Environment and Natural Resources Trust Fund

2025 Request for Proposal

General Information

Proposal ID: 2025-218

Proposal Title: Minnesota Center for Agrivoltaics and Biodiversity (MCAB)

Project Manager Information

Name: Uwe Kortshagen

Organization: U of MN - College of Science and Engineering

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Email: kortshagen@umn.edu

Project Basic Information

Project Summary: Solar energy faces mounting land competition, rural reluctance, and aesthetic concerns, which may hinder Minnesota's clean energy transition. The Minnesota Center for Agrivoltaics and Biodiversity aims to overcome these barriers.

ENRTF Funds Requested: $2,750,000

Proposed Project Completion: June 30, 2028

LCCMR Funding Category: Air Quality, Climate Change, and Renewable Energy (E)

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.

Minnesota's ambitious clean energy goals call for carbon-free electricity by 2040, with solar photovoltaics expected to be pivotal. However, solar energy's land-intensive nature poses challenges as utilities plan several gigawatts of solar development over the next decade, necessitating vast land allocation. This expected surge in solar developments creates tensions, pitting photovoltaics against agriculture and housing development.

Rural communities, in particular, grapple with relinquishing prime agricultural land for solar projects, foreseeing adverse effects like reduced land availability for rent for farming and diminished local revenues from agricultural services, sales of seeds and fertilizer. Out-of-state solar developers' involvement also exacerbates concerns by diverting resources and revenue streams from local communities to out-of-state investors. Furthermore, aesthetic worries regarding landscape alterations further fuel opposition to unchecked solar developments.

In the past, many projects proceed without addressing these multifaceted concerns, prompting community backlash and even moratoria on future solar ventures in some Minnesota counties. Failure to mitigate these issues risks impeding Minnesota's clean energy transition significantly. As such, urgent action is needed to reconcile competing interests and ensure sustainable solar developments that co-maximize solar energy production with economic benefits to local Minnesota communities.

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.

Now is the opportune time to shape Minnesota's clean energy transition for maximum sustainability and community benefit. The proposed Minnesota Center for Agrivoltaics and Biodiversity aims to demonstrate the advantages of agrivoltaics for future solar developments and the retrofitting of existing ones while exploring their impact on biodiversity.

Agrivoltaics involves integrating agriculture with solar energy production on the same land, maintaining agricultural productivity, unlike traditional solar farms. These systems combine energy and food production or grazing, leading to synergistically enhanced energy generation and crop yields. Research suggests that this approach could create over 100,000 additional jobs in rural U.S. communities, diversify farmer income, and reduce risk. Studies also highlight the positive public perception of agrivoltaic projects, indicating widespread support for this technology.

Given its local nature, tailored to regional crops and grazing practices, conducting agrivoltaics research in Minnesota is essential for visibility and engagement among communities, electric utilities, and solar developers. This localized approach ensures that agrivoltaics align with the needs and values of Minnesota's diverse communities while fostering sustainable energy solutions and removing barriers to Minnesota's clean energy transition.

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?

- Demonstrating the viability and potential advantages of agrivoltaics will enhance public acceptance of crop-producing & livestock-grazing solar projects. This will reduce the competition for land between photovoltaics, agriculture, and housing development, removing mounting barriers to Minnesota's clean energy transition.
- Scientific assessment of benefits/drawbacks and development of best practices of agrivoltaics for Minnesota-specific crops and livestock
- Scientific assessment of biodiversity impacts of solar developments and optimization of post-installation restoration efforts
- Large agrivoltaic projects near population centers may lead to new land access models, for instance, for

emerging farmers

- Locally grown foods will retain revenue streams in Minnesota communities

Activities and Milestones

Activity 1: Agrivoltaic plant growth on existing utility-scale solar farms

Activity Budget: $598,256

Activity Description:
This activity, a collaboration between UMN-Twin Cities researchers and US Solar, a Minnesota solar developer, will establish agrivoltaic best practices on a utility-scale solar farm.

Research will be conducted at the Big Lake LLC 1 solar farm in Minnesota in collaboration with the National Renewable Energy Laboratory (NREL). Researchers plan to equip the site with instruments to measure various environmental parameters under solar panels and in control plots receiving full sun, including photosynthetically active radiation, soil moisture, and soil and air temperature. Plant growth studies will assess the viability of various crops under agrivoltaic conditions, including crops suited to partial shade (e.g., lettuce, kale) and full sunlight (e.g., tomatoes, peppers), comparing their growth with control plots. Parameters such as biomass production, plant morphology, and yield will be measured to determine the suitability of agrivoltaic crop production in Minnesota.

By integrating these elements, the research aims to develop guidance for optimizing agrivoltaic practices for sustainable crop production in utility-scale solar farm environments. The close collaboration with US Solar will ensure that the researcher's results will inform the design of future solar developments by US Solar and other solar developers and utilities in the State.

Activity Milestones:

Description	Approximate Completion Date
Site instrumentation based on NREL experimental protocols	March 31, 2026
Site preparation for plant growth studies	March 31, 2026
Replication 1 of plant growth studies for various target crops	December 31, 2026
Replication 2 of plant growth studies for various target crops	December 31, 2027
Data analysis and reporting of findings, development of guidance for agrivoltaics on Minnesota solar farms	June 30, 2028

Activity 2: Evaluate dairy cow grazing interaction with agrivoltaic solar arrays

Activity Budget: $233,171

Activity Description:
Dairy grazing presents a significant opportunity for agrivoltaics, an area where the West Central Research and Outreach Center (WCROC) has conducted extensive research. At WCROC's dairy farm, a single row of single-axis tracking solar panels (~20 kW) will be installed in a cow pasture. These panels, mounted higher than usual to prevent cow-panel interactions, will be evaluated for their impact on cow behavior and potential panel damage. Strategies like protecting panel leading edges with rub bars and electric fence wires that move with panels will be tested. Management strategies like reducing the maximum panel tilt angle to keep the lower panel edge higher will also be explored. Since solar production is lowest when panels approach a vertical orientation, limiting extreme tilt angles will have minimal impact on total energy production. Further investigation will involve coordinating cow milking times with daylight hours to prevent cow-panel interactions during accessible periods. This research aims to optimize agrivoltaic systems for dairy grazing while considering agricultural and solar energy production requirements.

Activity Milestones:

Description	Approximate Completion Date
Procure solar array and design cow/panel interaction preventative measures	December 31, 2025
All pre-design/design/preconstruction milestones from questionaire table, col. A completed	December 31, 2025
Install solar array and create cow/panel interaction test plan	April 30, 2026
Evaluate cow/panel interactions and test preventative methods	May 31, 2028
Create solar cow grazing best practices manual and final report	June 30, 2028
All close-out milestones from questionaire table, col. A completed	June 30, 2028

Activity 3: Horticultural studies of agrivoltaic target crops

Activity Budget: $492,903

Activity Description:
The main difference between agrivoltaic and open-field systems lies in reduced sunlight and temperature in the former. While vegetables typically thrive in full-sun conditions, high light, and temperature can adversely affect crops like sweet peppers, leading to sunscald and reduced yield. Similarly, cauliflower may suffer from discoloration under intense light, yet low-light conditions may hinder curd formation. Our study aims to assess the potential of vegetables in agrivoltaic systems by examining the impact on cauliflower, peppers, and winter squash yield, marketability, and quality compared to traditional systems.

To achieve this, we'll establish a ~1/2-acre solar array at the Southern Research and Outreach Center in Waseca, MN, and irrigate the area. Over two years, we'll grow two hybrids each of peppers, cauliflower, and winter squash under and adjacent to the array, rotating crops annually. Yield and quality assessments will involve harvesting representative samples and evaluating for sunscald, marketability, curd color, firmness, and squash quality parameters. Environmental conditions will also be monitored. This research aims to enhance our understanding of agrivoltaics' potential for vegetable production while maintaining quality and yield standards.

Activity Milestones:

Description	Approximate Completion Date
All pre-design/design/preconstruction milestones from questionaire table, col. A completed	December 31, 2025
Construction of solar arrays and irrigation system	June 30, 2026
Summary report of year 1 produce yield and quality results	March 31, 2027
Presentation of year 1 and 2 results to the Minnesota Fruit and Vegetable Grower’s Association	January 31, 2028
Peer-reviewed publication and guidance for agrivoltaic vegetable crops in Minnesota	June 30, 2028
All close-out milestones from questionaire table, col. A completed	June 30, 2028

Activity 4: Innovative solar systems for high-value vegetable crops

Activity Budget: $711,307

Activity Description:
High-value crops hold particular promise for agrivoltaic systems. This activity will study an innovative "solar low tunnel" to grow high-value crops like strawberries and lavender. A small single-axis tilt solar array (50 – 70 kW) will mimic low tunnel growing environments. Panels will be closely spaced to create a continuous "roof" over crops, with retractable curtains on the array edges for weather protection, akin to traditional low tunnels. This setup will be installed at the UMN West Central Research and Outreach Center to compare with conventional low tunnels.

The research will optimize the growing environment alongside solar energy production. Environmental sensors will monitor conditions inside and outside the "solar low tunnel," including temperature, humidity, light levels, and plant

evapotranspiration. Conditions will be adjusted by altering solar panel tilt, spacing, and curtain position. Solar production will be logged for a techno-economic analysis of crop productivity and operational protocols. This study aims to enhance crop yields while maximizing solar energy benefits in agrivoltaic systems.

Activity Milestones:

Description	Approximate Completion Date
Design solar array and curtain system	December 31, 2025
All pre-design/design/preconstruction milestones from questionaire table, col. A completed	December 31, 2025
Procure and install solar low tunnel system and monitoring equipment	April 30, 2026
Plan and harvest crops. Test solar low tunnel operating protocols.	May 31, 2028
Complete technoeconomic analysis and final report.	June 30, 2028
All close-out milestones from questionaire table, col. A completed	June 30, 2028

Activity 5: Assessing solar farm impacts on plant biodiversity and post-installation restoration efforts

Activity Budget: $566,333

Activity Description:
The installation of solar panels can alter environmental conditions through soil disturbance during installation and changes to microclimatic variables under panels. To determine the impacts of these changes on local plant biodiversity, which serves as critical pollinator habitat, as well as providing other ecosystem services, we will conduct detailed vegetation surveys at ~50 US Solar farms established in Minnesota over the past ten years. The surveys will characterize the biomass, composition, and diversity of plant communities in replicate plots under and between panels at each farm and measure soil and environmental variables. To assess how restoration efforts post-installation can enhance plant biodiversity and reduce weed establishment, we will evaluate the efficacy of three prairie seed mixtures planted under and between panels of a 100 kW solar array established at the UMN Cedar Creek Ecosystem Science Reserve in East Bethel. Replicate plots within each seed mixture, which differ in plant diversity, will be monitored using the same methods as the more extensive 50-site survey. Additionally, a new K-12 educational curriculum regarding solar energy, biodiversity, and agrivoltaics will be developed for school field trip visits at Cedar Creek, which will reach ~15,000 K-12 students over the course of the project.

Activity Milestones:

Description	Approximate Completion Date
All pre-design/design/preconstruction milestones from questionaire table, col. A completed	December 31, 2025
Solar panel installation for Cedar Creek restoration experiment	March 31, 2026
Survey plant biodiversity at 50 US Solar farms, monitor plant biodiversity at Cedar Creek experiment.	December 31, 2026
Implement K-12 education activities at Cedar Creek	December 31, 2026
Complete biodiversity monitoring at Cedar Creek experiment, submit final report to LCCMR	June 30, 2028
All close-out milestones from questionaire table, col. A completed	June 30, 2028

Activity 6: Outreach and Stakeholder Engagement

Activity Budget: $148,030

Activity Description:
Outreach will play a central role in center activities, as research results will need swift dissemination to farming communities, solar developers, utilities, and the public. The team will employ a multifaceted approach:

1. An annual Minnesota agrivoltaics conference will actively engage the Minnesota Solar Energy Industry Association,

farming communities, and electric utilities, with invitations extended to the general public and legislators.

2. The Regional Sustainable Development Partnerships (RSDP) and the Clean Energy Resources Teams (CERTs) will coordinate outreach activities to connect farmers with agrivoltaics research and projects. With staff around the State, RSDP and CERTs will leverage community connections, serving as two-way-conduits for sharing research results and gathering community input through events, direct outreach, and strategic communications. Target audiences will include agricultural organizations and producers, community-based organizations serving underserved communities, rural local governments, Tribal governments, and solar developers.

3. Outreach to emerging farmers will explore opportunities for new land access models through agrivoltaics, with solar developers and utilities opening up their solar farms to farming activities. Collaborating with Big River Farms, which trains emerging farmers, center researchers will participate in annual emerging farmer meetings to share research findings.

4. K-12 and public outreach at Cedar Creek, detailed in Activity 5.

Activity Milestones:

Description	Approximate Completion Date
Minnesota agrivoltaics conference and 1-2 workshops/outreach events in farming communities	June 30, 2026
Minnesota agrivoltaics conference and 1-2 workshops/outreach events in farming communities	June 30, 2027
Minnesota agrivoltaics conference and 1-2 workshops/outreach events in farming communities	June 30, 2028

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Vivian E. Ferry	University of Minnesota - College of Science and Engineering	Vivian Ferry is an Associate Professor in the Department of Chemical Engineering and Materials Science at the University of Minnesota. She is an expert in innovative photonic concepts. She has experience in modeling outdoor photovoltaic technologies and plant growth in greenhouse and outdoor environments.	Yes
Nathan Eylands	University of Minnesota - College of Food, Agriculture, and Natural Resource Sciences	Nathan Eylands is an Assistant Professor in the the Department of Horticulture. Professor Eylands is an expert on controlled environment agriculture with an emphasis on the impact of the spectral distribution of light on plant growth characteristics.	Yes
Peter Kennedy	University of Minnesota - College of Biological Sciences	Professor Kennedy is a Professor of Plant and Microbial Biology and Associate Dean for Research in the College of Biological Sciences. His research, mostly performed at the Cedar Creek Ecosystem Science Reserve, seeks to mechanistically understand how both biotic and abiotic factors influence the structure and functioning of ecological communities.	Yes
Bradley Heins	University of Minnesota - West Central Research and Outreach Center in Morris	Professor Heins is an Associate Professor of Organic Dairy Management in the Department of Animal Science at the University of Minnesota's West Central Research and Outreach Center in Morris. He has worked extensively on agrivoltaics and lifestock grazing and is project director of a USDA funded organic dairy research grant.	Yes
Eric Buchanan	University of Minnesota - West Central Research and Outreach Center in Morris	Mr. Buchanan is the Director of Renewable Energy at the West Central Research and Outreach Center. He conducts applied research on small-scale renewable energy systems, focusing on their integration into agricultural systems. His research covers many forms of renewable energy, including solar PV, hydrogen fuel cells, and renewable ammonia production.	Yes
Charlie Rohwer	University of Minnesota - Southern Research and Outreach Center in Waseca	Dr. Rohwer is a Researcher 6 at the Southern Research and Outreach Center. For 16 years, he has conducted applied field research on a variety of solanaceous, leguminous, brassicaceous, cucurbital, and umbelliferous crops. His research interests range from variety trials and cover crop implementation to nutrient management and resilience studies.	Yes
Melissa Birch	Clean Energy Resource Teams	Dr. Birch co-directs the Clean Energy Resource Teams (CERTs). With staff based around the state, CERTs will serve as a two-way conduit for sharing research results and gathering community input through events, direct outreach and assistance, and strategic communications, including community engagement, developing accessible tools and guides, and media placement.	Yes
Shaylyn Bernhardt	Clean Energy Resources Teams	Ms. Bernhardt is the CERTs communications manager. Her work will be on executing CERTs' mission to achieve achieve communications, engagement and outreach goals of this project.	Yes
Greg Schweser	Regional Sustainable Development Partnerships	Mr. Schweser is the state-wide director for Sustainable Agriculture and Food Systems for the Regional Sustainable Development Partnerships. Schweser will coordinate outreach activities to connect farmers in the community with agrivoltaics research and projects.	Yes

Aaron Hanson	Institute on the Environment	Mr. Hanson is an energy programs specialist at the Institute on the Environment. He has been involved in multiple agrivoltaics projects and will serve as technical advisor and coordinator for center outreach efforts.	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?

The proposed research will help establish the full potential of agrivoltaics for solar developments. We expect that there will be significant interest both by federal funding agencies and by the solar energy industry. The team will pursue research funding from the US Department of Agriculture, the Department of Energy, and the National Science Foundation. The infrastructure created under this project may also lead to collaborative research projects with solar manufacturers, such as Heliene, Inc., that are interested in evaluating their technologies for agrivoltaic applications.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Develop Solar Window Concentrators for Electricity	M.L. 2018, Chp. 214, Art. 4, Sec. 2, Subd. 07a	$350,000
Environment-Friendly Decarbonizing of Steel Production with Hydrogen Plasma	M.L. 2023, , Chp. 60, Art. 2, Sec. 2, Subd. 07e	$739,000

Project Manager and Organization Qualifications

Project Manager Name: Uwe Kortshagen

Job Title: Professor

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

Uwe Kortshagen is a Professor of Mechanical Engineering at the University of Minnesota. Professor Kortshagen is an expert in solar energy systems and their application in plant growth environments. He holds the Ronald L. and Janet A. Christenson Chair in Renewable Energy. His work has been published in more than 240 scientific articles in peer-reviewed journals. He also holds 4 patents that have been licensed to a total of five industrial partners, generating royalty income exceeding $1M, and having led to 2 start-up companies.

Professor Kortshagen has considerable leadership experience with multi-investigator teams, having led three interdisciplinary research groups of the National Science Foundation-funded UMN Materials Research Science and Engineering Center from 2007-2021. He also directs an Army Research Office-funded Multidisciplinary University Research Initiative project involving partners at Caltech, the University of Michigan, the University of Iowa, and Washington University at St. Louis. He also gained significant management experience by serving for 10 years as Head of the Department of Mechanical Engineering at the University of Minnesota, which comprises more than 40 faculty, 40 staff members, and ~280 graduate students with an annual combined operations, maintenance, and research budget of ~$26M. He will oversee the project and be responsible for reporting to LCCMR and University of Minnesota Leadership.

This project is an equitable and interdisciplinary effort by UMN investigators from multiple colleges. Center strategic decisions will be made by an Executive Committee that will include representatives from each of the center sites. Center leadership will be advised by an external advisory board with members from the solar energy industry and community groups. Representatives of US Solar, Connexus Energy, and Heliene, Inc., have already indicated their willingness to participate.

Organization: U of MN - College of Science and Engineering

Organization Description:
The University of Minnesota–Twin Cities is the State's flagship research institution, with annual research expenditures of ~$1.2B in 2022. Faculty in the College of Science and Engineering have decades of experience with renewable energy technologies, including photovoltaics. Through recent collaborations with faculty in the College of Food, Agricultural, and Natural Resource Sciences (CFANS), these activities have expanded to the nascent field of agrivoltaics.

The West Central Research and Outreach Center (WCROC), part of CFANS, in Morris, MN, has collaborated with farmers and the public for more than 100 years. WCROC provides excellence in applied agricultural research and education, addressing various fields, from crop production to renewable energy.

The Southern Research and Outreach Center (SROC), part of CFANS, in Waseca, MN, conducts innovative research in agricultural production, human health, renewable energy, and the environment, contributing to sustained social and economic development.

The Cedar Creek Ecosystem Science Reserve (CCESR), part of the College for Biological Sciences, is renowned for its ecological research. With decades of data, its research is considered leading in biodiversity research. In addition to research, CCESR supports an extensive education and outreach program, engaging students, teachers, residents, and the public.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Prof. Uwe Kortshagen		Principal Investigator / Project Manager (UMN-TC)			27.1%	0.24		$115,737
Prof. Vivian Ferry		Senior Investigator			27.1%	0.12		$28,848
Prof. Nathan Eylands		Senior Investigator			27.1%	0.12		$20,927
Prof. Peter Kennedy		Senior Investigator			27.1%	0.12		$29,718
Prof. Bradley Heins		Senior Investigator			27.1%	0.12		$26,273
Dr. Charlie Rohwer		Senior Investigator			27.1%	0.15		$16,133
Eric Buchanan		Senior Investigator			27.1%	1.95		$170,110
Aaron Hanson		Technical advisor, outreach coordinator			27.1%	0.24		$26,038
Dr. Melissa Birch		CERTs co-director, outreach			27.1%	0.09		$9,666
Greg Schweser		RSDP sustainable agriculture director			27.1%	0.45		$51,063
Shaylyn Bernhardt		CERTs communications director			27.1%	0.15		$18,044
Kara Baldwin		Cedar Creek educational coordinator			25.1%	0.24		$29,171
CERTs regional coordinator		Outreach coordinator			25.1%	0.24		$25,520
Graduate Research Assistant - Chemical Engineering		solar and environmental measurements, US Solar site, data analysis			41.8%	1.5		$198,838
Graduate Research Assistant - Horticulture Science		plant growth studies - US Solar site			48.8%	1.5		$150,461
Horticulture researcher 2		plant growth studies at Southern ROC			25.1%	3		$169,561
Technician		Cedar Creek experiments			25.1%	3		$166,693

Horticulture Researcher 2		Plant growth, "solar high tunnel", WCROC			25.1%	3		$258,225
Summer interns		grazing and solar tunnel experiments at WCROC			0%	2.01		$70,370
Undergraduate summer students		Cedar Creek experiments			0%	2.25		$61,600
							Sub Total	**$1,642,996**
Contracts and Services								
Southern Regional Development Center	Professional or Technical Service Contract	Outreach and engagment of farming communities				0		$15,000
Services for SROC plant growth experiment	Professional or Technical Service Contract	Professional services, including greenhouse services, etc.				-		$10,678
							Sub Total	**$25,678**
Equipment, Tools, and Supplies								
	Equipment	Solar array	100 kW solar array covering ~1/2 acre for studies at SROC					$244,000
	Equipment	~20 kW solar array and ~60 kW solar array	Specialty solar arrays for grazing studies, solar high tunnel at WCROC					$320,000
	Equipment	Solar Array	100 kW solar array for biodiversity studies at Cedar Creek					$244,000
	Tools and Supplies	Noncapital equipment, moisture sensor, pyrometers, supplies for plant growth studies	Supplies for plant growth studies at US Solar Big Lake site					$53,444
	Tools and Supplies	Supplies for SROC studies	Supplies for plant growth studies at SROC					$46,532
	Tools and Supplies	Supplies Cedar Creek	Supplies for biodiversity research at Cedar Creek					$18,300
	Tools and Supplies	Supplies, tools for WCROC	Supplies, sensors and tools for studies at WCROC					$99,500
							Sub Total	**$1,025,776**
Capital Expenditures								

							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel of project participants to center site, conferences, workshops, outreach events	Travel to attend annual conference, discuss project progress, visit partner sites, participate in off-campus research					$23,700
							Sub Total	**$23,700**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
		Annual Agrivoltaics Conference	Outreach to stakeholders					$15,000
		Participant support	Participant support for educational activities at Cedar Creek					$16,550
		Repairs	potential repairs of equipment					$300
							Sub Total	**$31,850**
							Grand Total	**$2,750,000**

Classified Staff or Generally Ineligible Expenses

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

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
Cash	College of Food, Agriculture, and Natural Resources Science	25% match for solar arrays at WCROC and SROC	Secured	$141,000
Cash	College of Biological Sciences	25% match for solar array at Cedar Creek	Secured	$61,000
			State Sub Total	**$202,000**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**$202,000**

Total Project Cost: $2,952,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: 6b1b3d1b-8e4.pdf

Alternate Text for Visual Component

The image illustrates the different activities of the Minnesota Center for Agrivoltaics and Biodiversity at different project sites: Vegetable growth at US Solar farm in Big Lake, grazing and high-value crops at WCROC, vegetable growth at SROC, biodiversity studies at Cedar Creek Reserve....

Supplemental Attachments

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

Title	File
Endorsement Letter	441af913-33e.pdf
Capital Project Questionnaire	5f6e1a2b-a5e.pdf
Budget Supplement	d58d8f69-eb2.xlsx
US Solar Support Letter	86bfc24e-274.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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

Yes

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

Yes

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

No

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

Yes, Sponsored Projects Administration

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?

Yes

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:

Nathan Eylands, Vivian Ferry, UMN-TC; Eric Buchanan, Bradley Heins, UMN WCROC; Charlie Rohwer, UMN SROC; Peter Kennedy, UMN CBS, Cedar Creek Reserve; Shane Stennes, UMN Systemwide Chief Sustainability Officer