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Advanced air mobility, also known as AAM, is a broad concept focusing on emerging aviation markets and use cases for on-demand aviation in urban, suburban, and rural communities (Cohen et al., 2024). AAM includes local use cases of about an 80 km radius in rural or urban areas and intraregional use cases of up to approximately 500 km. Other common terms include:

- Urban air mobility (UAM) includes services within or between edge cities and urban, suburban, and exurban areas (Cohen et al., 2024; Garrow et al., 2021).
- Rural air mobility includes use cases within or traversing rural and exurban areas (Cohen et al., 2024).
- Regional air mobility (RAM) for intra- and interregional trips of up to 500 km (Cohen et al., 2024).

AAM enables users to access to air mobility, logistics, and emergency services by dispatching or using innovative aircraft (e.g., electric, hydrogen, vertical take-off and land- ing (VTOL), and short take-off and landing (STOL)) (Cohen et al., 2024). Typically, the electric aircraft under development carry fewer than ten passengers (or the equivalent in cargo weight). Hydrogen variants can have considerably larger capacity. AAM can also include aircraft that are piloted, remotely piloted, and autonomous.

The envisioned deployment of AAM may require a network of take-off and landing facilities and energy infrastructure (e.g., charging and fuelling). While AAM can use existing airports and heliports, an emerging taxonomy around new infrastructure concepts is emerging (Cohen et al., 2024; Johnston et al., 2020). These include:

- Vertipad/vertistation: A single landing pad and parking stall intended to accommodate one or two parked aircraft (Johnston et al., 2020)
- Vertiport/vertibase: A medium-sized facility intended to accommodate up to three landing pads and up to six parked aircraft (Johnston et al., 2020)

- Vertihub: A larger facility, possibly with multiple floors, to accommodate numerous landing pads with parking for multiple aircraft (Johnston et al., 2020).

AAM presents potential impacts and challenges, such as environmental, aesthetic, noise, weather air traffic management, safety (e.g., aircraft and personnel), security, social equity, land use, and travel behaviour (Cohen et al., 2021; Popper et al., 2024). Safety and operational concerns often focus on ground safety, flight outside approved airspace, unsafe proximity to people and property, critical system failure and loss of aircraft control, and cybersecurity, among others (Popper et al., 2024). Concerns around community impacts often focus on direct and indirect environmental impacts associated with take-off and landing facilities as well as flight paths, such as noise, privacy (from aircraft overflight), and low-level flight over sensitive land uses (e.g., open space and residential communities) (Cohen et al., 2021). The impacts of AAM deployments, such as noise, aesthetics, equity, and emissions, are unknown, and they will likely vary based on a variety of factors such as local context, aircraft type, use case, and scale of operations (e.g., the volume and frequency of aircraft and flights) (Cohen et al., 2021). There are social equity concerns associated with AAM, such as affordability, accessibility, and the impacts of flight operations and vertiports on neighbourhoods and underserved populations (Cohen et al., 2024). The potential for negative public perception associated with safety, noise, or social equity could present challenges to public acceptance and user adoption.

According to the Vertical Flight Society, more than 900 novel aircraft concepts are under development, with epicentres of research and development activity in China, Germany, Japan, South Korea, and the United States. Several market studies estimate a global market potential between US$74 and US$641 billion 2035 (Goyal et al., 2019) (Hasan, 2019) (Cohen et al., 2021). The wide variation is attributable to different study methodologies and the inclusion of various use cases and military applications. Due to the nascent nature of this sector, it is unclear which use cases (e.g., mobility, logistics, emergency response) may scale, how much these services could cost, and whether or not these services may be affordable for a mass market. Research and policy may be needed to address social equity concerns and to support sustainable and equitable outcomes. Finally, evaluations of early demonstrations could enhance institutional readiness, support impact assessment, and identify policies that could influence operations, use cases, and public adoption of this emerging technology.

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