

U.S. Dairy Net Zero Initiative

April 2021



Imagine a world where dairy is seen as an environmental solution. Dairy presents solutions for today's nutrition and environmental challenges. It provides accessible and affordable nutrition while sequestering carbon and improving soil health through improved land use systems; reducing greenhouse gas emissions through feed management, manure management and energy efficiency; and generating renewable energy that can cleanly power homes and businesses.

With this vision in mind, the Net Zero Initiative (NZI) launched in 2020 as an industry-wide effort to accelerate voluntary action on farm to reduce environmental impacts by making sustainable practices and technologies more accessible and affordable to U.S. dairy farms of all sizes and geographies. This is achievable through research, on-farm pilots, development of manure-based products and ecosystem markets, and other farmer technical support and opportunities. The primary expected outcomes include 1) the collective U.S. dairy industry advances to net zero carbon emissions and significant improvements in water use and quality, 2) in addition to nutrient-dense foods and beverages, dairy farms provide products and services that enable other industries and communities to be more sustainable, and 3) farmers are able to realize the untapped value on-farm, making the system of continuous improvement self-sustaining.

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Impact

- **NZI is a coordinated and collaborative** national platform informed by and designed for U.S. dairy producers – representing more than 31,000 independent farms, 95% of which are family-owned, and covering more than 15 million acres. Given the central role that farmers play in food production, research, and innovation, including their voice at the table helps to ensure the ability to feed the next generation and ensure practical and economically viable environmental solutions.

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- **The initiative is a critical pathway on farm** towards achieving U.S. dairy's voluntary 2050 environmental stewardship goals to collectively achieve carbon neutrality, optimize water usage, and improve water quality by optimizing utilization of manure and nutrients. Informed by a robust materiality assessment, the goals were endorsed by dairy industry leaders and farmers nationwide and approved by the Innovation Center for U.S. Dairy Board of Directors, which includes leaders from 27 companies that represent approximately 65% of U.S. milk production.
- **By expanding science-based research** and data collection, NZI closes knowledge gaps, improves analysis and advances practices and technologies that reduce environmental impact

in four key areas of dairy production: feed production, cow care, energy efficiency and manure management.

- **Many technologies and practices** are already in place to reduce environmental impacts on farm and some are widely used already. NZI looks to break down barriers to accelerate more widespread adoption, such as addressing the economic viability of technology and practices. This can be achieved by realizing untapped value on farm including sequestering carbon, converting manure and waste into nutrient-rich fertilizer, renewable energy and other valuable products, and contributing to ecosystem markets making more offsets available.
- **NZI is a collaboration of the U.S. dairy community**, corporate partners, research institutions, nongovernmental organizations and other stakeholders. This unprecedented partnership brings together diverse expertise and perspectives to strengthen its plan and realize its full potential for dairy to be an environmental solution both on and off farm.
- **NZI was established to unite the assets** and expertise of dairy trade, professional and industry organizations and their constituents toward a shared objective. The founding partner organizations are Dairy Management, Inc., Innovation Center for U.S. Dairy, International Dairy Foods Association, National Milk Producers Federation, Newtrient and U.S. Dairy Export Council.
- **This is a pioneering effort** – if solved for dairy, the learnings can be transferred to other parts of agriculture, becoming a catalyst for broader change.
- **This effort directly contributes to the achievement of several SDGs** including Climate Action (13), Clean Water (6), and Industry Innovation (9) – all of which through NZI are underpinned by partnerships and industry-wide collaboration. It can further contribute toward Responsible Consumption and Production (12), Affordable and Clean Energy (7), Sustainable Cities and Communities (11), and Partnerships for the Goals (17).

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Overview

In 2008, the U.S. dairy industry was the first in the food agricultural sector to conduct a full life cycle assessment at a national scale; this informed the LEAP methodology still employed by the FAO. Since then, the U.S. dairy community has built a collaborative effort that unites the assets and expertise of trade, professional and industry organizations to create a path forward. Following a year-long consultation process and more than 12 years of collaborative action on environmental topics, in 2020, the Innovation Center for U.S. Dairy set aggressive new environmental sustainability goals to collectively achieve carbon neutrality or better, optimize water usage and improve water quality by 2050, with a commitment for quantitative and credible measures of progress reporting every five years. As collective goals, not every farm, cooperative or processor is expected to reach these goals individually, but together the industry can leverage its diversity to meet them.

Four Key Areas of Focus

Feed production & practice changes:

- No/low-till farming and cover crops
- Renewable fertilizers
- Precision agriculture

Manure handling & nutrient management:

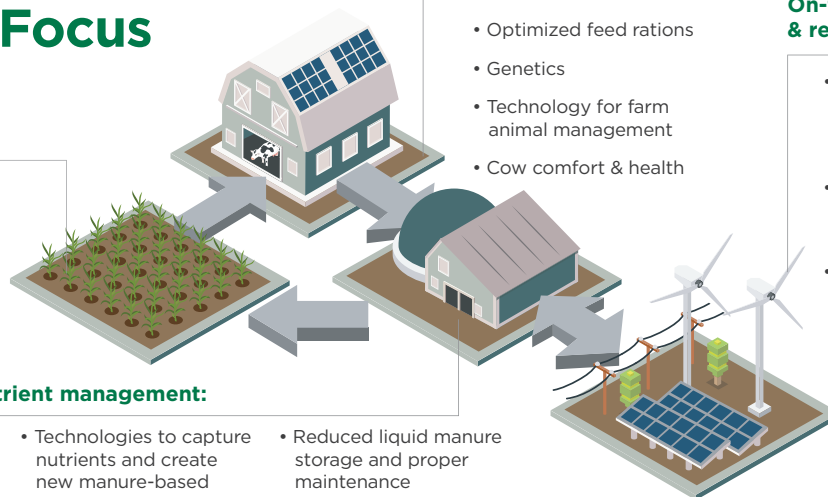
- Nutrient Management Planning (NMP)
- Anaerobic digesters turn manure into biogas
- Technologies to capture nutrients and create new manure-based products
- Reduced liquid manure storage and proper maintenance

Cow care & efficiency:

- Feed additives
- Optimized feed rations
- Genetics
- Technology for farm animal management
- Cow comfort & health

On-farm energy efficiency & renewable energy usage:

- LED lighting, variable speed vacuum pumps, high-efficiency refrigeration, and fans
- Conversion of biogas into electricity and/or renewable natural gas
- Renewable energy sources from wind/solar



Visuals do not represent all possible practices, technologies or benefits. Each farm can voluntarily contribute to net zero efforts based on their individual operation.

NET ZERO INITIATIVE

The farm and field strategy of these goals is termed the Net Zero Initiative (NZI). The intention of NZI is to remove barriers that stand in the way of all dairy farmers adopting best practices and technologies that advance sustainable food systems and garner recognition and sufficient compensation for the environmental assets they manage and enhance on their farms. The work of NZI is focused in four areas: feed production, cow care, energy efficiency and manure management – which together represent the total footprint of a farm.

Success requires addressing the affordability of technology and practice solutions, closing the gaps on data and research for more quantifiable outcomes, and making solutions accessible to farms of all sizes to scale. There are three tracks that are carrying out this work: Groundwork research, Dairy Scale for Good viability study and Collective Impact for widespread adoption.

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Groundwork provides foundational science to increase what is known, fill in data gaps, improve the models used to estimate improvements, and identify areas for largest potential impacts. This work leads to a strong understanding of technologies and practices and how they apply to dairy cropping systems and on dairy farms, as well as improvements to on-farm tools to help make decisions and measure progress. It is important to note the measurement component is not only essential to demonstrate our progress, but critical to enable new markets that can pay for the environmental assets generated through environmental management practices.

For example, feed production represents 26% of a dairy's environmental footprint. Through the Groundwork track, NZI is conducting research, partially supported by a grant from Foundation for Food & Agriculture Research, that seeks to close an important research gap to help offset dairy's GHG footprint. The data gained from this project will be shared broadly among the dairy community to provide scientific accuracy to support measurement of dairy's GHG footprint for feed production and set the stage for new market opportunities related to carbon, water quality and soil health. This project is in collaboration with U.S. Department of Agriculture Agricultural Research Service (USDA ARS), the Soil Health Institute and six leading dairy research institutions and universities throughout the country.



Dairy Scale for Good is focused on implementing the full suite of best practices and technologies on 3-5 farms across the country, to prove the economic viability of reaching net zero GHG on farm. This work will test, advance, and establish market-based approaches for reaching carbon neutrality, improving water quality, and improving farmer livelihoods. These pilots are intended to provide the scale needed to create benefit for all farms by driving down technology costs, establishing new markets and revenue opportunities and transforming the way farms of all sizes can improve their environmental footprint and benefit from untapped revenue potential on farm.



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Finally, **Collective Impact** will support broad, voluntary farmer adoption of proven best practices, technologies and combinations of both. An industry-wide network will share the positive impact that farms of varying geographies, sizes and capabilities are making together on the environment to support learning and adoption. This will be further informed by supply chain demonstration projects that provide proof of concept. To achieve solutions at scale, Collective Impact will increase awareness of technical assistance, financial support opportunities and more that can help all farms find the next thing they can do to help their farm increase efficient production and reduce impact and our help the industry reach these collective goals.

On-farm Benefits

Feed production & practice changes:

- Healthy soils
- Water resistant soils
- Improved nutrient and carbon cycling
- Enhanced air and water quality
- Ecosystem services

Manure handling & nutrient use:

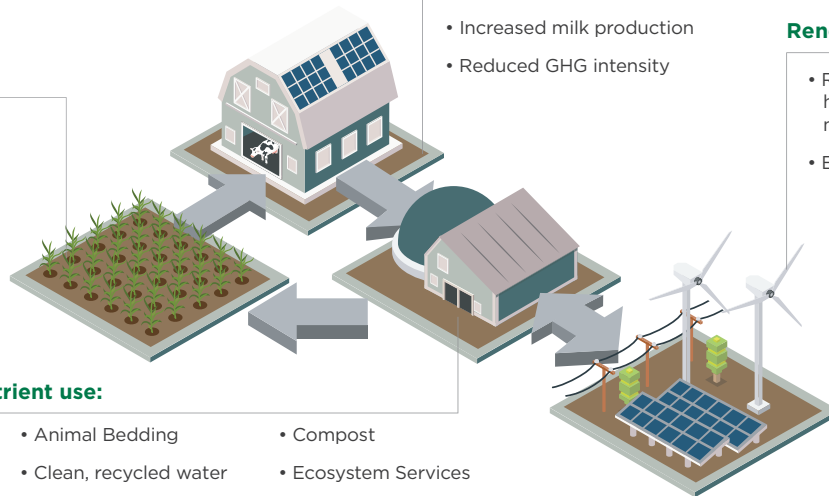
- Transportable, high-quality fertilizers
- Animal Bedding
- Compost
- Clean, recycled water
- Ecosystem Services

Cow care & efficiency:

- Healthier cows
- Increased milk production
- Reduced GHG intensity

Renewable energy:

- Renewable electricity, heat, vehicle fuel and natural gas
- Ecosystem services



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NET ZERO INITIATIVE

Off-farm Benefits



- Nutritious milk and food
- Improved air quality
- Reduced greenhouse gas emissions
- Improved water quality
- Electricity for communities
- Soil health and water resistance
- Renewable natural gas for vehicles
- Biodiversity
- Renewable fertilizers
- Carbon sequestration and greenhouse gas reduction
- Alternative to landfill for food waste

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NET ZERO INITIATIVE

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NZI is comprehensive and collaborative. Farmers have and continue to invest in their farms. Partners bring expertise, leadership and financial support to strengthen the plan and accelerate action leading to results. The initiative brings together diverse perspectives and experience from multiple sectors, including farmers, industry organizations, cooperatives and processors; global corporations; research institutions; foundations and non-governmental organizations. In October of 2020, Nestlé became the first corporate partner, followed by Starbucks announcing their intent. Beyond dairy customers, strong interest in supporting and advancing this work comes from ESG investors, tech companies and others who see the potential value in the assets, data and new product and ecosystem markets. As NZI moves forward, diverse partnerships and collaboration across both private and public sectors will continue to grow.

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The result of this work is transformative and reinforces the important role of dairy in sustainable food systems, making nutrient-dense foods more readily accessible. Through leveraging industry-wide collaboration and cross-sector partnerships, the U.S. dairy industry is equipped to advance environmental solutions on dairy farms and create economically-viable, scalable pathways to accelerate progress. Successes and learning from NZI can not only benefit dairy but inform similar approaches across agriculture to advance a sustainable 21st century food system.

Led by six national dairy organizations:

