Environment and Natural Resources Trust Fund
2020 Request for Proposals (RFP)

Project Title: **ENRTF ID: 185-E**

Filling Empty Trucks: Energy Efficient Regional Food Distribution

Category: E. Air Quality, Climate Change, and Renewable Energy

Sub-Category:

Total Project Budget: $ 1,058,772

Proposed Project Time Period for the Funding Requested: June 30, 2023 (3 yrs)

Summary:

This project fills empty wholesale trucks on existing routes to maximize energy efficiency, mitigate climate change and air quality impacts of food distribution, while opening markets for local food producers.

Name: Kathryn Draeger

Sponsoring Organization: U of MN

Job Title: Dr.

Department: University of Minnesota Extension, Regional Sustainable Development Partnerships

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Location:

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Locations of rural grocery stores on Minnesota map; MasonBrothers truck; diagram "backhauling" starting with farm, arrow to rural grocery store, circle with two trucks, wholesale building, trucks to grocery stores

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%

I. PROJECT STATEMENT

The University of Minnesota Extension Regional Sustainable Development Partnership (RSDP) will lead this statewide project, *Filling Empty Trucks: Energy Efficient Regional Food Distribution* with the goal to implement "backhauling" as an air quality, climate change, and energy efficiency strategy for regional food distribution. Backhauling, or using the return trip of a delivery truck, can reduce the carbon footprint of local and regional food systems and drastically reduce environmental impacts. Empty trucks waste fuel. For example, project partner, Mason Brothers Wholesale Grocery in Wadena, Minnesota has a fleet of trucks traveling 48,000 miles per week delivering groceries, of which over 20,000 miles are trucks returning to the warehouse empty. The project team will plan and execute the Filling Empty Trucks (FET) backhaul model in three Minnesota regions (NE, NW, and West Central) by coordinating cross-docking and backhauling among three farmers, three rural grocery stores, and two wholesalers. Environmental benefits and cost saving mechanisms identified during this project will be ready for implementation by Minnesota businesses.

The proposed project will employ an expert public and private sector team to develop, research, confirm, and deploy transportation best practices that maximize transportation efficiency in the regional food supply chain, including efficient vehicle utilization, filling empty trucks via backhauling, developing transportation collaborations, and systematizing backhauling in the Minnesota food supply chain.

Minnesota leads the nation in developing a backhaul system that uses existing underutilized rural infrastructure to build an energy efficient regional food supply chain. This project works with partners in the wholesale grocer sector to reduce local food transportation miles, associated fuel, and emissions. Through development of an FET backhaul supply chain, the State of Minnesota can substantially reduce environmental impacts by making use of empty trucks already traveling from rural grocery stores to wholesale warehouses, thus working to protect, conserve, preserve, and enhance Minnesota's resources.

II. PROJECT ACTIVITIES AND OUTCOMES

ACTIVITY 1 Title: Develop and deploy the Filling Empty Trucks (FET) backhaul supply chain model

Description: The project team researchers will analyze transportation routes, distribution requirements, incentives, and behaviors with the goal of identifying efficiencies that maximize fuel use and reduce total greenhouse gas emissions per unit delivered. The project team will also analyze the cold chain to identify opportunities to reduce energy usage and infrastructure build out (embedded energy and increased electrical load implications). The effects of optimizing driver behavior with reduction in fuel usage will be studied and quantified in terms of emission reduction. Formative evaluation will be used through continuous interactions with participating farmers, grocers, and wholesalers during the project.

ENRTF BUDGET: $350,544

Outcome	Completion Date
1. Analyze transportation routes, requirements, and the incentives and behaviors for participation in the FET backhaul supply chain.	7/1/2021 (Year 1)
2. Research reduction in fuel usage and emissions by fleet driver training on energy efficient driving combined with the FET backhaul model.	7/1/2021 (Year 1)
3. Analyze cold chain to reduce energy usage and infrastructure build out (embedded energy and increased electrical load implications).	7/1/2022 (Year 2)

ACTIVITY 2: Systematize Filling Empty Trucks (FET) backhaul model for broader implementation across stores, wholesalers, and farmers

Description: The project team will plan and execute the FET backhaul model in three Minnesota regions (NE, NW, and West Central) by coordinating cross-docking and backhauling among three farmers, three rural grocery stores, and two wholesalers. RSDP, in partnership with Vermont, developed a pilot curriculum for efficiency in transportation through fleet driver training, a tool that will be used in tandem with the FET backhaul model. The team will disseminate results.

ENRTF BUDGET: $708,228

Outcome	Completion Date
1. Pilot and implement the FET backhaul in three MN regions (NE, NW, West Central). Coordinate FET cross-docking and backhauling among multiple farmers, rural grocery stores and wholesalers at three sites to scale up and build efficient supply chain system(s) for locally grown foods.	6/30/2023 (Year 2 and 3)
2. Develop curriculum and tools for truckers, wholesalers, grocers, and farmers participating in the FET supply chain. Support scaling up and expanding to other Regions.	6/30/2023 (Year 3)
3. Evaluate and disseminate results across transportation and regional food system industry and support widespread adoption of Filling Empty Trucks.	6/30/2023 (Year 3)

III. PROJECT PARTNERS AND COLLABORATORS:

Filling Empty Trucks (FET) backhaul model will be tested with, but not limited to, three farms (**Round River Farm, Doubting Thomas Farm, and Big Stone Garlic**), Duke Harrison with **Mason Brothers Wholesale,** and **Russ Davis Wholesale**, and **Bonnie's Hometown Grocery**, **Tony's Supervalu,** and **Finland Cooperative General Store**.

Project collaborators include: **Dr. Kathryn Draeger,** Statewide Director, UMN Extension, RSDP; Adjunct Professor, member of the Graduate Faculty, Dept. Agronomy and Plant Genetics; **Ren Olive,** Program Associate, Sustainable Agriculture and Food Systems, UMN Extension, RSDP**; RSDP Regional Executive Directors:** Anne Dybsetter (SW), Dr. Okey Ukaga (SE), Molly Zins (Central), David Abazs (NE), Linda Kingery (NW)**; Dr. Karen Donohue,** Professor, Supply Chain and Operations, UMN Carlson School of Management; **Dr. Kevin Linderman,** Curtis L. Carlson Professor, Supply Chain and Operations, UMN Carlson School; **Lee Munnich,** Senior Fellow, State and Local Policy Program, Humphrey School of Public Affairs; Center for Transportation Studies; **Dr. Will Northrop,** Assoc. Professor, UMN Dept. of Mechanical Engineering, Center for Transportation Studies; **Ryan Pesch,** UMN Extension Community Economics; **Dr. Hikaru Peterson,** Professor and Coordinator, Undergraduate Agricultural and Food Business Management Major UMN Dept. of Applied Economics; **Dr. Emily Hoover,** Professor and Head, Horticulture

IV. LONG-TERM IMPLEMENTATION AND FUNDING:

This Filling Empty Trucks supply chain project is a collaboration between UMN, grocers, wholesalers, and Minnesota farmers that can result in improved air quality, emissions reduction, and ultimately, mitigate climate change. Increasing delivery truck efficiency through backhauling and fleet driver training will have lasting impact on lowering the carbon footprint of food transportation. The project team will work with stakeholders across Minnesota to increase the environmental benefits and cost saving mechanisms identified during this project, enabling implementation by Minnesota businesses. Outreach and publicity generated during this project will speed adoption of backhauling as farmers, wholesalers, and retail business become aware of the practice and have access to curricula and educational materials.

Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet
Legal Citation:
Project Manager: Kathryn Draeger
Project Title: Filling Empty Trucks: Creating Transportation Efficiencies through Backhauling
Organization: Regents of the University of Minnesota
Project Budget: $1,058,772
Project Length and Completion Date: 6/30/2023 36 months
Today's Date: April 15, 2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)	$ 934,667	$ -	$ 934,667
Kathryn Draeger, PI, $124,572 (74% salary 26% fringe) 25% each year for 3 years (supplement to traditional funding for time spent leading the project and researching/implementing project)			
Kevin Linderman, Professor, Supply Chain, $30,762 (74% salary 26% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Emily Hoover, Professor, Hort, $17,079 (74% salary, 26% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Swan Ray, Blockchain development $144,143 (74% salary 26% fringe) 40% each year for 3 years (soft funded position)			
Karen Donohue, Professor, Supply Chain $22,742 (74% salary, 26% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Will Northrop, Assoc Professor, Transportation Studies $16,901 (74% salary, 26% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Lee Munnich, Researcher, Trans Studies $6,523 (74% salary, 26% fringe) 1% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Hikaru Peterson, Professor, Economics $18,893 (74% salary, 26% fringe) 3% FTE each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Greg Schweser, logistics $44,750 (74% salary, 26% fringe) 15% each year for 3 years (soft funded position)			
Ryan Pesch, Extension Educator, Community Economics $6,721 (74% salary, 26% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Ren Olive, Program Associate $165,784 (77% salary, 23% fringe) 70% each year for 3 years (soft funded position)			
Annalisa Hultberg, farm food safety $8,222 (74% salary, 26% fringe) 3% each year for 3 years (soft funded position)			
Steve Poppe, hort research $7,962 (77% salary, 23% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Linda Kingery, RSDP NW Regional Executive Director $9,480 (70% salary, 30% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Okey Ukaga, RSDP SE Regional Executive Director $9,863 (74% salary, 26% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Anne Dybsetter, RSDP SW Regional Executive Director $7,508 (74% salary, 26% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Molly Zins, RSDP Central Regional Executive Director $7,558 (74% salary, 26% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			

David Abazs, RSDP NE Regional Executive Director $7,691 (74% salary, 26% fringe) 3% each year for 3 years (supplement to traditional funding for time spent researching/implementing project)			
Grad Student (Academic term) $102,560 (46% salary, 54% fringe) 50% FTE each year for 3 years			
Grad Student (Summer term) $18,197 (86% salary, 24% fringe) 50% each year for 3 years			
Grad Student (Academic term) $102,560 (46% salary, 54% fringe) 50% FTE each year for 3 years			
Grad Student (Summer term) $18,197 (86% salary, 24% fringe) 50% each year for 3 years			
Undergrad Student - $36,000 (100% salary, 0% fringe) 50% each year for 3 years			
Professional/Technical/Service Contracts	$ 59,975	$ -	$ 59,975
Duke Harrison and wholesale marketing team - Mason Brothers ($24,975) (price was determined by industry standard average contract fee for marketing at $75/hour, with 111 hours per year x 3 years)			
Wholesale system and process specialist ($35,000) (competitive bid process, with request for proposals)			
Equipment/Tools/Supplies	$ 27,000	$ -	$ 27,000
Packaging, merchandising design and materials ($9500)			
Software for project ($2500)			
Instrumentation for fleet vehicle efficiency monitoring ($3,000)			
Instrumentation for fleet vehicle efficiency monitoring ($3,000)			
Instrumentation for fleet vehicle efficiency monitoring ($3,000)			
Instrumentation for fleet vehicle efficiency monitoring ($3,000)			
Instrumentation for fleet vehicle efficiency monitoring ($3,000)			
Printing	$ 1,500	$ -	$ 1,500
Printing ($1500)			
Travel expenses in Minnesota based on University of Minnesota policy	$ 23,000	$ -	$ 23,000
In-state mileage for project personnel to implement all components of the project: approx 12,600 miles ($21,924)			
In-state hotel/lodging and meals for PI ($1076)			
Other	$ 12,630	$ -	$ 12,630
Producer stipends ($6000)			
Rural grocer stipends ($3000)			
Building rental costs and survey cost/supplies ($3630)			
COLUMN TOTAL	$ 1,058,772	$ -	$ 1,058,772

SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	**Status (secured or pending)**	**Budget**	**Spent**	**Balance**
Non-State:		$ -	$ -	$ -
State:		$ -	$ -	$ -
In kind: University's Indirect Costs $1,058,772 - grad fringe x 33%		$ 317,734	$ -	$ 317,734

Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS	**Amount legally obligated but not yet spent**	**Budget**	**Spent**	**Balance**
		$ -	$ -	$ -

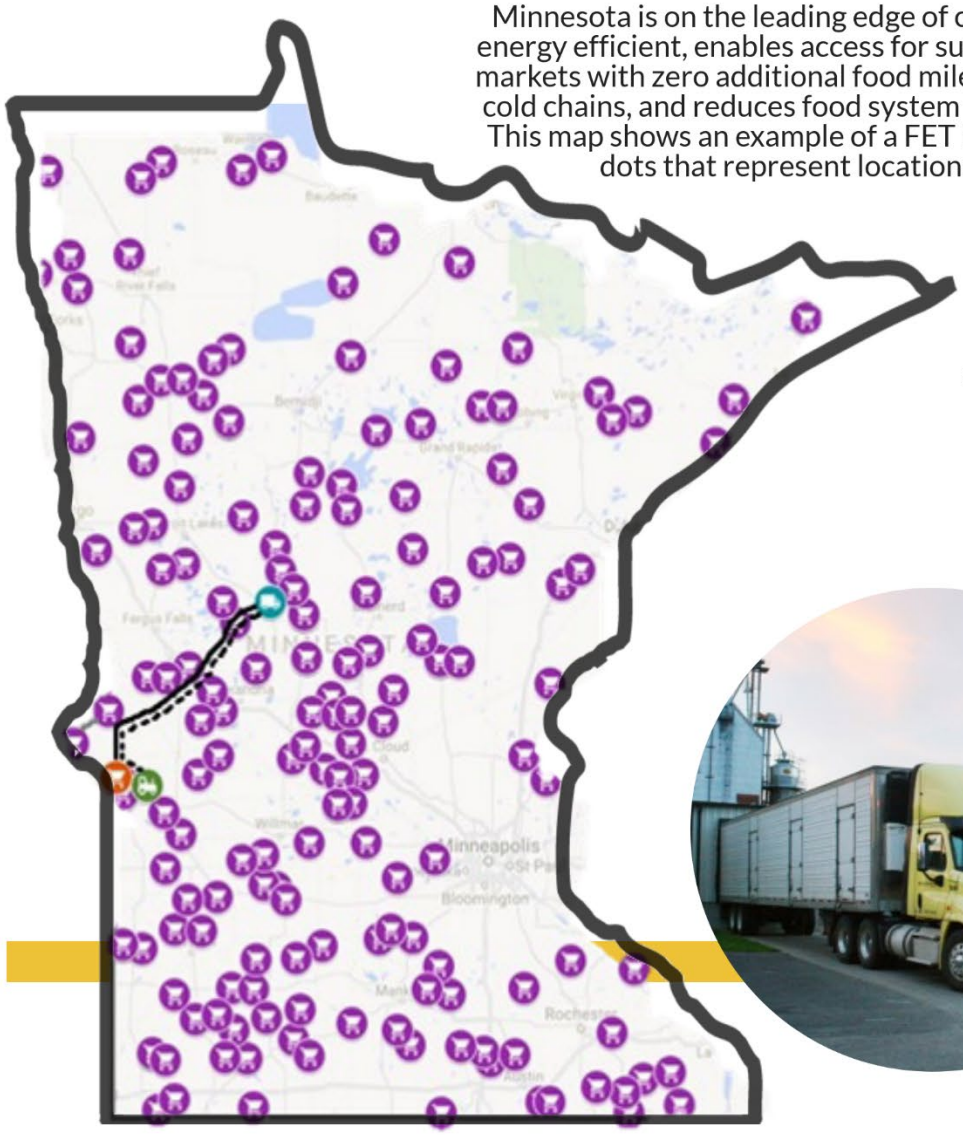
UNIVERSITY OF MINNESOTA EXTENSION

Regional Sustainable Development Partnerships

- PROPOSED PROJECT -

Filling Empty Trucks

Creating Transportation Efficiencies through Backhauling



Minnesota is on the leading edge of creating a backhaul system that is energy efficient, enables access for sustainable, local foods to wholesale markets with zero additional food miles, uses existing infrastructure and cold chains, and reduces food system fuel use and emissions drastically. This map shows an example of a FET backhaul route, along with purple dots that represent locations of rural grocery stores.

Project Manager:
Dr. Kathy Draeger

IN COLLABORATION WITH:

UMN Department of Mechanical Engineering

UMN Humphrey School of Public Affairs

UMN Department of Applied Economics

UMN Carlson School of Management

Center for Transportation Studies

UMN Department of Horticulture

Mason Brothers Wholesale

Russ Davis Wholesale

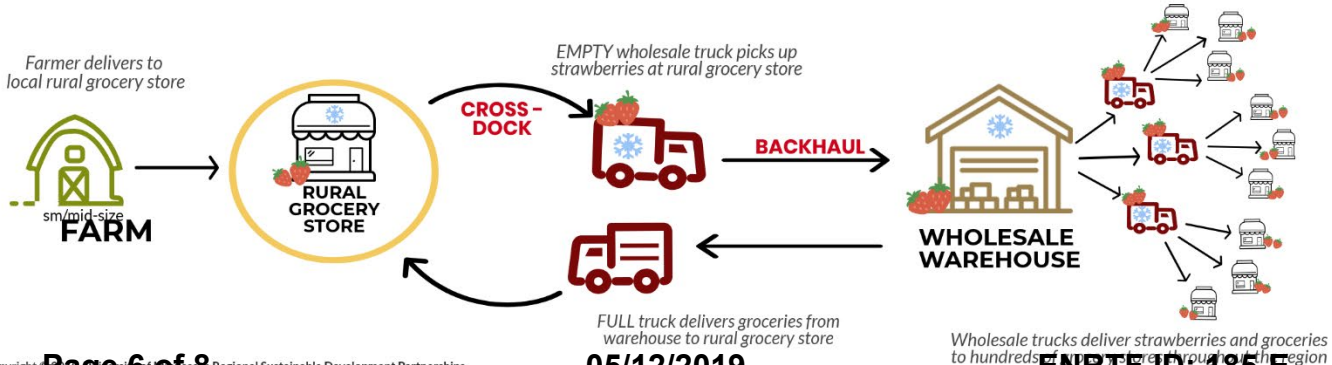
Rural Grocery Stores

Minnesota Farmers

PROJECT DATES

7/1/2020 - 6/30/2023

Filling Empty Trucks (FET) Backhaul Supply Chain



F. Project Manager Qualifications and Organization Description

Kathryn Draeger, Ph.D., Principal Investigator
Statewide Director, UMN Regional Sustainable Development Partnerships
Adjunct Professor and member of the Graduate Faculty, Dept. Agronomy and Plant Genetics
Dr. Draeger is a recognized community-engaged scholar at the University of Minnesota with a strong background in interdisciplinary research and outreach. Her academic research has focused on the intersections of agriculture, food systems, rural grocery stores, wholesale markets, supply chains, as well as specialty crop production and marketing. She will be responsible for overall project management, regular filing of project reports, and project financial oversight. She will develop clear work expectations, monitor the completion of project tasks, analyze any difficulties around task completion, and facilitate readjustment to any difficulties that arise. Dr. Draeger will lead the extension objectives and ensure that there is integration of the research and extension components. She will work closely with external and internal stakeholders to ensure they are fully engaged in the project.

University of Minnesota Extension, Regional Sustainable Development Partnerships
The Regional Sustainable Development Partnerships (RSDP) is a program of the University of Minnesota Extension that connects Greater Minnesota communities to the University in order to identify new opportunities and solve problems in sustainability. The Partnerships leverage University knowledge and seed funding with local talent and resources in four areas: agriculture and food systems, tourism and resilient communities, natural resources, and clean energy. RSDP is composed of a statewide office and five partnerships working in Greater Minnesota.