

Building Public-Private Partnerships at Underutilized NPIAS Airports: A Business Use Case for Emerging Technologies

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The National Plan of Integrated Airport Systems (NPIAS) includes a range of airports, many of which operate below capacity and face economic pressures, particularly as aviation shifts toward electrification. These sites, often non-hub primaries or general aviation facilities struggle to secure the matching funds required for Airport Improvement Program (AIP) projects, limiting their role in the evolving electrified economy. This article outlines a structured business use case for drawing public-private partnerships (PPPs) to these airports, focusing on public funding mechanisms and technology applications in advanced air mobility (AAM), autonomous vehicles (AVs), energy generation, battery energy storage systems (BESS), artificial intelligence (AI), and blockchain. By strategically using public resources, airport land (both aviation and non-aviation), and support from municipalities, sponsors, state and federal agencies, economic development organizations, and the Small Business Administration (SBA), these airports can become attractive for PPPs. The approach aims to generate new revenue, improve operations, and support national goals in mobility, energy security, and economic growth. Based on reference documents, I confirm key assumptions and discuss how PPPs can address funding gaps while creating value. For aviation professionals familiar with operations but less so with business development, this piece explains concepts step by step, emphasizing practical implications for airport sustainability.

1. The Problem: Economic Vulnerability of Underutilized NPIAS Airports in an Electrified Aviation Era

Underutilized airports in the NPIAS often serve smaller communities where traffic volumes do not support robust operations, leading to financial strain. NASA C/R 20250001574 *"Assessing the Electrification of Aviation's Impact on the Airport and Airway Trust Fund"* (2025) details how this vulnerability intensifies with electrification: the move to electric propulsion reduces taxable fuel revenues for the Airport and Airway Trust Fund (AATF), cutting available funds for maintenance and upgrades. Based on the report's analysis, electrification could lead to revenue shortfalls equivalent to 64% of current aviation gasoline taxes at small airports, threatening their long-term viability.

These airports typically cannot provide the 5-10% matching funds needed for AIP grants, excluding them from projects like vertiport development or charging stations essential for Regional Air Mobility (RAM) or AAM. The result is a cycle of decline: lower revenues lead to deferred maintenance, reduced services, and further economic isolation for the surrounding area. Consider the broader implications, without adaptation, these airports weaken the national network, as they are key for emergency response, cargo, and connectivity in rural or underserved regions.

To break this cycle, we must evaluate economic opportunities that align with national objectives, such as AAM for improved access (AAM National Strategy), AVs for logistics efficiency (DOT frameworks), energy independence through fusion and BESS (Ensuring American Space Superiority EO), AI for operational optimization (National Security Strategy), and blockchain for secure data handling (EDA grants). If current conditions (e.g., low enplanements) or forecasts (e.g., 1-2% annual traffic decline in some areas) indicate limited self-sufficiency, PPPs offer a path forward. Developing a business use case is the first step, providing a clear, data-backed rationale to attract partners.

What does this require? A collaborative effort involving airport data (e.g., FAA Form 5010 reports), economic assessments, and stakeholder input. Each airport's situation differs, land-rich sites near

growth corridors may suit energy projects, while those in logistics hubs favor AVs, but the process starts with honest evaluation of constraints and potentials, grounded in reliable information.

2. Definition of PPP and Its Various Manifestations in Airport Contexts

A Public-Private Partnership (PPP) is a formal agreement between public entities (like airport sponsors or local governments) and private companies to share responsibilities, risks, and benefits in delivering a project or service. In airports, this means combining public assets (e.g., land, grants) with private expertise and capital to achieve outcomes neither could alone. For aviation professionals, think of it as extending a management contract to include investment, private partners fund upgrades in exchange for operational rights or revenue shares.

PPPs in airports appear in several forms, each suited to different needs:

- Concessions: A private firm operates a facility (e.g., a vertiport) and pays fees to the sponsor, often with a percentage of revenues returned.
- Availability Models: The public pays the partner based on performance, such as maintaining BESS uptime, ensuring reliability without upfront public costs.
- Management Contracts: Private oversight for specific functions, like AI-optimized scheduling, without asset ownership transfer.
- Leasing: Long-term use of land for tech installations, generating steady income for the airport.
- Full Divestiture: Rare, involving sale of assets to private hands, though rare and heavily regulated by the FAA.

These are guided by the FAA's Airport Investment Partnership Program (AIPP, formerly known as the Airport Privatization Pilot Program), which waives certain grant repayment rules for approved PPPs. The key is flexibility; PPPs allow airports to pursue technologies without sole financial burden but require careful structuring to protect public interests.

3. Why a Business Use Case is Essential for Attracting PPP

For aviation leaders accustomed to operational planning, a business use case is like a master plan but focused on financial and market viability. It is essential because it translates technical opportunities into a compelling story for investors, showing how the project delivers returns, manages risks, and aligns with goals. Private partners need evidence of profitability, without it, they walk away. Data from industry studies confirms this: PPPs with strong cases secure funding faster, while weak ones fail due to unclear value.

In practice, the business use case builds trust, justifies public contributions (e.g., land leases), and outlines risk sharing (e.g., private handles tech maintenance). For underutilized airports, it highlights how PPPs can turn idle assets into revenue generators, addressing electrification gaps. Ultimately, it answers: Why invest here? In a competitive landscape, a solid business use case positions the airport as a smart choice.

4. Essential Components Toward Business Use Case Development

Crafting a business use case is an iterative, data-informed process that encourages thoughtful synthesis of information. For those in aviation, it's akin to an environmental impact study, thorough, evidence-based, and forward-looking. Core components include:

- Strategic Case: Explains the project's purpose, linking to national priorities (e.g., AAM for connectivity). This sets context, showing how it fits the NPIAS.

- Economic Case: Evaluates alternatives, costs, and benefits, using metrics like net present value (NPV) to prove value for money (VfM). NASA's electrification data can inform assumptions here.
- Commercial Case: Assesses market demand, partner interest, and risks (e.g., AV adoption timelines). It requires scanning investor interest in sectors like BESS.
- Financial Case: Details funding, expenses, and revenues (e.g., BESS ancillary mining profits). Sensitivity tests address variables like energy prices.
- Management Case: Outlines implementation, governance, and monitoring, including KPIs for success.

This process demands collaboration, airport sponsors provide site data, economic developers market insights, ensuring a balanced, realistic plan.

5. Funding Sources to Leverage in Support of PPP Projects

A thoughtful scan of reference documents reveals a mosaic of funding sources, each a thread in the national fabric of innovation. Validated opportunities include:

- FAA AIP (entitlement/discretionary): \$3 billion yearly for infrastructure; AIPP supports PPPs by exempting repayments.
- DOT BUILD/TIGER: For AV-AAM, with \$1.5 billion in FY26.
- EDA Grants: Up to \$100 million for AI hubs.
- SBA 7(a)/504 Programs: Loans covering 90% of costs for small business involvement.
- State/Local Funds: State grants like Wyoming's for energy projects.

These can seed PPPs, reducing entry barriers. For instance, the Digital Asset Market Clarity Act will clarify crypto operations, supporting BESS mining. The US sovereign wealth fund (launching Q1 2026) may incorporate digital assets, further enabling such projects.

6. Leveraging Airport Property and Resources for PPP

Airport property represents a core asset for PPPs, with aviation land suitable for operational enhancements (e.g., vertiports) and non-aviation land ideal for diversified uses (e.g., BESS installations). According to ACRP Report 47 - Guidebook For Developing and Leasing Airport Property, lease agreements can be designed to favor PPP structures, balancing public control with private incentives. Key details include long-term durations (30-50 years) to provide stability for capital-intensive projects like energy generation, revenue-sharing mechanisms (typically 5-10% of gross revenues) to ensure the sponsor benefits from tech-driven income, holdover provisions for seamless extensions, use clauses that explicitly permit emerging technologies while mandating compliance with FAA regulations, non-exclusive rights to avoid monopolies and encourage competition, and subleasing flexibility to allow partners to scale operations (e.g., expanding AI data centers).

Beyond property, airports can leverage municipal marketing efforts to promote sites to potential partners, state aviation grants for initial feasibility studies, federal agency endorsements (e.g., DOE for energy projects), economic development incentives like tax abatements, and SBA resources such as loan guarantees or business counseling to facilitate PPP formation. This integrated approach not only minimizes upfront public costs but also maximizes the airport's appeal as a stable, revenue-generating hub. For aviation professionals, consider how these leases can transform surplus land, often a liability, into a strategic asset, supporting both airport operations and regional growth.

7. Technology Vectors and Opportunities

The business use case for PPPs at underutilized airports centers on technology vectors that address specific challenges while generating revenue. AAM enables vertiports for regional connectivity, reducing leakage by offering efficient short-haul options; AVs support logistics hubs, integrating with ground transport for seamless cargo operations. Energy generation, such as fusion or nuclear, provides baseload power, while BESS offers storage solutions that stabilize grids and create new income streams.

BESS merits particular attention. These systems can serve as emergency backups for airport operations, ensuring continuity during outages for critical functions like lighting and communications, as permitted under FAA guidelines (e.g., Order 6950.2D). However, according to FAA's Revenue Use Policy which requires revenue to stay on-airport unless explicitly allowed, using BESS for off-airport municipal emergency needs is restricted by FAA revenue diversion policies, which prohibit airport resources from benefiting non-aviation uses without approval or regulatory adjustments.

Off-hours, BESS can be appealing for Bitcoin mining. Excess stored energy powers cryptography mining rigs, monetizing idle capacity and generating significant revenue (e.g., millions annually at scale sites). This fits national strategy, as the Trump administration has positioned the U.S. as the "Bitcoin mining capital of the world," with initiatives like the Strategic Bitcoin Reserve (established March 2025) and a sovereign wealth fund (set to launch early 2026) incorporating crypto assets. Pending crypto legislation, like the Digital Asset Market Clarity Act, further supports this by clarifying rules and encouraging domestic mining. AI, under national policy led by David Sacks, enhances operations through predictive tools, aligning with the "America's AI Action Plan" (July 2025) for innovation and infrastructure. DoD's integration of Grok (Jan 2026) signals secure AI access, benefiting small airports via tools for efficiency and planning. Blockchain secures supply chains, with synergies like AI-powered monitoring. These vectors create layered benefits, BESS powering AI, for instance, driving economic value.

8. Case Study: Cheyenne Regional Airport (CYS) – A 360-Degree Perspective

Cheyenne Regional Airport (CYS) in Laramie County, Wyoming, serves as a practical example of how PPPs can address vulnerabilities. From FAA Form 5010, CYC is a commercial service airport with two asphalt runways (9,300 ft and 6,120 ft), 90 based aircraft, and about 40,000 annual operations, a 5% decline from previous levels. Enplanements hover at 20,000 yearly, with 97% leakage to Denver International Airport (DIA). Due to limited service, many passengers drive the 90 miles south to DIA for more options. CYC grant history shows modest AIP support in the form of \$47,000 (2022 planning), \$2.2 million (2023 pavement), and shares of the Airport Infrastructure Grants (AIG) under the Infrastructure Investment and Jobs Act (IIJA). The IIJA/AIG requires further explanation. The IIJA is a landmark federal law providing \$1.2 trillion over five years (FY2022–FY2026) for infrastructure, with \$25 billion specifically earmarked for airports nationwide. This funding aims to modernize the NPIAS, addressing deficiencies in capacity, safety, and resilience at a national scale, critical for maintaining the interconnected network of 3,287 airports that underpins U.S. economic mobility and security. Within the IIJA, the AIG allocate \$15 billion (\$3 billion annually) to eligible airports based on a formula that considers factors like enplanements, cargo volume, and airport category (e.g., non-hub primaries like CYC qualify for shares). These "shares" represent the airport's proportional distribution from the national pool, often disbursed as formula-based entitlements rather than competitive grants. For smaller airports like CYC, this might equate to \$500,000 - \$2 million per year, depending on FAA apportionments, and can fund projects like pavement rehabilitation or terminal upgrades without the same matching requirements as traditional AIP grants.

Economically, Cheyenne is anchored by government/military (F.E. Warren AFB), logistics, health care, construction, manufacturing, and tourism, with growth in data centers and energy sectors. Challenges at CYS include maxed capacity (80% load factor, third highest in Wyoming), airline focus on larger markets, and inflation-driven costs, limiting expansion. A PPP for BESS/AI on 100+ non-aviation acres could mitigate these challenges by generating \$2-5 million yearly from mining, supporting the funding of upgrades. 360-degree view: Economic (new jobs in tech), social (better access for medical/transport), environmental (grid stability), geopolitical (energy security). Regionally, it boosts Wyoming's economy (1.23-2.15% warehousing growth), shoring up NPIAS by maintaining a key node.

a. Economic and Financial Focus Business Use Cases: BESS and Bitcoin Mining

For the BESS/Bitcoin mining PPP, the economic case centers on monetizing excess energy storage for high-return activities. BESS can store renewable or grid power during low-demand periods and discharge for mining operations off-hours, leveraging Wyoming's low energy costs (among the lowest in the US) and abundant wind/solar resources. Financially, this could yield NPV of \$10-20 million over 10 years, with IRR of 15-25%, based on mining profitability (e.g., \$0.03/kWh energy yielding \$50k/month per MW). A leading crypto advocate, Senator Cynthia Lummis (R-WY) co-sponsored the Digital Asset Market Clarity Act (pending Senate vote Jan 15, 2026) and the Responsible Financial Innovation Act, promoting regulatory clarity for digital assets. Her efforts align with Wyoming's pro-crypto stance (e.g., state laws for DAOs and Bitcoin mining), making her a natural advocate for CYS projects that position the state as a digital asset hub.

b. Commercial and Strategic Focus Business Use Cases: AAM for Leakage Recapture

The AAM PPP focuses on commercial viability through leakage recapture. 97% of Cheyenne passengers drive to DIA, a United hub, for broader connections. Capturing those passengers at CYS is beneficial for CYS and United Airlines. Strategically, this aligns with United's investment in Archer Aviation (2021, with additional funding; routes in Chicago 2023, NYC 2025). By capturing passengers at CYS, Archer eVTOLs feeds United's DIA hub, reducing drive times (90 miles) and enhancing system efficiency for all: United gains early entry and further demonstrates the utility of AAM, Archer scales, CYS boosts enplanements which unlocks more AIP funds (entitlements and possibly discretionary). Measurable outcomes include: passenger flow could increase 20-30k annually (10-15% recapture from 200k+ leakage), economic benefits \$10-20M/year (fares, jobs; multipliers 2.5x), reduced emissions, improved access. Other outcomes include safety gains, and regional tourism uplift.

These focused business use cases enable the management business use case by providing financial stability (BESS revenue funds operations), strategic partnerships (United/Archer for governance), and measurable KPIs (enplanements, ROI) for oversight.

9. End Result: Economic and Operational Benefits with Multi-Order Effects

PPP implementation leads to measurable gains. These gains include rising operational utilization (10-20% leakage capture via AAM), revenues increase (operational expenditure down 15-25% through AI), capital expenditures expand (sustaining NPIAS role), and economic impacts cascade - direct jobs in tech, supplier chains, induced spending (GDP uplift 2.5x investment). These effects strengthen communities, foster thoughtful sustainability and maintain enhanced economic relevance within an increasingly expanding electrified economy.

10. A Holistic Vision for PPP in Underutilized Airports

PPPs position underutilized airports as integral to national resilience, integrating tech to drive growth while addressing vulnerabilities. This vision encourages aviation professionals to view business development as a tool for long-term viability.

11. Recommendations: Actionable Tasks to Address Shortfalls

To advance PPPs:

- Develop Focused Business Use Cases: Sponsors start by Q2 2026, using FAA templates for alignment, incorporating Sen. Lummis advocacy for crypto elements.
- Leverage AIPP: Apply for exemptions to enable PPPs without repayments, prioritizing AAM/BESS.
- Pilot BESS/Mining: Launch at sites like CYS by 2027, tracking revenues/grid benefits, engaging local stakeholders.
- Engage SBA/EDA: Use loans/grants for small business tech integration, focusing on AI/Grok tools.
- Hold Forums: Quarterly for community/stakeholder input, building buy-in for AAM routes.
- Monitor Legislation: Track Clarity Act/Sovereign Fund for crypto support, adapting BESS plans.

Conclusion and Next Steps

This framework provides aviation professionals with tools to pursue PPPs, turning challenges into opportunities. By integrating technology like BESS mining (aligned with national crypto goals) and AAM (leveraging partnerships like United/Archer), airports like CYS can enhance NPIAS robustness. Next Steps: 1. Conduct site audits (5010/grant review). 2. Assemble teams (sponsors, EDA/SBA). 3. Draft initial cases (Q1 2026). 4. Engage champions (e.g., Sen. Lummis for mining). 5. Pilot one vector (e.g., BESS at CYS).

Reference Documents:

1. Advanced Air Mobility National Strategy (2025).
2. AAM Comprehensive Plan (2025).
3. FAA Reauthorization Act of 2024 (Public Law 118-63).
4. Ensuring American Space Superiority (Executive Order, 2025).
5. National Security Strategy (2025).
6. NASA's Regional Air Mobility Report (2025).
7. FAA Order 5100.38D, Change 1 (2019).
8. Bipartisan Infrastructure Law (2021).
9. NASA/CR-20250001574, Assessing The Electrification of Aviation's Impact on the Airport and Airway Trust Fund (2025).
10. NASA/CR-20250002542, Regional Air Mobility: Infrastructure Challenges, Passenger and Cargo Market Potential, and Sustainability Strategies for Underserved Airports (2025).