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## Indigenous Food Sovereignty:

How Minnesota utility Conservation Improvement Program participation pathways can enable greater food security for Minnesota Native Nations

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Contract 187328

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Conservation Applied Research and Development (CARD) FINAL Report

Prepared for: Minnesota Department of Commerce, Division of Energy Resources

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**The State of Minnesota Is Located on Anishinaabe Land and Dakota Land**

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## Definition of Terms and Acronyms

CARD: Conservation Applied Research and Development

CERTS: Clean Energy Resource Teams

CHP: Combined Heat and Power

CIP: Conservation Improvement Program

CPW: Co-op Partners Warehouse

CO<sub>2</sub>e: Carbon Dioxide Equivalents

EPA: United States Environmental Protection Agency

EV: Electric Vehicle

FAH: Food at Home

GHG: Greenhouse Gas

GRE: Great River Energy

HVAC: Heating Ventilation and Air Conditioning

ILTF: Indian Land Tenure Foundation

IOU: Investor-Owned Utility

KW: Kilowatt

LED: Light Emitting Diode

NDAREC: North Dakota Association of Rural Electric Cooperatives

SCI: Saint Croix Institute & LICO<sub>2</sub>e

TRM: State of Minnesota Technical Reference Manual for Conservation Improvement Programs

USDA: United States Department of Agriculture

VFD: Variable Frequency Drive



# Executive Summary

## Objectives and Background

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This research uses the lens and framework of Minnesota’s Conservation Improvement Program (CIP) to understand energy issues related to food sovereignty and resilience in Indigenous communities in Minnesota. It also identifies the barriers that impede Native nations from greater success in food cultivation, processing, storage, and distribution. The three primary objectives of the project are:

1. Understand energy issues related to Indigenous food sovereignty in Minnesota.
2. Identify potential non-energy benefits, including food desert<sup>1</sup> mitigation, that may result from additional support from CIP offerings for Native food sovereignty projects.
3. Provide recommendations for how CIP offerings may support Native nations in advancing food sovereignty work.

Slipstream Group, Inc. is the primary investigator for the research and partnered with Indian Land Tenure Foundation, St. Croix Institute, and Our Healthy Share GBC (“Healthy Share”) to complete the project.

This research strengthens CIP’s understanding of how the 11 federally recognized Native nations in Minnesota are engaged in food sovereignty efforts. It also explores common elements of the diverse work being done by each nation, including creating a clearer understanding of the tasks and processes that are used throughout the full food production process.

This paper considers how energy is used in food sovereignty work. It also recommends strategies that utilities and Minnesota policymakers may use to create and strengthen CIP offerings to better support Native food sovereignty work. To develop these recommendations, the project team explored the CIP offerings of the electricity and natural gas utilities that serve the 11 Native nations reservations and identified existing offerings that these communities can access in conjunction with food production activities. We also interviewed CIP managers from three utilities and from the Department of Commerce to better understand the utilities’ current awareness of, and support for, food sovereignty work. During these interviews, the team discussed current offerings and sought feedback on opportunities for additional CIP offerings that would support food sovereignty.

## Methodology

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Findings in this paper are based on the project team’s review of literature related to Indigenous food sovereignty, utility support for food desert mitigation, and utility energy program strategies that support food production systems or measures related to Indigenous food sovereignty. Following the literature

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<sup>1</sup> The [USDA Economic Research Service](#) defines a food desert as a low-income census tract (poverty rate of 20% or greater and/or a median family income at or below 80% of the statewide or metropolitan area median family income and where 500 people or a third of the tract’s population lives at least one mile from a grocery store (urban) or 10 miles from a grocery store (rural).

review, the project team interviewed stakeholders in food sovereignty efforts in Minnesota and three additional states as well as CIP managers at utilities that serve Indigenous lands in Minnesota. In parallel with the interviews, the team analyzed current CIP offerings of the electricity and natural gas utilities that serve Indigenous lands in Minnesota to determine what existing offering may be applicable to food sovereignty projects.

The project team reviewed both energy efficiency opportunities that would support food sovereignty, as well as the non-energy benefits of Indigenous food sovereignty efforts. Considering the potential for Indigenous food sovereignty to generate non-energy economic benefits for Native nations, the team analyzed potential impacts of reduced economic leakage that could be generated by more robust local food systems. As part of the analysis of non-energy benefits, the project team also leveraged a pilot program to advance local food systems for one Native nation in Minnesota. The findings from the pilot are intended to inform recommendations for a GHG emissions offset protocol based on the climate benefits of local food systems.

## Results

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The research identified five categories of food sovereignty work that CIP offerings may support:

- Efficient electricity and natural gas fueled equipment and buildings used for agricultural production on Native nations reservations. Greenhouse HVAC, greenhouse building shell measures, heirloom seed preservation equipment, and grow-lighting are particularly relevant.
- Efficient equipment used for processing traditionally-significant foods, including maple syrup and wild rice.
- Building and food service energy efficiency measures for commercial kitchens and community facilities that are used for community education and engagement related to food sovereignty
- Efficient transportation and distribution of locally-produced foods to members
- Development of food-based Indigenous businesses

Despite the energy uses listed above, the project team's literature review identified no precedents nationally of utility energy efficiency programs engaging with food sovereignty efforts. However, the literature review found an example of utility support for mitigating rural food deserts, as well as a published energy and cost analysis of an efficient and resilient food hub that may be applicable to energy efficient Indigenous food production work.

While no examples were found of utility support for food sovereignty, the research recognized the intersection of food sovereignty with both agriculture and commercial and industrial utility program offerings. To investigate opportunities for food sovereignty to benefit from these categories of utility energy programs, the research included a survey of programs serving these sectors in the Midwest and catalogued measures and program offerings that could also benefit food sovereignty work. Relevant measures included greenhouse HVAC equipment, LED grow lighting, and food service equipment, among others.

Interviews with Native nations and Indigenous producers, as well as the relevant literature, found that most Native nations initiate food sovereignty efforts to support non-energy objectives, which are

primarily focused on the health, economic, and cultural benefits of developing traditional, local food systems. Primary health benefits include diabetes prevention, obesity reduction, food security, and improved nutrition. Primary economic benefits were employment and financial self-sufficiency. Themes for cultural benefits included support for Indigenous sovereignty, increased connection with traditional ways, and relationship with the land.

In addition to the non-energy benefits sought by Native nations, the project team's investigation of the GHG emissions impacts of improved local food systems will support development of a framework for assessing the differences in transportation-related GHG emissions between local and conventional food systems. Such a protocol could be used to demonstrate how support for local food systems, such as food sovereignty efforts could reduce GHG emissions related to transportation of food.

The project offers two sets of recommendations: 1) CIP Offering Recommendations and 2) Structural Recommendations

## CIP Offering Recommendations

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Recommendations in this category identify near-term opportunities that utilities may enact to adapt their current CIP offerings to better support Native food sovereignty. These recommendations include:

1. Offer rebates and technical assistance for additional energy efficiency measures related to food sovereignty.
  - a. Support extension of the growing season and increased yields for Indigenously produced crops by offering rebates for measures that reduce energy consumption in greenhouses. Recommended measures include greenhouse shell measures, such as retractable heat curtains, air sealing interventions, and end wall insulation. We also recommend that utilities offer rebates for efficient greenhouse HVAC measures, including heat pumps, condensing boilers, and combined heat and power systems.
  - b. Offer rebates and design assistance for efficient grow lighting for greenhouses and indoor agriculture facilities. Efficient grow lighting systems can extend growing seasons and can also be used in indoor agriculture to enable year-round production.
  - c. Reduce energy consumption in the processing of traditionally significant maple syrup and maple sugar by introducing rebates for efficient maple syrup evaporators.
  - d. Adapt grain dryer rebate offering, or introduce new rebates, to provide financial assistance for purchasing wild rice parching equipment.
  - e. Support Indigenous strategies for using Indigenously produced food year-round and reducing energy consumption by incentivizing the purchase of efficient flash freezers.
  - f. Expand and adapt Great River Energy's modular indoor agriculture pilot to offer energy efficient, mobile indoor agriculture sheds to Native nations to support year-round food production.
2. Proactively manage Native nations accounts. Adapt outreach materials and custom rebate forms to facilitate the use of custom rebate offerings for the purchase of efficient food production equipment used by Native nations.
3. Coordinate with Native nations to integrate energy efficiency education, training, and outreach activities into community engagement events offered by Indigenous communities. Connect

energy efficiency information to these events to enable utilities to provide financial sponsorship for these activities.

4. Recognize that limited financial resources may affect purchasing decisions for food production equipment. Native nations may need to choose between buying refurbished inefficient equipment and purchasing new equipment. When applicable, adapt energy consumption baselines used in custom rebate programs to calculate energy savings between new equipment being purchased and the energy that would be consumed by alternative older equipment.

## Structural Recommendations

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Recommended changes that Minnesota policy makers may make to enable utilities to offer greater support for food sovereignty through their CIP offerings include:

1. Apply the greenhouse gas (GHG) emission reduction calculation methodology developed through the Healthy Share local food system pilot. Expand the scope of the societal cost-benefit test used to evaluate CIP offerings to consider how the CIP offering's support for local food systems has enabled emissions reductions.
2. Recognize the threat posed to food sovereignty by the production and transportation of fossil fuels. Develop a methodology to quantify and price this risk. Apply costs posed by these risks to the review of costs and benefits of CIP offerings.
3. Support Native nations in their goals of implementing sustainable food production and distribution initiatives. Enable CIP support for non-energy efficiency clean energy measures, such as renewable energy systems, solar and battery storage systems, electric vehicles and off-road equipment, electric tractors, and electric vehicle charging infrastructure.
4. Reduce energy program silos by developing a concierge model to enable Native nations and other customers to strategically implement comprehensive clean energy improvements.
5. Support development of partnerships between Native nations, Minnesota Clean Energy Resource Teams (CERTS), and University of Minnesota engineering departments to support Native nations in optimizing energy use in food production systems.

# Introduction

## Project Objectives

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The purpose of the research is to use the lens and framework of Minnesota's Conservation Improvement Program (CIP) to understand the energy issues related to food sovereignty and resilience in the Indigenous Communities of Minnesota and the barriers that impede these communities from greater success in food production, processing, storage, and distribution. The three primary objectives of this research are:

1. Understand energy issues related to Indigenous food sovereignty in Minnesota.
2. Provide recommendations for how CIP offerings may support Native nations in advancing food sovereignty work.
3. Identify potential non-energy benefits, including food desert mitigation, that may result from additional support from CIP offerings for food sovereignty projects.

[Slipstream](#) partnered with [Indian Land Tenure Foundation](#) (ILTF), [St. Croix Institute](#) (SCI), and [Healthy Share GBC](#) to conduct this research. This research focuses on the intersection between food sovereignty and energy efficiency. It also recognizes that food sovereignty may create an array of non-energy benefits for Native nations, local economies, and society. The project team explored the non-energy benefits of food sovereignty in the literature review, as well as during interviews with members of Native nations. To supplement a review of non-energy benefits of food sovereignty, this research monitored the impacts of a pilot local food system. Data collected explored opportunities to quantify emissions reduction benefits of local food systems, which is one of the potential non-energy benefits of food sovereignty work.

Using the information gathered through primary and secondary research, this paper considers how energy is used in food sovereignty work. It also recommends strategies that utilities and Minnesota policymakers may use to create and strengthen CIP offerings to better support food sovereignty work. We developed two sets of recommendations: one that focuses on the CIP offerings and one that explores more structural changes addressing food sovereignty and Native nations in Minnesota.

## Background

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### Native Nations of Minnesota

There are 11 Native nations that share the same geography as the State of Minnesota (Table 1). Each federally recognized Native nation is a sovereign nation with its own laws, culture, and traditions. As colonists displaced these nations from their historical lands, food systems and dietary traditions were disrupted.

Native nations members live both on reservations and off reservations in Minnesota. However, this research focuses primarily on food sovereignty work that is being done on and near the reservations. Reservations and associated land trusts in Minnesota cover 4,408 square miles, which is approximately

5% of the State’s land area. Figure 1 (MN Department of Health, 2021) shows where each reservation is located. In addition to reservation lands, treaties signed in 1837 and 1854 memorialized the perpetual rights of members of the Grand Portage and Bois Forte Bands of Lake Superior Chippewa to fish and hunt on certain ceded territories in northeastern Minnesota. Figure 2 (1854 Treaty Authority, 2022) shows the location of the ceded territories.

**Table 1. Geography of Federally Recognized Native Nations in Minnesota**

<b>Native Nation</b>	<b>Geography</b>	<b>Reservation and Off-Reservation Trust Land Area (square miles)</b>
Bois Forte Band of Chippewa	Northcentral Minnesota (between Ely and Virginia)	213.8
Fond du Lac Band of Lake Superior Chippewa	East of Duluth	158.7
Grand Portage Band of Lake Superior Chippewa	Northeastern Minnesota (Grand Portage)	75.8
Leech Lake Band of Ojibwe	Northcentral Minnesota (between Bemidji and Grand Rapids)	1,355.1
Lower Sioux Indian Community	Southwestern Minnesota (between Marshall and New Ulm)	2.7
Mille Lacs Band of Ojibwe	Central Minnesota (East of Brainerd)	161.5
Prairie Island Indian Community	Southeastern Minnesota (between Hastings and Red Wing)	5.3
Red Lake Band of Chippewa Indians	Northwestern Minnesota (East of Thief River Falls)	1,260.1

Native Nation	Geography	Reservation and Off-Reservation Trust Land Area (square miles)
Shakopee Mdewakanton Sioux Community	Southeastern Minnesota (Southwest of Minneapolis)	4.9
Upper Sioux Indian Community	Southwestern Minnesota (Granite Falls)	2.3
White Earth Reservation	Northwestern Minnesota (North of Detroit Lakes)	1,167.3

Figure 1. Native Nations Reservations in Minnesota

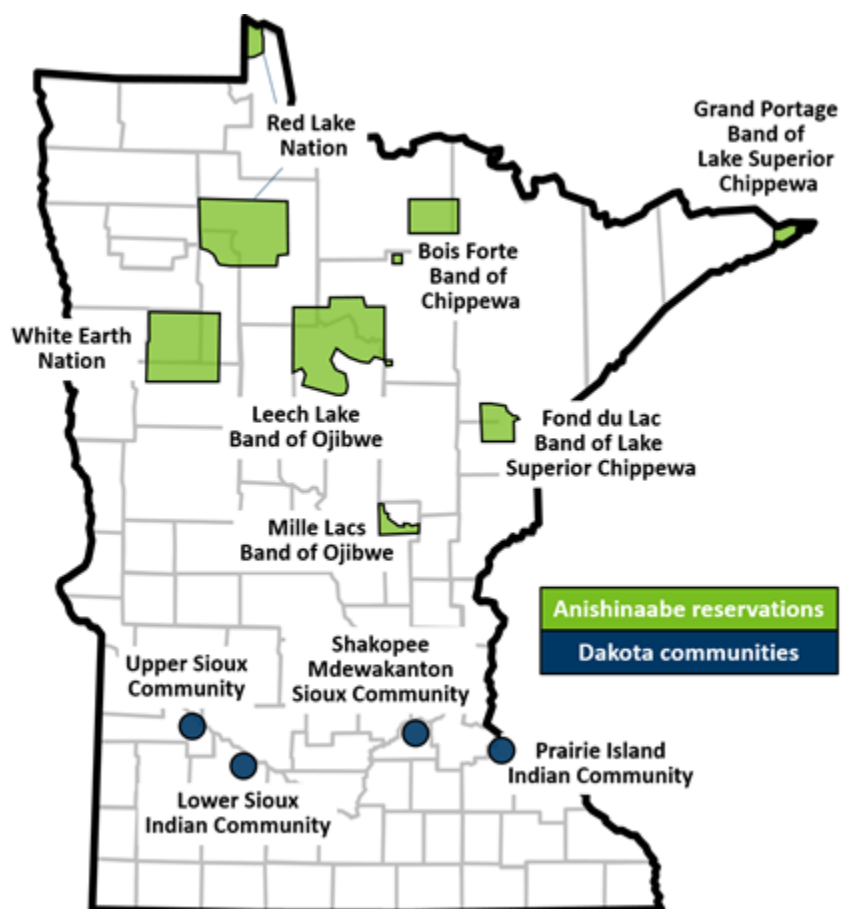
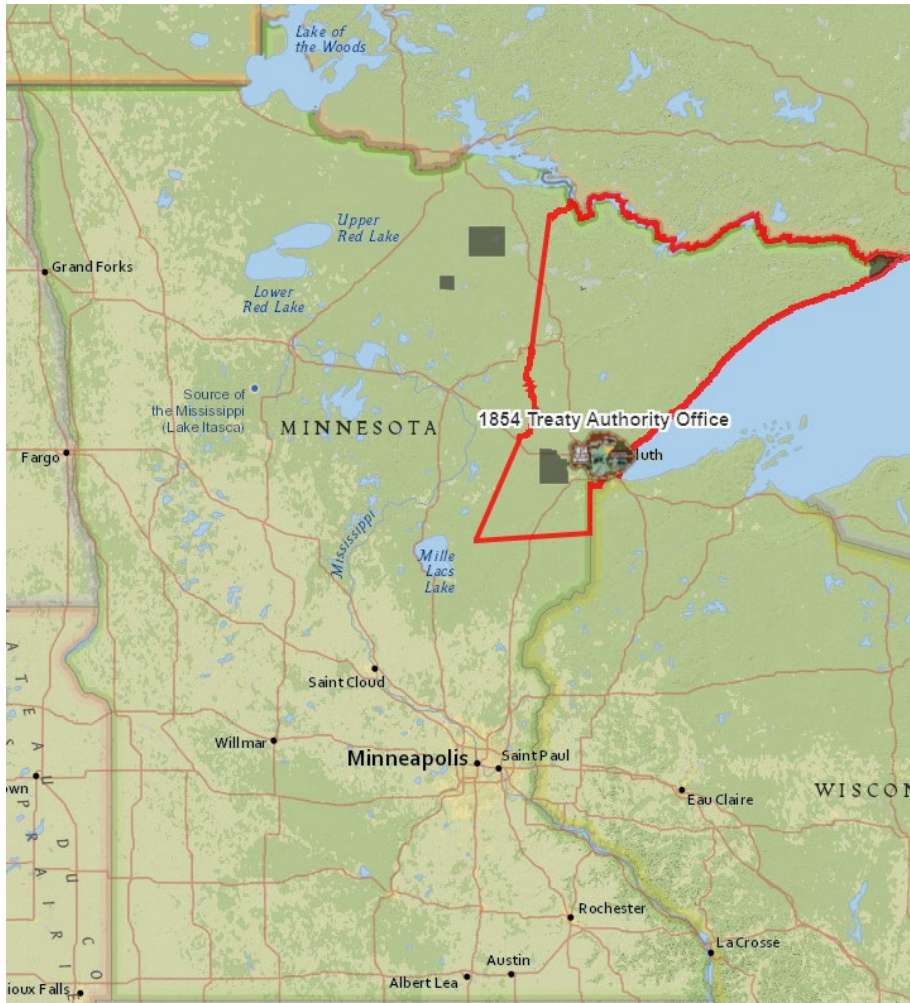


Figure 2. 1854 Treaty Ceded Territories



## Food Sovereignty

Globally, Indigenous communities pursue food sovereignty initiatives to strengthen connections with traditions, improve health, and increase the resiliency and diversity of local food systems. Native nations pursue food sovereignty through diverse initiatives based on their own traditional practices, available resources, and cultural priorities.

While food sovereignty work may appear differently in each community, there are certain commonalities among these efforts. The World Food Summit in Rome in 2002 included a Forum on food sovereignty, which provided this definition (Montana Office of Public Instruction, 2022):

*“Food sovereignty is the ability of an Indigenous nation or community to control its own food system and food-producing resources free of control or limitations put on it by an outside power (such as a settler/colonizer government). Food sovereignty includes creating access to healthy food resources of one’s own choice, assuming control over food production and distribution, and*



*integrating cultural practices and values concerning diet, food production, distribution, and the entire food system.”*

*“Food sovereignty is the right of peoples, communities, and countries to define their own agricultural, labor, fishing, food, and land policies which are ecologically, socially, economically, and culturally appropriate to their unique circumstances. It includes the true right to food and to produce food, which means that all people have the right to safe, nutritious, and culturally appropriate food and to food-producing resources and the ability to sustain themselves and societies.”*

The National Congress of American Indians’ Tribal Food Sovereignty Initiative (2021) offers this description of Indigenous food sovereignty:

*“Food sovereignty as the right and ability of tribal nations and peoples to:*

- *freely develop and implement self-determined definitions of food sovereignty;*
- *cultivate, access, and secure nutritious, culturally essential food produced through ecologically sound and sustainable methods; and*
- *design and maintain food systems and enact policies that advance tribal priorities for ensuring that tribal citizens have the sustenance they need to thrive physically, mentally, socially, and culturally not just today, but for the generations to come.”*

In Minnesota, Native nations and Indigenous producers are actively engaged in multiple types of food sovereignty initiatives. These initiatives may include subsistence hunting, fishing, and gathering on both Native nations and ceded territories, harvesting and processing wild rice, maple sugaring, field agriculture, indoor agriculture, and community education among other types of initiatives. These initiatives include the use of energy consuming equipment and processes. This research investigates strategies to optimize energy consumption within food sovereignty work.

## **Conservation Improvement Program**

Minnesota’s Conservation Improvement Program (CIP), as authorized by [Section 216B.241](#) of the Minnesota Statutes, applies to the entire state; however, CIP does not mandate uniform offerings by utilities across the state. Instead, CIP provides a framework that each investor-owned utility (IOU), municipal utility, and electric cooperative may use to advance energy conservation within its service territory. As a result of this structure, CIP offerings available to support food sovereignty vary between utility service territories.

## Methodology

To meet project objectives, the project team conducted an extensive literature review on food sovereignty and utility programs that address food related issues, such as food deserts and energy in agriculture or food processing. We interviewed food sovereignty leaders in Minnesota and in other states to learn about specific initiatives and objectives for these projects. We also spoke with CIP managers for Minnesota utilities to understand existing CIP offerings that can support food sovereignty work. The information was collected and analyzed and was used to develop recommendations on how CIP offerings may be adapted to support food sovereignty.

## Literature Review

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The team conducted a national literature review to establish a working definition of food sovereignty. The review also sought:

1. Research and case studies concerning engagement between Native nations and the electricity and natural gas utilities that serve Indigenous communities.
2. Utility initiatives intended to mitigate food deserts within their service territories.
3. Utility energy efficiency programs targeted at relevant agricultural, food processing, storage, distribution, and food preparation processes.

To complement the investigation of connections between utilities and food sovereignty, we attempted to identify the non-energy benefits of food sovereignty, which included both qualitative and quantitative findings.

To understand any potential effects on local and Indigenous economies that could be non-energy impacts of supporting food sovereignty work, the team analyzed the localized macroeconomic effects of robust local food systems.

## Indigenous Interviews and Outreach

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Food sovereignty initiatives vary between Native nations and across geographies. We reached out to members of the 11 Native nations in Minnesota who were engaged with food-related activities. We also contacted Indigenous members who own or manage organizations that undertake food sovereignty initiatives. Some Native nations representatives did not respond to the research team's inquiries. In these cases, we looked for web-based information that offered insights on the Native nation's work related to food sovereignty. As a supplement to interviews with Indigenous members in Minnesota, we interviewed food sovereignty leaders in Wisconsin, Michigan, North Dakota, and Mississippi. The team completed a total of seven interviews with representatives of food sovereignty initiatives, including three interviews with Native nations in Minnesota. We also interviewed five Indigenous producers who led initiatives that were not associated with a Native nations governmental body.

Using the findings from interviews and web research, the team developed a matrix showing food sovereignty activities for each Native nation and Indigenous producer. The matrix segmented activities across six steps in the food production process:

1. Farm equipment: Cultivation, transportation, and housing.
2. Farming practices: Field crops, animal rearing (bison/fowl), indoor crops, and indoor hatcheries/fish farming.
3. Water: Irrigation, purification, pumping, heating, and cooling.
4. Food preparation: Processing, storage, distribution, and commercial kitchen provisions.
5. Retail and food service: Transportation, refrigeration, food production, retail, and food service buildings.
6. Traditional food: Hunting, fishing, and gathering on the lands of Native nations and in treaty ceded territories.

## **Review of Potential Non-Energy Benefits of Food Sovereignty**

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During the literature review and interviews with Native nations and Indigenous producers, the team tracked the non-energy objectives that stakeholders seek to achieve in developing food sovereignty projects. The observations from the literature review and interviews offer perspectives on non-energy benefits of food sovereignty that provide additional rationale for focusing on food sovereignty.

### **Qualitative Benefits**

The literature review and interviews investigated a broad range of potential non-energy benefits of increased food sovereignty. Health, environmental justice, ecosystem service, and cultural benefits were inventoried and described qualitatively.

### **Local Food System Emissions Reductions**

One of the non-energy benefits that the team evaluated more closely is the potential reduction in transportation related GHG emissions that may be enabled through the development of local food systems.

To explore whether the local food systems created through food sovereignty initiatives reduce transportation-generated GHG emissions, team member Healthy Share conducted a pilot local food system project with a Native nation in Minnesota. In the pilot, Healthy Share and SCI are tracking the transportation emissions generated through the pilot and analyzing those emissions in comparison to equivalent emissions generated by conventional food systems. Healthy Share is collaborating with the Native nation's government to deliver shares containing a variety of fresh, organic foods, which align with USDA's dietary guidelines. As part of the pilot, Healthy Share worked to include as much locally produced food as could be obtained in each food share delivery, and then communicated to recipients where each type of food had been grown or produced.

In November 2021, Healthy Share began weekly deliveries of boxes of organic produce to community members. Deliveries are ongoing and preliminary data is being collected.

The pilot has two objectives:

1. Learn about and demonstrate the health benefits of the Healthy Share food delivery model and identify opportunities to expand the program to more Native nations in Minnesota.
2. Quantify the emissions reduction benefit of local food systems and establish a methodology for quantifying emissions reductions from this structure.

To investigate the first objective, Healthy Share will collaborate with the Native nation's staff to conduct exit interviews of participants in the pilot. One of the topic areas that these interviews will discuss will be changes in the diets of participant households that were enabled by the Healthy Share deliveries.

Due to a small sample size, the limited duration of the pilot, and restrictions on access to participant medical data, the pilot will not seek to determine a correlation between Healthy Share deliveries and health outcomes. Instead, data collected on dietary changes may be leveraged in combination with medical research on the effects of increased consumption of fresh produce and decreased consumption of processed foods to estimate changes in health outcomes that are facilitated by the Healthy Share deliveries.

For the second objective, Healthy Share, SCI, and ILTF identified the variables that could affect the levels of transportation-related GHG emissions in local food systems, and the variables that could influence emissions levels in conventional food systems. The team recognized the high degree of variability and lack of transparency in transportation methods used in conventional food systems. Finding that it would not be feasible to establish emissions rates that would apply to all transportation within conventional food systems, the team decided to limit the analysis to a comparison of transportation emissions for local and non-local food sourced by Co-op Partners Warehouse (CPW), in Minneapolis. Healthy Share aggregates both local and non-local food at CPW, prior to preparing it for delivery, so restricting the analysis to food sourced through CPW offered the most direct source of comparison to the Healthy Share model.

After identifying an initial set of variables that could influence transportation GHG emissions, Healthy Share and SCI tracked mileage for all transportation associated with the pilot project and calculated GHG emissions resulting from the combustion of gasoline and other transportation fuels used for Healthy Share's sourcing and distribution. Tracked activities in the Healthy Share model included transporting food 1) from farms to the CPW facility used by Healthy Share and 2) from deliveries made by Healthy Share from the warehouse to member households.

Healthy Share aligns the contents of its weekly food deliveries with USDA nutrition guidelines recommendations. Due to the restricted growing season in Minnesota and limitations on the types of produce that can be grown locally, Healthy Share sources some of the food that it delivers (ex. Oranges) from non-local producers in order to comply with USDA guidelines. Because even robust local food systems will be unable to supply certain types of food, the project team restricted the scope of the transportation emissions analysis to only include the GHG emissions savings potential of those types of foods that can be produced locally.

In addition to serving as the aggregation point for Healthy Share, CPW serves multiple other food retailers and sources food from national and international producers to supply its clients. Healthy Share and SCI will collect data from CPW staff on origin locations for non-locally produced foods, as well as the

transportation methods that are used to ship the non-local produce to CPW. Data collected will be limited to only include information for the types of produce that Healthy Share was able to source locally during the pilot.

For each food that has the potential to be produced locally and was delivered by Healthy Share during the pilot period, the project team will compare transportation-related emissions generated from local production and distribution of the food to the transportation emissions that are generated when that type of produce is grown outside of a local food system.

To conduct this analysis, the project team is tracking the total weight of each type of produce in each weekly delivery. They will use data provided by growers/producers on miles travelled from the farm to the Healthy Share aggregation point, the weight of food delivered, and vehicle types used to move food from the point of production to the aggregation point. Data from growers/producers will be paired with Healthy Share's data on the miles its vehicles travel to the aggregation point and from the aggregation point to participant households, as well as vehicle types used in transporting food from the aggregation point to member households.

From the mileage, food weight, and vehicle data, the project team will calculate an allocation of transportation-generated CO<sub>2</sub>e produced per kilogram of each type of produce that was delivered to participant households. These emissions rates will be compared to emissions rates estimated for each produce type through data collected from Co-op Partners Warehouse on origins and transportation of non-local foods that it receives.

At the conclusion of the pilot, for each type of local food that Healthy Share delivered during the project, SCI and Healthy Share will compare transportation-related GHG emissions of locally-sourced items against emissions from non-locally sourced foods.

In addition to centering on local and organic produce, the Healthy Share model differs from conventional food systems in that it delivers food directly to participant households. Delivering food directly to households may potentially further influence transportation emissions, both because of the emissions generated by the deliveries and by potentially avoided emissions when participants can reduce the frequency of their trips to grocery stores. Avoided grocery store trips may be particularly meaningful when deliveries are made to households in food deserts, which indicates that longer drives would be needed to reach grocery stores. Healthy Share and SCI will attempt to quantify the effect of Healthy Share deliveries on participant transportation to food stores as part of the offset protocol methodology.

Data collection will continue throughout the two-year term of the pilot project. The team will use the data that is collected to outline a preliminary framework for quantifying the reduction in transportation-caused GHG emissions that may be realized by transitioning toward a local food system. This protocol development, if successful, could generate carbon credits that could be sold into the voluntary carbon market for additional Native nations revenue.

This report will be released before data for a full year of Healthy Share deliveries is available. As described above, local sourcing and corresponding levels of transportation-related GHG emissions may vary significantly during the course of a year, reflecting limited growing seasons in Minnesota.

Therefore, this report includes findings on variables that may be included in development of a local food system GHG offset protocol, but does not include findings on comparative emissions rates for local and non-local foods

## Reduced Economic Leakage

To explore the economic effects of local food systems, the research investigated how improved local food systems can reduce leakage from local economies. The project team leveraged research on a local food self-sufficiency model (Peters, 2006), as well as previous experience by team members in economic modeling of local food systems.<sup>2</sup> The model developed for this research seeks to estimate the leakage of money from a local economy as a result of sourcing and delivery of food from outside of the region. This model primarily utilizes four types of public data:

- Income-aligned annual food expenditures per household from the Bureau of Labor Statistics
- Food dollar distribution data from the United States Department of Agriculture Economic Research Service
- Population data from the U.S. Census
- Literature review-informed assumptions about the share of economic value from conventional food systems that benefit individuals and businesses outside of the community in comparison to the economic benefits provided to the community.

As shown in Table 2, Household annual expenditure data from the Bureau of Labor Statistics (BLS, 2022) shows that the size and allocation of household food budgets changes based on the households’ income level. The project team used census data to determine average household income for residents of the reservations of each of the 11 Native nations in Minnesota. Census data was also used to determine population and average household size for each reservation, which together were used to estimate the number of households residing on each reservation.

Table 2. Annual Household Food Budget by Income Range

Annual Income Range	Food at Home (FAH) Annual Expenditure	Food Away from Home (FAFH) Annual Expenditure	Total Annual Food Expenditure
Less than \$15,000	\$4,003	\$1,935	\$5,939
\$15,000 - \$29,999	\$3,641	\$1,362	\$5,003

<sup>2</sup> Referenced work was funded by the Aspen Institute Community Strategies Group and by the Ford Foundation. This research is not available for distribution.

<b>Annual Income Range</b>	<b>Food at Home (FAH) Annual Expenditure</b>	<b>Food Away from Home (FAFH) Annual Expenditure</b>	<b>Total Annual Food Expenditure</b>
\$30,000 - \$39,999	\$4,152	\$2,547	\$6,699
\$40,000 - \$49,999	\$4,551	\$2,075	\$6,626
\$50,000 - \$69,999	\$4,616	\$2,948	\$7,564
\$70,000 - \$99,999	\$5,450	\$3,112	\$8,562
\$100,000 - \$149,999	\$6,321	\$4,020	\$10,341
\$150,00 and above	\$7,275	\$5,823	\$13,098
Median	\$5,498	\$3,482	\$8,980

For each Native nation, the project team estimated average annual food expenditures, based on the income band-grouped Bureau of Labor Statistics (BLS) food budget data. Adjustments were made to annual food expenditures to account for the three-person household size which is assumed for the BLS food budget data and the 2.72 person average household size that was found in the Census data (2021). Adjusted annual food budgets were multiplied by the number of households living on each reservation to estimate total food budgets for each reservation.

In addition to reducing economic leakage, strengthening local food systems may induce economic ‘multipliers’ as money retained in the local economy is spent at other local businesses and may foster increased local entrepreneurial activity. Studies in Oregon (Rahe, 2017), as well as in Iowa and Tennessee (Ekamen. 2016) documented the cascading economic benefits of strengthened local food systems. While these studies suggest that enhancing local food systems on reservations could enable broader economic benefits, the scope of the analysis for this research is limited to opportunities for reductions in economic leakage.

The macroeconomic analysis uses public data to estimate current food expenditures for each household, as well as the portion of that spending that constitutes “leakage” from the local economy, meaning that the money is paid to a company that is headquartered, and primarily employs staff, outside of the local economy. Therefore, money paid to these vendors leaves the local economy. Economic leakage in food systems occurs when grocery stores, institutions, restaurants, and other food outlets procure food through non-local vendors and from non-local producers.

The Bureau of Labor Statistics (BLS, 2022) delineates food expenditures between purchased groceries, and other retail purchases for preparation and consumption off-site and money that households spend

at restaurants and other sellers of prepared food, both for dine-in at those establishments, and for takeout. A robust local food system can influence economic leakage from both types of food purchases, therefore the analysis considers the effects of shifting both grocery and restaurant purchases toward local foods.

USDA research has found that median household expenditures vary based on the household's level of income in relation to the median income in that area. Households with higher incomes generally spend more than households with lower incomes on food purchases; however, the increased total spending on food represents a lesser share of the household's total income for higher income households. Additionally, more affluent households direct a higher share than lower income households of their total food spending on restaurants and similar venues.

For each of the 11 Native nations in Minnesota, our analysis used Census data to determine the population that lives on each Native nation's reservation, as well as the number of households and average household size for each reservation. Also using Census data, we determined the average household income for residents of each reservation. Using the median income for each reservation, we estimated total food spending for residents of each of the 11 reservations.

Our analysis applied USDA-ERS (2022) Food Dollar Series data, in combination with analysis of market representation of local food purchases (Vogel, 2015) to estimate existing rates of economic leakage on the reservations of the 11 Native nations in Minnesota. The objective of the economic analysis in this research is to estimate the gross economic opportunity available by reducing economic leakage on reservations by strengthening local food systems. The analysis does not account for additional potential benefits created by economic multipliers, such as increased entrepreneurial activity.

To understand opportunities that food sovereignty may create to mitigate the effects of food deserts on reservations, we used the USDA Economic Research Service Food Access Research Atlas (USDA-ERS, 2022a) to identify census tracts that include the lands of Native nations that the USDA has designated as food deserts. We then evaluated whether food deserts disproportionately affected Indigenous communities in comparison to their effects on the full state of Minnesota.

## Conservation Improvement Program Review

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The project team identified the electric and gas utilities that serve reservations and known Indigenous producers. The team then catalogued the CIP incentives offered by this subset of utilities that could be used to reduce the cost of, or provide other financial incentives for, equipment and other measures that would be used in the food production activities relevant to the food sovereignty work of the Native nation in the applicable service territory.

To gain further insights on utility perspectives on support for food sovereignty, team members interviewed CIP managers from two IOUs and from one wholesale electric power cooperative whose member cooperatives serve multiple reservations. The interviewers discussed current engagement between the utility and the Indigenous communities it serves, as well as the utility's views on adapting its CIP offerings to more closely align with food sovereignty work.



Following the review of applicable CIP offerings, the team identified gaps between the energy-related food production activities that are applicable to food sovereignty work and available CIP incentives. In addition to potential misalignment between relevant food production activities and CIP offerings, the team used information gathered from interviews with members to identify additional barriers that prevent the optimal energy use within food production.

## **Development of Recommendations**

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The team synthesized the findings and generated a list of strategies through which CIP offerings could potentially be adapted to increase levels of support for food sovereignty work. The initial findings and potential strategies were shared with managers at Department of Commerce to evaluate feasibility within the regulatory framework that governs CIP. To align the team's recommendations with the program and regulatory framework that governs CIP offerings, the recommendations are grouped into two categories. The first category includes steps that could be taken in the near term to enable CIP to better support food sovereignty. The second category includes structural recommendations that may be considered to better align the CIP framework with Indigenous needs to implement food sovereignty initiatives.

## Results

The project team collected information about specific food sovereignty initiatives both in Minnesota and outside the state. We also reviewed existing utility-based energy efficiency program models that support measures that may apply to food sovereignty projects. The team synthesized the data that was collected to identify reoccurring themes within food sovereignty work and within applicable utility energy programs. In addition to describing themes on these topics, the project team highlighted innovative utility program models that may be reviewed to find opportunities to implement these strategies more broadly.

### Native Nations Food Sovereignty

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Through our review of food sovereignty initiatives throughout the country, we found five primary categories of initiatives.

#### Agriculture on Reservations

Many Native nations working on food sovereignty initiatives committed sections of their lands to growing vegetables and fruits, as well as instances of raising bison. Some communities dedicated land as community gardens, in which plots are tended and used by individuals and households. In other examples, Native nations established larger gardens and farms that are managed by the Nation's government or by Indigenous enterprises. To extend growing seasons, Nations frequently use greenhouses and hoop houses<sup>3</sup> to start plants before the ground has thawed. Some initiatives focus on growing traditional foods, while other initiatives prioritize cultivating a variety of healthy produce and place lesser emphasis on traditional foods.

In support of Indigenous agricultural activities, some Native nations and individuals work to maintain, plant, and harvest traditional heirloom varieties of the crops that they grow. Traditional strains of crops may have superior nutritional value, in comparison with conventional varieties, in addition to having cultural value in their connections to traditional food production practices. Seed saving and seed banks are key means through which heirloom seed types can be maintained.

#### Harvest of Native Foods

Native nations used varied approaches to support members in harvesting native foods, including wild rice, maple sap, fish, and game. Strategies include providing processing equipment and facilities to convert the harvested items into food that is ready to be consumed and purchasing the harvested food for broader distribution.

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<sup>3</sup> "Hoop houses are small, semi-portable structures that can be used as a small greenhouse structure that can be used for starting seedlings and for growing heat-loving vegetables. A hoop house provides frost protection, limited insect protection, and season extension." (USDA NRCS)

## Community Education and Engagement

Interviews and literature review demonstrated that helping Indigenous members transition their food preparation and consumption habits from conventional practices toward traditional foods and techniques is a consistent component of these projects. One strategy for engaging community members was to collaborate with schools to incorporate education about traditional foods and benefits of fresh produce into curricula. Nations also offer community cooking classes about preparation of traditional and healthy foods and prepare traditional foods to be served at community events.

## Food Distribution

Interviewees discussed strategies to enable the food that communities produce to be provided to members. In some cases, food grown in Indigenous communities is added to commodities provided in Minnesota State Health Improvement Program (SHIP) food boxes. Some nations also include this food in Elder nutrition programs. For retail distribution, nations facilitate stationary farmers markets and adapted box trucks or refrigerated trucks into “mobile farmers markets” that bring food to more convenient locations for members to access.

## Development of Food-Based Indigenous Businesses

Native nations engaged with local business in two ways regarding their food sovereignty efforts. First, some nations created or facilitated retail locations or online platforms through which Indigenous producers can sell their products. Additionally, some nations position themselves as wholesalers that sell Indigenously-produced food to Native enterprises, such as casinos and grocery stores, or to non-Native retailers.

## Utility Programs and Support

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### Food Sovereignty

We did not identify examples nationally of utilities directing programs specifically at Native nations or members to reduce energy use in the food production and distribution process. However, Section 638 of the Indian Self-Determination and Education Assistance Act authorizes the governments of Native nations to create electric utilities to serve that nation’s lands. Nationally, 11 Native nations have exercised this authority and have created Tribal utilities to serve some, or all, of their lands. Tribal utilities were partial exceptions to this finding, as they only serve Indigenous communities and are therefore connected to food production activities on Native lands. However, our literature review and selected outreach did not identify examples of Tribal Electric Utilities that offer energy programs specifically directed at food production or distribution. A comprehensive review of support for food production and distribution by utility-based energy efficiency programs may be useful in recommending strategies for CIP offerings for food sovereignty; however, this review was beyond the scope of this research inquiry.

## Food Production Activities

Our review of examples of food sovereignty work found that these initiatives include a variety of energy-related processes and activities. Common elements include:

- Seed harvesting, seed processing, and seed storage/preservation equipment
- Greenhouses to grow plant seedlings and market crops
- Produce washing, processing, and packing equipment
- Meat processing equipment
- Rice and grain drying equipment
- Food cold storage – refrigerators and freezers
- Transporting food for processing
- Distributing food to members
- Retail outlets, including stores, cafes, and farmers' markets
- Worker housing

Many utilities that have a significant number of agricultural customers offer incentive programs that serve farming operations. Additionally, due to high energy use intensity in the food service industry, many utilities offer incentives for equipment commonly used in food preparation and storage end uses. Both types of incentives could be applicable to food sovereignty initiatives.

There are several agriculture-sector and commercial and industrial utility programs that provide rebates for energy efficiency improvements that could support processes identified as relevant in food production and distribution. Examples of relevant programs offered by Midwest electric and gas utilities that could indirectly support food sovereignty agricultural work are listed in Table 3 and examples of utility programs that serve food service customers are provided in Table 4. These tables are not intended to be comprehensive lists of relevant utility programs. Instead, the tables are intended to provide examples of existing utility energy program offerings that could be adapted or used as-is to support food sovereignty efforts.

We found that some incentives offered by utilities for the agricultural sector may be applicable to support food sovereignty work. Due to the broad implementation of field agriculture and the use of greenhouses by Native nations, utility incentives for measures such as LED grow lighting, variable frequency drives for irrigation, and agricultural HVAC may be applicable to support food sovereignty projects. However, the large segment of agricultural rebates for measures associated with dairy and hog raising would not be applicable for the types of Indigenous projects.

**Table 3. Examples of Utility Agricultural Program Offerings**

Utility	State Served	Relevant measure/strategy type
Ameren Illinois	Illinois	<ul style="list-style-type: none"> <li>• Farm energy audit</li> <li>• Agricultural HVAC</li> <li>• Agricultural lighting</li> <li>• Livestock watering</li> <li>• Ventilation</li> <li>• Custom incentives</li> </ul>
ComEd	Illinois	<ul style="list-style-type: none"> <li>• Farm facility assessment</li> <li>• Dairy refrigeration heat recovery</li> <li>• LED grow lights</li> <li>• No-Loss condensate drains</li> <li>• Compressed air</li> <li>• HVAC / Dehumidification upgrades</li> <li>• Heat recovery processes</li> <li>• Dairy heat plate exchangers</li> <li>• Low-Energy livestock waterers</li> <li>• Variable speed drives</li> </ul>
Consumers Energy	Michigan	<ul style="list-style-type: none"> <li>• Farm energy audit</li> <li>• Grain dryers and controls</li> <li>• Greenhouse heat curtains, IR film, heating, and controls</li> <li>• Fans</li> <li>• LED grow lights</li> <li>• Indoor agriculture dehumidification</li> <li>• Fan motors for cold storage</li> <li>• Multiple refrigeration measures</li> </ul>
DTE Energy	Michigan	<ul style="list-style-type: none"> <li>• LED grow lights</li> <li>• LED other lighting</li> <li>• HVAC reduction in grow rooms</li> <li>• VFDs for fans</li> <li>• Dehumidification for indoor agriculture</li> </ul>
Focus on Energy	Wisconsin	<ul style="list-style-type: none"> <li>• Lighting</li> <li>• Compressed air</li> <li>• Space heating</li> <li>• Variable frequency drives</li> <li>• Water heating</li> <li>• Specialty equipment (ex. grain dryers)</li> </ul>

Utility	State Served	Relevant measure/strategy type
Great River Energy	Minnesota	<ul style="list-style-type: none"> <li>• USDA Rural Economic Development Grants</li> </ul>
Minnesota Power	Minnesota	<ul style="list-style-type: none"> <li>• Agricultural customers are eligible for standard demand reduction (\$/KW) incentive</li> </ul>
Otter Tail Power	Minnesota	<ul style="list-style-type: none"> <li>• Commercial refrigeration</li> <li>• EV charging infrastructure</li> </ul>
Stearns Electric Association	Minnesota	<ul style="list-style-type: none"> <li>• Irrigation VFDs</li> <li>• Agricultural ventilation</li> <li>• Commercial food service</li> <li>• Commercial EV charging infrastructure</li> </ul>

The food service measures listed in Table 4 primarily apply to restaurant and food service kitchens. Some Native nations have built commercial kitchens, which they use for community engagement and education, as well as for preparing traditional foods for community events. Nations may be able to access rebates for the measures in this list to optimize energy use in those commercial kitchens. However, these measures are less applicable to production of traditional foods, such as wild rice or maple syrup.

**Table 4. Examples of Utility Food Service Offerings**

Utility	Relevant program offering/strategy
CenterPoint Energy	<ul style="list-style-type: none"> <li>• Booster heaters</li> <li>• Combi, convection, and conveyor ovens</li> <li>• Kitchen hood demand-controlled ventilation</li> <li>• Dishwashers</li> </ul>
Minnesota Power	<ul style="list-style-type: none"> <li>• Electric commercial oven</li> <li>• Commercial dishwasher booster heaters</li> <li>• Commercial low-temp dishwashers</li> <li>• Electric hot food holding cabinet</li> <li>• Electric griddle</li> </ul>
North Branch Municipal Water and Light	<ul style="list-style-type: none"> <li>• Solid door refrigerators and freezers</li> <li>• Kitchen hood vent controls</li> <li>• Low flow pre-rinse spray valves</li> <li>• Electric hot food holding cabinets</li> </ul>

Utility	Relevant program offering/strategy
Wild Rice Electric Coop	<ul style="list-style-type: none"> <li>• Electric steamers</li> <li>• Electric griddles</li> <li>• Electric hot food holding cabinets</li> <li>• Solid door refrigerators and freezers</li> </ul>

Interviewees and the literature described the connections between food sovereignty and broader economic development in the Indigenous community. To become self-sustaining, there must be a market for Indigenously produced food. There must also be sufficient demand for the food and the ability for people to pay for the cost of sustainable, local food. In this way, utility programs that help households and businesses reduce energy costs also indirectly support food sovereignty initiatives.

### Mitigation of Food Deserts

As mentioned above, food sovereignty work often seeks to address the lack of fresh and healthy food available within manageable proximity of residents on Native lands. One impactful non-energy benefit of food sovereignty work is to overcome food deserts on reservations by providing residents with access to locally produced healthy food. Reflecting the dual objective of the research as supporting food sovereignty as a strategy to overcome food deserts, we found two examples of utility support for programs that mitigate food deserts.

In 2019, the North Dakota Association of Rural Electric Cooperatives (NDAREC) conducted a [pilot program](#) to reduce the effects of food deserts in a rural five-county area, which included the Spirit Lake Reservation. The NDAREC found that high distribution costs to deliver fresh food to rural areas negatively impacted the finances of distributors, which led the distributors to bypass these rural communities. The pilot identified local businesses, such as cafes, scattered across the region to serve as local food hubs. The NDAREC provided mobile multi-compartment storage units to these hubs. Using the food hubs, distributors were able to deliver to the more centralized locations, allowing local grocers to retrieve the food from these storage units and thereby make fresh and healthy foods available to residents of dispersed rural areas.

Because NDAREC is a cooperative association that exclusively serves rural electric cooperatives and their members, NDAREC understands that food deserts negatively affect rural quality of life and may contribute to co-op members relocating to urban areas. When quality of life issues accelerate net migration of members to locations outside of the service territories of the cooperatives, those issues, including food deserts, present existential threats to the member cooperatives.

A second example of utility support for food desert mitigation surfaced during an interview with staff at Great River Energy (GRE), which is a wholesale cooperative serving many electric cooperatives in Minnesota. Using funds from a research and development grant, GRE purchased 8’ by 12’ portable containers that are outfitted as mobile indoor agriculture facilities and offered incentives to member cooperatives to acquire these modules. The selected cooperatives either managed the module themselves and provided the produce grown in the containers to local food security programs or gave

the unit to a local school or community organization that managed the module and harvested the produce for its own use or for consumption by community members. While GRE's pilot did not specifically focus on mitigating food deserts, it is relevant to this project in that the utilities supported local food production dedicated to improving food security in the community.

The team did find research conducted on energy savings potential of a model for a technology-based program that would reduce food deserts (Awjah Almeahmadi, 2020). The research describes a model for optimizing energy use for a small grocery store attached to a greenhouse. The study assessed opportunities to use combined heat and power (CHP) systems to enhance the financial viability of a combined grocery store and greenhouse. The analysis focused on the use of this technology in an urban setting in a heating-dominant climate; however, the technology and efficiency opportunities that were considered would also apply in rural settings. A utility program could incorporate this application of CHP technology to reduce food deserts in either an urban setting or in a rural setting.

## Non-Energy Benefits of Food Sovereignty

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The literature review and interviews supported the understanding that food sovereignty initiatives create significant non-energy benefits. However, we did not find research that quantified these benefits. The asserted non-energy benefits primarily included health outcomes, economic development, support for cultural integrity, and environmental justice benefits of this work. The local food system pilot project will include post-pilot interviews with participants. The pilot will continue through a two-year period and therefore exit interviews have not been conducted as of the date of this report. The interviews will include questions regarding dietary changes that households made as a result of the Healthy Share deliveries. The scope of the study does not seek to identify correlations between Healthy Share deliveries and changes in health outcomes, but rather to identify changes in diet, which may support positive health outcomes, as well as changes in transportation and economic decisions that influence transportation-generated GHG emissions and local economic leakage.

## Health

### *Diabetes prevention*

Several food sovereignty projects in Minnesota collaborate with local diabetes prevention programs. These programs serve the Indigenous community to provide nutritious foods that may reduce susceptibility to diabetes and may enhance the abilities of individuals who have diabetes to manage the disease (Brody, 1991).

### *Obesity*

Obesity in Native American communities has been connected to poor availability of fresh fruits and vegetables at food retailers in these areas (Love, 2019) and research-based obesity-prevention interventions for Indigenous communities have included components focusing on increasing access to fresh produce (Davis, 1999). Many of the food sovereignty initiatives that were identified included production of fresh fruits and vegetables, which can address the lack of access to healthy foods noted as



a risk factor for obesity in Native American communities, and which can support obesity-prevention interventions. Obesity is a risk factor for cardiovascular disease and diabetes, therefore reductions in obesity rates can also reduce occurrences of cardiovascular disease and diabetes among Indigenous people.

### ***Enhanced nutrition***

Food grown from heirloom and Indigenous seed stock have shown significantly higher nutritional value than those grown with conventional, industrial farming practices (Prathvadi, 2019) (Auger 2002). Food sovereignty efforts that include cultivation of heirloom and Indigenous seed stock therefore provide nutritional benefits to community members.

### ***Food Security***

Multiple food sovereignty projects incorporated Indigenous produced foods into federally supported food distribution packages for their members. Several projects also used Indigenous-produced food on the menus of the school nutrition programs that serve their communities.

Our analysis of USDA food access data found that 50 percent of Minnesota census tracts that include Native nations reservations were identified as food deserts. This prevalence of food deserts on Indigenous lands significantly exceeds the 14 percent of all Minnesota census tracts that qualify as food deserts, suggesting an increased impact of food deserts on Native communities. Living in food deserts may magnify the effects of food insecurity on Indigenous communities and consequently enhance the value of strengthened local food systems.

Food sovereignty initiatives and development of local food systems on reservations increase the availability of fresh and healthy foods to residents. While increased availability of Indigenously-produced fresh food may not be recognized in designation of a census tract as a food desert, increasing access to these foods may mitigate the negative health and food security impacts of food deserts in these locations.

### ***Indoor air quality***

Some food sovereignty work happens at a household level and includes activities that are traditionally fueled with firewood. Firewood combustion can harm indoor air quality, which can create health problems. This can be a place where energy efficiency measures benefit overall health, however health and energy benefits must be appropriately balanced with respect for cultural tradition and integrity.

## **Economic Development**

### ***Employment***

Farming, food production, and retail food outlets in Indigenous communities create jobs and entrepreneurial opportunities for members. These opportunities can lift household incomes and allow for a more healthy, holistic, and culturally enriching quality of life.

## ***Cross-subsidization***

Fresh and healthy foods can be more expensive than processed and packaged foods. For Indigenous members with limited incomes, it may be difficult to purchase healthy foods. We identified examples of using sales to non-members at higher prices to subsidize the cost of providing discounted food to Indigenous members.

## ***Living off Native nations lands***

One interviewee advised that food sovereignty extends beyond food production, processing, and distribution. From the Indigenous perspective, food sovereignty can be understood as the ability “to live comfortably off the land” (Cornelius, 2021) through subsistence hunting, fishing, and gathering as traditionally practiced. Reducing dependence on outside food production enhances economic self-sufficiency, environmental sustainability, and overall resiliency of each nation.

# **Cultural Relevance, Holistic Approach to Seeds and Food Production**

## ***Sovereignty***

Native nations have been burdened with the traumatic history of the decimation of their traditional lands and cultures. Historical actions have promoted Indigenous dependence on outside entities. Food sovereignty is centered around the ability of members to control the variety, quantity, and quality of foods that nourish their communities, both physically and spiritually, with a focus on the use of traditional foods, thus supporting their self-sufficiency.

## ***Relationship to food***

One interviewee described the difference between Indigenous foods and conventional American foods as being the difference “between a relative and a commodity.” Producing and consuming heirloom foods can create cultural benefits by connecting food to holistic health.

## ***Historical connection***

Collection and cultivation of heirloom and Indigenous seeds from traditional food and medicinal plants is a frequent component of food sovereignty initiatives. Developing repositories of sovereign heirloom seeds supports connections to cultural traditions and Spiritual practices.

## ***Connection to the land***

Food sovereignty can include subsistence hunting, fishing, and foraging on Native nations lands. Conducting traditional hunting and gathering practices on Native nations lands and ceded territories may support a culturally significant connection with the land.

## Environmental Benefits

### *GHG emissions – Transportation*

The GHG emissions generated in the food production and distribution process include emissions from transporting food from where it is grown to where it is consumed, as well as through any intermediate processing steps. Research has found that non-transportation factors influence food system emissions more than food miles and that local food systems do not necessarily generate lesser transportation-related emissions (Stein, 2021). The pilot associated with this project in which Healthy Share delivered boxes of primarily local produce to members of a Native nation sought to develop a protocol to quantify emissions reductions (if any) generated by local food systems.

### *GHG emissions – Production*

Reductions in energy consumed during food processing, distribution, and sales also reduce the release of greenhouse gases. Traditional Indigenous food systems may include bison grazing, harvesting of native plants (e.g., wild rice), hunting, and fishing. These practices may require less energy and produce fewer emissions than their alternatives in industrial meat production and conventional farming practices. For example, Cook (2019) measured methane emissions from bison that were 23 percent lower than those produced by cattle.

### *Ecosystem services*

Food production practices give rise to co-benefits of improved soil fertility, organic matter, microbial biodiversity, and water retention and quality. Water is valued in Indigenous culture, so the holistic approach to food production also includes a focus on water impacts of food cultivation and processing. Water management with regenerative strategies for quantity, quality, and watershed protection are common in many community models.

## Environmental Justice

### *Environmental Preservation*

Every two years, the State of Minnesota submits its list of impaired waters to the U.S. Environmental Protection Agency (EPA). In March 2021, the EPA partially rejected the State of Minnesota's list as it did not provide protection to wild rice waters that are particularly vulnerable to sulfates. The EPA declared by not including these waterways, the state was in violation of the Clean Water Act. For the first time in the state's history, the EPA is providing oversight of the sensitive waterways that affect the food sovereignty of the 11 Native nations of Minnesota. Environmental justice requires an understanding of how all systems are affected by pollutants and carbon emissions. Food sovereignty, and Indigenous dependence on the land and waters for game, fish, crops, and medicine, creates a framework for Environmental Justice and subsequent restoration efforts.

## ***Restorative Justice***

Throughout the history of the United States, Native nations have been the victims of both deliberate and indirect incursions into their sovereignty and cultures. Food sovereignty seeks to repair infringements on their food systems, thereby increasing the economic sovereignty and cultural strength of each nation. Support for food sovereignty by utilities and government can be a step toward justice against past infringements on Indigenous culture and sovereignty.

## ***CIP Participation***

The Native Nations Potential Study, funded through a Minnesota CARD grant, in which Slipstream and its partners are currently engaged, has observed evidence that Indigenous communities are under-represented in energy efficiency programs offered by Minnesota utilities. Utility support for food sovereignty projects can signal a shift toward more equitable distribution of program funds.

## ***Goal Alignment***

Through CIP and through other strategies, the State of Minnesota is prioritizing energy efficiency and decarbonization measures and is seeking innovative ways to produce those savings. In tandem, the state is beginning to prioritize equity for under-served communities, such as the 11 Native nations in Minnesota. As nations turn inward to protect their sovereignty, culture, and values, they will seek to protect their lands and waters. Their efforts to build a more sustainable future, especially with regards to food security and sovereignty will be based on the perspective of the Seven Generations: acts taken today must benefit the next seven generations that follow. In this way, support for food sovereignty through CIP aligns the objectives of the State of Minnesota with those of the Indigenous members and present an opportunity to promote partnerships between Minnesota's utilities and the 11 Native nations.

## **Local Food System GHG Offset Protocol**

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### **Emissions Offset Protocol Findings**

According to the US Environmental Protection Agency (EPA), transportation generates 29 percent of all U.S. greenhouse gas (GHG) emissions and is the leading source of GHG emissions in the United States (EPA, 2022). Per the Minnesota Pollution Control Agency, the average product in a grocery store in the Midwest traveled 1500 miles before it arrived on the shelf. As an alternative to transporting food long distances from where it is produced to where it is consumed, local food systems, such as those developed through food sovereignty initiatives, may produce lower transportation-related emissions than those generated through conventional global food systems.

Despite a potential GHG emissions reduction from the development of local food systems, the project team did not find a current example in the United States of a carbon offset protocol that quantifies the GHG emissions benefit created by these systems. Such a protocol would provide a mechanism through which individuals and organizations could invest in local food systems and obtain credits for the GHG

emissions reductions enabled by that system. Investors could then monetize and trade these credits in voluntary carbon markets. Investment in local food systems combined with quantification and monetization of resulting decarbonization from a replicable and scalable local food system model would provide additional security and revenue to Indigenous and non-Native communities.

To quantify GHG emissions reductions from a replicable local food system, this research studied a pilot project involving Healthy Share and a Native nation in Minnesota. The Native nation obtained a Bush Foundation Grant to develop an energy self-sufficient food hub model that features the Healthy Share local food model. Healthy Share started delivering organic produce to member households on November 9, 2021, and will continue these deliveries until 2023.

Healthy Share delivers a combination of locally-grown organic fruits and vegetables and non-locally grown organic produce. Healthy Share seeks to maximize the amount of locally-produced food that it delivers, while ensuring that the food it delivers each week aligns with USDA nutrition guidelines. Limitations on the types of foods that can be grown in Minnesota, as well as the seasonality of agricultural production in Minnesota lead Healthy Share to include varying levels of non-local foods in its deliveries throughout the year.

Data available at the time of publication was collected between November, 2021 and March, 2022, which includes the lowest-producing months in Minnesota’s growing season. The team anticipates that the amount and types of local foods will increase significantly by the conclusion of the pilot.

Through the first 21 weeks of the program (11/9/2021 – 3/31/2022), participants received 45 different kinds of produce in the Healthy Share deliveries. During this time, local food delivered was grown on 14 local farms, which were located between 45 miles and 305 miles of the aggregation point. The median distance from the local producers to the aggregation point was 175 miles. Healthy Share forecasted that locally-grown items will increase to represent up to 85 percent of weekly deliveries during the summer growing months. Reflecting increased availability of local food in the summer months, the food miles of the delivered produce is expected to drop significantly with the transition into the Minnesota growing season.

Table 5 lists the 13 types of produce that Healthy Share included in its deliveries during the study period that may be grown or produced in Minnesota and the distance from the point of production to the Healthy Share aggregation point.

**Table 5. Local Foods - Monthly Distance from Producers to Aggregation Point (Miles)**

<b>Produce Type</b>	<b>Kg Delivered</b>	<b>11/21</b>	<b>12/21</b>	<b>1/22</b>	<b>2/22</b>	<b>3/22</b>
Apples	34.0	53.7	N/A	N/A	N/A	N/A
Brussel Sprouts	36.3	202.5	202.5	201	N/A	N/A

Produce Type	Kg Delivered	11/21	12/21	1/22	2/22	3/22
Cabbage	212.3	163.5	163.5	163.5	163.5	125
Carrots	170.1	126	149.5	126	126	126
Lettuce	46.7	201	63.6	63.6	63.6	63.8
Mushrooms	22.7	305	79.3	N/A	79.3	79.3
Onions	108.9	189	142	201	173	173
Potatoes	368.3	244	216	272	244	229.3
Radish	44.9	N/A	173	173	173	48
Rutabagas	45.4	N/A	163	163	N/A	N/A
Shallots	4.5	N/A	N/A	45.1	N/A	N/A
Squash	222.3	149.5	138	177	201	N/A
Yams	72.6	112.5	112.5	177	N/A	N/A

While collecting data and developing a framework for the protocol, the project team discovered characteristics of local food systems that may meaningfully influence the GHG emissions benefit, or penalty, offered by those systems.

### ***Locations of Local Producers***

Healthy Share seeks to maximize the portion of the food that it delivers that is grown or produced locally. During the study period, 42 percent of delivered food was sourced from local producers; however, the distances from the locations of the producers to the Co-op Partners Warehouse aggregation point ranged from 45 miles to 305 miles, with a median distance of 175 miles. Healthy Share expects that the percentage of local foods delivered will increase significantly during the summer and fall growing seasons. During the study period, Healthy Share established relationships with additional producers in south-central Minnesota and these producers are located significantly closer to the aggregation point than the current average distance between local producers and the aggregation point. Sourcing food from these producers may reduce the median distance by approximately 50 percent.

Reducing the distance from producers to the aggregation point will increase the emissions benefits for the types of produce that these farms provide.

Describing the GHG emissions impact of local food systems requires establishing boundaries based on a meaningful definition of “local.” Local geography, availability of local producers, and diversity of local food production may influence the definition of “local” used to estimate the emissions benefit of a given local food system. The definition of “local” used by a given food system, as well as the actual distances from producers to the aggregation point are key inputs to estimate the GHG emissions benefit of a local food system.

### ***Location of Aggregation Point***

Healthy Share is based in Northfield, Minnesota. During the study period, it used Co-op Partners Warehouse, which is located in Minneapolis, Minnesota, as the aggregation point to which local producers would deliver produce. Healthy Share traveled to Co-op Partners Warehouse to assemble weekly food boxes and delivered those shares to community members. The current location of Co-op Partners Warehouse is 45 miles from Healthy Share. In summer, 2022, Healthy Share will transition to working through an aggregation point in Northfield that is one block from Healthy Share’s office. This change will essentially eliminate the miles traveled from Healthy Share to the aggregation point. Reducing this distance will meaningfully reduce transportation emissions for all produce types.

The anticipated impact of the change of the location of Healthy Share’s aggregation point demonstrates that distances from the distributor to the aggregation point and from the aggregation point to the community served are key inputs for estimating GHG emissions impacts.

### ***Uncertain Counterfactual Comparison***

The Healthy Share local food system model may potentially further reduce transportation emissions by delivering fresh produce to participant homes, thereby reducing the need to drive to a grocery store to obtain some of the most perishable items on a household’s shopping list.

Some of the types of organic produce Healthy Share delivered to member households are not available in the retail food outlets that are most proximate to the reservation. Additionally, the organic produce that was offered required a significant price premium when compared to conventionally produced items. The project team assessed organic produce offered at the food stores closest to the reservation to determine the number of miles that households would need to travel to purchase comparable foods. The project team also recognized that, if fresh organic produce is not available at a household’s preferred food store, the household may choose to purchase other foods, rather than travel farther to obtain organic produce. Exit interviews with pilot participants will collect feedback from participants on how the Healthy Share deliveries affected the frequency and destinations for their travel to food stores.

Lack of availability and price premiums both create obstacles to modeling how Healthy Share deliveries to households influenced the quantity and distance of trips to grocery stores made by participants. At this time, it is unknown whether, in the absence of a Healthy Share delivery, a participant household would drive a longer distance and pay potentially higher prices to purchase produce that is equivalent

quality to the food provided by Healthy Share. If households would not have traveled farther and paid higher prices for comparable food, it is unknown whether these households would have purchased conventional produce or would have replaced fresh produce with organic or conventional shelf-stable items that are available at the nearest food store.

Exit interviews with pilot participants will include questions intended to evaluate how the Healthy Share deliveries influenced frequency and destination of grocery store trips and may be used to recommend an appropriate counterfactual scenario that may be used as part of the estimate of baseline emissions rates from conventional food systems. Further research on household food purchasing behavior may help to inform inputs in a local food system protocol that would be used to estimate reductions in emissions due to reduced consumer travel to proximate food stores.

## **Macroeconomic Benefits**

The level of macroeconomic benefit from a strengthened local food system depends both on factors that affect the rate of economic leakage and “multipliers,” which are attributes of the community and economy that determine the opportunity for money that is spent locally to remain in the local economy.

The population of the community; the size and diversity of the local economy; and the income levels and distribution of residents affect the potential for economic multipliers from stronger local food systems. The estimates in this section only describe economic leakage due to food spending that leaves the community and do not account for multiplier benefits that would result from more robust local food systems. Therefore, it is probable that the forecasted economic benefit of stronger local food systems underestimates these benefits.

Non-local vendors include national and multinational food distributors. The share of each dollar spent at a grocery store that goes to the producer, to the retailer, and to other steps in the food value chain varies by food type. While there is variation between food products, the USDA ERS finds that, on average, \$0.224 of each food at home dollar spent is retained by the retailer and the remaining \$0.776 is distributed across ten other categories in the food value chain (USDA-ERS, 2022). The USDA ERS also finds that only 1.5 percent of food purchases are local (Vogel, 2015), with the remaining 98.5 percent reflecting participation in conventional non-local food systems. Therefore, a conservative baseline assumption would be approximately 75 percent economic leakage from conventional food systems. However, this baseline does not account for rates of non-local ownership of grocery stores and therefore additional leakage as grocery store revenue is applied to the non-local owner’s profits and expenses. In addition to estimating leakage at the conservative 75 percent baseline rate, our analysis includes loss at a 90 percent leakage rate, which may more accurately account for non-local ownership of retailers.

Table 6 applies the U.S. Census and BLS data sets to estimate annual food at home (FAH) expenditures for each Native nation (as described in Methodology), then estimates a range of baseline rates of economic leakage resulting from participation in conventional food systems.



**Table 6. Food Economy Summaries of Native Nations Reservations**

<b>Reservation</b>	<b>Number of Households</b>	<b>Average Household Size</b>	<b>Annual Median Income</b>	<b>Annual Food Expenditure</b>
Bois Forte Band of Chippewa	638	1.56	\$28,194	\$1,660,076
Fond du Lac Band of Lake Superior Chippewa	1,837	2.18	\$55,750	\$10,143,914
Grand Portage Band of Lake Superior Chippewa	346	2.09	\$24,022	\$1,211,692
Leech Lake Band of Ojibwe	4,632	2.50	\$53,925	\$29,079,696
Lower Sioux Indian Community	190	3.19	\$45,625	\$1,334,560
Mille Lacs Band of Ojibwe	1,950	2.37	\$42,245	\$10,208,250
Prairie Island Indian Community	82	2.35	\$51,500	\$483,800
Red Lake Band of Chippewa Indians	1,445	3.99	\$41,268	\$12,734,785
Shakopee Mdewakanton Sioux Community	220	2.62	\$250,000	\$2,506,900

Reservation	Number of Households	Average Household Size	Annual Median Income	Annual Food Expenditure
Upper Sioux Indian Community	65	2.15	\$46,719	\$310,115
White Earth Reservation	3,649	2.76	\$45,777	\$22,244,304
Total	15,054	N/A	N/A	\$91,918,092

In the local food system pilot project, Healthy Share replaced 42 percent of non-locally grown produce with locally grown fruits and vegetables. As noted previously, local sourcing is expected to increase significantly in the summer and fall of 2022, which is outside of the study period for this pilot. For 2021, 63 percent of the food that Healthy Share delivered was sourced locally and Healthy Share anticipates increasing the percentage of locally sourced food that it delivers for 2022. While the current Healthy Share program focuses on fresh produce, in the future deliveries are expected to include additional food categories. Table 7 estimates current rates of economic leakage due to conventional food system and forecasts potential economic benefits for growing the local food system through food sovereignty initiatives. The analysis applies a range of 40% - 65% locally-sourced food based on the local potential demonstrated by Healthy Share.

**Table 7. Local Food System Economic Benefit**

Reservation	Min. Loss (75% Leakage)	Max. Loss (90% Leakage)	Min. Local Benefit (75% leakage offset by 40% local)	Max Local Benefit (90% leakage, offset by 65% local)
Bois Forte Band of Chippewa	\$1,245,057	\$1,494,068	\$498,023	\$971,146
Fond du Lac Band of Lake Superior Chippewa	\$7,607,936	\$9,129,523	\$3,043,174	\$5,934,190
Grand Portage Band of Lake Superior Chippewa	\$908,769	\$1,090,523	\$363,508	\$708,840

<b>Reservation</b>	<b>Min. Loss (75% Leakage)</b>	<b>Max. Loss (90% Leakage)</b>	<b>Min. Local Benefit (75% leakage offset by 40% local)</b>	<b>Max Local Benefit (90% leakage, offset by 65% local)</b>
Leech Lake Band of Ojibwe	\$21,809,772	\$26,171,726	\$8,723,909	\$17,011,622
Lower Sioux Indian Community	\$1,000,920	\$1,201,104	\$400,368	\$780,718
Mille Lacs Band of Ojibwe	\$7,656,188	\$9,187,425	\$3,062,475	\$5,971,826
Prairie Island Indian Community	\$362,850	\$435,420	\$145,140	\$283,023
Red Lake Band of Chippewa Indians	\$9,551,089	\$11,461,307	\$3,820,436	\$7,449,849
Shakopee Mdewakanton Sioux Community	\$1,880,175	\$2,256,210	\$752,070	\$1,466,537
Upper Sioux Indian Community	\$232,586	\$279,104	\$93,035	\$181,417
White Earth Reservation	\$16,683,228	\$20,019,874	\$6,673,291	\$13,012,918
<b>Total</b>	<b>\$68,938,570</b>	<b>\$82,726,284</b>	<b>\$27,575,429</b>	<b>\$53,772,086</b>

## **Food Sovereignty and Energy in Minnesota**

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### **Data Protection and Confidentiality**

Native nations may consider their food production initiatives to be fundamentally linked to the health and cultural preservation of their people and may therefore view some, or all, aspects of their food

sovereignty work as potentially being threatened by outside interference. To honor requests that information shared be maintained as confidential and not attributed to a certain nation or individual, we present an overview of findings on food sovereignty work in Minnesota in a way that anonymizes the programs and projects in which each nation and producer is engaged. Additionally, those nations and interviewees who consented to participate in the research under an agreement that entitled them to review and comment upon the research prior to publication have been given the agreed upon opportunity to review and comment and the content of this report has been revised accordingly.

## **Categorization of Food Sovereignty Work in Minnesota**

Food sovereignty initiatives reflect the traditions of individual Native nations, the current needs of their members, and the human and natural resources available to them. Through interviews with Indigenous members and producers in Minnesota, as well as supplementary research, the project team gathered information about food sovereignty work that is being done by seven nations and four producers. Lack of publicly available information and difficulty contacting appropriate individuals prevented the team from learning about work in-process by the remaining four nations.

While each nation's work is unique, the team identified eight themes that surfaced for multiple nations and producers:

### ***Wild Rice***

Wild rice is a traditionally important food for Indigenous People. Members use canoes to harvest wild rice from Minnesota lakes. After the rice is harvested, a parcher is used to dry the grains, then a gravity table separates the grains from the hulls and stalks before the rice is bagged for later use. While wild rice is typically harvested by Indigenous members and households, rather than as a community activity, some nations support wild rice production by facilitating use of centralized parching, separating, and bagging equipment. We heard examples of the harvested rice being retained by the households for their own use, as well as examples of rice being added to SHIP food boxes and Elder nutrition programs, as well as being packaged for sale to non-members.

### ***Maple Syrup***

Multiple nations and Indigenous producers discussed harvesting and processing the sap from sugar maple trees to create maple syrup and maple sugar. Sap may be harvested and processed either by individual households or at centralized location by the nation or a producer. After the sap is collected, it must be heated for 1-3 days to reduce the liquid by a 40:1 ratio to convert it to syrup. Similar to wild rice, maple syrup and maple sugar are traditionally important foods. The syrup that Indigenous People produce is used by member households, incorporated into SHIP boxes, added to Elder nutrition programs, and used in school food programs.

### ***Vegetables, Fruits, and Meat***

There were many examples of both on and off-reservation growing of produce. Growing initiatives included:

- Mobile tilling and technical assistance for home gardens.
- Delivery of greenhouse-raised plant starts which members may use in home gardens or community gardens.
- Allocating Native land for community gardens that are managed by member households.
- On-reservation farms managed by the government of the Native nation. These may be accompanied by washing and packing stations to make the harvested produce ready for sale or use in Elder nutrition programs, SHIP boxes, and school food programs.

Multiple nations and producers discussed how they use greenhouses and hoop houses to extend Minnesota’s short growing season to enable a better harvest.

In addition to growing vegetables and fruits, one nation maintains a bison herd, from which they harvest to provide meat to members. Additional nations indicated plans to start and grow a bison herd in the near future.

### ***Food Distribution***

Most Native reservations are rural and some include food deserts. Therefore, nations identified the need to transport fresh and traditional foods to members and to transport members to food retail and distribution locations. Native nations use box trucks, refrigerated trucks, and other vehicles to bring food to retail and distribution locations. Some nations also adapted vehicles to serve as mobile farmers markets that drive to locations throughout the reservation that are more accessible for members.

### ***Youth Agriculture Education***

Multiple nations discussed the centrality of “growing farmers,” along with growing fruits and vegetables, as a strategy to ensure the ongoing success of their food sovereignty work. To engage children in food sovereignty work, nations discussed organizing field trips for local schools to their farms or gardens as well as creating youth internship programs to both educate young people about agriculture and to provide support for Indigenous gardens and farms.

### ***Seed Saving***

Native nations and producers discussed the cultural importance of cultivating traditional or heirloom varieties of certain fruits and vegetables. In addition to the cultural value of these crops, many of the heirloom versions of the produce are believed to have superior nutritional qualities, when compared to commercially available strains of the crops.

To avoid cross-fertilization with non-native varieties, nations have created seed saving programs which preserve and protect traditional seed varieties, so that these items can continue to be grown and enjoyed in the future.

## Support for Hunting and Fishing

Indigenous People value their rights to hunt and fish on their reservations and in the ceded territories. While member households do the hunting and fishing and consume what they harvest, several nations described facilities or equipment that they make available to members for cleaning and preparing the fish, venison, elk, and other game that members harvest.

## Community Engagement and Education

In addition to producing fresh and healthy food, multiple nations discussed the importance of broader community engagement in their food sovereignty work. Community education and engagement re-introduces Indigenous members to traditional foods. Members, especially those who live in a food desert, may need to develop a taste for traditional foods to which they have had minimal exposure in the past and may also need to learn how to prepare these foods.

To reorient members toward traditional foods, Native nations discussed preparing traditional foods to be served at community events and incorporating traditional foods into school lunch programs. They also discussed using commercial kitchen facilities on their reservations as classrooms where they prepare traditional foods while teaching youth or other members of the community how to prepare the foods.

## Energy Use in Food Sovereignty

There are several energy uses related to each of the categories of food sovereignty projects described in the previous section (Table 3 and Table 4). In this table, we include both utility-provided energy uses, as well as gasoline, delivered fuels, and other non-utility provided energy types. Some of the identified energy uses include conventional agricultural practices, such as lighting and heating equipment for greenhouses and refrigeration for food preservation. However, we also identified energy uses that apply primarily to food sovereignty work, including maple syrup evaporators and wild rice parching equipment. Energy uses for transportation, field equipment, and equipment powered by delivered fuels represent a meaningful segment of total food production energy use. These types of energy use are not relevant to utility CIP offerings under the current CIP framework.

Table 8. Energy uses in Food Sovereignty Projects

Project Type	Related Energy Uses
Wild rice production	<ul style="list-style-type: none"><li>• Parching equipment</li><li>• Gravity tables</li><li>• Bagging/finishing equipment</li></ul>
Maple syrup production	<ul style="list-style-type: none"><li>• Boiling equipment</li><li>• Evaporators</li><li>• Bottling/finishing equipment</li></ul>

Project Type	Related Energy Uses
Cultivation of vegetables, fruits, and meat	<ul style="list-style-type: none"> <li>• Tractors</li> <li>• Field equipment</li> <li>• Irrigation pumps</li> <li>• Greenhouse HVAC</li> <li>• Greenhouse and indoor agriculture grow lighting</li> <li>• Wash and pack stations</li> <li>• Bison barn lighting and HVAC</li> </ul>
Food distribution	<ul style="list-style-type: none"> <li>• General delivery vehicles</li> <li>• Refrigerated trucks</li> <li>• Mobile farmers markets</li> </ul>
Youth agriculture education	(See cultivation of vegetables and fruits)
Seed savings	<ul style="list-style-type: none"> <li>• Seed separating</li> <li>• Seed drying</li> <li>• Refrigeration equipment</li> </ul>
Support for hunting and fishing	<ul style="list-style-type: none"> <li>• Transportation</li> <li>• Venison and fish smokers</li> <li>• Cold storage</li> </ul>
Community engagement and education	<ul style="list-style-type: none"> <li>• Commercial kitchen equipment, including ranges, ovens, griddles, fryers, refrigeration, lighting, hot food holding equipment</li> </ul>

## Recommendations

Through our secondary research and interviews with Native nations, we found a consistent recognition of the interconnectedness between food sovereignty work, the economic considerations of Indigenous members, education systems, and the sustainability of the natural world. Parallel to a holistic view of food sovereignty, opportunities for Minnesota's utility energy efficiency programs to support these efforts include both opportunities that clearly align with the existing CIP structure and opportunities that may require adjustments to the CIP framework. We describe the first category of opportunities as CIP Offering Recommendations and the second category as Structural Recommendations.

### CIP Offering Recommendations

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Based on the literature review, interviews with Native nations, and review of current CIP offerings, we recommend that utilities could take near-term steps to adjust their current CIP offerings to better support food production.

### CIP Support for New Energy Efficient Measures

Utilities that serve Indigenous lands may offer incentives for energy efficient equipment that the Native nations they serve use in food production. Energy-saving opportunities include both equipment that reduces electricity and/or natural gas consumption and measures that reduce non-utility energy consumption, including gasoline, diesel fuel, fuel oil, propane, and firewood. The measures that could reduce electricity and/or natural gas consumption are described in this section and selected measures that reduce non-utility fuels are described in the Structural Recommendations.

#### *Greenhouses*

Due to the short growing season in Minnesota (with an even shorter season in the northern part of the state, where seven Native nations have reservations), multiple nations and Indigenous producers discussed the importance of greenhouses and hoop houses for starting plants early enough in the spring to provide sufficient time for them to develop, produce fruit, ripen, and be harvested before the return of cold weather. Greenhouses use specialized HVAC equipment to evenly distribute warm air to all plants. Utilities may offer incentives for greenhouse HVAC systems, including heat pumps, condensing boilers, and combined heat and power (CHP) systems.

Minnesota utilities that serve reservations may also offer incentives for retractable greenhouse heat curtains, which insulate the fenestration during the night and therefore reduce heating fuel use. Utilities may additionally support efficiency in greenhouses by establishing pathways for these buildings within new construction design assistance programs that the utilities offer and by introducing incentives for greenhouse energy audits, accompanied by air sealing interventions and for greenhouse end wall insulation (Runkle, 2011). To reduce energy consumption in greenhouses, utilities may also offer incentives for infrared anti-condensate polyethylene film, which improves the thermal performance of the building envelope for greenhouses.



## ***Efficient Grow Lighting***

Indoor agriculture facilities can grow fresh produce throughout the year, rather than just during the typical growing season. As a result of the opportunity to grow fruits and vegetables year-round, indoor agriculture presents an opportunity to address food deserts on reservations, which persist throughout the year. In addition to consistently producing fresh food, indoor agriculture requires less water inputs than conventional agriculture and can be paired with fish farming, which produces a symbiotic relationship with the plants. Though offering water and nutrient benefits, indoor agriculture replaces sunlight with artificial sunlight and therefore may require higher electricity use than conventional agriculture. Further research may be valuable in quantifying the costs and benefits of increased energy consumption in indoor agriculture balanced against impacts of reduced use of water, and potential local health benefits created by indoor agriculture. When indoor agricultural production is implemented, optimizing energy-use for these facilities can significantly reduce energy consumption.

## ***Indoor Agriculture Modules***

Commerce may engage with Great River Energy to explore the economics and energy savings potential of incentivizing purchase and distribution of modular indoor agricultural facilities to customer locations. Commerce may then model a CIP offering for these modules and communicate with the electric utilities that serve Native nations and Indigenous producers about including incentives for indoor agriculture modules in their CIP offerings.

## ***Maple Syrup Evaporators***

Maple sap must be heated for one to three days to evaporate water from the sap, ultimately reducing the sap by a ratio of 40:1 to produce maple syrup. Producers may increase the energy efficiency of maple syrup processing by:

- Connecting a sap pre-heater into the evaporator
- Adding an energy recovery steam hood or economizer
- Using reverse osmosis equipment (Sanford, 2022)

Maple syrup evaporators can be fueled by electricity, fuel oil, propane, natural gas, kerosene, or biomass (Ober, 2021). Some Indigenous producers stated that firewood is the traditional method for fueling the maple syrup boiler and that maintaining that aspect of the traditional process is culturally important. Therefore, they would be concerned about replacing wood-fired equipment with an electric evaporator; however other nations stated that they would be interested in replacing traditional production equipment with an energy-efficient alternative. Electric utilities could offer CIP rebates for replacing inefficient evaporators with efficient electricity-powered evaporators.

## ***Wild Rice Parchers***

Native nations harvest wild rice from lakes on Indigenous reservations and ceded territories. After harvesting, nations use parchers to dry the grains. Gravity tables are used to separate the grains from the hulls and stalks. Some natural gas utilities offer rebates in their agricultural-sector programs for

efficient grain dryers, which serve a similar purpose as a wild rice parcher, but on a larger scale. The measure description of grain dryers in the Minnesota TRM may be redefined to enable calculations of incentives for wild rice parchers or wild rice parchers may be added as a new measure in the TRM. Alternatively, utilities may create separate incentives for these measures, including investigating opportunities for incentivizing electric parchers.

### ***Flash Freezers***

Several Native nations described using food grown at farms or gardens on the reservation in school food programs, Elder nutrition programs and Minnesota Statewide Health Improvement Program (SHIP) food deliveries. To provide food for these outlets throughout the year, some nations freeze a portion of the produce that they grow and distribute frozen produce throughout the year. While many utilities offer incentives for efficient commercial refrigeration measures, CIP could more directly support distribution of Indigenously produced food by offering incentives for efficient commercial flash freezers.

### **Adapt Custom Rebate Programs**

Some energy saving opportunities associated with food sovereignty initiatives may not be relevant for all Native nations and may have limited applicability outside of food programs. Utilities that were interviewed for this project suggested that measures, such as energy-efficient wild rice gravity tables, may qualify for incentives through a utility's commercial custom rebate offerings. A review of descriptions of selected custom rebate offerings on utility websites found that additional steps could be taken to highlight the opportunity to use the rebates for food sovereignty measures and to facilitate custom applications for relevant measures.

### ***Direct Messaging***

Utilities that serve Native nations could incorporate examples or case studies of custom rebate opportunities relevant to food initiatives into the web pages that describe their commercial and industrial custom incentive offerings. Through clearer messaging, more Indigenous communities may access custom incentive programs to support their food production work.

### ***Robust Account Management***

Utilities that serve reservations may assign staff as account managers, who are responsible for engaging with a given Native nations government, to understand the nation's comprehensive energy needs. While certain utilities may currently assign an account manager to the nation(s) that they serve, interviews suggested that these account managers may focus on energy needs for Indigenous-owned casinos, rather than on all energy uses on the reservation. Account managers who serve nations may incorporate culturally appropriate agricultural and food production activities, and associated energy savings opportunities into their dialogue. Through this engagement, account managers may identify opportunities for Indigenous communities to access custom incentive offerings for food-related equipment.

## Sponsor Community Engagement

As described above, many Native nations conduct community engagement and education, focused on both re-orienting members toward traditional foods and on training members in farming and food production. To accomplish these objectives, communities leverage social gatherings, at which traditional foods are served and discussed, and youth farming internship programs, among other strategies.

Most utilities allocate a portion of their revenue toward customer engagement efforts in support of their CIP offerings. These efforts may include sponsorship of community events. While regulations do not limit how utilities may spend these funds, utilities must use these budgets strategically so that they may demonstrate that their energy efficiency programs are cost effective for ratepayers/members. In support of this objective, utility customer engagement may focus on highlighting energy saving opportunities (residential, commercial, or other) and relevant CIP offerings to encourage program participation.

Our interviews with Indigenous members also revealed the interconnections among food sovereignty work supported by Native nations governments, household-level food production activities, and food production and distribution work of organizations led by Indigenous members. Member households may use their own maple syrup processing and wild rice parching equipment, among other related residential energy uses. Additionally, where Indigenous produced food is sold to members at farmer's markets or other retail outlets, members must have the economic means to purchase the food. In this way, residential energy burden for Indigenous members directly relates to the economic viability of food sovereignty efforts.

Utilities may collaborate with Native nations to incorporate energy efficiency education into the community's food sovereignty programming. In doing so, utilities may be confident that providing financial support to community engagement work aligns with CIP energy conservation objectives.

## Adapted energy savings baselines

Indigenous members consistently discussed the financial limitations they face when they seek to expand food sovereignty initiatives. To remain financially sustainable when acquiring food production equipment, they may consider options for purchasing older used equipment, as well as options for purchasing new equipment. Older equipment may have a lower level of energy performance than a baseline option for purchased new equipment.

Custom incentives are typically calculated based on the difference in energy performance between a baseline/conventional piece of equipment and a more efficient option that the CIP incentive will enable the customer to purchase. When determining rebates for custom incentive applications for food production equipment, where applicable, utilities may work with Minnesota Department of Commerce staff to establish a methodology that uses purchase of refurbished equipment, rather than minimally efficient new equipment, as the energy baseline. The methodology would recognize the actual decision-making context encountered by Native nations and would therefore evaluate energy savings of the installed new (rather than refurbished) equipment, against the estimated energy consumption of the refurbished equipment baseline.

## Structural Recommendations

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Utilities may incorporate the outlined recommendations in the preceding section into their CIP offerings without requiring changes by Department of Commerce, the Minnesota Public Utility Commission, or the state legislature. However, the project team identified other potential opportunities for CIP support for food sovereignty that may require program-level changes to be made before utilities could apply these recommendations.

### Local Food System Emissions and Economic Benefits

The success of utility energy efficiency programs is evaluated based on analysis from a societal cost-benefit test. The societal cost-benefit tests accounts for the value of avoided emissions due to reduced energy consumption resulting from installed efficiency measures. According to the US Environmental Protection Agency (EPA), transportation generates 29 percent of all US emissions and is the leading source of GHG emissions in the United States (EPA, 2022). Per the Minnesota Pollution Control Agency, the average product in a grocery store in the Midwest traveled 1500 miles before it arrived on the shelf. As described in the Local Food System Offset Protocol section, the project team is developing a proposed methodology to calculate transportation emissions reductions and economic benefits that can be achieved by transitioning to local food systems, such as those created through food sovereignty work.

Minnesota policy makers can update applicable regulations to permit utilities to include emissions reductions and gains to local economies resulting from their support in developing local food systems. Utilities could then offer enhanced incentives for the measures described in the CIP Recommendations section. The implementation of those measures will enhance the ability of a Native nation or community to decrease the percentage of its food that it purchases from outside of Minnesota.

### Price Energy Risks to Food Sovereignty

Oil and natural gas pipelines cross multiple Indigenous reservations in Minnesota and are also present in the ceded territories. Nationally, there were 6,950 reported pipeline incidents<sup>4</sup> from 2010 – 2020 (Popescu, 2021). The success of food sovereignty directly depends on the health of the natural environment in reservations and ceded territories. Pipeline spills could irreparably damage the abilities of Native people to produce and harvest food on their land. Spills could destroy Native crop lands or poison waters where culturally significant wild rice is harvested and from which members harvest fish.

Utility-related fuel acquisition and energy distribution have the potential to greatly harm food production on Native lands, including the ability to harvest and produce culturally important foods, such as wild rice. Societal cost-benefit tests used to evaluate utility energy efficiency programs account for

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<sup>4</sup> The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration requires reporting of releases of hazardous materials, as well as incidents involving transportation of hazardous materials or related to a hazardous liquid pipeline facility.

the value of reduced emissions due to lower energy consumption as an externality of the efficiency program. The method for considering negative externalities due to energy consumption, and the consequent reduction in risk resulting from lower energy consumption could be revised to account for a quantified financial risk and probability factor associated with the potential for destruction of Indigenous food production capacity resulting from the utility's generation, purchase, and sale of energy and fuel, as well as during the process of fossil fuel extraction. In accounting for this risk, utilities could be further incentivized to reduce purchase and sale of energy and to consider risks to Native nations when evaluating siting and sourcing of energy transmission infrastructure.

## **Support Non-Energy Efficiency Clean Energy Measures**

During interviews with Indigenous members, the project team inquired about how energy use, costs, and objectives intersected with food sovereignty efforts. Responses identified several conventional energy efficiency opportunities, such as managing electricity use for greenhouse and indoor agriculture facilities or refrigeration for food preservation. However, responses frequently also expressed interest in siting solar photovoltaic systems at food production and processing facilities, including greenhouses and food hubs. Interviewees also discussed the importance of transporting food to members and transporting members to food sources in mitigating food deserts on Indigenous lands and stated that fuel costs affect the work nations are doing for transportation and distribution of food. Also related to transportation, several interviewees discussed tractors and field equipment and were interested in fuel reduction. Lastly, several interviewees discussed potential risks related to electricity outages. Risks include food spoilage if refrigeration equipment lacks power for a sustained period and damage to greenhouse and indoor crops if grow lighting, temperature controls, and ventilation equipment cannot be used for an extended period.

While CIP currently exclusively pursues reductions in energy consumption through the installation of energy efficiency measures, the Minnesota ECO Act introduces more opportunities to pursue other types of energy reduction and emissions reduction strategies, including enabling claims of energy savings from fuel switching measures and load management measures. Additionally, Minnesota's electric utilities have an interest in supporting growth of the electric vehicle industry in the state, as charging EVs can effectively capitalize on the utility's baseload electricity production, while increasing electricity sales to offset reductions due to energy efficiency improvements and distributed energy generation.

Under the expanded fuel switching and load management savings opportunities created by ECO, Commerce may consider opportunities to add measures related to electric on-road vehicles, electric tractors and field equipment, and EV charging infrastructure to the TRM, thereby assisting utilities in offering incentives for these measures. Similarly, Commerce may investigate how distributed battery-storage systems could be used to support improved load management, as well as options for how utilities may offer incentives for installing battery storage systems.

If available, Native nations could leverage incentives for on-road electric vehicles, electric field equipment, and/or EV charging infrastructure to purchase electric food delivery vehicles to improve food distribution and electric tractors to increase food production. Adding incentives for installing EV

charging infrastructure would enable these nations to simultaneously support EV adoption among members through access to charging stations and mitigate local food deserts.

If available, nations could use incentives for battery-storage systems to enhance the resiliency of their food production and preservation work. They could install battery-storage systems at food hubs and production kitchens to reduce risk of food spoilage during power outages. They could also install battery back-up at greenhouses and indoor agriculture facilities to reduce risk of harm to plants from temperature changes or lack of light and ventilation resulting from power outages.

## **Enable Holistic Clean Energy Solutions**

Commerce may also develop strategies to enable electric utilities to offer customers centralized and comprehensive clean energy solutions. Commerce may pursue a consolidated clean energy offering and/or may develop a clean energy concierge program model.

A comprehensive clean energy offering may evaluate the combined energy savings and load management impacts of energy efficiency measures, customer-sited distributed energy resources, customer energy storage systems, and electric vehicle deployment. The clean energy offering would include advisement to customers on opportunities to implement comprehensive improvements to support a clean energy transition. It would also recommend a methodology for calculating the benefits of the comprehensive project so that customer incentives could be offered accordingly.

If Commerce finds that the ECO Act does not allow for a comprehensive clean energy offering, it may develop and share with utilities a clean energy concierge model program offering. The concierge model would recognize the challenge presented to customers in navigating incentive programs, regulatory requirements, and utility authorizations related to implementing energy efficiency improvements; interconnecting solar photovoltaic and/or anaerobic digester biogas systems; purchasing and installing EV charging systems; purchasing electric vehicles; and installing battery-based energy storage systems. A clean energy concierge would be a resource to customers and offer a centralized source of information for evaluating the costs and benefits to implement each element of a clean energy system. It would also support customers in accessing all incentives and credits that they may be able to receive for the completed project.

## **Develop Partnerships**

To provide free or low-cost technical assistance to Native nations in optimizing energy systems to support food sovereignty initiatives, Commerce may facilitate the development of regional and statewide partnerships between the nations and resources available through the University of Minnesota and Minnesota Clean Energy Resource Teams (CERTS). Native nations that seek to optimize energy use in food systems may not have engineering or planning staff who have time available to advise on energy issues related to food production and distribution.

Minnesota CERTS teams specialize in providing technical assistance to communities on clean energy topics and may be able to offer free or low-cost technical assistance to nations. Similarly, some engineering classes at University of Minnesota undertake engineering design-assistance projects with

businesses and organizations in the community. One Indigenous producer interviewed provided an example of this type of partnership. The producer partnered with a University of Minnesota engineering class to design an automated and mechanized lighting system to significantly reduce energy consumption for indoor growing.

Commerce may engage with engineering departments at University of Minnesota system schools and with CERTS teams to identify opportunities for partnerships and then share information about those opportunities with the utilities that serve the 11 Native nations.

## Conclusions and Next Steps

This research reviewed energy uses within food sovereignty initiatives, both nationally and in the State of Minnesota. Our research finds that there are immediate opportunities for Minnesota's electricity and natural gas utilities to expand their Conservation Improvement Program offerings to support food sovereignty work in the state. Utilities may offer incentives for energy efficient models of equipment, such as wild rice parchers and maple syrup evaporators, that closely align with food sovereignty work in the state. Additionally, or alternatively, they may develop streamlined communications and processes to provide custom rebates for relevant types of food production equipment. Under a custom rebate review, utilities may apply energy consumption baselines other than a piece of new, but inefficient, equipment, such as refurbished used equipment, when calculating savings for a proposed food sovereignty measure. Finally, utilities may use their CIP marketing and education budgets to support the community engagement and education programs that Native nations implement to reorient members toward traditional and fresh foods.

Our research also finds that silos separating different clean energy programs and unduly narrow evaluations of the costs and benefits of utility CIP offerings impede the abilities of Minnesota's utilities to apply CIP offerings to support food sovereignty. Policy makers may enable additional support and reduce silos by incorporating holistic evaluations of program implementation, including calculating the emissions reductions benefits of developing local food systems and quantifying and pricing risks to Indigenous food systems posed by utility-related activities, then considering these factors and impacts in their evaluations of CIP offerings.

Some nations are committed to making their communities, including food production activities, as sustainable and self-sufficient as possible. They wish to incorporate renewable energy, battery-based energy storage, and vehicle electrification, and energy efficiency into their efforts. To support comprehensive clean energy improvements, Minnesota policy makers may use opportunities afforded by the ECO Act to enable CIP support for a broader array of clean energy measures. Separately, or as part of deploying these strategies, policy makers may support development of partnerships between Native nations in Minnesota, University of Minnesota engineering expertise, and Minnesota CERTS teams to offer technical assistance to Native nations in optimizing energy use in their food production systems.

This research found no precedents nationally for direct utility support for food sovereignty work and identifies both immediate and longer-term opportunities for Minnesota's electricity and natural gas utilities to support Indigenous food production in the state. Minnesota's utilities and policy makers may demonstrate national leadership in deploying innovative and high-impact clean energy programs by implementing the recommendations outlined in this research.



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