HONEYWELL AEROSPACE
INVESTOR TECHNOLOGY TOUR

NOVEMBER 30, 2022

Honeywell

HONEYWELL AEROSPACE

Our products and services are found on virtually every commercial and defense and space aircraft. We build aircraft engines, cockpit and cabin electronics, wireless connectivity systems, mechanical components, and more, and connect many of them via our high-speed Wi-Fi offerings. Our solutions create healthier air travel, more fuel-efficient and better-maintained aircraft, more direct and on-time flight arrivals, safer skies and airports, and more comfortable flights, along with several innovations and services that reflect exciting and emerging new transportation methods such as autonomous and supersonic flight.

~24,000
Employees

~9,000
Engineers and Technologists

~3,000
Global Software Engineers

~10,000
Active Patents and Applications

~30
Research & Development Facilities

10,000+
Customers

400+
Platforms

SERVICE AND SUPPORT
Extensive Network When and Wherever Needed

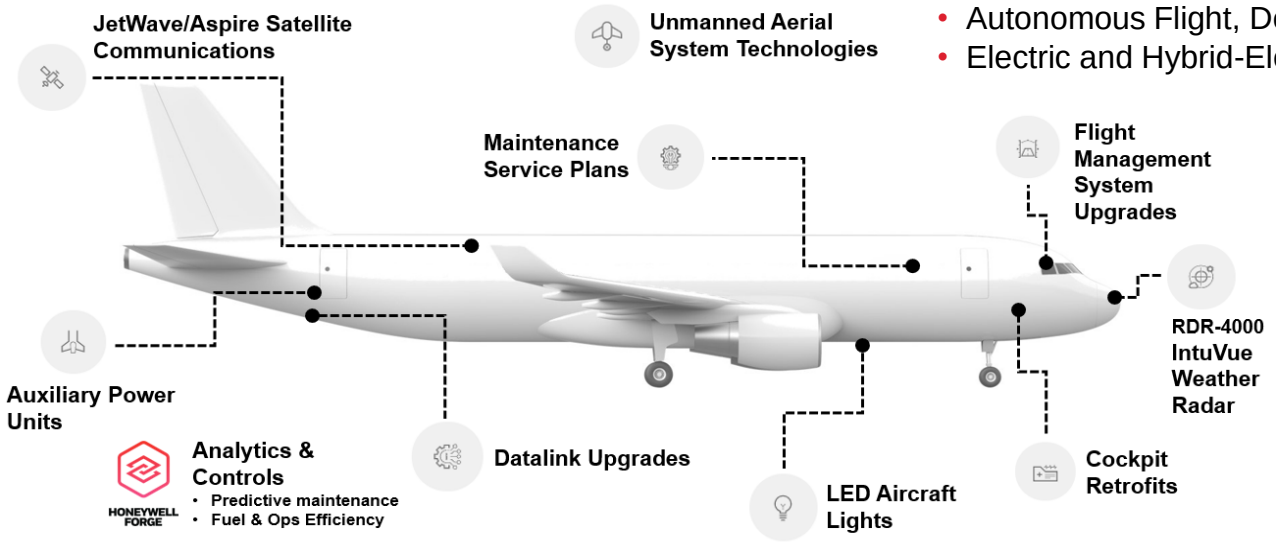
AEROSPACE OVERVIEW

WHO WE ARE

Honeywell Aerospace | Phoenix, AZ
2021 Sales: $11B

Serving Airlines and Cargo, Business and General Aviation, Defense, Helicopters, Space, and Emerging transportation solutions that advance:

- Profitability and productivity
- Mission readiness
- Direct and on-time flights
- Cleaner, safer, more comfortable flying
- Efficient and sustainable operations



PORTFOLIO HIGHLIGHTS

Electronic Solutions
- Navigation, Safety, and Surveillance
- Integrated Avionics Offerings

Engines and Power Systems
- Propulsion Engines
- Electric Power Systems

Mechanical Systems and Components
- Air Pressure and Control Systems
- Life Support Systems and Air Travel Hygiene

Services and Connectivity
- Airtime Connectivity Services
- Flight Efficiency and Maintenance Optimization

Unmanned Aerial Systems / Urban Air Mobility
- Autonomous Flight, Detect-and-Avoid Systems
- Electric and Hybrid-Electric Propulsion

AEROSPACE KEY MESSAGES

Long Term Tailwinds

- **Well-positioned** to take advantage of accelerating bizjet OEM jet growth and widebody return to flight
- **Industry leading cost position -** growing investment as percent of sales while expanding segment margin to 29%
- **Great positions on growing defense programs** (F-35, GBSD, B-21, National Programs)
- **Best in class space franchises** (RWA's, CMG's, optical interlinks)

Best in Class Positioning for Future of Aviation

- **$25B FLRAA engine win** with Boeing / SIK sets up multi-decade opportunity
- **Over $7B in UAM / UAS equipment wins** with $10B pipeline
- **Revolutionizing flight decks in all markets** with Honeywell Anthem®
- **Industry leading R&D investment profile** at a rate of 5% - 8% of revenue
- **Retrofits / Modifications / Upgrades (RMUs):** $800M+ per year and growing to $1B+ by 2024

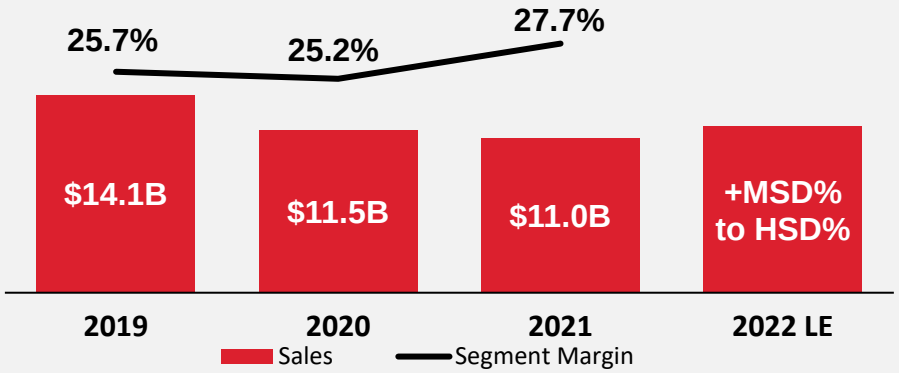
Productivity Improvements Driving Continued Margin Expansion

- **Digitized Processes:** >75% of customer transactions M-to-M
- **Leader in Connected Systems:** Installed on 10,000+ aircraft
- **One instance of ERP** across entire enterprise
- **50% reduction in manufacturing footprint** (2016 - 2022)
- **Breakthrough Initiatives:** vapor cycle cooling, alternative nav, electromechanical actuation, and LIDAR systems

Delivering The Future Today

AEROSPACE BUSINESS OVERVIEW

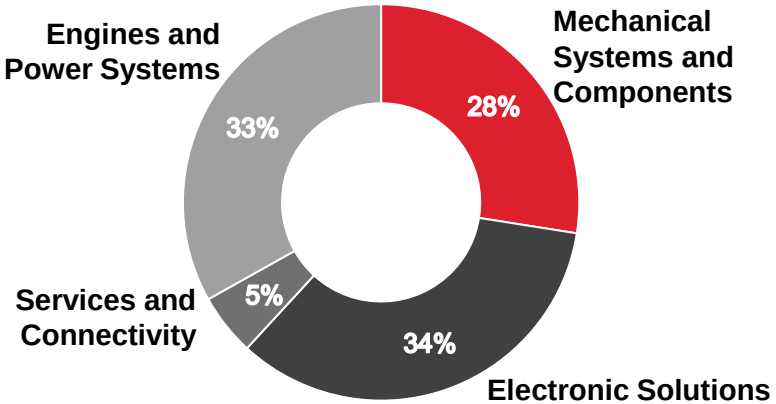
FINANCIAL OVERVIEW



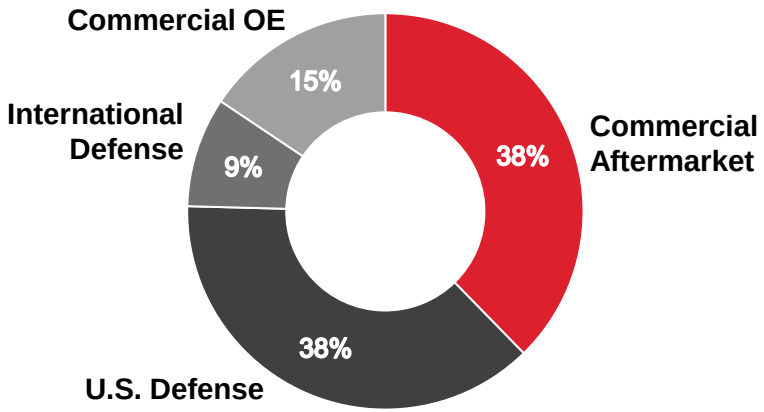
GROWTH DRIVERS

- ✓ Technology leadership driving differentiation in core and shaping the future
- ✓ $7B+ of recent UAM / UAS program wins – multiple platforms and products
- ✓ Connected business technology advances and expansion in defense
- ✓ Strong widebody flight hour growth near term, with steady long-term growth
- ✓ Accelerating RMUs and breakthrough initiatives to achieve above-market growth
- ✓ Exceptional cost position and poised to maximize gains on industry recovery

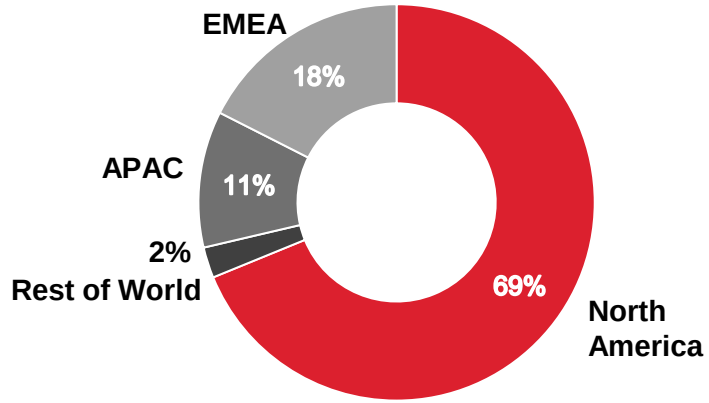
BUSINESS OFFERINGS



VERTICALS



GEOGRAPHIES



Pie chart data represents 2021 sales.

Attractive and Balanced Portfolio - Poised for Growth

AEROSPACE EXCITING MARKET OUTLOOK

ATR Flight Hour Recovery Led by Widebody Platforms	Business Jet Market Setting Record Levels	Innovative Decoupled Portfolio	Industry-Leading Cost Position	Great Positions on Growing Platforms
• Earn **3x more sales dollars per flight hour** on widebody planes	• 2021 business jet flight hours **exceeded 2019 by 10%**	• Revenue >$800M in 2021 and **growing at 10% CAGR**	• **Industry-leading** R&D investment profile	• ATR: **737 MAX**, A320neo, A350

AEROSPACE GROWTH OUTLOOK

Air Transport (ATR)	Business Aviation (BGA)	Defense (D&S)
DD% CAGR	**MSD%** CAGR	**LSD%** CAGR

Well-Positioned to Capture Market Upcycle

SUSTAINABILITY AT THE FOREFRONT OF OUR GROWTH

DAVID SHILLIDAY
VICE PRESIDENT AND GENERAL MANAGER
POWER SYSTEMS

Honeywell

CARBON NEUTRAL BY 2035

We pledge to achieve carbon neutrality in our facilities and operations by 2035. Here's where we stand today.

>90%
REDUCTION
in greenhouse gas intensity since 2004

~70%
IMPROVEMENT
in energy efficiency since 2004

6,100
SUSTAINABILITY
projects since 2010

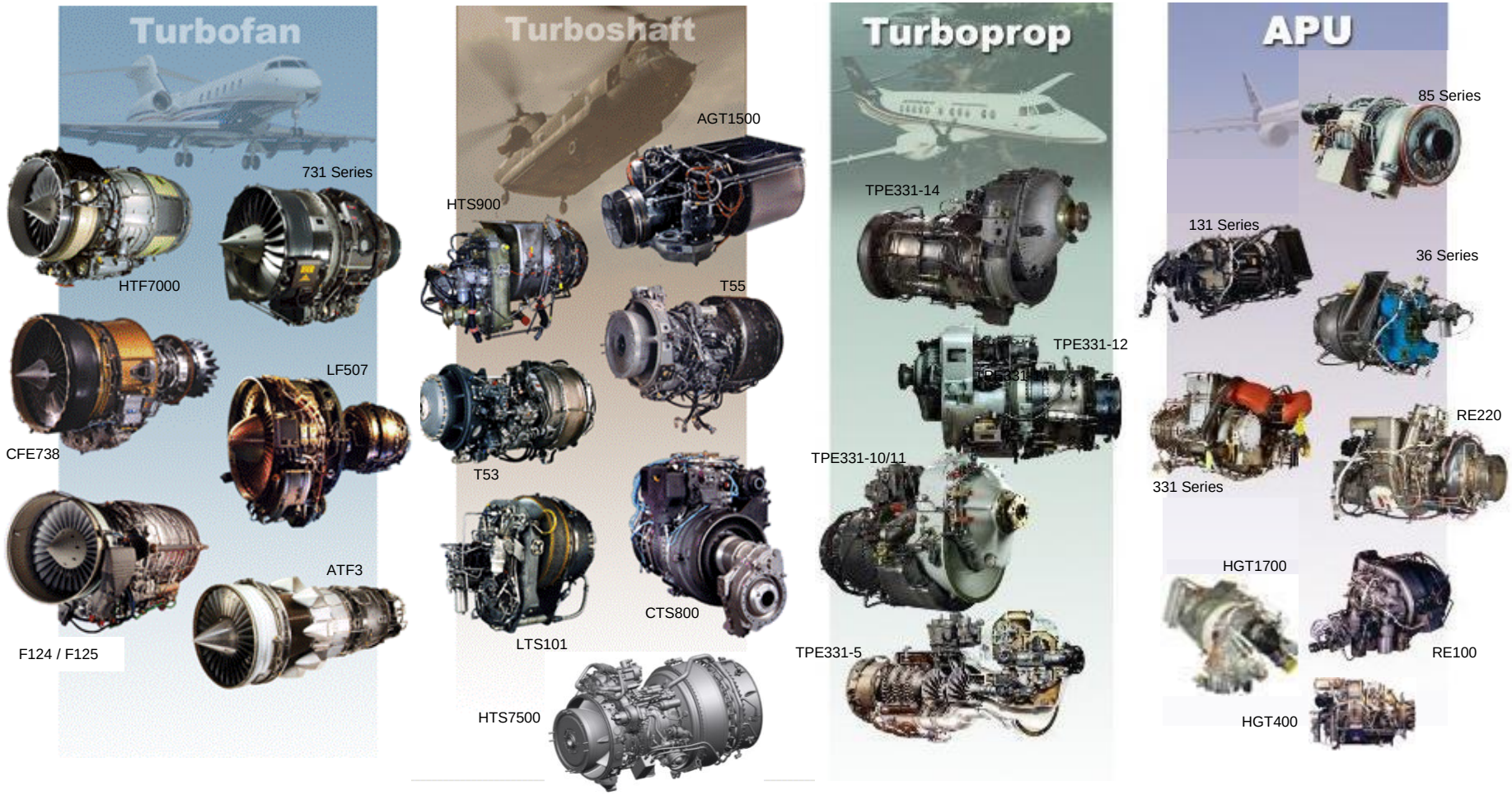
~60%
OF NEW PRODUCT RESEARCH AND DEVELOPMENT
investment focused on solutions that improve environmental and social outcomes for customers

~3,000
ACRES
remediated and restored as valuable community assets

160
MILLION GALLONS
of water saved in water-stressed areas since 2013

67
MILLION CARS
the equivalent of the number of cars removed from the road for one year thanks to Solstice

TURBINE ENGINE PRODUCT LINES



Turbofan Engines
3,000 to 8,000 lb thrust

Turboshaft Engines
500 to 7,500 shp

Turboprop Engines
500 to 1,600 shp

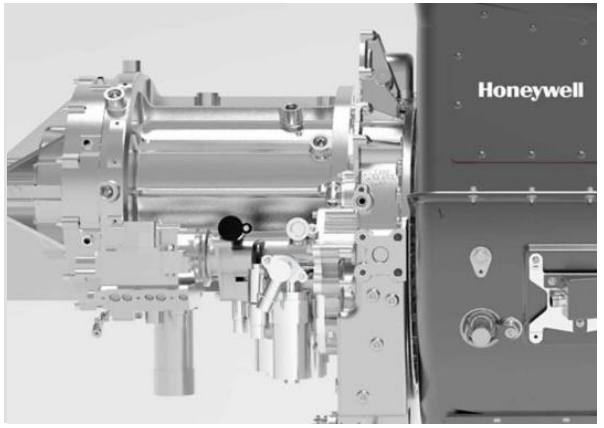
APUs
100 to 1,700 hp

Over 150,000 Turbine Engines Delivered

AEROSPACE SUSTAINABILITY PRODUCTS

SUSTAINABLE AVIATION FUEL (SAF)

HYDROGEN FUEL CELL



ELECTRIC POWER

AUXILIARY POWER UNIT (APU)

GENERATORS AND TURBOGENERATORS

ELECTRIC PROPULSION

HONEYWELL FORGE FLIGHT EFFICIENCY

AVIATION ROADMAP TO ZERO EMISSIONS

Entry into service: 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050

- **Long-Haul** — 1000 MW-hrs
- **Biz-Jet** — 100 MW-hrs
- **Regional** — 10 MW-hrs
- **Commuter** — 2 MW-hrs
- **GA** — 0.2 MW-hrs
- **UAM** — 0.02 MW-hrs
- **UAV** — 0.001 MW-hrs

Sustainable Aviation Fuels

Aggressive H2 Timeline

Conservative H2 Timeline

H_2 AND/OR

Hydrogen
Fuel cells
And
burning turbines

Batteries

H_2 Aggressive Timeline

Major government investment
H_2 infrastructure availability
Renewable energy availability
Energy dense fuel cells
LH_2 / GH_2 storage tech
Batteries insufficient
New Aircraft developed

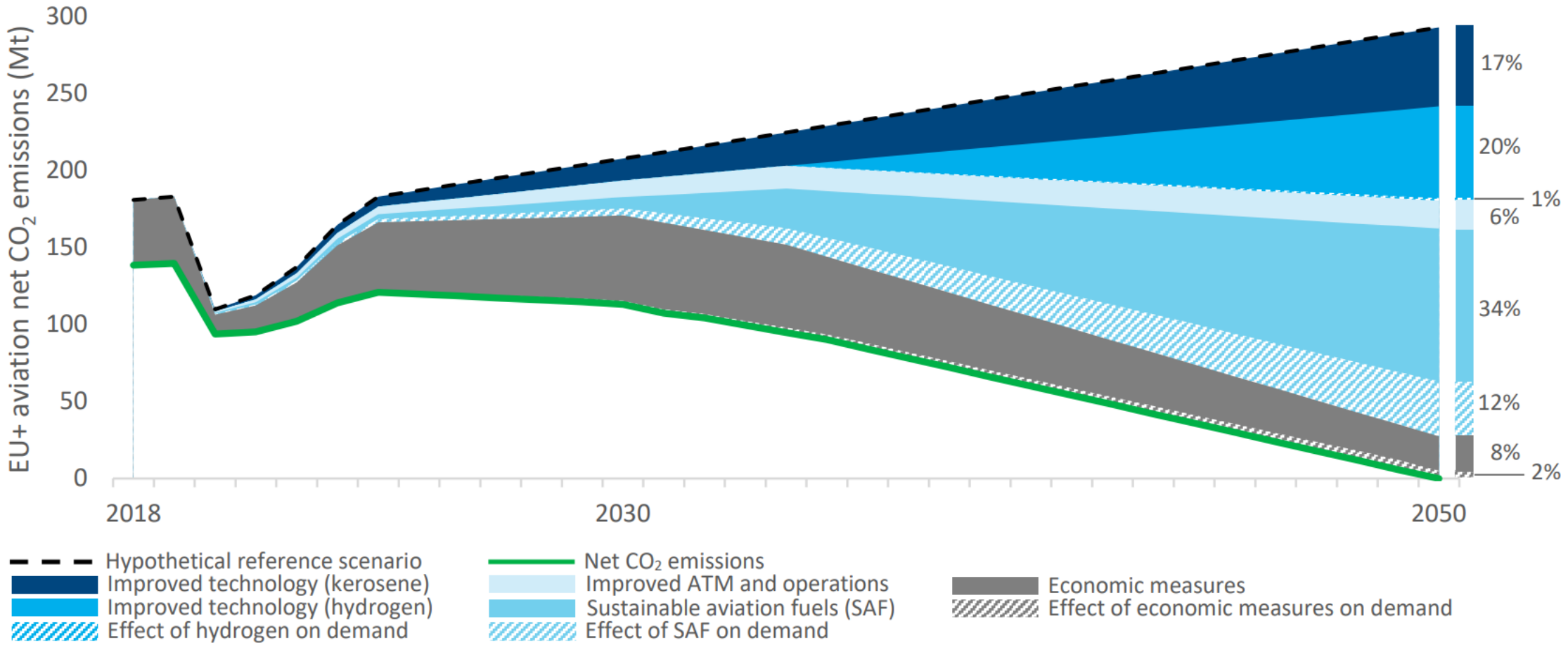
H_2 Conservative Timeline

Sustainable Aviation Fuels available and economic

SAF sufficiently carbon-neutral
Renewable feedstock available
Evolutionary aircraft and engines

SAF is Here Now; H_2 Timeline Not Solidified Yet

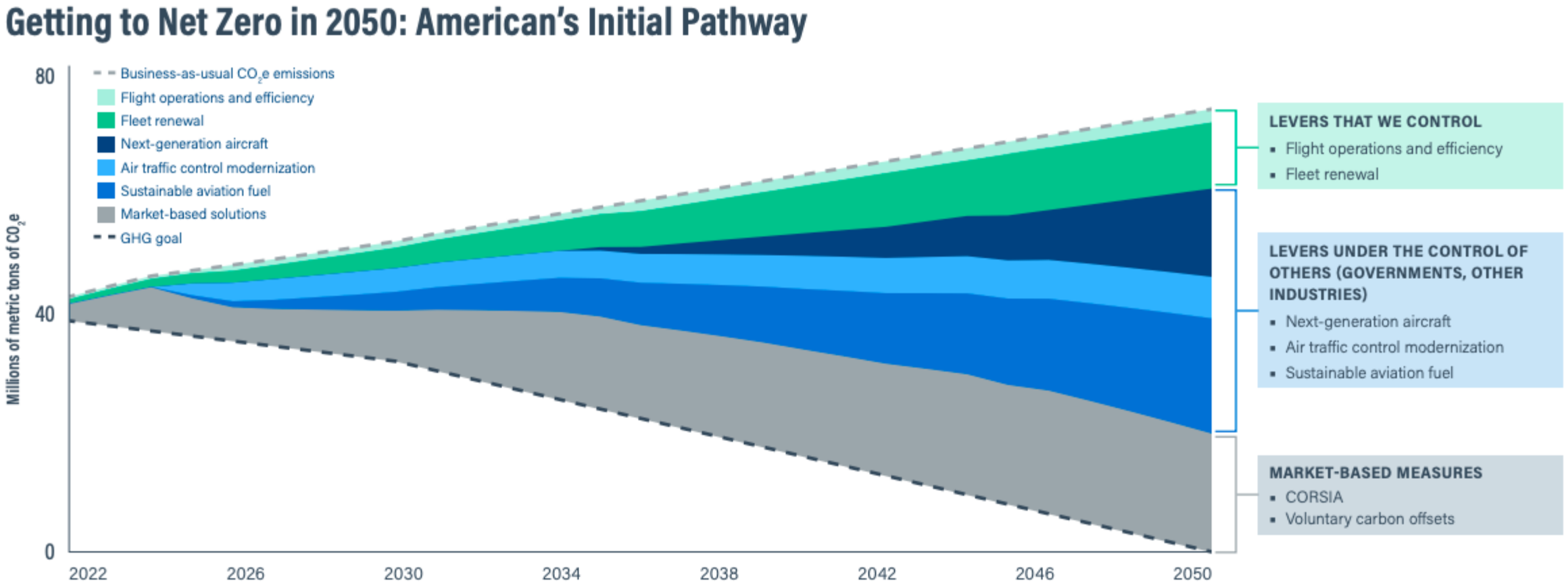
EU AVIATION ZERO EMISSIONS ROADMAP



Source: Destination 2050

U.S. Building Similar Roadmap, but Role of H_2 Unclear

U.S. AVIATION ZERO EMISSIONS ROADMAP
AMERICAN AIRLINES VIEW



Source: American Airlines

U.S. Not Bullish on H_2 and Sees SAF as More Reliable

TECHNOLOGY COMPARISON

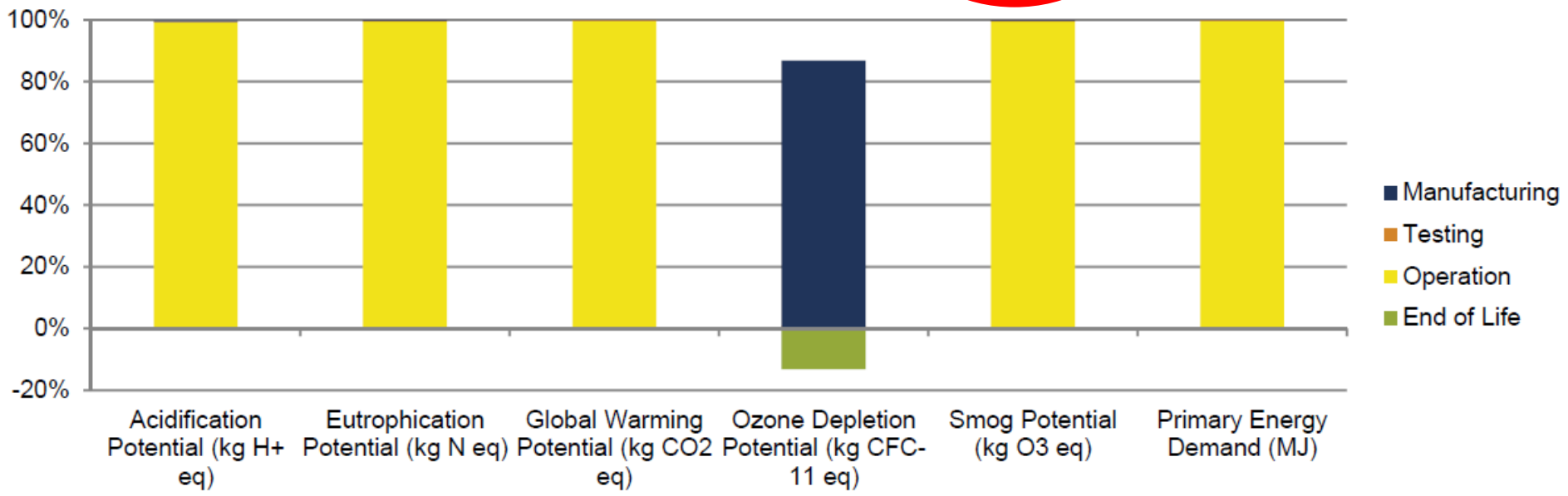
● Required ◑ Partially Required ○ Not Required

Parameters	Sustainable Aviation Fuel (SAF)	Electric Propulsion				Hydrogen Combustion
		Parallel Hybrid Electric	Series Hybrid Electric	Battery Electric	Hydrogen Fuel Cell	
Definition	Fuel mfd. from sustainable, renewable feedstock such as municipal waste, agricultural residue and waste lipid	A/C with Hybrid electric powertrain which combines conventional Internal combustion Engine (ICE) with electric propulsion system. **Hybrid solutions also compatible with SAFs.**		Aircraft runs on battery powered Electric motors	Producing electricity from H2 and O2 input to power an e-motor that drives the propeller.	Propulsion achieved by burning H2 instead of ATF (Kerosene) in a modified gas turbine engine.
Climate Impact (GHG Emission)	CO_2 Reduction: 30-60% NOx Reduction: 0 Water Vapor Increase: 0	30% - 60% emissions reduction with SAF	30% - 60% emissions reduction with SAF	TRUE ZERO No Emissions present	CO_2 Reduction: 100% NOx Reduction: 100% Water Vapor: Knock Out	CO_2 Reduction: 100% NOx Reduction: 50-80% Water Vapor: +150%
Challenges	High cost (currently 2x Jet-A) Scaling feedstock / supply chain	Battery weight Electric motor & power distribution	Battery weight Electric motor & power distribution	Battery weight / range	Fuel cell power density Hydrogen storage volume	Engine changes Hydrogen storage volume
Require new Engine Architecture	○	●	●	●	●	◑
Require new A/C Architecture	○	◑	●	●	●	◑
Require new Electrical Systems	○	◑	●	●	●	
A/C Operations	Same turn around time as convention fuel	Same turn around time as convention fuel	Same turn around time as convention fuel	10x recharge time or battery exchange mechanism	2X longer refueling time for short range	2X – 3X longer refueling time for medium and long range
Airport Infrastructure	Existing infrastructure can be used.			Fast charging or battery exchange system required.	Significant increase in H2 infrastructure: production, distribution and storage.	
Complexity	Medium	Medium	High	Very High	Very High	High

SAF is Attractive in Near Term, Max Investment in Fuel Cell

APU LIFECYCLE ANALYSIS

	Manufacturing	Testing	Operation	End of Life	Total
Acidification Potential (kg H+ eq)	1,686	951	5.3E+05	-1,162	5.4E+05
Eutrophication Potential (kg N eq)	0.51	0.81	3.7E+02	-0.29	3.7E+02
Global Warming Potential (kg CO2 eq)	3,488	8,103	6.4E+06	-1,676	6.4E+06
Global Warming Potential (car-yr eq)	0.69	1.6	1264	-0.33	1267
Ozone Depletion Potential (kg CFC-11 eq)	1.5E-05	4.7E-10	1.1E-07	-2.3E-06	1.3E-05
Smog Potential (kg O3 eq)	203	417	1.5E+05	-126	1.5E+05
Primary Energy Demand (MJ)	51,491	117,128	9.0E+07	-22,492	9.0E+07



Increasing Scrutiny on the Manufacturing and End of Life Impact

IN SUMMARY

The fleet that is today

Our immediate impact to sustainability is to enable the fleet of today to operate more efficiently

The fleet of the future

The process of doing so helps us learn some of the technical challenges we will face with fleet of future

Everything we are doing now is building a bridge of learnings for the future

Anything we do today that asks, “How can I be more efficient in my operations? More efficient in adoption of new technology?” So, when we get to a clean sheet aircraft, we can apply all these learnings

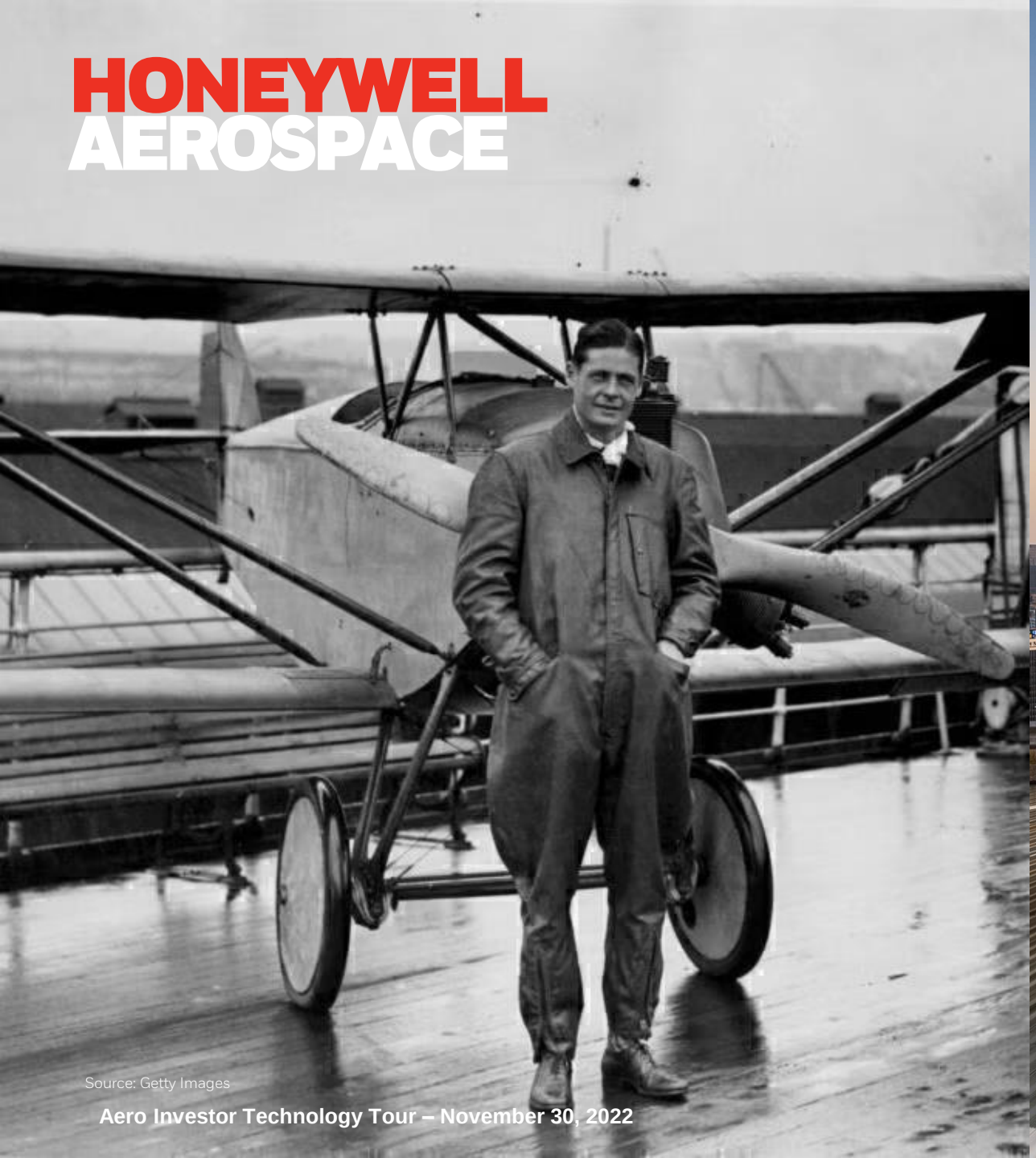
Sustainability at the Forefront of Our Growth

PATHWAY TO AUTONOMOUS FLIGHT

JIA XU
CTO, UAS/UAM

Honeywell

HONEYWELL
AEROSPACE



Source: Getty Images

PATHWAY TO AUTONOMOUS FLIGHT

We expect all of aviation to go autonomous (or highly automated)

- Unmanned cargo and military UAS need it now
- Urban air taxi needs it to scale
- General and commercial aviation will follow to increase safety and reduce cost

Honeywell is positioned to lead in aviation autonomy

- **Sense**: we build precise and accurate navigation and flight controls sensors
- **Decide**: we build mission critical avionics and software platforms
- **Act**: we build reliable, miniaturized actuation systems
- We can introduce autonomy as a series of seamless upgrades to avionics and sensor platforms

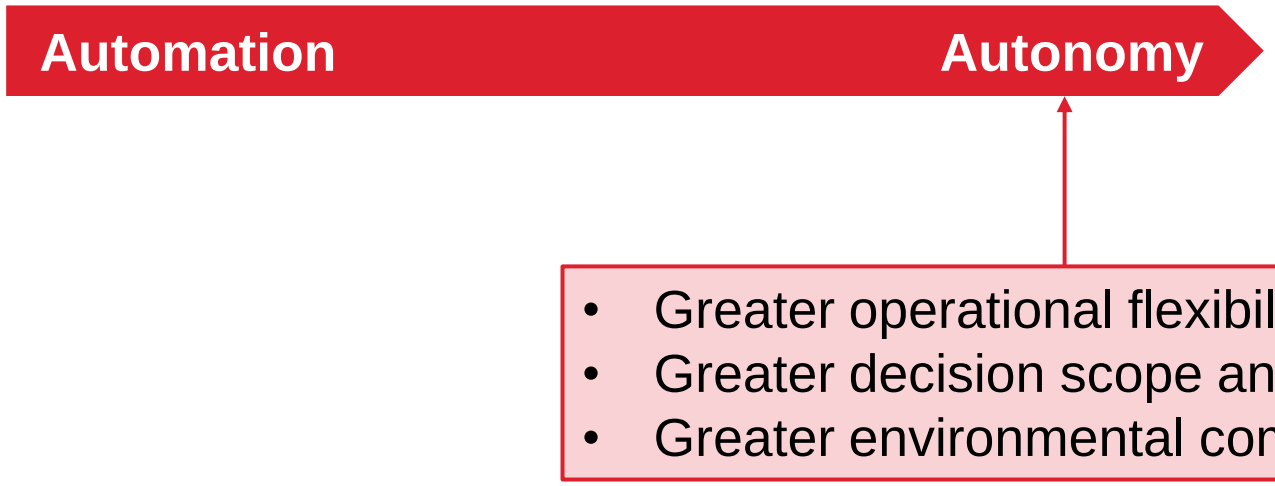
Autonomy is not some mystical thing – it can be boiled down to concrete functions and requirements

Autonomy can be Engineered, Tested, and Certified

AUTONOMY DEFINED

Autonomous Flight: fly missions with a minimum level of human supervision and intervention

Simple: automated flight supervised from the ground



Complex: mission decisions made by vehicle

WHY AUTONOMY

Value	Details
Reduce pilot cost *For UAM, Cargo, Military UAS*	Reduce training cost. Decouple operations from pilot availability. Ground operators can supervise multiple UAS.
Increase utilization *For Cargo, Military UAS*	Make route planning independent of crew positioning to increase utilization. Reduce pilot cost to further increase vehicle utilization
Improve safety and mission assurance *For Cargo, Military UAS and GA*	Reduce accidents caused by human error. Safety operate unmanned aircraft under communication interruptions
Increase payload *For UAM, Cargo*	One more revenue seat on UAM vehicles. Increased cargo capacity. Snowball weight reduction for aircraft
Increase effectiveness *For Military UAS*	Faster orchestration of weapon systems. Operate under communication denial. Increase force in high intensity operations




USE CASE SCENARIOS

	CARGO TRANSPORT FIXED ROUTE UNCONTROLLED AIRSPACE	CARGO TRANSPORT FIXED ROUTE CONTROLLED AIRSPACE	PEOPLE TRANSPORT FIXED ROUTE CONTROLLED AIRSPACE	PEOPLE TRANSPORT ON-DEMAND ROUTES CONTROLLED AIRSPACE	SEARCH & RESCUE FLEXIBLE PATTERN ANY AIRSPACE
MISSIONATE					
DEVELOP MISSION GOALS	-	-	-	-	**FUTURE**
PRIORITIZE, COMPLETE MISSION	-	-	-	-	NEEDED
COMMUNICATE					
TRANSPONDER - NORMAL	✓	✓	✓	✓	✓
TRANSPONDER - EMER	NEEDED	NEEDED	NEEDED	NEEDED	NEEDED
ATC - NORMAL	-	NEEDED	NEEDED	NEEDED	NEEDED
ATC - EMER	-	NEEDED	NEEDED	NEEDED	NEEDED
GROUND	NEEDED	NEEDED	NEEDED	NEEDED	NEEDED
PAX	-	-	NEEDED	NEEDED	NEEDED
NAVIGATE					
FLY FLIGHT PLAN	✓	✓	✓	✓	✓
FLY TO DIVERT	✓	✓	✓	✓	✓
PLAN FLIGHT	-	-	-	NEEDED	✓
MODIFY PLAN IN FLIGHT	-	-	-	NEEDED	NEEDED
AVOID A/C & OBSTACLES - AIR	NEEDED	NEEDED	NEEDED	NEEDED	NEEDED
AVOID A/C & OBSTACLES - TAXI	**FUTURE**	**FUTURE**	**FUTURE**	**FUTURE**	**FUTURE**
AVIATE					
CRUISE	✓	✓	✓	✓	✓
TAKE-OFF	NEEDED	NEEDED	NEEDED	NEEDED	NEEDED
LANDING	NEEDED	NEEDED	NEEDED	NEEDED	NEEDED
TAXI	**FUTURE**	**FUTURE**	**FUTURE**	**FUTURE**	**FUTURE**
PARKING	**FUTURE**	**FUTURE**	**FUTURE**	**FUTURE**	**FUTURE**
REGULATE					
MONITOR HEALTH - ACTION IF NEEDED	NEEDED	NEEDED	NEEDED	NEEDED	NEEDED

AUTONOMY: CONCEPT OF OPERATIONS

Flight Execution

Autonomous fly in tight virtual “corridors”. Integrate into the national airspace

Detect and Avoid (DAA)

Autonomously avoid other aircraft and obstacles

Emergency Landing

Detect failure and land at pre-designated locations

Autoland

Precisely navigate to land using certifiable technologies

Mission Executive

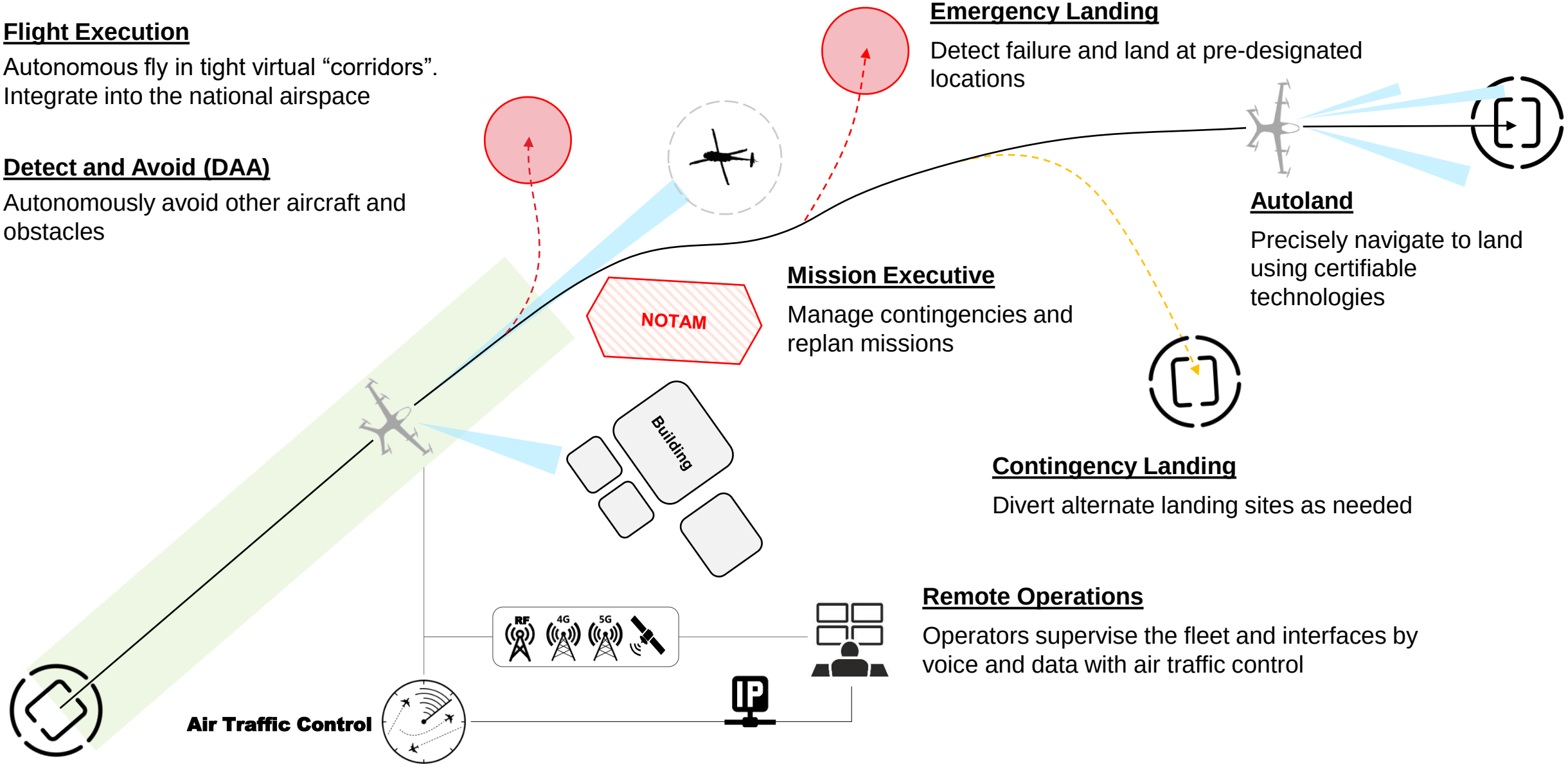
Manage contingencies and replan missions

Contingency Landing

Divert alternate landing sites as needed

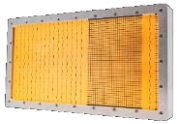
Remote Operations

Operators supervise the fleet and interfaces by voice and data with air traffic control



AUTONOMY: HONEYWELL SYSTEM

Detect and Avoid (DAA)



Radar and AI algorithms for detect and avoid

Flight Execution

Simplified Vehicle Operations (SVO)

Avionics for autonomous navigation and flight controls

Emergency Landing

Autonomy executive and contingency management

Autoland

Advanced high-precision navigation sensors

Mission Autonomy Engine

Autonomy executive

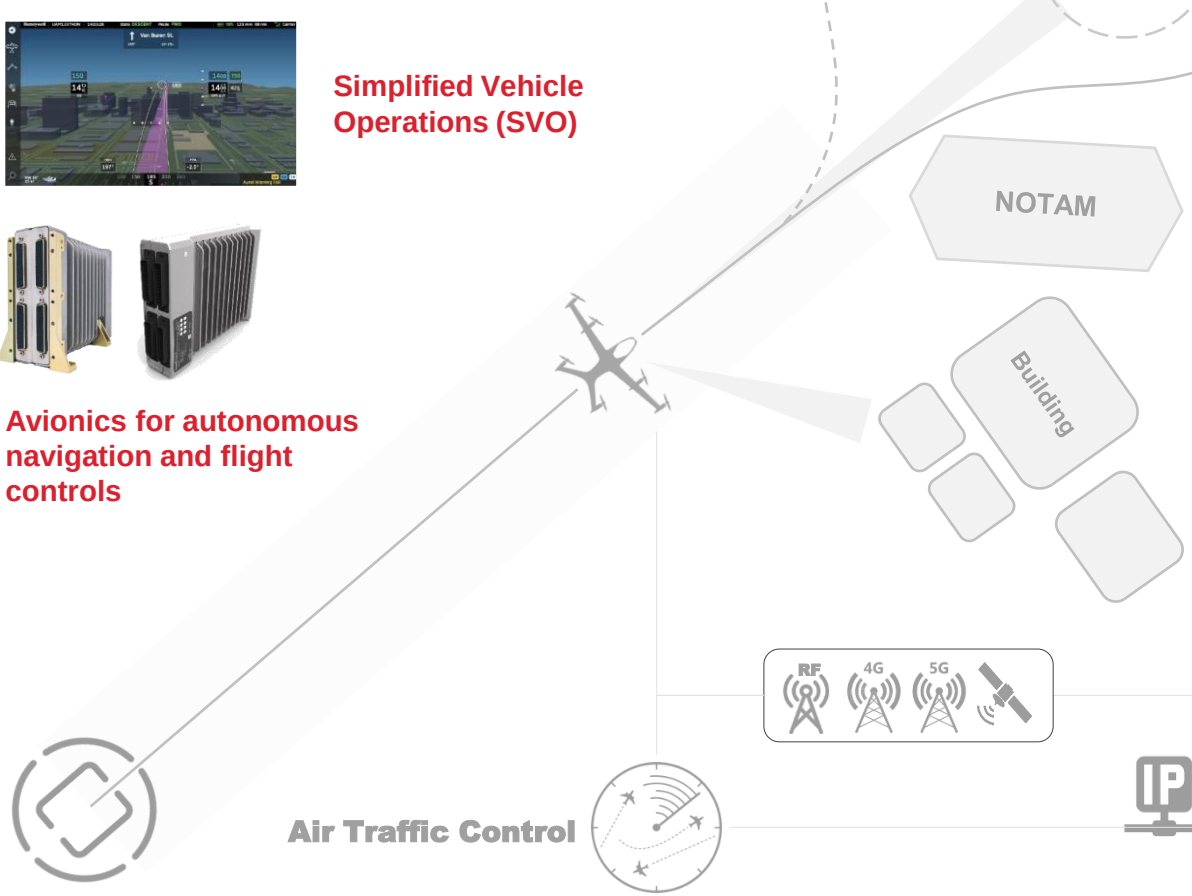
Contingency Landing

Autonomy executive and contingency management

Remote Operations

Ground Command Unit

Satellite Communications



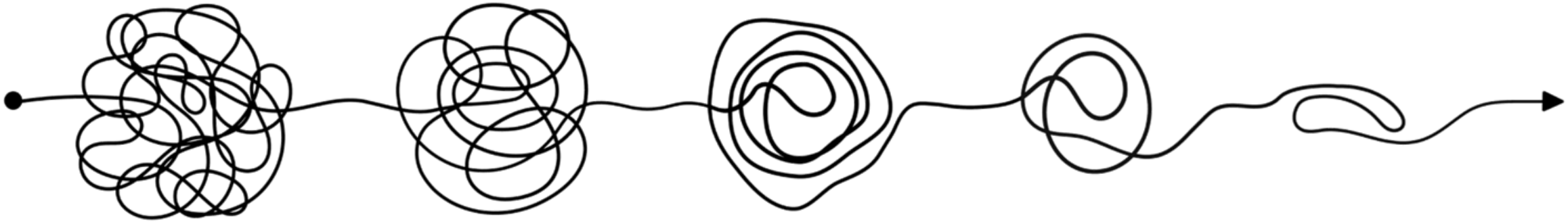
SIMPLIFIED VEHICLE OPERATIONS: PATH TO AUTONOMY

Modular, extensible avionics designed for **Simplified Vehicle Operations (SVO)** and transition to **autonomy**

With simplified interface and operations, we aim for a **10x reduction in pilot training requirements**

Robust Detect and Avoid
Path to Autonomy

UNTANGLING AUTONOMY



Autonomy means

New ways to operate and radically improved economics

Increased aircraft automation

Varying levels of decision making by aircraft in different situations

Autonomy is

Not *necessarily* artificial intelligence / machine learning (AI / ML) and deep neural net

“What is the aircraft supposed to do?”

Autonomy = defined set of requirements

Can be engineered, tested, and certified


Honeywell
THIS FLIGHT DECK IS THE FUTURE
JEFF WOIRHAYE
SENIOR DIRECTOR OFFERING MANAGEMENT, HONEYWELL ANTHEM
Honeywell
Anthem

Honeywell

SAY HELLO TO HONEYWELL ANTHEM

UNLOCKING NEW POSSIBILITIES

Smart and Intuitive User Experience

Connected

Advanced Safety Features

Flexible and Scalable

Honeywell

SMART AND INTUITIVE USER EXPERIENCE

INTUITIVE CONTROLS

SUPERMAP

SMART PILOT ASSISTANT

MISSION MANAGER

Honeywell

CONNECTED

SECURE COCKPIT BROWSER

ELECTRONIC FLIGHT BAG INTEGRATION

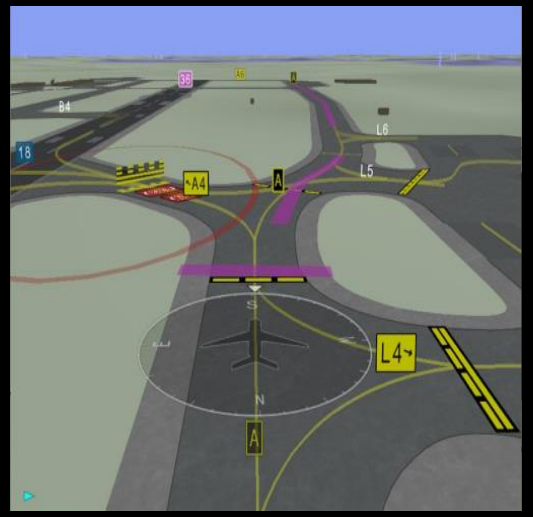
POWERED BY HONEYWELL FORGE

ADVANCED SAFETY FEATURES

EMERGENCY AUTOLAND

SYNTHETIC VISION SYSTEM WITH 3D WAYPOINTS AND 3D TRAFFIC

3D RUNWAY OVERRUN AWARENESS AND ALERTING SYSTEM



TAXI ASSIST WITH 3D AIRPORT MOVING MAP

FLEXIBLE AND SCALABLE

ADVANCED AIR MOBILITY

GENERAL AVIATION

BUSINESS AVIATION

AIR TRANSPORT

MILITARY


HONEYWELL ANTHEM
BUILT FOR
THE FUTURE

HONEYWELL ADVANCED AERIAL MOBILITY

STEPHANE FYMAT
VPGM, UAS/UAM

Honeywell

GASOLINE
TO ELECTRIC
TO SELF-DRIVING

IT'S HAPPENING IN AEROSPACE, TOO

AND HONEYWELL IS LEADING THE WAY

Honeywell, Hanwha Systems to collaborate on urban air mobility development in South Korea

By **Press**

JUL 20, 2022

Honeywell's advanced air mobility lab powers future aviation projects

By Pilar Wolfsteller, Phoenix | 15 April 2022

Honeywell Aerospace is on the cutting edge of advanced air mobility, developing

DENSO, Honeywell Co-Develop E-Motor for Lilium's All-Electric Jet

Small, light electric motor creates high output to power Lilium Jet

May 24, 2022

HEARING BEFORE THE UNITED STATES SENATE
COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
SUBCOMMITTEE ON AVIATION SAFETY, OPERATIONS, AND INNOVATION

"FAA Reauthorization:
Integrating New Entrants into the National Airspace System"

Wednesday, September 28, 2022

Written Testimony of Stéphane Fymat
Vice President and General Manager, Urban Air Mobility and Unmanned Aerial Systems

REUTERS® World Business Legal Markets More

2 minute read · October 14, 2022 8:23 AM GMT-7 · Last Updated a month ago

Hyundai's air taxi unit picks Honeywell as avionics supplier

By Allison Lampert and Abhijith Ganapavaram

Industry Leaders, Including NBAA, Discuss AAM's Future at Honeywell Summit

COMMERCIAL AEROSPACE

Archer selects Honeywell for climate system tech and actuators for its production eVTOL

Honeywell's actuators can accept hundreds of micro adjustments and commands per second from fly-by-wire computers, enabling precise navigation in urban environments.

Aug. 23, 2022

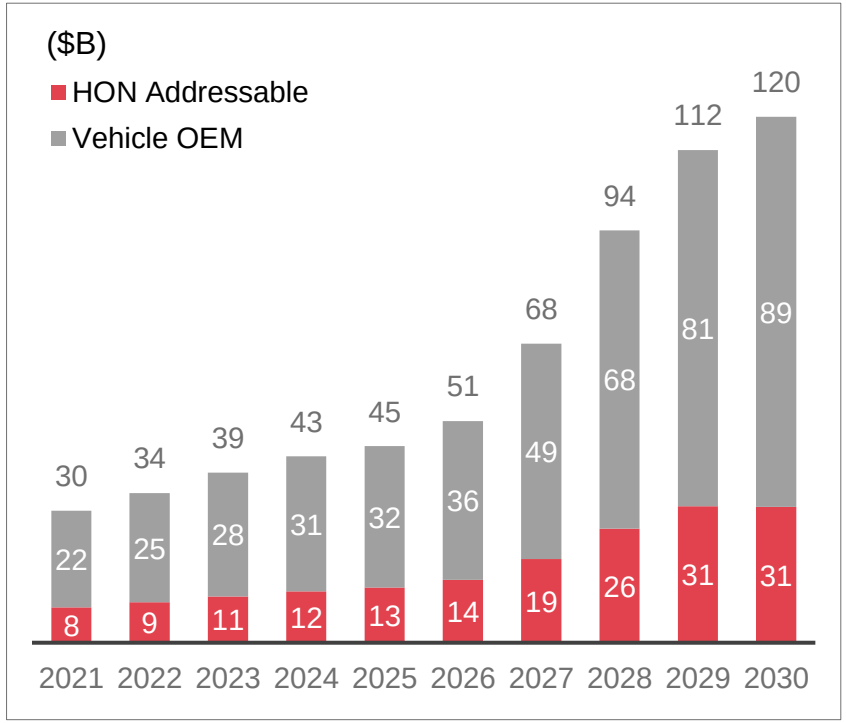
OUR VISION

100-mile trip in 45 minutes by air taxi, cutting commute times in half

Same-day package delivered anywhere by autonomous air cargo

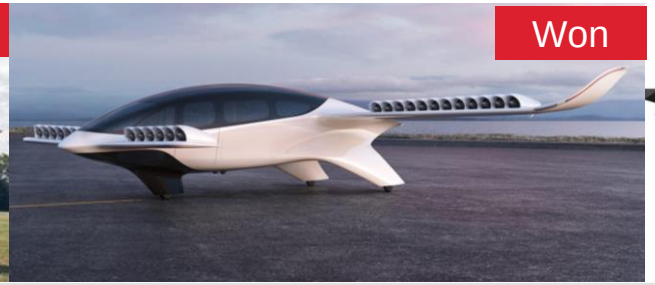
OPPORTUNITY SIZE

Segment	Examples	Start of Service	Approximate 2030 TAM
Air Taxi	Lilium, Vertical Aerospace, Archer, Beta, Volocopter, Wisk	2025	Vehicle: $80 Billion HON Opportunity: $20 Billion
Middle Mile Cargo	Pipistrel, Beta, MightyFly, Elroy Air	2023	Vehicle: $35 Billion HON Opportunity: $10 Billion
Local Light Parcel	Google Wing, WingCopter, Amazon	2022	Vehicle: $5 Billion HON Opportunity: $1 Billion

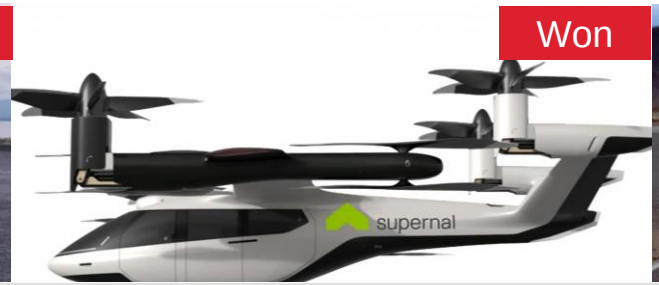


HONEYWELL IS WINNING

Integrated avionics and fly-by-wire for Vertical Aerospace VA-4X high-speed air taxi



Integrated avionics, fly-by-wire, and e-motor for Lilium Jet 7 passenger regional air taxi



Anthem for Hyundai Supernal

SATCOM for Pipistrel Nuuva 20 autonomous small cargo drone

MicroVCS for Archer Midnight

Actuation for flight control surfaces, engine-tilt and propeller pitch for Archer Midnight

cFBW for dual use autonomous cargo

Fly-by-wire and SATCOM for Pipistrel Nuuva 300 autonomous large cargo drone

$7B in Wins with $10B in Pipeline Over Next 5 Years

$2M – $5M

Typical UAM Vehicle Price

$200k – $1.5M

Potential Honeywell Content*

*Vehicles shown for illustration purposes; quoted value range does not reflect exact Honeywell system content on specific vehicles

$0.8M – $5M

Typical Heavy Autonomous Cargo Price

$100K – $1.5M

Potential Honeywell Content

$25K – $150K

Typical Delivery Drone Price

$5K – $60K

Potential Honeywell Content

REACHING TOMORROW'S POTENTIAL, TODAY.

Honeywell is building the **critical systems** that make disruptive aviation possible.

We are positioned to address a **$30B+ annual opportunity** in 2030.


Honeywell