

# Pipistrel electric aircraft projects

State-of-the-art and Beyond

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Beijing, 9 November, 2017







Austria

Slovenia

Croazia





# Pipistrel Group

**EcoLution: 10 systems for energy**  
**Self-sufficiency: 100% emission-free**

- Geothermal heat exchangers
- Geothermal accumulation field
- Co-generation unit
- Floor heating and cooling
- Recuperators for ventilation
- Heat pump
- Solar Power Plant
- Roof angle for maximum output
- Window pane orientation
- Intelligent System control and optimization

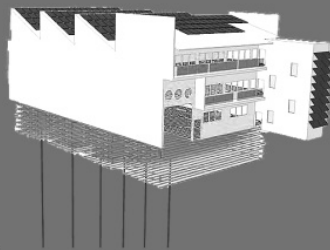
**Total yearly savings:**  
95.000 kWh, 180 tons of CO<sub>2</sub>



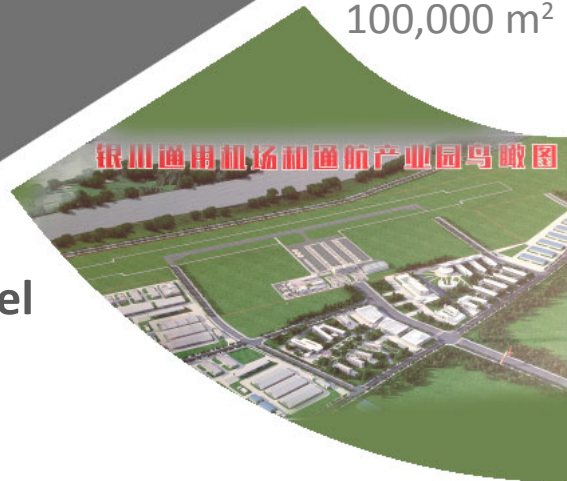
**Pipistrel  
d.o.o.**  
Ajdovščina  
(Slovenia)



Since **1989**  
4,500 m<sup>2</sup>



**2017 - 2019**  
2 facilities  
100,000 m<sup>2</sup>



**Pipistrel  
China**  
Jurong  
(China)

**Pipistrel s.r.l**  
Gorizia  
(Italy)



Since **2011**  
10,000 m<sup>2</sup>

**Pipistrel  
Vertical  
solutions  
d.o.o.**  
Ajdovščina  
(Slovenia)



Since **2016**  
4,200 m<sup>2</sup>

Since **2017**  
230 m<sup>2</sup>



**Pipistrel  
Branch Office**  
New Delhi  
(India)

# Awards & achievements

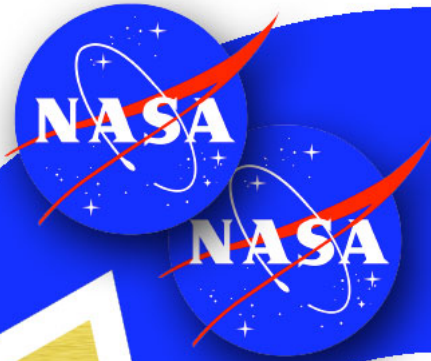
Positive growth every year

Among 35 largest exportets out ot EU in sector

AAA golden excellence rating



GAT 2008  
& PAV  
2007  
Winner



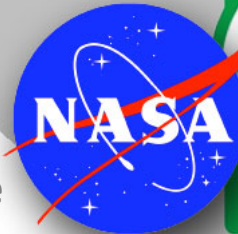
European  
Business  
Award - most  
innovative  
company in EU

Reader's  
Digest



Dr. August  
Raspel  
Memorial  
Award

Green Flight  
Challenge



NASA Green  
Flight Challenge  
1,3M USD

sponsored by  
Google



FAI Paul  
Tissandier  
Diploma



# Our Electric Aircraft Projects

Nomination for Collier Trophy

Bill Piper Award



**Taurus Electro**  
world's first two seat electric aircraft



**Taurus G4**  
world's first four seat electric aircraft



**Taurus Electro G2**  
second generation of the Taurus Electro



**Alpha Electro**  
the new electric trainer



**HY4 - H2fly/DLR**  
first 4-seat aircraft powered by hydrogen fuel cells



**EU Project Hypstair**  
200kW serial hybrid electric powertrain for general aviation





2007

Taurus Electro  
40kW 7kWh





2011

Taurus G4  
150kW 96kWh



Specific challenge: half-ton Li-Po battery





2015


Alpha Electro  
60kW 22 kWh



WATTsUP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 683959

Specific challenge: regulations



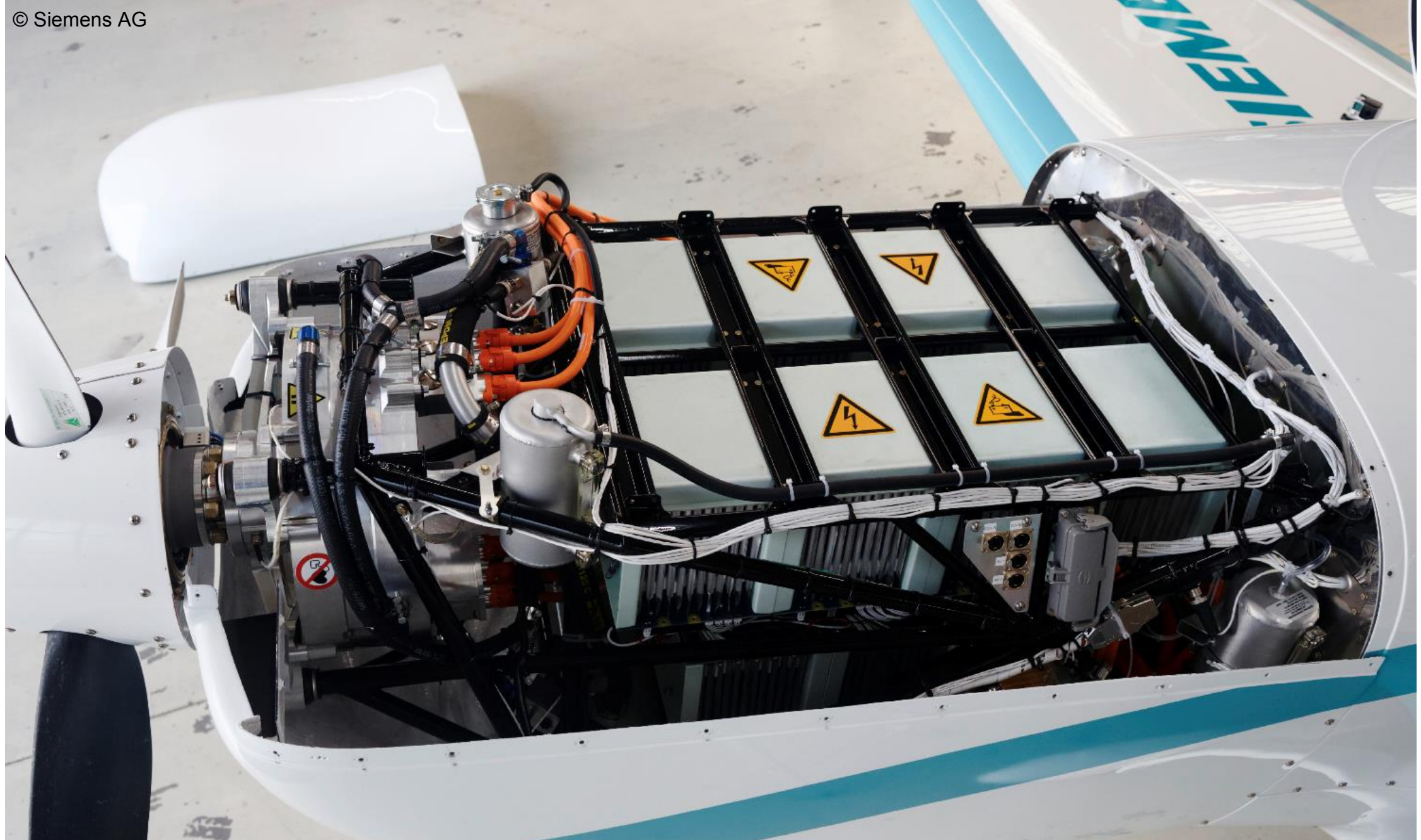
 <b>Australian Government</b> <b>Civil Aviation Safety Authority</b>		<b>Certificate/Job Number</b> <b>ATA0938-X01</b>
<b>SPECIAL CERTIFICATE OF AIRWORTHINESS</b>		
<b>1. Registration Mark</b> <b>23-0938</b>	<b>2. Manufacturer &amp; Manufacturer's Designation of Aircraft</b> <b>Pipistrel d.o.o. Ajdovscina</b> <b>ALPHA Electro</b>	<b>3. Aircraft Serial No.</b> <b>570 AE 60 LSA</b>
<b>4. Airworthiness: <input checked="" type="checkbox"/> Category <input type="checkbox"/> Categories</b> <b>Light Sport Aircraft</b>		
<b>4(a). Purpose</b> <b>Private Operations / Flight Training</b>		
<p><b>5. This certificate is issued pursuant to the Civil Aviation Safety Regulations of Australia in respect of the above aircraft which is considered to be airworthy when maintained and operated in accordance with the Civil Aviation Safety Regulations of Australia and any prescribed conditions set out as an Annex to this certificate.</b></p> <p>However, the above mentioned aircraft does not meet requirements in Annex 8 to the Convention on International Civil Aviation and therefore the aircraft must not be operated in international airspace or over the territory of a foreign country without the special permission of that country.</p>		
<b>Certificate issue date</b> <b>31 / 10 / 2017</b> (day/month/year)		<b>Certificate expiry date</b> <b>N/A</b> (day/month/year)
<input type="checkbox"/> Delegate of the Authority <input checked="" type="checkbox"/> Authorised person*		
		<b>Darren Bamfield</b> (Printed Name)
<b>* Instrument of Appointment Number: 1-13BVSM</b> <b>Note: This certificate is subject to the conditions listed on the annex dated 31 / 10 / 2017. Attachments to this certificate form part of this certificate.</b>		
<b>6. Subject to suspension or cancellation, pursuant to the Civil Aviation Safety Regulations of Australia, this certificate shall remain in force until the expiry date below or the aircraft ceases to be registered on the Australian Civil Aircraft Register.</b>		
<b>NO ENTRIES MAY BE MADE ON THIS CERTIFICATE EXCEPT BY A DELEGATE OF THE AUTHORITY OR AN APPROPRIATE AUTHORISED PERSON.</b>		
<b>Any person finding this certificate should forward it to the Civil Aviation Safety Authority</b>		

 <b>Australian Government</b> <b>Civil Aviation Safety Authority</b>		<b>Certificate/Job Number</b> <b>ATA0938-X01</b>
		<b>TC / TAC Number</b>
<b>ANNEX TO A SPECIAL CERTIFICATE OF AIRWORTHINESS</b>		
<b>THIS ANNEX IS ISSUED AS PART OF THE CERTIFICATE OF AIRWORTHINESS IDENTIFIED ABOVE AND MUST BE ATTACHED TO THAT CERTIFICATE AT ALL TIMES.</b>		
<b>Aircraft Registration 23-0938 is subject to the following conditions:</b>		
<b>7. The aircraft is to be operated within the limitations expressed in the Pipistrel d.o.o. Ajdovscina ALPHA Electro LSA flight manual for the ALPHA Electro LSA aircraft as amended</b>		
<b>8. Operation of this aircraft must be in accordance with CAR 202APA as amended</b>		
<b>9. Maintenance of the airframe must be in accordance with the approved Pipistrel d.o.o. Ajdovscina ALPHA Electro LSA maintenance schedule specified in the ALPHA Electro Light Sport Aircraft maintenance manual and approved revisions.</b>		
<b>10. This aircraft may only be operated by day under Visual Flight Rules.</b>		
<b>11. This aircraft may only be operated for the purpose specified at 4 of the Special Certificate of Airworthiness number ATA0938-X01 dated 31<sup>st</sup> October 2017.</b>		
<input checked="" type="checkbox"/> Continued next page      Page 2 of 3		
<b>Annex issue date</b> <b>31 / 10 / 2017</b> (day/month/year)	<input type="checkbox"/> Delegate of the Authority <input checked="" type="checkbox"/> Authorised person* 	
	<b>Darren Bamfield</b> (Printed Name)	
<b>* Instrument of Appointment Number: 1-13BVSM</b>		
<b>NO ENTRIES MAY BE MADE ON THIS ANNEX EXCEPT BY A DELEGATE OF THE AUTHORITY OR AN APPROPRIATE AUTHORISED PERSON.</b>		
<b>PURSUANT TO REGULATION 11.077 OF THE CIVIL AVIATION SAFETY REGULATIONS OF AUSTRALIA, A PERSON MUST NOT CONTRAVENE A CONDITION SPECIFIED ON A CERTIFICATE OF AIRWORTHINESS.</b>		
<b>Any person finding this certificate should forward it to the Civil Aviation Safety Authority</b>		









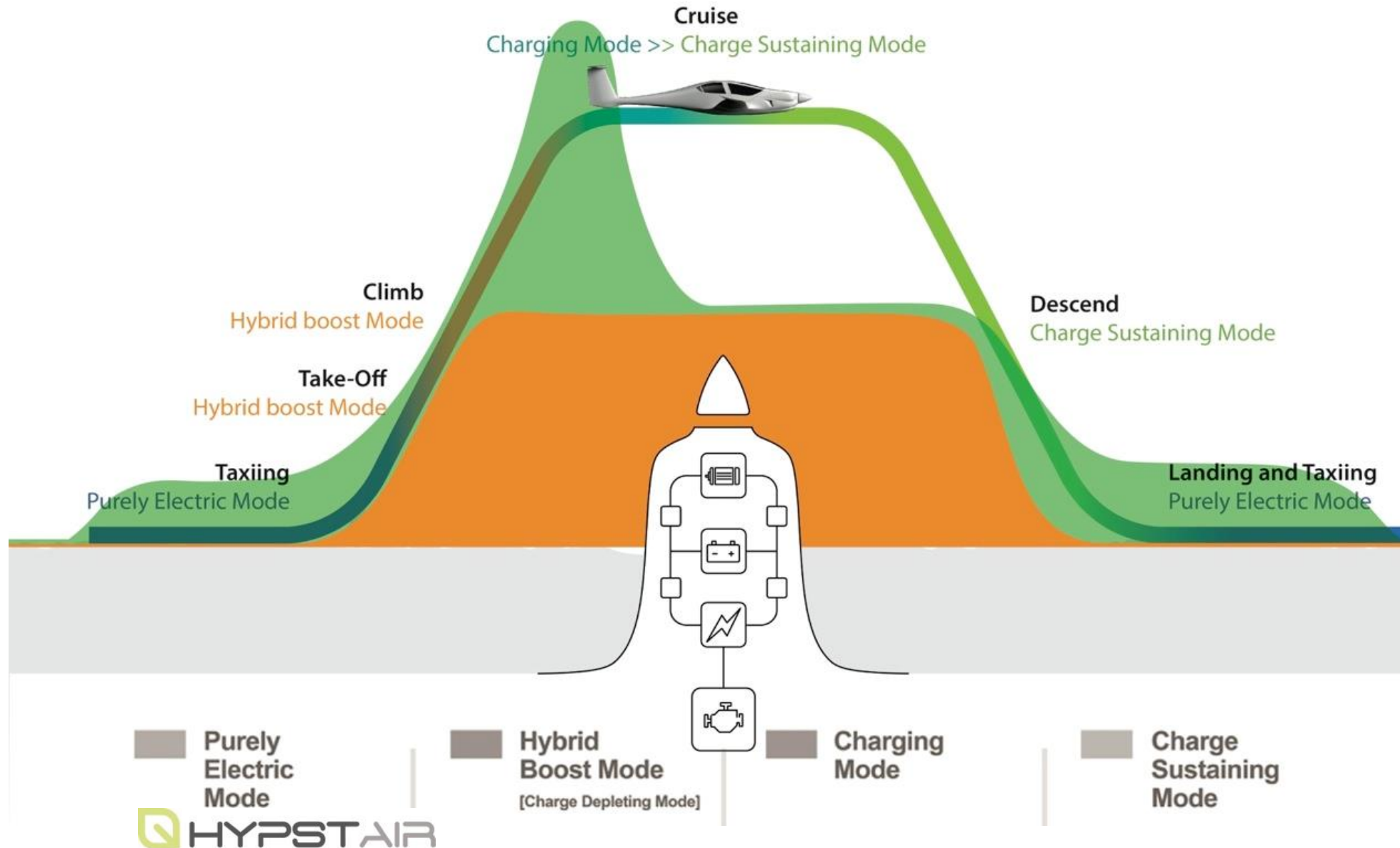
Specific challenge: high G and power profiles



Towards hybrids - more range for electric aircraft



# Hybrid flight and power generation

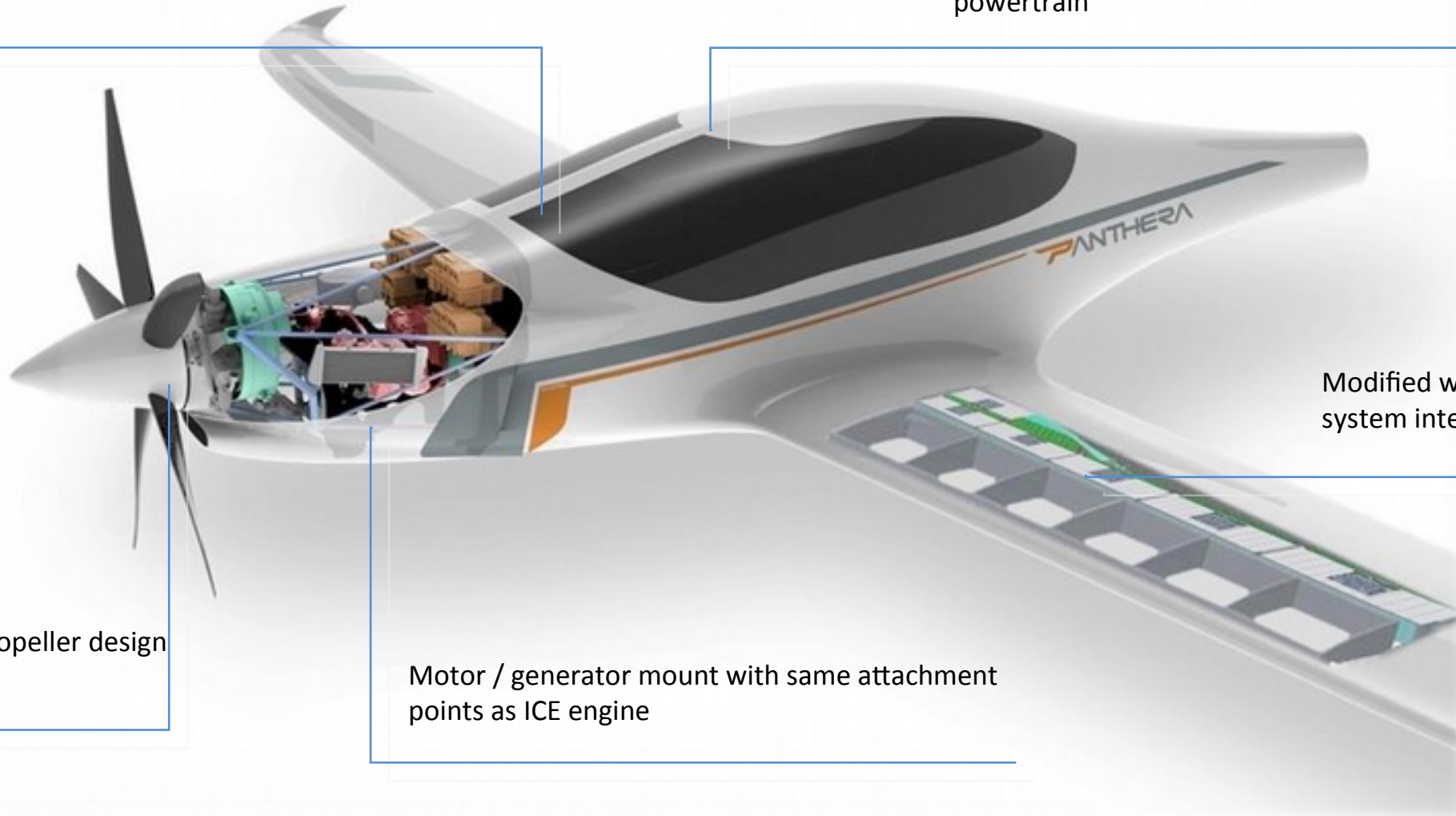




# HYPSTAIR Installation platform concept

HMI integration with modified dashboard and controls

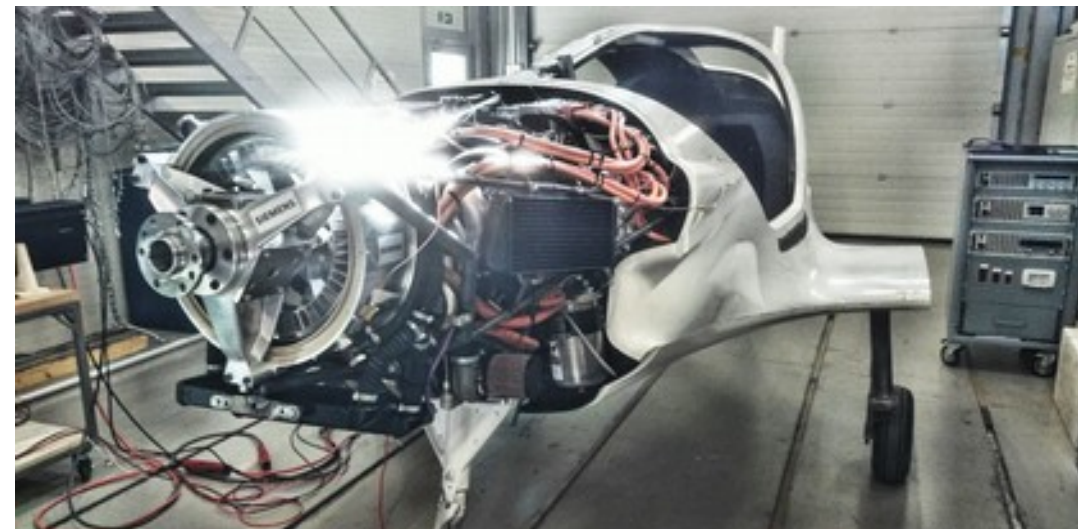
Fuselage with few modifications required for hybrid powertrain



Modified wing structure for battery system integration

Low rpm propeller design

Motor / generator mount with same attachment points as ICE engine







# 2016 HY4 project

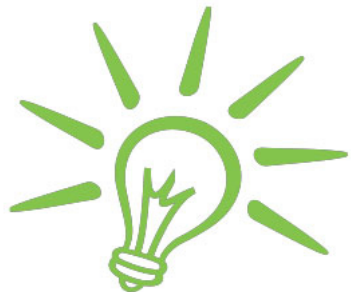


„The purpose of flight research is to separate the real from the imagined problems and to make known the overlooked and the unexpected“!

*Hugh L. Dryden*

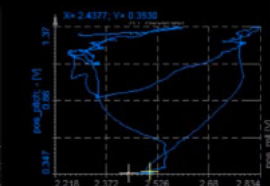
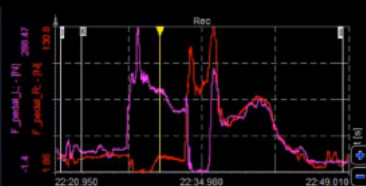
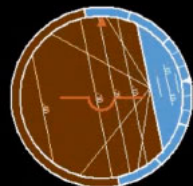
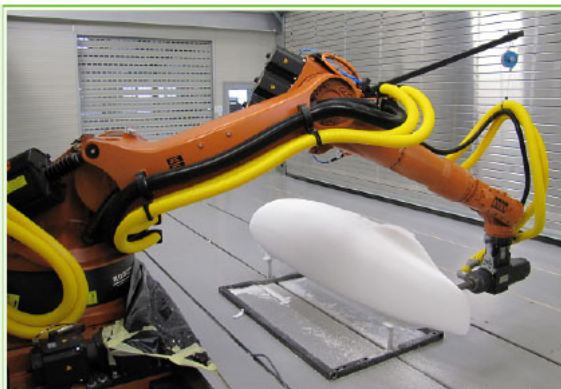
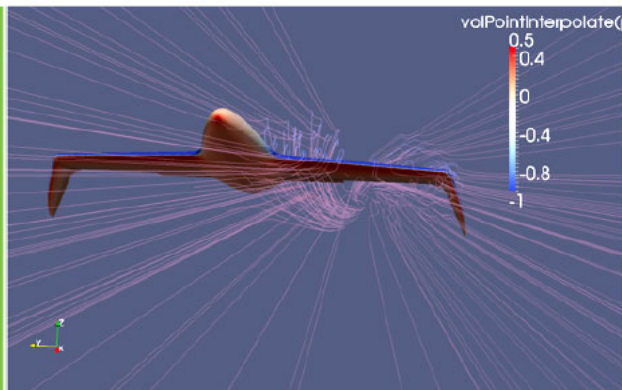






# All in house

Pipistrel offers all the phases of the process:



- concepts and development
- prototyping
- ground and flight testing
- certification process
- serial production
- own international sales network



# Pipistrel's Vision: Electric air travel

## 1. Hybrid-electric microfeeders

Development of 19 seat  
low emission commuter

## 2. eVTOL

Development of a  
revolutionary 3-seat and  
5-seat all electric aircraft  
for urban environments



Life quality in  
big cities  
must improve



Most experienced in  
electric flight



Make the atmosphere  
clean again!



Less noise,  
less pollution  
less stress



Spend time  
with your love ones,  
not in a traffic jam





# The 19-seat microfeeder

A real business case for today's hybrid-electric technology





# **A quiet revolution in air travel is on the horizon**

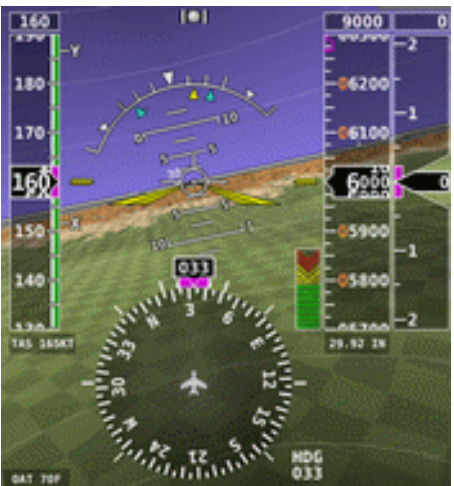
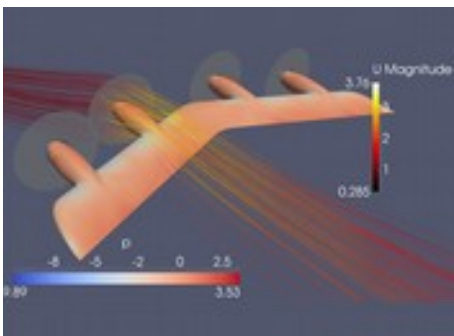
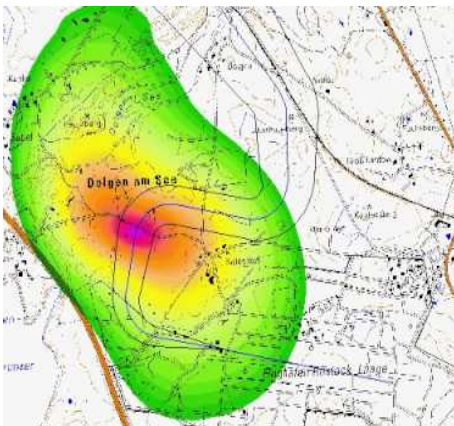
Megacities are driving the demand for Vertical Mobility

Helicopters are noisy, expensive, slow  
(electric helicopters would not work)

Technology convergence is now enabling a booming market  
for radically new, quiet, comfortable aerial vehicles  
with VTOL capability.







# Pipistrel's eVTOL design strategy

1

Combining high cruise speed with noise reduction technology

2

Modular propulsion: all-electric, hybrid-electric or turbo-electric

3

A match for a broader range of missions, distances and speeds

4

Reconfigurable payload volume: passengers, freight, medevac or surveillance













