PROJECT TITLE: Resilience and Prosperity in Rural Northern Wisconsin **TECHNICAL CONTACT:** Amy Simpkins, muGrid Analytics; amy@muGrid.com 720.281.0482	**TOPIC AREA:** Area 1 **REGION OF INTEREST:** Midwest **BUSINESS CONTACT:** Maria Redmond, State of Wisconsin Office of Sustainability and Clean Energy; maria.redmond@wisconsin.gov

SENIOR/KEY PERSONNEL:	TEAM MEMBER ORGANIZATIONS:
• Amy Simpkins, Chief System Architect, muGrid Analytics • Maria Redmond, Director, Office of Sustainability and Clean Energy • Mark Abeles-Allison, Bayfield County Administrator • Linda Nguyen, Environmental Director, Red Cliff Band of Lake Superior Chippewa Indians • William Bailey, President, Cheq Bay Renewables • Travis Simpkins, PhD., CTO and Founder, muGrid Analytics • Beth Haskovec, Director, Office of Rural Prosperity, WEDC • Maddie Koolbeck, Senior Researcher, Slipstream	• State of Wisconsin Office of Sustainability and Clean Energy – domestic entity • WEDC Office of Rural Prosperity– domestic entity • muGrid Analytics - domestic entity • Bayfield County and Towns, Villages and Cities in Bayfield County, Wisconsin - domestic entities • Red Cliff Band of Lake Superior Chippewa Indians - domestic entity, Federally Recognized Tribe • Cheq Bay Renewables - domestic entity • Slipstream - domestic entity

PROJECT LOCATION(S): 28 Communities in Bayfield County, Wisconsin, and the Red Cliff Band of Lake Superior Chippewa Indians

RURAL OR REMOTE AREA(S) THAT WILL BE RECEIVING TECHNICAL OR COMMUNITY BENEFITS:

Area	Population	Zip+4
Red Cliff Band of Lake Superior Chippewa Indians	1,403	54814-4579
Town of Clover	261	54844-4503
Town of Drummond	544	54839-4485
Town of Grand View	508	54839-4517
Town of Kelly	436	54856-2023
Village of Mason	101	54856-4501
Town of Port Wing	156	54865-1103
Town of Washburn	554	54891-4932

For a full list of benefitting communities, see Appendix B

CONFIDENTIALITY STATEMENT: None

COST SHARE WAIVER STATEMENT: As a federally-recognized tribal government, the Red Cliff Band qualifies for the 20% special cost share. Bayfield County and the Towns in Bayfield County also qualify for the 20% special cost share as local units of government. The State of Wisconsin also qualifies for the 20% cost share as a state government. Upon approval, the tribal and government entities listed will equitably share and commit to the cost share needed.

Table of Contents

TECHNICAL VOLUME
Resilience and Prosperity in Rural Northern Wisconsin

1 PROJECT OVERVIEW

This Resilience and Prosperity in Rural Northern Wisconsin Program will deliver clear and measurable benefits to 28 remote and rural communities in far northern Wisconsin. The Program, led by the Wisconsin Office of Sustainability and Clean Energy (OSCE), supports Bayfield County and the Red Cliff Band of Lake Superior Chippewa Indians with expert partners muGrid Analytics, the Office of Rural Prosperity (ORP) at the Wisconsin Economic Development Corporation (WEDC), Cheq Bay Renewables (CBR), and Slipstream. This project team will collaborate to implement 23 innovative microgrid projects and one compressed natural gas (CNG) fueling station across the county, creating a framework to replicate benefits that improve energy access and resilience for other rural communities across the state and nation.

1.1 Community Overview

Figure 1. Bayfield County location

The Red Cliff Reservation and communities of Bayfield County are located on the extreme northernmost point of rural Wisconsin along the windswept shores of Lake Superior. This area is disproportionately at risk for direct impacts from climate change,[1] due to an increased prevalence of lake-enhanced severe weather events frequently creating energy disruptions. Lake Superior's legendary gales and extraordinary ice and snow loads cause frequent downed power distribution lines. Because of its isolated geography and relatively limited service base, power restoration to this area following outage events is challenging for regional utility providers who must focus first on upstream energy distribution infrastructure serving larger population centers.

Along the Wisconsin Lake Superior National Scenic Byway and concentrated in rural parts of the state, Wisconsin's tourism and agricultural industries contribute nearly $95 billion dollars to the state's economy and face the greatest risks of climate change impacts. On June 6, 2023, the Wisconsin Department of Tourism released 2022 data showing tourism had an $89 million economic impact in Bayfield County – a 24% increase over the previous record held in 2019 when an estimated 1.5 million visitors traveled to Bayfield County.

Huge temperature and precipitation fluctuations have closed major highways in Bayfield County twice in the last six years, lasting between 30 and 90 days. These and other climate-related

[1] https://www.noaa.gov/news-release/biden-harris-administration-announces-575-million-for-coastal-and-great-lakes-climate-resilience

impacts result in loss of revenue from outdoor recreation and regional tourism, disruptions to rural jobs and small businesses, and decreased agricultural production.

Additionally, Northern Wisconsin is frequently blanketed with up to six months of snow cover each winter. Bayfield County (where the Red Cliff Reservation is located) is the northernmost county in Wisconsin, and as average winter temperatures have risen due to climate change, they create heavier snowfall and increased levels of snowpack. The 2022 winter season saw all-time record snowfall (182.9 inches[2]), increased electric outages, stronger and more frequent winds, as well as strained snow removal equipment and worker capacity. In addition, the remoteness of this area results in higher electric costs, increased travel times, reduced availability of equipment and services, and reduced capacity to compensate for these challenges. Snow from the 2022 winter remained until mid-May this year before finally melting away.

Figure 2. Tribal nations in Wisconsin. Red Cliff is the northernmost tribe.

97% of Wisconsin Land is classified as rural with 30% of the state's population residing in rural communities.[3] These communities face a unique set of challenges relating to future energy planning, increasing infrastructure costs on a per capita basis, and a disproportionate energy burden by percentage of income.

1.2 Proposed Program

The Resilience and Prosperity in Rural Northern Wisconsin Program utilizes a wide variety of energy technologies, referred to collectively as Distributed Energy Resources (DER). The projects that make up the program will include solar photovoltaics (PV), battery energy storage systems (BESS), electric vehicle supply equipment (EVSE), and intelligent control systems to integrate all components into microgrids capable of operating with, or independent from, the primary electric grid. By installing microgrids that are equitably dispersed throughout the County and on Tribal lands, and by converting heavy duty snowplows from diesel to CNG, this program will demonstrate how a county-wide approach to clean energy can successfully reduce carbon emissions, increase energy resiliency and security, and reduce energy burden on communities.

There are 24 distributed energy projects as part of this Program. These projects will be sited in 14 different communities. As some of the sites are county facilities that provide county-wide critical services, a total of 28 different communities across Bayfield County and Red Cliff tribal

[2] https://www.weather.gov/dlh/seasonal-snowfall-records

[3] https://apl.wisc.edu/shared/tad/putting-rural-wisconsin

Map sourced from https://www.travelwisconsin.com/article/native-culture/wisconsins-native-american-and-tribal-culture-a-visual-guide

lands will be served by these clean energy installations. The 14 host communities and 24 projects are:

Table 1. 24 proposed projects make up the program.

Community	Proposed Distributed Energy Projects
Cable	• County Highway Garage Microgrid (Solar, BESS, Fleet EVSE)
Clover	• Town Garage and Town Hall Microgrid (Solar, BESS, Public/Fleet EVSE)
Drummond	• Town Garage Microgrid (Solar, BESS) • Town Hall Microgrid (Solar, BESS, Public EVSE) • Firehall Microgrid Microgrid (Solar, BESS)
Drummond Sanitary District	• Drummond Sanitary District - Well #1 Microgrid (Solar, BESS)
Grandview	• Town Garage and Community Hall Microgrid (Solar, BESS, Public/Fleet EVSE) • Wastewater treatment plant (WWTP) Microgrid (Solar, BESS)
Iron River	• County Highway Garage Microgrid (Solar, BESS, Fleet EVSE)
Kelly	• Town Garage and Town Hall Microgrid (Solar, BESS, Public/Fleet EVSE)
Town of Mason	• County Highway Garage Microgrid (Solar, BESS, Fleet EVSE)
Village of Mason	• Town Garage, Town Hall & Lift Station Microgrid (Solar, BESS, Public/Fleet EVSE) • Wastewater treatment plant Microgrid (Solar, BESS)
Port Wing	• Town Garage Microgrid (Solar, BESS, Public/Fleet EVSE) • Town Hall Microgrid (Solar, BESS) • Firehall Microgrid Microgrid (Solar, BESS) • Well #1 (Solar, BESS) • Waste Water Treatment Plant (Solar, BESS) • County Highway Garage Microgrid (Solar, BESS, Fleet EVSE)
Red Cliff	• Community Health Center (Solar, BESS, Public EVSE) • Tribal Transportation Facility (Solar, BESS, Fleet EVSE)
Russell	• County Highway Garage Microgrid (Solar, BESS, Fleet EVSE)
Town of Washburn	• Town Garage and Town Hall Microgrid (Solar, BESS, Public/Fleet EVSE)
City of Washburn	• County Highway CNG Fueling Station

Collectively, these projects will provide a significant buffer against future power disruption to communities by offsetting energy deficits with self-generated power capacity. This new clean energy infrastructure will support goals for increased energy sustainability and energy sovereignty at Bayfield County and the Red Cliff Reservation.

To ameliorate the impacts of increasing extreme weather events, high outage frequency, and long recovery times, this program will create resilient backup power in community resilience hubs, ensuring that essential public services are maintained during grid disruptions.

Ensuring that public services continue uninterrupted during severe weather events is critical. The Bayfield County Highway Department serves all residents and visitors of the county by maintaining county and state highways and providing year-round access to 1500 square miles. Building resiliency for robust and efficient Highway Department operations is critical for fire, police, emergency medical services, and public safety for all residents. This resiliency is part of Bayfield County's Comprehensive Plan and is primary to this program.

Red Cliff's Tribal Transportation Department and its facilities serve a vital role in maintaining safe roadways and pedestrian routes within the boundaries of the Red Cliff Reservation and provide timely road maintenance, repair, and snow removal services to the Red Cliff community. This facility also provides local and regional public transit bus services through its *Miskwaabekong* Transit program, which is utilized by more than 15,000 riders annually and provides safe community transport to employment, education, and critical health care services.

Electric Vehicle (EV) charging infrastructure will be integrated into 14 of the 23 microgrids. Bayfield County will continue to support the electrification of their highway maintenance fleet, and two of the towns will begin the process of fleet electrification. Red Cliff will be adding two zero-emission electric buses to their transit program in 2024. Most of the project host communities will be able to offer public EV charging stations as a result of these microgrids, greatly increasing the number and geographic distribution of public charging infrastructure. Vehicle electrification is still a relatively novel concept for this area, due to the very limited number of electrified fleet vehicles and privately owned EVs in the county. However, seasonal tourists and second home owners do bring EVs into the area in substantial numbers during peak summer months and will benefit from the increased charging capability. As EVs approach cost parity with internal combustion engine vehicles, many residents will consider electric vehicles for their next vehicle purchase, especially if sufficient EV charging infrastructure is in place to reduce range anxiety along popular travel routes.

CNG is a popular vehicle fuel around the world. Natural gas is the cleanest burning fossil fuel with 28% lower particulate emissions than diesel, and is less expensive per mile. The distribution infrastructure for natural gas is more prevalent and reliable than for diesel, relying on pipelines rather than over-the-road deliveries. Efficient CNG distribution infrastructure and storage systems provide for an inexpensive clean fuel source. While increased electrification is a sound strategy for the long-term future, commercial duty fleet vehicles such as plow trucks will see greater immediate benefit from CNG conversion to better withstand the very cold climates found in northwest Wisconsin. Diesel equipment is the greatest contributor to carbon emissions in Bayfield County, especially during winter months when plow trucks operate in excess of 12 hours per day.

This project includes installation of a CNG fueling station at the Bayfield County Highway Garage, maintenance capability upgrades to the Bayfield County main Highway Garage and repair shop, as well as the purchase of two heavy duty CNG dump trucks for use in snow plowing and road maintenance operations. The program will utilize CNG fueling to demonstrate carbon reduction, energy efficiency improvements, and monetary savings in the county's critical heavy-vehicle plow truck fleet, a sector not yet available for electrification. Conversion to CNG will reduce wheel to wheel CO_2 emissions by 28% and substantially improve air quality with reduced NO_X and particulate emissions. Fuel costs will be reduced by 75% by reducing diesel consumption and switching to CNG. 24% of the energy used in county facilities currently comes from diesel fleets, representing 36% by dollar.

1.3 Past Experience

The Project Team will expand upon past projects where community collaboration yielded reduced implementation costs. In 2018 and 2019, Cheq Bay Renewables managed the largest solar group buys in Wisconsin's history, and in 2020, organized a six-municipal commercial solar group buy that significantly reduced installation costs. Similarly, this program brings Bayfield County, Red Cliff, and fourteen local municipalities together into a single mutually beneficial program to install similar DER systems across a region. This will achieve an economy of scale and drive down costs.

Bayfield County, supported by muGrid Analytics and Cheq Bay Renewables, has two microgrids currently under construction that will both be completed in the fall of 2023. Lessons learned from these microgrids will help create a replicable model for all 23 proposed microgrids in this Program. All proposed microgrids will utilize off-the-shelf components, which should eliminate long lead times. From simple 15kW solar + storage microgrids, to more complex 250kW microgrids, standardization will be replicable across a wide range of clean energy applications in Bayfield County, throughout the State, and beyond.

Bayfield County installed a small CNG fueling station in 2009. This station powers eight Bayfield County Fleet Vehicles in the Sheriff, Health, Zoning and Forestry Departments.

Though remote, this region has already demonstrated a willingness to embrace clean energy technologies. Bayfield was the first county in Wisconsin to receive a commendation from Governor Tony Evers in February 2020 for achieving 100% carbon-free electricity in all county-owned facilities.

1.4 Impact of DOE Funding

The US Department of Energy (DOE) Energy Improvements for Rural and Remote Areas funding is paramount to this program's success. Multiple nearby communities will be united by the unique opportunity to work together throughout this program, creating an equitable and regional approach to EV charging, renewable energy, and resilient power support to rural areas. The funding for these projects will also inform a framework for distributed energy projects in rural areas across the state and the eventual pipeline of microgrid projects.

This DOE Office of Clean Energy Demonstrations (OCED) funding program offers an unprecedented opportunity for upper Wisconsin's rural communities that have traditionally been left behind by challenges associated with limited financial resources, small population centers, and remote locations. Additionally, the scale of this program, rooted in collaboration between several communities, partners, and state advocacy institutions further bolsters the area's access to cost share funding and ability to maintain project success after the demonstration has come to a close.

Without a tax base, the Red Cliff Band must utilize alternative revenue sources to support new infrastructure projects. This funding fills that need and allows for other important functions such as capacity building, grant and project management, and ongoing planning for additional

renewable energy projects throughout Red Cliff, Bayfield County, and the entire state of Wisconsin.

1.5 Project Viability and Long-Term Success

The program will support these 28 communities (Figure 3) in the clean energy transition with the following objectives:

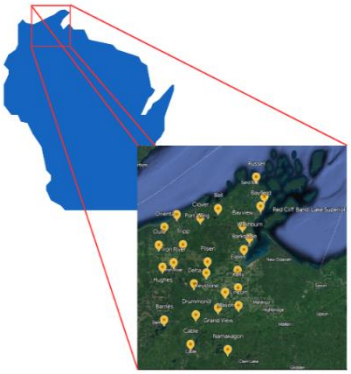


Figure 3. 28 communities receiving benefits.

- Bolster public and private vehicle electrification with fleet vehicle electrification and installation of a reliable charging infrastructure network throughout the county, reducing the energy burden to community members.
- Support vehicle and building electrification with renewable energy generation and create community resilience hubs through the proliferation of solar-plus-storage microgrids at essential public safety and service facilities.
- Limit negative economic impacts of EV charging by providing low-cost renewable energy generation and controllable battery storage to support economically optimal charging strategies.
- Provide revenue to site hosts through energy offset and increased solar self-consumption, including future-proofing the systems to ensure compatibility with programs that may come available in future years.
- Increase carbon efficiency and reduce greenhouse gas (GHG) emissions by 28% in large snow plow and road maintenance trucks by converting from diesel to CNG, the lowest emission fossil fuel.[4] GHG emission reductions from electrification of highway maintenance fleets and transit buses will be calculated in Phase 1.
- Individual community members will enjoy improved health benefits from reductions in GHG emissions, as well as increased opportunities for local jobs, skills training, and clean energy certifications.

Each community where a proposed microgrid is located was involved in the decision-making process, sought public input, and passed resolutions of project support and cost share commitment. This level of community engagement will ensure project success by reducing any unexpected public resistance, increasing public awareness and education, and preparing communities for future financial obligations. Documentation of this engagement can be found in public meeting agendas and minutes.

[4] From Bayfield County 2022 Fleet Fuel Analysis and EPA Emissions Calculator

Despite significant strides in the deployment of clean energy in Wisconsin, primarily through solar and wind development, Wisconsin continues to see significant energy end-use expenditures. Only a small percentage of the energy consumed in Wisconsin is produced in the state; therefore, most of the money Wisconsin spends on energy is sent out of state. This creates a significant annual spending deficit. In 2019, a study by the Center on Wisconsin Strategy concluded that Wisconsin's energy spending deficit of $14.4 billion, lack of substantial in-state fossil fuel resources, and continued reliance on fossil fuels is detrimental to the Wisconsin economy. There is a critical need to invest in clean and efficient energy infrastructure in Wisconsin while also focusing on bringing cost effective renewable energy into the state from external sources. Both resources are needed to meet Wisconsin's energy demand and associated clean energy goals.

The partner communities will actively collaborate with multiple State of Wisconsin departments throughout the project process, leading to demonstration of replicability across the state. The multiple small-scale projects replicated across small communities will use standard equipment to better illustrate the replicability in other locations. State-level involvement in these projects will help prompt state and local offices to consider similar improvements. This topic is described in more detail in the business plan section and in the Community Benefits Plan (CBP).

This program will also support workforce development and capacity building strategies that include energy education and industry skill-building opportunities for community members and local government staff. Labor agreements will be crafted to support on-the-job training for operations and maintenance of the systems, ensuring a locally-trained workforce.

2 BUSINESS DEVELOPMENT AND MANAGEMENT

2.1 Business Plan

This preliminary business plan outlines the overall strategy to achieve the implementation and continued operation of the 24 distributed energy projects presented herein. We have identified the following key success metrics and milestones for the period of the demonstration program and beyond as they relate to the overall business plan of the project.

Table 2. Program Business Plan milestones

Phase 1	Develop strong community engagement structures such as community accountability boards, establish baseline ratings for demonstration sites measurable through surveys, specifically in the areas of renewable energy, resilience, understanding, and approval of the project
	Start statewide microgrid pipeline analysis
	Identify candidates for Clean Energy Specialist positions and engage with professional schools and labor organizations to build a plan for skilled training.
	Complete installation layout and site surveys for finalizing the demonstration site selections
	Develop business plans such as Project Management (PMP), Risk Management (RMP), Intellectual Property Management (IPMP)
	Build system level technoeconomic and resilience performance models to quantify value streams
	Complete revised financial plan with firm financing requirements
Phase 2	Continue community engagement and plan adjustment
	Hire and onboard Clean Energy Specialists at Bayfield County and Red Cliff, and finalize construction apprenticeship program details.
	Develop Technoeconomic Analyses (TEA) and Lifecycle Analyses (LCA)
	Confirm financing sources against the revised financial plan (from Phase 1)
	Complete National Environmental Protection Act (NEPA) review of sites
	Finalize engineering, procurement and construction (EPC) contractor agreements
	Confirm execution-ready schedule and procurement plans
	Begin procurement of long-lead components
Phase 3	Receive final permitting and NEPA clearance to begin site construction
	Close any final financing requirements
	Finalize O&M training programs and candidates
	Break ground at demonstration sites per staggered schedule
	Complete construction, installation, and all acceptance testing
Phase 4	Operate systems and show financial benefits within tolerance limits to original predictions or update financial plan to show as-good-or-better overall return on investment (ROI) to stakeholders
	Measure new community engagement performance against metrics and compare to baseline taken in Phase 1 to show increase in understanding and acceptance of renewable energy, resilience, the demonstration itself
	Use operational data to validate technoeconomic analyses
	Build sustainability plans for ongoing operations after demonstration end
	Develop statewide microgrid pipeline report and approach based on project and process evaluations
	Update decommissioning and disposition plan to confirm with financial and lifetime metrics

Additional key metrics with regard to the technical outcomes of the demonstration program can be found in the Engineering section and the Workplan section.

2.1.1 Feasibility

All of the DER projects proposed herein have been analyzed for economic benefits to the communities based on preliminary design and cost estimates. Based on the results of feasibility studies, these projects will be able to sustain themselves during the operations and maintenance phase through economic savings, provided that the capital cost for the project is bolstered by DOE funding.

Each of the microgrid projects were analyzed independently with cost estimates, cash flow projections, and preliminary site mapping. Standardized equipment components were utilized without sacrificing unique input from the communities they are meant to serve. Each community has varying levels of financial capability which was taken into consideration during the preliminary design phase. Secondary funding resources were explored and presented to each community to reduce the economic burden of the 20% cost share. State incentives like Focus on Energy were estimated for projects in Xcel Energy territory. Other funding opportunities include private grant opportunities from clean energy philanthropies and other sources.

Some of the project sites have conducted formal feasibility studies and are already at 30% engineering, with the associated confidence in the economic feasibility. These sites include all of the Bayfield County highway garages and the Red Cliff Health Center. The Health Center's feasibility study was completed in 2018 by muGrid as part of a larger energy study at several tribal buildings. Red Cliff's new Transportation Facility offers similar metrics to the County highway garages.

In Phase 1, the project team will update feasibility studies for those sites that have already had them, and bring all other projects to the 30% design and technoeconomic analysis level.

2.1.2 Key Contracts, Permits, and Agreements

Each project has a unique set of required permits which will be obtained during phase 2. Solar installations in Bayfield County will be required to get a County Solar PV permit. Bayfield County will be required to get a City of Washburn building permit and State permitting for its CNG installation. All projects will require a State Electrical Permit and satisfy utility witness testing and commissioning requirements. Red Cliff's projects will require Tribal environmental review. Each

solar installation will file a utility interconnection agreement prior to construction that will also be included in phase 2 work.

2.1.3 Preliminary Site Selection

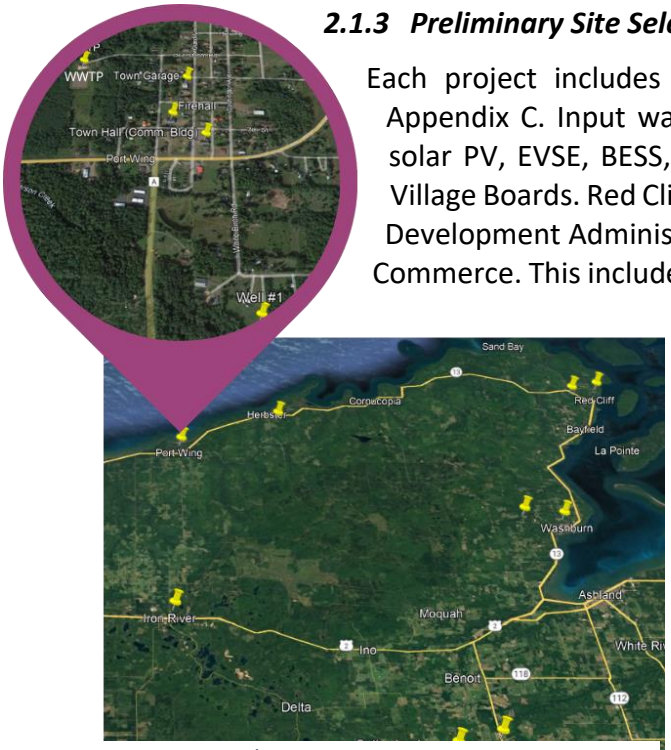


Figure 4. Project locations.

Each project includes a preliminary site map that is included in Appendix C. Input was sought from each community and siting of solar PV, EVSE, BESS, and controls were discussed with Town and Village Boards. Red Cliff has sought public input through its Economic Development Administration funding through the US Department of Commerce. This included several community engagement activities in 2021 with over 100 individual community members providing input through 1) focus groups with youth, elders, business owners, tribal leaders; 2) online surveys; 3) an online social pinpoint interactive mapping tool; 4) open house for public input; and 5) administrative evaluation of existing community input data. Red Cliff's Health Center and new Transportation Facility provide an opportunity for advanced microgrid design with integrated EV charging for fleet electrification, real time operations for economic benefits, and potential to independently interface with future energy markets.

Washburn was chosen as the CNG fueling site for multiple reasons. Washburn hosts the main county highway garage where equipment repairs are completed. Garage renovations are required for indoor repair work to occur. The Washburn Garage also has ready access to natural gas. For these reasons Washburn is the logical choice for locating improvements and vehicles. This site is also very close to national forest headquarters, Wisconsin Department of Natural Resources (DNR), City of Washburn and School Bus headquarters and other potential CNG fueling customers traveling on State Highway 13, two blocks north of the Bayfield County Highway Garage.

2.1.4 Market Analysis

Cash flow estimates included in the Budget Support for each project give a specific financial assessment of the impact that each project will have on the respective community. Solar PV capacity for each site is sized to offset 100% of the utility energy charge and for most of the Town sites which do not have demand charges. This reduces utility bills on average by 87%, leaving only the monthly facility charge. With payback periods averaging in the 4–5-year range, project income will not only sustain the installed systems, but create wealth within the communities by

reducing local government costs which in turn will reduce pressure for the need to increase property taxes, in the case of Bayfield County residents, or will build funds for critical Tribal programs, in the case of the Red Cliff Band. All of these microgrids are sized to take advantage of utility net metering policies with special attention paid to the newly developed Bayfield Electric Cooperative's Distributed Generation (DG) policy which includes a 20-year contract guaranteeing a 90% payback rate for exported solar electricity to the grid.

In addition to local government financial benefits, all of the microgrids support the grid by storing electricity during high solar radiation periods, and can strategically offset high demand time periods. Xcel Energy's commercial tariffs support this with current tariffs, but the microgrids are future-proof in that they will be ready to respond to future peak demand signals. Together, the 23 microgrids proposed in this project can store 2.2 megawatt hours (MWh) of electricity and when aggregated can support the grid, whether through utility tariff design and signals or through future energy market signals. Technology exists today to aggregate the 23 microgrids together into a virtual power plant.

Some revenue streams that are grid supportive are not yet available in northern Wisconsin, such as demand response and direct market participation from behind-the-meter as authorized by FERC 2222. As these opportunities become available, the microgrid projects will be well positioned to participate.

CNG snowplows, while not commonplace, offer multiple advantages in comparison with diesel plows. Environmental considerations include reduced emissions resulting in longer times between oil changes and due to being a cleaner fuel do not require diesel particulate filters (DPF), selective catalytic reduction (SCR), or diesel emission fluid (DEF). This makes natural gas vehicles simpler and less expensive to operate. Financially, natural gas is half the cost of other fuels and as a plentiful domestic fuel is much less susceptible to price swings and sociopolitical climate. Natural gas delivery is less susceptible to severe weather impacts on public infrastructure that can impede over-the-road fuel delivery. Existing natural gas distribution mains are in place on two sides of the Highway Garage in Washburn.

2.1.5 Replication and Additional Benefits

Eight municipalities in Bayfield County will own their own projects as a result of this program, but there are 20 more municipalities within Bayfield County alone where replicability could be expanded. Red Cliff is also developing a comprehensive strategic plan for distributed energy at its facilities and lands. Once these successful approaches are demonstrated, the project model could be expanded not only within Bayfield County but in other rural locations and tribal lands as well. Bayfield County highway garages and fleet electrification are another replicable model, where a more advanced microgrid system is proposed with higher capacities and integrated real time interface with EV charging to control utility demand charges. This model has potential widespread applications in Wisconsin's other 71 counties.

As part of this project, Wisconsin Economic Development Corporation's Office of Rural Prosperity (ORP) will develop a statewide microgrid pipeline framework based on the projects and processes developed for this demonstration program.

The team will perform data analysis to identify rural and remote communities across Wisconsin with significant energy resiliency challenges and energy burden concerns. Using the findings of the process evaluation and this data review, Slipstream will work with ORP on how to develop a pipeline of microgrids across the state and provide support to future installations. This will include a guide on microgrid installation best practices, economies to be achieved, the benefits of enhanced resiliency, and considerations for areas to prioritize across the state and in individual counties.

The project team is also dedicated to leveraging lessons learned from these projects to develop a set of guidance for installation of other microgrids in rural areas across Wisconsin. Learning from this project and leveraging it to help other rural areas in Wisconsin will ensure that the benefits of improved resiliency, increased workforce development opportunities, and decreased emissions and air pollution flow to areas across the state. Slipstream and ORP will work together to use the lessons learned from this project to inform other communities about the benefits of microgrids and the best practices for installation with the goal of creating a pipeline of future microgrids across the state. Slipstream will review environmental justice and resiliency metrics to identify which rural areas in the state are in most need of those benefits and are best candidates for microgrid technology. ORP will then prioritize those areas for outreach and will host meetings with communities to share the benefits of microgrids and lessons learned for installations.

With the support of the state Office of Sustainability and Clean Energy, this program will have far reaching effects on policymakers.

2.2 Management Plan

muGrid Analytics is serving as the Lead Program Manager for this Program. As such, muGrid provides program execution, project planning, systems engineering, and system-level analysis in addition to project management, system sizing, technoeconomic analysis, operational strategy, and operational data collection and analysis for individual projects. muGrid has provided analysis and project management support for dozens of microgrid projects and studies across the US and around the world, including in Bayfield County, Wisconsin. Bayfield County and the Red Cliff Band have been working successfully with Cheq Bay Renewables and muGrid Analytics on various renewable energy projects in Wisconsin since 2018.

2.2.1 Organizational Structure

The program organizational structure is visualized in Figure 5, and each partner's role is described in detail in Table 3.

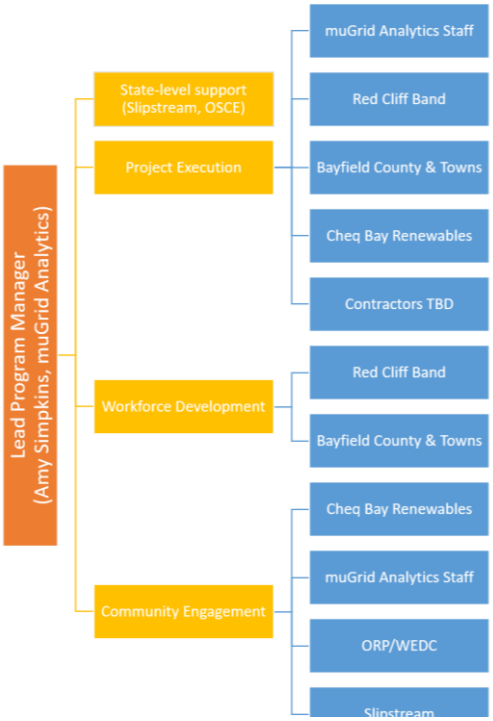


Figure 5. Program organizational chart

Table 3. Program roles and responsibilities.

Wisconsin Office of Sustainability and Clean Energy (OSCE) ● Prime Applicant	The OSCE staff members assigned to this program have historically served as the lead in over $85 million federally awarded energy programs. The OSCE will work collaboratively with the partner organizations to collect data, monitor progress, manage the reporting, serve as a central point for financial management and analyze any data generated through the process. OSCE will liaise with the DOE on behalf of the Program.
muGrid Analytics ● Project Partner ● Cost Sharing Partner ● Project Management ● System Architecture ● Data Collection ● Data Analytics ● Techno-Economic Analysis ● Operations ● Community Engagement	muGrid Analytics is a seven-year-old, woman-owned and Disadvantaged Small Business (DSB) with less than 10 full-time employees operating in Littleton, CO. muGrid has the technical expertise and analytical software to design and implement optimized solar plus storage systems and controls. They have been supporting DER projects in Wisconsin for over five years, including the largest BESS installation (1MWh) in Wisconsin to date. muGrid is the Technical Project Manager and the system architect for the microgrid project, incorporating the appropriate controls, software, and data-collection to allow for ongoing technoeconomic analysis, sustainability projection, and other key data to be mined from this demonstration. muGrid will perform site specific design and management.
Bayfield County ● Sub-recipient ● Cost Sharing Partner ● Demonstration Site Manager ● Policy and Regulatory ● Workforce Development	Bayfield County is an experienced leader in the clean energy transition. Bayfield was the first county in Wisconsin to receive a commendation from Governor Tony Evers in February 2020 for achieving 100% carbon-free electricity in all county-owned facilities. Bayfield County will host five microgrids at its county highway garages and the CNG fueling station project to support conversion of snowplows from diesel to CNG fuel. Bayfield County will also liaise between the program and the towns that fall within its borders for the town-level projects.
Red Cliff Band of Lake Superior Chippewa ● Sub-recipient ● Cost Sharing Partner ● Demonstration Site Manager ● Policy and Regulatory ● Workforce development	The Red Cliff Band of Lake Superior Chippewa Indians is a federally-recognized tribe governed by an elected nine-member Tribal Council consisting of a Tribal Chairperson, Vice-Chair, Treasurer, Secretary, and five At Large Members. The Tribal Council directly administers over 180 service programs and oversees an annual budget of approximately $40,000,000. Red Cliff is the largest employer in Bayfield County and will host the 2 largest microgrid projects in this demonstration; one at the Red Cliff Community Health Center, and the other at the new Tribal Transportation Facility.
Cheq Bay Renewables ● Project partner ● Cost sharing partner ● Financial planning	Cheq Bay Renewables is a 501(c)(3) nonprofit dedicated to local sustainable initiatives, primarily, but not limited to, renewable energy. Their mission is to work with multiple entities, in the spirit of cooperation and community building, to reduce reliance on fossil fuels while promoting clean water, clean air, organic foods, and healthy living. They initiate projects, develop resources, and educate to make renewable energy more accessible to local

• Site management • Utility liaison • Community engagement	communities. Cheq Bay will be providing support to the sites and to the program on a pro bono basis as a cost-sharing partner.
Office of Rural Prosperity, Wisconsin Economic Development Corporation • Project Partner • Cost Sharing Partner • Community Engagement • State-level Coordination	The Office of Rural Prosperity (ORP) at the Wisconsin Economic Development Corporation (WEDC) will lead community outreach efforts utilizing the Bayfield County project as a demonstration project to create a pipeline of similar projects across rural Wisconsin.
Slipstream, Inc. • Project Partner • Cost Sharing Partner • Technical Oversight and Review • Pipeline Development • State-level Coordination Support	Slipstream is a 501(c)(3) nonprofit dedicated to accelerating climate solutions for everyone. They are mission-driven, creating, testing, and delivering the next generation of energy efficiency and renewable energy programs that move us toward a clean energy economy. Slipstream's team comprises a unique mix of backgrounds that includes energy engineers, planning and outreach specialists, architects, social scientists, and financing experts. Slipstream has deep experience with process evaluation, data analysis, and microgrid design. Slipstream will provide technical assistance on community engagement efforts and microgrid design. Slipstream will also work directly with ORP to evaluate the projects and how the lessons learned can inform a future statewide clean energy pipeline.

Management

While OSCE will serve as the prime applicant and the primary point of contact for the DOE, muGrid Analytics will manage the main programmatic deliverables and schedule for the program. muGrid will assist Bayfield County and Red Cliff, as demonstration site managers, in selecting EPC contractors to provide final engineering, procurement, and construction services for three main groups of projects: the Bayfield County and town microgrids, the Red Cliff microgrids, and the Bayfield County CNG fueling station. Aggregating smaller projects into larger contracts is one method of making small, rural projects feasible and cost effective. muGrid will advise the EPC contractor on system architecture and hardware selection preferences and work with the contractor to develop early designs into mature engineering based on standardized sets of equipment.

As the projects move through permitting and into construction, the project timelines (shown in the Integrated Project Schedule in the Workplan section) will shift from parallel to staggered. At this point, each project will be managed on its own schedule, and the individual project schedules will be aggregated to and synced with the overall program schedule. Similarly, project data, analyses and assessments will be rolled up and aggregated into program level reports.

Issues that arise impacting cost, schedule, or performance will be communicated directly to the LPM. The LPM will then hold a special internal stakeholder meeting to determine the action(s) necessary to realign the task to project and program objectives.

Key personnel that will be involved in the project are included below and a resume for each person has been included with our application submission. A short summary of each person's experience and commitment to the project is also included here:

2.2.2 Team Principals

2.2.2.1 Lead Program Manager (LPM): Amy Simpkins, Chief System Architect, muGrid Analytics

Amy Simpkins is trained as an aeronautical and astronautical engineer holding bachelor and masters level degrees. Amy's experience with modeling and analysis of complex, critical systems and spacecraft project management at Lockheed Martin, coupled with her multiple publications on energy resilience, diversity, innovation, and the application of microgrids to Tribal sovereignty add an extra layer of depth and understanding to this demonstration program.

2.2.2.2 Business Lead: Maria Redmond, Director, Office of Sustainability and Clean Energy

Maria Redmond has been employed with the State of Wisconsin for over 22 years and has demonstrated leadership in organizing cross-jurisdictional work, establishing program and policy priorities, and delegating tasks to meet state and federal energy and environmental program goals. Maria is successful in securing, deploying, and managing over $100 million in federal and foundation grants. Maria ensures strategic communication, meeting performance, and productivity requirements while ensuring compliance with governmental policies and regulations.

2.2.2.3 Demonstration Site Project Manager: Mark Abeles-Allison, Bayfield County Administrator

Mark Abeles-Allison is the County Administrator for Bayfield County Wisconsin and has held the position since 2001. Mark previously served in City and Village Administration positions in Kansas and Michigan. Bayfield County adopted the 25x25 State Energy Plan in 2008 and has worked on conservation, renewable and microgrid initiatives over the past 15 years to improve sustainability and resiliency. In 2020 Bayfield County was recognized by Governor Evers as the first county in Wisconsin to have achieved carbon neutral status for county facilities. Mark attended Kalamazoo College for his political science degree and Michigan State University for his Masters of Science in Agricultural Economics.

2.2.2.4 Demonstration Site Project Manager: Linda Nguyen, Director, Environmental Department, Treaty Natural Resources Division, Red Cliff Band of Lake Superior Chippewa Indians

The Director of Red Cliff's Environmental Department, Linda Nguyen, is identified as the Red Cliff Demonstration Site Project Manager. Linda has served at Red Cliff since August 2012, initially as the Water Resources Program Manager. In May 2016, she accepted the Environmental Director position and now oversees the Environmental Department and its staff. Linda's duties include project oversight, procurement and contracts, grant writing and reporting, tribal permit

authorizations, Phase I and II Environmental Assessment reviews, HAZMAT and spill coordination, and oversight of Red Cliff's Code of Laws for environmental protection and enforcement actions. Linda has a wealth of experience in project management and implementation.

2.2.2.5 Project Manager/Community Support: William Bailey, President, Cheq Bay Renewables (CBR)

Bill Bailey has vast experience in solar development, financial analysis, team organization and management. His involvement as a non-profit volunteer continually demonstrates his commitment to the community and the environment.

2.2.2.6 Technical Principal: Travis Simpkins, PhD., CTO and Founder, muGrid Analytics

Dr. Travis Simpkins holds multiple diverse degrees in financial, electrical, and computer engineering, ideally suited to the demands of performing techno-economic analysis of the demonstration sites included in this proposal. Travis also understands the data collection needs of National Labs, thanks to his seven years of previous experience at National Renewable Energy Laboratory (NREL) in Colorado.

2.2.2.7 State-Level Community Support: Beth Haskovec, Director, Office of Rural Prosperity (ORP), WI

Beth Haskovec is the Director for the Office of Rural Prosperity within WEDC. Beth has a background working for one of the Nation's largest CDFIs, where she oversaw strategies and programs related to access to capital for small businesses across Rural America, Puerto Rico, and the U.S. Virgin Islands. She brings a wealth of expertise to the team in place-based community development, capacity building, commercial corridor development, small business capital, entrepreneurship and initiatives at the intersection of arts, culture and economic development.

2.2.2.8 Technical and Community Support: Maddie Koolbeck, Senior Researcher, Slipstream

Maddie works as a Senior Researcher at Slipstream. She leads market characterization, policy analysis, and community energy planning projects. She utilizes her economics and policy background to analyze how programs and policies impact carbon and costs. She also leads secondary research reviews and conducts interviews to further understand the current state of the market and stakeholder viewpoints. She holds a Master in Public Affairs with a concentration in Energy Analysis and Policy from University of Wisconsin – Madison and a bachelors in Economics and Environmental Studies from Coe College.

2.2.3 Experience

2.2.3.1 Wisconsin Office of Sustainability and Clean Energy (OSCE)

The Wisconsin Office of Sustainability and Clean Energy (OSCE), created via Executive Order #38 leads the state of Wisconsin in addressing the effects of climate change through programs and policies that support the use of clean energy resources and technology. Executive Order #38 also charges OSCE to partner with other state agencies and state utilities to achieve the goal of ensuring all electricity consumed within Wisconsin is 100% carbon-free by 2050. By consistently facilitating interagency coordination, OSCE elevates and aligns the clean energy and sustainability

work across agencies. Additionally, OSCE serves as an information and resource hub for Wisconsin's local governments, businesses, and residents. This is done by providing energy information and meeting with stakeholders (businesses, Native Nations, local governments, utilities, etc.) to discuss the advancement of policy projects and gather input on state-led efforts.

2.2.3.2 muGrid Analytics

muGrid solves wicked problems at the intersection of energy and economics using math and modeling. They provide bankable techno-economic optimization of renewable energy, energy storage, and microgrids to project developers, financiers, component manufacturers, utilities, and property owners. With a one-two punch of in-depth experience in the new energy industry and in the modeling, design, and operation of complex technical systems, muGrid provides comprehensive, data-driven advisory, and design services to a wide range of energy stakeholders throughout the project lifecycle. muGrid was founded by Dr. Travis Simpkins, who previously architected and developed the microgrid modeling capabilities for the NREL, including the REopt platform.

Sitting at the junction of technology and finance, muGrid Analytics is uniquely positioned to not only help clients understand how distributed energy technologies work, but also how they will make or save money. muGrid has developed the proprietary Redcloud energy optimization platform, which is used to optimize energy generation and consumption at buildings, campuses, feeders, networks, and bases so that clients meet their energy resilience and sustainability goals at minimum life cycle cost. The Redcloud ecosystem comprises two sister tools: Redcloud Planning and Redcloud RealTime. Redcloud Planning performs historical-looking mathematical optimization to right-size systems, develop optimal operational strategies across multiple stacked revenue streams, and build the business case for projects. Redcloud RealTime is built on the same foundation of mathematical optimization, but layers on predictive analytics and artificial intelligence to make dispatch decisions during real-time operations, enabling the system to realize the economic benefits estimated during the planning and design phases.

The muGrid team has served as owner's advisors, consulting engineers, project managers, and/or applications engineers for operations on dozens of resilient microgrid projects and studies across the US and around the world, including in Bayfield County, Wisconsin.

2.2.3.3 Bayfield County

Bayfield County has extensive energy project experience. Beginning over 15 years ago the County partnered with Wisconsin's Energy Management group, Focus on Energy, to identify conservation and efficiency upgrades. Early initiatives included adding T-8 and then LED lighting, motion detectors, variable speed drives, insulation, door sweeps, low flow showerheads and replacement windows. A second phase of renewable and alternate energy projects was then implemented beginning with a hot water solar project for the county jail, two small scale solar PV projects and a CNG alternate energy fuel project. A third phase currently underway is the development of microgrids to improve resilience for county essential service delivery that combines large scale solar, generators and batteries. Over the past 15 years the county has

overseen and implemented numerous grant-based projects through both the State of Wisconsin and Focus on Energy. All projects are in good standing.

Xcel Energy and Bayfield County have a long history of collaborative clean energy projects. Bayfield County was one of the first participants in Xcel Energy's Solar*Connect Community program that includes a 1 MW community solar array located in nearby Ashland, Wisconsin. Bayfield County is also a large subscriber to Xcel Energy's Renewable*Connect program which helped Bayfield County become the first county in Wisconsin to achieve 100% carbon-free electricity for its own facilities. Bayfield County was the first county to utilize Xcel Energy's Empower Resiliency tariff, creating an advanced microgrid with the County Courthouse and Jail Complex.

2.2.3.4 Red Cliff Band of Lake Superior Chippewa

Red Cliff has been studying the feasibility of clean energy projects and implementation since 2018, and will install their first commercial solar microgrid in July 2023 at the Red Cliff Early Childhood Center. In 2018, Red Cliff engaged with muGrid Analytics and Cheq Bay Renewables to complete an evaluation of solar microgrid and battery energy storage potential at 3 tribal buildings as part of the Department of Energy's Solar In Your Community Challenge. The proof-of-concept study showed that renewable solar is economically viable at Red Cliff's Community Health Clinic, Fish Hatchery, and Legendary Waters Resort & Casino. Additional grant funding is being sought to further expand these evaluations at other tribal facilities at Red Cliff by completing a Comprehensive Energy Planning Study that will set the stage for multiple solar infrastructure projects in support of the tribe's continuing transition to a clean energy future. In 2023, Red Cliff and Bayfield County forged a clean energy grant partnership that would provide major additions to existing EVSE infrastructure throughout the county to promote increased EV use and reduce range anxiety for those traveling to and from the Bayfield Peninsula.

2.2.3.5 Cheq Bay Renewables

Cheq Bay Renewables was recognized by RENEW Wisconsin in January 2019 as a 2018 Renewable Energy Champion for the 2018 Solar Group Buy which was the largest in Wisconsin's history, and in 2021 with the Wisconsin Rural Partners' 2021 Top Rural Development Initiative award for the community solar projects implemented in the Cities of Bayfield and Washburn. In January 2023 CBR was recognized as a partner with muGrid Analytics and the Bad River Tribe in recognition of the Ishkonige Nawadide – Solar Project, the Bad River Band of Lake Superior Chippewa Indians' 3 microgrid project which is Wisconsin's largest implemented battery storage system project.

2.2.3.6 ORP / WEDC

WEDC has a record of accomplishment of providing technical support to rural communities through our Business and Community Development (BCD) division. BCD collaborates with partners and communities to help resolve issues and to improve infrastructure, resulting in more resilient communities through technical assistance and grants.

2.2.3.7 Slipstream

Slipstream specializes in analysis of emerging technologies, data analysis, and policy analysis. They regularly partner with the DOE, US Department of Defense (DoD), national labs, and utilities to field test and demonstrate emerging technologies, conduct energy planning, and provide stakeholder education. Slipstream has experience with microgrid feasibility studies, statewide planning, and qualitative and quantitative data analysis. Recent experience includes feasibility studies on commercial facility microgrid and grid-interactive efficient buildings; serving as technical lead during the development of the Wisconsin Clean Energy Plan, and participation in a needs assessment for microgrid training.

2.2.4 Pending Investigations

At the time of application, neither OSCE, muGrid Analytics, nor any of our team members have any pending or threatened actions, suits, proceedings, or investigations that would relate in any way to this demonstration program.

2.3 Financial Plan

This DOE OCED funding is paramount to project success. Multiple nearby communities will be united by the unique opportunity to work together throughout this project, creating a regional approach to EV charging, electrification, and resilient power support to rural communities.

2.3.1 Funding requirements

The cost share requirement is mitigated by working with each community individually. Whether identified as disadvantaged by a US Census Tract or not, nearly all of the local units of government are financially challenged and need careful financial planning assistance. For each site, additional funding sources were identified and listed below in the Non-Federal Support section.

Each community project is backed by Resolution, Memorandum of Understanding, or Letter of Intent showing financial responsibility for the required 20% cost share match.

All project partners have agreed to provide their own cost share at or in excess of 20% of funding that is going toward programmatic overhead and community engagement, in order to ensure that this undue burden does not fall on the disadvantaged site hosts.

Equipment procurement financing will be covered by the selected EPC contractors until grant funding is paid out to reimburse them.

Once installed and operational, all projects are anticipated to deliver sustainable revenue to their site hosts from regular operation – solar power generation and energy offset, public EV charging payments, and cost savings from natural gas usage over diesel. The sites that have revenue streams available to the BESS, such as peak demand reduction or energy arbitrage will also generate utility bill savings using the battery. All sites with a BESS will reap the benefits of increased community resilience that would typically come from consumable fossil fuels.

For Bayfield County Towns, low interest loans could come through Commissioners of Public Land lending program or the State Land Trust administered through the Wisconsin State Treasury's Office.

2.3.2 Prime Applicant and Project Partners

The Prime Applicant is the OSCE. Subrecipients include Bayfield County, Wisconsin, and its identified Towns and Villages, and the Red Cliff Band of Lake Superior Chippewa Indians. Project partners are Cheq Bay Renewables, muGrid Analytics, ORP from WEDC, and Slipstream. Bayfield County, Red Cliff Band, muGrid Analytics, and WEDC will receive funds and document cost share as part of subcontract agreements to OSCE. Bayfield County will coordinate technical implementation and community engagement for all of the participating municipalities, and those municipalities will provide cost share back to Bayfield County. Slipstream and CBR will receive funding and provide cost share as subcontracts through muGrid Analytics.

2.3.3 Financial Strength

2.3.3.1 OSCE

The Department of Administration, where the OSCE is located, manages many services and programs on behalf of state agencies, including, but not limited to, providing budget, management, technology, and administrative services; providing broad administrative support and a variety of program services; and managing all state office buildings.

2.3.3.2 muGrid Analytics

muGrid is a certified Woman-Owned Small Business with seven full-time-equivalent employees at the time of this application. This and other imminent funding sources will further support expansion of a diverse workforce. The company was founded in 2016 and has been providing techno-economic consulting and technology implementation services for seven years, showing year-on-year revenue growth for every year except for the 2021 pandemic effect. The company is bootstrapped with no external funding, therefore the leadership team is free to pursue mutually beneficial opportunities and partnerships.

This demonstration project is of strategic significance to muGrid, as it will enable hiring new team members to support the project, continuing to increase workforce stability.

2.3.3.3 Bayfield County

Bayfield County is able to use its cost share match as an investment for years to come to ensure increased resiliency in the delivery of essential services. Bayfield County's prior experience with renewable and alternate energy sources has yielded financial returns and resulted in improved reliability during extreme weather and power outages. These projects will extend Bayfield County's experience at the Courthouse and jail to the six county Highway Department facilities.

2.3.3.4 Red Cliff Band of Lake Superior Chippewa Indians

The Red Cliff Band of Lake Superior Chippewa Indians is a federally-recognized tribe governed by an elected nine-member Tribal Council consisting of a Tribal Chair, Vice-Chair, Treasurer, Secretary, and five At-Large Members. The Tribal Council directly administers over 180 service programs and oversees an annual budget of approximately $40,000,000. Red Cliff performs an annual financial audit at the conclusion of each fiscal year via an independent financial auditing firm. There have been no discrepancies or findings noted that would impact or influence the

management of federal energy grants. All financial procedures for tribal business are incorporated into the Red Cliff Financial Policies Manual, approved February 8, 2018, and the Red Cliff Property & Procurement Manual, revised June 8th, 2021.

The Financial Policies Manual establishes standardized financial policies and procedures for the Tribe and provides guidelines for the proper financial management of business affairs to make certain that its programs are properly administered. This manual also ensures fiscal accountability in accordance with generally accepted accounting principles, ensures the Red Cliff Tribal Council and the tribe's funding agencies that an adequate and compliant accounting system of internal controls is operating effectively and that complete and accurate records are being maintained and resources controlled and expended in accordance with all laws, regulations, and policies, and within budget limitations as specified in the approved projects.

The Property & Procurement Manual defines authorization structures based on management level and dollar amounts, describes the purchase order system that is employed for purchasing, and defines bid processes to ensure competition is incorporated in the process. Written policies, qualified staff, an annual independent audit, and Tribal Council oversight are all resources employed to ensure that the financial management systems meet the requirements of 2 CFR Part 200 and 24 CFR part 1003. Any tribal employee in violation of financial policy will be disciplined in accordance with the Tribe's Personnel Policies.

2.3.3.5 Cheq Bay Renewables

Cheq Bay Renewables' (CBR) financial strength lies outside conventional norms. CBR has raised tens of thousands of dollars in community support for local renewable energy projects by gaining community trust. This trust is achieved through CBR's 100% volunteer nonprofit status and as such, the lack of financial involvement sets them apart, and "sets them free". CBR does not sell anything or gain financially from any project they develop. As a volunteer organization they do not need money to carry out their mission. This lack of financial involvement gives them strength through community relationships and personal engagement. CBR develops projects with fiscal responsibility but does not need conventional financial strength to be financially strong.

2.3.3.6 ORP / WEDC

WEDC has a record of accomplishment of providing financial support to rural communities through our Business and Community Development (BCD) division. The division works to expand the capacity of economic development partner organizations through the Office of Rural Prosperity, Regional Economic Development Directors (REDDs), the Wisconsin Main Street program, and the Diverse Business Development team and invests over $20 million annually in Wisconsin communities through a suite of grant and tax credit programs.

2.3.3.7 Slipstream

Slipstream is a 501(c)(3) nonprofit with close to 150 employees located across the US. At the forefront of energy solutions since 1980, Slipstream has been at the forefront of energy solutions, transforming energy use and understanding through next generation programs, technologies, and financing. Slipstream has deep experience managing and contributing to complex projects

with multiple partners, including DOE-supported research. Slipstream has strong financial audits year-over-year.

2.3.4 Other Federal Support

The sites intend to pursue Elective Pay (aka Direct Pay) reimbursement as authorized by the Inflation Reduction Act for counties, municipalities, and tribes.

2.3.5 Non-Federal Support

Non-federal funding sources for all sites that can help defray cost share expenses are:

- Wisconsin's Focus on Energy program for solar PV installations for all sites within Xcel Energy's service territory
- Bayfield County's Carbon Credit Offset Reserve Fund (CCOR) which is in development and anticipated to be finalized by the fall of 2023

For Red Cliff, additional funding opportunities may include:

- Tribal Solar Accelerator Fund, administered by Grid Alternatives
- Wisconsin Economic Development Corporation's Workforce Innovation Grant Program
- Section 105 Lease
- Native Sun Community Power Development funding

For Bayfield County Towns, low interest loans could come through Commissioners of Public Land lending program or the State Land Trust administered through the Wisconsin State Treasury's Office. Bayfield County could be the pass-through applicant for aggregated Towns needing assistance. State Land Trust funding has been used on past local renewable energy projects in the area.

3 ENGINEERING, PROCUREMENT, CONSTRUCTION, AND OPERATIONS (EPC&O)

Bayfield County already has two advanced microgrids at county buildings under construction which will be commissioned in 2023. Red Cliff operates a large solar PV installation at their Early Childhood Center. Bayfield County and Red Cliff have strong relationships with local utilities, Xcel, Dahlberg and Bayfield Electric. The County, Tribe, and Project Team will build on this experience and develop a replicable model for 23 additional microgrids strategically placed in small communities throughout the County and in Red Cliff.

3.1 Technology Descriptions

Each microgrid will include proven, mature Solar PV and lithium-based battery storage to create fossil-fuel-free microgrids. Most projects also include Level-2 EVSE to enable the microgrids to support vehicle electrification. Small microgrids are often infeasible, as soft costs usually outstrip benefits. This program will demonstrate a replicable model where American-made, off-the-shelf components create a solution and economy not previously thought possible. The combination of small projects using mature, off the shelf components into a larger, comprehensive program is an example of project architecture innovation.

Five of the microgrids will be installed in Bayfield County Highway Garages and will include automated remote monitoring and control to optimize economic dispatch of the solar generated electricity and stored energy. The control system will minimize utility demand charges by shaving demand peaks and taking advantage of low off-peak electric rates for vehicle charging. muGrid Analytics' proprietary Redcloud energy optimization platform will be used to interface and control the microgrids and EVSE.

Two of the microgrids, on the Red Cliff reservation, are larger solar + storage installations and will require a higher-level of design and engineering. Redcloud will also be used in these two microgrids to optimize the systems.

The remaining fifteen microgrids are located in small communities and most will not require remote control interfaces as the systems are below demand charge thresholds for the local utilities. The microgrids will still operate automatically to optimize energy dispatch, but from programmed setpoints rather than real-time interface. Operational data will be collected for remote monitoring using standard equipment.

The EV Supply Equipment (EVSE) will be Level-2, meaning single phase and 240 volts, and will have charging capacity sized to meet site-specific requirements. The five Bayfield County Highway Garages, for example, will have the largest Level-2 capacities at 19.2 kW at each charging port to accommodate the large batteries of the Ford F150 Lightning trucks. These EVSE will be used for fleet vehicles, installed inside the garages, will require electric service upgrades from the current 200-amp service to 400 amps, and will be controlled by muGrid Analytics Redcloud software platform to co-optimize economic dispatch of battery storage and EV charging. The other sites will have smaller 40 amp/7.2 kW EVSE so the existing 200-amp services are adequate. They will be installed outside and will be available for public charging 24/7. With the lower or nonexistent demand charges, these sites will not require Redcloud control. Red Cliff's Health Center will have public charging while Red Cliff's Transportation Facility will be installed inside and available for fleet vehicles only. The need for advanced economic dispatch with Redcloud has been included in the budget and will continue to be evaluated.

An additional technology used will be the high-capacity CNG fueling station at Bayfield County's main highway garage in the City of Washburn. This highway garage hosts one of the two county electric microgrids under construction with completion scheduled in the fall of 2023. The 2023 project includes EV charging for pickup trucks. The county highway facility supports county and state highway repair and maintenance including heavy duty winter snow plowing equipment and other severe weather infrastructure response. In total, Bayfield County maintains over 360 miles of county and state highways. Bayfield County has cooperative agreements and long-standing collaborations with county municipalities in addition to the Red Cliff Band. Bayfield County will purchase new CNG fueled snowplows to support local and collaborative snow removal and keep local roads safe and open during severe winter weather. To safely perform repair and maintenance tasks on CNG vehicles, two sections of the Washburn Highway Garage will be upgraded with code compliant systems. A list of applicable codes, scope of upgrades and cost estimates is available in Appendix E.

For a CNG fuel system, the same natural gas that heats homes across the country is "compressed" to 3600 pounds per square inch (psi), and stored in high strength cylinders, installed in vehicles. The fueling station will have similar pumping speeds to current diesel pumps. The fueling station will include two compressors for redundancy and two storage devices capable of storing over 160 gasoline gallon equivalents (GGEs). The station will be located outdoors, adjacent to the Highway Garage near existing vehicle fueling.

Two single axle CNG Plow Trucks will be purchased. These vehicles will operate on CNG with an emergency backup gasoline tank. The trucks will utilize the new Cummins CNG engine.

After a winter plow shift, vehicles are heavily encrusted with snow and are brought into the shop to thaw after refueling. CNG codes require that when vehicles are stored or repair work is done indoors, then modified wiring, lighting and heating systems are required. Gas detectors, roof top ventilation, explosion proof wiring and forced air heating is also required. This project will upgrade both vehicle storage areas and repair shop areas to meet United Facilities Criteria (UFC) standards.

All technologies used in this program are currently commercially available and at TRL 9.

3.2 Performance Projections

The project team will be tracking various technical and technoeconomic performance metrics throughout the demonstration period. Performance metrics will be tracked on a project basis and then rolled up and aggregated into total program performance. Performance will be modeled and refined during Phases 1 and 2 as designs mature. Performance against metrics will be monitored throughout the Phase 4 operational period, and control strategies will be adjusted where applicable to improve performance and/or align with design phase projections. Final performance will be assessed and reported in Phase 4 after three years of operations have been completed on every project.

Performance projected at the time of application is available in Table 4. These estimates will be refined and updated as designs mature.

Table 4. Performance metrics and projections

	Annual Solar Production (kWh)	Year 1 Utility Bill Savings	Resilience Backup Duration at peak demand (hr)	Annual GHG emissions saved (MT CO2)
Washburn Garage / Town Hall	15,600	$1,928	4	9.7
Clover Town Hall/Garage	20,800	$2,708	4	6.0
Drummond Town Garage	12,090	$1,590	4	3.5
Drummond Town Hall	7,800	$1,026	4	2.3
Drummond Fire Hall	8,970	$1,181	4	2.6
Drummond Sanitary District	7,800	$953	3	2.3

Mason Garage / Village Hall / Lift Station	28,600	$3,761	2	8.3
Mason WWTP	15,600	$2,066	2	4.6
Grandview Garage / Town Hall	30,160	$3,972	4	18.6
Grandview WWTP	26,607	$3,492		16.4
Kelly Garage / Town Hall	19,500	$2,435	4	5.7
Port Wing Town Garage	7,320	$800	4	2.1
Port Wing Town Hall	15,120	$1,652	4	4.4
Port Wing Fire Hall	9,360	$1022	4	2.7
Port Wing Well #1	41,280	$4,509	2	12.0
Port Wing WWTP	56,760	$6,200	2	16.5
Cable County Garage	23,789	$3,276	3	6.9
Iron River County Garage	29,715	$3,560	3	21.1
Mason County Garage	30,288	$3,783	3	8.8
Port Wing County Garage	26,329	$3,474	3	7.7
Russel County Garage	26,603	$3,724	3	16.4
Red Cliff Community Health Clinic	390,000	$39,000	TBD	240.1
Red Cliff Tribal Transportation Facility	150,000	$15,000	TBD	106.0
Bayfield County CNG Fueling	N/A	$24,255	N/A	9.6
Total	**1,000,091**	**$135,367**		**520.6**

3.2.1 Annual Solar Production

With many solar PV systems already in place in the area, estimated solar production for the planned microgrids was calculated based on actual production of nearby arrays and scaled to the planned size. All ground-mounted solar arrays will use bifacial solar modules for increased efficiency.

These performance projections will be verified against actual production during Phase 4 operations.

3.2.2 Annual Utility Bill Savings / Revenues (Year 1)

Calculating economic revenues can be complicated depending on the complexity of the rate tariff and the control strategy for the batteries. For more complex sites, muGrid's Redcloud Planning platform will be used to optimize microgrid control strategies and calculate revenue opportunities during the Phase 1 and Phase 2 design maturation and technoeconomic analysis. For the smaller systems, operational strategy is very simple and calculated with basic arithmetic.

These preliminary economic performance estimates were calculated using a combination of Redcloud Planning outputs during previous feasibility studies, simple calculations for smaller systems, and estimates based on similarly sized projects in the area. Higher level technoeconomic analysis in Phase 2 will include economic impacts of EV charging – both negative in terms of increased electricity consumption and positive in terms of saved gasoline purchases.

For CNG, cost savings will also be significant. Nationwide DOE fuel cost average tabulations in April 2023 showed diesel at $4.25 and CNG equivalents at $2.98, a 42% savings. A total of 7700 diesel gallons were consumed at the Washburn garage in 2022. Local costs were $4.11 per gallon for diesel with a projected cost of $31,647. For self-fueling locations, like Bayfield County's, with grant funds for infrastructure and alternate fuel tax credits included, the cost per gallon equivalent will be $.96 per gallon for an annual cost of $7,392 with a net annual savings of $24,255.

Projections were made for the first year only, so no escalation rate was assumed. We will measure and report on actual economic performance of systems throughout the first 3 years of operations in Phase 4.

3.2.3 Resilience Backup Duration

System resilience performance, that is the ability of the microgrid system to provide backup power to the site in the event of a grid outage, is driven by a complex interaction of each microgrid component. This may include solar PV or other renewable generation, fuel-based generation, and energy storage. Preliminary resilience performance estimates have been conducted for each site based on the asset mix expected to integrate.

Project partners agree that resilience performance is stochastic and characterized with both expected outage survival duration and probabilistic confidence levels. Resilience performance is dependent upon several stochastic variables, including weather, solar irradiance, cloud cover, time-of-day, time-of-year, and load at the facility. Some of these variables have characterizable but not fully predictable cross-correlation. Even if the relationships are characterized, the conditions at the beginning of an outage are never fully known enough to calculate a deterministic resilience duration so multiple descriptors of resilience are analyzed, including probability for a given duration.

Resilience duration is the amount of time the microgrid can support its dedicated loads after a grid outage before the microgrid fails due to lack of power from battery depletion, fuel depletion, or lack of solar irradiance. Other important resilience metrics include the time to recover functionality after the first failure and the amount of time the microgrid can then run following that recovery. Duration values are paired with confidence levels to be valuable analysis results. The confidence values are not randomly distributed; they are highly correlated to season of year and load conditions at the building and can also be correlated to the time of day. Therefore, resilience performance is not presented as a deterministic number, but rather as a full graphic capturing the dependency on these other variables.

All resilience projections will be refined and presented in more detail during Phase 1 and 2 design maturation. During Phase 4 operations, grid outage event data will be tracked as well as microgrid resilience performance during those outages.

3.2.4 GHG emission reduction

The host communities will experience GHG emissions reductions from several sources. First, the solar PV will generate electrical energy that would typically come from fossil fuel generation sources. Second, the electric vehicles, both fleet and public, will use electricity for fuel instead of burning gasoline or diesel. The GHG reductions shown in Table 4 include only the former, the carbon free electrical energy generated by the solar PV, and the numbers have been adjusted to account for the generation mix of each utility (41% fossil fuel in the case of Xcel and 87% fossil fuel in the case of Bayfield Electric.) Utility system transmission losses were not calculated, therefore the tabulation is likely understated by 9-10%. In Bayfield County's 2022 Fleet Fuel Analysis[5], it was determined that emissions will be reduced by 66% when comparing unleaded fuel to average utility provided electricity. For every 100 miles driven on utility provided electricity, 41 lbs of CO2 emissions will be avoided. With both on-site solar generation and Xcel Energy's above national average clean energy in their generation mix, the emissions reduced will likely be significantly higher than 66%. Further refinements of the GHG analysis will be accounted during Phase 1.

Finally, CNG elements will also reduce emissions. One gallon of diesel emits 10,180 grams or 22 pounds of CO2 when combusted. 7700 gallons of diesel were consumed at the Washburn Garage in 2022 and 40% of this will be displaced with CNG. This will remove 1,023 tons of carbon. With this project as the foundation, the five-year plan is to reduce diesel by 100% at the Washburn Garage, resulting in a reduction of 23 tons. This benefit can be amplified by making local CNG fueling available to other regional entities and uses such as school buses, the National Forest, and the State Department of Natural Resources, which all have offices within blocks from the proposed Highway Garage fueling station. This fueling station will have capacity to fill 15 large trucks a day, potentially tripling the county's emission reductions in the years ahead to 69 tons of carbon annually.

[5] fleet_fuel_analysis_2022v2.xlsx (live.com)

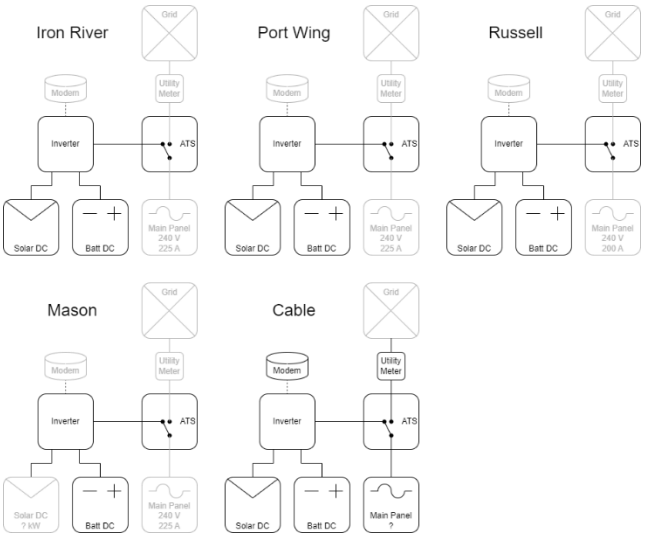


Figure 6. Preliminary one-line diagrams for highway garage microgrids.

GHG emission reduction modeling will be defined and well documented in Phases 1 and 2 of the program, and actuals will be tracked and reported in Phase 4.

3.3 Engineering, Design, and Procurement

Preliminary engineering evaluation for all microgrids was completed by muGrid Analytics and Cheq Bay Renewables. Some sites have had a feasibility study with preliminary design activities and some have not. All sites with feasibility studies will be refreshed in Phase 1 of this demonstration program. Figure 6 shows microgrid one-line diagrams at the five Bayfield County Highway Garages, which have had a feasibility study and preliminary design exercise conducted.

All sites without previous feasibility studies will have them conducted during Phase 1 so that all sites will be at a maturity of 30% engineering by the end of Phase 1. For purposes of this application, preliminary designs from sites that have had feasibility studies were used to size and cost sites that have not had studies due to similarity in size and site usage. These estimates were combined with designer experience and industry standard rules of thumb. Preliminary layouts have been generated for all sites. For example, Figure 7 shows the 5% design for the Town of Drummond and its three planned microgrids. Other site layouts and preliminary engineering can be found in Appendix C.

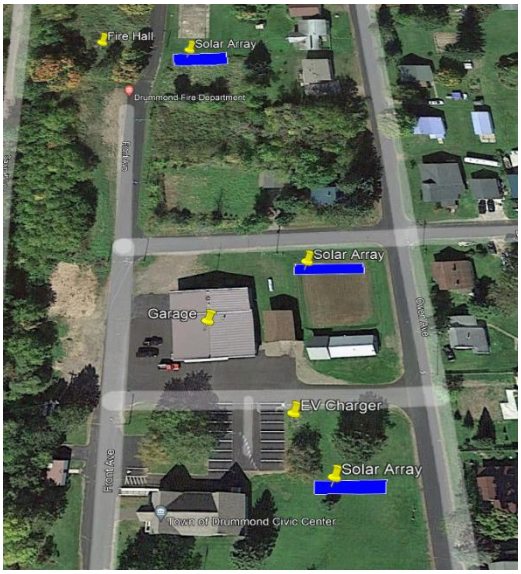


Figure 7. Town of Drummond 5% microgrid layout

The preliminary design for the CNG fueling station will include two 75hp electric compressors capable of pumping and storing sufficient volumes to fill one 90 GGE truck in 15 minutes and a second truck within the hour. The optimal balance of storage and compressor speed will determine final configuration. A pump unit will allow for both large and medium sized vehicle fueling. Final design for the station will allow the first truck to fill in 15 minutes and a second truck to fill within the next 45 minutes. Storage tanks will be filled immediately after use. CNG fueling will be located adjacent to existing Diesel and gasoline fueling maintaining current traffic flow at the facility. Maintenance and storage facility upgrades to house CNG vehicles will include HVAC, electrical and gas detection modifications to comply with national electric and fire codes. Initial station usage is estimated at 150 gallons per day expanding to 250 gallons per day by year 5.

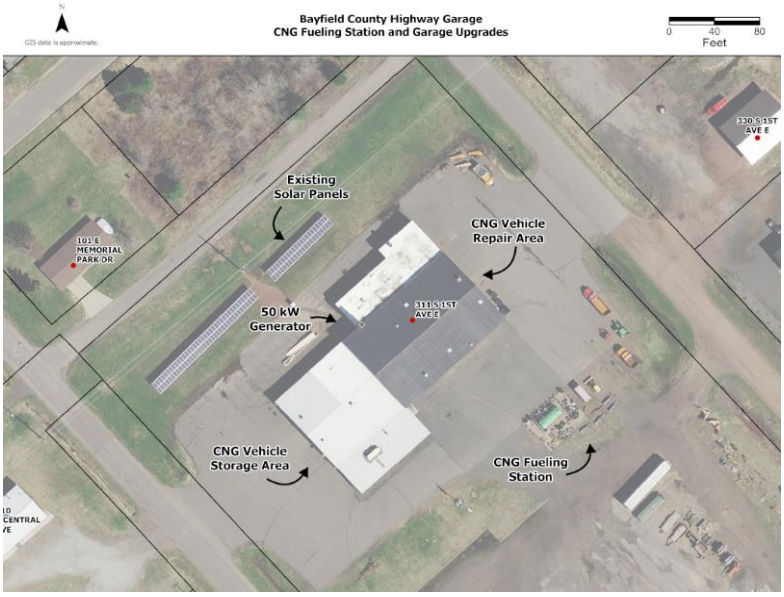


Figure 8. CNG Fueling station and garage upgrades.

At the beginning of Phase 2, EPC contractors will be selected for the Bayfield County and Towns microgrids, the Red Cliff microgrids, and the Bayfield County CNG fueling station. All three contractors will handle final engineering of the projects with the support of muGrid and Cheq Bay. The EPC contractors will also handle all hardware procurement in accordance with procurement policies and standards of the applicable jurisdiction of Bayfield County or Red Cliff.

3.4 Cost Estimates

The Total Project Cost Estimate follows:

Table 5. Total Project Cost Estimate.

OSCE Rural Prosperity - DOE ERA Budget	Cost Estimate
Area 1: Bayfield County Microgrids	
Bayfield County 5 Highway Garage Microgrids (Solar, BESS, EVSE)	$1,297,010
Bayfield County CNG Fueling Station and 2 Plow Trucks	$3,256,000
Area 2: Bayfield Towns Microgrids	
7 Bayfield County Local Units of Government - Microgrids (Solar, BESS, EVSE)	$1,535,317
Port Wing - 5 Sites including WWTP (110kW Solar, BESS, EVSE)	$817,542

Area 3: Red Cliff Band Microgrids	
Red Cliff Health Center Microgrid, 300kW Solar, BESS, EVSE	$1,228,689
Red Cliff Transportation Facility, (Solar, BESS, EVSE)	$696,768
Legal Support	$38,856
Area 4: Workforce Development	
Bayfield County Staff Support	$458,973
1 FTE Energy Specialist for Bayfield County	$415,469
RE + CNG Training Funding - Bayfield County	$170,000
Red Cliff Staff Support	$244,803
1 FTE Energy Specialist for Red Cliff - 4.5 years	$415,469
Renewable Energy Training Funding - Red Cliff	$75,000
Area 5: Community Engagement	$319,700
Area 6: Programmatic Support	
muGrid+Slipstream Technical Program Management	$780,926
State of Wisconsin ORP Oversight + Participation	$438,997
Total Project Cost	**$12,221,489**
Federal Share	$9,777,445
Cost Share	$2,444,044

Cost estimates for all project components were developed by seeking quotes for a specific set of EVSE and BESS hardware, suitable to serve the size range of these similar projects. Solar pricing as well as balance of system estimation and installation quotations were provided by a local contractor. muGrid Analytics provided quotes for project management and, where applicable, intelligent BESS and/or EVSE operational control. Bayfield County's CNG project was evaluated by Marathon Technical Services along with code requirements and cost estimates and is in Appendix E. A 10% contingency reserve was applied.

Operating & Maintenance Plans

Conceptual plans for operations and maintenance of the project components are listed in the Work Breakdown Structure (WBS) along with time lines. Refinement of the Operation and Maintenance (O&M) Plan will take place in each of phases 1-2 as ownership and financing structures become apparent for the larger Red Cliff and Bayfield County CNG projects. The smaller microgrids in the Bayfield County Towns will have simpler O&M requirements with workmanship warranties covering the first 5-years and manufacturer warranties covered 10-years minimum, extendable to 20-years for certain components like PV inverters. In addition,

contractors will be required to provide O&M manuals so local site owners can perform basic maintenance tasks and assist in monitoring system performance.

3.5 Decommissioning

At equipment end of life, the program team will seek to put as little material into landfills as possible. First, working, partial capacity solar modules and batteries will be provided to organizations that can reuse them, such as Equitable Solar Solutions. For any components that cannot be reused, all available recyclable components will be recycled before general disposal. A formalized decommissioning plan will be developed during Phase 2 as hardware selections are finalized.

CNG Decommissioning will follow DOE and NEPA provisions. Decommissioning processes will follow guidelines including Defueling, Decommissioning and Disposal of fuel tanks. CNG Tanks require inspections every three years. Bayfield County Highway staff are currently certified to do this for courthouse vehicles and will continue to retain their certifications for future highway vehicles. Bayfield County normally maintains highway plow trucks for seven years; after that time operation in the heavily corrosive salt environment is problematic. Due to cleaner operations, the CNG vehicles will have a longer life, but that is not expected to go beyond 15 years. The fuel station storage tanks are now built with no end-of-life expectancy, eliminating decommissioning but still requiring inspections as specified.

4 SAFETY AND OCCUPATIONAL HEALTH, CYBERSECURITY, PERMITTING AND REGULATORY REQUIREMENTS

4.1 Safety and Occupational Health Plans (SOHPs)

The program team will develop comprehensive safety plans for the project work, including construction, installation, and maintenance activities. Fostering a strong safety culture is a priority for both Bayfield County and Red Cliff, and both demonstration site leaders follow state and federal occupational health requirements. Local emergency planning committees (LEPC) personnel will be involved via the Community Advisory Board during Phases 1 and 2 to ensure adequate considerations are given and all contingencies can be considered. The SOHPs will then be updated regularly throughout the program work to ensure it accurately and completely reflects hazardous conditions and required safety protocols, along with up-to-date communications and planning with LEPCs regarding onsite emergency response planning and training.

4.2 Cybersecurity

The primary pathway for cybersecurity threats to the projects will be in the communications, command, and control area, as this hardware requires data connectivity via local area network (LAN) or cellular network. During Phase 1, the program team will perform a comprehensive cybersecurity assessment of the microgrid hardware and control architectures. All control and communication components will provide their security approach and protections and these will be integrated into the cybersecurity plan. Since the equipment implemented at each site will be chosen from a standard menu, this task is another area where economies of scale can be

achieved by reviewing cybersecurity specifications and performance for one set of hardware that serves multiple DER implementations.

LANs provided by site hosts utilized for communication will be reviewed by the cybersecurity team for vulnerability, and firewalls or limited access partitioned networks may be implemented. Red Cliff uses Albert for its network intrusion detection system (compliant with federal policy), Veronis for file and domain intrusion detection, and Palo Alto for its firewall. Bayfield County uses FortiGate Next Generation Firewalls at each site to prevent cyberattacks.

All vulnerable communications will be encrypted, and internal connections will be authenticated. Firewalls will be installed at each site. The team will work with IT/cybersecurity professionals at the host site to comply with internal security requirements. This task will initially focus on defining a communication system architecture that enhances system resilience based on communication latency requirements and communication interface requirements for grid interconnection per the IEEE 1547 standard.

4.3 Permitting

The program team has a general understanding of the permitting and regulatory requirements for all the demonstration sites, considering that both Bayfield County and Red Cliff have experience with bringing distributed energy projects through the permitting and interconnection process.

A key component of the program plan will be to engage with inspectors and utilities early and often throughout the project to establish clear communication channels, ensure alignment, and allow for early identification and resolution of potential issues. This continuous communication channel is critical to prevent surprises or unnecessary delay in later stages of project work. During Phase 1, the program team will fully define specific permit and interconnections requirements for project initiation and completion. Additionally, during Phase 1, an assessment will be completed to identify gaps in the regulations, codes, and standards which are relevant to the program, and the team will work with the local communities via the Community Advisory Board to address those gaps.

For many permitting requirements, Bayfield County and Red Cliff are the Authorities Having Jurisdiction (AHJ) for these projects. Bayfield County has an established solar / electric vehicle ordinance in their zoning regulations. Both state and local building and electrical inspectors control new construction permitting, and will be engaged through established relationships to file permits for each project. The staggered phasing of the implementation of these projects will ensure that local inspectors can handle the pipeline of permit requirements and they will not be overwhelmed by parallel work. Permitting timelines will be coordinated with the inspectors early in the process and changes to the timeline will be communicated promptly.

Red Cliff requires an environmental land use permit. The purpose of the Red Cliff “Land Use Project Application and Compliance Review” (PAC) is to provide the policies and procedures necessary for comprehensive land use management on the Red Cliff Reservation. Land use projects are defined as all projects on tribal land, allotted land and private (fee) land within the

exterior boundaries of the Reservation which have the potential to affect tribal land or resource use, through ground disturbance and/or aquatic or terrestrial habitat disturbance.

All solar PV and BESS projects will be required to file an interconnection application with the site's utility distribution provider.

4.4 National Environmental Policy Act

The program team has experience in and will follow all NEPA rules and regulations. An extensive NEPA review or compliance issues are not expected for the microgrid projects. The CNG fueling project, however, will have potential environmental impacts. Bayfield County will ensure that the contractors selected to design and construct the CNG fueling and maintenance facilities are well-versed in NEPA regulations for CNG infrastructure.

4.5 Other Considerations

Projects at Red Cliff require oversight from the Red Cliff Tribal Historic Preservation Office to ensure that no culturally significant lands or artifacts are disturbed during construction.

Throughout the design, implementation, operation, and decommissioning process, community leadership will be engaged through the Community Advisory Board to develop standard practices, share lessons learned, and address special, community-specific issues.

5 RISK ANALYSIS AND MITIGATION

Risk Management is a critical element to the success of any significant technical project and will be actively managed for this program. A formal risk management process will be used to focus on the early identification of project risks and opportunities. Risks will be assessed, appropriate actions will be prepared (accept, transfer, avoid or mitigate), and status of mitigation and corrective actions will be tracked, should they be invoked.

The LPM will create and maintain a catalog of identified risks and provide regular project updates, including the risk assessments, to relevant stakeholders including, but not limited to, senior management, DOE, sites, sub-recipients, or project partners. The catalog will be reviewed, vetted, and updated on a regular basis. The LPM approves all mitigation plans and determines where and when to allocate project resources for mitigation. Decisions made at project risk management meetings will be reflected in an updated catalog, which will be communicated to the appropriate stakeholders.

Risks are evaluated quantitatively based on their probability of occurrence (P) and severity of impact (I). A total risk score is calculated by multiplying P x I. If P and I are ranked on scales of 1 to 5, then total risk score has a range of 1-25.

An initial assessment of technical and project risks is documented below. Additional mitigation strategies will be developed in Phase 1.

Table 6. Risk catalog.

Risk	Probability (P)	Impact (I)	Risk Score (PxI)	Mitigation
Supply chain disruption	4	3	12	Identify long lead procurement items early; Work with contractors to check delivery timelines
Procurement timelines extended for large systems due to long lead times for transformers and switchgear	3	3	9	Identify long lead procurement items early; Work with contractors to check delivery timelines
Cost increases due to inflation	3	3	9	
New fueling system prone to human errors resulting in economic and safety impacts	3	3	9	Enroll highway dept workers in CNG training well in advance of system commissioning; update training annually
Delayed interconnection approvals	3	2	6	Develop relationships with utilities; monitor queues
Battery catches fire	1	5	5	Use state-of-the-art battery systems with integrated fire suppression and/or UL9540 certification
Delay of Red Cliff Transportation Facility building construction	2	2	4	
Community input / concerns delay project timeline	1	4	4	Community engagement begun during application phase; strong, detailed community engagement plan
Oversight board approvals delay project timeline	1	4	4	Community engagement begun during application phase; strong, detailed community engagement plan
Fleet EV range limitation becomes an issue due to temperature and loading	4	1	4	Provide training modules and lessons learned prior to EV delivery; document local lessons learned and share across communities
Construction timeline impacted due to tourism and/or inclement weather	2	2	4	
Decommissioned equipment goes to landfill	3	1	3	Ensure decommissioning plan developed early; seek inputs from Community Advisory Boards

This project team already navigates successfully through similar risks on distributed energy projects and can implement lessons learned for future projects.

A full Risk Management Plan will be developed in Phase 1.

6 WORKPLAN

6.1 Project Objectives

The top objective of this program is to demonstrate that "we are stronger together." That is, a collection of rural, but nearby communities can leverage collaboration and shared vision for financial scalability and repeatability for the deployment of distributed energy projects using standard equipment that supports critical community and cross-community infrastructure. With this framework developed, the project team will be able to educate and mentor other rural communities across Wisconsin from the ground up by the communities themselves and from the top down by the state-level organizations involved. The area proposed for this demonstration is very rural, and in the northernmost reaches of the state of Wisconsin, suffers many climate challenges and severe weather events. We posit that if you can do this on the shores of Lake Superior, you can do it anywhere.

Practically, the main program objectives are the following:

1. Reduce carbon and criteria pollutant emissions both locally and on the grid through the deployment of region-wide EV charging infrastructure for the public and for fleets and through the deployment of local solar PV electricity production. These projects also exist on national and international scenic byways such as the Lake Superior Circle Tour, drawing many tourists to the region who will also benefit from clean and resilient energy projects.
2. Reduce carbon emissions locally by converting diesel snowplows to CNG
3. Increase community resilience by implementing clean solar-plus-storage microgrids at critical facilities
4. Provide community revenue, freeing up funding to go to other critical functions and community support
5. Build capacity for energy innovation and development in rural communities through workforce development, education, and practical experience
6. Align with tribal goals and values of environmental stewardship – to protect the land, not only within the boundaries of the Red Cliff Reservation, but also in Red Cliff ceded territory, which encompasses all of Bayfield County and beyond

6.2 Technical Scope Summary

The technical work scope for this program has 3 main components:

1. **Bayfield County Distributed Energy** – These projects on county infrastructure are located within various towns in Bayfield County. The benefits provided by these projects will directly go to all 28 county towns and villages.

a. **Bayfield County 5 Highway Garage Microgrids.** Each county garage will require an electric service upgrade from 200A to 400A to accommodate fleet EV charging. Each site will have solar PV installed on roof structures as space is limited for a ground-mount application. Each site will have a BESS installed in heated interior space. Both the BESS and EVSE are sited away from salt brine equipment and water systems used to wash vehicles.

b. **Bayfield County CNG Fueling Station and Garage Update**. The fueling station, shown in the site plan in Appendix E, will be located near the existing diesel and unleaded gasoline dispensaries, but also retain code-compliant safety distance. The Bayfield County Washburn Highway Garage building that will be upgraded to comply with code regulations for CNG vehicle maintenance is also shown on the site plan. The CNG fueling station will support the conversion of diesel snowplows to CNG fuel.

2. Bayfield County Town Microgrids – Multiple towns in Bayfield County will deploy solar-plus-storage resilient microgrids, many integrated with public facing and/or fleet EV charging. The microgrids will utilize common equipment and therefore allow collaborative ease of operations and maintenance. Some towns have multiple microgrid sites. This will result in 16 microgrids serving town infrastructure.

a. Seven Bayfield County Local Units of Government Microgrids. Each site will have ground-mounted solar PV installations, interior BESS, and one pedestal dual EVSE. Sites will be impacted by trenching to install electrical conduit and conductors to connect components. Systems are sized so existing 200amp electrical service will not need to be upgraded. Interior space has been selected within electric rooms to accommodate the small-refrigerator-size BESS.

b. Town of Port Wing 5 Microgrids. Each of the five essential community sites will have solar PV, a mix of roof and ground-mounted arrays, as well as BESS installed in interior heated space. Only one site, the Town Garage, will have a single-port Level-2 EVSE, wall mounted in interior space to charge a new F150 Ford Lightning pickup truck. Site maps of all sites are included in Appendix C. Sites will be impacted with trenching to install electrical conduit and conductors to connect equipment.

3. **Red Cliff Band Microgrids** – The Red Cliff Band has been studying the feasibility of distributed energy projects since 2018. These demonstration projects will represent the first on Red Cliff lands, and will inform Red Cliff policy, process, and capacity for future projects.

a. **Red Cliff Community Health Center Microgrid.** A 300kW ground-mounted solar PV array is proposed just south of the existing Health Center along with a 250kW/500kWh BESS. The land where the solar array will be installed has been disturbed in the past and now contains brush which will need to be cleared and leveled. Treaty Natural Resources permitting will be required. The BESS location

has not been identified and will be a design component in Phase 1 of the project. A public level 2 EVSE will be installed.

b. **Red Cliff Tribal Transportation Facility Microgrid.** Design for the new Tribal Transportation Facility is underway, and design studies to develop a supporting microgrid during Phase 1 of this project will be able to influence building design and construction. The microgrid will include solar PV, BESS, and fleet EVSE to support planned electric buses. The equipment has not yet been sized due to the preliminary stage of the building design, but will be completed in Phase 1 of this project.

This program will involve alteration of public infrastructure (natural gas distribution infrastructure) in the US and is therefore subject to Buy America Requirements for Infrastructure Projects.

The major work planned for each phase follows:

Table 7. Major work milestones by phase.

Phase 1	● Generate preliminary 30% design, sizing and selecting major components for both microgrids and CNG fueling station. ● Develop environmental and regulatory plans and identify required permitting ● Build system-level modeling to assist with design and performance validation ● Develop business and financial plans, including an assessment of anticipated economic revenues from microgrid and EVSE operation ● Develop operations and training plans to identify and prepare local workers and create jobs ● Begin community engagement with public and school focused presentations and feedback collection
Phase 2	● Select EPC contractors and complete 100% engineering for all projects ● Begin procurement of long-lead items ● File interconnection applications and conduct environmental reviews ● Develop verification and acceptance test plans ● Finalize business plans and agreements, including subsidy program ● Finalize Diversity, Equity, Inclusion, and Accessibility (DEIA); Equity and Environmental Justice (EEJ), and Justice40 Plans and onboard full time Energy Specialists for both Bayfield County and the Red Cliff Band
Phase 3	● Construct and integrate microgrid systems and CNG fueling station ● Finalize all permitting, inspections, and approvals ● Execute test plans and collect data ● Onboard local workers to perform operations and maintenance ● Begin site tours for the community and local business
Phase 4	● Operate microgrids to best economic and grid support advantage and provide operational data for validation ● Provide project sustainability projections ● Report final Total Project Cost ● Write final project report and document best practice and lessons learned

	● Conclude community presentations and tours for this project, but establish ongoing rhythms of public communication for local governments ● Develop a report to support a statewide pipeline of rural microgrids

6.3 Work Breakdown Structure (WBS) and Task Description Summary

The full WBS along with all task description summaries is available in Appendix A.

6.4 Go/No-Go Decision Points for each Project Phase

Because this program is an amalgamation of 24 sub-projects which will be staggered in time, each project will conduct Go/No-Go Decision review prior to moving to its own next phase. Program-level Go/No-Go reviews will be conducted once both the first and last project have moved into the given next phase.

6.4.1 Project Go/No-Go Decision Points

The projects will each have their own go/no-go review prior to moving into the next phase at their installation. Table 8 shows these criteria at each phase transition. All projects will move from Phase 1 to Phase 2 together, so that transition is only documented in Table 9, at the program level.

Table 8. Project-level Go/No-Go decision points.

Go/No-Go Decision	Description	Task #	Timeframe	Criteria for Evaluation
Project Phase 2	Exit Phase 2 and Go for Phase 3	2.1.10	Varies by Project	● 100% engineering complete ● Environmental project review complete ● All permitting and approvals in place to begin construction ● Approval from community oversight group achieved
Project Phase 3	Exit Phase 3 and Go for Phase 4	3.1.6	Varies by Project	● All project components installed ● Project V&V and Project Completion Testing conducted and successful ● Utility Distribution V&V and Project Completion Testing conducted and successful ● All permitting and approvals in place to begin operations ● Approval from community oversight group achieved
Project Exit	Exit Demonstration Project and Go for Sustained Operations	4.1.5	Varies by Project	● Project O&M staff trained and plans in place ● Project performance results documented and compared to modeled performance predictions ● Project ongoing impact analysis and project sustainability analysis complete ● Project report on impact of project community engagement efforts complete

6.4.2 Program-level Go/No-Go Decision Points

To accommodate a staggered development schedule for the 24 projects, we propose an initial programmatic review and decision point when the first projects are ready to proceed to the next phase. The final programmatic review and decision point will occur when all projects have moved to the next phase and all programmatic phase requirements are complete.

Table 9. Program-level Go/No-Go decision points.

Go/No-Go Decision	Description	Task #	Timeframe	Criteria for Evaluation
Program Phase 1	Exit Program Phase 1 and Go for Phase 2	1.1.14	Jan 2025	● All business and management plans drafted ● Statewide microgrid pipeline initial analysis complete ● Technical and economic models built ● All projects Go for Phase 2 ● System-level technical and economic models built ● Community Development Analysis complete ● Candidates identified for clean energy specialist position ● Report progress against stakeholder engagement, DEIA, and J40 in Phase 1.
Initial Program Phase 2	Allow first tranche of projects to move to Phase 3 before Program Phase 2 is complete.	2.1.9	Apr 2025	● EPC contractors selected ● Initial N projects Go for Phase 3 ● V&V and Project Completion Test Plans complete for first projects ● O&M Training and Guidelines finalized for first projects ● Program Safety and Occupational Health Plan finalized
Final Program Phase 2	Exit Program Phase 2 and Go for Phase 3	2.1.11	Apr 2026	● Financing agreements finalized ● Utility agreements finalized ● All projects Go for Phase 3 ● V&V and Project Completion Test Plans complete ● Energy specialist onboarded ● O&M Training and Guidelines finalized ● Community Impact Target identified and tracking plans in place ● DEIA, EEJ, and J40 Plans finalized ● Report progress against stakeholder engagement in Phase 2
Initial Program Phase 3	Allow first tranche of projects to move to Phase 4 before Program Phase 3 is complete.	3.1.5	Nov 2025	● Initial N projects Go for Phase 4
Final Program Phase 3	Exit Phase 3 and Go for Phase 4	3.1.7	Nov 2026	● All projects Go for Phase 4 ● Report progress against stakeholder engagement and workforce development in Phase 3

Program Exit	Exit Demonstration Program and Go for Sustained Operations	4.1.6	Dec 2027	● All projects Go for Sustained Operations ● Final report complete including Total Cost Reporting, Lessons Learned ● Performance results documented, compared to modeled performance predictions, and aggregated at program level ● TEA and LCA Reports complete ● Ongoing impact analysis, project sustainability analysis complete and aggregated at program level ● Complete evaluation of demonstration projects and processes for statewide pipeline report ● Report on impact of project community engagement efforts aggregated at program level and complete

6.5 End of Project Goal Summary

This scope will result in 23 solar-plus-storage-plus-EVSE microgrids and a CNG fueling station, which will be sited in 11 rural communities and serve a total of 28 rural communities plus a tribal community. These projects will achieve the goals of providing clean, resilient power with economic benefits to these communities, as well as providing cleaner, lower cost snow removal. This program will solidify a collaborative relationship between the towns, between Bayfield County and the Red Cliff Band, and between these rural communities at the northern edge of Wisconsin with state policymakers. This collaborative approach will have demonstrated a framework for other rural communities and tribal nations across the state of Wisconsin and around the US.

6.6 Integrated Project Schedule (IPS)

The projects in this demonstration program will be staggered so that they may be completed in accordance with individual long-lead procurements and with EPC construction schedules. Therefore, we anticipate the first projects moving into Phase 3 as early as April 2025 and the last as late as September 2026. This staggered approach will allow all construction to take place during the temperate months of May to November over two years, 2025 and 2026. To support this staggered schedule, all projects will enter Phase 2 together in January 2025. There will be an initial DOE Go/No-Go approval for the first projects to enter Phase 3 in April 2025 and for the first projects to enter Phase 4 in July 2025 to ensure that at the Program level, we have approval to proceed. Note that not all programmatic Phase 3 milestones may be complete when the first projects enter Phase 4, but the programmatic milestones related to initiating project Phase 4 success will be prioritized to complete early. Each project will conduct their own Go/No-Go review to enter Phase 3 and Phase 4 when they are individually ready based on their own schedules. Then, when the last projects wrap up Phase 2 in August 2026 and wrap up Phase 3 in October 2026, there will be another DOE review to verify that all program milestones for the completed phase have been achieved and the program phase is formally closed.

During Phase 1, preliminary design project tasks will be staggered by 1 week, to reduce the burden of parallel development. During Phase 3, construction schedules will be staggered by no less than two weeks for the same reason. Draft phase-level schedules for the program and each project are shown in Figure 9.

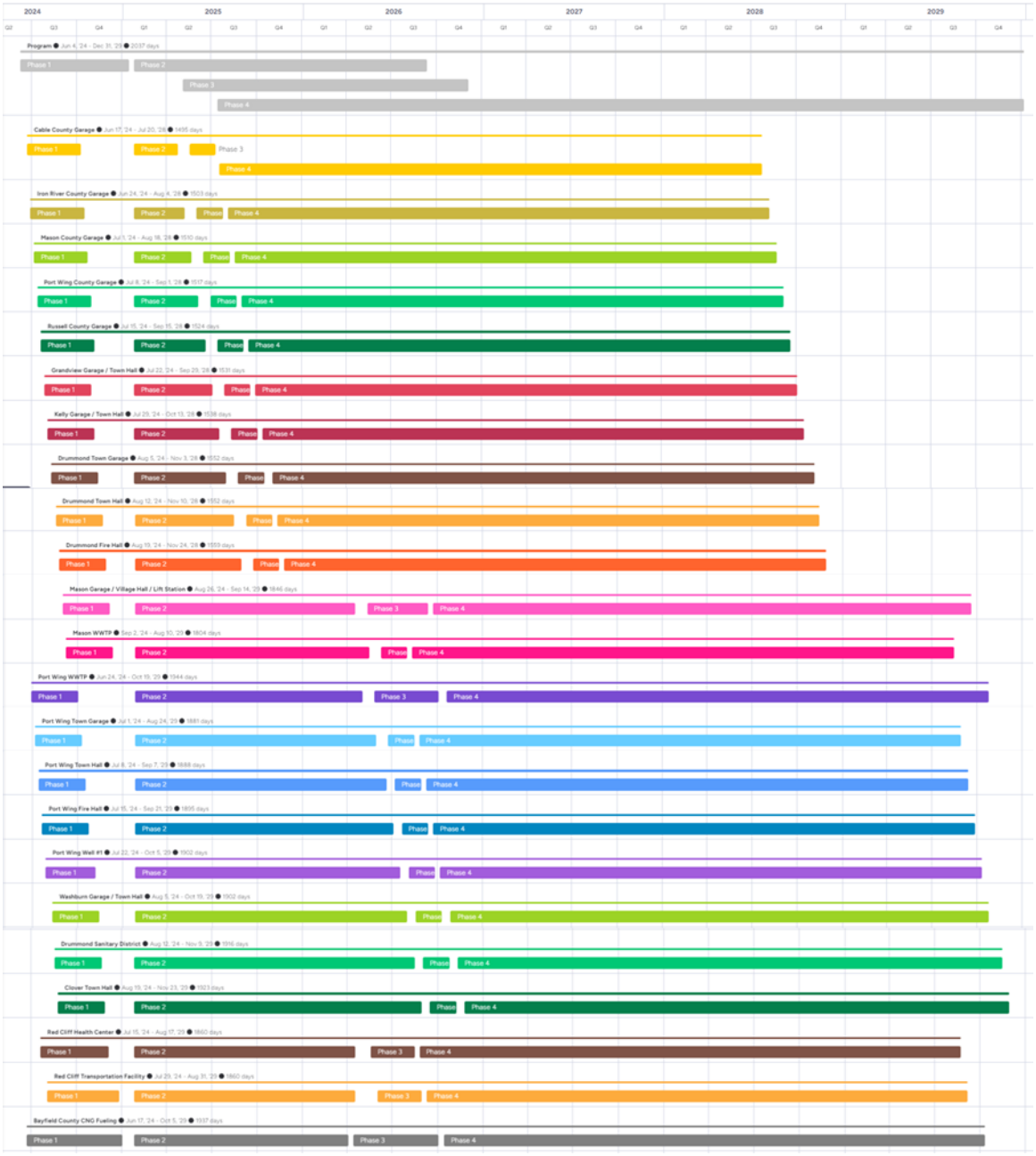


Figure 9. Project timelines by phase.

A full IPS is available in Appendix F.

As projects accelerate or hold for necessary tasks to complete, schedules for each project will be managed and adjusted accordingly. Projects may be slotted in before or after each other as these schedules become clear during execution.

All projects will be supported as part of this demonstration for three years of operation, with the last projects finishing up their three years in November 2029 and all program reporting complete by the end of December 2029. The projects are expected to continue operating, in self-sustaining fashion with regular O&M as defined in program plans, for at least 10 years.

7 Appendix A: Work Breakdown Structure (WBS) and Task Descriptions

WBS Workplan		
1	**Phase 1: Detailed Project Planning**	
1.1	**Task 1: Business Development & Project Management**	
1.1.1	Sign Prime Agreements	Sign Prime Agreements
1.1.2	Execute Subcontracts (i.e. Sign)	Execute Subcontracts (i.e. Sign)
1.1.3	Hold Program Kickoff Meeting(s)	Hold Program Kickoff Meeting(s) - All stakeholders invited. One large meeting for the program, and then a meeting for each community to focus on community level needs and projects
1.1.4	Update Integrated Project Schedule	From the IPS developed during application phase, update based on actual start date
1.1.5	Develop Project Management Plan	muGrid will lead the Project Management, assisted by technical contractors and community leaders to advise
1.1.6	Develop Risk Management Plan	Using the initial Risk Analysis from the application, plan for management and tracking of technical and programmatic risks throughout the project
1.1.7	Develop Intellectual Property Management Plan	No intellectual property issues are anticipated, but in this task, we will investigate to be sure.
1.1.8	Develop Program Financial Model and Plan	muGrid will develop an integrated business plan and financial projections that capture capital investment costs, ongoing operational costs, and expected revenue. This will be broken down by community and rolled up into a program level document.
1.1.9	Develop project-level financial models	Assess incentive programs available to reduce cost, as well as potential financing options.
1.1.10	**Development of statewide microgrid pipeline**	The Office of Rural Prosperity will lead an effort to develop a statewide pipeline of microgrid projects across rural Wisconsin. As a first step in this project, ORP will work with Slipstream to identify how the lessons learned from the Bayfield County demonstration projects can inform a statewide pipeline of microgrid projects across rural Wisconsin. Integrate analysis with Green Tier Communities, a Wisconsin DNR Energy Initiative. Mark Abeles-Allison is on board.
1.1.10.1	Perform data analysis to inform statewide microgrid pipeline and produce memo	Slipstream will perform data analysis to identify counties across Wisconsin with significant energy resiliency challenges, and energy burden concerns. The team will use available public data sources, such as the Low-Income Energy Affordability tool, EJ Screen, and FEMA's National Risk Index, to identify census tracts and counties where energy burden and resiliency challenges intersect.

1.1.10.2	Begin evaluation of demonstration projects and process	The Slipstream team will lead an evaluation of the Bayfield and Red Cliff demonstration projects. As Slipstream will act as a consulting technical expert during the design, this evaluation will serve as an independent review of the process, community engagement, and benefits. The process evaluation will include interviews with contractors and government staff, and surveys with key community stakeholders to understand challenges, barriers, and lessons learned from the installation process and how well it addressed community concerns and support workforce development. The quantitative analysis will estimate how well the system will meet the stated benefits, such as reduced greenhouse gas emissions, improved resiliency, reduced energy burden, and improved energy access.
1.1.11	Create Budget Period Go/No-Go Assessments	Create specific and detailed exit criteria for each phase, expanding on the criteria proposed in the application
1.1.12	Complete Program Phase 1 Go/No-Go Assessments	Review current Phase 1 project and programmatic status and move all projects and program to Phase 2.
1.2	**Task 2: Engineering, Procurement & Construction**	
1.2.1	**Microgrid Design Planning Study through 30% Design**	Execute planning studies to produce conceptual designs and system architecture for microgrids without studies already in place
1.2.1.1	Washburn Garage / Town Hall - Planning + 30% Design	
1.2.1.2	Clover Town Garage - Planning + 30% Design	
1.2.1.3	Clover Town Hall - Planning + 30% Design	
1.2.1.4	Drummond Town Garage - Planning + 30% Design	
1.2.1.5	Drummond Town Hall - Planning + 30% Design	
1.2.1.6	Drummond Fire Hall - Planning + 30% Design	
1.2.1.7	Drummond Sanitary District - Planning + 30% Design	
1.2.1.8	Mason Garage / Village Hall / Lift Station - Planning + 30% Design	
1.2.1.9	Mason WWTP - Planning + 30% Design	
1.2.1.10	Grandview Garage / Town Hall - Planning + 30% Design	
1.2.1.11	Grandview WWTP - Planning + 30% Design	
1.2.1.12	Kelly Garage / Town Hall - Planning + 30% Design	
1.2.1.13	Port Wing Town Garage - Planning + 30% Design	

1.2.1.14	Port Wing Town Hall - Planning + 30% Design	
1.2.1.15	Port Wing Fire Hall - Planning + 30% Design	
1.2.1.16	Port Wing Well #1 - Planning + 30% Design	
1.2.1.17	Port Wing WWTP - Planning + 30% Design	
1.2.1.18	Red Cliff Transportation Facility - Planning + 30% Design	
1.2.2	**Microgrid 30% Engineering**	Produce conceptual designs and system architecture for microgrids with planning studies already in place
1.2.2.1	Cable County Garage - 30% Design	
1.2.3.2	Iron River County Garage - 30% Design	
1.2.2.2	Mason County Garage- 30% Design	
1.2.3.3	Port Wing County Garage- 30% Design	
1.2.2.3	Russel County Garage- 30% Design	
1.2.3.4	Red Cliff Health Center- 30% Design	
1.2.4	Perform CNG Design Planning Study + 30% Design	Execute planning studies to produce conceptual designs and system architecture for CNG fueling station
1.2.5	Document general microgrid command and control requirements	Using outputs of planning studies and system modeling, determine requirements for command and control
1.2.6	Document general microgrid functional and design requirements	Using outputs of planning studies and system modeling, determine requirements for function, hardware selection, and technical design
1.2.7	Document general microgrid interfaces and interface requirements	Using outputs of planning studies and system modeling, determine requirements for interfaces
1.2.8	Document CNG fueling functional and design requirements	Using outputs of CNG planning study and system modeling, determine requirements for function, hardware selection, and technical design
1.3	**Task 3: Safety, Permitting, and Security**	
1.3.1	Refine Safety and Occupational Health Plan	From SOHP developed during application phase, update based on new information from planning studies
1.3.2	Develop Environmental and Regulatory Plans	The County's and Red Cliff's governmental departments will lead environmental and regulatory planning based on established policy
1.3.3	Develop Cybersecurity Plan	The County's and Red Cliff's governmental departments will lead cybersecurity planning based on established policy, assisted by technical consultants

1.3.4	Identify required permitting and approvals for microgrid construction	Identify permitting requirements to be able to advise micorgrid EPC contractor responsible in Phase 2
1.3.5	Identify required permitting and approvals for CNG fuel station construction	Identify permitting requirements to be able to advise CNG EPC contractor responsible in Phase 2
1.4	**Task 4: Technical, Data, and Analysis**	
1.4.1	**System-level Modeling and Optimization**	
1.4.1.1	Build system-level technoeconomic model	Perform analysis to estimate microgrid economic performance, inform system sizing, and estimate revenues for each microgrid project, and roll up to program level.
1.4.1.2	Build system-level resilience performance model	Perform analysis to estimate microgrid resilence performance, specifically a stochastic evaluation of expected duration of outage support, and roll up to program level.
1.4.2	Obtain technical specifications for major equipment - Microgrids	Gather spec sheets from major hardware providers to inform modeling and prepare for hardware selection and procurement for microgrids
1.4.3	Obtain technical specifications for major equipment - CNG Fueling	Gather spec sheets from major hardware providers to inform modeling and prepare for hardware selection and procurement for CNG fueling
1.5	**Task 5: Community Engagement**	
1.5.1	Perform Community Development Analysis	Using previous experience and resources, ORP will lead the identification of community problems and of the resources to resolve them, the assignment of priorities among them, and the development of a plan of action, specifically in the area of energy access and equity. Integrate analysis with Green Tier Communities, a Wisconsin DNR Energy Initiative. Mark Abeles-Allison is on the board.
1.5.2	Identify and develop any required community and/or labor agreements	We will issue community and labor MOUs that put expectations and anticipated outcomes in writing, in collaboration with community leaders and residents and labor representation.
1.5.3	Develop Energy Operations plans to guide construction, ongoing maintenance, and upgrades	As Bayfield County and Red Cliff expand their energy capability and programs, governmental staff will develop guidance documentation and policy to direct this and future work in a standardized way, incorporating lessons learned from past projects.
1.5.4	Develop Microgrid Operation and Maintenance Training and Guidelines Draft	As Bayfield County and Red Cliff prepare to train and onboard local workforce to support O&M of energy projects, government staff will develop a planned approach for this and for capacity building.
1.5.5	Identify candidates for Clean Energy Manager positions	A key piece of workforce development, Bayfield County and Red Cliff will identify candidates for a full time energy specialist role from within the tribal membership or local community
1.5.6	Public Forum / Presentation #1	The public forums will present the current project status and future plans to community members

1.5.7	**School / Educational Presentation #1**	The school presentations will focus on technical aspects of the project, tying them to Science, Technology, Engineering, and Math (STEM) learning objectives to real world STEM application and generate excitement for STEM career paths
1.5.7.1	Bayfield School District	
1.5.7.2	Drummond School District	
1.5.7.3	South Shore School District	
1.5.7.4	Washburn School District	
1.5.7.5	Red Cliff	
1.5.8	Conduct Community Survey #1	Community surveys will be available by electronic and paper methods to increase accessibility and collect anonymous, quantifiable feedback on community perception of this project and energy efforts in general.
1.5.9	Public Relations Campaign	The project will be kept front-of-mind in the public consciousness with social media, email and/or print newsletters, local news articles, webinars, and other forms of communication.
1.5.10	Establish Community Advisory board	An important stakeholder throughout the demonstration project, the project team will engage with community leadership and local business to form a Community Advisory Board. This board will commit to supporting the project through all phases and providing community input on decisions.
1.5.11	Community Advisory Board Phase 1 Pre-exit Meeting	Bayfield County, Red Cliff, and Cheq Bay have previously worked with community members, local businesses, and unrelated tribal government departments to gather input and achieve consensus on energy projects, and will continue to do so for this project.
1.5.12	Establish and monitor continuous feedback channels	In addition to surveys, we will establish an email address, web form, and physical dropbox for collecting any questions, comments, and general feedback on the project. Answers to questions will be addressed through the public forums and public relations campaigns.
1.5.13	Define requirements for educational display / kiosks	We will develop a standard kiosk and display format with a combination of print and electronic, frequently updated information to inform the public about the projects. These will be located in each community. Engage potential assistance from UW Madison Extension / Students / interns / staff and/or the Univercity program.
2	**Phase 2: Project Development**	
2.1	**Task 1: Business Development & Project Management**	

2.1.1	Update Integrated Project Schedule	From the IPS developed during Phase 1, update based on work accomplished during Phase 1
2.1.2	Finalize Project Management Plan	Once the EPC contractor is selected, muGrid may jointly finalize the project management plan based on Phase 1 work and contractor approach.
2.1.3	Update Risk Management Plan	Using the initial Risk Analysis from Phase 1, update management and tracking of technical and programmatic risks based on work completed
2.1.4	Finalize Intellectual Property Management Plan	No intellectual property issues are anticipated, but if some were identified in Phase 1, finalize the plan.
2.1.5	Finalize Financial Model and Plan	muGrid will finalize business plans and financial projections that capture capital investment costs, ongoing operational costs, and expected revenue based on selected financing approach for each community and then roll up into a program level overview
2.1.6	Finalize financing agreements	Execute agreements for selected financing approaches from Phase 1.
2.1.7	Finalize any community or workforce agreements identified in Phase 1	We do not anticipate any formal community or labor agreements needed, but we will put them in place if deemed necessary after Phase 1.
2.1.8	**Development of statewide microgrid pipeline**	The Office of Rural Prosperity will lead an effort to develop a statewide pipeline of microgrid projects across rural Wisconsin. As a first step in this project, ORP will work with Slipstream to identify how the lessons learned from the Bayfield County demonstration projects can inform a statewide pipeline of microgrid projects across rural Wisconsin. Integrate analysis with Green Tier Communities, a Wisconsin DNR Energy Initiative. Mark Abeles-Allison is on the board.
2.1.8.1	Continue evaluation of demonstration projects and design process	The Slipstream team will lead an evaluation of the Bayfield and Red Cliff demonstration projects. As Slipstream will act as a consulting technical expert during the design, this evaluation will serve as an independent review of the process, community engagement, and benefits. The process evaluation will include interviews with contractors and government staff, and surveys with key community stakeholders to understand challenges, barriers, and lessons learned from the installation process and how well it addressed community concerns and support workforce development. The quantitative analysis will estimate how well the system will meet the stated benefits, such as reduced greenhouse gas emissions, improved resiliency, reduced energy burden, and improved energy access.
2.1.9	Complete Initial Program Phase 2 Go/No-Go Assessments	Review first N projects ready to move to Phase 3 and current Phase 2 programmatic status so that the first projects may move to Phase 3 before program Phase 2 is complete.
2.1.10	Complete Project Phase 2 Go/No-Go Assessments	Once project Phase 2 activities are complete, evaluate exit criteria to move to project Phase 3. These assessments done project-by-project and may not be simultaneous for all projects.

2.1.11	Complete Final Program Phase 2 Go/No-Go Assessments	Once program Phase 2 activities are complete and all projects have moved to phase 3, evaluate exit criteria to move to program Phase 3.
2.2	**Task 2: Engineering, Procurement & Construction**	
2.2.1	**Select EPC contractor - Bayfield County / Towns Microgrids**	Use Bayfield County's standard procurement and contracting process to select the engineer/procure/construct firm to implement the microgrids. One RFP / selection will bundle all County and Town microgrids together.
2.2.1.1	Issue RFP for EPC contractor	
2.2.1.2	Evaluate RFP responses and select EPC contractor	
2.2.1.3	Finalize agreement with EPC contractor	
2.2.2	**Select EPC contractor - Red Cliff**	Use Red Cliff's standard procurement and contracting process to select the engineer/procure/construct firm to implement the microgrids. One RFP / selection will bundle both Red Cliff microgrids together.
2.2.2.1	Issue RFP for EPC contractor	
2.2.2.2	Evaluate RFP responses and select EPC contractor	
2.2.2.3	Finalize agreement with EPC contractor	
2.2.3	**Select EPC contractor - Bayfield County CNG Fueling**	Use Bayfield County's standard procurement and contracting process to select the engineer/procure/construct firm to implement the CNG fueling station.
2.2.3.1	Issue RFP for EPC contractor	
2.2.3.2	Evaluate RFP responses and select EPC contractor	
2.2.3.3	Finalize agreement with EPC contractor	
2.2.4	**Microgrid 100% Engineering**	Once selected the contractors will bring the projects to 100% engineering with associated drawing sets, hardware selection, and long lead procurement initiation. Perform this task for all 23 microgrids.
2.2.5	CNG Fueling 100% Engineering	Once selected the contractor will bring the project to 100% engineering with associated drawing sets, hardware selection, and long lead procurement initiation.
2.2.6	**Select key hardware component vendors / models**	Once selected the contractors will bring the projects to 100% engineering with initial hardware selection for major components. Perform this task for all 23 microgrids, plus CNG fueling station
2.2.7	**Identify and initiate procurement for long lead items**	Once selected the contractors will bring the projects to 100% engineering with long lead procurement initiation. Not all projects are expected to need long lead procurement items. This will be determined in Phase 1.

2.2.7.1	Mason Garage / Village Hall / Lift Station	
2.2.7.2	Port Wing WWTP	
2.2.7.3	Red Cliff Transportation Center	
2.2.7.4	Red Cliff Health Clinic	
2.2.7.5	Bayfield County CNG Fueling	
2.2.8	Develop Decommissioning Plan	Develop plans for equipment decommissioning and disposal
2.3	**Task 3: Safety, Permitting, and Security**	
2.3.1	**Finalize execution-ready Safety and Occupational Health Plan**	
2.3.1.1	Finalize execution-ready Safety and Occupational Health Plan - Bayfield County	From SOHP developed during application phase, update based on new information from studies and design activities.
2.3.1.2	Finalize execution-ready Safety and Occupational Health Plan - Red Cliff	From SOHP developed during application phase, update based on new information from studies and design activities.
2.3.2	**Refine Physical Security and Cybersecurity Plans**	
2.3.2.1	Refine Physical Security and Cybersecurity Plan - Bayfield County	Bayfield County's IT department, together with muGrid's assistance will develop cybersecurity plans based on project data architectures. Bayfield County's governmental departments will advise on physical security regulations
2.3.2.2	Refine Physical Security and Cybersecurity Plans - Red Cliff	Red Cliff's IT department, together with muGrid's assistance will develop cybersecurity plans based on project data architectures. Red Cliff's governmental departments will advise on physical security regulations
2.3.3	**File any required interconnection applications**	EPC contractors will file any required interconnection applications. Perform this task for all 23 microgrids and the CNG fueling station.
2.3.4	**Conduct final environmental project review**	EPC Contractors will perform environmental reviews consistent with NEPA requirements. Perform this task for all 23 microgrids and the CNG fueling station.
2.3.5	**All permitting and approvals in place for construction**	EPC contractors will apply for and secure construction permitting. Perform this task for all 23 microgrids and the CNG fueling station.
2.4	**Task 4: Technical, Data, and Analysis**	
2.4.1	**System-level Modeling and Optimization**	
2.4.1.1	Update system-level technoeconomic model	Update analyses with final design parameters to estimate systems' economic performance
2.4.1.2	Update system-level resilience performance model	Update analysis with final design parameters to estimate microgrids' resilience performance, specifically a stochastic evaluation of expected duration of outage support.

2.4.2	Develop Technoeconomic Analysis (TEA) Report - Microgrids	Combine final technoeconomic modeling and financing approaches for microgrids into formal TEA report
2.4.3	Develop Lifecycle Emissions Analysis (LCA) Report - Microgrids	Work with Bayfield County and Red Cliff environmental experts and selected hardware vendors to produce LCA for microgrids
2.4.4	Develop Verification and Validation (V&V) Plan - Microgrids	Write test plans for microgrids with clear and measurable success criteria for system verification post-construction
2.4.5	Develop Project Completion Test Plan - Microgrids	Write test plans with clear and measurable success criteria for microgrid acceptance and commissioning. This may incorporate the results of V&V testing with additional assessments and local utility policy.
2.4.6	Develop Technoeconomic Analysis (TEA) Report - CNG Fueling	Combine final technoeconomic modeling and financing approaches for CNG Fueling into formal TEA report
2.4.7	Develop Lifecycle Emissions Analysis (LCA) Report - CNG Fueling	Work with Bayfield County and state environmental experts and selected hardware vendors to produce LCA for CNG fueling
2.4.8	Develop Verification and Validation (V&V) Plan - CNG Fueling	Write test plans for CNG fueling with clear and measurable success criteria for system verification post-construction
2.4.9	Develop Project Completion Test Plan - CNG Fueling	Write test plans with clear and measurable success criteria for CNG fueling acceptance and commissioning. This may incorporate the results of V&V testing with additional assessments and local utility policy.
2.5	**Task 5: Community Engagement**	
2.5.1	Finalize DEI, EEJ, and J40 Plans	From the CBP developed during application phase, update based on learnings from community engagement and technical progress
2.5.2	Identify Community Impact Targets and build tracking plans	Select quantitative and qualitative measures for community impact and define tracking approaches for implementation
2.5.3	Update CBP	From the CBP developed during application phase, update based on community engagement thus far and any plan alterations going forward
2.5.4	Finalize Microgrid Operation and Maintenance Training and Guidelines	As the project team prepares to train and onboard local workers to support O&M of energy projects, the energy working groups will finalize a planned approach for this.
2.5.5	Onboard + train Clean Energy Manager/Specialist - Bayfield	A key piece of workforce development, Bayfield County will select a candidate for a full time energy specialist role from within the tribal membership or local community
2.5.6	Onboard + train Clean Energy Manager/Specialist - Red Cliff	A key piece of workforce development, the Red Cliff Band will select a candidate for a full time energy specialist role from within the tribal membership or local community
2.5.7	Public Forum / Presentation #2	The public forums will present the current project status and future plans to community members
2.5.8	**School / Educational Presentation #2**	The school presentations will focus on technical aspects of the project, tying them to STEM learning objectives to real world STEM application and generate excitement for STEM career paths
2.5.8.1	Bayfield School District	

2.5.8.2	Drummond School District	
2.5.8.3	South Shore School District	
2.5.8.4	Washburn School District	
2.5.8.5	Red Cliff	
2.5.9	Conduct Community Survey #2	Community surveys will be available by electronic and paper methods to increase accessibility and collect anonymous, quantifiable feedback on community perception of this project and energy efforts in general. Transition this task to community energy specialists for remainder of project.
2.5.10	Public Relations Campaign	The project will be kept front-of-mind in the public consciousness with social media, email and/or print newsletters, local news articles, webinars, and other forms of communication. Transition this task to community energy specialists for remainder of project.
2.5.11	Community Advisory Board Phase 2 Pre-exit Meeting	Bayfield County, Red Cliff, and Cheq Bay have worked with community members, local businesses, and other government departments to gather input and achieve consensus on tribal energy projects for years, and will continue to do so for this project.
2.5.12	Monitor continuous feedback channels	In addition to surveys, we will establish an email address, web form, and physical dropbox for collecting any questions, comments, and general feedback on the project. Answers to questions will be addressed through the public forums and public relations campaigns. Transition this task to community energy specialists for remainder of project.
2.5.13	Finalize design for educational display / kiosks	We will finalize technical design and layout of print and electronic displays for kiosks to inform the public about the projects. These will be located in each community. Engage potential assistance from UW Madison Extension / Students / interns / staff and/or the Univercity program.
3	**Phase 3: Construct & Integrate**	
3.1	**Task 1: Business Development & Project Management**	
3.1.1	Update Integrated Project Schedule	From the IPS updated during Phase 2, update based on work accomplished during Phase 2 and EPC contractor schedules
3.1.2	Update Risk Management Plan/Tracking	Using the updated Risk Analysis from Phase 2, update management and tracking of technical and programmatic risks based on work completed
3.1.3	Provide execution reporting	Report periodically on work completed as required.

3.1.4	**Development of statewide microgrid pipeline**	The Office of Rural Prosperity will lead an effort to develop a statewide pipeline of microgrid projects across rural Wisconsin. As a first step in this project, ORP will work with Slipstream to identify how the lessons learned from the Bayfield County demonstration projects can inform a statewide pipeline of microgrid projects across rural Wisconsin. Integrate analysis with Green Tier Communities, a Wisconsin DNR Energy Initiative. Mark Abeles-Allison is on the board.
3.1.4.1	Continue evaluation of demonstration projects and construction process	The Slipstream team will lead an evaluation of the Bayfield and Red Cliff demonstration projects. As Slipstream will act as a consulting technical expert during the construction, this evaluation will serve as an independent review of the process, community engagement, and benefits. The process evaluation will include interviews with contractors and government staff, and surveys with key community stakeholders to understand challenges, barriers, and lessons learned from the installation process and how well it addressed community concerns and support workforce development. The quantitative analysis will estimate how well the system will meet the stated benefits, such as reduced greenhouse gas emissions, improved resiliency, reduced energy burden, and improved energy access.
3.1.5	Complete Initial Program Phase 3 Go/No-Go Assessments	Review first N projects ready to move to Phase 4 and current Phase 3 programmatic status so that the first projects may move to Phase 4 before program Phase 3 is complete.
3.1.6	Complete Project Phase 3 Go/No-Go Assessments	Once project Phase 3 activities are complete, evaluate exit criteria to move to project Phase 4. These assessments done project-by-project and may not be simultaneous for all projects.
3.1.7	Complete Final Program Phase 3 Go/No-Go Assessments	Once program Phase 3 activities are complete and all projects have moved to phase 4, evaluate exit criteria to move to program Phase 4.
3.2	**Task 2: Engineering, Procurement & Construction**	
3.2.1	**Procure balance of equipment**	Contractor will specify and procure all remaining microgrid components as needed. Perform this task for all 23 microgrids and the CNG fueling station.
3.2.2	Install CNG Fueling Station	Contractor will construct and install all CNG fueling components and integrate the system.
3.2.3	**Install Solar PV**	Contractor will construct and install all solar PV components and integrate the system. Perform this task for all 23 microgrids.
3.2.4	**Install BESS**	Contractor will construct and install all BESS components and integrate the system. Perform this task for all 23 microgrids.
3.2.5	**Install EVSEs**	Contractor will construct and install all EVSE components and integrate the system.
3.2.5.1	Washburn Garage / Town Hall	
3.2.5.2	Clover Town Garage	
3.2.5.3	Clover Town Hall	

3.2.5.4	Drummond Town Hall	
3.2.5.5	Mason Garage / Village Hall / Lift Station	
3.2.5.6	Grandview Garage / Town Hall	
3.2.5.7	Kelly Garage / Town Hall	
3.2.5.8	Port Wing Town Garage	
3.2.5.9	Cable County Garage	
3.2.5.10	Iron River County Garage	
3.2.5.11	Mason County Garage	
3.2.5.12	Port Wing County Garage	
3.2.5.13	Russel County Garage	
3.2.5.14	Red Cliff Health Clinic	
3.2.5.15	Red Cliff Transportation Center	
3.2.6	**Integrate communications and controls**	Contractor will construct and install all communication and control components and integrate the system. Perform this task for all 23 microgrids and the CNG fueling station.
3.2.7	**Perform Validation and Verification Testing**	Once systems are installed, V&V testing will be performed in accordance with the developed test plan. The test plan will be reviewed and updated just prior to test execution to confirm that testing is still adequate for as-built systems. Perform this task for all 23 microgrids and the CNG fueling station.
3.3	**Task 3: Safety, Permitting, and Security**	
3.3.1	**Finalize interconnection application approval**	Contractors will ensure that any required interconnection applications have been approved, responding to utility questions as needed. Perform this task for all 23 microgrids and the CNG fueling station.
3.3.2	**Submit ongoing permit and approval reporting**	Document submissions and approvals of permits and inspections. Perform this task for all 23 microgrids and the CNG fueling station.
3.3.3	Finalize any permitting and approvals needed for CNG Fueling operations	CNG Contractor will apply for and secure any permitting needed for operations
3.4	**Task 4: Technical, Data, and Analysis**	
3.4.1	**System-level Modeling and Optimization**	
3.4.1.1	Update system-level technoeconomic models	Update analysis with as-built parameters to estimate system economic performance
3.4.1.2	Update system-level resilience performance models	Update analysis with as-built parameters to estimate microgrids' resilience performance, specifically a stochastic evaluation of expected duration of outage support.
3.4.2	**Collect and analyze V&V data**	Collect and archive V&V test data, then analyze it to confirm that the system is installed as expected. Verify that success criteria were achieved. Perform this task for all 23 microgrids and the CNG fueling station.

3.4.3	**Perform Project Completion Testing**	Once system verification testing is complete, execute project completion testing as written and verify success criteria to declare successful system commissioning. Perform this task for all 23 microgrids and the CNG fueling station.
3.5	**Task 5: Community Engagement**	
3.5.1	Onboard + train Red Cliff Band members for operations and maintenance	A key piece of workforce development, Red Cliff Band will seek and select one or more individuals to be trained for O&M work from within the tribal membership or local community
3.5.2	Onboard + train Bayfield County residents for operations and maintenance	A key piece of workforce development, Bayfield County will seek and select one or more individuals to be trained for O&M work from within the local community
3.5.3	Public Forum / Presentation #3	The public forums will present the current project status and future plans to community members
3.5.4	**School / Educational Presentation #3**	The school presentations will focus on technical aspects of the project, tying them to STEM learning objectives to real world STEM application and generate excitement for STEM career paths
3.5.4.1	Bayfield School District	
3.5.4.2	Drummond School District	
3.5.4.3	South Shore School District	
3.5.4.4	Washburn School District	
3.5.4.5	Red Cliff	
3.5.5	Conduct Community Survey #3	Community surveys will be available by electronic and paper methods to increase accessibility and collect anonymous, quantifiable feedback on community perception of this project and energy efforts in general.
3.5.6	Public Relations Campaign	The project will be kept front-of-mind in the public consciousness with social media, email and/or print newsletters, local news articles, webinars, and other forms of communication.
3.5.7	Community Advisory Board Phase 3 Pre-exit Meeting	Bayfield County, Red Cliff, and Cheq Bay have worked with community members, local businesses, and unrelated tribal government departments to gather input and achieve consensus on tribal energy projects for years, and will continue to do so for this project.
3.5.8	Monitor continuous feedback channels	In addition to surveys, we will establish an email address, web form, and physical dropbox for collecting any questions, comments, and general feedback on the project. Answers to questions will be addressed through the public forums and public relations campaigns.
3.5.9	Install educational display / kiosks	Educational / system activity display kiosks will be installed in each community.
4	**Phase 4: Operate**	

4.1	**Task 1: Business Development & Project Management**	
4.1.1	Update Risk Management Plan/Tracking	Using the updated Risk Analysis from Phase 2, update management and tracking of technical and programmatic risks based on work completed
4.1.2	Provide execution reporting	Report periodically on work completed as required.
4.1.3	Update financial analysis and reporting	Validate the business plan and financial projections that were developed in phases 1 & 2 and ensure that tracking mechanisms are in place to document the ongoing financial success of the project for later analysis and reporting.
4.1.4	Provide project sustainability projections	Perform economic analysis to demonstrate how the projects will be self-sustaining after the demonstration period is over.
4.1.5	**Development of statewide microgrid pipeline**	The Office of Rural Prosperity will lead an effort to develop a statewide pipeline of microgrid projects across rural Wisconsin. As a first step in this project, ORP will work with Slipstream to identify how the lessons learned from the Bayfield County demonstration projects can inform a statewide pipeline of microgrid projects across rural Wisconsin. Integrate analysis with Green Tier Communities, a Wisconsin DNR Energy Initiative. Mark Abeles-Allison is on the board.
4.1.5.1	Complete evaluation of demonstration projects and process	The Slipstream team will lead an evaluation of the Bayfield and Red Cliff demonstration projects. The process evaluation will include interviews with contractors and government staff, and surveys with key community stakeholders to understand challenges, barriers, and lessons learned from the installation process and how well it addressed community concerns and support workforce development. The quantitative analysis will estimate how well the system will meet the stated benefits, such as reduced greenhouse gas emissions, improved resiliency, reduced energy burden, and improved energy access. Slipstream will use actual performance data from the systems to analyze these quantitative impacts, and produce a memo sharing the results of the evaluation.
4.1.5.2	Develop statewide microgrid pipeline report and approach	Using the findings of the process evaluation and this data review, Slipstream and ORP will work together on how to develop a pipeline of microgrids across the state and provide support to future installations. The team will create a guide on microgrid installation best practices and considerations for areas to prioritize across the state and in individual counties.
4.1.6	Complete Project Exit Assessments	Once project Phase 4 activities are complete, evaluate exit criteria to close the demonstration and move to "sustained operations." These assessments done project-by-project and may not be simultaneous for all projects.
4.1.7	Complete Program Exit Assessments	Once program Phase 4 activities are complete and all projects have moved to sustained operations, evaluate program exit criteria to move to program closure.

4.1.8	Write program final report	Write project final report, incorporating all data and lessons learned. Share results of projects with Wisconsin Towns, League of Municipalities, Wisconsin Counties Association.
4.2	**Task 2: Engineering, Procurement & Construction**	
4.2.1	Report final Total Project Cost Reporting	Update and report actual project costs for the as-built system.
4.2.2	Finalize Decommissioning Plan	Finalize plans for equipment decommissioning and disposal
4.3	**Task 3: Safety, Permitting, and Security**	
4.3.1	Submit ongoing safety, permitting, and security reporting	Document submissions and approvals of permits, inspections, and safety incidents.
4.4	**Task 4: Technical, Data, and Analysis**	
4.4.1	Validate system performance models	Use operational data to compare to system performance models and gauge accuracy / success of modeled prediction
4.4.2	Finalize Technoeconomic Analysis (TEA) Report - Microgrids	Combine final technoeconomic modeling and financing approaches for microgrids into formal TEA report
4.4.3	Finalize Lifecycle Emissions Analysis (LCA) Report - Microgrids	Work with Bayfield County and Red Cliff environmental experts and selected hardware vendors to produce LCA
4.4.4	Report operational data - Microgrids	Continue to report and archive load, solar production, battery operation, outage support, grid support, and other operational data.
4.4.5	Adjust operational strategy if needed - Microgrids	Using operational data and the comparison of operational data to modeled performance, adjust operational strategies to refine and improve performance as able.
4.4.6	Finalize Technoeconomic Analysis (TEA) Report - CNG Fueling	Combine final technoeconomic modeling and financing approaches for CNG Fueling into formal TEA report
4.4.7	Finalize Lifecycle Emissions Analysis (LCA) Report - CNG Fueling	Work with Bayfield County and state environmental experts and selected hardware vendors to produce LCA
4.4.8	Report operational data - CNG Fueling	Continue to report and archive operational data and system performance data
4.4.9	Document Lessons Learned and analysis/performance results	Document Lessons Learned and analysis/performance results
4.5	**Task 5: Community Engagement**	
4.5.1	Public Forum / Presentation #4	The public forums will present the project results and future plans to community members
4.5.2	**School / Educational Presentation #4**	The school presentations will focus on technical aspects of the projects, tying them to STEM learning objectives to real world STEM application and generate excitement for STEM career paths
4.5.2.1	Bayfield School District	
4.5.2.2	Drummond School District	

4.5.2.3	South Shore School District	
4.5.2.4	Washburn School District	
4.5.2.5	Red Cliff	
4.5.3	Conduct Community Survey #4	Community surveys will be available by electronic and paper methods to increase accessibility and collect anonymous, quantifiable feedback on community perception of this project and energy efforts in general.
4.5.4	Public Relations Campaign	The project will be kept front-of-mind in the public consciousness with social media, email and/or print newsletters, local news articles, webinars, and other forms of communication.
4.5.5	Community Advisory Board Phase 4 Meeting	Bayfield County, Red Cliff, and Cheq Bay have worked with community members, local businesses, and unrelated tribal government departments to gather input and achieve consensus on energy projects for years, and will continue to do so for this project.
4.5.6	**Conduct site tours**	Now that construction is happening, we can show the community physical results. The site tours will show the built hardware and explain what it will do for the community. Perform this task for all 23 microgrids and the CNG fueling station.
4.5.7	Perform ongoing impact analysis	Perform environmental and community impact analysis for the sustained operations project phase to estimate total project community benefits / impacts.
4.5.8	Report on impact of community engagement efforts	Report on impact of community engagement efforts, both during the project and anticipated future impacts during sustained operations

8 Appendix B: Rural Communities Benefitting from Program – Full List

Area	Population	Zip+4
Red Cliff Band of Lake Superior Chippewa Indians	1,403	54814-4579
City of Bayfield	584	54814-5006
Town of Bayfield	787	54814-4455
Town of Barksdale	745	54806-5608
Town of Barnes	823	54873-4866
Town of Bayview	512	54891-6862
Town of Bell	355	54827-4788
Town of Cable	177	54821-5009
Town of Clover	261	54844-4503
Town of Delta	315	54847-9533
Town of Drummond	544	54839-4485
Town of Eileen	722	54856-3692
Town of Grand View	508	54839-4517
Town of Hughes	471	54847-4815
City of Iron River	768	54847-3412
Town of Kelly	436	54856-2023
Town of Keystone	373	54816-0000
Town of Lincoln	251	54856-2096
Town of Mason	289	54856-9366
Village of Mason	101	54856-4501
Town of Namekagon	316	54921-4816
Town of Orienta	164	54865-3704
Town of Oulu	560	54820-9072
Town of Pilsen	216	54806-7629
Town of Port Wing	156	54865-1103
Town of Russell	1,553	54814-4886
Town of Tripp	244	54847-7516
Town of Washburn	554	54891-4932
City of Washburn	2,051	54891-2211

The population density of this Bayfield County is 11 people per square mile.[6]

[6] U.S. Census Bureau QuickFacts: Bayfield County, Wisconsin

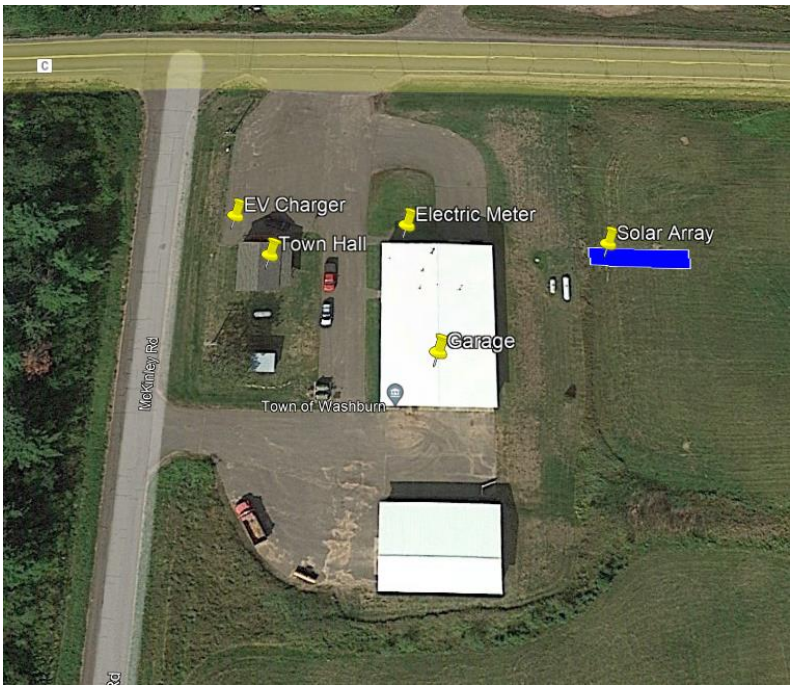
9 Appendix C: Preliminary Microgrid Project Site Layouts and Engineering

9.1 Drummond Sanitary District

9.1.1 Well #1

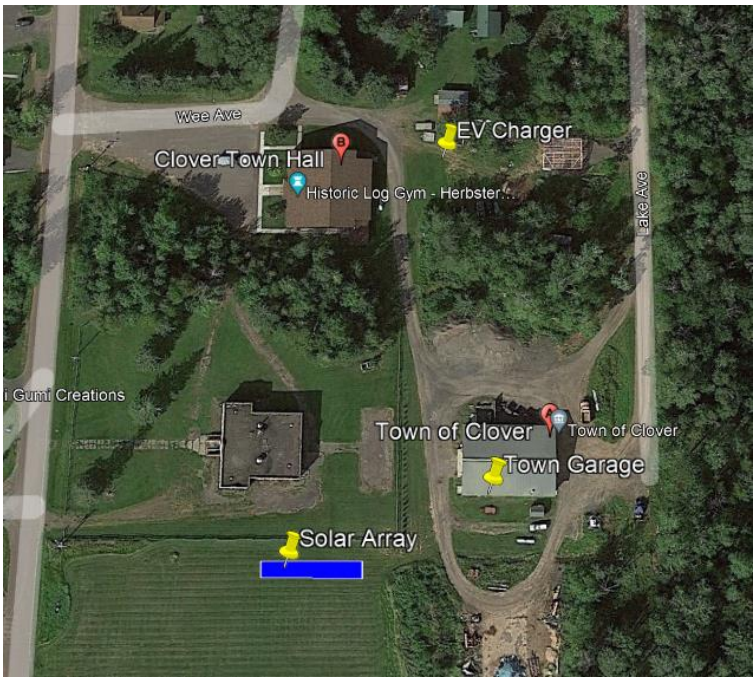
9.2 Town of Washburn

9.2.1 Garage / Town Hall



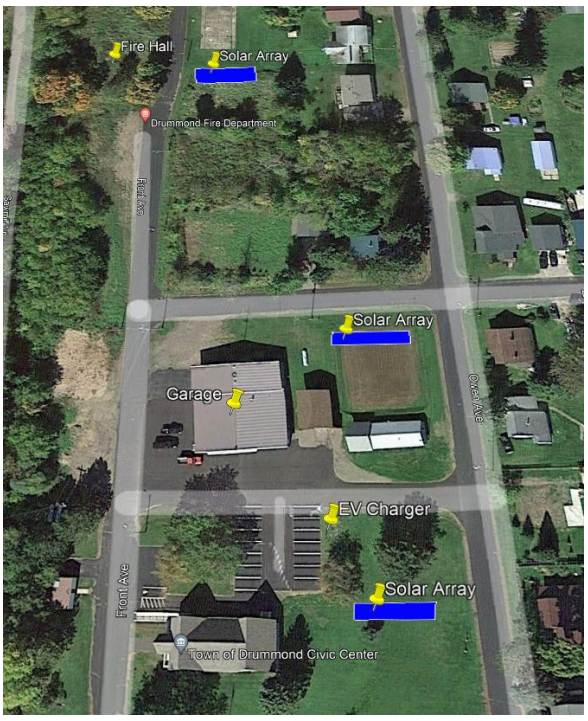
9.3 Town of Clover

9.3.1 Town Hall / Gym



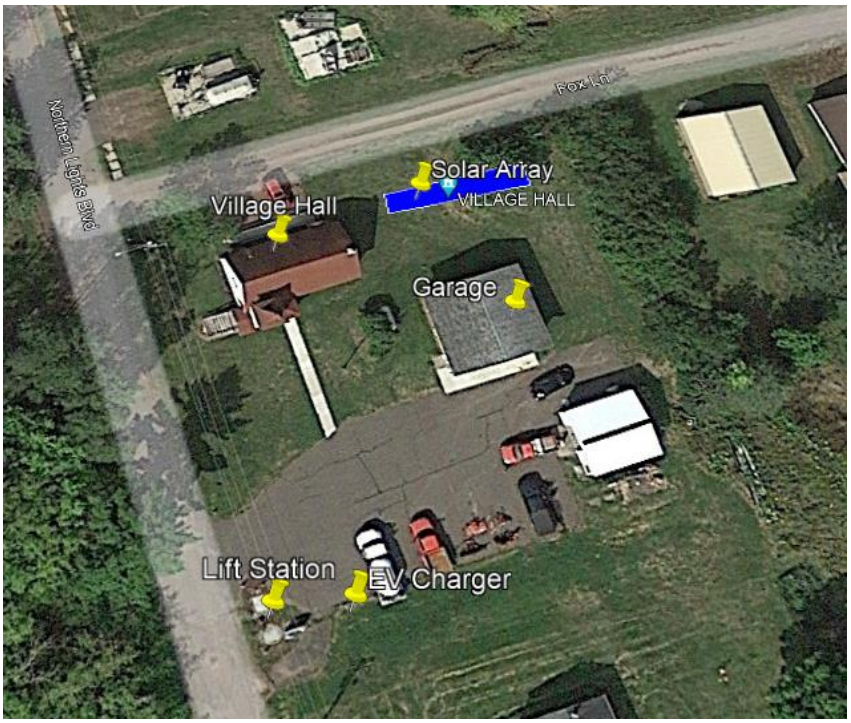
9.4 Town of Drummond

9.4.1 Garage - Town Hall - Fire Hall

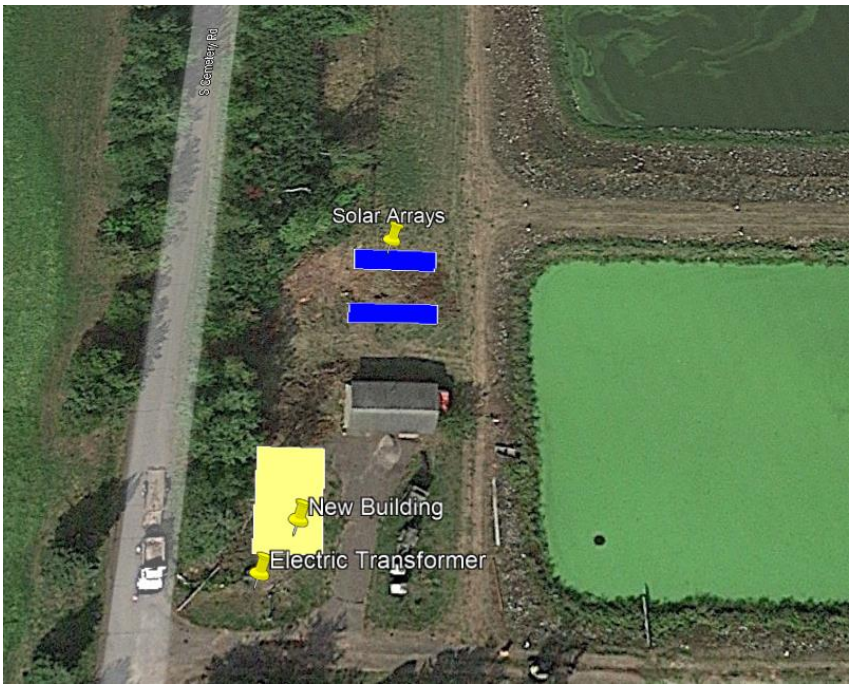


9.5 Village of Mason

9.5.1 Garage / Village Hall / Lift Station



9.5.2 WWTP



9.6 Town of Grandview

9.6.1 Town Hall/Garage

9.7 Town of Kelly

9.7.1 Town Hall / Garage

9.8 Town of Port Wing

9.8.1 Town Hall (Community Building)

9.8.2 Firehall

9.8.3 Town Garage


Town Garage
Electric Meter
Solar Array
Port Wing Information
Grand Ave

9.8.4 WWTP


Electric Meter
WWTP
Solar Array

9.8.5 Well #1

10 Appendix E: Preliminary CNG Project Scoping

- **Garage Facility**
- **Pump Station**
- **Trucks**

GARAGE FACILITY HVAC RENOVATON FOR CNG COMPLIANCE

(Provided by Marathon Technical Services)

Assumptions/Qualifications

1. Prices are in 2023 dollars—ie cost estimates do not include any escalation for later dates.
2. Prices do not include taxes, if applicable.
3. Prices do not include Design or Project Management fees.
4. Prices assume the two garages of 8000 ft2 and 6400 ft2 are each upgraded to the same design as outlined below.
5. Estimate does not include any costs to do non-CNG related upgrades.
6. CNG station and defueling equipment is not included in this estimate.

Code Compliance (current versions)

7. National Electrical Code (NEC-NFPA 70).
8. NFPA 30A (Maintenance Garages).
9. NFPA 88A (Parking Garages).
10. International Mechanical Code (IMC).
11. International Fire Code (IFC).

Scope of Upgrades

HVAC:

12. Demo existing radiant tube heaters.
13. Supply and install a gas fired makeup air unit for each garage outside of garage at grade. MAUs to provide 1cfm/ft2 of heated air. Unit to run 24/7/365.
14. Duct the warm air to approximately 18” above floor level around two long sides of rooms and into adjacent rooms including tire shop, lube storage and welding shops. (balance the system to pressurize adjacent rooms).
15. Install exhaust duct down centerline of rooms at peak with exhaust points along the underside of the peak and discharging out the end of the garages to provide 1cfm/ft2 of exhaust.
16. Install two additional direct venting emergency exhaust fans in each room to provide 5 air changes per hour (ACH) at building peak with gravity dampers.
17. Supply and install makeup air dampers on outside walls with interlock to emergency exhaust.

Electrical:

18. Relocate/upgrade electrical equipment in ceiling exclusion zone.

19. Demo existing lighting.
20. Supply and install new LED lighting.
21. Supply and install de-powering contactors for sparking equipment (receptacles, crane, etc.).
22. Generator—no upgrade is included in this cost estimate; however, the existing generator should be checked to confirm that it (plus the solar array batteries??) can handle the load of the new HVAC equipment.

Gas Detection:

23. Main control panel.
24. Detectors in each garage and adjacent rooms.
25. Tie-in to overhead doors, dampers, depowering contactors, heating equipment.
26. Manual activation buttons.
27. Horns/strobes and signage.

Upgrade Estimate

HVAC:

28. 14,400 ft2 at $33/ft2 = $475,200.
29. Upgrade from open loop heating system to closed loop heat recovery system $150,000.

Electrical:

30. 14,400 ft2 at $8/ft2 = $115,200.

Gas Detection:

31. Main control panel and system tie-ins. $50,000.
32. Detectors 17 at $6000 installed = $102,000.

Grand total cost estimate for 14,400 square foot upgrade (not including heat recovery upgrade but including 10% contingency): $816,640. + Design Fees, 15% = 939,136

FUELING STATION INSTALATION:

(Cost estimates from American Fueling)

American Fueling

Bayfield County

Gas dryer – inlet gas-low pressure --

1-PLD36-2.8-S	$24,500.
1-GF200-3 outlet drainage	$2,800.
4- ceramic beads 84# each	$1,450.
21- peak dessicant beads 50#each	$2,775.

Bauer Compressor options

M Series C23.2 duplex – dual compressor (inlet 10-15 psig, 150 CFM flow rate, output 64 DGE / hr) $590,000.

Dual crankcase heaters $1,900. Each (X2)
Enclosure space heater - $15,900.
C52.2 X fill - (inlet 10-15 psig, 351 CFM flow rate, output 150 DGE / hr) $800,000.
Crankcase heater - $1900.
Enclosure space heater - $16,000.

Dispenser

2 hose dispenser – can be 2 hoses for light duty vehicle or 2 hoses for heavy vehicles.
Heavy duty - $76,000.
(All equipment is 3-4 month delivery.)

Storage

Two spheres, 80gge each @$60,000 = x 2 = $120,000

Totals

Materials $1,040,000 materials
Installed x 125% = **$1,276,000**

CNG SNOW PLOW COST ESTIMATES:

Truck, Body, CNG Engine and Fuel Tank Package, $375,000 each x 2 = $750,000

- Freightliner 114SD
- Monroe Body and CNG Fuel System
- Cummins L9N Engine

Suppliers:
Larry J. Hilgart | Heavy Truck & Equipment Sales | IState Truck Center
V&H Work Ready Trucks
1505 S Central Ave | Marshfield, WI 54449

MONROE TRUCK EQUIPMENT

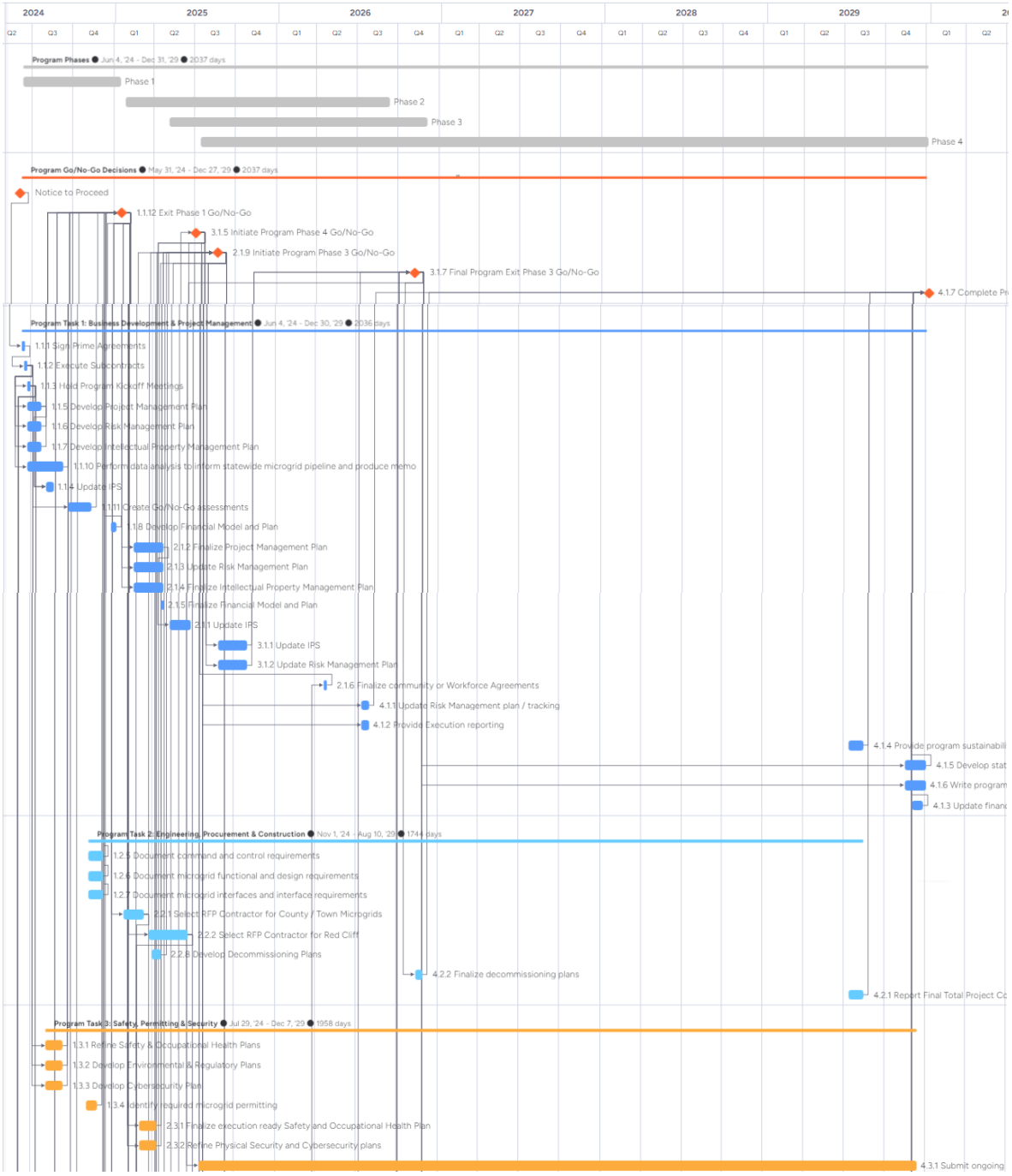
1601 E 29th Street
Marshfield, WI 54449
Sales Rep: Tom Schartner
Ph: (715) 558-1165
www.MonroeTruck.com

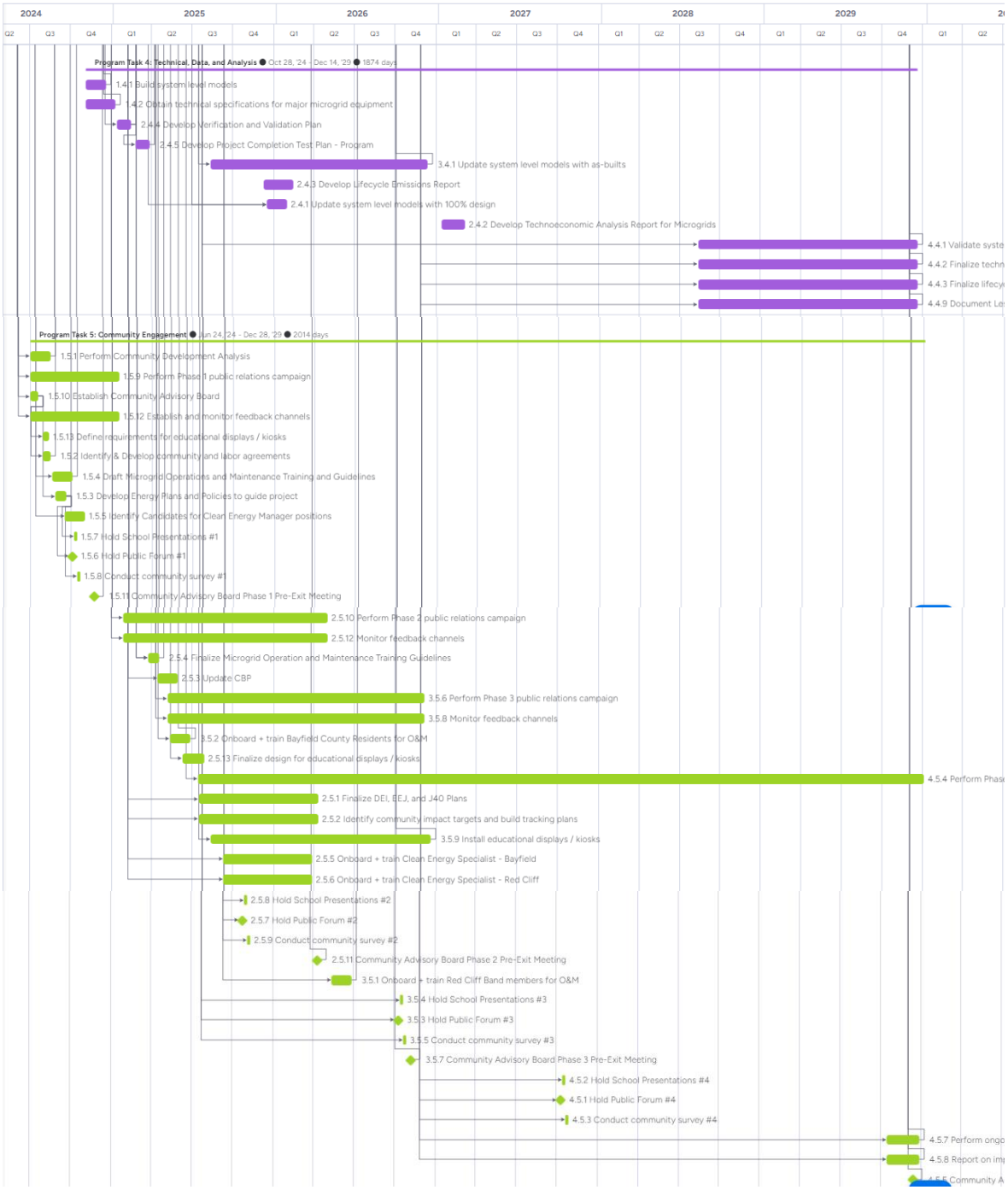
J.O. #
Quotation ID: 1JAK005484
Date: 6/28/2023
Valid thru: 7/28/2023
Terms: NET 30
Quoted by: Julie Katzner
Ph/Fax: 715-502-9076 / 715-387-3952

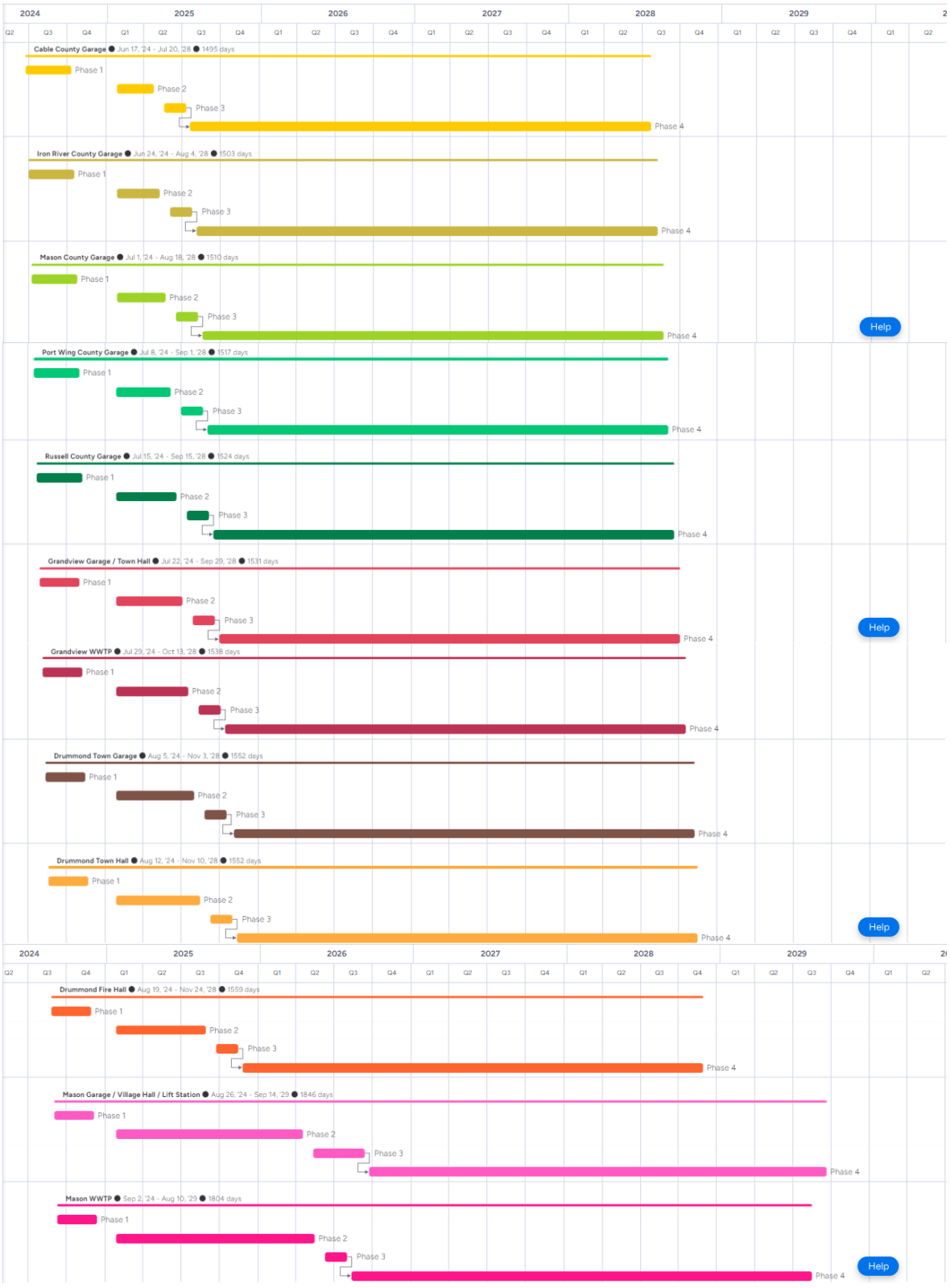
Quoted to:
BAYFIELD COUNTY HIGHWAY (ATTN: 715-373-6116 (SHOP))
311 FIRST AVE EAST
WASHBURN, WI 54891
Ph: 715-373-6115 / Fax: 715-373-6140
Email:

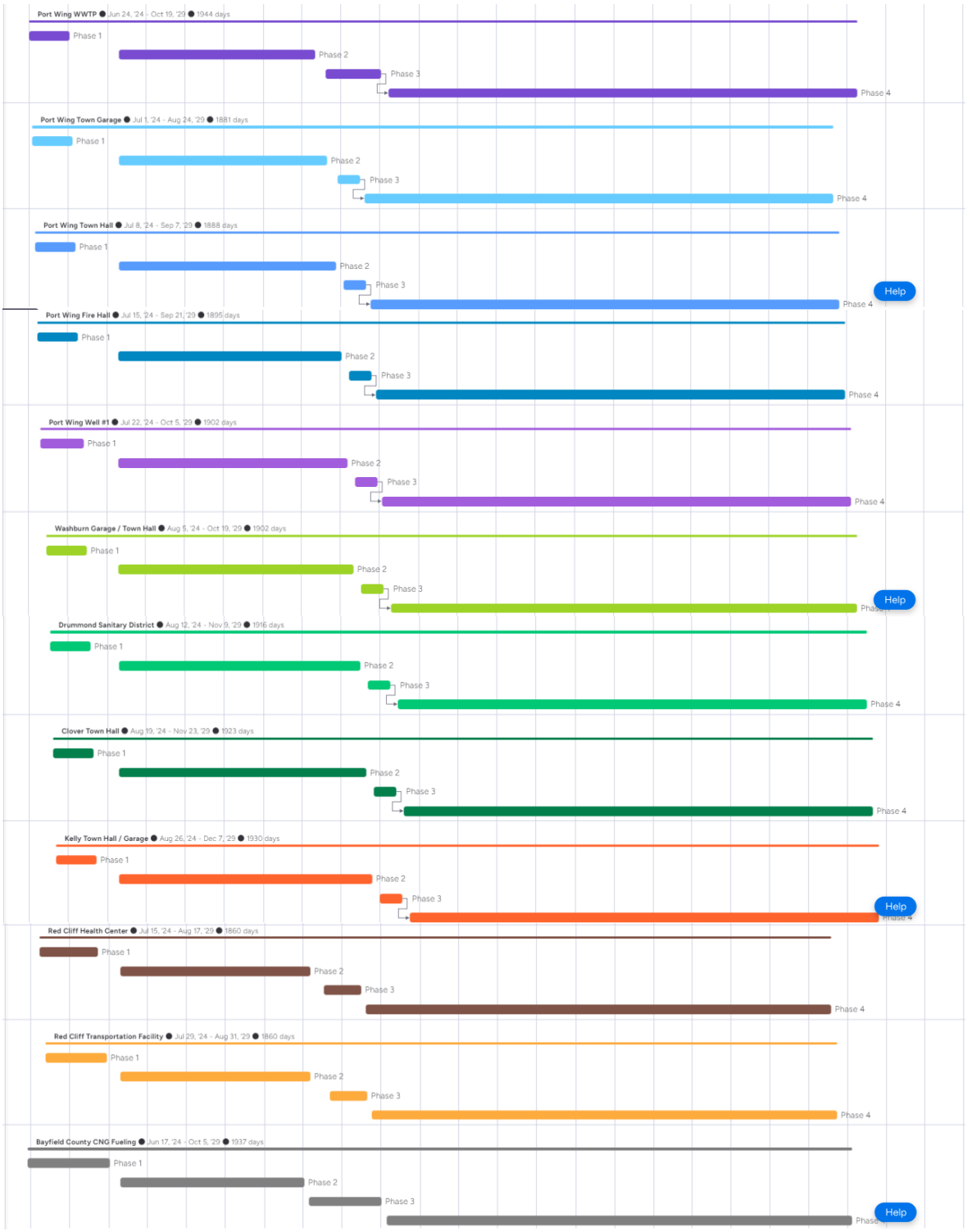
Total Estimate: $2,960,000

11 Appendix F: Full IPS




2024
2025
2026
2027
2028
2029
Program Task 4: Technical, Data, and Analysis ● Oct 28, '24 - Dec 14, '29 ● 1874 days
1.4.1 Build system level models
1.4.2 Obtain technical specifications for major microgrid equipment
2.4.4 Develop Verification and Validation Plan
2.4.5 Develop Project Completion Test Plan - Program
3.4.1 Update system level models with as-builts
2.4.3 Develop Lifecycle Emissions Report
2.4.1 Update system level models with 100% design
2.4.2 Develop Technoeconomic Analysis Report for Microgrids
4.4.1 Validate syste
4.4.2 Finalize techn
4.4.3 Finalize lifecy
4.4.9 Document Le
Program Task 5: Community Engagement ● Jun 24, '24 - Dec 28, '29 ● 2014 days
1.5.1 Perform Community Development Analysis
1.5.9 Perform Phase 1 public relations campaign
1.5.10 Establish Community Advisory Board
1.5.12 Establish and monitor feedback channels
1.5.13 Define requirements for educational displays / kiosks
1.5.2 Identify & Develop community and labor agreements
1.5.4 Draft Microgrid Operations and Maintenance Training and Guidelines
1.5.3 Develop Energy Plans and Policies to guide project
1.5.5 Identify Candidates for Clean Energy Manager positions
1.5.7 Hold School Presentations #1
1.5.6 Hold Public Forum #1
1.5.8 Conduct community survey #1
1.5.11 Community Advisory Board Phase 1 Pre-Exit Meeting
2.5.10 Perform Phase 2 public relations campaign
2.5.12 Monitor feedback channels
2.5.4 Finalize Microgrid Operation and Maintenance Training Guidelines
2.5.3 Update CBP
3.5.6 Perform Phase 3 public relations campaign
3.5.8 Monitor feedback channels
3.5.2 Onboard + train Bayfield County Residents for O&M
2.5.13 Finalize design for educational displays / kiosks
4.5.4 Perform Phas
2.5.1 Finalize DEI, EEJ, and J40 Plans
2.5.2 Identify community impact targets and build tracking plans
3.5.9 Install educational displays / kiosks
2.5.5 Onboard + train Clean Energy Specialist - Bayfield
2.5.6 Onboard + train Clean Energy Specialist - Red Cliff
2.5.8 Hold School Presentations #2
2.5.7 Hold Public Forum #2
2.5.9 Conduct community survey #2
2.5.11 Community Advisory Board Phase 2 Pre-Exit Meeting
3.5.1 Onboard + train Red Cliff Band members for O&M
3.5.4 Hold School Presentations #3
3.5.3 Hold Public Forum #3
3.5.5 Conduct community survey #3
3.5.7 Community Advisory Board Phase 3 Pre-Exit Meeting
4.5.2 Hold School Presentations #4
4.5.1 Hold Public Forum #4
4.5.3 Conduct community survey #4
4.5.7 Perform ongo
4.5.8 Report on im
Community A


2024
2025
2026
2027
2028
2029
Cable County Garage ● Jun 17, '24 - Jul 20, '28 ● 1495 days
Phase 1
Phase 2
Phase 3
Phase 4
Iron River County Garage ● Jun 24, '24 - Aug 4, '28 ● 1503 days
Phase 1
Phase 2
Phase 3
Phase 4
Mason County Garage ● Jul 1, '24 - Aug 18, '28 ● 1510 days
Phase 1
Phase 2
Phase 3
Phase 4
Help
Port Wing County Garage ● Jul 8, '24 - Sep 1, '28 ● 1517 days
Phase 1
Phase 2
Phase 3
Phase 4
Russell County Garage ● Jul 15, '24 - Sep 15, '28 ● 1524 days
Phase 1
Phase 2
Phase 3
Phase 4
Grandview Garage / Town Hall ● Jul 22, '24 - Sep 29, '28 ● 1531 days
Phase 1
Phase 2
Phase 3
Phase 4
Help
Grandview WWTP ● Jul 29, '24 - Oct 13, '28 ● 1538 days
Phase 1
Phase 2
Phase 3
Phase 4
Drummond Town Garage ● Aug 5, '24 - Nov 3, '28 ● 1552 days
Phase 1
Phase 2
Phase 3
Phase 4
Drummond Town Hall ● Aug 12, '24 - Nov 10, '28 ● 1552 days
Phase 1
Phase 2
Phase 3
Phase 4
Help
2024
2025
2026
2027
2028
2029
Drummond Fire Hall ● Aug 19, '24 - Nov 24, '28 ● 1559 days
Phase 1
Phase 2
Phase 3
Phase 4
Mason Garage / Village Hall / Lift Station ● Aug 26, '24 - Sep 14, '29 ● 1846 days
Phase 1
Phase 2
Phase 3
Phase 4
Mason WWTP ● Sep 2, '24 - Aug 10, '29 ● 1804 days
Phase 1
Phase 2
Phase 3
Phase 4
Help


Port Wing WWTP ● Jun 24, '24 - Oct 19, '29 ● 1944 days
Phase 1
Phase 2
Phase 3
Phase 4
Port Wing Town Garage ● Jul 1, '24 - Aug 24, '29 ● 1881 days
Phase 1
Phase 2
Phase 3
Phase 4
Port Wing Town Hall ● Jul 8, '24 - Sep 7, '29 ● 1888 days
Phase 1
Phase 2
Phase 3
Phase 4
Help
Port Wing Fire Hall ● Jul 15, '24 - Sep 21, '29 ● 1895 days
Phase 1
Phase 2
Phase 3
Phase 4
Port Wing Well #1 ● Jul 22, '24 - Oct 5, '29 ● 1902 days
Phase 1
Phase 2
Phase 3
Phase 4
Washburn Garage / Town Hall ● Aug 5, '24 - Oct 19, '29 ● 1902 days
Phase 1
Phase 2
Phase 3
Help
Drummond Sanitary District ● Aug 12, '24 - Nov 9, '29 ● 1916 days
Phase 1
Phase 2
Phase 3
Phase 4
Clover Town Hall ● Aug 19, '24 - Nov 23, '29 ● 1923 days
Phase 1
Phase 2
Phase 3
Phase 4
Kelly Town Hall / Garage ● Aug 26, '24 - Dec 7, '29 ● 1930 days
Phase 1
Phase 2
Phase 3
Help
Red Cliff Health Center ● Jul 15, '24 - Aug 17, '29 ● 1860 days
Phase 1
Phase 2
Phase 3
Phase 4
Red Cliff Transportation Facility ● Jul 29, '24 - Aug 31, '29 ● 1860 days
Phase 1
Phase 2
Phase 3
Phase 4
Bayfield County CNG Fueling ● Jun 17, '24 - Oct 5, '29 ● 1937 days
Phase 1
Phase 2
Phase 3
Help