NASA EPFD Key Program Objective



Close Regulatory Gaps	Barrier Risks
Technology Maturation	Demonstration on Ground and Flight

Next generation battery

- Requirement of two 400kWh battery packs > 270 Wh/kg
- High level of safety and reliability (Part 25)
- Support quick turn around (< 60min)
- Comprehensive test campaign - longer service life

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The Promise of Electric Flight



Opportunities for Electric Aviation

1. Sustainability and Lower Cost
2. Accessibility –
    1. Enabling route and airport viability,
    2. Reducing the barrier to entry.
    3. Opening new frontiers
3. Emissions Reductions

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What Makes a Viable Electric Airplane

Criteria for Viability

1. Market Need / Demand
2. Aircraft must be able to operate a viable mission in that market
3. Need to be carry a useful payload on that mission
4. Needs to be at least the same cost to operate over the long term as competing airplanes
5. Society Acceptance
6. Regulatory Acceptance





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Marketplace Future Demand

Demand for Pilot Training

- 300,000 new pilots are needed over the next decade to replace retiring pilots as well as fill in for 50% growth in passenger numbers
- Asia alone will account for 100,000 new pilots – India is a key market for growth opportunities

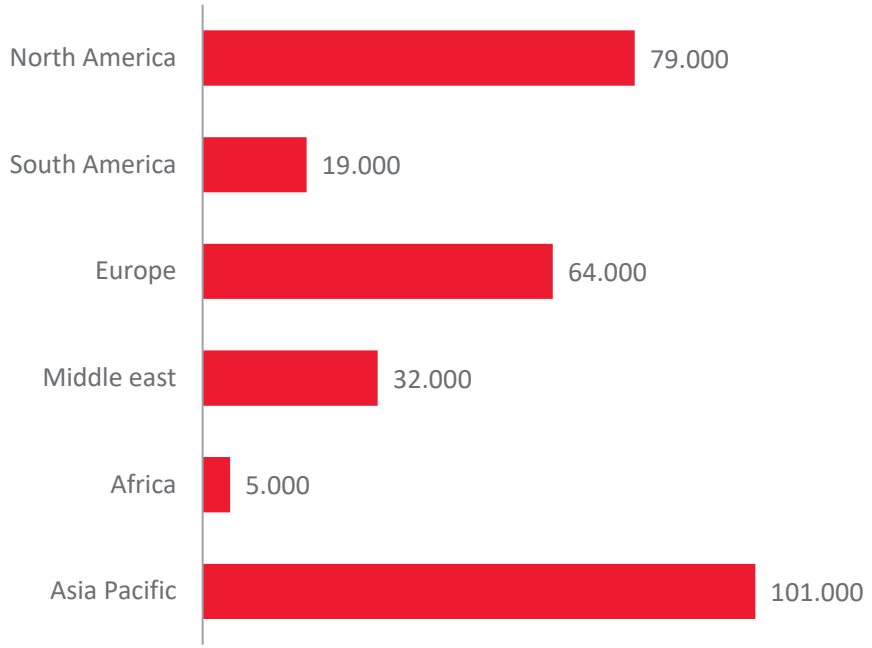
Aging Fleet, Increasing Costs

- Many flight training schools, small and large are still flying fleets from the 1970's-2000's with some aircraft approaching 50 years old
- Maintenance and fuel costs continue to increase, with replacement parts for some engines hard to find. These factors have resulted in significant increases in the costs of flight training and obtaining a pilot's license
- Strong demand for fleet replacement with more affordable, less maintenance intensive options exist in flight schools, with electrification seen as a keen opportunity

New Opportunity

- New electric aircraft, such as the Bye Aerospace eFlyer, or the Diamond DA40 promise significant cost reductions over today's fleet

Demand for 300,000 new Pilots over the next decade (CAE)



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Marketplace Flight Training





Piper and CAE look to Electrify Flight Training

In 2022, Piper Aircraft and CAE announced plans to electric the training fleet using the Safran engine and a H55 battery.

Both partners appear to have fallen short on performance and delivery's, with it unclear how the combination would yield a viable aircraft.

Met with CAE to discuss magniAIR motor and Samson ESS opportunity. Indicate looking for a 60min mission plus reserve.

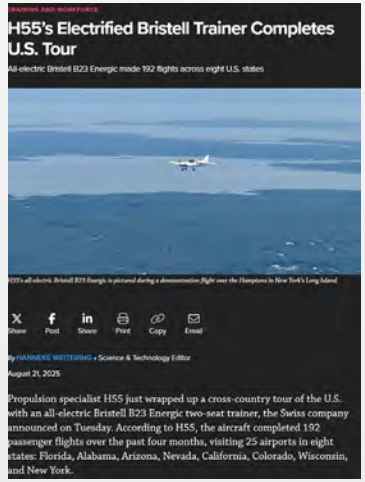


TRAINING GOES ELECTRIC AT NEW VISION AVIATION

FAA grants SLSA approval

January 24, 2024 By Niki Britton

Nonprofit aviation education and flight school organization New Vision Aviation can now provide flight training in the group's four Pipistrel Electro trainers thanks to an eight-year public-private collaboration to prove electric aircraft can be suitable for flight training.



H55's Electrified Bristell Trainer Completes U.S. Tour

All-electric Bristell B23 Energic made 192 flights across eight U.S. states

By HANNEKE WETTERING • Science & Technology Editor

August 21, 2025

Propulsion specialist H55 just wrapped up a cross-country tour of the U.S. with an all-electric Bristell B23 Energic two-seat trainer, the Swiss company announced on Tuesday. According to H55, the aircraft completed 192 passenger flights over the past four months, visiting 25 airports in eight states: Florida, Alabama, Arizona, Nevada, California, Colorado, Wisconsin, and New York.

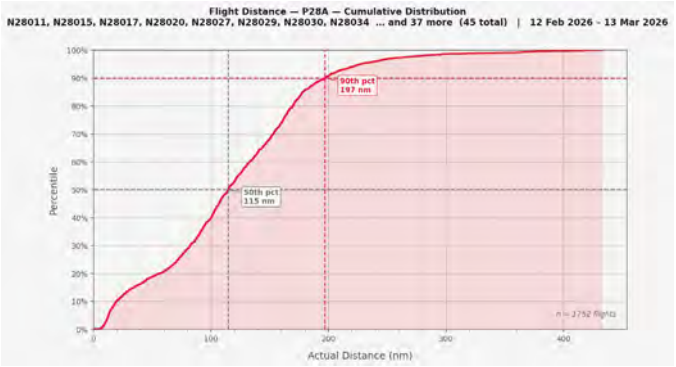
Electric Aircraft for Flight Training In the News

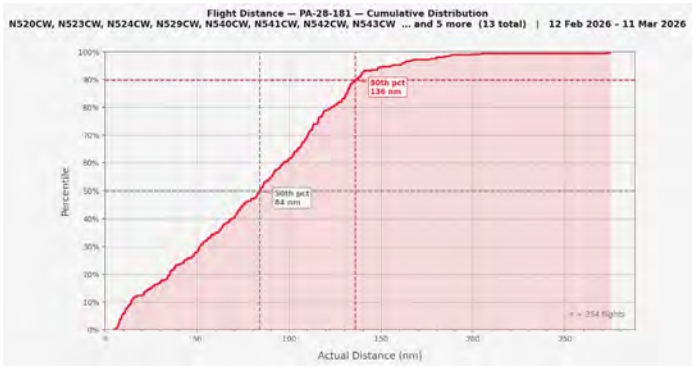
Electric aviation for flight training has been increasingly in the news with the availability of the Pipistrel creating excitement.

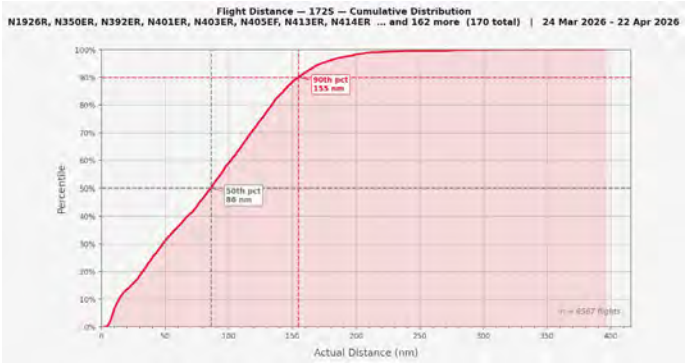
The Pipistrel does not have sufficient endurance talking to flight schools that have investigated it, with many suggesting the need for a 1 hour training mission plus reserves as a minimum

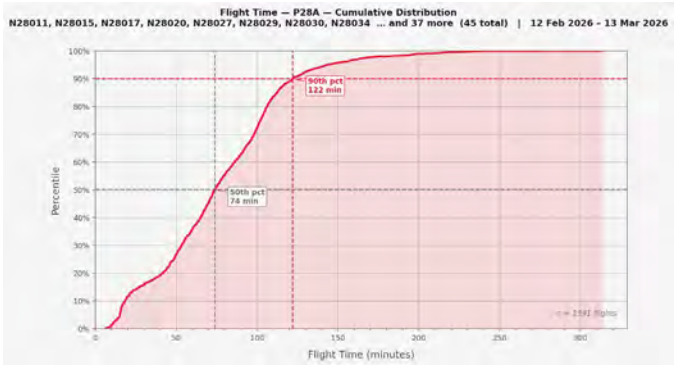
Operational Data Mission Analysis in Flight Training

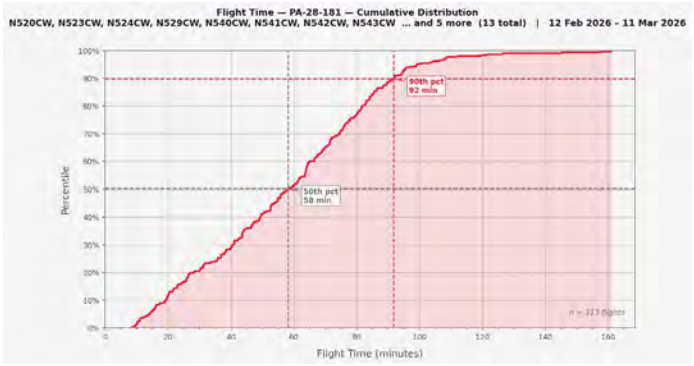
Market data shows flight school missions can be met with the magniAIR and Samson product.

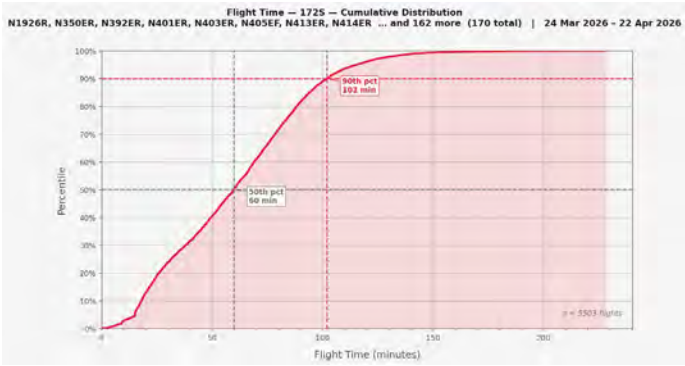












CAE – Part 61 Training Organization

Fleet Focus – 45x PA28s

Distance

- 50th Percentile: 115 nm
- 90th Percentile: 197 nm

Flight Time

- 50th Percentile: 74 mins
- 90th Percentile: 122 mins

Central Wash. Univ – Inst. Training Org.

Fleet Focus – 13x PA28-121s

Distance

- 50th Percentile: 84 nm
- 90th Percentile: 136 nm

Flight Time

- 50th Percentile: 58 mins
- 90th Percentile: 92 mins

Embry Riddle – Inst. Training Org.

Fleet Focus – 170x C172S

Distance

- 50th Percentile: 86 nm
- 90th Percentile: 153 nm

Flight Time

- 50th Percentile: 60 mins
- 90th Percentile: 102 mins

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Emerging Opportunities Rotorcraft / eVTOL

Competitive Flight Training, Advanced Air Mobility

The 220kW class electric powertrain for Helicopters powers the worlds most popular aircraft, making flight training more accessible

Key Opportunities

- **Flight Training:** Create a lower-cost platform for helicopter flight training organizations, meeting growing demand for new pilots over the next decade.
- **Sightseeing:** Lower DOC's well aligned with shorter missions typical of sight-seeing operation. Zero emissions technology well suited to eco-tourism operations. High utilization and low maintenance ensure grater revenue for operators.
- **Advanced Air Mobility:** Cost competitive solution for AAM eVTOL sector with an estimated market size $73bn[1] – $137bn[2] by 2034
- **Defense & Law Enforcement Applications:** Lower-cost platform for training and integration with autonomous operation.
- **Dual-Use Flexibility:** Applicability across both commercial and defense verticals (including drones, rotorcraft, and niche aviation programs) creates diversified demand.







Cost Drivers Propulsion



Electric Engine



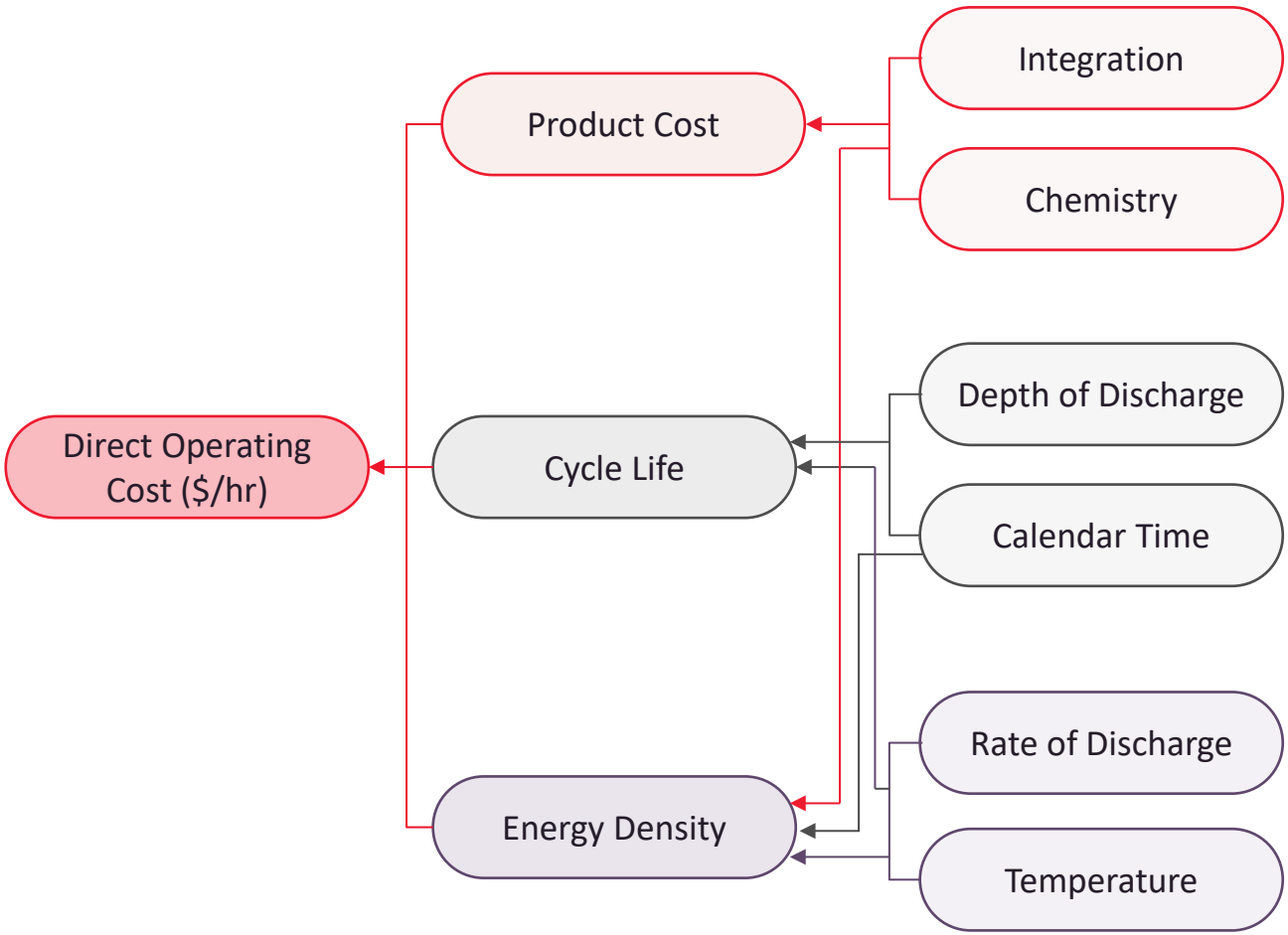
Energy Storage

Engine Cost Comparison

	 YIO-540-D4A5	 IO-390-EXP119	 magniAIR
TBO	~2,000 hours	~2,000 hours	~5,000 hours
Overhaul Cost	$30 - $38k	$45 – 55k	$10k
Reserve/hr	$15 -20/hr	$22 – 25/hr	~$2/hr
HP	235 to 260	200 to 220	215-260
Total Cost	$69,900	$58,200	Target

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Commercial Viability - Battery's



Design Space
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Applications operate 50-70% Depth of Discharge Careful storage
Flight profiles impact life Thermal performance

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Flight Training Operating Cost Comparison

magniAIR enables reduced operating costs when compared to competitors

Cost Comparison

For a representative GA Airplane used for flight training, a Cessna 172, converted to electric, the direct operating costs per hour are 13% less then the original airplane at EIS pricing.

Assumptions

- AVGAS Cost is 6.05 per Gallon at a consumption of 11 Gal / hr
- Battery cost is amortised fully over 2000 hours of flight.
- Base airplane maintenance requirements are the same.
- Engine reserve based on expected TBO of 5,000 hours.

	Base Airplane (C172)	Electric C172 (Inc Battery)
Direct Operating Cost (US $ /hr)		
Fuel / power	67.00	8.40
Lubricants	1.00	1.00
Maintenance Labor	29.00	29.00
Parts	11.00	11.00
Engine Reserve	41.00	2.00
Battery Reserve		85.5
Misc	18.00	9.00
Total DOC per hour	**167.00**	**145.90**
Total DOC over 2000 hours	**340,000**	**291,780**

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eBeaver Case Study

- Has the range to cover 90% of Harbour Airs operating routes
- Can carry 5 passengers with baggage
- Initially at least 10% Cheaper to operate the then existing airplane.





Wheels
Floats

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Electric Rotorcraft – an AAM Comparison









	Robinson R66	eR66	Joby S4	Archer Midnight
Estimated Range* (nm)	260-350	80 - 130	86 - 130	86 (max) [4] 17 – 43 (target mission)
MTOW (lbs)	2,700	2,700[2]	5,300[3]	6,500[1]
No. Powertrains	1	1	6[3]	12
Installed Power*** (kW)	220	220	1416[3]	1500

*Max. Range numbers are inclusive of regulatory energy reserves
** Rated Take-Off/Max powers

[1]https://s202.q4cdn.com/174276461/files/doc_financials/2024/q2/Archer-Shareholder-Letter-Q224-FINAL.pdf
[2]https://robinsonstrapistorprod.blob.core.windows.net/uploads/assets/r66_poh_full_book_rev_e4398f06e3.pdf
[3]https://www.sec.gov/Archives/edgar/data/1819848/000181984823000253/joby-8kx20230628xex993.htm
[4]https://www.mlit.go.jp/koku/content/001906970.pdf

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Social Acceptance Sport Aviation

Sport Aviation – The Early Adoption

- All the major 4 Sailplane manufactures now offer electric self launch and sustainer options
- Self launch can launch to 4000ft and still cruise 100+km
- Electrification has opened up new possibility's in the sport
- Demand is high with a high rate of adoption







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