

Solving Tarmac Battery Downtime

AAAE MEMBER INNOVATION BRIEF: AN ASSET-UPTIME THESIS



Merlin Solar eliminates battery-related equipment failures on the ramp – reducing emergency jumpstarts, maintenance labor, and cascading flight delays.



FREE VALIDATION PILOT. ZERO COST TO YOUR AIRPORT.

Merlin Solar is offering AAAE member airports a fully funded pilot to prove passive solar integration eliminates battery-related downtime on tarmac equipment. **All hardware, engineering, and installation at zero cost to your team.**

THE PROBLEM

- Ramp support equipment – baggage tugs, belt loaders, sky stairs – idles constantly and draws continuous parasitic power. This rapidly drains chassis batteries, causing localized failures at the worst possible times.
- **One dead battery triggers a cascade:** emergency jumpstarts, unplanned maintenance labor, and operational flight delays.

THE SOLUTION

Merlin Solar's thin, flexible panels adhere directly to vehicle hoods and cabs – passively maintaining battery voltage during idle. No modifications. No splicing into factory wiring.

Aviation-Safe: 2% Glare: Independently tested by Sandia National Laboratories. Conventional panels reach 20% glare – a ramp hazard. **Merlin's proprietary surface measures just 2%**, ensuring full compliance with air traffic control visibility requirements.



WHERE MERLIN WORKS ON THE RAMP

Merlin's technology is proven across military transport, Class-8 commercial fleets, and RV operations. These use cases map directly to airport asset classes:



FLEET BATTERY PRESERVATION & ASSET UPTIME

Baggage tugs, belt loaders, and sky stairs idle for hours drawing constant parasitic power – rapidly draining chassis batteries.

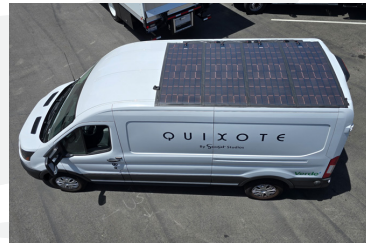
Merlin panels passively maintain voltage with zero modifications, preventing the failures that trigger cascading delays.



DEPLOYABLE OFF-GRID POWER & MOBILE INFRASTRUCTURE

Power access is limited across remote airfield perimeters and work zones. Generator sets are inefficient and emission-heavy.

A 6.4kW flexible array with 36kWh storage and a 10kW inverter delivers stable 120V/240V power anywhere on the airfield, completely off-grid.



HIGH-VOLTAGE RANGE EXTENSION & CHARGING BUFFERS

Airport fleet electrification is outpacing ramp charging infrastructure. Grid constraints are creating operational gaps.

A 720W aero-array offsets auxiliary HVAC and electronics loads on EVs, protecting drive battery health and extending daily range – no wiring changes required.



MICRO-MOBILITY & RAMP CARGO LOGISTICS

Electric cargo platforms and micro-mobility vehicles run continuously for baggage routing, parts delivery, and gate logistics.

Flexible solar arrays on curved surfaces reduce grid dependency and keep vehicles dispatch-ready throughout the shift.

THE NO-COST VALIDATION PILOT

Merlin Solar proposes a controlled, data-backed trial to empirically confirm that passive solar integration eliminates battery downtime on tarmac assets.

Cohort	5 Merlin-equipped assets vs. 5 unmodified baseline assets (same equipment class)
Duration	30-60 days of continuous data logging
Metrics	Voltage profiles, battery state-of-health, runtime extension, documented downtime events
Partners	Seeking a forward-looking AAAE member airport (Phoenix Sky Harbor, Denver, IAH, or DFW) or direct partnership with a ground support equipment manufacturer (e.g., TUG).
Cost to Airport	Zero. All hardware, installation, and engineering fully funded by Merlin Solar.
Deliverable	Technical White Paper or Digital Playbook distributed across the broader AAAE network

NEXT STEP

Connect an innovation-focused AAAE airport director with Merlin Solar to identify high-bottleneck equipment classes (baggage tugs, sky stairs, utility vehicles) and **launch the pilot at zero cost.**

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