

FAA OFFICE OF AIRPORTS FY2023 SUPPLEMENTAL DISCRETIONARY GRANT PROGRAM PROCUREMENT AND INSTALLATION OF SOLAR PHOTOVOLTAIC ARRAYS AT MARTIN STATE AIRPORT PROJECT NARRATIVE

In November 2023, the Maryland Aviation Administration (MAA) prepared a Solar Siting and Feasibility Study (the Study) that outlined a solar energy generation roadmap to maximize the generation of clean energy at Martin State Airport (MTN or the Airport).

The State of Maryland’s drive to combat the climate crisis comes from a desire to further protect the people and the fragile environment of the Chesapeake Bay watershed from the adverse effects of a warming climate. Climate change is already happening in Maryland with observed impacts including sea-level rise, increases in water temperature, heavier rains, more frequent heat waves and drought, and adverse impacts on tourism. In 2007, the Maryland Commission on Climate Change was established to advise the Governor and the Maryland General Assembly on strategies for reducing greenhouse gas (GHG) emissions. In the following years, several acts were passed establishing GHG reduction targets that were successfully met. The latest target (and most ambitious in the country) was passed into law under the Climate Solutions Now Act (CSNA) which calls for a 60% emissions reduction target by 2031 and “net zero” emissions by 2045. MAA is actively developing and improving actions that reduce GHG emissions while also adapting to the current and future effects, risks, and hazards of climate change.

This application requests \$1.5 million of fiscal year (FY) 2023 supplemental discretionary grant funding from the Federal Aviation Administration’s (FAA) Office of Airports, Airport Improvement Program (AIP) to continue MAA’s commitment to solar power generation and begin implementing the solar initiatives prioritized in the Study (the Project).

SECTION 1: ELIGIBILITY

The Project is offered in response to FAA’s Airports Climate Challenge initiative in support of the current administration’s goals to achieve net-zero GHG emissions economy-wide by 2050. The Project meets the eligibility criteria of C.3.a.3 (iii) *Energy Supply, Redundancy and Microgrids* contained in the Notice of Funding Opportunity (NoFO). As MTN is a non-hub airport, MAA is eligible for 90% AIP funding as described in the AIP Handbook. The Airport is located in Baltimore County, an area designated by the United States Environmental Protection Agency’s (EPA) National Ambient Air Quality Standards (NAAQS) as (1) nonattainment for 2008 and 2015 8-hour ozone, precursors of which are oxides of nitrogen (NO_x) and volatile organic compounds (VOC), as well as 2010 sulfur dioxide (SO₂), and (2) is designated a maintenance area for 1997 particulate matter with a diameter of 2.5 microns or less (PM_{2.5}). While the Energy Supply, Redundancy, and Microgrids criteria does not require projects to be in non-attainment areas, the emission reductions from the Project will benefit an area that is in nonattainment of the NAAQS described in the Clean Air Act.

Figure 1: Example of Solar Array



Source: Maryland Aviation Administration, 2024

The Energy Supply Redundancy and Microgrid (“Microgrid”) Program funding, as specified in 49 USC 47102 (3)(p), is allowed to be used for activities associated with the acquisition or construction of equipment that will supply energy to the Airport. Specifically, 49 USC 47102 (3)(p) specifies that the Secretary of Transportation may fund “an on-airport project to improve the reliability and efficiency of the airport’s power supply and to prevent power disruptions to the airfield, passenger terminal, and any other airport facilities, including the acquisition and installation of electrical generators, separation of the airport’s main power supply from its redundant power supply, and the construction or modification of airport facilities to install a microgrid (as defined in section 641 of the United States Energy Storage Competitiveness Act of 2007 (42 U.S.C. 17231).”

Priority Project Category

The Project is eligible for the Emissions and Energy (EE) Priority Project Category, as it is intended to be funded under the Microgrid Program. MAA has completed the planning for a solar facility and the assessment of energy requirements and usage and is thus eligible to apply for a grant under 49 USC 47102 (3) (p). While any public-use airport that is eligible to receive AIP funds is also eligible for the Microgrid Program, FAA’s selection criteria has historically prioritized airports that are in nonattainment or maintenance of the NAAQS for one or more criteria pollutants. This makes the Project an important step towards improving local health. The Project will result in the generation of renewable power that will be used within the boundaries of the Airport and will comply with all requirements contained within 49 USC 47102 (3)(p) and the corresponding Technical Guidance.

SECTION 2: PROJECT DESCRIPTION

Project Purpose and Scope

The Study described and analyzed the logistical, financial, and long-term planning feasibility of solar power generation at numerous sites within the Airport boundaries. In conjunction with our efforts to eliminate carbon emissions being studied in the FAA-funded MTN Decarbonization Plan, MAA is interested in building the Airport’s first solar photovoltaic (PV) array by utilizing this innovative grant request. Our grant request includes (1) expediting our decarbonization actions by respectfully requesting the maximum allowable grant award from FAA’s FY 2023 supplemental discretionary grant program, (2) providing matching funds that meet or exceed the 10% local match requirement of AIP, and (3) utilizing a design/build contracting mechanism to motivate the winning contractor to build the most efficient solar array possible (that maximizes the energy production of regardless of footprint, configuration, manufacturer, or equipment specifications utilized). The Project is described using generic assumptions, which MAA will seek to improve through a design-build procurement process that seeks to maximize the energy produced within the budget and footprint available.

This application refers to the site as MTN Site 2, it’s identifying site number in the Study. The site was selected based on its land use compatibility, size, and ease of utility interconnection, and it is expected to feed the Airport’s energy supply through MAA’s grid connection. This site is expected to support 0.5 megawatts (MW) of solar PV panels producing 1,400 megawatt-hours (MWh) of clean energy that will be used at the Airport by way of an interconnection agreement with the local utility.

The Study identified multiple sites that were appropriate for the installation of solar PV arrays. While reducing the carbon footprint of the Airport is a high priority for MAA, it is recognized that a full implementation of the solar plan would exceed the allowable funding in NoFO and must be completed in phases. Fortunately, the installation of solar PV arrays is a flexible project that can be scaled to the funding available. Thus, MAA is seeking the maximum allowable grant amount, with the intent to build out as much of the MTN solar plan as is possible with the available funding. MAA intends to use a design/build contracting mechanism to maximize the solar power production, building as much of the 0.5 MW array as is possible with the \$1.67 million budget available.

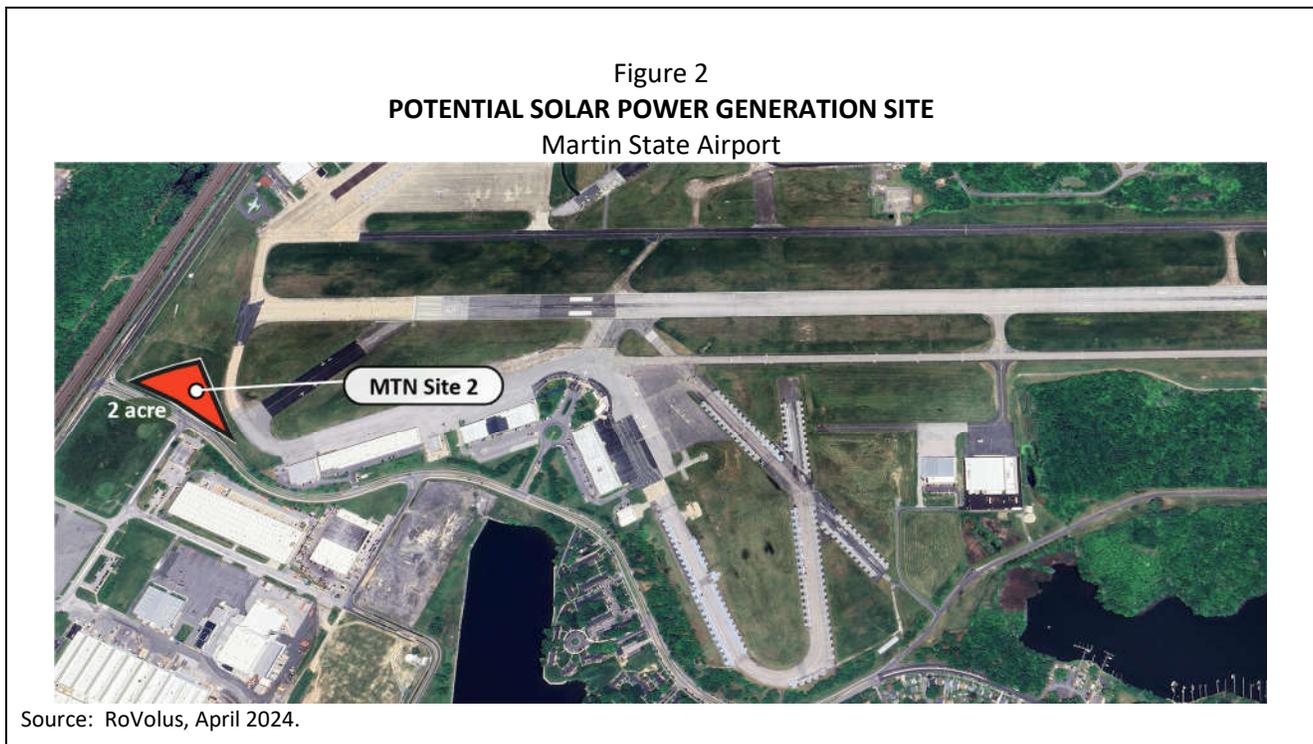
With the aforementioned methodology, our engineers confidently estimate that 0.5 MW of solar PV panels can ultimately be installed at the Site within the budget of this grant request. During the design/build proposal

process, potential contractors will be required to provide a committed power installation amount, and an estimate of funds used on (1) electrical infrastructure needed for interconnection, (2) installation of a solar PV array on stable supports that meet the requirements of construction on an airfield.

MAA is requesting \$1.5 million in grant funding for fiscal year 2023 (FY 2023) to partially cover the design and construction of the solar PV arrays. MAA expects the Project will cost a total of \$1.67 million, with local matching funds provided by MAA.

Location of Project

The solar PV panels will be permanently located at the Airport, installed on solar panel supports on undeveloped land at the Airport entrance on Wilson Point Road as shown in Figure 2.



Projected Energy Production

The objective of the Project is to (1) decrease the Airport's climate footprint by displacing a portion of the energy currently being purchased from traditional sources, by generating zero-emissions, renewable energy onsite, (2) improve energy resilience by providing redundancy and reducing the amount of energy that must be transmitted from traditional power plants that are vulnerable to security risks, natural disasters, and human errors, and (3) reduce operation costs for passengers, tenants, and business partners, and (4) increase electrical capacity to the Airport's campus for future electrification.

First year electricity generation was estimated at approximately 700 MWh from the anticipated 0.5 MW solar PV array. Over a 20-year useful life of the solar PV array, it is estimated that approximately 14,000 MWh of clean power would be produced on-site from the solar PV panels.

Electricity generation was modeled with PVWatts, a subcomponent of the National Renewable Energy Laboratory's System Advisor Model. PVWatts inputs include: (1) location and climate (specific geographic and historic weather data assembled by the National Solar Radiation Database and provided as default values in PVWatts), (2) array tracking and orientation (measures the orientation of the array surface with respect to

incoming solar radiation), (3) system derate factor (measures the electrical conversion efficiency, or electrical loss that occurs during the conversion of DC electricity to AC electricity), (4) shading (measures the interference with incoming solar radiation that occurs due to nearby objects such as building, trees, etc.), and (5) array capacity. The proposed solar PV array was modeled as a single component (module and inverter).

Alignment with Administration Priorities

The Project is broadly compatible with several priorities of the current Presidential administration, including:

- Executive Order (EO) 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*, which advocates for better accounting of the social costs and impacts of gases associated with climate change, including carbon, nitrous oxide, and methane. Projects to replace conventionally-generated electricity with carbon free electricity directly reduce airport carbon emissions, which results in a corresponding reduction of social costs on affected communities.
- EO 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*, which advocates for the Federal government to adopt improved practices that will encourage more fair treatment and better accounting of potential impacts in historically underserved communities. The Project supports the goals of this EO by reducing Airport-related climate change impacts to neighboring communities via the generation of renewable energy and the corresponding GHG reductions.
- EO 14008, *Tackling the Climate Crisis at Home and Abroad*, which sets out a series of tasks intended to reduce current and future climate-related impacts. These tasks include the development of sustainable infrastructure (Sec. 213) which, in the service of ensuring Federal infrastructure investments reduce climate pollution, considers the effects of GHG emissions and climate change in these decisions. The Project would result in the reduction of climate pollution by significantly reducing GHG and local emissions associated with the generation of power at traditional power plants and aligns well with the goals of this EO.

SECTION 4: COST ESTIMATE

MAA anticipates funding 90% of the Project’s cost through the requested AIP discretionary funds. MAA is committed to providing the 10% required local match, which could be made available from state funds or airport revenues.

Table 1 summarizes the grant request for the Project. MAA is requesting FAA to provide FY 2023 AIP funds in the amount of \$1.5 million, for a total project cost of approximately \$1.67 million. The proposed cost-share is consistent with FAA AIP guidelines. Cost estimates are not expected to change throughout the proposal/bid cycle, due to our recommended approach to design/build proposals, which would resize the Project to target the grant request amount and local matching funds.

Table 1: Preliminary Funding Estimate for the Solar Photovoltaic Array(s)

Cost Element	Estimated Cost
Transmission, Connection, and Infrastructure Upgrade Needs	425,000
Solar PV array at MTN Site 2	1,241,666
TOTAL COST	\$1,666,666
10% local share	166,666
Formal grant request	\$1,500,000

Source: RoVolus, April 2024.

SECTION 5: EMISSION REDUCTIONS

EPA’s eGRID model was used to determine emission factors for location-specific grid power production in the eGRID Subregion that includes the Airport. Emission factors are provided in units of pounds per Megawatt-hour (lbs/MWh) for carbon dioxide (CO₂), oxides of nitrogen (NO_x), and SO₂. Emission factors and emission reductions are shown in Table 2.

The useful life of a solar PV Array is assumed to be 20 years, with a maintenance cost to replace the inverter equipment incurred at the 10-year point.

Table 2: Emission Factors and Emission Reductions Estimate

	CO ₂	NO _x	SO ₂
Emission Factors (lbs/MWh)	672.8	0.296	0.337
Emission Reductions First Year (tons)	235	0.10	0.12
Emission Reductions 20-year useful life (tons)	4,700	2.0	2.0

Note: Numbers may not add due to rounding
Source: RoVolus, April 2024.

SECTION 6: OTHER SUSTAINABILITY BENEFITS

Solar energy is a renewable source of power that it is a sustainable alternative to the resource constraints of fossil fuels. Additionally, solar energy has an important role in reducing GHG emissions and mitigating climate change, which is critical to protecting humans, wildlife, and ecosystems. The use of solar energy generated onsite will (1) reduce the impacts of local air pollutants near power plants in Maryland, (2) improve the financial sustainability of MAA, (3) increase the resiliency of the National Airspace System (NAS), (4) support American workers through FAA’s Buy America Provisions, (5) reduce MAA’s dependence on fossil fuels, and (6) support energy independence and decrease the negative externalities of the global energy trade.

SECTION 7: PROPOSED SCHEDULE

MAA intends to pursue a design/build procurement mechanism to (1) ensure the “apparent winning proposal” can be selected prior to the grant execution deadline of May 31, 2025, and (2) reduce costs and delays associated with the preparation of engineering design documents needed for design/bid/build procurement strategies.

Execution of the design phase would begin no later than 15 days following selection of the firm, and is expected to take place over the first six months of the Project. MAA would work with the selected contractor to review design documents in the 10%-, 25%-, and 80%-complete stages, and expects final review and approval to take less than 30 days. Approval for Materials Procurement is expected to take place early in this timeframe to ensure equipment is available for construction to start early in the spring construction season. Given that the Project is to be constructed on a currently unused plot of land, construction is expected to be swift and relatively straightforward. MAA expects the construction phase to take place over a 6-month period.

MAA will ensure, via contractual language, that the winning contractor completes all installation and connection activities by May 31, 2027.

Table 3 shows each proposed milestone associated with the Project, including both pre-and post-grant execution activities.

Table 3: Proposed Schedule

Schedule Element/Milestone	Estimated Start Date	Estimated Finish
Development of Requests for Proposals (RFP)*	July 2024	September 2024
RFP Release/Due/Selection Dates*	September 2024	January 2025
Grant Execution Selection of Successful Proposal*	January 2025	February 2025
Project Design	February 2025	June 2025
Design Approval	July 2025	August 2025
Materials Procurement	September 2025	April 2026
Solar PV Installation	March 2026	June 2026
Grant Closeout	June 2026	December 2026

Source: RoVolus, April 2024.

SECTION 8: REGULATORY REVIEWS

Regulatory reviews, and approvals will be required to construct the solar PV arrays, electric transmission lines, and infrastructure connections, including:

- Airport Layout Plan update to include solar array,
- Form FAA 7460-1 - Notice Of Proposed Construction or Alteration, including an assurance there is no potential for ocular impact to the Air Traffic Control tower cab, and
- National Environmental Policy Act (NEPA) review is expected to be addressed with a Categorical Exclusion as described in FAA Order 1050.1F.

SECTION 9: FINANCIAL PLAN

The requested grant funding and local matching funds are expected to cover the capital cost of designing, purchasing and installing the solar PV array, as well as associated electrical upgrades required to transmit the solar power to the grid. It requires a 10% local match to support the FAA grant and MAA will use local funds to provide that match.

SECTION 10: PROJECT FLEXIBILITY

The scope and potential cost of the Project has been developed based on the most current information available. However, neither a request for information on equipment and vendors, nor any formal construction bids have been solicited for this work. In the current environment of price instability in some sectors, it is possible that the total cost of equipment and/or installation could be higher or lower than anticipated. As a result, the Project has been designed to be scalable to match actual bids and/or available funding. However, given the cost of interconnection to the grid, a significant reduction in the grant amount requested could result in a disproportionate reduction in power generation. It could also result in a delay in meeting Federal, state, local, and agency goals concerning climate change and sustainability.