



HEALTHY PEOPLE • HEALTHY PRODUCTS • HEALTHY PLANET

Dairy Processing Decarbonization Efforts

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Background: Innovation Center for U.S. Dairy

DMI: Structured to Maximize Farmer Investment



United Dairy Industry Association

(UDIA, established 1971)

16 state and regional promotion organizations
44 UDIA board members elected through co-ops



National Dairy Research & Promotion Board

(NDB, established 1983)

37 National board members are nominated by the dairy community, appointed by the Secretary of Agriculture





The Innovation Center for U.S. Dairy works across the dairy community to

- **Align** on pre-competitive priorities,
- **Advance** an industry-wide sustainability/social responsibility platform, and
- **Speak with a unified voice** about the good work of farmers and the dairy community

A future where U.S. dairy unlocks transformative good for people and the planet



Advance Well-being

Deliver dairy nutrition that meets emerging and personalized health needs

Enhance nutrition security: Leverage dairy's opportunity to improve nutrition security in the U.S. and around the world.

Benefit the body: Advance the dairy science, innovation, products and outreach to help people reach their goals for optimal health and well-being.



Regenerate the Environment

Optimize dairy solutions that enhance natural resources and ecosystems

Achieve GHG neutrality: Significantly reduce industry-wide emissions and sequester carbon through climate-smart technologies and agricultural practices.

Improve ecosystem health: Advance efforts to sustain and restore water, soil and biodiversity health.

Accelerate the circular economy: Generate value through resource efficiency, waste reduction and renewable resource and energy production.



Care for Our Animals and Communities

Ensure healthy animals, a vibrant workforce and safe, high-quality dairy foods

Provide exceptional care for our cows: Advance industry-leading best practices for animal well-being and care.

Empower our people and communities: Support the well-being of those who make dairy possible and foster creation of the dairy jobs of the future that build vibrant communities.

Ensure excellence in food safety and traceability: Drive adoption of world-class food safety practices and explore next-generation technologies which advance further protection and traceability.

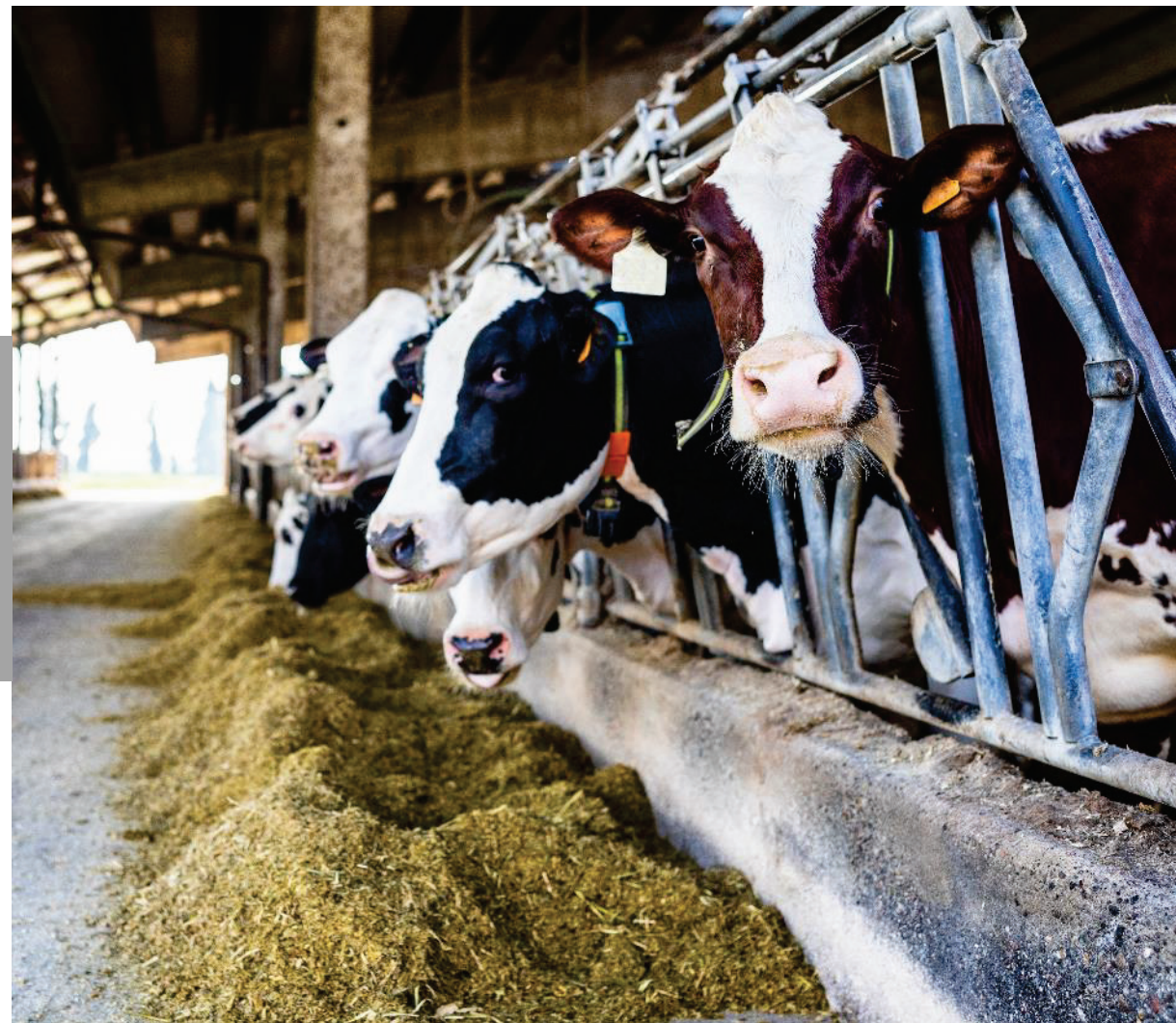
The **U.S. Dairy Stewardship Commitment**, our social responsibility pledge, will measure and report progress against our collective social responsibility actions.



U.S. dairy is an environmental solution

By 2050, U.S. dairy collectively commits to:

- Achieve **greenhouse gas (GHG) neutrality**
- **Optimize water use** while maximizing recycling
- **Improve water quality** by optimizing utilization of manure and nutrients



STRATEGIES TO REACH OUR 2050 GOALS

FOR FIELD AND FARM

Net Zero Initiative

A collaboration of dairy organizations to advance research, on-farm pilots and new market development to make sustainability practices more accessible and affordable to farms of all sizes – an essential first phase to accelerate progress toward the 2050 goals.



FEED



ENTERIC
METHANE



MANURE



ENERGY

FOR PROCESSORS

Processor Working Group

Led by the Innovation Center, a working group of more than 60 participants representing over 30 processing organizations convenes regularly and engages in facility-focused workstreams.



GHG



CIRCULARITY



WATER





Industry Collaboration & Guidance

Processor Working Group

Sub-Teams

Circularity



Water



GHG



Processor Working Group Resources



Freely available at: usdairy.com/research-resources



GHG Reduction Opportunities Guidance



Scope 1 & 2 Reduction Guidance

- Heating, ventilation and air conditioning
- Boiler, steam and condensate systems
- Hydraulic systems
- Motors and drives
- Pumps and fans
- Hauling and distribution fleet
- Lighting
- Compressed air systems
- Material handling and conveying systems
- Pasteurization process
- Refrigeration and process cooling
- Renewable energy options

Scope 3 Reduction Guidance

- Packaging
- Supply chain collaboration and interventions
- Waste
- Carbon markets



The background of the slide features a photograph of a hillside covered in solar panels. A semi-transparent green overlay is applied to the entire image. In the foreground, the rows of solar panels are clearly visible, extending towards the background. In the distance, a small building and some construction equipment are visible on the right side of the hill. The overall tone is professional and environmentally focused.

「Measuring, Reporting, and Managing GHG Emissions

The U.S. Dairy Stewardship Commitment

U.S. dairy's social responsibility pledge to consumers, customers and other stakeholders

Demonstrates and documents how U.S. Dairy:

- ✓ Responsibly produces milk and dairy products
- ✓ Brings value to the communities we serve
- ✓ Acts transparently and meets globally accepted standards



U.S. Dairy Stewardship Commitment

36 ADOPTING COMPANIES TO DATE

Agri-Mark	Hilmar Cheese
Agropur	HP Hood
Associated Milk Producers	Idaho Milk Products
Bel Brands	Kroger
California Dairies, Inc.	Leprino Foods
Cayuga Milk Ingredients	Land O' Lakes
Chobani	Maryland & Virginia Milk Producers
Cumberland Dairy	Michigan Milk Producers Association
Darigold	Milk Specialties Global
Dairy Farmers of America	Prairie Farms
Foremost Farms	Proliant Dairy
First District Association	Pursue Happiness/CLA Spruce Haven LLC
Franklin Foods	Select Milk Producers
General Mills	Schreiber Foods
Glanbia Nutritionals	Southeast Milk
Grande Cheese	Tillamook
Great Lakes Cheese	United Dairymen of Arizona
Great Lakes Milk Producers	Valley Queen Cheese

**>75% of U.S. milk
production**

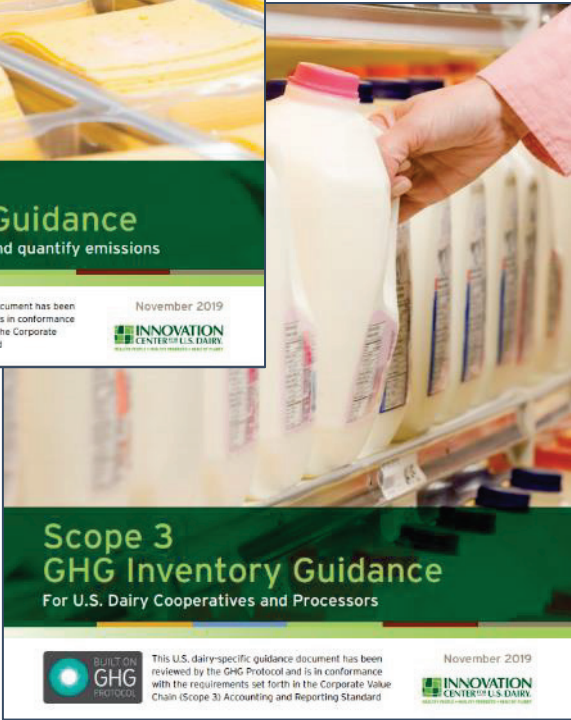


Stewardship Commitment Processor Metrics



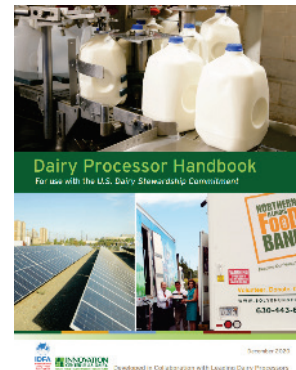
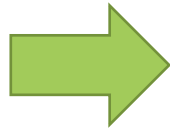
PROCESSOR		
Priority	Indicator	Metric
Energy Use	Energy intensity	• Total energy use (converted to MMBTU)/lb. of production output
GHG Emissions	GHG intensity	• Total GHG emissions (tonnes CO ₂ e, Scope 1 and 2)/lb. of production output
Water Quantity	Water withdrawal	• Gallons of water withdrawn by source of water supply/lb. of production output
	Water efficiency	• Gallons of water withdrawn/lb. of production output
	Water recycling and reuse	• [Gallons of water supplied that are captured for reuse within the facility + milk water captured for use]/lb. of production output
	Milk water use	• Gallons of water captured from milk for use within facility/lb. of production output
	Surplus water	• [Discharge volume - water withdrawn]/lb. of production output
Water Quality	Water discharge and quality	• Policy, program or monitoring system to ensure routine compliance with industrial or storm water permit parameters (Y/N)
Resource Recovery	Waste diversion	• Percent waste stream (lbs.) diverted from landfill or incineration without energy recapture
	Throughput efficiency	• Total waste stream/lb. of production output
	Resource utilization	• Food/organics repurposed to feed hungry people • Food/organics donated or repurposed as animal feed and non-food recycled or composted (lbs.)/total waste stream (lbs.) • Food/organics repurposed for industrial uses or compost and non-food repurposed for energy recovery (lbs.)/total waste stream (lbs.) • Waste sent to landfill or incineration without recapturing energy (lbs.)/total waste stream (lbs.)
Packaging	Recycled content	• Research/investment in use of post-consumer and/or post-industrial recycled content (Y/N)
	Material optimization	• Exploring options to reduce or replace non-recyclable and/or non-compostable packaging (Y/N)
	Material utilization	• Materials used for product packaging, differentiated by primary, secondary, and tertiary packaging

Built on GHG Protocol



The Processor Stewardship Reporting Tool

- Stewardship Commitment companies measure, report, and verify energy and GHG emissions data for each processing facility
- Dairy Processor Handbook provides step-by-step guidance on how to measure and report metrics
- Third-party administrator validates data across all companies, and creates company-wide reports, helping to identify energy and GHG emissions hotspots
- Company reports are blindly aggregated into a national level report each year



INTELEX



**NATIONAL
AGGREGATED
REPORTING**



2020 Processor Aggregate Data Report: Environmental

Aggregate Base (Reporting Entities)

Results, updated in December 2022, cover processing locations for the 25 processors that adopted the Stewardship Commitment and reported 2020 calendar year data.

25 processors represent 70% of U.S. milk production.*

Metric Reporting

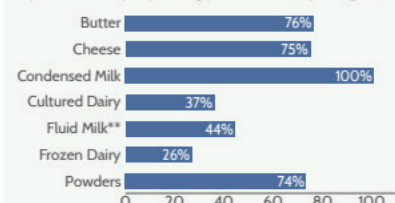
Data reported by metric varies among processors; therefore, aggregate coverage for each indicator set is noted. Processors enter their data into the reporting tool, by facility or for the company as a whole, for calculation and aggregation. Harbor Environmental and Safety, which developed the tool, performed a quality review for data consistency and calculation accuracy. Harbor did not verify the data submitted by each processor.

Aggregate Intensity Metrics

The intensity-based metrics report amounts per pound of dairy production at the processing level.

Product Distribution

% of 2020 U.S. production of key dairy categories represented by reporting processors (by weight)*



*Source: Calculations provided by The McCully Group using 2020 data from USDA NASS Dairy Products Annual Summary (April 27, 2021), Hoard's Dairyman Top 50 Cooperatives and private estimates.

**The 2020 aggregate is under-indexed in fluid milk due to significant transactions that took place during the reporting period. It is anticipated that the next aggregation (2021) will be more balanced in the fluid milk category. This is consistent with guidance from the Stewardship Commitment Committee on facility startups and acquisitions.

For more information, contact stewardship.commitment@dairy.org.

ENERGY & GHG EMISSIONS

88% of processors reported data for all their processing facilities; 100% of processors partially reported.

Metric	2020
ENERGY USE INTENSITY	
kWh per pound of production output	0.575
MMBtu per pound of production output	0.002
GHG EMISSIONS INTENSITY (SCOPES 1 AND 2) (kg CO ₂ e per pound of production output)	
GHG Emissions Intensity (Location-Based)	0.125
GHG Emissions Intensity (Market-Based)	0.127

WATER QUANTITY

80% of processors reported data for all their processing facilities; 92% of processors partially reported.

The use of water extracted from milk enables many processors to return more water than they withdraw from municipal and other sources.

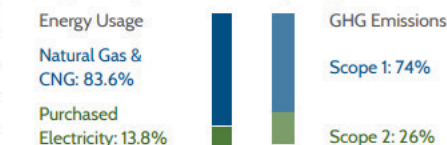
Metric (gal. per pounds of production output)	2020
WATER WITHDRAWAL	
Freshwater Withdrawal by Sources	
Municipal/third-party source	56% 0.296
Groundwater	22% 0.114
Surface water	2% 0.010
Produced water/milk water ¹	21% 0.109
WATER RECYCLED	0.121
WATER DISCHARGED	0.523
WATER CONSUMPTION²	0.007

¹ Milk water is water extracted from milk during processing.

² Aggregate water consumption (Withdrawal - Discharged) is reduced through the capture and use of water from milk by many processors.

ENERGY AND GHG EMISSIONS BY SOURCE

The main sources of GHG emissions are natural gas (Scope 1) and purchased electricity (Scope 2).



26.8% of grid electricity is generated from renewable sources. Other energy sources contribute < 2.6% of GHG emissions.

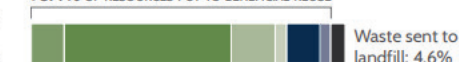
RESOURCE RECOVERY

84% of processors reported data for all their processing facilities; 100% of processors partially reported.

Processors pursue strategies for zero waste to landfill in line with the U.S. EPA's Waste Management and Food Recovery Hierarchies, which provide the basis for the resource recovery metrics.

RESOURCE UTILIZATION AND WASTE DIVERSION

95.4% OF RESOURCES PUT TO BENEFICIAL REUSE



Food donated to feed hungry people: 10.4%
 Food/organics repurposed to feed animals: 53.2%
 Food/organics repurposed for industrial purposes: 14.0%
 Food/organics sent to compost: 3.6%
 Non-food sent to recycling/composting: 10.7%
 Non-food repurposed for energy recovery: 3.4%

Values do not sum to 100% due to rounding. Note: Waste sent to incineration without energy recovery is not shown because value is less than 0.01%.

The Stewardship Commitment processors participating in reporting are Agri-Mark, Associated Milk Producers, Bel Brands USA, California Dairies, Cayuga Milk Ingredients (incl. Pursue Happiness), Chobani, Dairy Farmers of America (incl. Cumberland Dairy), Danisco, First District Association, Foremost Farms USA, General Mills, Glanbia Nutritionals, Great Lakes Cheese Company, Hilmar Cheese Company, HP Hood, The Kroger Co., Land O'Lakes, Leprino Foods Company, Maryland & Virginia Milk Producers Cooperative Association, Michigan Milk Producers Association, Prairie Farms Dairy, Schreiber Foods, Select Milk Producers, Tillamook County Creamery Association and United Dairymen of Arizona.



「Dairy Processing Decarbonization Case Studies



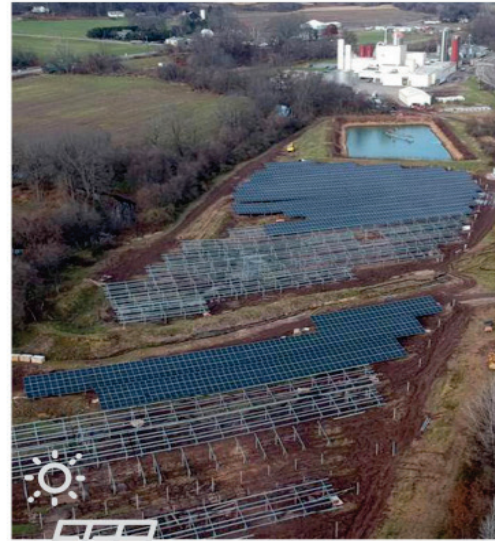
Dairy Farmers of America



ZERO WASTE TO LANDFILL

In the United States, it is estimated that 40% of food goes unsold or uneaten, ending up, instead, as waste. This accounts for roughly 4% of all U.S. GHG emissions and 24% of landfill inputs. Many of our plants are making strides to divert their waste, including the Kemps® plant in Rochester, Minn., which produces ice cream and has achieved zero waste to landfill status. In 2021, the plant sent more than 9 million pounds of food waste to become feed for an animal nursery that it has partnered with in repurposing efforts. Any unsellable finished product and packaging is used by the county to turn waste into energy.

In total, the Kemps plant in Rochester, Minn., diverted more than 13 million pounds of waste away from the landfill in 2021.



MIDDLEBURY CENTER SOLAR PROJECT

Our first solar project at a DFA production facility was completed in 2021, with a 1.9 megawatt (MW) ground mount solar installation at the DFA plant in Middlebury Center, Pa.

Approximately 20% of the plant's yearly electricity needs comes from the newly installed solar panels on facility grounds.

It will generate an estimated 2,012,633 kilowatts per hour (kWh) annually, offsetting the equivalent of 1,426 metric tons (MT) of carbon dioxide equivalent each year. This usage equates to taking 307 cars off the road, or the equivalent energy use of 180 homes for a year.

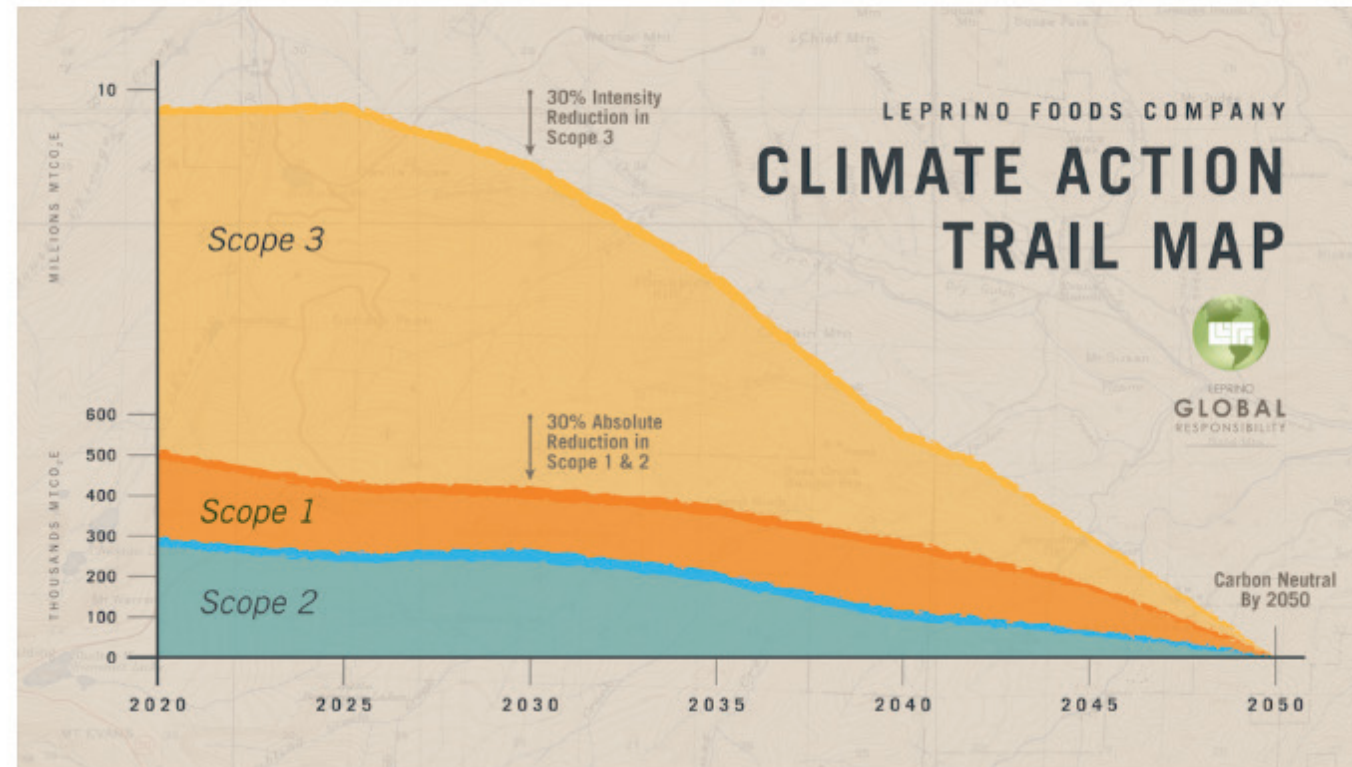
ON THE ROAD

At DFA, we look at changes in energy sourcing as a long-term evolution and are taking steps to reduce our impact across every aspect of our business – including transportation. With 83 manufacturing facilities throughout the United States, our processing plants are always near our supply, requiring minimal transportation so that we can provide the freshest dairy possible to customers around the world. And when it comes to hauling and trucking, some parts of our fleets have transitioned from diesel fuel to compressed natural gas to lessen our environmental footprint.



Carbon Neutral by 2050

Our Climate Action Trail Map to 2050 includes shorter term targets based on science and water stewardship goals. Reducing our impact is driving our journey and we will work relentlessly to achieve our targets.





Natural gas is cleaner burning than the coal
used to produce electricity from the grid





Thank You!

usdairy.com/commitment

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