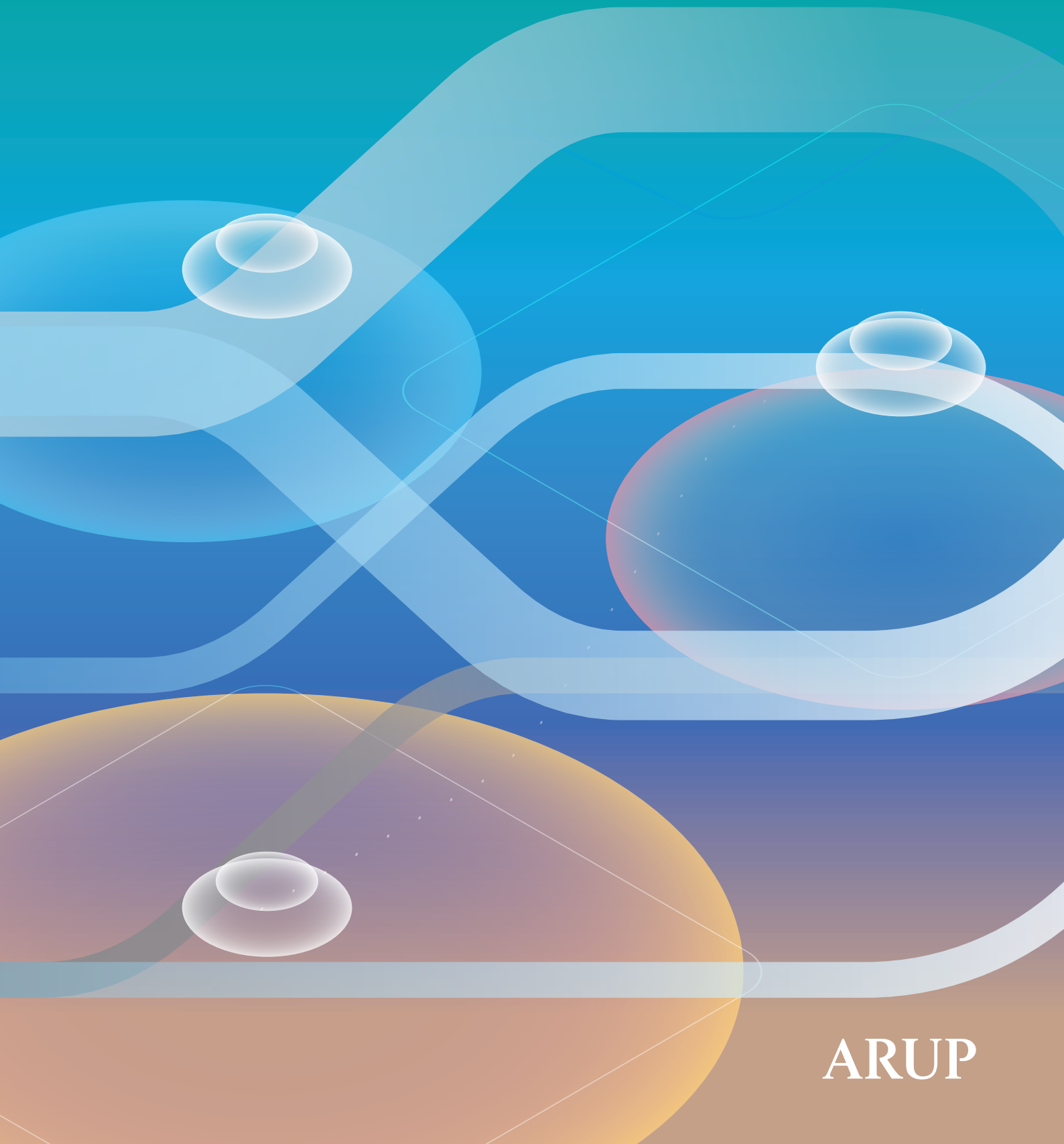
PLANNING FOR A LOW-ALTITUDE ECONOMY IN THE GREATER BAY AREA

A Playbook Integrating LAE into Urban Planning and Design



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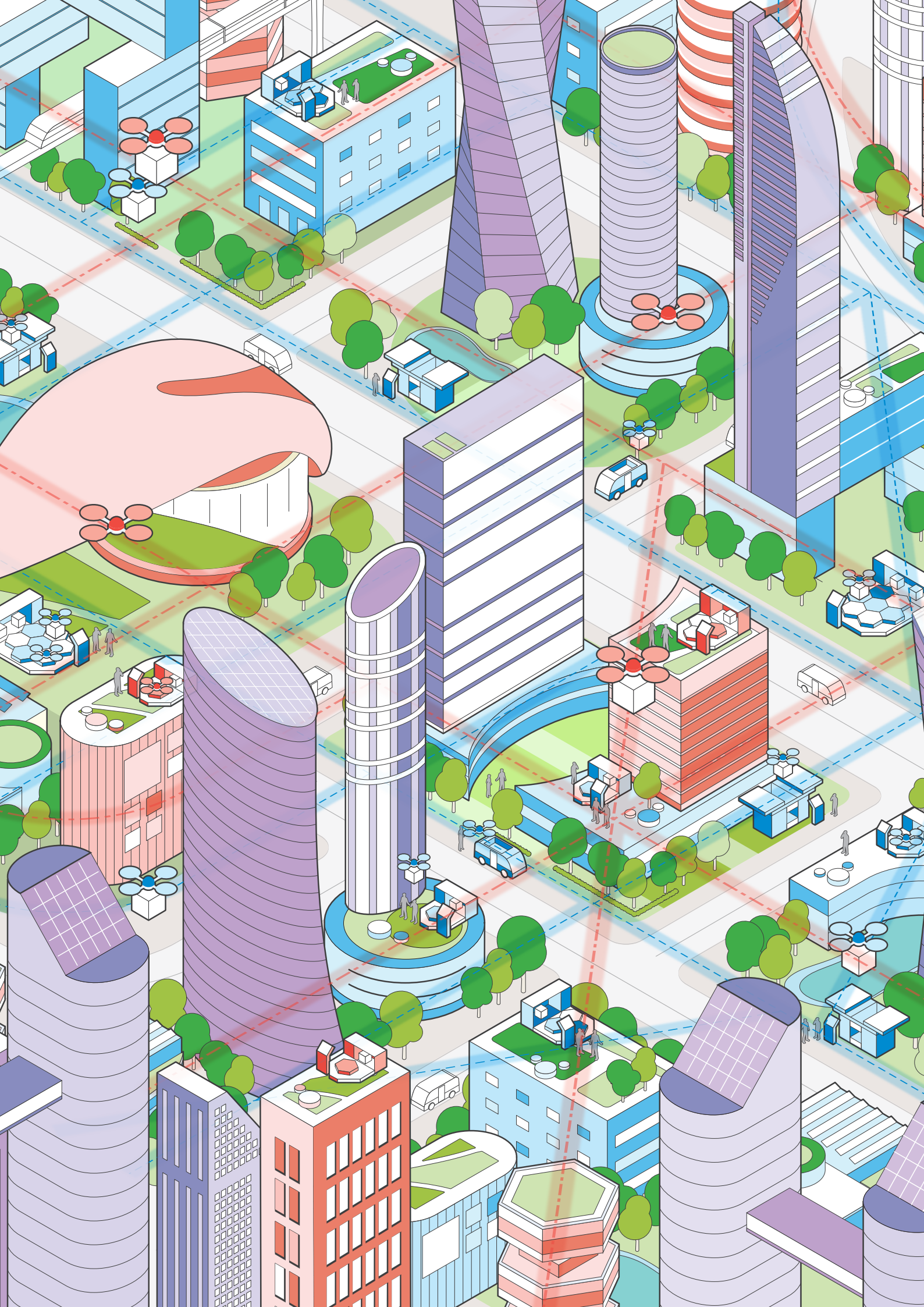
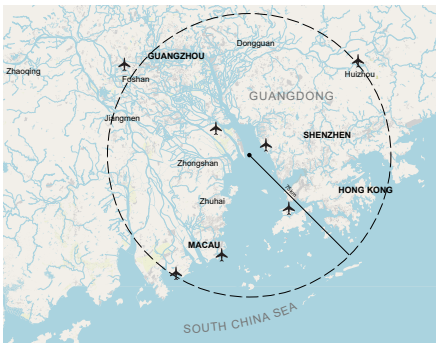


Understanding the Low-Altitude Economy

The Low-Altitude Economy (LAE) represents a shift from isolated drone technologies to a broader economic system that leverages low-altitude airspace for logistics, mobility, and public services. It is not just about flying devices—it's about rethinking how cities function. LAE introduces a new layer of infrastructure that can reduce congestion, improve delivery efficiency, and support emergency response, environmental monitoring, and even tourism.



Greater Bay Area, China

This transformation is particularly relevant in high-density urban regions like the Greater Bay Area (GBA), where land is limited and mobility demands are high. The GBA's interconnected cities, technological capabilities, and policy momentum make it an ideal environment to pilot and scale LAE systems. The region's diversity in urban form and governance also provides a valuable testing ground for cross-boundary coordination and innovation.

However, LAE is still in its early stages. Key challenges include managing crowded airspace, ensuring safety and privacy, and developing regulatory frameworks that can keep pace with rapid technological change. Public acceptance is another hurdle—residents must see LAE as a benefit, not a disruption.

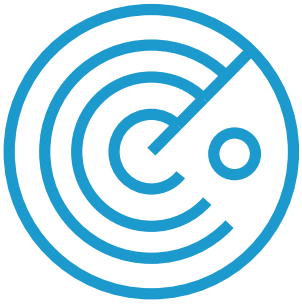
Despite these challenges, the potential is significant. LAE can support more sustainable and decentralized logistics, reduce reliance on ground infrastructure, and create new economic opportunities. But realizing this potential requires a coordinated, multidisciplinary approach. Urban planners, technologists, regulators, and communities must work together to design systems that are safe, inclusive, and adaptable.

The shift to a low-altitude economy is not just a technological evolution—it's a reimagining of how cities move, connect, and serve their people. It offers a chance to build more resilient, efficient, and equitable urban systems for the future.

Components

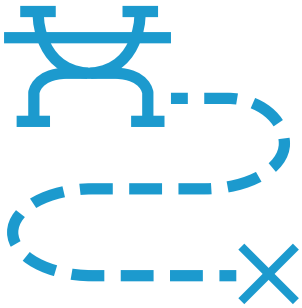
The Low-Altitude Economy (LAE) is built on three core components: networks, routing, and delivery. These elements define how aerial systems operate and interact with the urban environment.

Networks refer to the structural layout of drone operations. Fixed Hub-and-Spoke models offer predictability for centralized logistics, while flexible versions adapt to real-time conditions. Point-to-Point networks are ideal for urgent deliveries, and Multi-Point or Multi-Hop systems provide broader coverage. A Dynamic Hybrid model could combine these to optimize performance.



Networks

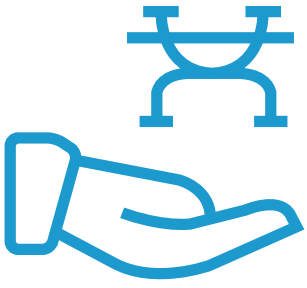
Routing strategies determine how drones navigate. Basic Flight is direct and simple, suitable for low-density areas. Free Route allows dynamic path selection based on real-time data but requires advanced systems. Corridors offer structured paths for safety in dense areas, while Fixed Routes are best for routine deliveries. Each has trade-offs in flexibility, efficiency, and regulatory complexity.



Routings

Delivery methods complete the system. Landing Cabinets provide secure drop-off points in public or residential areas. Rooftop Stations use vertical space in dense cities. Mobile Vehicles act as moving hubs, while Drone Ports support high-volume operations. Home Delivery offers convenience but raises privacy and safety concerns.

In vertical cities, rooftop and shared delivery points are often more practical than direct-to-door service. Hybrid models—where drones hand off to ground vehicles—may become standard in complex environments.



Delivery

These components must be designed together. The choice of network affects routing, which in turn influences delivery methods. Successful LAE systems will align these elements with urban infrastructure, land use, and community needs. Integration, not isolation, is key to unlocking the full potential of LAE.

Linking Findings to Future Directions

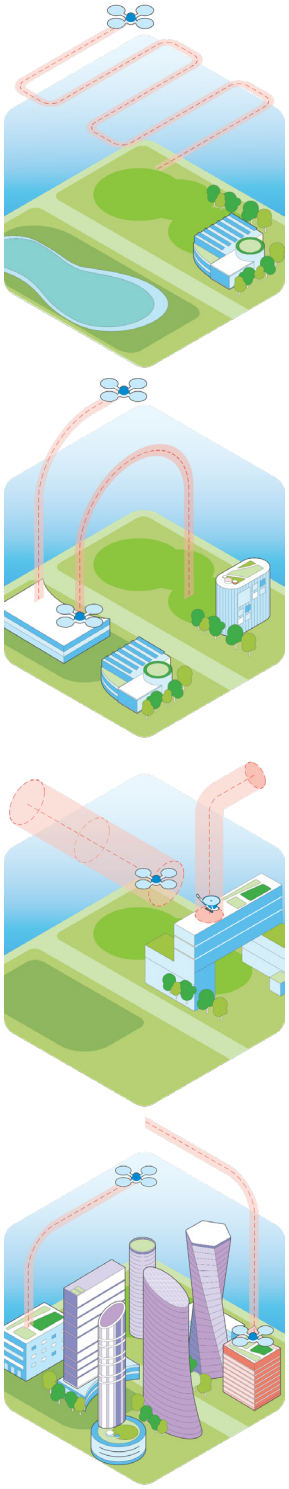
To chart a path forward for the Low-Altitude Economy (LAE), cities must first understand the challenges and opportunities that shape it. Technological limitations—such as battery life, payload capacity, and navigation precision—still constrain operations. Regulatory frameworks are often outdated or fragmented, especially in regions with multiple jurisdictions. Environmental concerns, including noise and wildlife disruption, must also be addressed. Public trust and privacy protections are essential.

Yet the opportunities are equally compelling. Advances in AI, 6G, and edge computing are enabling smarter, more autonomous systems. LAE can reduce congestion, reclaim public space, and support decentralized logistics. It can also improve access to services in underserved areas and enhance emergency response.

The key is to align LAE with broader urban goals. This means designing systems that are inclusive, sustainable, and adaptable. It also means engaging communities, updating regulations, and investing in shared infrastructure.

Future directions must be grounded in real-world constraints but oriented toward long-term transformation. They should create synergies—like combining drone corridors with green infrastructure or integrating delivery nodes into public spaces.

By linking current insights to strategic directions, cities can move beyond pilots and toward systemic change. The next step is to define those directions and explore how they can be implemented in diverse urban contexts.



Top to Bottom: Basic Flight, Free Route, Corridors, Fixed Route - Routing Strategies

Future Directions

The future of LAE lies in how cities integrate it into their infrastructure and public spaces. Two strategic pathways—Public Space Design and Logistics Hubs & Architecture Integration—offer a roadmap.

FD1a focuses on redesigning streets to reduce ground-based delivery traffic. By shifting logistics into the air, cities can reclaim space for pedestrians and cyclists. This improves safety, reduces congestion, and supports sustainability. Implementation requires investment in drone corridors, landing zones, and digital coordination systems.

FD1b proposes repurposing underused logistics land into parks and community spaces. These areas can still support drone operations while serving social and ecological functions. This direction aligns with goals for green space, public health, and urban resilience.

FD2a promotes decentralized logistics hubs embedded within cities. These smaller clusters reduce delivery times, support local economies, and lower emissions. They also enable more flexible, community-based logistics systems. However, they require new zoning policies and shared infrastructure models.

FD2b integrates LAE into existing transport hubs—like train stations or ferry terminals—creating multimodal logistics clusters. This co-location improves efficiency, reduces redundancy, and enhances accessibility. It's especially valuable in dense cities where space is limited.

Together, these four directions offer adaptable strategies for embedding LAE into the urban fabric. They balance technical feasibility with social and environmental goals, helping cities build more connected, efficient, and inclusive systems.

Top to Bottom: FD1a, FD1b, FD2a, FD2b Future Direction Perspectives

Acknowledgements

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This publication is part of Arup University's mission to share knowledge that shapes the future of cities. We thank all teams involved for their dedication and insight.

As LAE continues to evolve, Arup remains committed to supporting its growth through design, planning, and systems integration. If you or your company are involved in setting up low-altitude networks, technologies, or infrastructure, consider Arup your expert partner in expanding this exciting frontier.

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