The First Practical Zero Emission Aviation Powertrain

Q3 2019
First Practical Zero Emission Aviation Powertrain

Our Mission: Accelerate the World’s Transition to Sustainable Aviation

Starting with:

Zero emission 500 mile air travel @ half of today’s cost

$100B+ in clean, faster, more convenient local travel

2020: 300-mile @6 seats; first 19-seat flight
2022-23: 500-mile commercial ops, 19-seat
Why We Do It

Aviation emissions particularly harmful; growing 4x by 2050

Air travel has increasingly poor user experience
How: Electric but Not Battery

Battery aircraft, while being conceptually simpler, will likely be limited to shorter range missions.

Future Fuel options -
Battery, H2 gas and H2 Liquid*

500-mile range covers almost 50% of all trips worldwide**

Initial ZeroAvia offering based on compressed hydrogen storage

*Sources: batteries: 250 Wh/kg @system level 2022, 5% YoY improvements (more optimistic than Schafer (2018)); H2 gas: 1000 Wh/kg 2022, 5% YoY; H2 liquid: 2500 Wh/kg, 6% YoY, all based on supplier information.

**Schafer et al (2018) - Technological, economic and environmental prospects of all-electric aircraft.
Renewable On-Site H2 = ~$2 / G
Equivalent Fuel Price
First Product: PT6 Replacement for 500nm in 2022

Lower fuel, maintenance costs; lower noise; zero emissions end-to-end
# Cheaper, Zero Emission PT6 Level Performance

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<thead>
<tr>
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<th>H₂-electric</th>
<th>Battery-electric</th>
<th>Turboprop-jet fuel</th>
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<tbody>
<tr>
<td>Acquisition costs</td>
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<td>Fuel burn &amp; associated costs</td>
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<td>Maintenance intervals</td>
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<td>Total variable costs</td>
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- Hydrogen powertrains can provide up to 40% OPEX savings for small operators

* for small operators
Consistently Hitting our Milestones for 18 Months

2019 milestones
- **July**: Hydrogen fuel cell and tank integration tests
- **April**: Max Range, Max Speed & Formation flights
- **March**: First full pattern flight
- **February**: First flight after FAA’s Exp. R&D Certificate
- **January**: First high speed taxi tests: 50kts, 95kt

2018 milestones
- **October**: Runway Flying El Camino demos: 60 kts, 75kts
- **July**: First 1000+ RPM run and First 100kW power-up
- **May**: First starts; SW & HW integration tests
Supporting R&D and early commercial spec testing are crucial

**R&D roadmap**

- **R&D 6-seater**
  - > 10 hours of flight tests

- **ZA250 prototype**
  - Aug 2019 - Jul 2020

- **ZA600 prototype**
  - Q1/2020 - Q1/2021

- **Certified ZA600**
  - Q3/2021 - Q4/2022

**Commercial roadmap**

- **Infrastructure providers**
- **Operators**

- **Pre commercial operations to the commercial specs from regional, agricultural, and defense operators** - Q3 2020 - Q3 2022

- **First tests on 6-seat aircraft**
- **Testing to full commercial specs in 19-passenger aircraft**
- **Commercial intro Q4/2022**

**Potential for public support and cross-border efforts**

- 6-seat 300-mile flight
- 20-seat prototype
- Certified 20 seat
Team with Proven Success & Deep Experience

Val Miftakhov, Founder & CEO
Google, McKinsey, DOE, eMotorWerks (Founder & CEO; acquired in 2017)
Pilot, fixed wing & rotorcraft
Physics PhD, Princeton; MIPT

Gabriel DeVault, Head of Drivetrain
Zero Motorcycles (founding team), InspectTools (founding team; acquired 2018), JOBY Aviation
Private pilot

Julia Batishcheva, CFO
eMotorWerks CFO (acquired in 2017), Vivus, SH (an AI SW DOD contractor); BS Economics

Leonid Ganapolsky, Drivetrain Test & Validation
Sonos, Tesla, eMotorWerks (acquired in 2017)
CS, Project Management
Golden Gate University

Ben Drobiz, Embedded architect
Tesla (architect of Model S/X/3 onboard systems); Rochester Institute of Tech, Mech/Computer Eng

Aleksandr Kikhtenko, Head of the Remote Engineering office
Expert on mobile power plants, both terrestrial and aerial
Electroavtomatika, Aerostart;
Industrial electronics NCS TU

James Lawson, Regulatory
FAA Designated Engineering Rep, Zee Aero, BAE, Crane Aerospace, Astronics; MEng Loughborough

Vadim Belogorodsky, System Integration
CANtrolls (Founder), System engineer at Schramm, One Motion
BS Electrical Eng, Widener

Julia Akulinicheva, IR and UK operations
Finance experience in M&A, PE, Cleantech VC
BA/MA Politics & Economics, Oxford; MBA, INSEAD

Ben Drobiz, Embedded architect
Tesla (architect of Model S/X/3 onboard systems); Rochester Institute of Tech, Mech/Computer Eng

Julian Renz, Partnerships
SYSTEMIQ, Air Liquide, BMW, tado
MSc Chemical Eng, TUM, Tech Mgmt, CDTM
<table>
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<th><strong>Strong Advisory Board</strong></th>
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**John Uczekaj, Aviation Industry Relations Advisor**  
CEO & President, Aspen Avionics; EVP & GM, Honeywell; Board Member, General Aviation Manufacturers Association; 2012 honoree, Living Legends of Aviation (Entrepreneur of the Year)

**Brian Snow, Investment Advisor**  
Impala Ventures, Pristine Environments (Founder & CEO; acquired by MAST Capital in 2017), Vornado Realty  
Wharton MBA, MS Georgetown

**Andrew Patton, Business Advisor**  
Google (Wing, X), GrowthPoint Technology Partners, Titan Aerospace, Boeing; Aerobatic Pilot; Princeton Mech & Aerospace; Stanford MBA

**David Walrod, Investment Advisor**  
Managing Director / Partner @Sabia Capital, Pier 88, Pacific Growth Capital, Vodafone Ventures, Bridgescapes Partners, Oak Investment Partners; McKinsey & Company; Board Member @5+ VC-funded startups; UC Berkeley Foundation Trustee Harvard JD, MIT PhD & Berkeley AB Physics

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**Micah Myers, Investment Advisor**  
CEO, Pace Avenue; Board Member, eMotorWerks (acquired in 2017); Co-Founder & SVP, CleanPowerFinance (acquired in 2018); Principal, Claremont Creek Ventures.  
Fighter pilot  
MBA, Stanford; BA, UC Davis

**Roger Atkins, EV Business Advisor**  
Founder EVOutlook; LinkedIn Top Voice; Advisory Board Member with Momentum Dynamics, Energy Disruptors, RENU ventures.  
Brand Ambassador of Rimac Automobili and Pariss Electric

**Julian Chu, Business Advisor**  
Google, GE, McKinsey, Ford  
MBA, UMich  
MS Aerospace, UMich  
BS Physics, UHongKong

**Ron Mangon, Aircraft systems Advisor**  
Mangon Aircraft (aircraft repair & maintenance)  
Certified Piper, Cessna, Lycoming, Continental mechanic

**Michael Reich, Investment & Talent Acquisition Advisor**  
Founder & President, MRA  
Retained Executive Search; built exec teams that led to 16 IPOs and 40 profitable M&A events; Founder, Silicon Valley Aviation

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**Confidential**

> = Pilots

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- **Micah Myers, Investment Advisor**  
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- **Michael Reich, Investment & Talent Acquisition Advisor**