Climate and Agriculture: What Do Farmers Think?

October 2024

Minnesota Farmers Union

FOUNDATION

Contents

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Cover photos: Top, Corn stalks reaching for the sky in Washington County. In the bottom row, left to right, a cow and calf pair on pasture in Goodhue County; a Kernza field day in Lac qui Parle County; and peppers and tomatoes grow in a hoophouse at Clear Lake Gardens in Aitkin.

Minnesota Farmers Union
FOUNDATION

Minnesota Farmers Union Foundation is a non-profit 501(c)3 organization established in 1958 to help members and the general public learn about farming and farm cooperatives. The goal of the foundation is to support the educational mission of the Minnesota Farmers Union.

The Climate and Working Lands Program operates under MFU Foundation and is supported by the McKnight Foundation and Morgan Family Foundation.

Further details about this report can be found at:
https://mfu.org/mfu-foundation-com-climate-working-lands/

Dairy cows at the UMN West Central Research & Outreach Center farm in Morris graze on a mobile agrivoltaic test plot.

Executive Summary

In recent years, there has been a significant shift as businesses, policymakers, and the public increasingly turn to agriculture for climate solutions. This shift has been accompanied by historic investments from state, federal, and private sectors in climate-smart agriculture, soil health initiatives, and renewable energy. The adoption of these new policies and technologies has quickened, making it essential that family farmers be at the table for conversations about resource allocation, land use, power generation, grid reliability, and programs aimed at harnessing the potential of working lands. Farmers have a stake in climate policy and the development in new voluntary, incentives-based climate-smart markets because these initiatives have the potential to impact their farms, marketing opportunities and communities.

Additionally, Minnesota farmers are on the front lines of experiencing climate change through extreme weather and increased pressure from plant and animal diseases. Farmers Union members recognize that inaction on climate change will have consequences for family farmers' livelihoods, the vitality of rural communities, and the economy of our state.

Farmers are constantly adapting to new demands and navigating the ever-shifting landscape of agriculture. Many farmers have implemented conservation management practices that help build their resiliency and decrease greenhouse gas (GHG) emissions – including planting cover crops and reducing tillage to protect soil health and improve water quality.

Creating climate resilience is, and has been for years, a priority for Farmers Union members. Farmers Union is a grassroots, general farm organization and policy is decided by democratically elected farmer members. For years, MFU has been an active leader on climate initiatives and advocates for state and federal action to give farmers the information, tools and resources they need to pursue on-farm climate action. Ensuring that family farmers are protected and represented as new projects and technologies are deployed to address climate change is our priority.

In 2023, Minnesota Farmers Union Foundation launched the Climate and Working Lands Program in response to the growing opportunities for farmers to be at the table when new policies are made. This new program is strategically focused on *mitigation* and *adaptation* across the landscape.

Adaptation: Adapting and building resilience to climate change and its impacts

Mitigation: Reducing or removing greenhouse gas (GHG) emissions that cause climate change

This report was developed to capture insights from producers across the state to help inform decision makers during this critical time in agriculture. This report includes a summary of listening sessions held in 2023 along with themes from those convenings and information about MFU's dynamic strategies to address evolving climate related challenges and opportunities in Minnesota and beyond. There is also a link to an appendix on page 11 which includes the outline used for listening sessions, county-specific listening session information and the survey given to all participants.

This report also draws on insights from a range of MFU Climate and Working Lands Program activities, including participation in state and nationwide initiatives through working groups, panels, and conferences. Quotes in the report were gathered from climate conversation meetings and interviews featured in our ongoing 'Climate Resilience on the Farm' series.

In the first section, this report provides an overview of the current state of climate and agriculture in Minnesota and covers some of the recent public and private climate initiatives impacting farmers. This section gives context to why it is important for farmers to be at the table when decisions are being made. In the next section, the report summarizes themes identified during MFU listening sessions and farmer interviews held in 2023. The third and final section looks at strategies MFU's Climate and Working Lands Program is working on to address climate through a farmer-centered lens.

There were many recurring themes at listening sessions regarding the climate and agriculture nexus. Prominent topics of discussion included:

- Fair Markets for Climate-Smart Agriculture
- More Farmers and Advisors
- Access to Equipment and Machinery
- Land Availability and Prices
- Building Resiliency

Identifying solutions to address the challenges and opportunities presented in these themes is crucial because of the significant role that agriculture plays in Minnesota's economy and in mitigating climate change.

Context of Climate Change and Agriculture in Minnesota

Historic investments from the public and private sectors are driving climate solutions on working lands. Farmers and businesses alike are leveraging these opportunities and resources to increase their operations' profitability and sustainability. Farmers' perspectives on climate solutions are shaped in part by these broad investments in agriculture. This section includes some of the developments from the public and private sectors related to climate and agriculture, as well as the science of climate change in the state.

Climate Impacts on Agriculture in Minnesota

Left: Flood damage to a tractor and planter in Chippewa County. Right: Straight line winds damage property in Big Stone County.

Minnesota farms of all sizes and production types are confronted with the varying and contradictory effects of climate change. Farms are affected by a combination of extreme weather events and persistent challenges including drought, excess rainfall, excessive heat, changes in growing seasons, and increased pressure from plant and animal disease. These extreme weather events are also causing damage to infrastructure, including barns, bins and hoop houses.

By using climate-smart practices, farmers can be more resilient.[1] Programs and policies designed to boost farmers' resilience by enhancing soil health and generating renewable energy, for example, will offer protection and diversification to revenue streams and help adapt Minnesota's working lands to increasing extreme weather.

This section provides some examples of how the changing climate is already affecting Minnesota farmers. For more information on climate change in Minnesota, visit the University of Minnesota Climate Adaptation Partnership: **climate.umn.edu**.

Climate Adaptation Partnership
University of Minnesota
Driven to Discover®

The University of Minnesota Climate Adaptation Partnership (MCAP) conducts cutting-edge climate and adaptation research, champions climate leadership, develops the next generation of adaptation professionals, and advances implementation of effective, equitable adaptation actions across sectors, communities, and levels of government. Minnesota CliMAT – Climate and Mapping Analysis Tool is an interactive online tool developed by MCAP that provides highly localized climate projections for Minnesota.

1 USGCRP, 2023: Fifth National Climate Assessment. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. https://doi.org/10.7930/NCA5.2023.

Drought and Flood

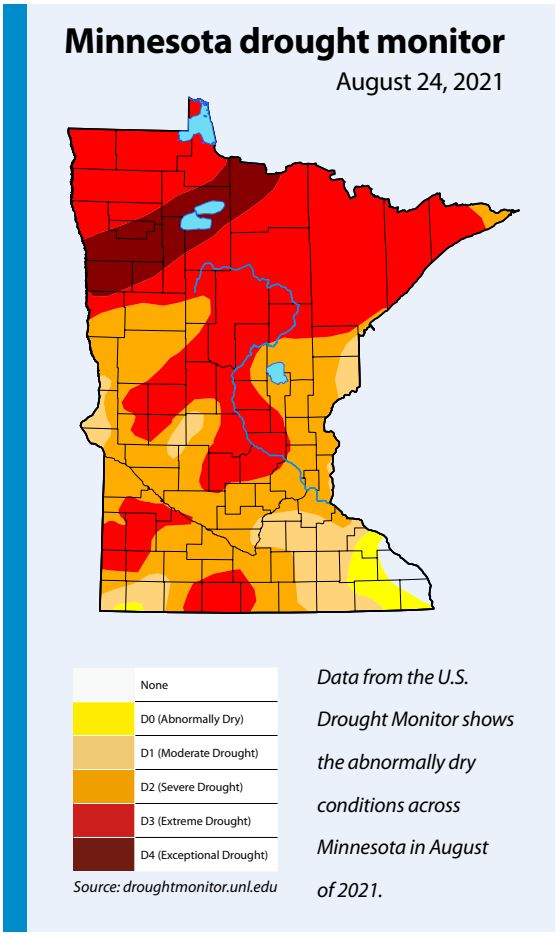
Minnesota experienced intense drought conditions from 2021-23, with the drought of 2021 following some of the wettest years on record in 2016 and 2019. Early 2023 was also marked by historic snowfall and large winter storms followed by heavy precipitation and major flooding across the southern part of the state.[2] Impacts to farmers included infrastructure damage and constrained planting windows. The spring and summer of 2024 once again brought record-breaking precipitation across much of the state.[3] These increasingly intense weather events are likely to become more common with the changing climate.

The USDA Farm Service Agency (FSA) is increasingly offering disaster assistance relief and emergency farm loans due to drought stress. In 2023, for example, several counties including Big Stone, Beltrami and Waseca were eligible for disaster assistance relief due to drought stress that persisted over eight consecutive weeks during the growing season.

Dry soil conditions diminish crop and pasture productivity, while irrigation adds additional stress on Minnesota's water supplies. Warming temperatures along with shifts in precipitation patterns are likely to cause drought conditions to increase. According to The Fifth National Climate Assessment, climate-related changes to water quantity and quality in the Midwest pose significant risks to agricultural production.[4]

There are various management tools that farmers can use to adapt to drought. Implementing the use of cover crops, conservation crop rotations and/or reducing tillage can positively impact soil health and increase water-holding capacity. Choosing different crop species or varieties that are better suited to tolerate heat and water stress is another way farmers can adapt to expected future conditions.[5]

A hotter and drier climate also leads to more wildfires and pollution from smoke. Smoke from Canadian wildfires exacerbated by



Data from the U.S. Drought Monitor shows the abnormally dry conditions across Minnesota in August of 2021.

2 National Oceanic and Atmospheric Administration. (2023). *Annual 2023 National Climate Report*. https://www.ncei.noaa.gov/access/monitoring/monthly-report/national/202313

3 Wurzer, C. (2024, July 26). *July's record precipitation balances dry weather from earlier months.* MPR News. https://www.mprnews.org/story/2024/07/26/july-record-precipitation-dry-weather-earlier-months

4 USGCRP, 2023: Fifth National Climate Assessment. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. https://doi.org/10.7930/NCA5.2023.

5 Roop, H. A., Meyer, N., Klinger, G., Blumenfeld, K., Liess, S., Farris, A., Boulay, P., Baule, W., Andresen, J., Bendorf, J., Wilson, A. B., Nowatzke, L., Todey, D., & Ontl, T. (2024). *Climate Change Impacts on Minnesota Agriculture.* Ames, Iowa: United States Department of Agriculture Climate Hubs, University of Minnesota Climate Adaptation Partnership and Great Lakes Research Integrated Science Assessment.

drought brought thick and smoky skies across Minnesota in the spring and summer of 2023, resulting in poor air quality. At one point in June, Minnesota had the unhealthiest air quality in the country.[6]

Smoke was thick in the air during a visit to Prairie Rose Farm in Moorhead, June 2023.

Periods of extreme and less predictable weather have accelerated, and farmers across Minnesota experience the impacts intensely through the loss of crops and profit.

With the new climate reality, family farmers and communities are concerned about how they will deal with the unpredictability of the future and how to keep up amid production challenges that will only increase in frequency and severity in years to come.

Shifting Weather Patterns, Longer Growing Seasons and Crop Projections

Severe heat across the state made for a historic autumn in 2023. In time for the September harvest, southern, western and central Minnesota experienced a "historic, rare, and extreme heat wave" with multiple 100-degree temperature readings according to the Minnesota Department of Natural Resources.[7] Higher temperatures make crops, livestock, farmers and farmworkers alike vulnerable to heat stress.

Milder winters are also a concern to agriculture in Minnesota. Winter temperatures are rising faster than in any other season. This can impact pests, disease, and crop development. Ultimately, the ongoing warming trend is likely to alter the range of crops that can be produced in Minnesota.

For example, corn may be harder to grow in the southern and eastern parts of the state, while it may become easier to grow in the northern and western parts of the state. According to ***Climate Change Impacts on Minnesota Agriculture***, a report led by the University of Minnesota Climate Adaptation Partnership (MCAP), "By mid-century, under higher emissions, the optimal growing region for corn and soybean is likely to shift both north and west, with more suitable growing conditions emerging in Minnesota and the Dakotas compared to Illinois and Iowa. However, while models suggest that yields may increase initially from the changing climate, they may in fact begin to decline by mid-century. Soil productivity will prove to be an important variable in any potential range shift."[8]

The report also notes that counties in northern and east-central Minnesota have experienced significant increases in growing season length (1950-2021).[9] While longer growing seasons may help some farmers, increased pests, diseases and even weeds may add additional pressure on production.

6 Minnesota Department of Natural Resources. (2023, June 14). *Smoke Event of June 14, 2023*. [Press release]. https://www.dnr.state.mn.us/climate/journal/smoke-event-june-14-2023.html

7 Minnesota Department of Natural Resources. (2023, November 1). *Warm, Wet and WEIRD September*. [Press Release]. https://www.dnr.state.mn.us/climate/journal/wild-september-2023.html.

8/9 Roop, H. A., Meyer, N., Klinger, G., Blumenfeld, K., Liess, S., Farris, A., Boulay, P., Baule, W., Andresen, J., Bendorf, J., Wilson, A. B., Nowatzke, L., Todey, D., & Ontl, T. (2024). *Climate Change Impacts on Minnesota Agriculture*. Ames, Iowa: United States Department of Agriculture Climate Hubs, University of Minnesota Climate Adaptation Partnership and Great Lakes Research Integrated Science Assessment.

Public Policy

The past years have seen a significant increase in climate change related policies at the state and federal levels. A few high-impact examples are the Minnesota State Climate Action Framework, the Inflation Reduction Act (IRA) and USDA Partnerships for Climate Smart Commodities (PCSC), all of which aim to encourage climate action across the landscape.

Minnesota's Climate Action Framework

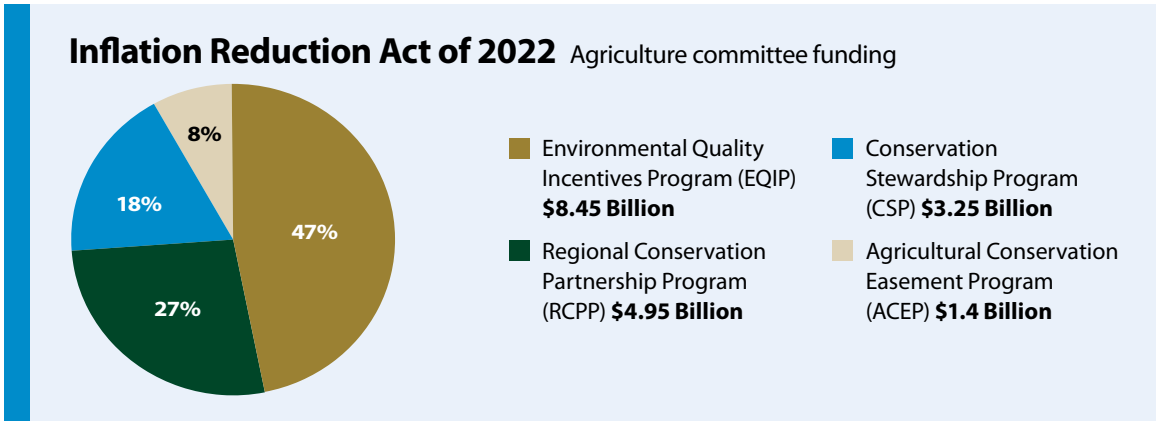
In 2022, the state of Minnesota released a Climate Action Framework envisioning climate change as an opportunity to strengthen the economy and foster a more equitable Minnesota. This framework aims to help Minnesota meet its goal of being carbon-neutral by 2050 through reducing GHG emissions and focusing on carbon storage in working lands.

"Climate-smart natural and working lands" is one of the six climate action goals identified with specific steps and progress measures to guide work. Priority actions laid out in the Framework include expanding climate-resilient agriculture and forestry, increasing water storage and infiltration, investing in new markets and promoting local food systems.

Inflation Reduction Act

The Inflation Reduction Act (IRA) of 2022 is the largest investment in climate change mitigation and adaptation in history. This expansive bill includes everything from tax rebates for household energy upgrades to major investments in solar and industrial decarbonization. The IRA commits $369 billion in funding to implement climate and clean energy solutions.

One of those solutions is the $19.5 billion for climate-smart agriculture investments in four USDA conservation programs: Environmental Quality Incentives Program (EQIP), Regional Conservation Partnership Program (RCPP), Conservation Stewardship Program (CSP), and Agricultural Conservation Easement Program (ACEP). In addition to climate-smart practices through EQIP, CSP, RCPP, and ACEP, the funding includes $1 billion for Conservation Technical Assistance and $300 million to invest in the science of measurement and evaluation of carbon sequestration and GHG emission reductions. The goal of this investment in USDA's conservation programs is to yield climate change mitigation benefits. This significant investment will enable more producers to take climate action by participating in voluntary and incentive-based mitigation activities.



> *"We know that agriculture plays a critical role in the nation's effort to address climate change. We're using this funding to bolster our existing programs, maximize climate benefits, and foster other environmental benefits across the landscape."*
>
> **- U.S. Secretary of Agriculture Tom Vilsack, at the National Association of Conservation Districts annual meeting in February of 2023.**

Another IRA program is the Clean Fuels Production Credit (45z) which provides a tax credit to produce clean transportation fuels, including ethanol, biodiesel and sustainable aviation fuel (SAF). The amount of the credit varies depending on the type of fuel produced and its emissions profile. Emissions factors for fuel are calculated using the Argonne National Lab's 'Greenhouse gasses, Regulated Emissions, and Energy use in Transportation' model (often referred to as GREET).

GREET combines components for a life-cycle analysis of fuel production to create a final carbon intensity score. For example, the primary components for corn-based ethanol's carbon intensity score are related to the use of energy at the ethanol plant, the handling of the carbon dioxide produced during fermentation, and the feedstock of the biomass. Farming practices like cover cropping, reduced tillage and nutrient management can all lead to a lower score, which may create additional value through the 45Z tax credit.

Questions remain around how the tax credit will drive changes for biofuel plants, farmers and grain marketers. While the tax credit goes into effect in January 2025, as of the time of publication of this report, the final rules for the tax credit have not been released.

Partnerships for Climate-Smart Commodities

In 2022, the USDA announced Partnerships for Climate-Smart Commodities (PCSC), an ambitious new opportunity to drive climate action across the nation through agriculture. Through the PCSC, $3.1 billion will go to 141 projects with the goal of supporting the development of climate-smart commodity markets, monitoring and verification processes, and relationship building with emphasis on historically underserved farmers and ranchers.

Of the total, 30 projects include Minnesota in their listed geographies. The projects vary in their approach to farmer payments, market development, environmental credit claims, and commodity type, and each project's success relies on farmers participating in the programs and implementing climate-smart practices on the landscape.

Climate-Smart Agriculture and the Inflation Reduction Act (IRA)

The IRA has prioritized climate-smart investments that will foster climate change mitigation and adaptation. Through the existing conservation programs — EQIP, CSP, and ACEP — farmers and landowners in Minnesota will have greater access to financial and technical assistance for making climate-smart changes.[10]

10 Climate Smart Agriculture and Forestry (CSAF) conservation practices or activities directly improves soil carbon, reduces nitrogen losses, or reduces, captures, avoids or sequesters carbon dioxide, methane or nitrous emissions associated with agricultural productions.

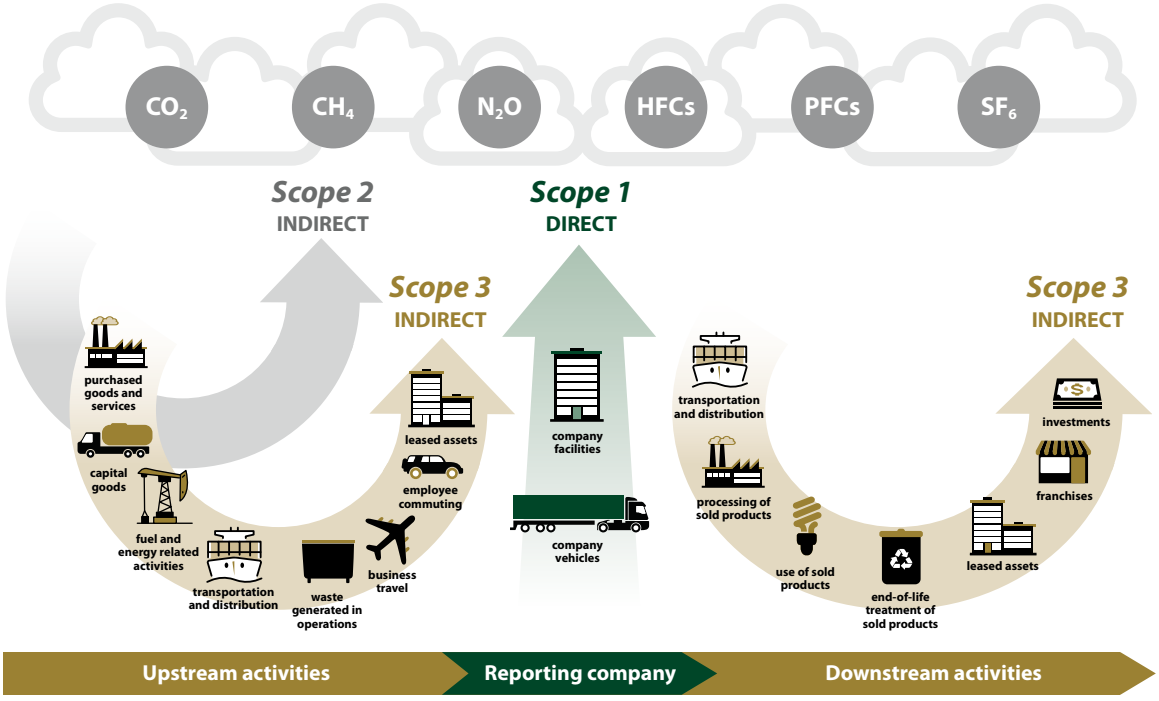
With this funding comes new career opportunities for positions that support the climate- smart transition, from program implementation to hands-on conservation agronomists and technical service providers. The IRA's Civilian Climate Corps aims to address this by helping to train young people for clean energy and climate resilience jobs in the public and private sectors. MFU will be a host site for a Climate Corps Working Lands service member through 2025.

Private Sector

In recent years there has been a rise in private sector climate commitments and GHG reporting. Currently, the private sector landscape consists of mostly voluntary markets with private frameworks for reducing GHG in supply chains and offsetting emissions. For companies to reduce emissions, they need to understand their full value chain emissions.

One of the main ways companies measure and assess their GHG emissions is through 'scopes'. Scope 1 is reserved for direct emissions, whereas Scopes 2 and 3 are indirect emissions that are a consequence of company activities but occur from sources they do not own or control. Agriculture makes up 70 percent of Scope 3 emissions for companies in the Forest, Land and Agriculture (FLAG) sector.[11] Using scopes to categorize emissions sources helps companies to identify and focus their efforts on the most significant reduction opportunities.

Overview of GHG Protocol scopes and emissions across the value chain



*From GHG Protocol's **Corporate Value Chain (Scope 3) Accounting and Reporting Standard***

This graphic illustrates the three scopes of greenhouse gas (GHG) emissions under the GHG Protocol. It distinguishes between direct emissions from owned sources (Scope 1), indirect emissions from purchased energy (Scope 2), and all other indirect emissions from upstream and downstream activities (Scope 3). This framework helps organizations measure their overall carbon footprint more comprehensively[12]

11 CDP Technical Note: Relevance of Scope 3 Categories by Sector. (2023, January 25). https://cdn.cdp.net/cdp-production/cms/guidance_docs/pdfs/000/003/504/original/CDP-technical-note-scope-3-relevance-by-sector.pdf

12 World Resources Institute & World Business Council for Sustainable Development. (2013). Corporate value chain (scope 3) accounting and reporting standard. https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf

Companies need multiple tools to meet climate commitments. The Greenhouse Gas Protocol and Science Based Targets initiative are guiding frameworks that help companies keep comprehensive inventories of their GHG emissions and develop clearly defined pathways for reducing emissions.

Offsets and Insets

Companies employ offsetting and insetting strategies as part of their pathway to reducing GHG emissions identified and categorized in Scopes 1, 2 and 3. Companies are often making these decisions based on interest from executive leaders, shareholders and employees. While some changes may be consumer-driven, many GHG reduction strategies are not consumer-facing.

Carbon Offsets

Companies that seek to offset their carbon emissions are looking directly to farmers and landowners to make verified practice changes that sequester carbon, and then sell the 'credit' for sequestered carbon back to the company.[13] With half of the world's largest companies setting net-zero emissions targets[14], carbon markets have gained significant attention for meeting these goals.

Carbon Insets

Carbon insets are used for reducing climate impacts through supply chain interventions. Supply chain programs are likely to expand significantly with the USDA's PCSC grant projects and new low carbon-intensity markets, especially for biofuels. Importantly, many of these can reward early adopters who have been implementing conservation practices for years.

Many Minnesota-based food and beverage companies have set targets for land-based emissions reductions and removals. For example, Land O'Lakes, a member-owned agricultural cooperative, committed to reducing Scope 1 and 2 GHG emissions 42 percent and scope 3 GHG emissions 25 percent by 2030 (from a 2020 base year).[15] General Mills has already enrolled 500,000 acres in regenerative agriculture programs and aims to enroll over 1 million by 2030. The food company has committed to reducing scope 1, 2, and 3 GHG emissions 30 percent by 2030 (from a 2020 base year).[16] Other actions the company will take to meet 2030 emissions goals include increasing renewable fuels in transportation and having no deforestation in palm, cocoa and fiber supply chains.[17]

13 A carbon credit certifies that someone - a farmer - took an action to sequester carbon or reduce GHG emissions under contract.

14 Newcomb, J., Sonaike, A., Walter, D., Speelman, L. (2023, November 29). *Corporate Climate Action: Analyzing the Recent Surge of Climate Commitments*. Rocky Mountain Institute. https://rmi.org/corporate-climate-action-analyzing-the-recent-surge-of-climate-commitments/.

15 Land O'Lakes. (2023). *2023 Community Impact Report*. https://www.landolakesinc.com/getmedia/5f7c6a73-ab53-45b4-8c6c-210764e7914e/2023-community-impact-report.pdf

16 General Mills. (2023). *Global Responsibility Report 2023*. https://globalresponsibility.generalmills.com/images/General_Mills-Global_Responsibility_2023.pdf

17 General Mills. (2024). *Global Responsibility Report 2024*. https://globalresponsibility.generalmills.com/images/General_Mills-Global_Responsibility_2024.pdf

Anthony Hicks, Fergus Falls City Councilman and manager at Green Plains Inc., an ethanol plant, took part in the "Farmers Union Conversations about Climate & Agriculture" meeting held at Outstate Brewing Co. in Fergus Falls on October 30, 2023.

Farmers' thoughts on climate and agriculture: Themes

Between May and November of 2023, the MFU Climate and Working Lands team worked with county leaders to organize "Farmers Union Conversations about Climate & Agriculture" around the state. The goal of these convenings was to hear about climate policies and investments that have real implications for farmers and farm businesses. MFU staff took notes during each of the listening sessions and reviewed the written comments from the worksheets. The following themes were identified based on what was discussed at the listening sessions. Where possible, the themes include direct quotes from participants of listening sessions and "Climate Resilience on The Farm" interviews.

Stars indicate where listening sessions were held in 2023.

For more information on the methodology used in the listening sessions, visit https://mfu.org/mfu-foundation-climate-report-2024.

Theme: Fair Markets for Climate-Smart Agriculture

The emergence of many new markets that value climate and environmental co-benefits was identified as a top issue for producers. Climate-smart agriculture markets give farmers options, and not all require new practices. As described in the previous section, the private sector is looking to agriculture to help meet their corporate climate commitments. However, the complexities of these new markets are still being developed and are challenging to navigate.

Pathways for Climate-Smart Agriculture

Currently, there are multiple pathways for farmers to be paid for their ecosystem services or climate-smart activities. These pathways include:

- Direct marketing and identity preserved (CSAs, farmers markets, organic and non-GMO labels, etc.)
- Traditional government programs (EQIP, CSP)
- Carbon offsets and insets
- Clean/low-carbon fuels

Participants value programs that are easily accessible, allow participation by early adopters, and have payments that fully cover, or even exceed, implementation costs while transitioning practices.

The Minnesota Agricultural Water Quality Certification Program (MAWQCP), administered through the Minnesota Department of Agriculture, is a voluntary, farmer-led certification program that supports the adoption of conservation practices that safeguard water resources. The program offers several endorsements that producers can add to their certification, including Irrigation Management, Soil Health and Climate-Smart. Each endorsement has been developed with experts in the topic and provides farmers with opportunities to improve their operations and to be recognized for their stewardship practices. The Climate-Smart endorsement also includes access to a $1,000 payment for new practice adoption.

MAWQCP is a valuable resource for farmers looking to enter a climate-smart market. With the one-on-one technical assistance provided, producers enrolled in MAWQCP can get connected to resources and other certified farmers in their area to help identify goals for their operation.

In 2023, the program celebrated the certification of one million acres since the program launched in 2014. Farmers that have enrolled in this program have also received consistently higher profits and other improved financial metrics than non-certified farms.[18]

The topic of incentives vs. regulations was frequently brought up in listening sessions, with many producers strongly advocating for an incentives-based approach to support farmers in the climate-smart transition. Producers expressed hopeful skepticism that new climate-smart markets will drive incentives, including price premiums, that will help farmers leverage the growing demand for more sustainable and climate-smart commodities.

18 Minnesota Department of Agriculture. (2024, May 29). *Five years of data reveal higher profitability for ag water quality certified farms*. https://www.mda.state.mn.us/five-years-data-reveal-higher-profitability-ag-water-quality-certified-farms

One of the climate-smart pathways that participants discussed in depth was the future of the clean fuels market in Minnesota and across the Upper Midwest. Participants discussed the potential opportunities for cash cover crops like winter camelina to serve the biofuels market, with an emphasis on Sustainable Aviation Fuel (SAF), to provide both ecosystem services and economic benefits to farmers.

Producers frequently shared concerns that navigating the opportunities climate-smart ag markets offer can be challenging and unclear. Many discussions about climate-smart ag markets led back to how critical fairness, competition and ownership are to serving farmers and building long lasting, durable climate and ag markets.

Return on Investment as the New 'Yield' Measure

One producer noted in a listening session, "Farmers are noticing the importance of building sustainability into their operation rather than focusing on yields alone." This sentiment was echoed by others as an increasingly important factor. A cattle producer emphasized that return-on-investment is the key indicator he monitors on his family farm, where they use practices like no-till and cover crops, saying, "We had to look at it long-term and profit-per-acre. That's what changed our farm."

What Are Farmers Saying About Markets for Climate-Smart Agriculture?

"Carbon contracts at this stage are often geared at enrolling new lands and do not provide recognition of the ongoing efforts that exist already." - **Wadena County**

"We are worried about government regulations telling farmers how to farm. We believe long-term incentivization with seven-to-ten-year programs that provide education will make the most impact." - **Pennington County**

"People need to be aware of how non-stop busy farmers are and realize they have a bank to answer to at the end of the day. Farmers need to know how implementing more climate-smart agricultural practices will work for them and have access to relevant information to help them make decisions. Incentives for conservation practices enable farmers to experiment. It is time-consuming to plan what and how you are going to plant." - **Clay County**

"Incentives and policy will make climate-smart agriculture economical." - **Fillmore County**

"We receive a significant premium for our regeneratively grown crops. The diverse system we have created leads to environmental and economic resiliency." - **Redwood County**

"I'm optimistic about opportunities for diversifying income, through solar, for example." - **Swift County**

Quotes from listening sessions held in 2023 and interviews with MFU members.

Theme: More People Needed – Farmers and Advisors

Many discussions during listening sessions circled back to the question of who will be implementing climate-smart management practices. Both farmers and other rural community members expressed the need to have more farmers and advisors to contribute to a more robust and resilient economy that is diversified and community oriented.

Farmers are getting older; according to the 2022 Census of Agriculture, the average age of a farmer in Minnesota has increased to 57.1 years old (the national average is 58.1 years old). Participants voiced a sense of urgency and optimism for figuring out pathways to encourage more people to work in agriculture, including through careers in soil health and through mentorship programs for current farmers with emerging farmers.

Farming requires the support of many different services, from Certified Crop Advisers (CCAs) and equipment dealers, to seed suppliers and bankers. Many participants discussed the importance of having access to professionals that understand conservation practices and climate-smart opportunities to help them navigate the best decisions for their operation. Creating and investing in programs to train conservation agronomists would help to equip professionals with the skills necessary to help farmers learn and implement new farm management practices.

What are Farmers Saying About the Need for More Farmers and Advisors?

"Let's pay farmers to be teachers and encourage mentorship." - **St. Louis County**

"Farming should be a viable career path for those who want to do it."
- **Red Lake County**

"From my perspective, *who* is going to grow food in the future is really an issue. The bottom line is that we need to produce new farmers." - **Swift County**

"In the time it takes to solve these issues farmers have to live day to day."
- **Clay County**

"For rural communities, climate investments offer enormous economic development and job opportunities and the chance to solve a lot of longstanding issues."
- **Kandiyohi County**

"Land can be drastically different from one area to the next – just because a practice works for one farmer doesn't mean it will or should apply to all. It is important to have people that can educate farmers while understanding the context of the place." - **Stearns County**

Theme: More Access to Equipment and Machinery

Investments in new equipment and machinery that help farmers to increase the efficiency of their operation and employ new practices often require intensive financial capital.

Some producers discussed the inability to scale conservation practices if ag lending institutions are not leading or actively participating in the conversation. Many producers were reluctant to take on more debt to buy the equipment needed to implement new practices, citing already narrow margins. Other producers in listening sessions were skeptical of the payoff versus investment for switching to low-tillage given the huge investment in equipment required upfront.

Building local capacity to better serve farmers is one way to address these shared concerns of the high cost of equipment. Supporting Soil and Water Conservation Districts (SWCD) in buying equipment for farmers use has shown success in places like Rice County, where the SWCD invested in a no-till drill that farmers can rent.

What Are Farmers Saying About Access to Equipment and Machinery?

"Equipment costs and updates are the biggest barrier to the adoption of conservation practices." **- Goodhue County**

"I am trying to diversify and experiment with conservation practices but am also hesitant. There are a lot of costs to consider between land and machinery rent and upkeep."
- Clay County

"I installed drain tile a year ago because the farm gets really wet. Now with the drought, I want to pump any water leaving the tile lines back onto the fields so as not to lose any nutrients. In the future, I expect more droughts and a lot of volatility in the market. I need to manage risk by keeping expenses bare bones. I also switched to reduced tillage and cover crops to reduce my labor hours and diesel use. Another reason I value sustainability practices is their increased time efficiency." **- Goodhue County**

Matt Kruger, a farmer in Pine Island, uses a no-till drill available for rent through the Soil and Water Conservation District (SWCD).

"The inability to rent or hire custom operators to plant for me hindered my operation from employing new climate-smart ag methods."
- Wadena County

Theme: Farmland Availability and Prices

There are many issues surrounding farmland access that were discussed in listening sessions, including consolidation, steeply rising prices and loss of farmland to development (from housing, urban sprawl, renewable energy, etc.). A shared concern among many participants was not only how family farmers will continue to exist, but how emerging farmers will be able to build a life in agriculture.

Access and ownership of farmland is connected to a farmer's ability to securely invest in climate-smart production methods. Improving farmers' access to land is an opportunity to meld climate adaptation and mitigation.

What Are Farmers Saying About Land Availability and Prices?

"I am concerned about the price of land increasing rapidly." **- Fillmore County**

"I'm concerned about losing ag land to housing, solar panels, etc." **- Pennington County**

"Right now, land is selling between $9-12k an acre. There isn't a young person that can buy this, so who is buying it? We talk about the big three in seed, big three in packers, and that's a problem, we are also starting to see the big three farmers in each area out in the country, which is very concerning." **- Swift County**

"Land transitions to first-generation farmers should be more appealing to landowners. There should be incentives to keep the land in agriculture and not split it up, selling to the highest bidder." **- Rice County**

"In order to utilize the regenerative practices we want, we need the flexibility that comes with being primary tenants. Owning our own land might also allow us to have permanent infrastructure for hard winter temperatures. These factors are causing us to put the pedal to the metal when it comes to finding new spaces to farm as well as a need for a homebase location." **- Rice County**

Theme: Building Resilience – Abnormal is the New Normal

The changing climate farmers are experiencing and its impact on their farms was a prominent topic at listening sessions. Many farmers shared concerns about progressively hot temperatures over the last ten years as well as extreme weather events and discussed the implications of changing growing seasons.

There was significant interest among farmers and community members about how to address the stress of these concerns at a local and regional level. Some participants discussed the importance of proactive farm management and community planning to better prepare people for the unpredictability of the future.

Additionally, some farmers and communities spoke about food security and potential pathways to increase local food production through developing infrastructure, including distribution and processing networks to connect farmers to markets. Many participants were eager to support and encourage the development of local food systems.

Diversification as Adaptation

Many producers were concerned about how they will adapt to unpredictability and make their operations resilient in the face of challenges like a changing climate and volatile markets. Some producers spoke about diversifying their income so they are not reliant on a single crop, for example, that might be harmed by a storm or extreme temperature changes. Many are looking at options for diversifying their income to adapt to future uncertainty. Crop diversification and rotation, adding on-farm renewable energy, and livestock integration are a few strategies farmers are either already implementing or considering adding to protect their incomes.

Mental and Behavioral Health Support

In many listening sessions participants expressed their anxiousness or uncertainty about the future. Financial risks involved in agriculture, corporate consolidation in the food and agricultural system, and a changing climate are just a few of the many stresses that farmers have on their plates. The mental health and isolation of farmers was brought up in some listening sessions, as was the importance of having discussions as a community about what can be heavy topics like climate change. Mental health care can be challenging to access in rural communities. It was important to participants that farmers can access help if they need it. Many participants recognized the significance of mental and behavioral health resources in supporting resilient people and communities.

What Are Farmers Saying About Building Resilience?

"How do we adapt to unpredictability?" - **Otter Tail County**

"We both have off-farm jobs as a backup plan knowing the unpredictability of farming." - **Rice County**

"The climates from southern regions are increasingly in our area compared to the 1960s and 1970s." - **Stearns County**

"Resilience requires asking questions and being able to think outside of the box. We can't limit ourselves to "this is the way it's always been done." - **Morrison County**

"Our ability to pivot when something is not working even in the middle of the season is what keeps us resilient. We are determined to stick to our mission as a family farm and discuss opportunities with each other." - **Morrison County**

"During COVID, we saw the importance of having more inputs produced on farm, so we started composting – we have composted over 350,000 tons of material." - **Clay County**

"I'm concerned about soil health, soil loss." - **Mille Lacs County**

"Crop insurance ability to cover back-to-back-to-back disaster years." - **Redwood County**

"In the face of future droughts and floods, we will continue the regenerative practices we have implemented. Sustaining the resilience we have created will make us less susceptible to future weather extremes. Even while staying true to the principles of soil health the farm still has issues to contend with like receiving runoff from neighbors' fields and flooding near the river." - **Redwood County**

"The mature corn line moving North." - **Pennington County**

"I'm concerned about not being able to adapt fast enough." - **Scott County**

"Last year, we didn't even have spring. It was snowing forever - there was snow on the ground in May. And then two weeks later it was summer. I worry about having these extreme temperature changes in the summer as well. I worry about if the ecosystem can adapt. If we have a torrential downpour that we shouldn't have had, then I can't get in the field because it's muddy." - **St. Louis County**

"I'm concerned about unpredictable weather." - **Otter Tail County**

continued

What Are Farmers Saying About Building Resilience? *continued*

"A beautiful sight for me used to be when the corn was about 12 inches tall, lush green and the soil was really black, now for me that is not beauty anymore. Now when the corn is about a foot tall and I have soybean residue in-between the rows and I don't have black soil, to me that's beauty. My mindset has changed and going to see these things has made the difference." **- Swift County**

"You can really see how farmers are getting serious about making these changes. Peer pressure is also hugely important. We listen to our agronomists and need trustworthy professionals, but we also want farmer-to-farmer networks." **- Mower County**

"Drought, flooding, more intense storms, frost damage." **- Otter Tail County**

"Smoke in the summer is making it difficult to be outdoors." **- Clay County**

"A big challenge is maintaining general infrastructure like buildings and equipment. There are increasing pressures on already strained infrastructure from increasing storms, out of the ordinary large snowstorms, and increasingly erratic weather that makes maintenance more difficult and expensive." **- Kandiyohi County**

"In the last 10 years, it's really been this pendulum of extremes. Right now it's been a warm, dry winter. It's been so warm that the ground is in a thaw/freeze cycle. I feel like I need to have diversity in my farm and what I'm growing so that I'm not depending on one or two things." **- St. Louis County**

Farmers walk together during a farm tour at Scott County MFU President Mike Seifert's farm in Jordan, Minnesota.

How We're Addressing Climate and Agriculture at Farmers Union

There are many opportunities to support farmers' role in climate resilience. This section looks at strategies that MFU's Climate and Working Lands Program is working on to empower farmer ownership of climate solutions, ensure competitive markets and bring the voice of farmers to the table.

Cooperatives

Often, solutions to the climate crisis focus on individual entrepreneurship or on public policy solutions. While both are important pieces of building meaningful and scalable climate action, cooperatives offer additional social and community benefits that are critical for ensuring a sustainable and resilient future. Farmer-owned cooperatives reduce costs of production, maintain a reliable source of inputs, effectively market and process farm products, and help retain wealth in rural communities.

Green Ammonia and Fertilizer Production

Many MFU members have stressed the importance of alternative and stable input markets. Nitrogen fertilizer, a key input for many farmers, is not only a significant contributor of GHG emissions worldwide, but the market is notoriously volatile, unpredictable and heavily concentrated.

Transitioning to localized and domestic green fertilizer production, coupled with farmer ownership, can enhance economic resilience for family farmers and rural communities. MFU sees a meaningful opportunity for distributed and local production of decarbonized nitrogen fertilizer in production facilities owned by farmer cooperatives. With this approach, the energy transition can be democratized and can provide farmers additional opportunity to benefit from new low- or zero-carbon energy production. The local production of fertilizer will also provide self-sufficiency in Minnesota's agricultural sector and reduce market volatility for essential inputs.

Recent federal and state investments, including the IRA's hydrogen tax credit (45V) and Minnesota's $7 million investment in a Green Fertilizer Grant Program are unlocking opportunities to grow and scale this emerging sector.[19] The Green Fertilizer Grant Program, administered through MDA, provides support to farmer cooperatives to invest in green fertilizer production facilities.

Co-ops for Climate

Supporting farmer cooperatives has long been a central part of Farmers Union's mission and has continued throughout the decades, adapting to the changing needs and challenges faced by Minnesota farm families. As climate change continues to impact agriculture across the state, there's opportunity for cooperatives to meet the need for meaningful, farmer-centered solutions from renewable energy to novel crops and new markets.

Through the Climate and Working Lands program, MFU is promoting cooperative development through a grant program for farmer cooperatives that focuses on climate action. The 'Co-ops for Climate' grant program provides funds for technical assistance for cooperatives to engage in climate solutions, building capacity and advancing cooperative models for the future.

In 2023, the first grants were awarded to cooperatives that are working in a range of areas, from strengthening markets for alternative crops, including perennial grains and tree seedlings, to developing a local beef market and creating opportunities for historically marginalized farmers in Minnesota to engage in specialty crop production. The second round of grants was awarded in 2024 to three farmer-led cooperatives building new markets for their products with climate resilience benefits.

Competition

Farmers, workers, and consumers alike benefit from a food and agriculture system that is distributed, resilient and fair.

Corporate consolidation makes it harder for farmers to be resilient and earn a fair living. Many farmers have shared their experiences of receiving low prices for their product, and the high cost of maintaining production. With a few giant firms controlling the inputs and markets farmers rely on, the farmers' share of every dollar spent on food has declined from nearly 50 cents in 1952 to less than 15 cents today, the lowest on record. Companies such as Bayer, Cargill, and Nutrien Ag Solutions, known for their core businesses in crop inputs and sales, are now expanding into climate-smart agriculture. This strategic move further increases their market dominance because of their position across the supply chain. Without proper competition policy, new climate-smart markets could become highly consolidated and create the same issues seen in other parts of the agricultural economy.

19 Minnesota is a front-runner in the field of green ammonia for agricultural use. Notably, the state funded a first-of-its-kind project involving renewable hydrogen and ammonia production in 2013 at the University of Minnesota's West Central Research and Outreach Center. This project uses wind power to generate anhydrous ammonia which has been successfully deployed on nearby cropland.

Companies use their market power to push down prices paid to farmers, increase input costs, stifle innovation born from competition, offshore rural jobs, close Main Street businesses, influence public policy, and otherwise limit the individual farmers' voice in the marketplace and our democracy. The impact corporate monopolies have on farmers and rural communities was discussed in many listening sessions as MFU members mentioned the loss of small businesses in their towns and difficulties in accessing service providers for equipment repairs. Farmers also noted that already very slim margins hinder their ability to invest in climate-smart production methods like no-till equipment.

Companies can use their power to act as *de facto* regulators. For instance, they may start expecting farmers to submit climate data along with their grain or livestock at the point of sale. This could become standard practice, especially in scenarios where there are few competitive buyers. A potential outcome could be further loss of market power for farmers, while companies gain greater leverage in terms of pricing, production, and overall dominance over the agricultural economy.

A changing climate will continue to accelerate marketplace pressures directly and indirectly. More frequent severe weather events and production challenges will likely cause disruptions to an already fragile and concentrated sector.

To challenge consolidation and the many impacts it has on the agricultural community, MFU is invested in building diverse, distributed market opportunities, including through cooperatives, incentives for small businesses and supply chain development.

The Farmers' Guide to Carbon Markets

Carbon markets are one of the new markets emerging for farmers. Over the last few years, many MFU members have raised concerns about the fairness, transparency and structure of carbon markets and how contracts for selling carbon 'credits' work. Additionally, many farmers sought clarity in how carbon markets view additionality, data ownership, and standards for measurements, reporting and verification.

In response to these concerns and questions raised by MFU members about deciding what's right for their farms and potential risks of carbon markets, MFU in partnership with MDA and **Farmers' Legal Action Group** (FLAG), developed *The Farmers' Guide to Carbon Market Contracts in Minnesota*. This guide provides plain language information to farmers about these emerging market opportunities, helping to create fairer and more transparent markets. During the 2023 state legislative session, based on findings from the Farmers' Guide, the legislature passed a law barring confidentiality clauses in carbon market contracts in order to promote fairness for farmers engaging in carbon markets.

Jim Falk, a farmer in Swift County, spoke at the Minnesota Farmers Union's 2024 annual Legislative Fly-In, which brought nearly 300 members from across the country to Washington, D.C., to meet with lawmakers and advocate for fair farm policies.

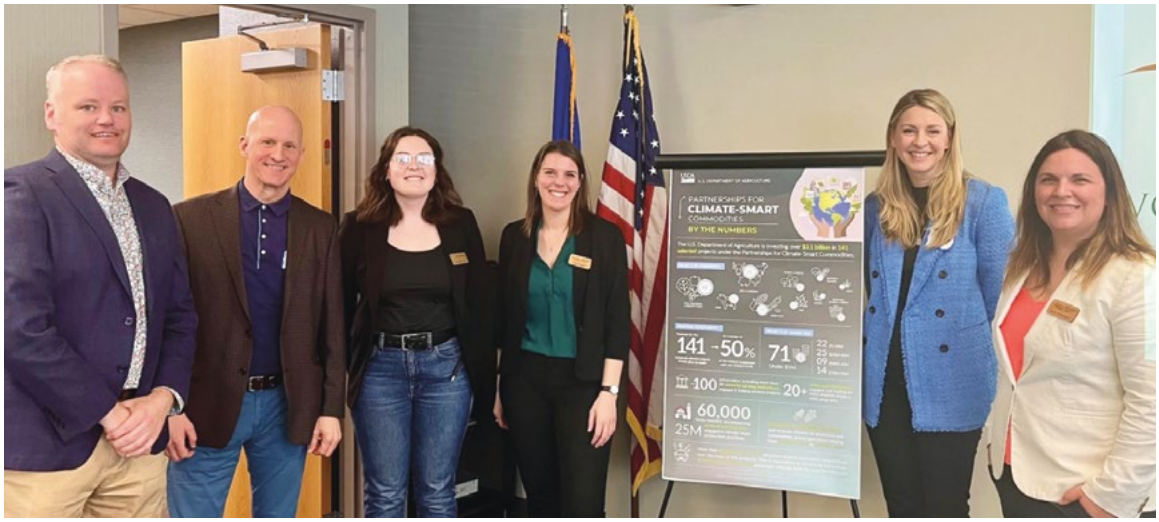
Bringing Farmer Voices to Policy Discussions

Minnesota Working Group for Partnerships for Climate-Smart Commodities (PCSC)

In response to Minnesota being listed on over 30 PCSC projects, Minnesota Farmers Union, in partnership with Minnesota Milk, Edge Dairy and The Nature Conservancy, developed the Minnesota Working Group for Climate-Smart Commodities. The goals of this working group are to convene partners to share information about how grant funds will be deployed within Minnesota, and for coordination across grant partners and farm organizations to ensure these programs support farmers and our natural resources.

At the convening of the Minnesota Working Group for Climate-Smart Commodities in October of 2023, USDA Under Secretary for Farm Production and Conservation Robert Bonnie noted, "*When we developed Partnerships for Climate-Smart Commodities and rolled it out, it was a bit like throwing a party and not knowing if anybody would show up. I'm not sure if anybody showed up as much as Minnesota showed up.*"

"*The Climate-Smart Agriculture initiative at USDA builds on the work that Minnesota farmers and leaders have been doing to build more resilient agricultural systems*," said Minnesota Farm Service Agency State Executive Director Whitney Place at the Minnesota Working Group convening in May 2023.



Participants in the first convening of the MN Working Group for Climate-Smart Commodities (pictured left to right:) Joe Smentek (Minnesota Soybean Growers Association), Brad Jordahl Redlin (Minnesota Department of Agriculture), Julia Wickham (Office of Sen. Tina Smith), Ariel Kagan (MFU), Whitney Place (Farm Service Agency in Minnesota), Anne Schwagerl (MFU)

State Level Funding and Policy

There have been significant efforts on the state level to empower farmers and landowners to participate in voluntary conservation programs and adopt climate-smart practices.

According to the **2022 Census of Agriculture**, the state is seeing a positive trend in the use of conservation practices that are important in addressing climate change, like no-till agriculture and the use of cover crops. In the past five years, Minnesota has had a 30% increase in the use of cover crops, which helps reduce erosion, improve soil health, and improve water quality.

Minnesota is also seeing growth when it comes to local food systems. There was a growth in the number of farms between 10 and 49 acres, often the right scale for beginning and emerging farmers to start their operation. There was also significant growth between 2017 and 2022 in the number of farms selling directly–to institutions like food hubs and schools. Programs like the **MDA farm-to-school grant program** and the investments in **The Good Acre's Local Emergency Assistance Farmer Fund** have helped the growth of that sector.

Even with recent climate resilience investments, there remains greater demand than resources available at the state level for farmers to access technical and financial assistance, indicating further opportunities for growth.

Recent Climate Resilience Investments in Minnesota

During the 2023 legislative session, lawmakers made investments to reduce carbon emissions and build resilience in agriculture, including:

- **$7 million** to pilot a green fertilizer production incentive.
- **$21 million** for soil health financial and technical assistance at the Board of Water and Soil Resources (BWSR), which could leverage additional federal funds.
- **$2.35 million** for soil health financial assistance grants which help farmers purchase equipment that supports soil health practices.
- **$2 million** for resilience planning at the University of Minnesota Extension.

> *"It's important to recognize the financial hurdles farmers face when trying to implement soil health practices because of specialized, expensive equipment and machinery. The Soil Health Financial Assistance Grants will help offset equipment costs, helping to expand the number of Minnesota farmers and acres engaged in soil health activities."* [20]
>
> **- MDA Commissioner Thom Petersen**

20 Minnesota Department of Agriculture. (2023, August 1). *New Funding Available to Help Improve Minnesota's Soil Health*. [Press release] https://www.mda.state.mn.us/new-funding-available-help-improve-minnesotas-soil-health

Conclusion

Farmers are experiencing the changing climate and adapting to new environmental and market conditions. This report signifies the importance of continuing to listen to farmers while considering public and private climate action.

The Climate and Working Lands program's work to engage farmers in conversations about climate and agriculture continues. We hope this report serves as a tool for kickstarting more conversations. MFU is committed to promoting the voice of farmers and rural communities in Minnesota and advocating for farmer-centered approaches when considering agriculture as a climate solution. Farmers have a stake in climate policy and the development of new voluntary, incentives-based climate-smart markets and we are honored to help add their voices to this important discussion.

Farmer walking in his Kernza field in Western Minnesota.

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