

**The  
MATINICUS  
RENEWABLE POWER  
PROJECT**

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An application to the  
**USDA Rural Utilities Service High Energy Cost Grant Program**  
Submitted by  
**The Matinicus Plantation Electric Company**  
**Matinicus Island, Maine**

April 26, 2020

## PART B: PROJECT SUMMARY AND GRANT ELIGIBILITY STATEMENT

### 1. Project Summary and Eligibility

The Matinicus Renewable Power Project (MRPP) will lower and stabilize electricity costs and improve the reliability of electric service on Matinicus Island by integrating renewable energy and battery energy storage, and replacing aging critical generation as well as medium voltage transmission and distribution equipment. True to the nature of this grant opportunity, funding would allow for financing the acquisition, construction and improvement of existing and future facilities, including those for electric generation, transmission and distribution, including a) equipment, materials and activities, and b) land or right-of-way acquisition, permitting, rezoning, professional expenses, design, and engineering and permitting costs.

At 20 miles off the coast, this small lobster fishing village is Maine's most remote island community and **pays one of the highest (if not the highest) electric rates in all of the United States at an average of \$0.67 per kilowatt-hour for power from its on-island diesel generator station.** This rate is almost double the per unit extremely high energy cost benchmark for electricity (\$0.36) set by USDA. In addition to the strain of high costs, electricity generation and service are plagued with safety, reliability and efficiency challenges, primarily due to the power station's aging switchgear, generators, and total reliance on fossil fuels for generation.

Led by the municipally owned Matinicus Plantation Electric Company (MPEC), MRPP will purchase and install a 300kW solar photovoltaic (PV) array, a 1000kWh battery energy storage system and a new efficient Tier 4 diesel generator with new switchgear and automation. These components will greatly reduce diesel consumption and air pollution from our ancient diesel engines. The project will also improve system efficiency; replace critical distribution infrastructure required to provide reliable service; improve system resiliency; and provide flexible infrastructure to support further renewable generation. Milestones include completing the RFP process to select successful bidder(s); securing funding; design, delivery, and construction; commissioning and training; and ongoing monitoring (see Section D).

This project is linked with other remote grid projects through the Island Institute's network of the Islanded Grid Resource Center (IGRC), ensuring that what is learned here can be emulated in other islands and small, remote communities in Alaska, Hawaii, and beyond.<sup>1</sup>

We respectfully request \$2,036,430 for the full budget of the project. As the two MPEC staff members and members of the Matinicus Plantation Board of Assessors have and will continue to devote many volunteer hours to this project, there is no recorded match. This assistance will forever change the future of Matinicus by increasing economic opportunity and the quality of life for our beautiful island community.

### 2. Applicant Eligibility

Matinicus Plantation Electric Company is a municipal non-profit electric utility organized in 1977 to provide centralized power to Matinicus Island, and is subject to regulation according to federal and state law. Matinicus was incorporated in 1840 as a Plantation, a civil division exclusive to Maine that falls between a town and an unorganized territory and to which the State has granted limited governing powers. After decades of relying first on individually owned diesel and gasoline generators and then a centralized, privately-run, but problematic, generation and distribution system, the Plantation applied to have a new system declared a public utility. The utility is eligible for this grant as a legally organized cooperative, nonprofit, membership organization.

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<sup>1</sup> See <https://dieselislandpost.wordpress.com/2015/11/13/maines-diesel-islands-find-a-role-model-3500-miles-away/>

Due to MPEC's small number of ratepayers (approx. 80) and distance from the mainland, laying a submarine transmission cable is cost prohibitive. The current system consists of a centralized power station housing three Newage generators driven by GM diesels (two 65kW and one 100kW) and switchgear, as well as an on-island grid. MPEC has demonstrated capacity to receive and administer federal funds, having managed three previous grants of \$150,000 (HUD 1977), \$100,000 (HUD 1978) and \$400,000 (CDBG, 1983). One of the principals involved with this project, Clayton Philbrook, worked on these previous projects.

MPEC is free of any debarment or other restriction on its ability to contract with the Federal government as identified in Part C, Section 1(a) of the FOA and has an active and unexpired registration with [www.sam.gov/SAM](http://www.sam.gov/SAM).

### **3. Community Eligibility – Matinicus Isle Plantation, Maine**

The proposed project would be located on the island of Matinicus, within the local municipal jurisdiction of Matinicus Isle Plantation, and would be undertaken by the applicant, MPEC. According to the 2010 U.S. Census (County Subdivision #2301344165), the island is home to 74 year-round residents and has a seasonal population of roughly 120. **The current year-round population as of March 2020 has dropped to 18—a loss of population of 76%.** Electric rates on Matinicus are five times the national average, and heating fuels and propane sell for a high premium. Matinicus is one of 15 remaining year-round island communities on the Maine coast. One of the main reasons for the outmigration is the cost of electricity. To spend the winter on Matinicus costs at least double compared with living on the mainland.

#### **Matinicus is an economically distressed community**

According to the U.S. Census (2010), the median household income on Matinicus is \$52,857, 3% above the national median at the time and 14% above the Maine MHI figure. **The census figures fail to take account of the fact that the cost of living on the island is estimated to be between 25% and 50% higher than on the mainland.** According to the *Island Indicators 2010-2011* report, “The higher costs of food, fuel and other necessities are a factor to consider when looking at median income levels on the islands as compared to the state as a whole.”<sup>2</sup>

Freight costs to the island are substantial: groceries are ordered from a mainland store and delivered by air taxi for a \$10.00 per banana box charge plus a \$5 packing fee. Non-grocery items are billed at 50 cents a pound, which could double the price of goods such as lumber. Anything that will not fit on the plane must come by the water taxi during the late spring and summer, if there is room, or wait for the infrequent Maine State Ferry service. For doctor's appointments, for example, the cost of a round-trip flight is \$130-\$240 per person.

**While the island appears to have an annual income that is slightly higher than the median for the State of Maine, the standard of living for the year-round community is significantly below this. These figures are further skewed by inclusion of a small number of wealthier seasonal residents.**

If the electric rates were lower, we might have a business locate here. For the last five years there has not been a grocery store, restaurant or any other similar business on Matinicus, as one of the main drawbacks is the cost of running the refrigerators and freezers.

Lobster fishing is the most common source of income on the island. This fishery is susceptible to booms and busts, dependent upon the price of fuel and bait, and the global seafood market. This year in particular will cause significant economic hardship on residents, as demand for seafood has plummeted during the pandemic. When fuel prices rise, Matinicus fishing

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<sup>2</sup> Terry, Mary. “Island Indicators 2010-2011.” Island Institute. 2012.

families are hit twice; their cost of doing business goes up as they have to pay more to fuel their boats, and their electricity and heating costs rise as well. Seasonal tourism makes a small contribution to the island's economy, but is constrained by the lack of rental housing, restaurants and stores, and transportation challenges.

### **Matinicus is a high energy cost (HEC) community**

Matinicus qualifies as an HEC community under two of the annual average per unit residential energy cost benchmarks: electricity and propane. Matinicus also appears to qualify under the Total Household Energy Use average annual fuel costs benchmark, but definitive data is lacking.

**Electricity - At \$0.67/kWh, residents of Matinicus are currently paying one of the highest, if not the highest electric rates in all of the United States and almost double the per-unit high energy cost benchmark for electricity.** MPEC is the island's sole provider of electricity. The per-unit electricity cost data is documented in reports to the Maine Public Utilities Commission, and in supplemental materials. Added transport and delivery costs apply for all goods and supplies on Matinicus, including diesel fuel used to generate electricity; electric rates are based on \$0.30/kWh plus a fuel charge added to bills to cover the cost of the diesel fuel, less a dollar per gallon, necessary for generation.

**Propane** - Propane costs \$6.14/gallon on Matinicus, above the Rural Utilities Service (RUS) benchmark of \$5.76/gallon, as reported by Paul Murray, Matinicus' sole distributor of propane.

**Total Household Energy Costs** - For heating, Matinicus residents employ a mix of fuels, including propane, kerosene, coal, wood, and wood pellets. Electric heat is rarely used due to its high cost. There is no natural gas infrastructure on the island. Propane is often used for cooking, hot water heaters, and clothes dryers, instead of electricity. To the extent we can calculate, it appears **Matinicus also qualifies for the Total Household Energy Costs benchmark of \$5,104/year**, but it is difficult to document due to the diverse combinations and sources of heating fuels employed.

One resident reports using 7 tons of wood pellets per year, costing \$230/ton with ferry and delivery costs, for a total heating cost of \$2,030, plus electricity costs of \$3,900 for a total energy budget of \$5,930. Another resident reports fuel oil use of 900 gallons with a cost of \$3,321, plus electricity costs of \$4,200 for a total energy budget of \$7,521. A third resident, who uses a mix of fuels, reports coal use at \$475/year, K-1 use of \$500/year, and electricity use of \$3,600/year plus several cords of locally cut spruce at a cost per cord exceeding \$150, for a total energy budget exceeding \$5,000/year.

**If the electric rates could be reduced because of this grant, the use of electricity for heating by air source heat pumps would save energy and reduce the use of fossil fuels. The present electric rates make any form of electric heating cost prohibitive.**

### **4. Priority Considerations**

This project meets priority considerations for rurality (74 year-round residents in 2010 U.S. census). The generator upgrade to a Tier 4 model will also significantly improve generation efficiency, ideally by more than 25%. While Matinicus does not meet the criteria for a high poverty area, high costs of living drastically reduce the effective purchasing power (see above).

### **5. Contact Information**

For more information, please contact George Tarkleson; Administrative Assistant, Treasurer, Tax Collector; 17 South Road, Matinicus, Maine 04851; 207-366-3970; [matinicustownoffice@gmail.com](mailto:matinicustownoffice@gmail.com).

## **PART C: PROJECT NARRATIVE PROPOSAL**

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## EXECUTIVE SUMMARY

Matinicus Plantation Electric Company (MPEC), a municipal electric utility which serves Matinicus Island, Maine, respectfully requests \$2,036,430 for the design, procurement, installation and operation of clean, reliable, and affordable generation technology, and the improvement of distribution equipment on the island. The primary objectives of this project are to: 1) lower fuel and operations and maintenance costs and reduce the environmental impacts of electricity generation on the island by installing and integrating a hybrid energy system including centralized renewable energy; and 2) increase the reliability and safety of the electricity generation and distribution system. Funds would provide for the purchase and installation of a 300kW PV array, 1000kWh of battery storage, and a new efficient Tier 4 diesel generator with state-of-the art switchgear. The USDA Rural Utilities Service's High Energy Cost Grant program represents a unique opportunity for the Matinicus Renewable Power Project, as very limited funding is available for community-based renewable energy projects.

Residents of Matinicus are currently paying one of the highest electricity rates (if not the highest) in the country: \$0.67/kWh, which is almost double the per-unit high energy cost benchmark. Matinicus' 20-mile distance from the coast makes the cost of a submarine cable prohibitive, which has left the island dependent on diesel generators for its power. The extraordinarily high electric rate is particularly burdensome due to residents' reliance upon variable, seasonal incomes, and the high cost of living on Matinicus. The remoteness of the island raises the cost of every service and supply item by 25% to 100% over mainland costs.

The safety and reliability of the current system is compromised by an obsolete analog switchgear, which has caused several outages, and occasionally needs to be bypassed due to maintenance issues. It has become increasingly difficult to repair this equipment, as many replacement parts are now outmoded.

The integration of renewable energy and battery storage will significantly reduce MPEC's reliance on diesel fuel. The PV component of the MRPP will be able to cover most of the island's load during the day, while battery storage and charging will increase efficiency of the generators. Most of the fuel savings from reduced generator use and improved generator efficiency will be passed directly on to MPEC's customers, which are estimated to exceed \$50,000 per year. Additional savings will be realized from decreased operations and maintenance costs.

The new equipment will improve the safety and reliability of electric service by not using our obsolete, ancient two cycle engines and antiquated switchgear. The new switchgear, solar arrays and engine will have off-site monitoring and maintenance support, and allow for optimal efficiency and proactive maintenance.

This project meets the USDA priority considerations for rurality (74 year-round residents in 2010 U.S. census, and has since dropped to 18 people year-round), as well as efficiency improvements. While Matinicus does not meet the criteria for a high poverty area, high costs of living drastically reduce the effective purchasing power. The viability of Matinicus as a place to live and work is directly tied to the price of diesel. The island's main source of income comes from lobster fishing, and diesel prices directly affect the cost of doing business for lobstermen. When the price of diesel rises, Matinicus fishing families have to cope with reduced incomes in addition to a higher cost of living. This situation has contributed to an outmigration in recent years; since December of 2018 there have not been any students enrolled in the Matinicus Island School. By reducing MPEC's fuel consumption, the MRPP will decouple the survival of the community from the volatile price of diesel.

For more information, please contact George Tarkleson; Administrative Assistant, Treasurer, and Tax Collector; 17 South Road, Matinicus, Maine 04851; 207-366-3970; [matinicustownoffice@gmail.com](mailto:matinicustownoffice@gmail.com).

## PROJECT DESCRIPTION

### A. Community Eligibility and Assessment of Community Needs

#### 1. Background

The proposed Matinicus Renewable Power Project (MRPP) would be located on the island of Matinicus, 20 miles off the coast of Maine, within the local municipal jurisdiction of Matinicus Isle Plantation. According to the 2010 U.S. Census, the island (County Subdivision #2301344165) is home to 74 year-round residents and has a seasonal population of roughly 120. The year-round number of residents has since dropped to 18. At an average of **\$0.67 per kilowatt-hour**, electric rates on Matinicus are five times the national average, and heating fuels and propane sell for a high premium. Matinicus is one of 15 remaining year-round island communities on the Maine coast.

If fully funded, ratepayers would benefit from the project by paying significantly lower electricity rates, as operation and maintenance costs for solar are minimal. This could also benefit total household energy costs, as lower electricity prices could allow for the cost-effective adoption efficient heat pumps rather than relying on propane and other expensive heating fuels.

The viability of Matinicus as a place to live and work is directly tied to the price of diesel. The island's main source of income comes from lobster fishing, and diesel prices directly affect the cost of doing business for lobstermen. This situation has contributed to an outmigration in recent years; since December of 2018 there have not been any students enrolled in the Matinicus Island School. By reducing the utility's fuel consumption, the MRPP will decouple the survival of the community from the volatile price of diesel.

The overall high cost of living on Matinicus is due primarily to extremely high energy and transport costs. The volatile pricing of fossil fuels, resulting in increases in diesel fuel costs and the costs of transporting it to the island, deeply impact all residents in terms of **electricity costs, which are over five times the national average**. A variety of heating fuels are used on the island, all more expensive than on the mainland. The most commonly used fuels for heating are #2 heating oil and K-1 which cost \$3.00 and \$3.50/gallon, respectively. Propane is used for cooking, clothes drying, and heating hot water and costs \$6.14 per gallon, which is above the high energy cost benchmark for propane. Fuel for the power company has averaged \$3.18/gallon as we have switched to Ultra Low Sulfur Diesel (ULSD). When average annual fuel costs are added to average annual electricity bills on Matinicus, **the annual household energy costs for many residents appear to be well above the HEC benchmark of \$5,104 year**.

The current generation and distribution systems on Matinicus are aging and obsolete. MPEC experiences continued problems with the analog switchgear used to synchronize engines and manage load. This extremely critical piece of equipment was intentionally built and purchased in 1983 and has essentially exceeded its original design life. Many parts have been replaced over the past 35 years. What was state-of-the-art in 1983 is becoming increasingly hard to source new and difficult to repair as technology moves on. In some cases, the switchgear must be bypassed, leaving MPEC with no ability to synchronize multiple generators, necessitating the use of a larger generator at a low output,



Figure 1 Current switch gear (37 years old)

which is very inefficient, and wears heavily on the machine. While in bypass mode, safety devices which monitor outgoing voltages, frequency and currents are also bypassed, increasing the risk of damaging the grid and customer loads. In many cases, switchgear issues have resulted in false faults, which disrupted service to the island, resulting in extended power outages while the switchgear system is either reset or bypassed.

Additionally, the island's 25- to 35-year-old generators are suffering from a lifetime of service as continuous power at or near prime power ratings.



Figure 2 Matinicus Power Station

Their efficiency has declined in recent years; two of the units had to be sent to the mainland to be rebuilt, a process that cost over \$24,000 for each engine and took over a year. The cost of maintaining this system is increasing, which recently forced us to raise our base rate, which covers operational costs, from \$0.24/kWh to \$0.30/kWh. **The cost of fuel (minus \$1.00 per gallon) is passed directly on to MPEC's customers.**

MPEC sources its diesel fuel from a small tanker run by Maine Coast Petroleum (MCP), and as such is subject to a fluctuating global commodity markets. Deliveries are only possible at times of high tide and good weather, further stressing the already fuel-dependent island and power company. The power company owns a small, 17,500 gallon tank farm. This fragile system depends upon regular oil deliveries and sufficient cash flow which can be challenging due to the seasonality of the island's economy. Over the past 18 months, delivered fuel prices averaged \$3.18/gallon. These issues have left Matinicus residents in a vulnerable situation regarding their energy future.

Due to the recent and necessary MPEC rate increase, some wealthier residents have begun to discuss installing their own generators or solar PV systems, and going off grid. This is a decision that could have a severe impact on the community. When a customer goes off grid, the revenue that they were contributing to cover the power company's fixed operating costs goes away. Those costs will now have to be spread over a smaller (and likely less affluent) customer base, ultimately resulting in more rate increases further compounding the problem. Reducing the cost of electricity from MPEC is imperative to remedying this situation as the alternative is untenable.

There are three major constraints on MPEC's ability to improve electricity generation and distribution to the community:

1. The island's remoteness and isolation increase the cost of supplies, fuel, and services;
2. MPEC has a small customer base over which to spread the cost of capital improvements; and
3. MPEC has only two paid employees, which limits its ability to designate human resources towards these types of projects.

Additionally, MPEC is constrained by a lack of available funding to undertake a community-based renewable energy project.

## 2. Economic Hardship

According to the U.S. Census (2010), the median household income for the community is \$52,857, 3% above the national median at the time and 14% above the Maine median household income (MHI) figure. These figures do not accurately reflect the incomes of actual year-round residents, as a few wealthy seasonal residents identify Matinicus as their home, but do not live there year-round. Approximately 60% of the homes on Matinicus are used seasonally. The vast



majority of year-round residents in this community work several jobs and often struggle to make ends meet. Most residents rely upon highly variable seasonal income sources, such as lobstering and tourism to support themselves and their families.

Lobster fishing is the most common source of income on the island; approximately 40% of Matinicus residents hold lobster licenses.<sup>3</sup> This fishery is susceptible to booms and busts, dependent upon the price of fuel and bait, and the global seafood market. This year will be particularly challenging for residents, as demand for seafood has plummeted during the pandemic. When fuel prices rise, Matinicus fishing families are hit twice; their cost of doing business goes up as it gets more expensive to fuel their boats, and their cost of living goes up as electricity rates and heating costs rise. Seasonal tourism makes a small contribution to the island's economy, but is constrained by the lack of rental housing, restaurants and stores, and transportation challenges.

Tourism makes a very small contribution to the local economy, since there is only one bed and breakfast, very few weekly rentals and almost no places for tourists to spend money, as well as no convenient way to travel to Matinicus for day trips: travel options being limited to air taxi (high cost, \$65/passenger for shared flight each way, weather limited) and the State-operated ferry (four trips monthly in summer, one monthly in winter). Passenger tickets on the State Ferry are \$33/round trip and vehicle rates are based on length of vehicle and start at \$86/round trip for a normal length (20 feet) automobile and going up by \$6.75/ft. for additional lengths such as delivery trucks.

The median household income does not appropriately represent the higher cost of living on Matinicus compared to the mainland. Motor vehicles, both for personal use and for large deliveries, such as building supplies or propane tanks, must come by ferry, and personal vehicles to be left on island must pay a \$250 disposal fee to the municipal government to ensure removal at the end of their useful life which, given that there are no paved roads or garages for repairs, is usually very short. According to the *Island Indicators 2010-2011* report, "The higher costs of food, fuel and other necessities are a factor to consider when looking at median income levels on the islands as compared to the state as a whole."<sup>4</sup> **The census figures fail to take account of the fact that the cost of living on the island is estimated to be between 25% and 50% higher than on the mainland.**

The cost of living is higher on Matinicus because all food and supplies must be imported from the mainland. Freight costs are substantial: groceries are ordered from a mainland store and delivered by air taxi for a \$10.00/banana box charge plus a \$5 packing fee. Non grocery items are billed at 50 cents a pound. For an example of the extra cost to live here – a 2x4x8 piece of lumber would cost around \$3 at the lumber store on the mainland. This board weighs 6 pounds, so the freight cost to fly it out would be \$3, doubling the cost by the time it gets to Matinicus Island. Anything that will not fit on the plane must come by the water taxi during the late spring and summer, if there is room, or wait for the infrequent State ferry runs. Residents report at least a 25% to 100% additional cost for delivery on all items. **While the island appears to have an annual income that is slightly higher than the median for the state, the standard of living for**



Figure 3 Plane used for transport to Matinicus

<sup>3</sup> Terry, Mary. "Island Indicators 2010-2011." Island Institute. 2012.

<sup>4</sup> *ibid.*

**the year-round community is significantly below this. These figures are also skewed by inclusion of a small number of wealthier seasonal residents.**

### **3. Imminent Hazard**

The current energy system on Matinicus is unsustainable, and presents an imminent hazard to welfare, safety, and the environment. Aging and obsolete equipment is compromising the power company's ability to provide reliable and predictable service to its customers. Generators installed in the 1990s are reaching the end of their useful life, exclusive of recent costly repairs, and the power station's analog switchgear is quickly becoming obsolete, making it difficult to repair and source replacement parts. These factors increase the likelihood of a catastrophic system failure resulting in a long-term outage, which could have a devastating impact on the community.

Reliable power supply is crucial to maintaining emergency services on the island, and assisting with marine rescue operations, which are a regular occurrence on the island. Onshore VHF radios, dock lighting, and weather monitoring equipment at the island's airstrip are all required to respond to medical, marine, or other emergencies, all require electrical service from the electric company. Additionally, the diesel generators currently used to provide power on the island have adverse impacts on human health, welfare, and the environment. The generators have no emissions controls, and are very inefficient due to their old age. Long-term exposure to diesel exhaust has been linked to a number of respiratory issues, including lung cancer.<sup>5</sup>

If fully funded, ratepayers would benefit from the project by significantly lowering electricity rates due to decrease in bulk diesel purchases. Operation and maintenance costs for solar are minimal when compared to diesel continuous power generation. This could also benefit total household energy costs, as lower electricity prices could allow for the cost-effective adoption of efficient air source heat pumps rather than relying on propane and other expensive heating fuels.

## **B. Project Design, Technical Feasibility and Responsiveness of Community Needs**

### **1. Background**

Prior to the mid-1960s, Matinicus Island residents primarily relied on individually owned diesel and gasoline generators to provide limited electricity to the island. A more centralized, privately owned system eventually evolved but it was plagued by noise issues, mechanical problems, severe line losses and extreme unreliability, original installation was on untreated cedar poles that were essentially just trees that had been cut, limbed and debarked, and stuck into the ground with wire strung on them. In response, Plantation leaders appealed to the Maine Public Utilities Commission (MPUC) in 1977 to have a new system declared a public utility. The municipal non-profit MPEC was thus established, subject to regulation according to federal and state law.



**Figure 4 Matinicus Harbor**

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<sup>5</sup> "Diesel Exhaust and Cancer." American Cancer Society. 2015.  
<http://www.cancer.org/cancer/cancercauses/othercarcinogens/pollution/diesel-exhaust-and-cancer>

Rates were set at \$0.24/kWh, to cover projected costs and \$1.00/gallon diesel fuel. A fuel surcharge was built in, in case fuel prices rose over \$1.00/gallon, which they eventually did. The base rate, however, remained at \$0.24/kWh up until the summer of 2015, as rising costs forced us to raise it to \$0.30/kWh.

The MRPP has spurred a conversation in the community around how to address the energy cost problem, and the community has adopted a many-pronged approach to tackling this issue. In the fall of 2014, we hosted a spray foam crew through the Island Institute's "Weatherization Week" program. This crew was out for one week and weatherized or insulated eight homes on the island, for an anticipated savings of about \$2,500. With the help of an Island Institute Fellow, hired in September of 2014, we have taken steps to quantify the impact of line losses, and identify the sources of those losses. The Fellow also inventoried buildings on the island to determine the greatest need for energy efficiency investments across the island, and ran an LED bulk purchase program, which offered island residents high-quality LED lights for a significantly discounted rate. It is estimated that these efforts saved ratepayers about \$5,000 annually on their electric bills. While these steps help ratepayers cope with rising power costs, they do not alleviate the root cause of the problem: inefficient generation and reliance on fossil fuels.

## **2. Project Elements**

The MRPP will address the needs of the community through the procurement, installation, and integration of several critical pieces of equipment, including a 300kW ground-mounted solar PV array, a 1000kWh battery energy storage system, and a new, efficient Tier 4 diesel generator with modern switchgear and automation. These system upgrades will meet the following key project goals, which are explained in further detail in Section G of this application:

1. Stabilizing and lowering electricity costs on the island.
2. Increasing the reliability and long-term viability of the electric system on Matinicus.
3. Integrating renewable generation into the island's grid, and easing the integration of future renewable capacity.
4. Providing a model for other remote microgrids to follow.

The project is consistent with the standards and requirements for projects financed with loans and loan guarantees under the RE Act as set forth in RUS's Electric Program Regulations and Bulletins. Funding would directly support the construction of electric distribution, transmission, and generation facilities, including system improvements and replacement required to furnish and improve electric service in rural areas, as well as demand side management, energy efficiency and conservation programs, and on-grid and off-grid renewable energy systems.

The PV component of the MRPP will significantly reduce MPEC's diesel consumption, which will reduce the cost of energy for our ratepayers, and the environmental effects of generation on the island. This component is sized to match the island's peak critical summer load (130kW), meaning that even during the summer months, generator use will be minimal. In addition to fuel savings, running the generators less will reduce operation and maintenance hours, which will reduce the frequency and costs associated with oil changes and other routine maintenance, and the need for costly and time-consuming generator rebuilds. Fuel savings will

be immediately passed on to customers through reduced fuel charges on their bills, and MPEC's cost savings could be passed onto customers through a rate decrease. In addition to these cost savings, the risk of an outage due to mechanical failure will be greatly reduced, due to a decreased reliance on out-of-date generators for prime power. The solar panels will be placed to the east of generator shed and the fuel tanks at a site already approved for new energy generation. Please see Figure 5.



**Figure 5. MPEC generating assets, including fuel storage and equipment storage (Town Garage)**

### **Energy Storage**

We intend to install and integrate a 1000 kWh modular battery energy storage system, which will be located adjacent to the generator shed (see Figure 5). These batteries must be able to handle daily rapid charging and discharging with little maintenance, applicable to a grid scale project such as this one, with warranties extending 10 years or more.

The storage component of this project will serve several purposes. First, it will facilitate maximum utilization of the solar arrays, by allowing power generated during the middle of the day, when solar generation peaks but the load generally isn't as high, to be used later on in the day or at night. Second, the battery energy storage system will allow the generators to be run independent of power demand. Instead of responding to changes in load in real time, which results in inefficient fuel consumption and operation, the generators will simply have to charge the batteries when they discharge below a certain level. This means that when the generators are running, they will be running at maximum efficiency, creating additional fuel savings, which will be passed on to customers, and reducing the need for regular maintenance and rebuilds, which will also result in cost savings. Finally, batteries can act as a redundant source of power in the event of a mechanical failure or a maintenance shutdown that would otherwise result in an outage, providing stored electricity to customers while an issue is diagnosed and remedied.

### **3. Project Timeline**

The installation process is expected to take about twelve weeks, from installing inverters and controls, to commissioning and operator training. Competitive procurements will begin at least six months ahead of the anticipated project start date, in order to allow for full vendor participation and adequate time for order processing. Permitting will also begin six months before the project start date, to ensure adequate time for regulatory approval, particularly with regards to land use planning compliance. A request for proposal (RFP) for the project was released on April 10, 2020. For more information on the project timeline, please see Section D of this application.

### **C. Applicant Organization and Eligibility**

Matinicus Plantation Electric Company (MPEC) was established in 1977 to provide centralized power to the remote island community of Matinicus, Maine. A previous iteration of the utility, Matinicus Plantation Electric Cooperative, Inc., was incorporated in 1973 (see supplemental materials), and changed its name in 1977. MPEC is a non-profit, municipal utility, subject to State of Maine and U.S. federal law, and is therefore eligible for this USDA funding opportunity. The utility is regulated under the Maine Public Utilities Commission.

MPEC manages the diesel generators on town-owned land near the harbor, the island distribution system and ratepayer accounts. Revenues are generated solely from ratepayer accounts; MPEC does not receive any town or state funds other than an annual town subsidy of \$30,000. Decisions are made by a three-member Board of Assessors that also serves as the Board of Directors. Assessors are elected at the Annual Town Meeting to overlapping three year terms and are the only form of local government on island. Through the leadership of Operations Manager Gary Peabody, and Head of the Board of Assessors Clayton Philbrook, MPEC will oversee the implementation of all aspects of the project.

MPEC has demonstrated capacity to receive and administer federal funds, having managed three previous grants of \$150,000 (HUD 1977), \$100,000 (HUD 1978) and \$400,000 (CDBG, 1983). One of the principals involved with this project, Clayton Philbrook, worked on these previous projects. For more background on Mr. Philbrook, see Section F.

For financial management, MPEC will use its existing system to administer grant funds. Please see [https://matinicusolar.org/wp-content/uploads/2020/04/2019-Annual-Report\\_Matinicus.pdf](https://matinicusolar.org/wp-content/uploads/2020/04/2019-Annual-Report_Matinicus.pdf) for Matinicus Isle Plantation's 2019 Annual Report.

Additional support on project management and administration, as well as system design and measurement and verification will be provided in partnership with the Island Institute. This nonprofit, located in Rockland, Maine, has supported other island communities in their pursuits and management of energy projects and federal grants, including previous USDA High Energy Cost Grant applications with Matinicus, as well as a successful diesel generator plus solar High Energy Cost Grant application with the island of Monhegan, Maine in 2012. For more information on the Island Institute and staff involved in this project, see Sections E and F below.

### **D. Organizational Capabilities and Project Management Plan**

#### **Implementation Plan**

MPEC will work in partnership with the Island Institute to oversee competitive bidding, site preparation, logistics, procurement and installation of all components and will ensure work is completed in a timely manner and adherence to NFPA 70 NEC 2017 standards. Island Institute will continue to work with local consultants familiar with the timeline and necessary steps to procure and construct community scale solar plus storage projects. The installation process is expected to take about twelve weeks, from installing inverters and controls to training. Competitive procurements will begin at least six months ahead of the anticipated project start date, in order to allow for full vendor participation and adequate time for order processing. Permitting will also begin six months before the project start date, to ensure adequate time for regulatory approval. A request for proposal (RFP) for the project was released on April 10, 2020. This RFP is critical as it further defines the scope of the project, but also defines the necessary requirements for suitable and qualified bidders. At the time of this submission, leaders in the solar and storage space have responded favorably and have committed to submitting bid proposals. Further details can be found at

matinicussolar.org. All procurements will comply with the Buy American requirement found at 7 CFR part 1787.

### **Organizational Structure and Relevant Expertise**

The project will be managed jointly by MPEC General Manager and contractor (Gary Peabody), Head of the Board of Assessors (Clayton Philbrook), with financial and logistical support by the Business Manager (Kimberly Peabody) and Treasurer (George Tarkleson). Island Institute staff will support the project closely with project management and technical support. Key approvals related to financial commitments or bid selection will be made by the three-person Board of Assessors.

The bid and construction processes will be managed by an Island Institute consultant, Bryan Carroll. Island Institute staff have been working closely with Matinicus representatives over the past several years, and Mr. Carroll has been involved in the project since fall 2019. Island Institute staff also intend to draw on expertise from the Islanded Grid Resource Center (IGRC), with representatives highly familiar with remote energy projects in Alaska, Hawai'i, and similar context.

For more details on relevant organizations and individual expertise, see Sections E and F. Additional services for design, procurement, and construction will be selected through a competitive bid process, as referenced in the RFP process.

### **Method of Funding and Financial and Legal Capacity**

MPEC intends to fund this project through this federal grant. The utility has demonstrated capacity to receive and administer federal funds, having managed three previous grants of \$150,000 (HUD 1977), \$100,000 (HUD 1978) and \$400,000 (CDBG, 1983). One of the principals involved with this project, Clayton Philbrook, worked on these previous projects. For more background on Mr. Philbrook, see Section F. An annual report is included

Additional financial or legal expertise and capacity will be added as needed, hired either by MPEC or through staff or consultants of the Island Institute.

## Request for Proposal Timeline

Dates are subject to change based on restrictions and market conditions related to the COVID-19 pandemic. Updates will be shared at <https://matiniccussolar.org/rfp-milestone-dates/>

NO.	ACTIVITY	SCHEDULE	DATE
1	ISSUE OF REQUEST FOR PROPOSAL		04/10/2020
2	NOTICE OF INTENT (NOI)	21 DAYS AFTER NO.1	05/01/2020
3	REQUEST FOR QUALIFICATIONS (RFQ) SUBMITTAL	7 DAYS AFTER NO.2	05/08/2020
4	DEADLINE FOR SUBMITTAL OF QUERIES AND CLARIFICATION BY BIDDER	7 DAYS AFTER NO.3	05/15/2020
5	DEADLINE FOR MPEC FOR ANSWERING OF QUERIES AND CLARIFICATIONS	14 DAYS AFTER NO.4	05/29/2020
6	DEADLINE FOR SUBMISSION OF PROPOSAL BY BIDDER	31 DAYS AFTER NO.5	06/29/2020
7	REQUEST FOR CLARIFICATIONS BY MPEC TO BIDDER (AS NEEDED)	14 DAYS AFTER NO.6	07/13/2020
8	COMPLETE EVALUATION OF PROPOSALS	14 DAYS AFTER NO.7	07/27/2020
9	NOTIFICATION OF PREFERRED BIDDER(S)	7 DAYS AFTER NO.8	08/03/2020
10	COMPLETE NEGOTIATIONS OF PROJECT FINANCING, TAX AND SCHEDULE WITH PREFERRED BIDDER(S)	59 DAYS AFTER NO.9	10/01/2020
11	SIGNING OF TERM SHEET WITH PREFERRED BIDDER(S)	7 DAYS AFTER NO.10	10/08/2020
12	ISSUE OF FULL NOTICE TO PROCEED WITH MPEC	7 DAYS AFTER NO.11	10/15/2020

## Installation Timeline

TASKS	Six months prior to project start	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Project Lifetime
Permits	█													
Material Procurement & Delivery	█													
Install Generators, batteries and inverters		█												
Prep site material			█											
Survey, Drill Piers			█											
Deliver Pole Mounts & Prep			█											
Pump & Pour Concrete				█										
Pole installation & Frame				█										
AC Electrical					█									
Set Interconnection Breaker					█									
Clean-up						█								
3rd Party Inspection LOC Eng.							█							
Build Rack & Inventory Modules							█	█						
Install PV Panels								█	█					
DC Conduit & Wiring									█	█				
Debug										█	█			
Test & Inspect												█		
Electrical Inspection												█		
Commissioning													█	
Training													█	
Monitoring and verification													█	█

The proposed project’s design and its implementation schedule have been created with close attention to the possibility for delays, particularly due to the potential for weather to impact transport. Freight movement to Matinicus is, as might be expected, highly weather dependent. Island Transporter, LLC has a very capable and seaworthy fleet of transport vessels, but allowances must still be made for weather as the crossing is nearly 20 miles of open ocean.

The PV component of the system will not require any significant downtime at the power station so therefore it will not be installed until the more timely components of the system – the switchgear and batteries – are fully operational. Due to the fact that the panels will be installed on the ground, installation and grid tie-in is anticipated to be quick.

Maintenance of these new components will be incorporated into MPEC’s regular maintenance routine and will be enhanced by the switchgear’s remote monitoring capabilities and training in PV operations and maintenance for MPEC’s Operations Manager. The power station crew will continue to take daily measurements of power production and system performance. The Island Institute will work with MPEC on a monthly basis to review the new production and performance data, comparing it to historic data in order to verify the impact of the proposed modifications.

Throughout this process, the Matinicus community will be kept informed of the project’s progress. Once funding is secured and the timeline is clear, MPEC – with support from the Island Institute – will announce the project implementation plan during a presentation at a regular MPEC Board of Assessors meeting and ratepayers will be notified



through an update in their monthly bills. The Island Institute will coordinate with MPEC and USDA to help to share news of this project with other HEC communities at [matinicussolar.org](http://matinicussolar.org) and through other networks and channels.

### **Procurement**

MPEC will run competitive procurement processes in accordance with federal guidelines outlined in 2 CFR §200.318 - §200.326, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards for materials and installation of the various components of the MRPP. Our project website at [matinicussolar.org](http://matinicussolar.org) includes all bid information. **MPEC intends to source local labor, and local materials whenever and wherever possible.**

### **Regulatory Approval**

Zoning and land use issues on Matinicus, as in other plantations in the state, are in the jurisdiction of the State of Maine's Land Use Planning Commission (LUPC) with consultation with the local community. While the modifications in this proposal are not substantial in terms of land use, Matinicus Plantation will seek an advisory ruling from LUPC regarding required permitting and will apply for any permits necessary prior to awarding of funding to minimize delays in starting the project.

## **E. Organizational Experience**

### **Matinicus Plantation Electric Company**

MPEC has considerable experience administering federal funds having applied for and been awarded three previous grants, in 1977, 1978 and 1983. Clayton Philbrook, Head of the Board of Assessors took an Island Institute sponsored trip to Naushon and Cuttyhunk islands in Massachusetts in the spring of 2014 to learn more about solar installations and their integration with existing diesel micro-grids and has also attended Island Institute Energy Conferences in person.

### **Island Institute**

The Island Institute is a non-profit corporation founded in 1983 to partner with Maine's 15 year-round inhabited islands and working waterfront communities to ensure their long-term sustainability. A portion of the Institute's annual operating budget has been supported by federal funds, from the National Science Foundation, the U.S. Environmental Protection Agency, the Economic Development Administration, and National Oceanographic and Atmospheric Administration, and from state agencies, such as Efficiency Maine. General operating funds for the Island Institute come from private donations and individual donors.

The Island Institute will provide project management support while assisting MPEC with reporting, administrative tasks, and outreach and information sharing about the project. The Institute will help oversee the procurement process and financial management, both during the term of this project, and during the discussions, calculations, and consideration of rate changes that result from cost savings due to this project. In its role as convener, the Institute will work with MPEC to ensure that the Matinicus community is informed about the project and its impact on power company costs.

The Island Institute's Climate & Energy team will work closely with MPEC on this project, providing technical assistance for grant compliance, financial management, and reporting requirements. For the past several years, the team has been providing technical assistance and community outreach support to New England island communities in order to help them plan, develop and evaluate community-owned wind and solar projects, an innovative smart grid-controlled fuel substitution project, local weatherization and heat pump efforts, and energy education programming.

In 2009, the institute worked with the Fox Islands Electric Cooperative to obtain a USDA HEC Grant for the 4.5 MW Fox Islands Wind project on Vinalhaven Island. That same year, the Institute implemented a nearly \$500,000 project to purchase and install videoconferencing equipment in each island school, as well as several coastal mainland schools, with a Distance Learning and Telemedicine grant from USDA. In response to the Institute's successful USDA funded projects, Undersecretary Dallas Tonsager and Maine State Director Virginia Manuel hosted a tour of the Fox Island Wind project and a demonstration of the Tandberg teleconferencing equipment at the Island Institute's offices for nine other USDA state directors from the Northeast in May 2012. The Island Institute also worked with the Monhegan Plantation Power District (MPPD) to obtain its \$1,092,015 HEC Grant (ME 23 A84), awarded in 2012 for the Monhegan Hybrid Power Project on Monhegan Island and has continued to work with MPPD through the ongoing implementation of the project.

In addition to USDA support, the Island Institute has received grants from the U.S. Department of Energy/National Renewable Energy Lab, U.S. Environmental Protection Agency, the Economic Development Administration, the National Science Foundation, the National Oceanic and Atmospheric Administration, and AmeriCorps. Related to energy, the institute recently completed serving as project manager and fiscal sponsor for a community wind power feasibility study for the Swan's Island Electric Cooperative that was funded by ARRA and state funds. Assisting small island communities in procuring and efficiently managing funding is an important part of the institute's work.

## **F. Key Staff Experience**

The team assembled for the MRPP is well-versed in the island's electric system, renewable energy technologies, project economics, environmental impacts, regulatory review, risk management, island logistics, as well as strategies for meaningful community engagement.

### **Matinicus Plantation Electric Company**

**Gary Peabody** has served as MPEC's Plant Manager since 2016. His technical knowledge of the Matinicus Power Station will be critical to the success of this project. His work will be supported by other members of the MPEC Board of Directors and the Island Institute.

**Kimberly Peabody** has served as Business Manager for Matinicus Plantation Electric Company for 4 years. She is an expert manager and will be an integral part of this project.

**Clayton Philbrook** has served as Business Manager for MPEC in the past, was Project Administrator for one of the HUD Grants that was used to build MPEC infrastructure, and has served on the Board of Assessors for over 24 of the past 35 years. In that capacity, Mr. Philbrook has served as project manager for several capital improvement projects for the Plantation, including purchase of and upgrading the tank farm that serves MPEC. He is currently certified by the Maine Department of Transportation as a Locally Administered Projects Supervisor and has recently completed a State funded project to upgrade and resurface the airport on Matinicus.

Clayton will work closely with other members of MPEC and the Island Institute to meet all reporting requirements for this grant.

**George Tarkleson** has served Matinicus Island for the last seven years as the Administrative Assistant (similar to a town manager), Treasurer, Tax Collector and the Island School Business Manager. He also runs a water taxi business seasonally and has extensive knowledge of solar and wind power. Mr. Tarkleson will help with the financing and logistical aspects of this project.

### **Island Institute**

**Emma Wendt** leads the Climate and Energy team at the Island Institute in Rockland, Maine, where she supports island and coastal communities in their efforts to better understand and confront their unique energy challenges. Before joining the Island Institute, Ms. Wendt served to address energy issues locally and globally in a variety of settings, including supporting cleantech entrepreneurs at Michigan-based university and economic development organizations; running energy generation models and emerging clean technologies research in the renewable energy team at Pacific Gas and Electric; leading the International Finance Corporation's internal sustainability efforts; and building fundraising campaigns for local nonprofits. She received an AB in Environmental Science and Public Policy from Harvard University, and an MBA/MS in Environment & Resources from Stanford University. For this project, Ms. Wendt will work closely with MPEC to support project management and grant requirements.

**Suzanne MacDonald** is the Chief Community Development Officer at the Island Institute. As Chief Community Development Officer, Ms. MacDonald is responsible for designing the organization's strategic approach to sharing information and experiences across all areas of its work in order to further the sustainability of communities in Maine and elsewhere. She currently co-leads the Islanded Grid Resource Center, a project to promote fact-based decision making about wind and other renewable energy sources in remote "islanded grid" communities in New England, Alaska, and other US states and territories. This network will be actively supporting and learn lessons from this project. For nine years, Ms. MacDonald directed the Institute's Community Energy Program, partnering with island communities in Maine, New England, and beyond to develop and implement practical strategies to lower their high energy costs. In this role, she provided technical assistance and community outreach support to the 4.5 MW Fox Islands Wind project on Vinalhaven Island, Maine, the Star Island Solar Hybrid Project in the Isles of Shoals, New Hampshire, the Monhegan Hybrid Power Project, and several other communities considering wind and solar power. Suzanne's extensive energy project development experience will be valuable to MPEC, for she is a former seasonal resident of Monhegan, coordinated the 2008-2009 community renewables feasibility study, and continues to be an active participant in energy-related discussions on the island. Ms. MacDonald holds an M.A. in urban and environmental policy and planning from Tufts University and a B.A. in international development and political science from McGill University. She serves as Vice-Chair of the Efficiency Maine Trust Board of Trustees and sits on the Maine Climate Council's Buildings, Infrastructure, and Housing Working Group. She is also a Senior Fellow in the Environmental Leadership Program. In 2015, Suzanne gave a TEDx Talk entitled "What Islands Can Teach Maine About Energy."<sup>6</sup>

**Bryan Carroll** lives on Isle au Haut, Maine. He is the consultant for the Matinicus Renewable Power Project, including the RFP drafting, bidder identification and selection for a community-wide solar plus storage project. He is also the General Manager and chief lineworker for the Isle au Haut Electric Power Company, a member-owned cooperative which is also

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<sup>6</sup> See <https://www.youtube.com/watch?v=ZFypPjyRDkg>

pursuing a solar plus storage project. Beyond utility management and grid operation, Bryan has integrated commercial and community-scale solar projects throughout North America, including Mexico and the Caribbean, working primarily on island and rural communities over the past 15 years.

## G. Project Goals, Objectives and Performance Measures

### 1. Goals and Performance Measures

The Matinicus Renewable Power Project will:

1. **Stabilize and lower electricity costs on the island** – Once implemented, the MRPP will result in savings for MPEC and its ratepayers. The primary savings will come from reductions in fuel use, and additional savings will also be realized through reduced maintenance costs.

The PV and battery components of the project will offset diesel generation, resulting in fuel savings. MPEC estimates that these components will offset 146,000 kWh of diesel generation, about 45% of the island’s total annual electricity consumption. Additional fuel savings will be realized from increased generator efficiency, as the switchgear and battery components will allow the generators to be run at optimal efficiency instead of responding to load in real time. It is difficult to predict exactly how much efficiency will improve, but current optimal efficiency is about 10kWh/gallon. Given these estimates, the MRPP is expected to reduce fuel consumption by over 50%, and generate more than \$50,000 in annual fuel savings. MPEC currently recoups its fuel costs, minus a dollar per gallon, through a fuel surcharge on customer’s monthly bills, so most of these saving will be passed directly onto MPEC’s customers. The table below demonstrates projected fuel savings:

System Performance Analysis	
Total Annual Island Consumption	325,000 kWh
Annual Solar Production	146,000 kWh
Total Annual Production from Diesel	189,000 kWh
Estimated Generator Efficiency	10 kWh/gallon
Annual Fuel Consumption (before MRPP)	36,633 gallons
Annual Fuel Consumption (after MRPP)	18,900 gallons
Annual Fuel Savings	17,733 gallons
<b>Annual Fuel Cost Savings*</b>	<b>\$53,199</b>

\*Based on a Diesel fuel cost of \$3.00 per gallons with no annual escalator

Maintenance savings will be realized through reducing the frequency of daily checks at the power station and oil changes on generators; reducing the need for costly generator rebuilds; and the addition of remote monitoring and maintenance support with the new switchgear.

These outcomes (as well as those outlined below) will be validated through measurements and analysis performed by MPEC and the Island Institute and reported on a monthly basis and in a report produced one year after the project’s completion.

2. **Increase the reliability and long-term viability of the electric system on Matinicus** – In addition to high electricity costs, Matinicus’ consumers have suffered inconsistent and unreliable service. The combination of a new, better functioning generator and switchgear that allows for remote monitoring and support and the PV/battery system will allow for more seamless switching among modules, and more consistent performance from newer, more facilitative equipment.

This goal would be measured by tracking the number and length of island-wide power outages. Island-wide outages due to switchgear issues are expected to be greatly minimized, if not completely eliminated as a result of this project.

3. **Increase the potential and ease of renewable energy integration into the island grid** – The new generator and switchgear will integrate renewable and diesel energy generation, as well as enable MPEC to better respond to the dramatic seasonal fluctuation of the island's electric load with PV production. It will have the capacity to integrate several additional modules, and can accommodate diverse power sources such as wind power, as well as various sizes and numbers of diesel generators. As the community continues to study the feasibility of various energy resources, the versatility of this equipment will accommodate any of them.

This goal will be measured by tracking the performance of the system and its ability to integrate with our current grid system, using the number and length of outages and system faults as a metric for performance

4. **Provide a replicable model for other islands and other remote high energy cost (HEC) communities** – This microgrid system, which will integrate renewable power generation with battery storage, will be a novel approach on a Maine island. With many components to compare and contrast with Isle au Haut’s proposed solar plus storage microgrid project, the other large-scale community solar project planned on Maine’s 15 year-round islands, it will serve as a model and opportunity for learning for other islands and remote communities as they search for solutions to address high energy costs, safety and reliability issues, and reliance on unsustainable energy sources.

The MRPP was developed in coordination with the Islanded Grid Resource Center (IGRC), a network to support sharing of experiences and resources. This network will ensure that what is learned here can be emulated in other islands and small, remote communities in Alaska, Hawaii, and beyond, through events and various media. The link between Matinicus and remote Alaskan villages was highlighted in AlexAnna Salmon’s keynote at the 2015 Island Energy Conference in South Portland, Maine.<sup>7</sup> Additionally, the energy efficiency work undertaken by MPEC and the Island Institute was highlighted in a *Portland Press Herald* article published on November 8<sup>th</sup>, 2015.<sup>8</sup>

## 2. Broader Community Impact

This project will be an important first step in increasing the viability and sustainability of the historic fishing community of Matinicus by reducing energy costs and related emissions. In the short term, MPEC’s decreased expenses and new system components are anticipated to increase the quality of service to the island and decrease electric rates, benefiting families and

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<sup>7</sup> For more on the link between Matinicus and AlexAnna’s hometown of Iguigig, Alaska, please visit:

<https://dieselislandpost.wordpress.com/2015/11/13/maines-diesel-islands-find-a-role-model-3500-miles-away/>

<sup>8</sup> For more on this story, visit: <http://www.pressherald.com/2015/11/08/in-maines-remotest-island-the-simple-act-of-changing-the-lightbulb-has-far-reaching-implications/>

businesses that have been hit hard by the current recession. In the long term, the project will help to sustain Matinicus' year-round community by providing more affordable and reliable electricity while lowering the environmental footprint of its diesel plant and significantly insulating the island from future increases in the price of diesel fuel.

#### **H. Project Reporting Plan**

MPEC and Island Institute will work together to meet all USDA reporting requirements. Locally, MPEC staff will prepare and present monthly updates to the Matinicus Board of Assessors on project implementation, including the procurement, installation and operation of new equipment, as well as the impact of that equipment on fuel costs, maintenance costs and reliability of service. Island Institute will work with MPEC to collect data relevant to these factors and provide a comprehensive report to the Matinicus Board of Assessors that summarizes the performance and impact of the new system one year after the project has been completed.

## I. Project Budget, Financial Feasibility and Matching Contributions

### 1. Project Budget

Quantity		COST
	<b>EQUIPMENT</b>	
800	Solar Modules CS3U-375MS	\$159,000
	Ground Mount Solar Racking Fixed Tilt Ground Mount Solution GM-2	\$ 68,400
	Drilling and Post Installation	\$147,600
	Installation Labor – Racking (prevailing wage)	\$ 15,900
	Installation Labor – Modules (prevailing wage)	\$ 16,200
	Site Prep, Excavation, Trenching	\$ 78,000
	DC Balance of System-Conductors, switches, etc.	\$ 81,000
	PV Electrical Installation	\$ 75,000
	Freight	\$ 17,400
	DC Wire Protection	\$ 30,000
	Construction Materials	\$ 15,000
	Contingency	\$ 7,500
	<b>TOTAL</b>	<b>\$ 711,000</b>
	<b>EQUIPMENT</b>	
1	Containerized Battery Energy Storage System 1MWh solution with microgrid controllers and inverters	\$650,000
1	Diesel Generator 150kw standby	\$ 82,000
	Site Prep, Excavation, Trenching, Improvement – Pad preparation, bonded electrical grounding	\$ 10,000
	Installation Labor (prevailing wage)	\$ 18,000
	Freight	\$ 15,000
	Contingency	\$ 30,000
	<b>TOTAL</b>	<b>\$805,000</b>
	<b>TASK</b>	
	PV Engineering and Design	\$ 35,000
	Grid Interconnect Utility Design	\$ 37,500
	Utility Tie Modifications	\$ 39,000
	Utility modification installation labor(prevailing wage)	\$ 94,500
	Appraisal, Inspection, Insurance	\$ 2,500
	A&E Fees	\$ 5,000
	Legal and closing	\$105,000
	Developers Fee	\$137,000
	Travel and Accommodations	\$ 15,000
	Island Institute	\$ 10,000
	Project Management	\$ 39,930
	<b>TOTAL</b>	<b>\$520,430</b>
	<b>TOTAL PROJECT COST</b>	<b>\$2,036,430</b>

## 2. Budget Information and Explanation

MPPD respectfully requests **\$2,036,430** from USDA – High Energy Costs Grant Program, to be allocated as follows:

A. **Personnel** – (\$455,500) This will cover the following expenses:

- Appraisal, inspection, and insurance
- Architecture and engineering services
- Legal fees
- Developer’s fees

MPEC’s staff will provide support on this project, and their time will be compensated through indirect charges, as outlined below under “Indirect Charges”.

B. **Fringe Benefits** – None.

C. **Travel** – (\$15,000) This will cover travel and accommodations for any persons involved in the project but not directly contracted to install or integrate its components. Individuals or organizations bidding for a contract to install or integrate a component, or components of this project will be asked to include travel costs as part of their bid. This will ensure that contractors understand and have accounted for the often complicated travel logistics involved in working on an island 20 miles away from the mainland.

D. **Equipment** – (\$1,516,000) The largest expense in this budget is for procurement, transportation, installation, and integration of the new system components.

E. **Supplies** – None.

F. **Contractual** - (\$10,000) The Island Institute is contracted to assist MPEC in assembling required reports to help meet USDA grant compliance requirements for reporting and invoicing. The fee represents two weeks of the Island Institute’s Climate & Energy Project Lead’s time and one week of support from the Island Institute’s Grants Director, as well as organizational indirect and fringe rates for this staff time.

G. **Construction** – None.

H. **Other** – None.

I. **Total Direct Charges** (\$1,996,500) – Includes all charges detailed previously.

J. **Indirect Charges** (\$39,930) – This represents one half the maximum allowed by USDA for this grant, which is 4% of all direct charges. These funds will support project management by the Matinicus Plantation Electric Company (MPEC) for additional effort required to implement this project and comply with the terms of this grant, including all reporting and accounting requirements.

**Total Grant Request** (\$2,036,430) – The full amount required for this project is requested of USDA. While the two MPEC staff members and members of the Matinicus Plantation Board of Assessors have and will continue to devote many volunteer hours to this project, there is no recorded match.

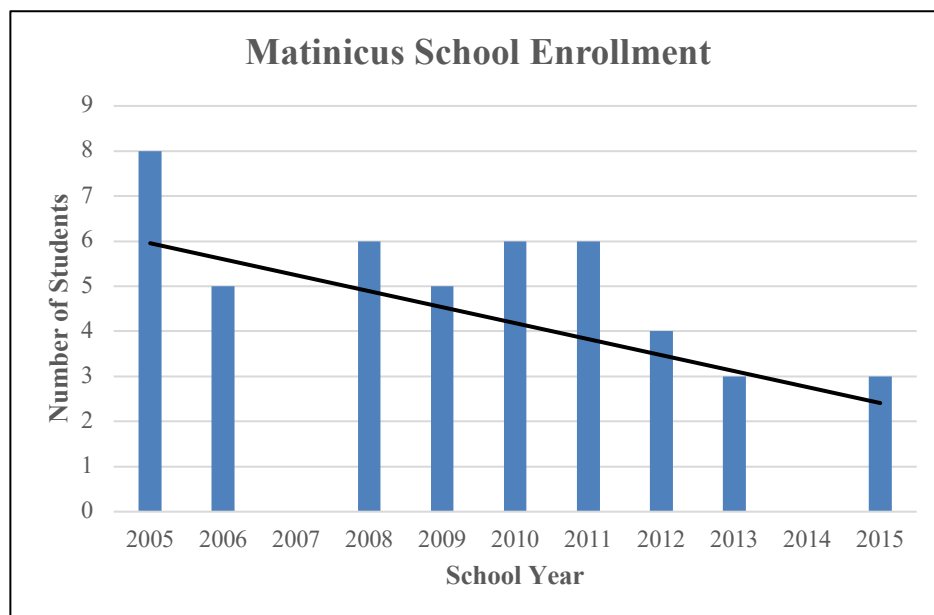
MPEC has demonstrated capacity to receive and administer federal funds, having managed three previous grants of \$150,000 (HUD 1977), \$100,000 (HUD 1978) and \$400,000 (CDBG, 1983). One of the principals involved with this project, Clayton Philbrook, worked on these previous projects.

MPEC will manage this grant with existing financial management systems, and with the support of Island Institute staff. See supporting documents for a Matinicus Isle Plantation Annual Report.



## J. State Rural Development Initiatives

The MRPP's goals to reduce the cost of energy and cost of living on Matinicus aligns with the USDA Maine State Office's rural development initiatives to reduce outmigration and non-employment in rural communities. Matinicus has suffered a recent outmigration of fishing families who have been forced to move off the island due to unfavorable market conditions in the lobster fishery and the high cost of living and doing business attributed to high diesel prices. According to the 2010 U.S. Census, the island (County Subdivision #2301344165) is home to 74 year-round residents and has a seasonal population of roughly 120. **The current year-round population as of March 2020 has dropped to 18, a loss of population of 76%.** Electric rates on Matinicus are five times the national average. As this trend started in 2010, US Census data does not effectively illustrate this very real problem. However, one key indicator of population on the island is enrollment at the school, kept by the Maine Department of Education for each year. This data shows that school enrollment on Matinicus has dipped from a high of eight in 2005, to three in 2015, and in 2014, there were no students in the school.<sup>9</sup> **In 2019 and through the April 2020 there were also no students enrolled.** Additionally, Knox County, where Matinicus is located, has a not-employed rate of 40%. A letter from a previous State Director of USDA Rural Development in Maine, is included in the supplementary materials of this application to document how the MRPP aligns with the state office's rural development initiatives.



In addition to aligning with the aforementioned rural development initiatives, the MRPP aligns with several other regional and statewide initiatives. Letters of support from our U.S. representatives are included with the supplementary materials for this application and outline how the goals of the MRPP align with their policy priorities.

Additionally, the MRPP was developed in close coordination with the Islanded Grid Resource Center (IGRC), a US Department of Energy-funded network devoted to supporting information exchange between remote "islanded" electric grids (i.e. grids that aren't connected

<sup>9</sup> Data available at: <http://www.maine.gov/education/enroll/attending/statefallpub.htm>

into the main electric grid, such as on islands like Matinicus, or in remote Alaskan villages) that are seeking to adopt renewable energy. Matinicus is represented in the network and has participated in several exchange trips run by the IGRC, which have involved tours of other islanded microgrids, on Cuttyhunk and Naushon islands in Massachusetts, Star Island in New Hampshire, and Appledore Island in Maine. These trips have helped inform project design for the MRPP, and networking between other recipients of the Rural Utilities Service's High Energy Cost Grant, including Cuttyhunk Island and Monhegan Island, and related service providers and vendors. The MRPP will benefit this network by disseminating lessons learned on a unique project undertaken in a very remote rural community.

## K. Priority Considerations

### 1. High poverty areas

Matinicus Isle Plantation is located in Knox County, Maine. Knox County is not classified as a High Poverty or Persistent Poverty area by the USDA Economic Research Service, nor does it contain a census tract with a poverty rate of 20% or more. **The census figures fail to take account of the fact that the cost of living on the island is estimated to be between 25% and 50% higher than on the mainland.** According to the *Island Indicators 2010-2011* report, "The higher costs of food, fuel and other necessities are a factor to consider when looking at median income levels on the islands as compared to the state as a whole."<sup>10</sup>

The cost of living is higher on Matinicus because all food and supplies must be imported from the mainland. Freight costs are substantial: groceries are ordered from a mainland store and delivered by air taxi for a \$10.00/banana box charge plus a \$5 packing fee. Non grocery items are billed at 50 cents a pound. For an example of the extra cost to live here – a 2x4x8 piece of lumber would cost around \$3 at the lumber store on the mainland. This board weighs 6 pounds, so the freight cost to fly it out would be \$3, doubling the cost by the time it gets to Matinicus Island. Anything that will not fit on the plane must come by the water taxi during the late spring and summer, if there is room, or wait for the infrequent State ferry runs. Residents report at least a 25% to 100% additional cost for delivery on all items.

For a doctor's appointment, for example, the minimum cost of a round trip flight is \$130 a person on shared flights, or \$240 if not able to be shared. **While the island appears to have an annual income that is slightly higher than the median for the state, the standard of living for the year-round community is significantly below this. These figures are also skewed by inclusion of a small number of wealthier seasonal residents.**

### 2. Rurality

According to the 2010 U.S. Census, Matinicus (County Subdivision #2301344165) is home to 74 year-round residents. **The current year-round population as of March 2020 has dropped to 18—a loss of population of 76%.**

### 3. Renewable energy projects

The MRPP will acquire, install, and integrate 300kW of solar PV, for the purposes of lowering and stabilizing electricity costs and reducing the environmental impacts of electricity generation on the island. The MRPP will also acquire, install, and integrate 1000kWh of battery

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<sup>10</sup> Terry, Mary. "Island Indicators 2010-2011." Island Institute. 2012.

storage, which will allow for a more seamless integration and full utilization of the PV component of the project, as well as any future renewable installations.

#### **4. Extraordinary conditions or circumstances**

##### **Imminent hazard**

The current energy system on Matinicus is unsustainable, and presents an imminent hazard to welfare, safety, and the environment. Aging and outdated equipment is compromising the power company's ability to provide reliable service to its customers and increased the risk of a long-term outage due to catastrophic equipment failure. Additionally, the aging and outdated diesel generators currently used to provide power on the island have adverse impacts on the environment.

The reliability of electric service on Matinicus is critical to welfare and safety on and around the island. Onshore VHF radios, dock lighting, and weather monitoring equipment at the island's airstrip are all required to respond to medical, marine, or other emergencies, all require electrical service from the power company. Matinicus community members have played a crucial role in several marine rescue operations, including the sinking of the *Harkness* tugboat in 1992, a plane crash off the island in 2011, the rescue of the *Southern Skies* in the winter of 2014, and many other, similar incidents. Additionally, on-island medical emergencies often involve logistically complicated medical evacuations, which require functioning communication equipment. If the power goes out on Matinicus, the ability of the island to respond to on- and off-shore emergencies is severely inhibited.

Outages due to switchgear malfunction have also been reported and are expected to become more common as it becomes more difficult to source replacement parts, due to the outdated nature of the equipment. As the generators and switchgear continue to age, the risk of a long-term outage due to catastrophic equipment failure increases significantly. The cost of avoiding these types of outages is significant; in the last three years the power company had to send in two generators for a complete rebuild. Each rebuild took over a year to complete, and cost over \$24,000 for each engine. The consequences of such an outage would be severe, and would threaten the ability of residents to continue living on the island.

The environmental impact of generation on Matinicus also presents an imminent hazard. The current generators being used to provide power to the island have no emissions controls, and, due to their old age, are very inefficient. The health and environmental impacts of diesel emissions are well-documented; the American Cancer Society lists diesel engine exhaust as a "known human carcinogen", and the US Environmental Protection Agency (EPA) states that "chronic exposure [to diesel particulate emissions] in experimental animal inhalation studies have shown a range of dose dependent lung inflammation and cellular changes in the lung and there are also diesel exhaust immunological effects."<sup>11</sup> Diesel emissions also contribute to global climate change and associated issues such as ocean acidification, warming, and sea level rise, which have potentially devastating effects to island lobster fishing communities such as Matinicus.

The MRPP will remedy these imminent hazards. By adding 300kW of PV and 1000kWh of battery storage, generator run time will decrease significantly. This will reduce long-term wear and tear, and allow more down time to service the engines, decreasing the likelihood of outages related to equipment failure. The integration of battery storage will also allow the generator to run more efficiently, by allowing it to run at a constant speed, instead of responding to load fluctuations in real time. Reducing generator runtime, and improving generator efficiency

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<sup>11</sup> For more information, see the EPA's page on diesel particulate matter, found at: <http://www3.epa.gov/region1/eco/airtox/diesel.html>

will greatly reduce the environmental impact of generation on Matinicus. Replacing the current switchgear will reduce the risk of outages due to equipment failure.

### **5. Extreme economic hardship**

According to the U.S. Census (2010), the median household income for the community is \$52,857, 3% above the national median at the time and 14% above the Maine MHI figure (Census Tract# 975600-5-001). **The census figures fail to take account of the fact that the cost of living on the island is estimated to be between 25% and 50% higher than on the mainland.** According to the *Island Indicators 2010-2011* report, “The higher costs of food, fuel and other necessities are a factor to consider when looking at median income levels on the islands as compared to the state as a whole.”<sup>12</sup>

The cost of living is higher on Matinicus because all food and supplies must be imported from the mainland. Freight costs are substantial: groceries are ordered from a mainland store and delivered by air taxi for a \$10.00/ banana box charge plus a \$5 packing fee. Non grocery items are billed at 50 cents a pound. For an example of the extra cost to live here – a 2x4x8 piece of lumber would cost around \$3 at the lumber store on the mainland. This board weighs 6 pounds, so the freight cost to fly it out would be \$3, doubling the cost by the time it gets to Matinicus Island. Anything that will not fit on the plane must come by the water taxi during the late spring and summer, if there is room, or wait for the infrequent State ferry runs. Residents report at least a 25% to 100% additional cost for delivery on all items.

A doctor’s appointment, for example, adds a minimum cost of a round trip flight of \$130 a person if they are shared flights, or \$240 if unable to be shared. **While the island appears to have an annual income that is slightly higher than the median for the state, the standard of living for the year-round community is significantly below this. These figures are also skewed by inclusion of a small number of wealthier seasonal only residents.**

Approximately 60% of the homes on Matinicus are used seasonally. The vast majority of year-round residents in this community work several jobs and often struggle to make ends meet. Most residents rely upon highly variable seasonal income sources, such as lobstering and tourism to support themselves and their families.

Approximately 40% of Matinicus residents hold lobster licenses. The last few years have been very bad for lobstering on Matinicus due to reduced catches, low lobster prices, high fuel costs and bait prices that have quadrupled. For the past 18 months there have not been any students in the Matinicus Island School. Many lobstering families have been unable to make ends meet, and were forced to move off the island. The high cost of power, which also rose significantly as fuel costs went up, directly contributed to this outmigration trend.

The MRPP will reduce the community’s dependence on diesel fuel, thereby decoupling, to some degree, the price of diesel and the ability of fishing families with seasonal, variable incomes to live on the island.

### **3. Substantially Underserved Trust Areas**

Matinicus is not an eligible Substantially Underserved Trust Area.

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<sup>12</sup> Terry, Mary. “Island Indicators 2010-2011.” Island Institute. 2012.

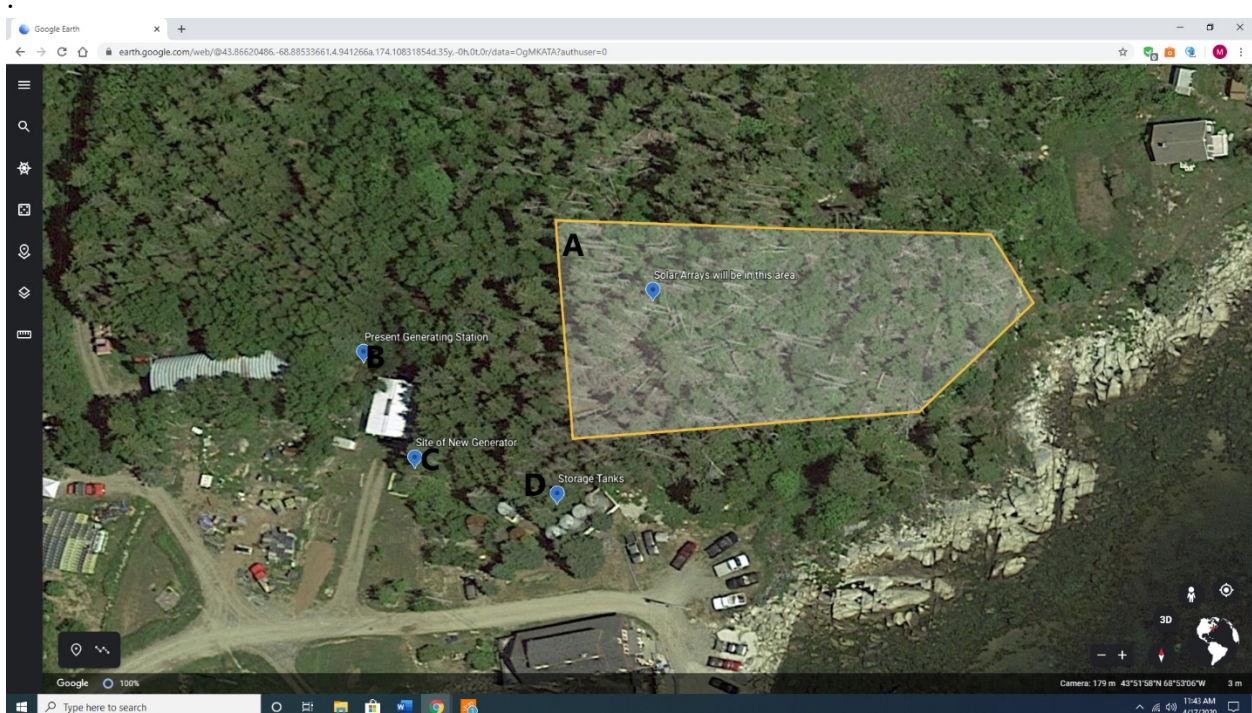
# USDA HIGH ENERGY COST GRANT PROGRAM

## MATINICUS PLANTATION ELECTRIC COMPANY MATINICUS RENEWABLE POWER PROJECT

### ENVIRONMENTAL REPORT and QUESTIONNAIRE

#### A. Project Description and Location:

The Matinicus Renewable Power Project (MRPP) will install and integrate a 300kW solar array and 1000kWh of battery storage, and add a new Tier 4 diesel generator with new switchgear. This project will mitigate the air pollution now produced by antique two cycle diesel engines. The solar array will be located just east of the present generator and storage tanks. The new generator will be just south of the existing generating station.



A: Solar Arrays will be in this area

B: Present Generating Station

C: Site of New Generator

D: Storage Tanks

Location of the solar arrays will be in an area of blown down spruce trees, which are a fire hazard as of now. Removing them will decrease the risk of a fire affecting the island.

Coordinates of the area are:

Southwest corner: 43degrees 51'58" N, 68 degrees 53'07"W

Southeast corner : 43 degrees 51' 58"N, 68 degrees 53'04"W

Northwest corner: 43 degrees 51'59"N, 68 degrees 53'04"W

Northeast corner: 43 degrees 51'59"N, 69 degrees 53'07"W

Total acreage will be 3-4 acres

**B. Land Ownership and Use**

The MRPP will be entirely located on property owned by Matinicus Plantation. The MRPP will not be located on land owned or managed by the Federal Government. The deed is at the end of this document.

**C. Farmlands**

The MRPP will not irreversibly convert farmland to nonagricultural use.

**D. Wetlands:**

The MRPP will not affect any wetlands. While there are wetlands in the area shown in the map above, they will be avoided in this project.

**E. Floodplains:**

The MRPP will not be located on any known floodplain.

**F. Coastal Areas:**

The MRPP will be located within the boundaries of a coastal zone management area.

**G. Protected Species:**

The MRPP is not located in a critical habitat for any threatened, endangered or candidate species. Matinicus is often a stopover point for migratory birds and bats, including the following species of:

1. Arctic Tern
2. Black billed Cuckoo
3. Canada Warbler
4. Great Cormorant
5. Great Shearwater
6. Horned Grebe
7. Hudsonian Godwit
8. Peregrine Falcon
9. Purple Sandpiper
10. Short eared Owl
11. Upland Sandpiper
12. Northern Long eared Bat

The effect on these species is expected to be minimal to non-existent because of the small area and better habitat for stopping located nearby. The Matinicus Plantation Electric Company will work with local agencies to secure necessary permits, if needed.

**H. Section 106 of the National Historic Preservation Act (NHPA) Review:**

The project area is not located within 500 feet of any know historical sites. This project will not impact, use or alter any building or structure that was constructed more than 50 years ago.