



OPPORTUNITY #43

What if deliveries went underground?

HATCHES, TUBES AND ROBOT DISPATCHES

An AI-powered pneumatic tube system for city-wide delivery on demand that offers a completely integrated on-demand delivery model reviving an old approach with the technological advances needed.



MEGATREND
Devaluation of Raw Data

TRENDS
Artificial Intelligence
HumanXMachine
New Materials
Quantum Technology

SECTORS AFFECTED
Communication Technologies & Systems
Consumer Goods, Services & Retail
Data Science, AI & Machine Learning
Infrastructure & Construction
Logistics, Shipping & Freight
Manufacturing



WHY IT MATTERS TODAY

Delivery services have grown exponentially as consumers continue to switch from physical to online retail. E-commerce will account for just over 20% of global retail sales by the end of 2022, up from 10% in 2017.⁷¹⁷

Valued at \$3.3 trillion in 2022, e-commerce sales are expected to grow to \$5.4 trillion by 2026.⁷¹⁸ In 2021 Amazon shipped an estimated 7.7 billion packages globally.⁷¹⁹ In the United States, 21.5 billion parcels were shipped in 2021 at a rate of 683 parcels per second and 166 parcels per household.⁷²⁰ In the United Kingdom, 5.4 billion parcels were shipped in 2021 at a rate of 171 parcels per second and 192 parcels per household.⁷²¹ In India, 2.7 billion parcels were shipped in 2021 at a rate of 85 per second and 11 parcels per household.⁷²²

As cities grow, couriers compete for road space with commuters and essential transport (e.g. emergency services). On-demand delivery comes at significant hidden environmental and economic costs not least from vehicle emissions and increased wear and tear on infrastructure.⁷²³ With the aim of finding ways to reduce delivery related emissions, a study in central Tokyo, Japan, estimated that switching to electric vehicles would account for a 20% drop in carbon dioxide emissions in urban areas. A further 14% could be gained through the use of hydrogen-fuel-cell electric vehicles, another 8% from delivery robots and 7% from autonomous ground vehicle (AGV) lockers. The rest of the approaches examined by the study were minimally impactful from an emissions perspective; these included micro-hubs, parking retrofits, delivery parking zones, drones and trucks, parcel boxes and goods trams.⁷²⁴

Survey figures show that, while 26% of US retailers offered same-day delivery by the end of 2021 compared to 46% in Canada and 34% in the EU and the UK, 1% of retailers in all four countries do not have plans for same-day delivery by 2025 with the remainder — 73% of US retailers, 54% of Canadian retailers and 66% in the EU and the UK — plan to offer it by 2025.⁷²⁵ Demand for express delivery will result in there being 36% more delivery vehicles in inner cities by 2030.⁷²⁶

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THE OPPORTUNITY

The idea of a city-wide pneumatic tube system is not new – no longer operational because of high operational costs, the New York postal service was connected in 1897 through pipes that delivered letters and parcels around the city.⁷²⁷

New materials, new building techniques and automated, AI-powered distribution centres could offer completely integrated on-demand delivery models giving traction in reviving the former approach. Pneumatic tunnels (also called vacuum tunnels) embedded into the urban infrastructure to connect buildings and distribution nodes could offer ‘beyond-the-doorstep’ delivery solutions to hospitals and other critical services. With development costs integrated into zoning and real estate plans, the tunnel system could be run on a pay-per-use basis.

Integrating small robotic distribution centres around cities would mean that packages could be electronically tagged for delivery to an address and loaded into a sealed pipe for instant dispatch. Buildings would be equipped with hatches where goods could be sent and received. Perfect traceability of goods from dispatch to delivery would be guaranteed, as the system would automatically track tagged goods via distributed ledger technology databases.

BENEFITS

Reduced traffic. Environmental benefits. Reduced costs caused by delays, damage and losses. Faster, more secure deliveries.

RISKS

Long wait times to connect older buildings due to the high costs of retrofitting pipe systems. Risk of pipe damage creating delivery bottlenecks and/or damaging goods. High costs or high difficulty of adequately maintaining the pneumatic system. Risk of unauthorised use of pipes for transport of illegal goods or cyber-attacks.



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