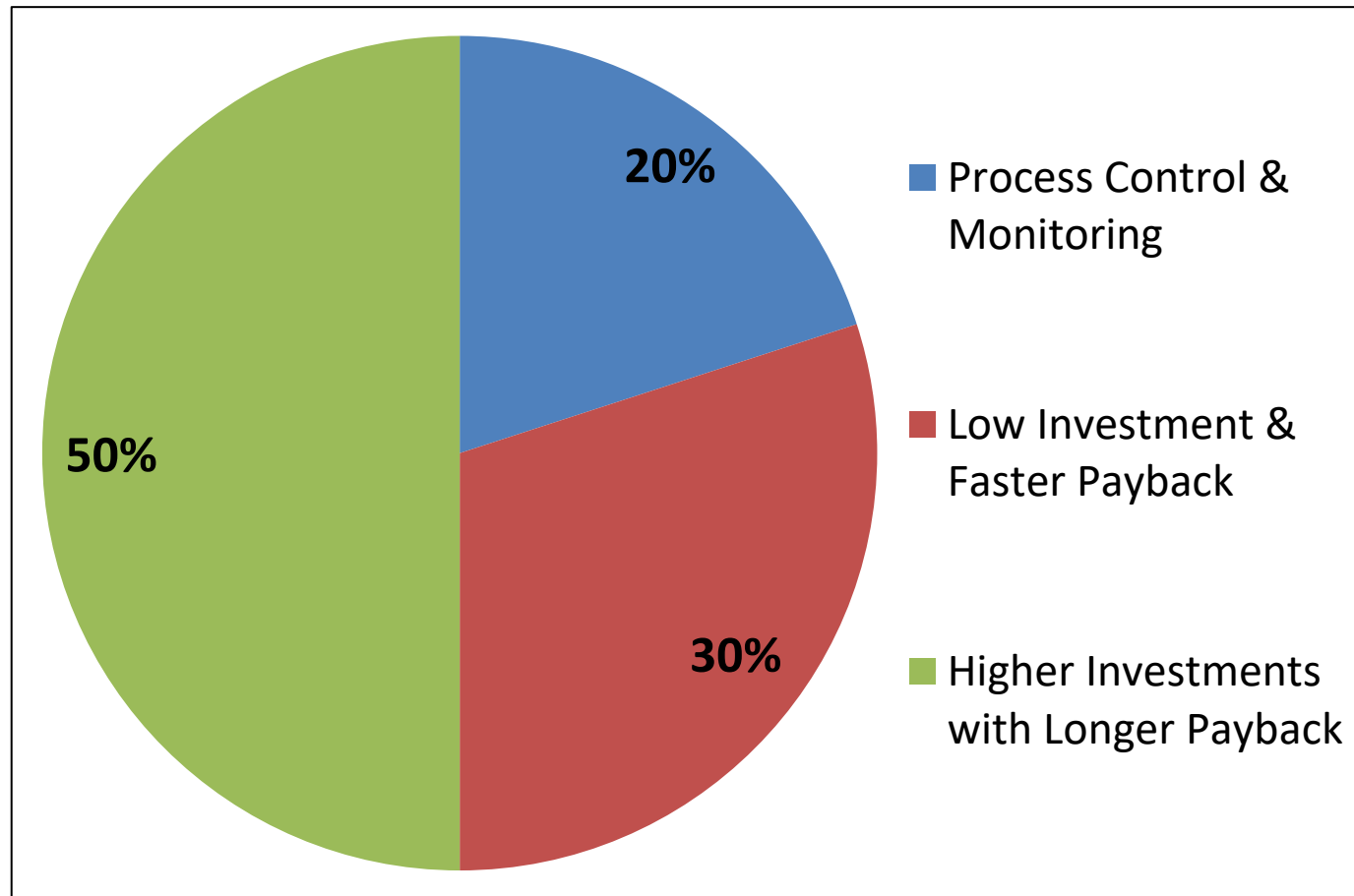
Estimated Savings Potential in Indian Dairy Industry

1. Energy Efficiency = 15-20% (0.075 – 0.1 Million MTOE)
2. Reduction in Cost of Energy = 15-20%

Source : Report by CII & Shakti Sustainable Energy Foundation on Indian Dairy Industry, Dec-2013 & Dairy India (Seventh Edition)



Ways to Reduce Energy Bill in Indian Dairy Industry



Source : Experience of Umang Dairies Ltd & Dairy India Yearbook 2007



Indian Dairy Industry – Less Focus on Energy

1. Lack of awareness on the Energy efficiency
2. Lack of organizational commitment
3. Narrow focus on Energy
4. Not clear about existing level of operations and efficiency, due to lack of instrumentation & non availability of Energy consumption data
5. Limited manpower
6. Lack of trained manpower
7. Limited information on new technologies
8. Cost of Energy conservation options



Indian Dairy Industry – Less Focus on Energy

Typical Cost Sheet of Various Dairy Products

All Values in %

Sr No	Particulars	Milk Powder	Fluid Milk (PPM)	Curd / Chhachh	Butter / Ghee
1	Variable Cost				
1.1	Material	88.55	97.38	84.62	96.21
1.2	Energy	7.00	0.96	7.58	1.09
1.3	Casual Labour	0.60	0.55	2.47	0.55
1.4	Stores	1.09	0.28	1.23	0.32
1.5	Repairs	0.50	0.09	0.12	0.18
1.6	Sub Total	97.74	99.25	96.02	98.35
2	Fixed Cost	2.26	0.75	3.98	1.65
3	TOTAL COST	100	100	100	100



Approaches Towards Energy Efficiency for Indian Dairy Industry

Sr No	Approach	Adoption by Umang Dairies
1	Cogeneration / CHP – reduces cost of energy by 15-30%. Useful for Dairy plants with electric load >1MW and high demand for steam. Cheaper fuels further add to reduce cost.	Yes
2	Trigeneration – Energy system efficiency can further increase by 5%	
3	Desuperheater – Waste heat recovery	
4	Vapour Absorption Refrigeration	Yes
5	Variable Frequency Drives – Huge scope in Refrigeration / Air compressors, boiler fans, homogenizers, various pumps	Yes
6	Lighting – LEDs can reduce Dairy plant electric load by 1-2%	Yes
7	Flash Steam Recovery	Yes
8	Evaporative Condensers in place of Air/Water Condensers – Potential to save 10-20% of energy of refrigeration compressor	Yes
9	O₂ Analyzer / Automatic O₂ Sensor for Boiler / HAG	Yes

Source : Report by CII & Shakti Sustainable Energy Foundation on Indian Dairy Industry, Dec-2013 & Umang Dairies Ltd.



Approaches Towards Energy Efficiency for Indian Dairy Industry

Sr No	Approach	Adoption by Umang Dairies
10	Use of Methane out of Anaerobic Digester – 0.34 m ³ can be generated out of 1MT effluent treatment. Around 2645 kCal/MT of milk can be produced. Potential to save 1-3% of overall energy.	Under Progress
11	Replacement of old Motors by Energy Efficient Motors	Yes
12	Use of Screw Compressors (Air/Refrigeration) in place of Reciprocating	Yes
13	Increase Condensate Recovery to 80%	Under Progress
14	Optimize Transformer loading (70-80%)	
15	Maintain Power Factor of (0.98-1.00)	Yes
16	Auto blow down in Boilers	



Source : Report by CII & Shakti Sustainable Energy Foundation on Indian Dairy Industry, Dec-2013 & Umang Dairies Ltd.



Approaches Towards Energy Efficiency for Indian Dairy Industry

Use of Renewable Energy

Sr No	Approach	Adoption by Umang Dairies
1	Use of Biomass / Agro based Fuels	Yes
2	Use of Solar Energy – Power/ Heating	



Source : Report by CII & Shakti Sustainable Energy Foundation on Indian Dairy Industry, Dec-2013 & Umang Dairies Ltd.



Process Related Energy Efficiency Measures for Indian Dairy Industry

1. **Automation**
2. **Insulation**
3. **Pasteurization**
 - i. Use Pasteurizers with higher regeneration efficiency (>92%)
 - ii. Reduce Pasteurization temperature by controlling microbial count in raw milk
 - iii. Explore new technologies like photo purification using lamp emitting UVC band light (a micro biocidal wavelength)
4. **Homogenization**
 - i. While addition of fat, only high fat phase should be homogenized
 - ii. Achieve same creaming index with less pressure using technologies like NanoVALVE
 - iii. Optimize CIP fluid volumes
5. **Cleaning in Place (CIP) Optimization**
 - i. Increase process cycle time
 - ii. Explore alternate chemicals
 - iii. Optimize volume & temperature
6. **Optimize Equipment Sizing**
7. **Reduce Reprocessing**
8. **Cold Sanitation**

At Umang, most of above points are either implemented or under implementation



Results of Energy Efficiency Initiatives at Umang Dairies Ltd

**Reduction in Energy Cost by 15.6% in last 3 years
(Year 2014-15 to 2017-18)**

Comparison of Specific Energy Consumption – European Dairy Plants & Umang Dairies

Sr No	Product	Energy Consumption (Million kCal/ton of Product) *	Energy Consumption (Million kCal/ton of Product) at Umang Dairies
1	Milk Powder	2.41	2.58
2	Fluid Milk	0.24	0.14
3	Butter	0.47	0.50

*** Typical Energy Consumption Correspond to European Dairy Plants**

**Source : Report by CII & Shakti Sustainable Energy Foundation on Indian Dairy Industry, Dec-2013*



Suggestions to Improve Energy Efficiency in Indian Dairy Industry

1. Creation of Awareness
2. Formulation of favourable policies by Govt. of India to encourage energy efficiency in Dairy Industry
3. Benchmarking – Indian / International
4. Creation of Technology Upgradation Fund – low cost funding for new energy efficient technologies and automation
5. Subsidies for Cogeneration
6. Inclusion of Dairy Industry in Schemes like - REC / PAT



Thank You.....

