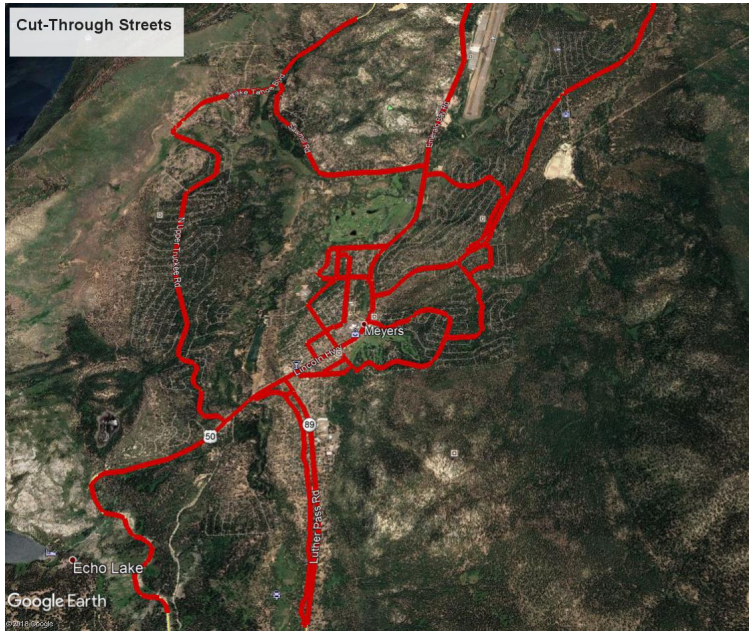
KTVL Opportunities with Advanced Air Mobility



Traffic Demand is Unsustainable

Flying Taxis Are Coming and Communities Need to Prepare

American Planning Association

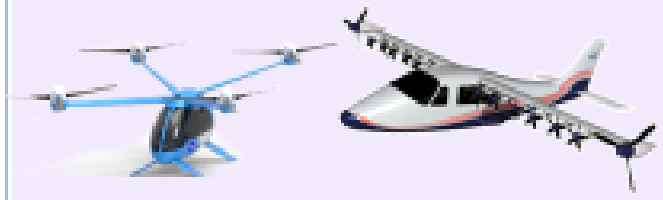
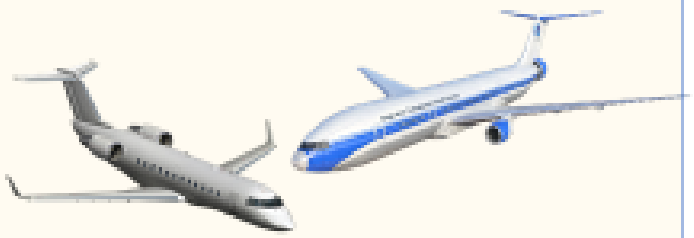
Creating Great Communities for All

Jan. 1, 2021

By JOHAMARY PENA , AICP

- According to NASA, advanced air mobility (AAM), or the use of automated transportation technology to transport people and cargo at lower altitudes in places not traditionally served by aviation, is likely to be a commercially viable transportation option by 2028.
- Unless municipalities are game for unplanned deployment across communities (think the disruption of short-term rentals or dockless micromobility multiple times over), planners and policy makers need to start preparing as soon as possible.

Electrified Aircraft Propulsion – a 60,000 ft Perspective

	UAS	UAM / Small A/C	RJ / Single Aisle	Twin Aisle
				
Implementation Status	All electric vehicles in operation	All electric or hybrid applications being developed	Potential for hybrid or turbo-electric within 10 years	Significant progress needed for practical implementation
NASA Role	NASA research not needed	NASA focus on informing standards, regulations & design tools **Small Vehicle EAP** ***Energy & cost-efficient, shorter-range aviation***	NASA focus on enabling technologies, demonstrating benefits, addressing safety needs **Transport Scale EAP** ***Energy & cost efficient, transport aviation***	Still too long term – not yet a NASA focus

Leverage learning at smaller size to inform scale-up

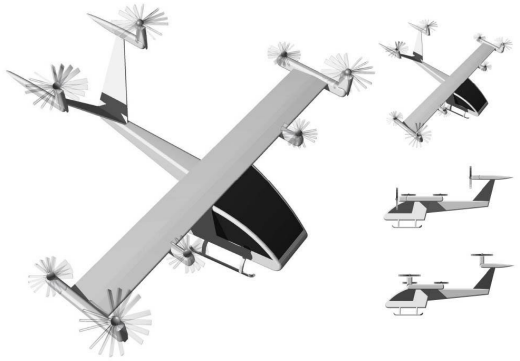
Fundamental challenges span range of sizes

Four Transformations for Sustainability, Greater Mobility, and Economic Growth

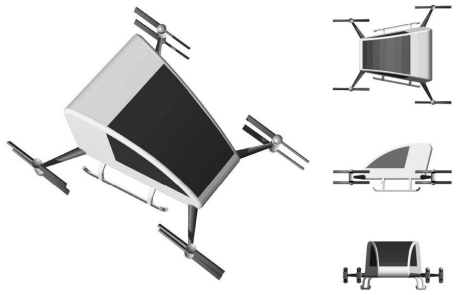
Advanced Air Mobility Mission

Safe, sustainable, affordable, and accessible aviation for transformational local and intraregional missions

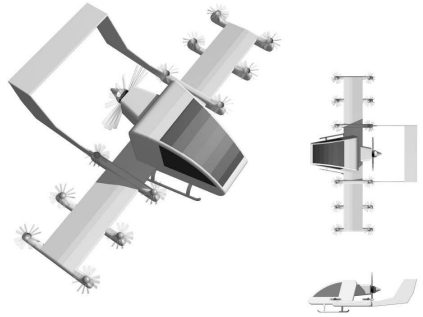
Types of eVTOL



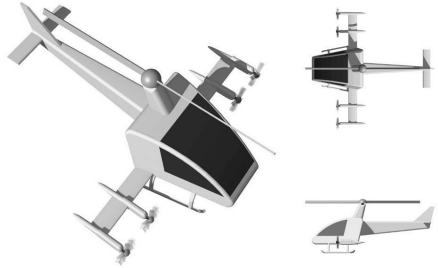
Vectored Thrust
An eVTOL aircraft that uses any of its thrusters for lift and cruise. It has a wing for an efficient cruise and uses the same propulsion system for both hover and cruise.



Wingless (Multicopter)
No thruster for cruise – only for lift. They are multirotors. They have large disk actuator surface which makes them efficient in hover, but they do not have a wing for an efficient cruise. Suited for short-range operations in cities where they can fly over traffic jams.



Lift + Cruise
Also aircraft with wings. Completely independent thrusters used for cruise vs. for lift without any thrust vectoring.



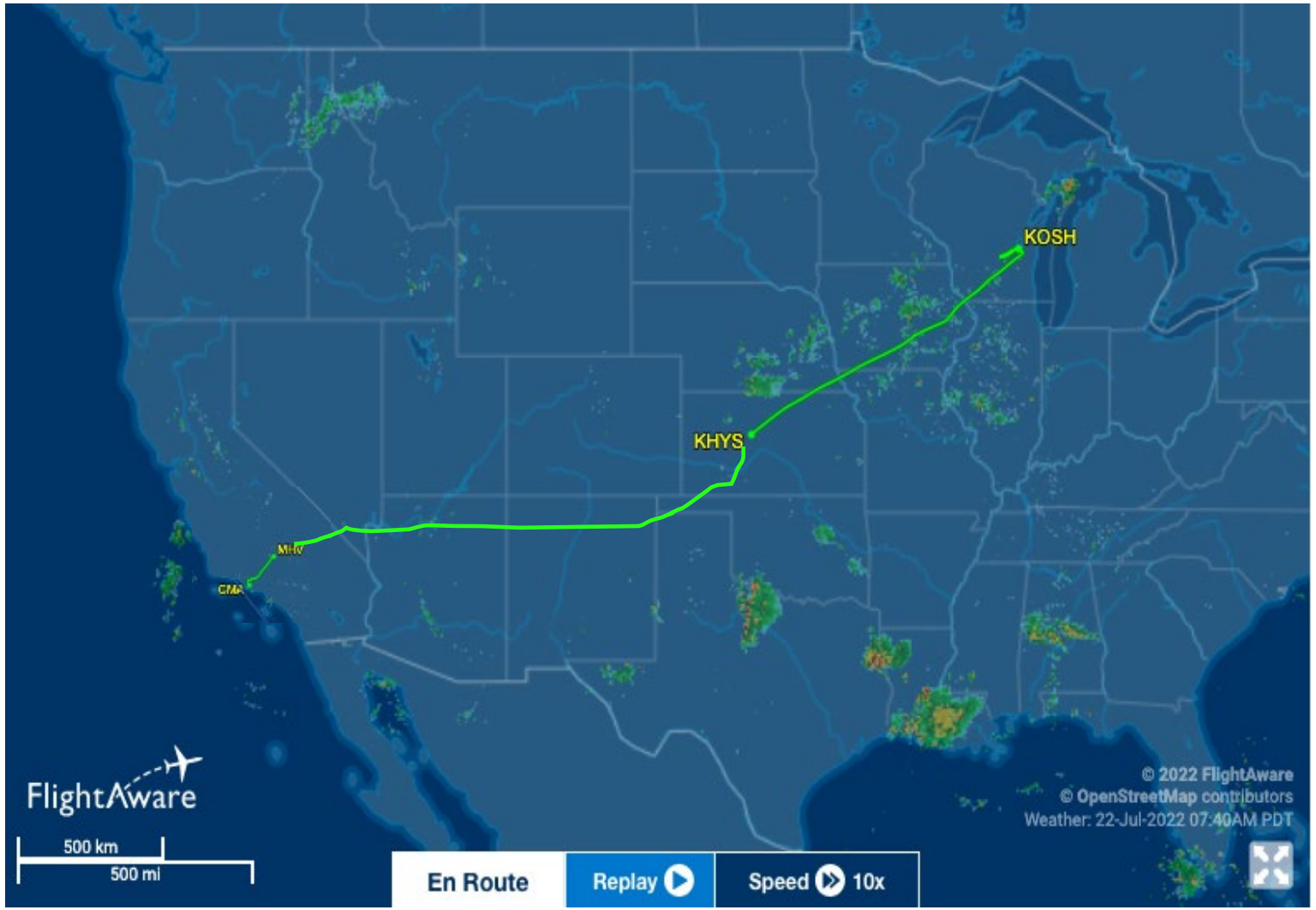
Electric Rotorcraft
An eVTOL aircraft that utilizes a helicopter frame plus a carrying wing.

URBAN AIR POLICY COLLABORATIVE | Mission and Participants

The mission of the Urban Air Policy Collaborative is to develop a policy framework for the local implementation of advanced air mobility through the sharing of knowledge, discussion of issues, development of recommendations, and collaboration with peers through an ongoing program of workshops, presentations and conversations.

The UAPC has two programs – the Cohort and the Forum

N337EE Longest Hybrid-Electric Direct Flight Ever 1,135 Miles



- 7/20: CMA – MHV 85 miles
- 7/21: MHV – IGM
  -- SAF
  – ULS
  -- TQK
  – HYS 1,135 miles
- 7/22: HYS – CYM
  -- DSM
  -- IIB
  -- OSH 660 miles
- 7/21: 100 gallons fuel used
- 1,880 miles total, 3 take-offs and landings on a single charge
- **40% fuel savings** and emissions reduction vs standard Skymaster
- Non-stop flights achieve over 400nm

Why is it important for the City?

- Cities and counties must be at the forefront of the conversation on AAM and be active participants in policy formulation
- No one knows the City better than ourselves, and no one is better positioned to understand the potential impacts of AAM
- Enhanced mobility and transportation alternatives
- Continued innovation with our regional partners
- Equity considerations
- AAM/UAM is regional in nature and must be considered with regional partners

[1] *Source: Community Air Mobility Initiative (CAMI) Advanced & Urban Air Mobility Impact and Training*

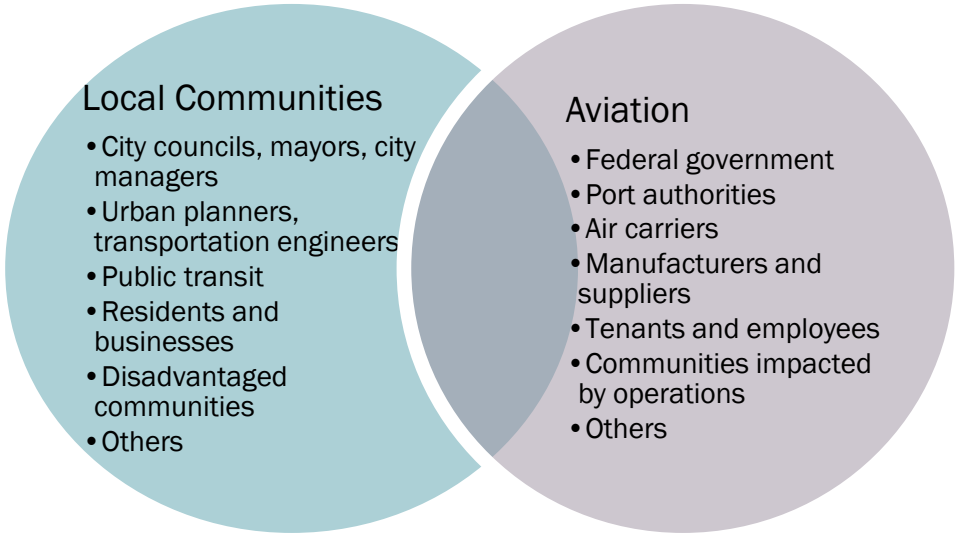
Stakeholder and Community Engagement

- **Industry Stakeholders**
  - Aircraft manufacturers & suppliers
  - AAM providers (operators)
  - Support service providers
    - Air traffic management
  - Airports & FBOs
  - Private & public vertiport developers & operators
- **Other Stakeholders**
  - Federal, state & local governments
    - City & county planning departments
  - Regional transportation planning & public transportation agencies
  - Economic development agencies
  - Environmental groups
  - ***Local Communities***

The Stakeholder Ecosystem is Expanding

- ✓ Airport operator
- ✓ AAM providers and their flight operators
- ✓ Existing flight operators (including GA community)
- ✓ Aircraft rescue and firefighting (ARFF)
- ✓ FAA ADO and AFS
- ✓ Air traffic control tower (ATCT)
- ✓ Aircraft ground support providers
- ✓ Fixed-base operators (FBO)
- ✓ Utility providers and hydrogen suppliers
- ✓ Maintenance, repair, and overhaul (MRO)
- ✓ Ground transportation (TNC, transit authority, etc.)
- ✓ Local governments
- ✓ Metropolitan & regional planning organizations
- ✓ Communities and small businesses
- ✓ Building and land-owners

Community Integration



Trust

- Safe Vehicles
- Safe Infrastructure
- Secure Operations

Public Benefit

- Emergency Services
- Increased travel options
- Economic opportunities

Limited Adverse Impacts

- Noise and visual impact
- Emissions and environment
- Privacy

Integration

- Existing transit & roads
- Grid capacity
- Social Equity

Communities are Powerful.

Stakeholder and community input is critical to human-centered, equitable, and scalable AAM.

Engage with industry proactively to co-create the regulatory, infrastructural, and technological ecosystem, and learn more about AAM.

Quantify the noise thresholds that communities find acceptable so the OEMs can engineer aircraft to meet these targets.

Decide where, when, and how AAM can operate to ensure planning and operations are acceptable to the community.

Set expectations for community benefits. Define who must be able to access AAM (e.g., people with disabilities), who must benefit, and what the benefits should deliver (e.g., disadvantaged neighborhoods and training opportunities).

DECARBONIZE AVIATION

TO BRING AIR TRANSPORTATION TO EVERY PART OF THE WORLD

Opportunities & Challenges for Communities

- Hub airports are becoming **intermodal nodes**.
- **Mobility-as-a-service (MaaS)** can enable a better integration of these modes.
- With advanced air mobility, smaller aviation facilities may follow this trend as well and become **local mobility hubs**.

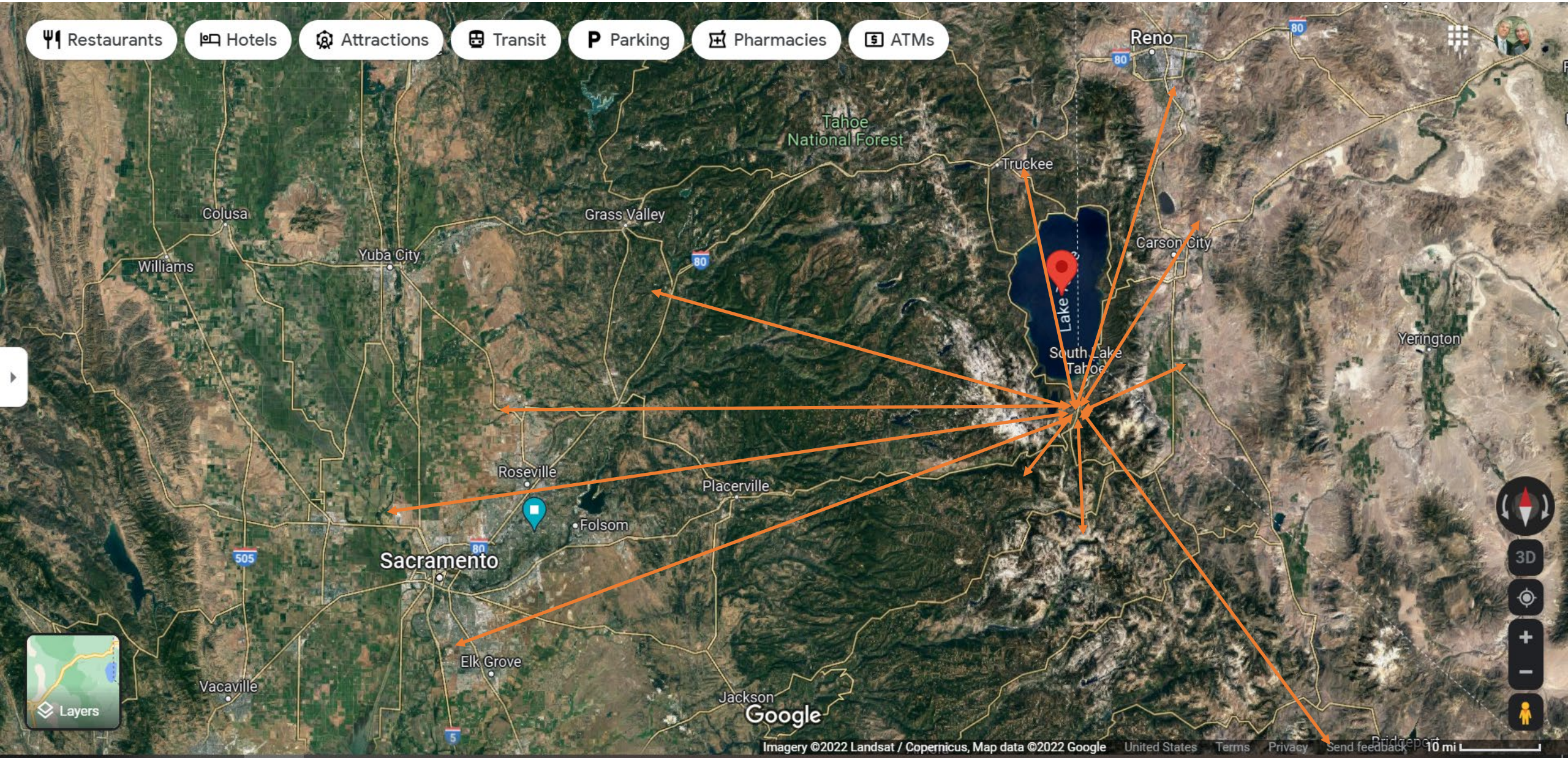
- **New supply chains** are needed to meet new power requirements and deliver new fuels to airport end users.
- **On-airport power generation** and microgrid approaches can help addressing these challenges.
- Airports can increase **energy resilience** and provide power to local communities when the grid is deficient.

The Aviation Carbon Reduction Challenge

- By 2050, an estimated 10 billion passengers will fly each year a distance of 22 trillion revenue passenger kilometers.
- With today's fleet and operational efficiency, this activity would require over 620 megatonnes (Mt) of fuel and generate close to 2000 Mt of CO_2.
- Imagine enabling the same level of demand while reducing net CO_2 emissions to zero by 2050.

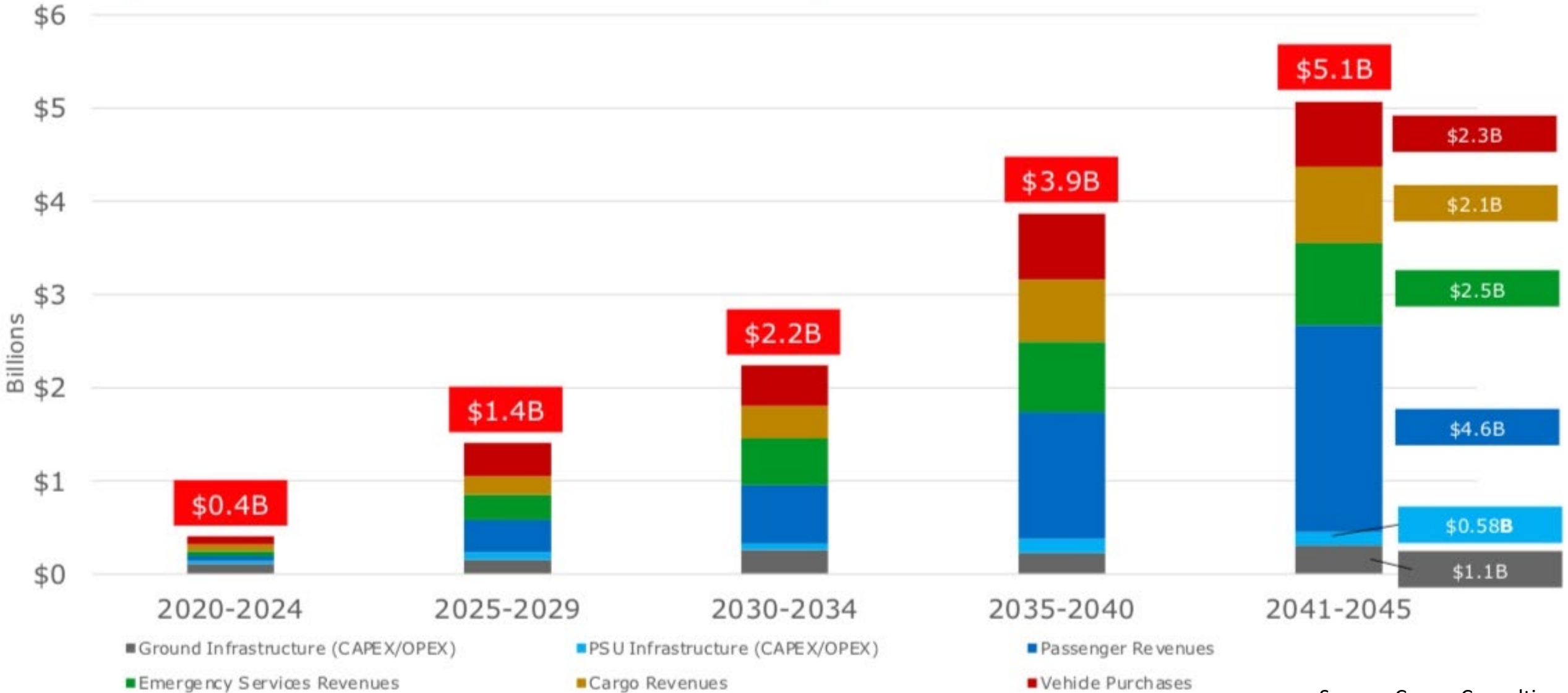
Meeting the challenge is the opportunity for the United States to lead the world in innovation and reductions in CO_2 aviation emissions, and to maintain economic competitiveness in a critical export industry ($6 trillion-plus market over the next 20 years).

Trips within 75nm



AAM Economic Forecast by Five-Year Phase

$13 Billion of Economic Activity Generated Over 25 Years



Source: Crown Consulting

Significant Opportunity for Communities

Where do we start?

Even though the federal government regulates airspace and AAM safety standards, it will be up to communities to identify and shape how AAM infrastructure will fit with community assets.

- Collaborate with existing airport industry stakeholders on potential noise & annoyance issues
- Assist stakeholders in planning for the integration of UAM/AAM into the aviation system
- Engage legacy airports as advocates for UAM/AAM