



ADVANCE MOBILITY NC

AAM Readiness Energy Audit Guidebook



September 2025

HNTB



Table of Contents

1.	Introduction	1
2.	Energy Audit Guidance	3
2.1.	Prep	3
2.2.	Audit	5
2.3.	Further Analysis & Next Steps	7
3.	Energy Audit for 3-Phase Power Upgrade	9
4.	Utility Engagement	10
4.1.	Key Questions to Ask Utilities	10
4.2.	Utility Engagement Template	11
5.	Energy Audit Support Tables	12
5.1.	AAM Infrastructure Needs	12
5.2.	General AAM Charging Specifications	13
5.3.	AAM Energy Demand Estimates	14
5.4.	AAM Electrical Capacity Issues & Proposed Upgrades	14
6.	Energy Audit Resources	15

List of Figures

Figure 1:	AAM Readiness Flowchart	2
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List of Tables

Table 1:	AAM Energy Audit Steps	1
Table 2:	Prep Guidance and Worksheet	3
Table 3:	Audit Guidance and Worksheet	5
Table 4:	Further Analysis & Next Steps Guidance and Worksheet	7
Table 5:	3-Phase Feasibility Energy Audit Guidance	9
Table 6:	AAM Infrastructure Needs	12
Table 7:	General AAM Charging Infrastructure Specifications	13
Table 8:	General AAM Infrastructure Energy Demand Estimates	14
Table 9:	AAM Readiness Electrical Capacity Issues & Proposed Upgrades	14
Table 10:	Resource Links	15

1. Introduction

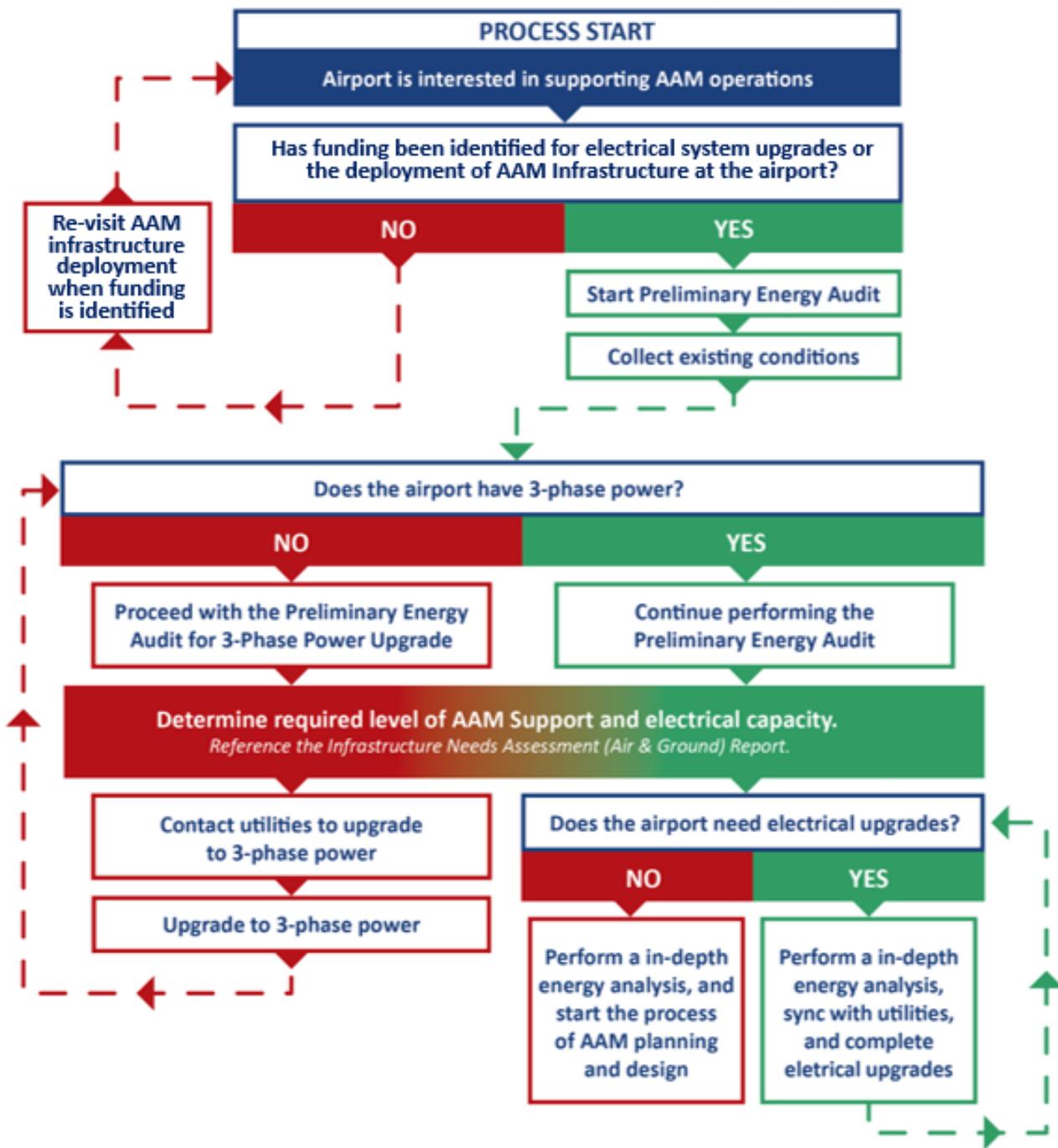
This planning-level guidebook is designed to help airports assess their energy needs to support Advanced Air Mobility (AAM) operations through a preliminary energy audit. The integration of vertiports, electric Conventional Takeoff and Landing (eCTOL) and electric Vertical Takeoff and Landing (eVTOL) operations, and other AAM systems require robust electrical infrastructure. This is driven by the high energy demands of electric aircraft charging, the need for reliable grid connectivity to support continuous operations, and the importance of scalable systems to accommodate future growth in air mobility network. This preliminary study will enable airports to evaluate their current systems and identify necessary upgrades. The energy audit process is divided into three stages: Preparation, Audit, and Future Analysis & Next Steps.

Table 1: AAM Energy Audit Steps

Description	Energy Audit Action Items
 <p>Preparation: This stage involves assembling the project team, gathering existing conditions, and initiating the audit process.</p>	<ol style="list-style-type: none"> 1. Identify Stakeholders 2. Determine Use Cases 3. Collect Existing Conditions <ul style="list-style-type: none"> • 12-Months of Utility Bills • Utility Maps • As-built Single-line Diagram • Existing Backup Power Specifications • Electrical Service Size(s)
 <p>Audit: This stage includes verification of 3-phase power availability for AAM operations and assessing existing electrical infrastructure.</p>	<ol style="list-style-type: none"> 4. Verify Existing Conditions <ul style="list-style-type: none"> • Collaborate with Local Utilities to Confirm Capacities 5. Determine if 30-day Metering Study is Needed
 <p>Further Analysis & Next Steps: This stage focuses on analyzing utility bills/metering study, contacting utilities, and planning for electrical upgrades. A baseline energy profile will be created to capture the airport's typical energy use over time, serving as a reference for future demand and management planning.</p>	<ol style="list-style-type: none"> 6. Analyze Utility Bills or 30-day Metering Study <ul style="list-style-type: none"> • Baseline Energy Profile • Evaluate voltage and phase compatibility with AAM charging requirements. 7. Contact Utility with Results 8. Confirm Desired Upgrades and Begin Prep for Construction

By following this guidebook, airports can take the necessary steps to meet the energy demands of future AAM systems. [Table 1](#) outlines the process of the preliminary energy audit for AAM readiness. An energy audit is not only a technical assessment but a strategic tool that informs infrastructure planning, investment decisions, and upgrades. [Figure 1](#) presents a flowchart outlining the decision-making process an airport would follow to assess its AAM readiness.

Figure 1: AAM Readiness Flowchart



2. Energy Audit Guidance

The energy audit guidance and supporting worksheet and resources have been developed to support airports with conducting a preliminary AAM readiness energy audit. This audit is key for assessing the airport's current energy infrastructure, understanding the energy demands of proposed AAM systems, and identifying necessary upgrades to support AAM operations. It is important to note that an in-depth energy analysis should be performed after this preliminary audit and prior to the design of the proposed AAM systems to ensure comprehensive analysis and accurate planning, as seen in [Figure 1](#).

2.1. Prep

The preparation stage of a preliminary AAM energy audit is critical because it establishes the foundation for accurate analysis and effective planning. During this phase, the audit team defines the scope of the audit, gathers essential data on current energy usage, and coordinates with stakeholders to understand operational patterns and infrastructure constraints. Without thorough preparation, key variables may be overlooked, leading to incomplete assessments or costly missteps during implementation. Ultimately, a well-prepared audit enables informed decision-making and supports the successful integration of AAM technologies into existing transportation systems. [Table 2](#) includes the prep stage guidance steps and worksheet.

Table 2: Prep Guidance and Worksheet

 Guidance	Worksheet
<p>1: Identify Stakeholders</p> <ul style="list-style-type: none"> a: Determine project team to perform the AAM Readiness Energy Audit. Assign team roles and responsibilities. b: Start communicating with key stakeholders at the airport. Examples of key stakeholders are: <ul style="list-style-type: none"> i: Planning and Engineering Departments: AAM Use Cases, Planning, and Designs. ii: Operations/Maintenance Department: On-Site Utilities Information, Energy Audit iii: Leadership: Sign-Off and AAM Support c: Engage with utilities. Reference the Utility Engagement section for the Utility Engagement Template and Sample Questions. d: Host a kick-off meeting or send an informational email to begin the analysis. 	<p>Project Team: <i>Project Manager:</i> <i>Electrical Engineering Lead:</i></p> <hr/> <p>Key Internal Stakeholders:</p> <hr/> <p>Utilities Contact Information:</p> <hr/> <p>Was a meeting held, or an informational email sent out to stakeholders? (Y/N)</p>
<p>2: Determine Use Case(s) for Airport</p> <ul style="list-style-type: none"> a: Identify AAM use cases— eCTOL Cargo Logistics, eVTOL Emergency Response, and Regional Air Metro Services— and determine the associated infrastructure needs for 	<p>AAM Use Cases:</p>

 Guidance	Worksheet
<p>each. Reference Table 6 for a listing of key infrastructure needs.</p> <ul style="list-style-type: none"> b: Identify the infrastructure needed for the selected use case(s). c: Use the GIS mapping to map the potential infrastructure deployments. <ul style="list-style-type: none"> i: Ensure the following layers are included: airport location, transmission lines, emergency response facilities, land use and zoning overlays, demographic and economic indicators, and use sub-area planning techniques to identify focus zones within communities. ii: Capture GIS coordinates of key infrastructure points. 	<p>AAM Use Cases Infrastructure Needs:</p> <hr/> <p>GIS mapping software</p>
<p>3: Collect Existing Conditions</p> <ul style="list-style-type: none"> a: Collect the most recent 12 months of historical electricity bills from all airport-owned facilities with energy usage and peak demand. b: Request and collect updated utility maps from local utility. Utility maps that have been updated within the last 6 months are preferable. c: Request and collect as-built single-line diagram for airport campus, including backup generation and distributed energy resources to document known conditions between utility demarcation point and desired installation. d: Using the single-line diagram, create a spreadsheet to document service sizes, including the following details: location, voltage, amperage, transformer capacity, associated meter or account number, and limitations. 	<p>File Location of 12 Months of Historical Electrical Bills from All Airport-Owned Facilities:</p> <hr/> <p>File Location of Utility Maps and As-built Single-line Diagram:</p> <hr/> <p>File Location of Specifications of Existing Backup Power, Microgrids, or Energy Storage Systems:</p> <hr/> <p>File Location of Service Sizes Spreadsheet:</p>

2.2. Audit

The Audit stage involves an assessment of the airport's power availability and infrastructure, as well as its resilience and redundancy. This stage is critical for identifying the current state of the airport's electrical systems and determining the necessary upgrades to support AAM operations. By conducting this audit, the airport can ensure it is well-prepared to meet the energy demands of future AAM systems. [Table 3](#) includes the Audit guidance steps and worksheet.

Table 3: Audit Guidance and Worksheet

 Guidance	Worksheet
<p>1: Verify Existing Conditions</p> <p>a: Confirm Availability of 3-Phase Power</p> <ul style="list-style-type: none"> i: Reference the utility map to determine whether the power lines to the airport are single-phase or 3-phase. Look for indicators such as “3Ø” or “three-phase” in diagrams or service descriptions. ii: If single-phase is only available, proceed with the guidance steps in the Energy Audit for 3-Phase Power Upgrade section. <p>b: Assess transformer, panel, and conduit capacity.</p> <ul style="list-style-type: none"> i: Reference the utility maps or GIS data showing the location of transformer and service panel. ii: Locate, take photos, and inspect the main electrical service panel, transformers, and conduit systems. iii: Compare real-life conditions to as-built single-line diagrams for location and technical accuracy. iv: Record panel amperage ratings, transformer kVA ratings, and conduit sizes and availability. v: Identify any signs of overloading or aging infrastructure. vi: Note any easements or right-of-way (ROW) that may affect access or expansion. <p>c: Determine site suitability for expansion.</p> <ul style="list-style-type: none"> i: Review site layout for physical space to add charging infrastructure, switchgear, electrical panels, transformers, or conduit. ii: Check for available breaker space in existing panels: <ul style="list-style-type: none"> (1) Inspect each electrical panel to identify unused breaker slots and confirm that the addition of new breakers will not exceed the panel’s rated capacity. Ensure total loading remains between 80% and 100% of the panel’s rated capacity, avoiding overloading or underutilization. (2) Ensure compatibility with the required breaker type and document any constraints found. 	<p>File Location of Documentation and Maps Showing Type of Power Supply Available at The Site:</p> <hr/> <p>Discrepancies with Documentation:</p> <hr/> <p>Voltage Level:</p> <hr/> <p>Phase Configuration:</p> <hr/> <p>File Location of Main Electrical Service Panel, Transformers, and Conduit Systems Photos:</p> <hr/> <p>Identified the location of existing transformers and switchgear on the site plan? (Y/N)</p> <hr/> <p>Transformer Capacity:</p> <hr/> <p>Transformer kVA Ratings:</p> <hr/> <p>Panel Amperage Ratings:</p> <hr/> <p>Conduit Sizes and Fill Levels:</p> <hr/>

 Guidance	Worksheet
<ul style="list-style-type: none"> iii: Collaborate with the utility provider to confirm whether additional service capacity can be made available and to establish a projected timeline for availability. iv: Document any constraints (e.g., trenching limitations, structural barriers). 	<p>Electrical Panels and Wiring Notes:</p> <hr/> <p>Easements or ROW that May Affect Access or Expansion:</p> <hr/> <p>Is there physical space for any upgrades? (Y/N)</p> <hr/> <p>File Location of Site Plan with Available Space Marked for Any Upgrades:</p> <hr/> <p>Is there available breaker space in existing panels? (Y/N)</p> <hr/> <p>Can additional service capacity be made? (Y/N)</p> <hr/> <p>Constraints:</p>
<p>2: Determine if 30-day Metering Study is Needed</p> <ul style="list-style-type: none"> a: If the airport meets any of the following, a 30-day metering study is warranted: <ul style="list-style-type: none"> i: The airport lacks 12 months of complete utility data. ii: New large systems have been installed, but their demand is not reflected in the existing metering data, and no detailed demand study was conducted prior to installation. 	<p>Is a 30-day metering study needed? (Y/N)</p>

2.3. Further Analysis & Next Steps

The Further Analysis & Next Steps stage of a preliminary AAM readiness energy audit is critical because it transforms initial findings into actionable strategies. After gathering data and assessing existing conditions, this phase allows airport managers to evaluate energy demand projections, infrastructure gaps, and potential technology solutions in greater detail. This step also helps prioritize future investments, identify permitting or utility coordination needs, and align with regulatory and funding requirements. Without this step, the audit remains a snapshot rather than a roadmap, limiting its usefulness in guiding long-term planning, stakeholder engagement, and implementation. Ultimately, this stage ensures that the audit leads to informed decisions and measurable progress toward AAM readiness. [Table 4](#) includes Further Analysis & Next Steps guidance and worksheet.

Table 4: Further Analysis & Next Steps Guidance and Worksheet

 Guidance	Worksheet
<p>1: Analyze Utility Bills or 30-day Metering Study</p> <ul style="list-style-type: none"> a: If a 30-day metering study is warranted, proceed with enlisting qualified in-house electricians or contracting a qualified contractor to complete the study. Upon completion, continue to the following step. b: Evaluate voltage and phase compatibility with AAM charging requirements. <ul style="list-style-type: none"> i: Review specifications for the proposed AAM charging equipment. If the airport does not have access to the charging equipment specifications, reference the general specifications listed in Table 7 and review Table 8 for the general AAM infrastructure energy demand estimates. ii: Compare the specifications with existing site power characteristics. iii: Assess the capacity of the existing electrical infrastructure to handle additional load. iv: Reference the on-site measurements and utility data to verify actual power availability. v: If discrepancies or limitations are identified, consult with the airport's on-site facilities team, a licensed electrical engineer, or a qualified electrical contractor for further evaluation and resolution. c: Document any proposed electrical upgrades (e.g., service upgrades, step-down transformers). Reference Table 9 to understand what upgrades are needed. 	<p>File Location of 12 Months of Historical Electrical Bills from All Airport-Owned Facilities:</p> <hr/> <p>File Location of Technical Specifications for the AAM Charging Equipment (if available):</p> <hr/> <p>Technical Specifications and Existing Site Power Characteristics Discrepancies:</p> <hr/> <p>Proposed Electrical Upgrades by Site:</p>

 Guidance	Worksheet
<p>2: Contact Utility with Results</p> <ul style="list-style-type: none"> a: Share the preliminary energy audit findings with the utility provider, by scheduling a meeting or sending a summary report outlining key results (current service capacity, peak demand, anticipated demand, and potential bottlenecks). b: Work with the utility to determine whether service or metering upgrades are needed. c: Request a cost estimate for any required electrical upgrades. d: Initiate a rate discussion and explore available incentives or utility-based funding programs for AAM charging infrastructure to help offset operating costs. 	<p>Electrical Upgrades Needed:</p> <hr style="border-top: 1px dashed #ccc;"/> <p>File Location of Cost Estimate:</p>
<p>3: Confirm Desired Upgrades and Begin Prep for Construction</p> <ul style="list-style-type: none"> a: Validate the need for electrical upgrades based on the preliminary energy audit findings, by proceeding with a comprehensive energy and infrastructure analysis. b: Obtain updated cost estimate to support funding decisions and upgrade planning. c: Estimate permitting and construction timelines for new or upgraded connections. d: Include utility scheduling constraints in overall AAM readiness planning. e: Initiate the preliminary design work. 	<p>File Location of Comprehensive Energy and Infrastructure Analysis Report:</p> <hr style="border-top: 1px dashed #ccc;"/> <p>File Location of Permitting and Construction Timeline:</p> <hr style="border-top: 1px dashed #ccc;"/> <p>Utility Scheduling Constraints:</p>

3. Energy Audit for 3-Phase Power Upgrade

This section provides guidelines for airports that currently have only single-phase power available and still want to move forward with supporting AAM operations. To support the infrastructure required for AAM, airports will need to upgrade to 3-phase power, which is essential for handling significantly increased energy demands. AAM systems, including charging stations, hangar operations, and air traffic systems, can require power loads ranging from 500 kW to over 2 MW, depending on the scale of operations and number of aircraft served. These demands far exceed the capacity of typical single-phase systems and necessitate robust, scalable electrical infrastructure. These guidelines have been developed to help airports assess their current power capabilities and plan for the necessary upgrades to achieve 3-phase power compatibility. [Table 5](#) includes guidance for upgrading to 3-phase power.

Table 5: 3-Phase Feasibility Energy Audit Guidance

 Energy Audit for 3-Phase Power Upgrade - Guidance	Worksheet
<p>1: Define AAM Power Requirements</p> <p>a: Estimate the total electrical load/ energy demand required for AAM systems (charging stations, hangar operations, air traffic systems, and communications). Reference Table 7 and Table 8 for the general AAM infrastructure energy demand estimates.</p> <p>b: Identify peak demand and future scalability needs.</p>	<p>Projected AAM Load:</p> <p>.....</p> <p>Peak Demand:</p> <p>.....</p> <p>Future Scalability Needs:</p>
<p>2: Contact Utility with Results</p> <p>a: Share the AAM load projections and 3-phase power needs with the utility provider.</p> <p>b: Ask if 3-phase service is available at or near the site.</p> <p>c: Request a feasibility study, cost estimate for extending or upgrading service, and lead times for equipment and construction.</p>	<p>Is 3-phase service available at or near the site? (Y/N)</p> <p>.....</p> <p>File Location of Cost Estimate:</p>
<p>3: Begin Prep for Construction</p> <p>a: Hire a licensed electrical engineer or could also be a qualified contractor or electrician to design the upgraded service layout, size transformers, switchgear, and panels, and ensure compliance with NEC (National Electrical Code), local codes, and airport safety standards.</p> <p>b: Use utility and engineering cost estimates to budget and secure funding.</p> <p>c: Schedule construction, testing, inspection, and commissioning of the new service.</p>	<p>File Location of Upgraded Service Layout:</p> <p>.....</p> <p>File Location of Utility and Engineering Estimates:</p>

4. Utility Engagement

Utility engagement is critical during the preliminary AAM readiness energy audit as it ensures that the planning process is grounded based on actual local grid capacity, infrastructure limitations, and interconnection requirements. Utilities provide essential data on existing electrical services, transformer availability, and upgrade timelines, which directly influence site feasibility and deployment schedules.

Early collaboration helps identify potential constraints, such as insufficient 3-phase power and long equipment upgrade lead times, and allows for coordinated planning of load management strategies, rate structures, and renewable energy integration. Without utility input, energy audits risk overlooking key technical and financial factors that could delay or derail AAM implementation. This section includes sample questions and an engagement template to guide airports through communications with their local utility.

4.1. Key Questions to Ask Utilities

Power Capacity & Load Planning (Site-specific¹)

- What is the current available capacity at the nearest substation or feeder?
- Can the existing infrastructure support high-power charging for AAM operations?
- Are there any seasonal or peak load constraints that could affect AAM operations?
- How does the utility prioritize service restoration for airports during outages?
- What are the utility's standards for transformer sizing and placement for aviation-related loads?
- What are the utility's requirements for underground line extensions?

Rates, Incentives & Cost Recovery

- What are the utility's policies on demand charges or time-of-use rates for high-power charging?
- What rate structures are available for high-load, intermittent users like eVTOL charging? Does the airport qualify for time-of-use or EV-specific tariffs?
- Can the airport participate in demand response or other grid services?
- Are there any incentives or rebates for infrastructure upgrades or renewable integration?

Upgrade Timelines

- What is the estimated lead time for upgrading service to support 3-phase power at the site?
- Are there any known constraints (e.g., permitting, equipment availability, workforce) that could delay upgrades?
- What is the typical timeline for transformer upgrades in this service area?
- Can you provide a Gantt-style breakdown of the upgrade process from application to commissioning?
- Are there any planned grid improvements in this area that could align with our AAM deployment?
- What is the process for coordinating long-term infrastructure planning with the utility?
- Can the utility provide a single point of contact for AAM-related projects?

¹ [The Power Capacity & Load Planning questions are site-specific and should be addressed individually for each location.](#)

4.2. Utility Engagement Template

This template should be used when initiating discussions with electric utility providers for AAM readiness planning.

Project Name:	
Airport Name & Location:	
Point of Contact (Airport):	
Point of Contact (Utility):	
Date of Initial Contact:	

Project Overview:

Brief description of AAM use case (e.g., eVTOL passenger service, cargo logistics), expected power demand (kW/MW), and timeline for deployment

Existing Infrastructure:

(e.g., current service voltage and capacity, proximity to substation, known constraints or limitations.)

Requested Information:

(e.g., feasibility of 3-phase service extension, upgrade cost estimates, interconnection process and timeline, backup power options (e.g., microgrid, battery storage), rate structure and demand charges.)

Next Steps:

- Site visit scheduled? [Yes/No]
- Load study required? [Yes/No]
- Follow-up meeting date:
- Additional documentation needed:

5. Energy Audit Support Tables

This section of the document is important because it provides foundational guidance for conducting a preliminary energy audit to assess AAM readiness at airports. By identifying potential electrical capacity challenges and offering upgrade options, the section helps airport managers evaluate whether their facilities can support AAM operations and what improvements may be necessary. As AAM technologies and standards continue to evolve, this section also emphasizes the importance of consulting current guidance to ensure alignment with best practices and regulatory expectations.

The following tables are provided to provide further guidance and resources:

- AAM Infrastructure
- General AAM Charging Specifications
- AAM Energy Demand Estimates
- AAM Electrical Capacity Issues & Proposed Upgrades

5.1. AAM Infrastructure Needs

The AAM Infrastructure Needs table ([Table 6](#)) explores necessary infrastructure for AAM within airport environments.

Table 6: AAM Infrastructure Needs

Infrastructure Needs

- **Current Transformers & Metering Cabinet:** Electrical devices used to measure energy use for accurate load monitoring and billing.
- **Dedicated Meter:** An electrical meter installed to track aviation-specific energy usage.
- **Fire Suppression Systems:** Safety equipment designed for lithium-ion battery risks and aircraft safety.
- **Hangars & Maintenance Bays:** Facilities equipped for battery diagnostics, cooling systems, and general maintenance.
- **High-Capacity DC Fast Chargers:** Charging equipment rated at 100 kW - 1 MW to support aircraft charging requirements. Requires distinct charger access (clearances, ingress/egress, etc.) for eCTOL and eVTOL.
- **Lighting & Signage:** Infrastructure to support low-visibility or night operations and safety compliance.
- **Passenger Boarding Areas:** Facilities designed to provide shelter that are also ADA-compliant and integrated with scheduling systems.
- **Runways:** Airside facilities sized appropriately for eCTOL aircraft. The eCTOL runway size is around 2,500 to 6,500 feet, depending on eCTOL aircraft size².

² FAA. (2005). *AC 150/5325-4B Runway Length Requirements for Airport Design*

Infrastructure Needs

- **Smart Grid Integration:** A modernized grid that supports load balancing, demand response, and predictive energy management to monitor, manage, and optimize energy flow.
- **Taxiways & Aprons:** Airside reinforced surfaces to support eCTOL weight and movement.
- **Transformers and Substations:** Electrical equipment upgrades to support high power draw, especially during simultaneous charging.
- **Three-Phase (3-Phase) Electrical Service Extension:** Overhead or underground electrical infrastructure required to provide 3-phase power, depending on site constraints.

5.2. General AAM Charging Specifications

By outlining these specifications, [Table 7](#) helps airports, utilities, and managers accurately assess whether their existing electrical infrastructure can support AAM technologies or if upgrades are needed. It also promotes consistency, safety, and interoperability as the industry evolves. As AAM technologies and standards continue to develop, this table serves as a foundational tool for aligning infrastructure planning with current best practices and regulatory expectations.

Table 7: General AAM Charging Infrastructure Specifications

Parameter	Specification Range	Notes
Voltage	400 V – 1,000 V DC	Higher voltages (up to 1,500 V) may be needed for ultra-fast charging
Current (Amperage)	200 A – 800 A	Dependent on aircraft battery size, charging limitations, and desired turnaround time
Power Output	100 kW – 1 MW per charger	Scalable based on aircraft type, requirements, and fleet size
Phase	3-phase AC input	Standard for industrial and airport-grade systems
Frequency	60 Hz	Must match local grid standards
Connector Standards	Depends on the aircraft manufacturer – CCS1, Joby GEACS, NACS, MCS, SAE AE-7D (in development)	Standardization is still evolving
Transformer Size	eCTOL: 500 kVA per 350 kW charger eVTOL: 750 kVA per 500 kW charger	Multi-megawatt (2.5–5 MVA) transformers needed for vertiports with multiple chargers

5.3. AAM Energy Demand Estimates

The AAM Energy Demand Estimates (Table 8) helps managers estimate total load, identify peak demand scenarios, and coordinate with utilities to ensure reliable service. It also supports budgeting, site selection, and long-term energy planning, making it a critical tool for informed decision-making and readiness assessment.

Table 8: General AAM Infrastructure Energy Demand Estimates

AAM Infrastructure	Energy Demand Estimates
eVTOL and eCTOL Charger	500 kW per charger
Vertiports Lighting and Signage	Assumptions: <ul style="list-style-type: none"> LED lighting power density: ~1–2.5 W/sq ft Vertiport pad area: ~2,000 sq ft per pad Signage and safety lighting: ~2–5 kW per pad Lighting duration: 10 hours per night (e.g., 8 pm – 6 am)
	Example Estimate: <ul style="list-style-type: none"> 2 pads @ 2,000 sq ft each × 2 W/sq ft = 8 kW Signage and beacons = 5 kW Total lighting demand: ~13 kW Total energy demand: 13 kW x 10 hours = 130 kWh per night

5.4. AAM Electrical Capacity Issues & Proposed Upgrades

This table helps airports proactively identify and address potential electrical limitations that could hinder the deployment of AAM infrastructure. As AAM systems, such as electric aircraft charging stations, require substantial and reliable power, Table 9 outlines common capacity challenges like insufficient transformer size, lack of 3-phase service, or outdated switchgear.

Table 9: AAM Readiness Electrical Capacity Issues & Proposed Upgrades

Electrical Capacity Issue	Impact on AAM Readiness	Proposed Electrical Upgrade
Insufficient transformer capacity	Limits ability to support electric aircraft charging systems	Upgrade or install new high-capacity transformers
Overloaded service panels	Risk of outages or inability to add new loads	Replace or expand service panels with higher ampacity
No smart metering or load monitoring	Poor visibility of energy usage and peak demand	Deploy advanced metering infrastructure (AMI) and energy management system (EMS)
Single-phase power	Insufficient for electric aircraft charging systems	Upgrade to 3-phase service from utility
No dedicated AAM service connection	Shared loads may cause interference or reliability issues	Establish dedicated service lines or meters for AAM infrastructure
Limited space for electrical equipment	Physical constraints on installing necessary infrastructure	Conduct site assessments and redesign layouts to accommodate switchgear, transformers, etc.

6. Energy Audit Resources

This section offers a list of references to support the preliminary energy audit. These curated resources are designed to assist planners, engineers, and auditors in their assessments. [Table 10](#) includes links, infrastructure requirements based on specific use cases, and detailed specifications for charging infrastructure.

Table 10: Resource Links

Resource	Description
American Planning Association (APA). (2024). <i>Planning for Advanced Air Mobility</i>	The report provides guidance for planners and policymakers on how to prepare communities for the integration of AAM systems by addressing infrastructure, land use, environmental impacts, equity, and regulatory considerations.
National Academies of Sciences, Engineering, and Medicine. (2021). <i>Airport Microgrid Implementation Toolkit</i>	The toolkit provides guidance and tools for airports to assess, plan, and implement microgrids to enhance energy resilience, reliability, and sustainability in response to increasing power outage risks.
National Academies of Sciences, Engineering, and Medicine. (2022). <i>Preparing Your Airport for Electric Aircraft and Hydrogen Technologies</i>	This research report provides a framework to help airports assess, plan, and implement infrastructure and operational changes needed to accommodate emerging electric and hydrogen-powered aircraft technologies.
National Institute of Aerospace, National Aeronautics and Space Administration. (2020). <i>Preparing for Take-Off</i>	This study outlines the foundational infrastructure, regulatory, and operational considerations necessary to support the safe and scalable integration of Urban Air Mobility (UAM) systems, such as air taxis and cargo drones, into the national airspace and urban environments.
National Renewable Energy Laboratory (NREL). (2022). <i>Addressing Electric Aviation Infrastructure Cybersecurity Implementation</i>	The report outlines key tools and strategies to reduce cybersecurity risks in electric aviation systems by minimizing the cyberattack surface and enhancing system resilience.
NREL. (2017). <i>REopt: A Platform for Energy System Integration and Optimization</i>	This document demonstrates the capabilities of NREL's REopt model which is used to analyze energy systems and maximize potential using electrification technologies.
NREL. (2021). <i>Electrification of Aircraft: Challenges, Barriers, and Potential Impacts</i>	This report discusses the possible developments and impacts of aviation electrification, including battery technology and charging infrastructure.
NREL. (2023). <i>Federal Aviation Administration Vertiport Electrical Infrastructure Study</i>	In this report, the vertiport infrastructure and operations system is studied to find charging demands, impacts, and infrastructure upgrade requirements.
NREL. (2023). <i>Impacts of Regional Air Mobility and Electrified Aircraft on Airport Electricity Infrastructure and Demand</i>	This study analyzes the impacts of implementing aircraft charging in airport infrastructure. This includes studying distributed energy resources to facilitate the use of renewable energy in aircraft charging.

Resource	Description
<u>NREL. (2023). Overview of Potential Hazards in Electric Aircraft Charging Infrastructure</u>	<p>This report outlines natural, human, and technological hazards that aircraft charging infrastructure faces, including a discussion on the safety and mitigation of the hazards.</p>
<u>United States Government Accountability Office (GAO). (2023). Airport Infrastructure Selected Airports' Efforts to Enhance Electrical Resilience</u>	<p>This audit was performed to study and prevent electrical power outages at airports. This involves analyzing electrical power resilience strategies taken by both airports and the FAA.</p>