



Environment and Natural Resources Trust Fund

2026 Request for Proposal

General Information

Proposal ID: 2026-429

Proposal Title: Roadmap for Pollution-Smart Agriculture in Minnesota

Project Manager Information

Name: Jason Hill

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

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Project Basic Information

Project Summary: We will provide Minnesotans with a detailed report describing the potential for Minnesota agriculture to contribute to improved air quality and reduced greenhouse gas emission goals while improving farm profitability.

ENRTF Funds Requested: \$377,000

Proposed Project Completion: June 30, 2029

LCCMR Funding Category: Land (F)

Project Location

What is the best scale for describing where your work will take place?

Statewide

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Nothing dominates the Minnesota landscape like agriculture, which constitutes half the state's land area. Food, fiber, and fuel production occurring on these lands is central to Minnesota's economy and well-being. However, these same activities can also cause poor air quality that contributes to poor health and premature mortality. Approximately 700 deaths per year are attributed to Minnesota agriculture, with both rural and urban populations affected. Most of these deaths are caused by ammonia emissions from fertilizer and manure; dust from tilled fields and particulate matter from farm equipment also contribute.

There now exist major opportunities for agriculture to contribute to improved air quality and greenhouse-gas targets. This proposal explores a suite of innovative practices in terms of their potential for long-term environmental benefits. Our work and that of others has identified numerous ways to reduce agriculture's impacts on air pollution, including changes in fertilizer use, mitigation measures in livestock-production facilities, and more efficient fuel use. How and where these improvements should be deployed to maximize health benefits is unknown, however. There is no Minnesota-specific guide for how and where new farming practices should be prioritized to improve air quality and climate. This gap hinders efforts to address agriculture's impacts.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

This proposed work will develop a guide for stakeholders (including policymakers, regulators, and farmers) that assesses and compares options for improving the environmental performance of Minnesota agriculture while optimizing profitability. State-of-the-science computer models developed and used here at the University of Minnesota will permit rapid scenario assessment across a broad range of emission sources and types. These models will provide a broad understanding of the effects of reducing agricultural emissions in the state. We will monetize these changes to provide a basis for comparing the economic value of health and climate benefits against the economic costs of implementation. Put more plainly, our work will show what options for reducing agricultural air pollution result in the greatest benefits for farmers and for the public at the lowest costs to each.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

The specific outcome of this project is an increased public understanding of the potential for specific air quality protection measures to benefit our state's climate, air quality, and rural development goals. This information will be described in the form of a public report that will provide actionable information for farmers, agribusiness, investors, environmental non-governmental organizations, policymakers, regulators, and consumers. Our work will both raise awareness of these key environmental issues, and provide a roadmap for solutions that can realize benefits for all Minnesotans—and in particular for win-win outcomes across rural and urban populations.

Activities and Milestones

Activity 1: Quantify the changes in emissions of air quality and climate pollutants from improved farming practices

Activity Budget: \$125,000

Activity Description:

The objective of this activity is to quantify the changes in emissions of air quality and climate pollutants that can be achieved through improved agricultural practices. The tasks involved include compiling a comprehensive inventory of potential improvements, determining the associated emission changes in each case, and using GIS software to define a range of scenarios in which these improvements are deployed across the Minnesota agricultural landscape. Data will be sourced from publicly-available state and federal resources, communications with producers, and consultation with other experts. Air pollutants to be considered will be those that affect atmospheric fine particulate matter and greenhouse gasses. The specific outcome of this activity will consist of a spatially-explicit inventory of pollutants emitted under a suite of possible mitigation scenarios.

Activity Milestones:

Description	Approximate Completion Date
Compilation of Minnesota-specific production practices for air pollution mitigation	December 31, 2026
Development of emissions inventories for implementation of air pollution mitigation practices	May 31, 2027

Activity 2: Quantify the human health and climate change benefits from implementation of new farming practices

Activity Budget: \$175,000

Activity Description:

The objective of this activity is to quantify the changes in human health and greenhouse gas emissions arising from the modeled improvements in agricultural practices. Activity tasks will include using the emissions inventories developed in Activity 1 as inputs to computer models that estimate changes in health and climate outcomes. The specific outcome of this activity will consist of estimated changes in health and climate outcomes under the different mitigation scenarios.

Activity Milestones:

Description	Approximate Completion Date
Quantification of climate change benefits of improved agricultural practices	May 31, 2028
Quantification of air quality benefits of improved agricultural practices	September 30, 2028

Activity 3: Prepare and present the results of the project to stakeholders and the public

Activity Budget: \$77,000

Activity Description:

The objective of this activity is to prepare the final report and public presentation. This will be accomplished by writing up the final results and submitting it for peer comment and review. The outcome, a final report, can be used directly by stakeholders to understand the potential for agricultural environmental mitigation in Minnesota to benefit air quality and state greenhouse gas reduction targets.

Activity Milestones:

Description	Approximate Completion Date
Public release of a final project report	March 31, 2029
Public engagement around the release of the final project report	June 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dylan Millet	University of Minnesota - Dept. of Soil, Water, and Climate	co-PI	Yes

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

We will communicate findings through publications and at conferences, by presenting to state and local elected officials, and by discussing results at state agencies including the Minnesota Departments of Agriculture and Health, and MPCA. We will collaborate with the Minnesota Climate Adaptation Partnership to ensure outcomes are disseminated to relevant policymakers and stakeholders. Modeling and analysis results will be permanently archived and made publicly available at the Data Repository for the University of Minnesota. No additional work will be needed for this project, but we anticipate seeking funding for subsequent work from federal, state, and foundation sources.

Project Manager and Organization Qualifications

Project Manager Name: Jason Hill

Job Title: Distinguished McKnight University Professor

Provide description of the project manager's qualifications to manage the proposed project.

Dr. Jason Hill is a Professor in the Department of Bioproducts and Biosystems Engineering at the University of Minnesota. He received his A.B. from Harvard College in 1997 and his Ph.D. from the University of Minnesota in 2004. Dr. Hill has been studying the environmental, human health, and climate impacts of energy and natural resource use for over 20 years. As a central part of this work, his group has completed multiple projects using life cycle analysis to compare the environmental effects of conventional versus alternative energy sources, and of agriculture, within Minnesota and beyond.

Dr. Dylan Millet is a Professor in the Department of Soil, Water, and Climate at the University of Minnesota. He received his B.Sc. from the University of British Columbia in 1997, his Ph.D. from U.C. Berkeley in 2003, and completed postdoctoral training at Harvard University in 2007. Dr. Millet has been studying air pollution and atmospheric chemistry for over 20 years. He has completed many research projects examining how human-caused and natural emissions affect air quality and climate change. As part of these studies, his research team has successfully used ambient measurements, satellite data, and atmospheric modeling to characterize emissions for a wide range of air pollutants and greenhouse gases across Minnesota.

Drs. Hill and Millet have worked together on successful grants before, including as project leads in the US-EPA funded Center for Air, Climate and Energy Solutions. If funded, Drs. Hill and Millet will work together to accomplish the research scope of this project and to co-supervise the project's postdoctoral researcher. They will be responsible for fulfilling project milestones and reporting requirements, and for working with relevant stakeholders to ensure that project findings are broadly and effectively disseminated.

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:

The University of Minnesota is one of the largest US universities and offers a rich research and academic infrastructure.

PI Hill is in the Department of Bioproducts and Biosystems Engineering, which has a mission to develop solutions for the sustainable use of renewable resources and the enhancement of the environment. The department discovers innovative solutions to advance sustainable production and consumption of energy, food, feed, fiber, materials, and chemicals through engineering, science, technology, and management.

Co-PI Millet is in the Department of Soil, Water, and Climate, which has a mission to advance understanding of Earth system processes and the interactions among land, atmosphere, and water. The department seeks to improve and protect the quality of soil, air, and water resources in natural and managed ecosystems; enhance agricultural and forest productivity and sustainability, predict and mitigate impacts of environmental change on ecosystems and society; and provide science-based knowledge for improved decision making and a better-informed citizenry.

Drs. Hill and Dr. Millet have sufficient office and laboratory space, and computing resources, to conduct the proposed research. The project will also make use of the University of Minnesota Supercomputing Institute (MSI), which provides extensive software options and an array of high-performance computing systems.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Lead PI - Summer salary only		Direct all research and personnel, create models			36.6%	0.24		\$64,339
Post doc reseracher		Run calculations and experiments			25.9%	3		\$244,530
Co-PI - summer salary only		Conduct specific research within project			36.6%	0.24		\$66,514
							Sub Total	\$375,383
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
							Sub Total	-
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
							Sub Total	-
Travel Outside Minnesota								

							Sub Total	-
Printing and Publication								
	Publication	Partial cost of 1 journal fee	to disseminate results and receive peer review					\$1,617
							Sub Total	\$1,617
Other Expenses								
							Sub Total	-
							Grand Total	\$377,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$377,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [54593ee0-c73.pdf](#)

Alternate Text for Visual Component

This figure is an overview of the proposal and includes supporting images of a map of the agricultural area of Minnesota, a headline from the Star Tribune, a diagram of agricultural pollution emissions, and a photograph of a combine harvester....

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Letter of Authorization to submit	788d3d5c-66d.pdf
Audit	4d96c9f4-c39.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

N/A

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

No

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing \$10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care,

treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Sponsored Projects Administration of the University of Minnesota

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A