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# FAST-TRACKING THE MOBILITY REVOLUTION

## Shaping the future of sustainable mobility

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# EXECUTIVE SUMMARY

The mobility ecosystem is rapidly evolving today, driven by far-ranging changes to the world we live in — from social and economic to environmental and technological. Mobility is facing new challenges as a result — on both the demand and supply side.

Forces shaping mobility demand include increased urbanization, the need to reduce greenhouse gas emissions through the transition to new sources of energy, and technology breakthroughs like connected vehicles and short-range electric aircraft. Mobility consumers are changing too — shopping online, buying fewer cars, and expecting more customizable, on-demand services. Meanwhile, on the supply side, the mobility landscape has become more fragmented, as digitally focused new entrants jostle with traditional infrastructure managers for investment and market share.

As a result of these changes, nine “megatrends” have been identified that could be disruptive to the future evolution of the mobility ecosystem. Many involve rising technologies that could provide new avenues for mobility, from space-based and defense-to-civilian transfer technologies to smart devices and smart infrastructure. Other trends focus on the need to better use urban space, improve customer experiences, and support the transition to more sustainable and equitable mobility access.

With these trends in mind, we believe that the mobility transformation could be accelerated in three ways: better, more sustainable investment in fleets and infrastructure; leveraging technology to enhance traditional mobility infrastructure or build new mobility solutions; and unlocking the full potential of mobility data management to optimize transportation networks and support personalized mobility services.

Lastly, we have identified the implications of these emerging trends for organizations in the mobility space to consider when forging their future roles. For instance, among the things to consider are the changing boundaries in the mobility ecosystem, new service offerings from mobility players, effective coordination of public and private spheres, and the use of systemic policymaking to better support the transition.

# A CHANGING MOBILITY ECOSYSTEM

The evolution of the mobility ecosystem historically has been driven by governments and major market incumbents, as conventional mobility models are based on long-lived infrastructure, such as highways and rail lines, which require large-scale investment. But major changes in today's social, economic, environmental, and technology spheres are putting pressure on the mobility ecosystem to rapidly evolve, with new challenges emerging for mobility on both the demand and supply sides.

Urbanization and densification are increasing — 60% of the world's population will live in cities by the end of the decade. Almost 600 million people (nearly the population of North America) are expected to move to cities by 2030.[1]

**Climate change and the energy transition** are becoming a core focus for governments worldwide. Drastic action is required to meet current climate commitments, and the transportation sector, which accounts for 23% of worldwide emissions, is in dire need of decarbonization.[2]

**Technological breakthroughs** are occurring at a record pace. For example, this past year, an electric vertical take-off and landing aircraft (EVTOL) obtained type certification in China, while Toyota announced that it is close to mass producing solid-state batteries, which could revolutionize the EV sector. [3, 4]

The pandemic has vastly expanded **remote working** and increased the appeal of a flexible work-life balance. While this has reduced commuting, "workations" — a combination of work and vacationing, have increased, leading to **changes in travel patterns** for working-age adults.[5, 6]

**E-commerce** is booming, accounting for an estimated 22% of sales in 2022 (versus 15% in 2019), according to Morgan Stanley.[7] On the one hand, this has increased demand for last-mile services; on the other, it reduces personal car and public transport flows to brick-and-mortar retailers. **Car ownership** also is declining, in favor of mobility-as-a-service (MaaS) solutions: Oliver Wyman Mobility Forum forecasts 50% of ground mobility will involve shared vehicles by 2030. Finally, **customers themselves are evolving,** with a growing focus on individual needs, as they become accustomed to customizable, on-demand services.

At the same time, the **supply landscape** has become more fragmented, with new entrants from sectors outside of transportation gaining relevance, thanks to digital technologies and an increasing focus on services. While major incumbents have historically based their success on developing and managing infrastructure, multiple players are taking on new roles in the industry by focusing on new and digitally enabled mobility services.

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1 United Nations — World Population Prospects

2 Intergovernmental Panel on Climate Change (IPCC) — Climate Change 2022; Mitigation of Climate Change

3 Aviation International News — China Approves Ehang EH216-S as World's First Type-certified eVTOL

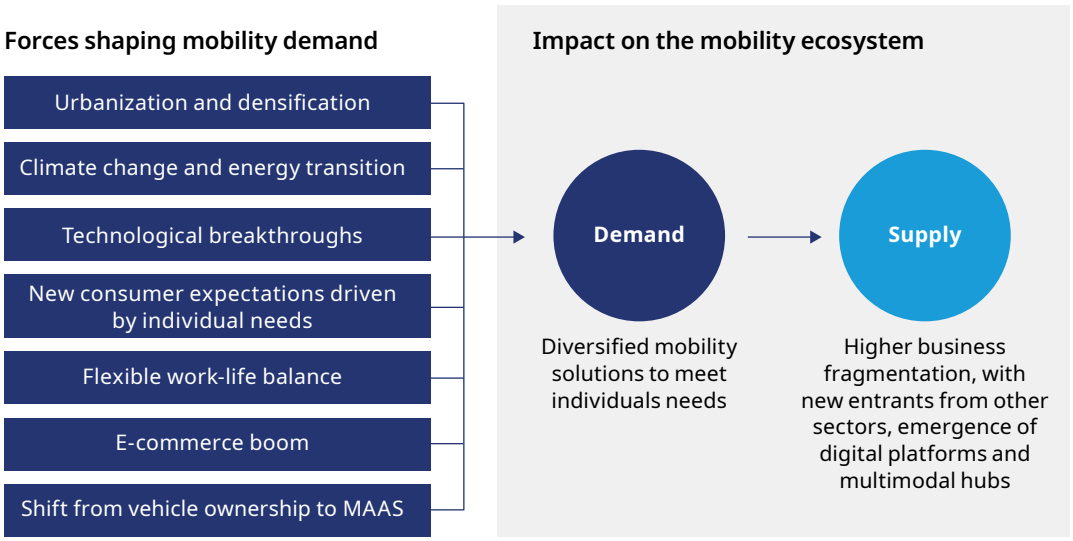
4 Financial Times — Toyota near mass production of solid-state batteries

5 Forbes — Commuter Level Still Haven't Returned To Pre-Covid Level

6 Financial Times — Out of office: the rise of the "workcation"

7 Morgan Stanley — Here's Why E-Commerce Growth Can Stay Stronger For Longer

**Exhibit 1: Forces shaping mobility demand and their impact on the mobility ecosystem**




Source: Oliver Wyman Analysis

# MEGATRENDS IN MOBILITY

As a result of the various forces shaping the current mobility environment, nine megatrends have been identified that will have a disruptive effect on the future evolution of mobility — fundamentally influencing current dynamics.

**Exhibit 2: Nine megatrends shaping the new mobility revolution**


Source: Oliver Wyman Analysis

# GROWING COMPETITION FOR URBAN SPACE

Rapid urbanization and densification are creating growing competition for urban space, which drives the need for innovative solutions to optimize transportation efficiency and minimize congestion. By 2030, 60% of the world population will live in cities; 70% of economic growth will be driven by the top 300 cities. Half of the mobility infrastructure developed by 2030 will be designed to respond to changing urban environments. That means new mobility hubs will be increasingly focused on better space utilization and responding to customers' shifting preferences toward personal wellbeing, environmental impacts, and personalization of services.

**60%**
World population living in cities by 2030[8]

**70%**
Contribution of top 300 cities to world economic growth

**2.3X**
Urban mobility demand in 2030 versus 2017

8 United Nations — World Population Prospects

# DIGITALLY ENABLED SERVICES

Digital technologies enable innovative offerings, improve end-to-end customer experiences, and reduce costs. Global consumer spending on mobility services is expected to be $660 billion in 2030, representing an increase of more than 10% over 2020. New mobility solutions, like air taxis and bus pooling, are projected to grow faster than 30% through 2030. But different regions are developing differing mobility patterns and behaviors, meaning that there is no one-size-fits-all solution. (As an example, e-scooters are popular in Europe but nearly nonexistent in Asia). Digital technologies represent a critical enabler for mobility operators, supporting demand prediction and personalized solutions, and helping optimize cost structures. Examples of digital solutions enabling new mobility services include real-time tracking, individualized recommendations, frictionless payment options, and predictive logistics services models.

**$660**
**BILLION**
Global consumer spending on mobility services in 2030

**+10%**
Increase of global consumer spend on mobility services (2030 versus 2020)

**>30%**
Growth of new mobility solutions like air taxis and bus pooling (2020–2030 CAGR)

# CONNECTED AND AUTONOMOUS VEHICLES

Newly manufactured vehicles are increasingly connected, fostering opportunities to collect data and monetize data-driven services. Connected vehicle penetration is expected to exceed 95% of global new car sales by 2030. Service providers are gradually integrating car-centered telematics (such as insurtech) with driver-centered telematics (such as in-car payments). Players who have the capabilities and access to process data and extract insights will be in a privileged position.

Vehicle connectivity also is a key prerequisite for autonomous vehicles. The evolution of autonomous vehicle solutions is not expected to be uniform. It is crucial to study customers' regional preferences to anticipate what autonomous mobility solutions are likely to arise (such as robotaxis versus personal autonomous cars).

**$17 BILLION**

Connectivity & mobility operating profit for automotive in 2030

**>95%**

Connected vehicles penetration versus total new car sales in 2030[9]

**30%**

Capex optimization for industrial fleet operators thanks to telematics

9 2Hire — Connected Cars — What's the talk?

# SMART DEVICES AND INFRASTRUCTURE

Fast diffusion of smart devices and infrastructure will further enable mobility service supply. Smart devices and infrastructure connect systems and gather real-time data that is crucial to capturing customers' preferences and supporting dynamic and personalized mobility services. Examples of smart devices that support mobility include smartphones, wearables, and vehicle sensors, while smart infrastructure integrates sensors and intelligent cameras and enables services such as dynamic traffic management and the delivery of personalized user experiences. The smart city global market in 2025 is expected to be worth $2.1 trillion.

**8%**

Average speed increase on arterial roads in Singapore between 2005–2014 with the Intelligent Transport system

**$2.1 TRILLION**

Smart city global market in 2025

# DEFENSE-TO-CIVILIAN TECHNOLOGY TRANSFER

The portfolio of mobility solutions is being expanded by technologies imported from the military. Defense technologies are particularly useful to enhance assets with new functionalities and improved performance. For example, LiDAR (light detection and ranging) technology and advanced sensor technologies are being used in autonomous vehicles for object detection and mapping. By 2030, 100 million LiDAR units are expected to be shipped, corresponding to a $15 billion market. Additional defense technologies are increasingly being used for navigation, traffic optimization, and overall safety improvement.

**$15 BILLION**

LiDAR market in 2030, corresponding to 100 million annual shipments of LiDAR units[10]

**+14.5%**

CAGR of civil UAV market in 2021-2030 period, globally[11]

10 Counterpoint — LiDAR Now High on Automotive Industry Radar

11 Teal Group — Teal Group Predicts Worldwide CIVIL UAS Spending of $121 Billion Over the Next Decade in its 2021/2022 UAV Market Profile and Forecast

# SPACE-BASED TECHNOLOGIES

Space-based data is being leveraged to provide new mobility services. Navigation data is available free of charge from public global navigation satellite systems (GNSS), such as European Union's Galileo. The GNSS market, which is expected to reach $460 billion in 2030, uses these data to provide navigation services. The market is being driven by demand for higher precision mapping data, increasing cybersecurity needs, and next-generation services. Navigation information can be exploited for mobility applications such as autonomous vehicles, short-range aircraft, and smart traffic systems.

**$460 BILLION**
GNSS market size in 2030[12]

**10%**
GNSS market growth (CAGR in 2022-2030)[12]

**30%**
Share of GNSS market for road and Aviation industries[12]

12 European Union Agency for the Space Program (EUSPA) — EUSPA EO & GNSS 2022 Market Report

# SUSTAINABILITY-ORIENTED REGULATION

Sustainability-oriented regulation is boosting electrification and safe and equitable access to mobility. The EU, for instance, has set a 2050 target date to reduce greenhouse gas emissions from transportation by 90%. This target is being interpreted at a more granular level to understand how different mobility modes can contribute — for example, the goal of 30 million zero-emission cars on European roads by 2030. Such aggressive targets are pushing stakeholders to develop regulatory frameworks and business models that can rapidly boost mobility decarbonization. Cities are also implementing measures, such as congestion charges, low-emission zones, and mass transit subsidies, to reduce environmental impacts and guarantee equitable access to mobility.

**90%**

Reduction target in 2050 (versus 2030) for EU transport GHG emissions[13]

**30**
**MILLION**

Target for zero-emission cars circulating in 2030 in Europe[14]

**€25**
**BILLION**

Funding for EU transport sector from the CEF (Connecting Europe Facility)[15]

13 International Energy Agency (IEA) — Net Zero by 2050

14 European Commission — Sustainable and Smart Mobility Strategy

15 European Council — Clean and Sustainable mobility

# SUSTAINABLE ENERGY AND FUELS

Worldwide, electricity generation is expected to move mainly to renewables by 2050, with Europe expecting 85% of total power capacity to come from renewable sources. New technologies such as batteries and hydrogen will play a key role in boosting electrification and the transition to cleaner transportation solutions. Sustainable aviation fuel (SAF) will be a critical factor in mitigating the environmental impact of the hard-to-abate aviation sector for the foreseeable future.

Energy transition at its roots, however, is an infrastructure game: more than $5 trillion in new infrastructure projects will need to be developed in Europe alone by 2050 — from renewable power plants to smart grids and battery storage power stations.

**$5 TRILLION**

Investments required until 2050 to reach net zero scenario[16]

**30%**

Target for anthropogenic methane emissions reduction in 2030 versus 2020 levels[17]

**85%**

Share of total electricity capacity expected to come from renewable sources in Europe in 2050[18]

16 BloombergNEF— Europe's Path to Clean Energy: A $5.3 Trillion Investment Opportunity

17 European Commission — 2023 Global Methane Pledge Ministerial: decisive action to curb emissions

18 European Commission — Renewable Energy Sources To Account For 85% Of Global Electricity Production By 2050

# ARTIFICIAL INTELLIGENCE AS A BUSINESS DISRUPTOR

Artificial intelligence (AI) is on the rise as a cross-industry accelerator, enhancing current service offerings and enabling new business models. AI-based mobility applications include environmental traffic management, object detection and path planning for autonomous vehicles, and dynamic traffic flow optimization for urban traffic control (such as Advanced Transportation System and Coordination in Los Angeles and the Green Link Determining System in Singapore). AI also supports analytics to improve road safety, by enhancing road infrastructure, signage, and traffic management systems. These and other AI-based applications are reshaping the way mobility services are offered and consumed, and AI is expected to contribute some $1.5 trillion to global GDP in 2030 (versus $120 billion in 2022).

**$1.5**
**TRILLION**
AI contribution to global GDP in 2030 (versus $120B in 2022)[19]

**1.6**
**BILLION**
Number of users of ChatGPT within first six months of its release[20]

**35**
**THOUSAND**
AI-related patents published in 2022 (versus 20,000 in 2019)[21]

19 BloombergNEF — The trillion-dollar AI opportunity

20 Meetanshi Blog — 20+ ChatGPT Statistics & Facts to Know in 2024

21 Deutsche Bank Research — AI in action: where is the smart money going?

# BOOSTING THE TRANSFORMATION

There is vast pressure to reshape the mobility ecosystem to better meet the needs of tomorrow. Three focus areas have been identified that could accelerate the transition: sustainable investment, new technology solutions, and mobility data management.

## SUSTAINABLE INFRASTRUCTURE AND FLEETS

Investment in infrastructure and fleets is needed to support new mobility options as well as sustainability and climate change goals. This includes supporting transportation electrification by building networks for clean energy generation, storage, and distribution, as well as leveraging alternative fuels, such as renewable diesel and SAF.

The electrification of transportation is a prime example of innovation meeting environmental responsibility. With advancements in battery technology and charging infrastructure, electric vehicles are becoming a tangible solution to reduce carbon emissions.

Electric vehicles are estimated to increase tenfold over the next seven years across Germany, France, Italy, Spain, and Belgium, from 4.5 million in 2023 to more than 40 million by 2030. Italy is expected to see the fastest growth, from about 370,000 vehicles in 2022 to nearly seven million by 2030. Consequently, EV charging demand in these countries will also skyrocket, reaching around 80 terawatt hours (TWh) — 13 times what it was in 2022.31 This includes the installation of about 170,000 fast and ultra-fast electric chargers by 2030, compared with an installed base of only 25,000 in 2022.

Electricity demand overall is expected to be 20% higher in 2030 versus 2015, making it important to use energy more efficiently, develop new and better power plants, upgrade transmission and distribution grids, and expand renewable energy capacity. Power plants require large amounts of space and sufficient revenues to sustain the initial investment. Non-energy players are increasingly contributing, either by signing long-term power purchase agreements or making space available for new power plants. For example, it has been estimated that by 2030, airports globally could produce as much as 10 TWh — representing ~6% of global airport energy demand — by using rooftop solar panels. Highways could produce between 25 and 40 TWh of green electricity per year — 33% of global highway demand — using solar panels in road verges and as photovoltaic noise barriers.

New technologies, such as battery storage and vehicle-to-grid (V2G), will be critical to provide flexibility and stabilize network loads. According to the International Energy Agency, demand for flexible energy services is expected to be four times bigger by 2050 versus 2022.

Today, upfront costs still represent a barrier for those technologies, although the cost of batteries is expected to be halved by 2030, and the global battery marketplace is expected to reach as much as €160 billion. The development of the V2G market may take longer as it will require widespread diffusion of technology-ready charging infrastructure and electric vehicles, as well as adequate regulatory framework.

There is a need to increase government support and collaboration to ensure an adequate supply of SAF. With the right support and collaboration, SAF could play a significant role in reducing aviation emissions for the foreseeable future. Despite recent investments in production, there will not be enough SAF supply by 2030 to stop the rise in global aviation emissions: The best-case scenario projects only about 5.4 billion gallons of SAF production by 2030, representing 5% of global jet fuel consumption. SAF would have to make up at least 15% to offset growth in emissions from more air travel.

## BUILDING NEW TECH-ENABLED SOLUTIONS

Technology can be leveraged to enhance traditional mobility infrastructure, such as smart highways and smart parking, or build new mobility solutions, such as urban air mobility.

Smart highways implement technology solutions that enable the exchange of information between roads and vehicles for tolling, road monitoring, and traffic information. A project involving partners from Germany, Italy and the Netherlands, found that smart roads and highways can reduce travel times by 13%, reduce road accidents by 34%, and cut annual CO2 emissions by 22%. The global market is expected to be $110 billion to $120 billion in 2030. Connected vehicle penetration and interoperability are key enablers of this market, but the technology's long and costly deployment represents a barrier to implementation.

Smart parking systems leverage sensors, data analytics, and mobile apps to guide drivers to available parking spaces, reducing the time spent circling for a spot, and minimizing congestion and CO2 emissions. The results of SFPark, a smart parking pilot project in San Francisco, California, suggested that the average time spent searching for parking can be reduced by 30%.

Going beyond this, several smart parking players are working to convert parking structures into mobility services hubs for people and goods, especially for last-mile logistics. Estimates show that the total addressable global market for smart parking could be as much as $30 billion by 2030.

Urban air mobility is an example of leveraging technology to build an entirely new transportation service. EVTOL aircraft could potentially be used for efficient and low-carbon transportation within cities, reducing traffic congestion, improving accessibility, and providing faster and more flexible travel. This sector had attracted over $7 billion in funding globally, as of 2023. The global addressable market is estimated to be around $50 billion in 2030 and as much as $250 billion by 2035.

# UNLOCKING MOBILITY DATA MANAGEMENT FULL POTENTIAL

Lastly, maximizing mobility data management will enable transportation networks to be optimized, improve traffic flow, and support personalized mobility services. Relevant opportunities deriving from mobility data management include intelligent transportation systems, space-based services, and financial services for connected vehicles.

Intelligent transportation systems (ITS) are advanced solutions that combine internet of things (IoT), digital applications, and management software platforms to improve road transport efficiency and safety in urban and interurban settings, as well as helping to reduce traffic-related CO2 emissions. For example, a recent adoption of ITS systems at 50 intersections in Pittsburgh has led to a 25% reduction in journey times and 20% reduction in vehicle emissions.The global ITS market is expected to be $45 billion in 2030.

In the context of financial services, telematics specialists focus on providing data generation and data processing to industrial players to deliver end-user solutions. For example, the market for insurtech and in-car payment software collectively could grow to between $12 billion and $14 billion by 2030.

Space-based data (especially navigation data) can be leveraged to provide services across several transportation industries. For example, motorway and airport operators are turning to space navigation data for improved services, including tolling apps and satellite-based landing systems. The global market for space-based services in the road and aviation industries is expected to be $100 billion in 2030.

# IMPLICATIONS FOR THE MOBILITY ECOSYSTEM

With so much changing in the mobility space over the next decade, the challenge for mobility players is to identify the smartest opportunities for their investment and effort. Here are some factors to consider that can help players choose the most promising role:

**Changing boundaries in the mobility ecosystem**
Industries appear to be progressively converging on multimodal solutions to satisfy complex customer needs. But what was once solely the domain of pure transportation incumbents has now opened up to players from different sectors with the ability to leverage their technology know-how and relationships with mobility consumers.

**Expanding service offerings**
For mobility players, the key appears to be looking beyond traditional transportation services and integrating a broader range of solutions. For example, in the context of declining car ownership, car companies likely will need to combine the capabilities of a tech company, an energy company, and a service company to provide consumers offerings that take the place of ownership. Thus, stakeholders should look to identify synergies and opportunities for collaboration across different sectors. This collaborative approach enables the pooling of resources, expertise, and innovation, leading to more efficient and sustainable solutions in response to evolving customer needs.

**Coordinating support from public and private spheres**
Public funding is important — such as the EU's Recovery Fund, which has allocated approximately $20 billion to boost the sales of electric vehicles — but won't be enough on its own. Private corporations have a crucial role to play in driving innovation and bringing new technologies to support mobility to the market. Public-private partnerships have emerged as a valuable tool to bridge the gap between public funding and private sector expertise, fostering collaboration and accelerating progress. To guarantee a successful transformation of mobility, clear frameworks of risk allocation and support to innovation are necessary, also leveraging blended finance and other innovative financing schemes. Blended finance, such as the strategic use of public funds to attract private investors by reducing their risk exposure, is particularly impactful, as it lets investors with different risk tolerances participate in the same project. By working together, governments and private corporations can create a mobility ecosystem that is accessible, environmentally friendly, and capable of meeting the evolving needs of society.

**Creating more supportive policies for the mobility transition**
The right systemic policies encouraging carbon neutrality, resiliency, and energy security — at all levels of government — are urgently needed to promote innovation and competitiveness and unlock market opportunities. Local policies play a crucial role in addressing specific needs and challenges within a particular region, but systemic policies provide a broader and more cohesive approach to fostering the future of mobility. Systemic policymaking can harmonize standards, promote interoperability, and facilitate the seamless integration of different modes of transportation across jurisdictions. It also can encourage collaboration and knowledge-sharing among different stakeholders, including governments, industry players, and technology providers.

**Position paper researched and written by Oliver Wyman and sponsored by mobility services company Mundys**

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**About Mundys**

With over 23.000 employees, Mundys manages a portfolio of assets that combines transport infrastructure concessions with digital services platforms to provide innovative and sustainable mobility services for people on the move.


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