Environment and Natural Resources Trust Fund

2022 Request for Proposal

General Information

Proposal ID: 2022-231

Proposal Title: Minnesota Renewable Energy Jobs Through Technology Commercialization

Project Manager Information

Name: Uwe Kortshagen

Organization: U of MN - College of Science and Engineering

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Project Basic Information

Project Summary: The program will support a fellowship program that trains graduate students in the commercialization of renewable energy technologies developed at the University of Minnesota.

Funds Requested: $332,000

Proposed Project Completion: June 30 2024

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.

Global climate change presents a significant challenge for mankind but also creates economic opportunities for the development of new energy technologies. With increasing public acceptance that new energy solutions are needed in the very near future, there will be tremendous need to quickly bring new energy technologies from the laboratory to commercialization to deployment.

Renewable energy research conducted at the University of Minnesota is of tremendous breadth and includes research into solar and wind energy harvesting, biofuels, energy storage, and smart electrical grid technologies that adapt to intermittent renewable energy sources. However, much of the research performed is funded by sources that emphasize the creation of new scientific knowledge and not on the commercialization of new technologies. Hence, there is tremendous potential for a program that specifically focusses on drawing on the impressive reservoir of renewable energy research and accelerating the commercialization of some of the most promising technologies.

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

The Renewable Energy Commercialization (REC) fellowship program was started in 2019 to address this opportunity. With seed funding provided by the College of Science and Engineering and the Office of the Vice President for Research, the program has invested in graduate students and post-doctoral researchers to provide them with the opportunity to pursue commercialization of the technologies developed by them free from the restrictions for allowable effort imposed by many other funding sources. The program is housed under the Institute on the Environment and fellows are selected in collaboration with the Office of Technology Commercialization (OTC) and the MIN-Corps program, which provides commercialization education and coaching programs to STEM researchers.

The first cohort of three REC fellows was selected in 2020 with projects in wind energy, solar energy, and clean ammonia combustion. Though fellows started on their projects only in summer of 2020, there are already four invention disclosures and three provisional patent applications. OTC is working on finding a licensing opportunity for one technology and one fellow is interested in starting a start-up company.

This proposed project is seeking additional support for students and post-doctoral researchers to pursue technology commercialization of the clean energy technologies developed by them.

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?

This program will accelerate technology translation of renewable energy and energy efficiency research at the University of Minnesota. These technologies will improve air quality, reduce the emission of gases that cause climate change, and enhance the adoption of renewable energy technologies. Furthermore, the program will train a STEM workforce that is interested in commercializing clean energy technologize through technology licensing or forming start-up companies that will create new clean energy jobs in Minnesota.

Activities and Milestones

Activity 1: Selecting and training 2022 REC fellows

Activity Budget: $166,000

Activity Description:
REC fellows are selected based on a three-page proposal that describes their proposed projects. Applicants are asked to discuss the societal and technological impacts of their projects and the commercialization potential. Applications require a commitment letter by the faculty advisor to provide appropriate access to resources.

REC fellows are selected by a review panel comprising both technical experts and experts in technology commercialization. The latter include CEOs of local renewable energy companies, staff of the Office for Technology Commercialization (OTC), and MIN-Corps staff. Technical merit and commercialization potential as well as diversity, equity and inclusion are the criteria that guide the selection of fellows.

After the selection of three REC fellows, awardees are required to attend one of the MIN-Corps Value Proposition Design Workshops and are matched with commercialization mentors by OTC staff. Fellows will be required to present their projects at renewable energy ecosystem events and industry connect events. REC fellows will have access to the larger cohort of MIN-Corps fellows and be educated about further funding sources for their programs, such as Small Business Innovative Research programs.

REC fellows will be involved in training in the next class of REC fellows by transferring best practices of technology transfer.

Activity Milestones:

Description	Completion Date
Advertising REC fellowship opportunities throughout the University of Minnesota (based on LCCMR recommendation of project)	October 31 2021
Applicants submit their applications (based on LCCMR recommendation of project, but contingent upon legislative approval)	January 31 2022
Fellows are selected by selection committee (based on LCCMR recommendation of project, contingent approval)	April 30 2022
Start date of 2022 class of REC fellowships	July 31 2022

Activity 2: Selecting and training 2023 REC fellows

Activity Budget: $166,000

Activity Description:
Activity 2 will follow the same scheme as activity 1, but adjustments will be made based on what has been learned from activity 1.

Activity Milestones:

Description	Completion Date
Advertising REC fellowship opportunities throughout the University of Minnesota	October 31 2022
Applicants submit their applications	January 31 2023
Fellows are selected by selection committee	April 30 2023
Start date of 2023 class of REC fellowships	July 31 2023

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Jessica Hellmann	UMN - Institute on the Environment	Jessica Hellmann is the director of the University of Minnesota's Institute on the Environment and the Ecolab Chair in Environmental Leadership. As director, she provides strategic leadership for the Institute, a mission-based organization working to help build a future where people and planet prosper together.	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 be funded?

LCCMR support for 2 years will provide additional data about the overall success of the program. Based on these data, we will pursue additional funding through philanthropic sources (foundations, individuals). There may also be the opportunity to pursue training grants through the National Science Foundation or other agencies.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Waste Heat Recovery with Efficient Thermoelectric Energy Generators	M.L. 2016, Chp. 186, Sec. 2, Subd. 07b	$400,000
Develop Solar Window Concentrators for Electricity	M.L. 2018, Chp. 214, Art. 4, Sec. 2, Subd. 07a	$350,000

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 Professor of Mechanical Engineering at the University of Minnesota. Professor Kortshagen is an expert in materials for renewable energy technologies. He holds the Ronald L. and Janet A. Christenson Chair in Renewable Energy. His work has been published in more than 200 scientific articles in peer-reviewed journals. His invention of silicon nanoparticle inks has been patented by the University of Minnesota and licensed to various industrial partners. He was issued 4 patents that generated royalty income exceeding $1M and led to 2 start-up companies. He will oversee the project and be responsible for the day-to-day operations.

Organization: U of MN - College of Science and Engineering

Organization Description:

The University of Minnesota offers world-class research infrastructure for this project. Fellows have access to a wide range of research laboratories and shared user facilities. For instance, fellows will have access to a large number of shared materials characterization instruments at the University of Minnesota Materials Characterization Facility ("CharFac," http://www.charfac.umn.edu/), including a small angle X-ray scattering facility, and an electron microscopy center. Several machine shops are also available at the University of Minnesota. Computational projects have access to the Minnesota Supercomputing Institute.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Program manager - faculty director		Direct day-to-day operation of project			26.7%	0.04		$16,177
Project co-director		Will co-direct day-to-day operation of project			26.7%	0.04		$15,823
6 REC fellows		stipend for commercialization fellows (3 ea. for 2 years)			41.7%	6		$270,000
							Sub Total	**$302,000**
Contracts and Services								
							Sub Total	**-**
Equipment, Tools, and Supplies								
	Tools and Supplies	Allowance for general laboratory supplies for each of the 6 fellows	To pursue development of technology required for commercialization					$20,000
							Sub Total	**$20,000**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
							Sub Total	**-**

Travel Outside Minnesota								
	Conference Registration Miles/ Meals/ Lodging	Allowance for travel to visit potential commercialization partners, tech connects, etc.	Travel related to commercialization of technology					$10,000
							Sub Total	**$10,000**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$332,000**

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				
			State Sub Total	**-**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**-**

Attachments

Required Attachments

Visual Component

File: fe6a9dac-c58.pdf

Alternate Text for Visual Component

The attached slides provides an overview of the Renewable Energy Commercialization (REC) program, including names and project titles of the current class or REC fellows....

Optional Attachments

Support Letter or Other

Title	File
Endorsement by Sponsored Projects Administration	552cb8b4-239.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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

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

RENEWABLE ENERGY COMMERCIALIZATION

Renewable Energy Commercialization Fellowship
Global climate change presents a significant challenge for mankind but also creates economic opportunities for the development of new energy technologies. With increasing public acceptance that new energy solutions are needed in the very near future, there will be tremendous need to quickly bring new energy technologies from the lab to commercialization to deployment. Doing so effectively requires not only technical expertise, but also skills in entrepreneurship and technology translation. Building on the University of Minnesota MIN-Corps program, this competitive program will provide fellowship support to interested Ph.D. students and postdoctoral researchers to translate their technical innovations in the renewable energy space into real world solutions.

The Goal
A joint initiative of the Institute on the Environment and the College of Science and Engineering, in partnership with the University of Minnesota MIN-Corps program and the Office of Technology Commercialization, to accelerate technology translation of renewable energy and energy efficiency research at the University of Minnesota.

The 2020 – 2021 REC Fellows

Christopher Warkentin
Department of Chemistry

Upconversion to increase solar cell efficiency

Linyue Gao
Saint Anthony Falls Laboratory

Control strategies to alleviate wind turbine icing

Seamus Kane
T.E. Murphy Engine Research Laboratory

Reducing emissions from marine diesel engines with ammonia fueling