Lithium Battery Leading Indicators

Commercial Aviation Risk Assessment — Executive Dashboard

ELEVATED

Report Date: 25 FEB 2026
Next Update: MAY 2026

TOTAL INCIDENTS (2006–2025)
648 [1]
+388% since 2015 [2]

CURRENT RATE
~2/wk [3]
+16% YoY (2024) [4]

2024 INCIDENTS
89 [1]
Record year | 18% caused disruption [3]

PASSENGER NON-COMPLIANCE
38% [5]
Put lithium devices in checked bags

REGULATORY CHANGES
4
In last 12 months

INDICATOR #1
Vape Market Expansion
Disposable vapes surging despite bans. "10,000+ puff" models use larger cells (up to 50 Wh). #1 incident category at 35%. [1]

RISING

INDICATOR #2
Power Bank Price Collapse
20K+ mAh power banks at $6–8 on Temu. ASP down >25% in 12 months. March 2025 checked-bag ban hasn't slowed demand. [6]

RISING

INDICATOR #3
Undeclared E-Commerce Cargo
Cross-border parcels from Temu/Shein/AliExpress routinely carry undeclared lithium batteries. PHMSA enforcement up 40% YoY. [7]

RISING

⚠ EMERGING PRODUCTS — WATCH LIST

Sodium-Ion Batteries — 100-160 Wh/kg
NOT classified under lithium battery rules. No UN number, no packing instructions, no Wh thresholds. Consumer products entering market 2026.
REGULATORY GAP

Portable Power Stations — 500-6,000 Wh
Jackery/EcoFlow marketed as "travel essentials" despite being PROHIBITED. Smaller 256 Wh units hard to distinguish from large power banks at screening.
PROHIBITED

Solid-State Batteries — 400-500 Wh/kg
Samsung SDI / Toyota targeting 2026–2028. Different failure modes — current UN 38.3 tests may not capture them.
NEW CHEMISTRY

E-Foils / Hydrofoils — 2,000-3,500 Wh
Wealthy coastal travelers. 2,000+ Wh batteries far exceed all thresholds. Attempted as "sporting equipment."
PROHIBITED

AI Wearables — 5-30 Wh
Meta Orion AR glasses (2027), AI smartwatches. Always-on AI processing demands larger batteries in small form factors.
MONITOR

Smart Rings — <0.1 Wh
Oura, Samsung Galaxy Ring — 30M+ units by 2028. Negligible energy but zero Wh labeling. Growing awareness gap.
LOW RISK

⚑ REGULATORY GAP FLAGS

Sodium-Ion Unregulated
49 CFR 173.185 applies only to "lithium" batteries. Na-ion products have no UN number, no PI, no Wh thresholds for air transport. [8]

Cordless Hair Tools — No Labels
Rapidly growing category. Many products exceed 100 Wh but lack Wh labels. Passengers can't determine compliance.

Power Stations as "Travel Gear"
500–2,000 Wh products marketed for travel despite being prohibited. 256 Wh units resemble large power banks at screening.

Heated Medical Bags — Unclear
Battery-heated medication transport bags occupy ambiguous regulatory space. No specific exemption or guidance exists.

▪ PRODUCT RISK MATRIX — LEADING INDICATOR SCORECARD

PRODUCT	DEMAND	PRICE	ENERGY	SIZE	IMPORT	CARRY-ON	CHECKED	POSTURE
TIER 1 — HIGH RISK								
E-Cigarettes / Vapes	H	H	M	L	H	✓	✗	RED
Power Banks	H	H	M	M	H	✓	✗	RED
E-Bikes / E-Scooters	M	M	M	L	M	BANNED	BANNED	RED
Drones / UAVs	M	M	H	M	M	✓	✗	ORANGE
TIER 2 — MEDIUM-HIGH RISK								
Wireless Earbuds	H	H	L	L	H	✓	✓	ORANGE
Bluetooth Speakers	M	H	L	L	H	✓	✓	ORANGE
Portable Gaming	M	L	M	L	L	✓	✓	YELLOW
Cordless Hair Tools	H	M	H	M	M	VARIES	VARIES	ORANGE
TIER 3 — MEDIUM RISK								
Portable Fans	M	H	L	M	H	✓	✓	YELLOW

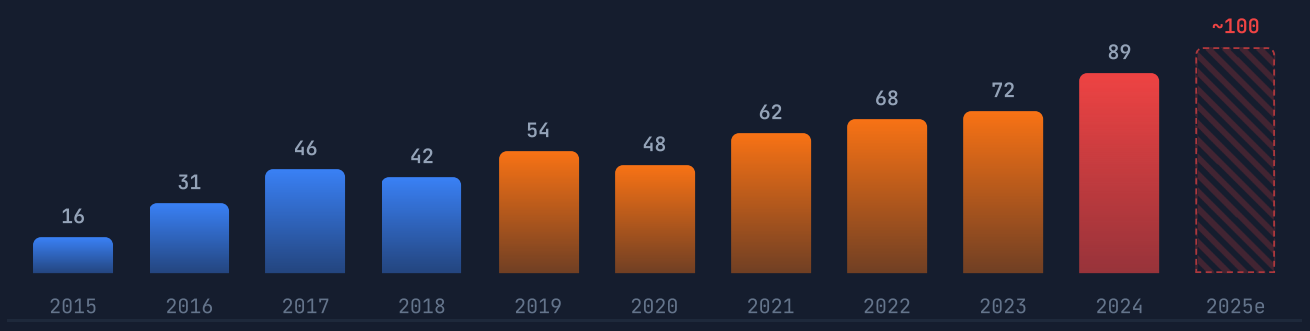
↓ PRICE COLLAPSE TRACKER

PRODUCT	ASP	12MO	QUALITY FLOOR
Power Banks (20K mAh)	$18.50	-28%	BELOW
Wireless Earbuds	$12.20	-35%	BELOW
Portable Fans	$9.80	-22%	BELOW
Cordless Hair Tools	$35.00	-15%	BELOW
Bluetooth Speakers	$24.50	-12%	BELOW
Disposable Vapes	$4.50	-18%	BELOW
Drone Batteries	$28.00	-5%	OK

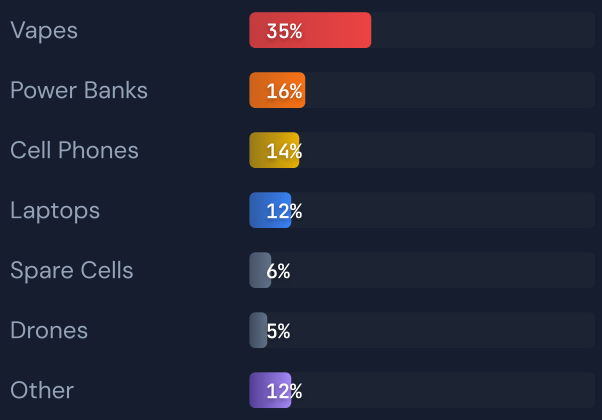
KEY FINDING
6 of 7 tracked categories are selling **below the cost-of-quality floor** — the price at which adequate BMS, quality cells, and safety certifications are not economically viable.

PRODUCT	DEMAND	PRICE	ENERGY	SIZE	IMPORT	CARRY-ON	CHECKED	POSTURE
Heated Clothing	M	M	L	L	M	✓	✓	YELLOW
Cordless Power Tools	M	L	H	L	M	VARIES	✗	YELLOW
Smart Luggage	L	M	L	L	L	✓	REMOVE	GREEN
Mobility Devices	L	L	M	L	L	N/A	14 CFR [illegible]	GREEN

▲ ANNUAL INCIDENT TREND [1]



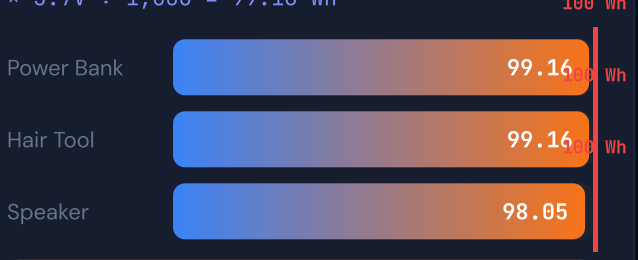
▦ INCIDENT BREAKDOWN BY DEVICE [1] [3]



"Other" is the fastest-growing category — driven by proliferation of new battery device types.

⚠ COMPLIANCE GAMING — THE 99 WH PATTERN

Products deliberately engineered to **99.16 Wh** — just under the 100 Wh threshold. The math: `26,800 mAh × 3.7V ÷ 1,000 = 99.16 Wh`



Risk: Manufacturing variance of 1–2% could push "99 Wh" products over the threshold. No verification mechanism exists at screening.

✗ BANNED FROM ALL US COMMERCIAL FLIGHTS [6] [8]

- **Hoverboards / Self-Balancing Scooters**
  100–200+ Wh | All US airlines | Extensive fire history
- **E-Scooters (whole device)**
  250–750+ Wh | All US airlines | Battery exceeds all thresholds
- **E-Bikes (whole device)**
  300–750+ Wh | All US airlines | Battery only if removed & ≤160 Wh
- **Samsung Galaxy Note 7**
  ~13 Wh | DOT Emergency Order (Oct 2016, still active)
- **Portable Power Stations**
  500–6,000+ Wh | Jackery, EcoFlow, Bluetti | Exceeds 160 Wh
- **All CPSC-Recalled Battery Products**
  Varies | 49 CFR 173.185(f) | Any active recall for fire risk

☆ SEASONAL RISK CALENDAR — 2026

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
CES	Samsung	Spring	Steady	Steady	Peak	Peak	Peak	Apple	Prime	BF/CM	PEAK

Moderate Elevated High Highest

➤ PRIORITY ACTIONS FOR DECISION-MAKERS

IMMEDIATE (0–90 DAYS)

01 **Close sodium-ion gap** — Issue guidance before consumer products hit mass market

02 **Require Wh labeling** on all lithium battery products sold in the US

03 **Update crew training** for new product categories (hair tools, heated clothing, portable fans)

04 **Enhanced e-commerce screening** for undeclared batteries from China-based platforms

NEAR-TERM (90–365 DAYS)

05 **Address 99 Wh gaming** — Verify tested vs. nominal capacity at threshold

06 **SoC spot-check capability** for 30% mandate cargo compliance

07 **Product-specific passenger guidance** for cordless hair tools, heated clothing, fans

08 **Fund independent testing** of ultra-cheap e-commerce battery products

✎ REGULATORY TIMELINE

JAN 2026
30% SoC Mandate Active
Cargo Li-ion (UN 3480 Sec II)

AUG 2025
FAA SAFO 25002
Lithium battery risk mitigation

MAR 2025
Power Bank Checked Bag Ban
All Wh ratings, all US flights

JAN 2026
IATA DGR 67th Edition
Enhanced SoC + labeling rules

⚙ DATA SOURCES & CITATIONS

[1] FAA Lithium Battery Incident Database
faa.gov/hazmat/.../incidents — Updated quarterly

[2] Simple Flying — 388% Surge Report
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[3] UL TRIP — 2024 Aviation Data Review
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[4] Lion Technology — Incidents Up 16%
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[6] FAA PackSafe — Lithium Batteries
faa.gov/hazmat/packsafe/lithium-batteries

[7] PHMSA — Lithium Batteries
phmsa.dot.gov/lithiumbatteries

[8] 49 CFR 173.185 — eCFR
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[9] FAA SAFO 25002 (PDF)
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[10] IATA DGR 67th Ed. Guidance (PDF)
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[11] 14 CFR 382 — Mobility Devices (eCFR)
ecfr.gov/.../part-382/subpart-I

[12] FAA Tech Center Report DOT/FAA/TC-24-39
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