

Navigating the Future: Emerging Trends in Transportation

Gil Ramirez, Chief Executive Officer

gramirez@ltg-inc.us

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Introduction

- Space Coast TPO
- Key Point:
 - “Vision Zero requires a **fundamental change** in the way we **think** about traffic safety and planning.”



Image Courtesy: Florida Department of Transportation



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Topics

Transportation

Electrified

Analyzed

Connected

Automated

Advanced

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Electrification

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Electrification


State of Conversion: a Tale of Two Perspectives 📊

• The “Yays”

- 40% YoY Growth in Q4 2023
- Mercedes '23 EV Sales ↑248%
- Tesla EV '23 Sales ↑38%
- Kia EV YoY '24 Sales ↑65% 📊

• The “Nays”

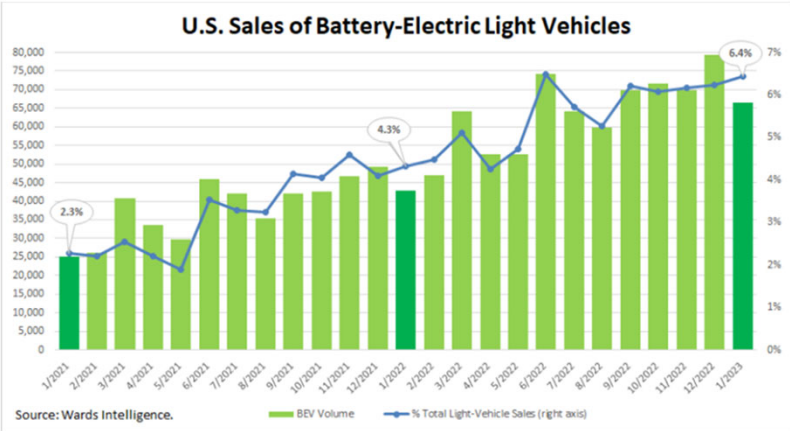
- Ford & GM EV production
- Charging infrastructure needed
- Resolving Highway Trust Fund



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Electrification

U.S. Sales of Battery-Electric Light Vehicles

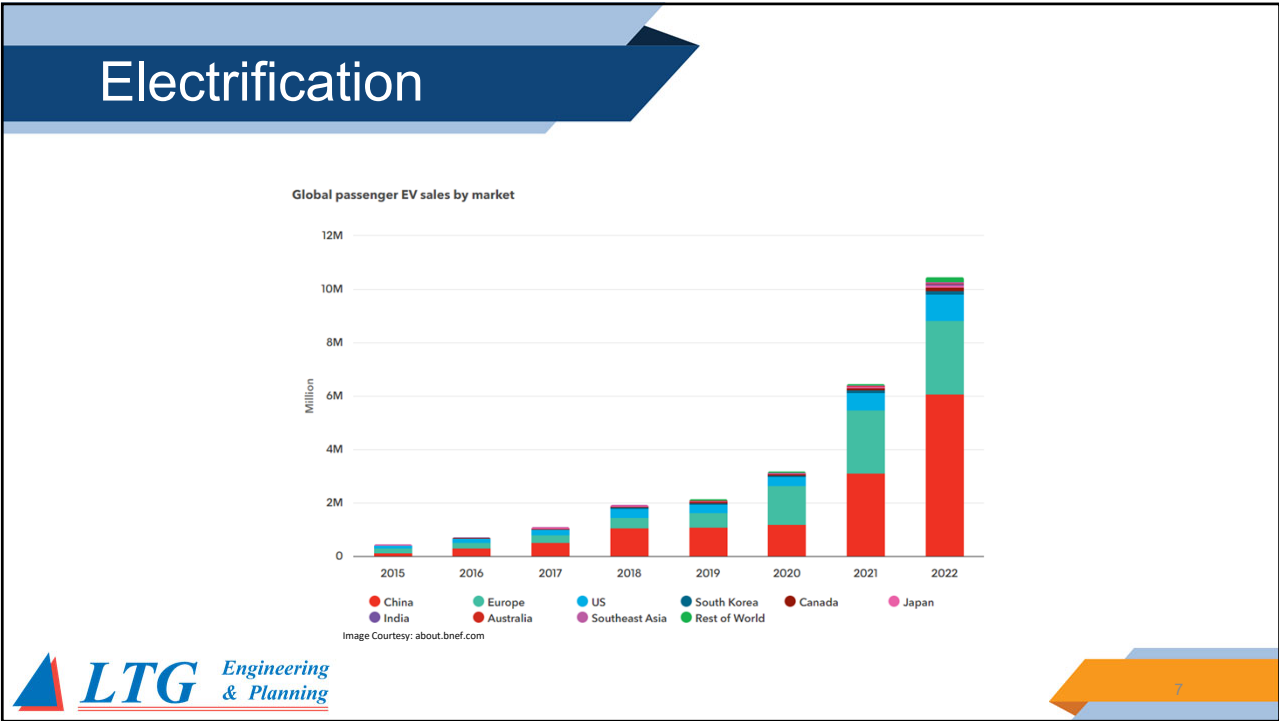


Source: Wards Intelligence. ■ BEV Volume — % Total Light-Vehicle Sales (right axis)

Image Courtesy: Wards Intelligence





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Electrification

The Economics - Real Experience

Vehicle	I.C.E. 2018 Ford Explorer	E.V. 2023 Kia EV6	E.V. + FP&L EVolution Any EV
Cost of Power	\$ 3.10/gal	\$ 0.16/kwh	\$ 31.00/mth
Efficiency	22mpg	4.1mi/kwh	~
Cost/Mile	\$ 0.14/mile	\$ 0.04/mile	~
Miles Driven	10,000 mi/year		
Cost per Year	\$ 1,407.27	\$ 390.24	\$ 372.00

Images Courtesy: Florida Power & Light



Electrification

Range Anxiety




The image shows a driver from a first-person perspective inside a car. The driver is looking at the dashboard, which displays a battery level of 2.10%. A charging station icon is visible on the dashboard. Outside the car, a road leads to a charging station with a red lightning bolt icon. The sky is overcast, and the overall mood is one of concern or anxiety about running out of power.




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Electrification

Charging Network Expansions



- IIJA**
 - Infrastructure Investment and Jobs Act
 - \$1.2 Trillion
 - Enacted November 15, 2021
- NEVI**
 - National Electric Vehicle Infrastructure Program
 - \$7.5 Billion in Formula & Discretionary
- EVCI**
 - FL E.V. Charging Infrastructure Program
 - Started July 2021



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Electrification

Charging Network Expansion

- Florida
 - E.V. Charging Infrastructure Program
 - Utilities
 - FP&L EVOlution
 - Public/Private Partnerships
- EV OEMs
 - Expanding Their Networks
 - Opening Their Networks
 - Alliances Forming (Feb 9,2024)

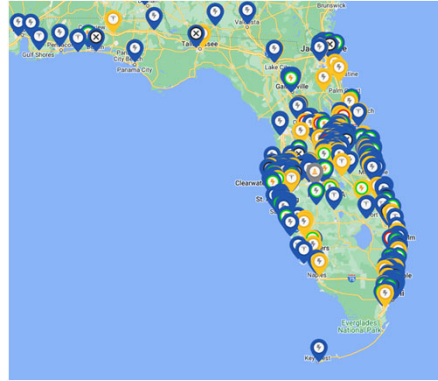


Image Courtesy: chargehub.com

Electrification

FDOT Program Approach

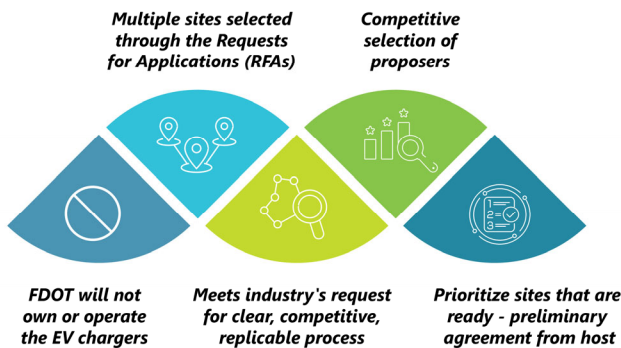


Image Courtesy: Florida Department of Transportation

Electrification

Solid-State Battery Technology

- 600-900 mi range
- 10-minute charging
- OEMs
 - Toyota
 - Ampcera
 - CASIP Consortium

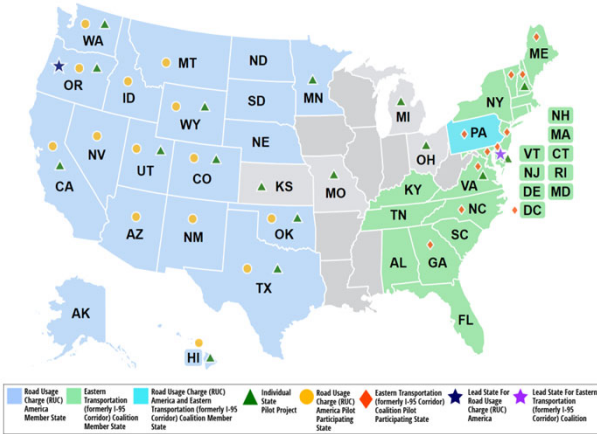


Electrification

Funding our Transportation Network



Electrification



FHWA - Finding Alternatives

- User-Based Alternative RD
- Revenue Mechanisms
- Registration Fees RD
- Weight-Based Fees


Analysis

Intelligent Transportation Systems



Analysis

Cooperative Automated Transportation



LTG Engineering & Planning

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Analysis

Data Collection

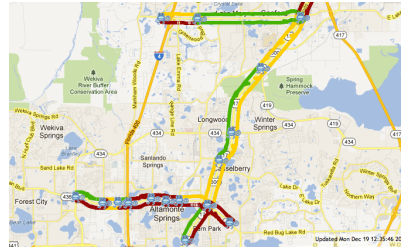
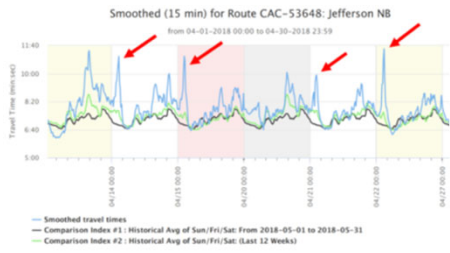


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Analysis

Data Analysis ("Big Data")



Analysis

Data Delivery



Analysis

Near Miss Detection

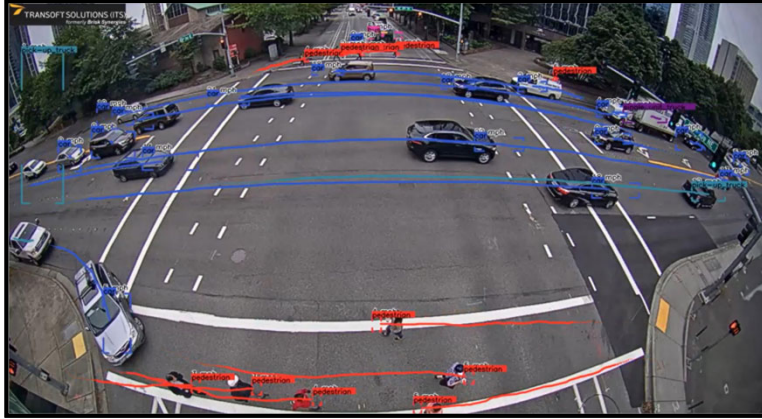


Image Courtesy: TranSoft Solutions

Connection

Connected Vehicle Technology



Connection

Connected Vehicle (CV) Technology

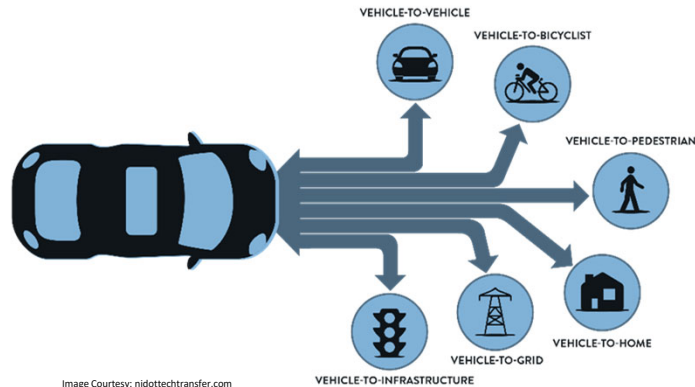


Image Courtesy: njdottechtransfer.com

Connection

Safety Benefits

- Crash avoidance
 - Intersection Conflicts
 - Queue Detection
- Emergency Alerts
- Cooperative Adaptive Cruise Control

Operational Benefits

- Traffic Flow Optimization
- Eco-Driving
- Predictive Maintenance
- Transit integration
- Performance Measurement

Automation

Autonomous Vehicle (AV) Technology




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Automation

Levels of Automation

- Level 0 – Warnings
- Level 1 – Lane Centering **OR** Adaptive Cruise Control
- Level 2 – Lane Centering & Adaptive Cruise Control
- Level 3 – Traffic Jam Chauffeur
- Level 4 – Driverless Taxi
- Level 5 – Fully Autonomous

		Steering & Accel/Deceleration	Monitors Driving Environment	Fall Back
0	NO AUTOMATION			
1	DRIVER ASSISTANCE			
2	PARTIAL AUTOMATION			
3	CONDITIONAL AUTOMATION			
4	HIGH AUTOMATION			
5	FULL AUTOMATION			

Image Adapted From: Journal of Automotive Software Engineering


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Automation

Safety Benefits

- IIHS Study July 2023
 - Level 0 - 1
 - ADAS
- Waymo Study
 - 57% reduced reported crash rate
 - 85% reduced injury rate

Target Zero

*w/ Camera & Sensors

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Automation

Safety Benefits

- Est. reduced crash rate
 - Level 0-1 (ADAS)
 - Level 2-3 (LKS, ACC)
 - Level 4-5 (Autonomous)
- Not total crashes
 - Dependent on market penetration

Level 0/1
23% - 40%

Level 2/3
43% - 64%

Level 4/5
76% - 94%

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Automation



Image Courtesy: Lassiter Transportation Group, Inc.

Operational Benefits

- Increased efficiency
- Accessibility to all
- Increased productivity
- Lower operational costs

Automation

Oxa & BEEP deliver AV services in Florida

Shuttles are part of Ultimate Urban Circulator Project which includes monorail expansion
Detection, Monitoring & Machine Vision / February 29, 2024



Image Courtesy: ITS International

Orlando, Florida, debuts self-driving shuttles that will whisk passengers around downtown



Image Courtesy: NBC News

Waymo's self driving cars on Miami streets as company tests its technology

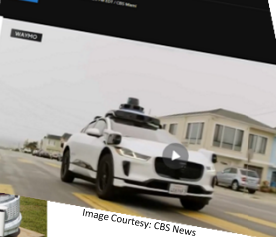


Image Courtesy: CBS News

Altamonte Springs launches passenger service aboard autonomous vehicles

A new way to travel around the city is opening today for public use



Image Courtesy: WKMG ClickOrlando

Automation

Projects/Initiatives

- ◆ Statewide Project Initiative
- ◆ FDOT Led Projects
- ◆ Partner Agency Led Projects

Design/Implementation

- 1 I-4 FRAME (2019 ATCMTD)
- 2 US 90 SPAT Tallahassee (Phase 2)
- 3 US 98 Smart Bay
- 4 SR-710/Beeline Hwy - CAV
- 5 I-541 FRAME
- 6 Florida's Turnpike Mainline and Beachline CV Deployment
- 7 Lake Mary Boulevard CV Project
- 8 I-10 Smart Road Ranger
- 9 + V2X Data Platform
- 10 US-1 Keys COAST
- 11 Railroad Advanced Notification System
- 12 I-4 Active Work Zone
- 13 Lee/Tam Traffic Signal Priority
- 14 Collier Countywide Connected Traveler Information System (CTIS)
- 15 Train Vehicle Crash Avoidance Pilot Project
- 16 Wildlife Protection
- 17 AWZM - District 2
- 18 AWZM - District 3
- 19 AWZM - District 6
- 20 CV Smart Signal - Lake County
- 21 SR 436 PedSafe Project - City of Altamonte Springs
- 22 SR-40 ITS Safety Deployment
- 23 Pasco County SMART US-19
- 24 Hillsborough County Connected Vehicle Priority and Preemption System
- 25 AWZM - District 7
- 26 Pedestrian Warning System - CV Deployment along All 19 City of Clearwater
- 27 Smart Signal Corridor (West St. Petersburg)
- 28 + RSU Health Monitoring
- 29 Cybersecurity
- 30 First Responder
- 31 US-17-92 Connected Vehicle Deployment
- 32 Ped/Safe I-4 U.S. 441/State Road 50

Planning

- 1 CV Bike Safety Pilot Deployments
- 2 State Road 427 Hightail Signal Priority
- 3 Downtown Interchange Smart Work Zone
- 4 + Pinellas County Smart Community (2020 ATCMTD)
- 5 SR 866/29W 10th Street Connector TSM&S SWZ
- 6 Smart St. Augustine
- 7 Intersection Collision Avoidance Safety Program
- 8 SR 60 West Coast Smart Signal Corridor Project
- 9 Connected Vehicle Priority and Preemption System (CVPP)
- 10 Bee Ridge Corridor Smart Signals
- 11 City of Sarasota CAV Project
- 12 SMART US 19

Operational

- 1 + Security Credential Management Systems (SCMS)
- 2 + Lane Closure Notification Systems (LCNS)
- 3 Gainesville SPAT Trapezioid
- 4 + Smart Signals Dashboard
- 5 + AV Shuttles at Lake Nona
- 6 + THEA CV Pilot
- 7 Smart Work Zone Trailer
- 8 Pinellas County SPAT
- 9 Incident Response Vehicle Pilot Project
- 10 I-75 FRAME Gainesville
- 11 SR 434 CV Deployment
- 12 + Downtown Tampa Autonomous Transit
- 13 + HART AV
- 14 + AV Shuttles at PSTA
- 15 I-75 FRAME Ocala
- 16 Orlando Smart Community (2017 ATCMTD)
- 17 Seminole Expressway SWZ
- 18 I-4 Beyond the Ultimate South Smart Work Zone
- 19 Gainesville Bike and Pedestrian Safety
- 20 FTE SunTrax
- 21 US-1/Jupiter Bridge Smart Work Zone

Legacy/Retired

- 1 Near Miss Identification Safety System (N-MISS)
- 2 US 90 SPAT Tallahassee (Phase 1)
- 3 Gainesville AV Shuttle
- 4 Dixie County CV Signals
- 5 CAV Projects (ATMA)
- 6 CAV Tele-Operated Vehicle Phase 1 Research

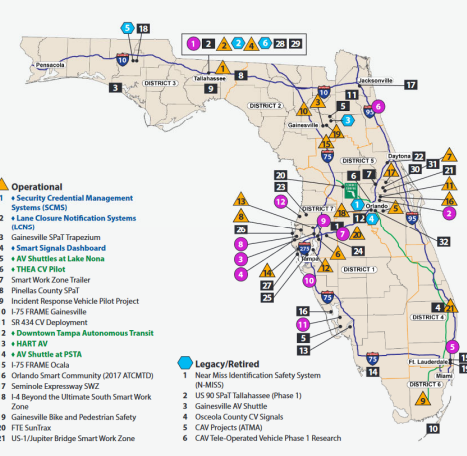
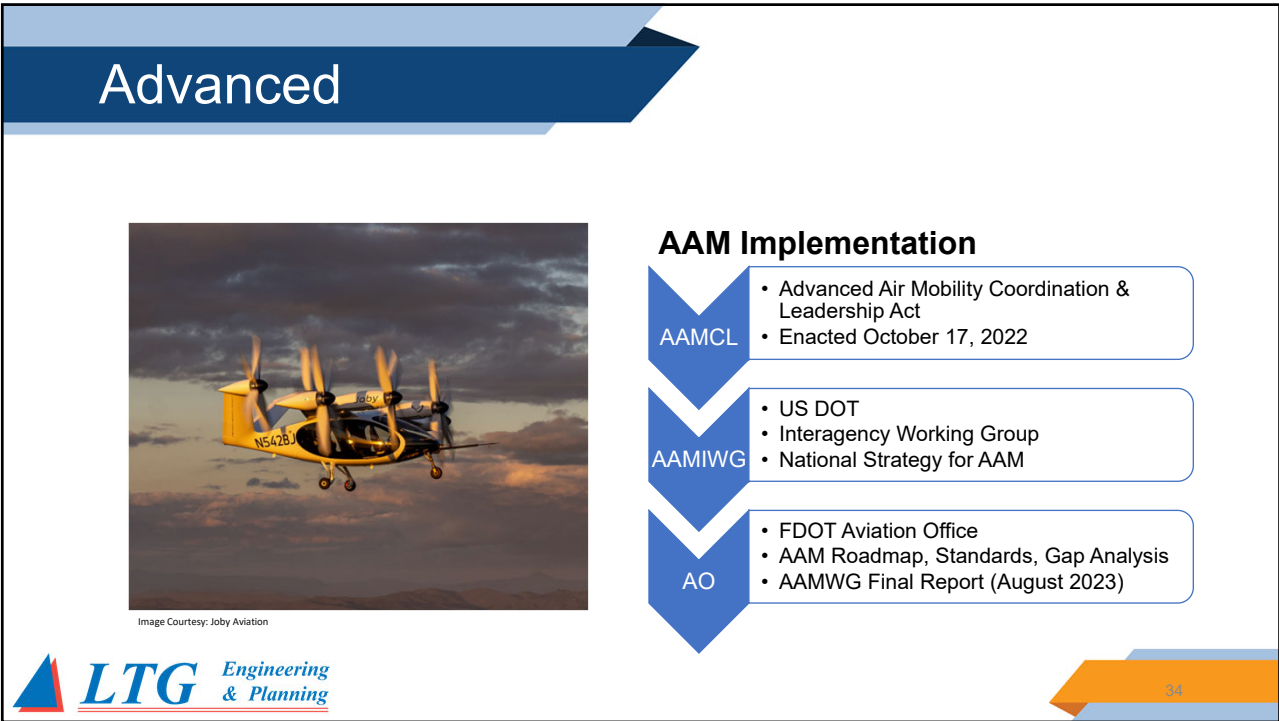
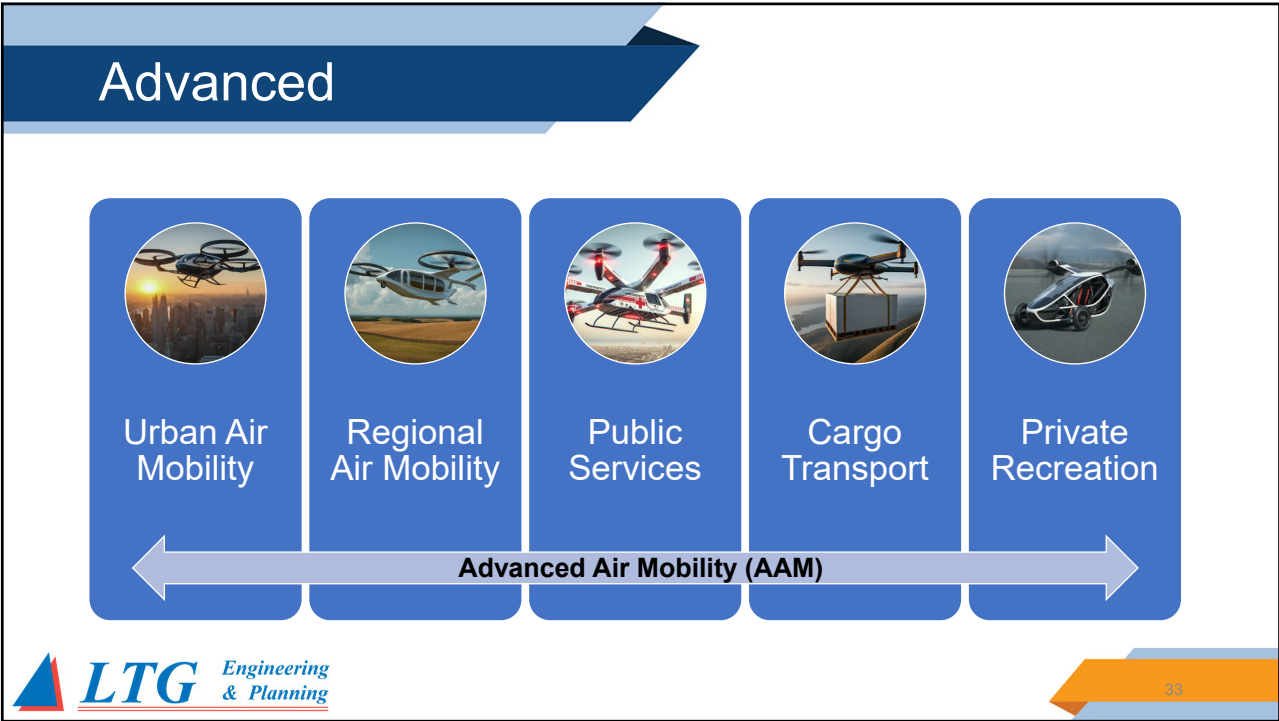


Image Courtesy: Florida Department of Transportation

Advanced

Advanced Air Mobility





Advanced

Benefits

- Reduced automobile trips
- Reduced congestion
- Enhanced safety
- Improved connectivity
- Increased accessibility
- Environmental sustainability
- Economic growth



Advanced Aviation Infrastructure Modernization Act

Challenges

- Vertiports
- Vertiport Design Standards
- S. 4246 – AAIM Act
 - \$25M Federal grants
 - Planning for Vertiports
 - Currently in Senate
- Aircraft Certifications
- Air Traffic Integration

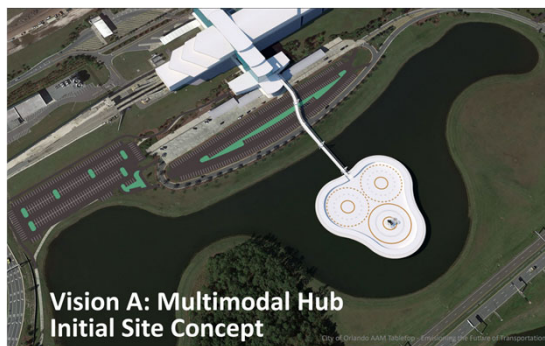


Image Courtesy: City of Orlando AAM Tabletop

Advanced Air Mobility

CHINESE COMPANY HITS MAJOR MILESTONE WITH FIRST-EVER PASSENGER FLIGHT OF PILOTLESS FLYING TAXI: 'THERE'S NO NEED FOR A RUNWAY'

"A journey that might take one hour on the ground due to road restrictions and traffic congestion could be completed in just 10 minutes in the air."

By Hanna Furnell / January 27, 2024



Image Courtesy: www.thecooldown

City of Orlando Vertiport Approval

1. Chapter 58, Part 4P Vertical Development Code
2. Zoning Districts
3. Conditional Use Permit

Image Courtesy: City of Orlando



Autonomous air mobility may serve Miami in five years



Image Courtesy: www.miami todaynews.com

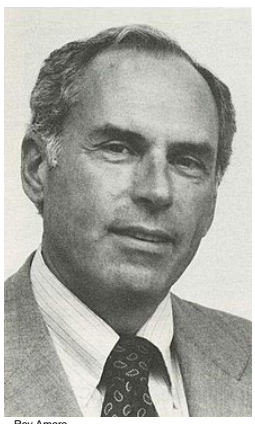


Tampa International Airport hosts the first successful "air taxi" test flight in Florida



Image Courtesy: news.tampaairport.com

Conclusion



Roy Amara
Image from 'News and Events', a newsletter published by the Rochester Institute of Technology (RIT)

Amara's Law

- We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run.