ICAO STOCKTAKING 2021

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Founder & Chief Executive Officer,
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Fuel Cells –
Path to Aviation

hypoint

Alex Ivanenko
Co-Founder & CEO

2020 NASA iTech CYCLE II WINNER

ALCHEMIST ACCELERATOR

ICAO PRE-STOCKTAKING 2021

April 15, 2021

Powerful Team

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PLUG POWER

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3M

PRESTOCKTAKING

key advisors

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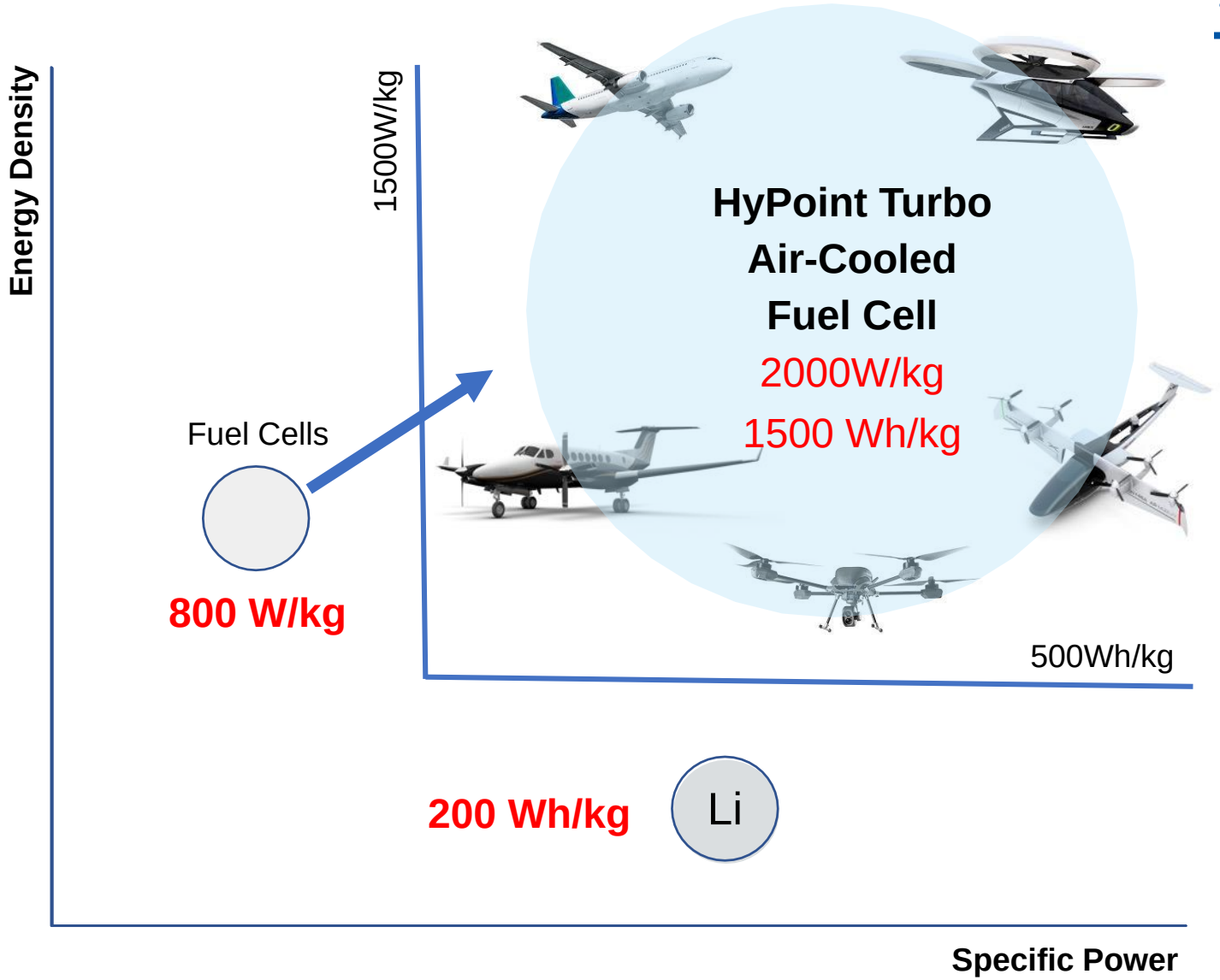
Arwed Niestroj
Mercedes-Benz FuelCell

John Hamilton
JOBY LOCKHEED MARTIN

Val Miftakhov
ZEROAVIA

There is a Problem

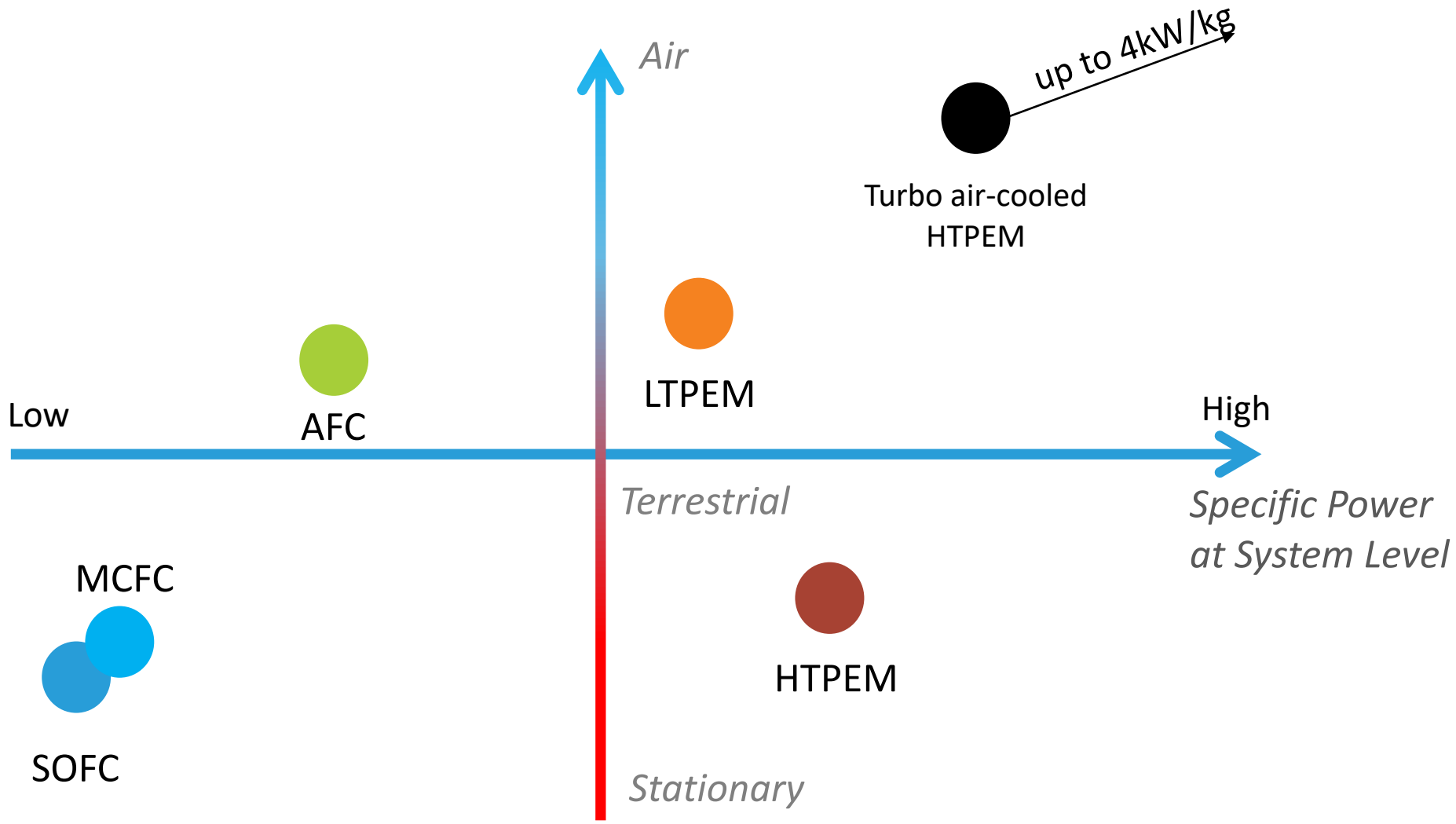


Major Types of Fuel Cells

- Alkaline fuel cells
- Solid oxide fuel cells
- Molten carbonate fuel cells
- Solid oxide fuel cells
- LTPEM fuel cells
- HTPEM fuel cells

PEM = Proton Exchange Membrane

Fuel Cells – Path to Aviation



HTPEM vs. LTPEM

Parameter	LTPEM	HTPEM	Comments
Temperature Range	≤ 80 C	140-180 C	Even broader range for shorter periods of time. Easy to cool in any environmental conditions.
Electrolyte	Water	Phosphoric acid	
Humidity control	Critical	Unnecessary	HTPEM permits short overheating – more reliable in an emergency
Impurity Tolerance	CO – ppm levels	CO – several percent	Enhanced tolerance for HTPEM for other impurities also. Lower operational cost
Membrane chemistry	Fluorocarbon – higher cost	Hydrocarbon – lower cost	Lower capital cost
Durability	5,000-10,000 hours	5,000-20,000 hours	5,000 hours at high current rate 20,000 hours achieved in a lab
Stack design	Standard	Simplified	No gas humidification, simpler cooling system

Thank you!

Alex Ivanenko,
CEO and Founder

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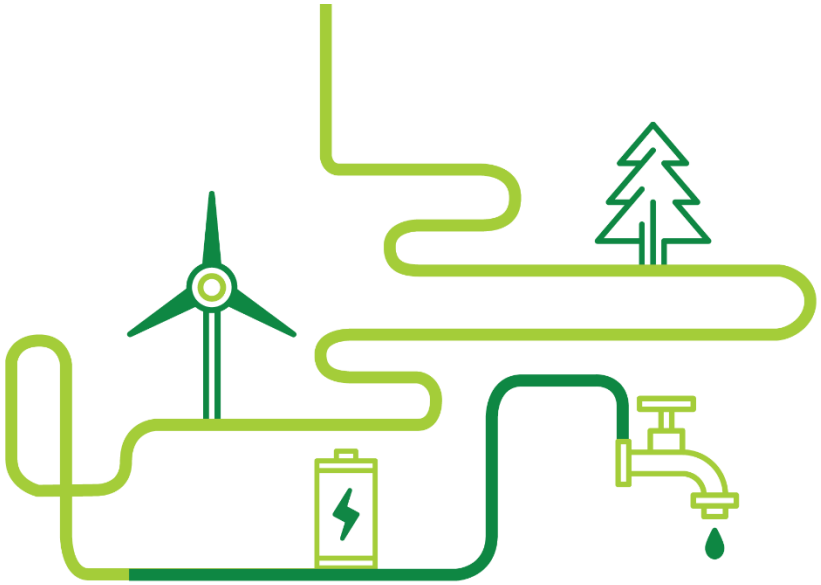
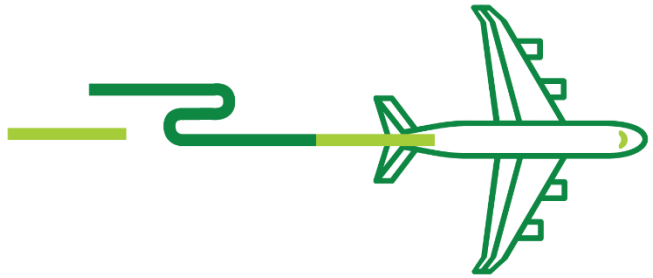
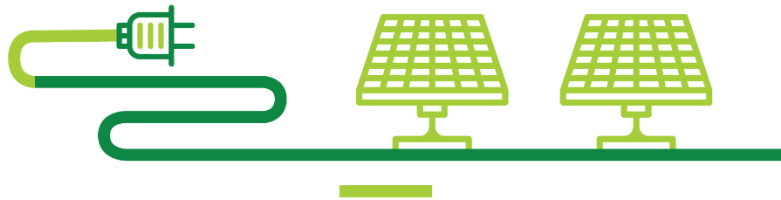




AVIATION CO_2 REDUCTIONS



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