



future planet   
**Smart Cities**  
**Future of Transport**



As urbanization increases – an additional 2.5 billion people will live in cities by 2050\* – cities and suburbs will undergo significant transformations to create sustainable living conditions for their residents. **Energy and mobility** are the twin pillars of these transformations, and both will require radical adaptation to meet the demographic and economic growth without increasing congestion and pollution. **The future of transportation involves moving into new, smarter sources of energy, modes of transport and physical and technological infrastructure to support these transportation innovations.** Three common themes in transportation innovation are: mobility-as-a-Service, electrification and autonomy.

The future of transportation is **seamless mobility**—where all modes of transportation are fully connected into a single, integrated network of transportation modes, with public transit at the center. This future is happening right now. We can already see it manifesting in the idea of shared mobility, where cars and bikes are borrowed instead of owned. This paradigm shift away from ownership toward multimodality and interconnectedness capitalizes on the flexibility of shared modes and the productivity of mass transit to provide passengers with more choices than ever before on how they get around.

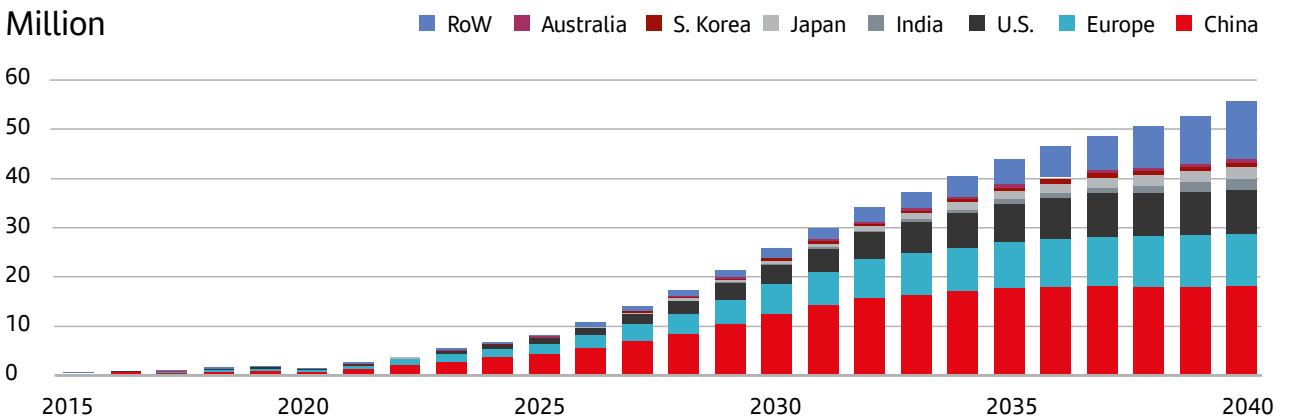
**Autonomous vehicles (AV)** are also a part of the future and won't displace mass transit. As autonomous vehicles enter the mainstream, the software in the car will become the most important factor driving consumer purchasing behavior & brand identity. Much as the smartphones became defined by apps created by third parties, transportation will find a similar transformation.

The rise of **electric vehicles (EV)**, autonomous vehicles and **Mobility-as-a-Service (MaaS)** is transforming the mobility landscape. As a result, the scale of the investment opportunity has increased significantly, with a **\$7 trillion potential global market for mobility and related services\*\***. Future of Transport analyzes the opportunities that this transformation will bring to many sectors and the companies that are driving the innovation and gaining market share.

**The next 10 years of mobility will bring more change in the way that people and products move than any decade since the invention of the automobile.** As emerging technologies and business models, like ride-hailing and sharing, are joined by autonomous vehicles and micro-mobility, we see massive new businesses being created, existing models disrupted, cities changed, and the way we all live impacted in ways big and small.

## Annual passenger electric vehicles (EV) sales by region

Source: BNEF



Note: Europe includes EU, U.K. and EFTA. EV contains battery electric and plug-in hybrid.

\* United Nations - 2018 Revision of World Urbanization Prospects

\*\* Goldman Sachs – The Future of Mobility June 2019



# Innovations and trends in Future of Transport



## Autonomous Vehicles (AV)

Autonomous cars use technologies like RADAR, LIDAR, GPS, and computer vision, in order to sense their environment. Advanced control systems that are integrated into the car can interpret the sensory inputs to detect the signboards or to avoid the collision. Although, Level 4 and Level 5 (as scaled by SAE\*) autonomous cars are unlikely to reach wide acceptance, by 2030, there will be a rapid growth for Level 2 and Level 3 autonomous cars, which have **advanced driver assistance systems**, like collision detection, lane departure warning, and adaptive cruise control\*\*. Advanced emergency braking (AEB) and lane keeping assistance (LKA) are features that are expected to grow at a compound **annual growth rate of 20% in the next decade** according to BNEF. Autonomous Vehicles (AVs) with SAE level 4 are being tested, so we will have these cars in the market really soon. These applications will, however, be primarily proofs of concept, and learning arenas, for both technology and operational models



## Electric Vehicles (EV)

According to Bloomberg NEF the annual sales of **Electric Vehicles** are projected to reach **26 million units by 2030** from an estimated 2,1 million units in 2019. Favorable government policies and support in terms of subsidies and grants, tax rebates and other non-financial benefits in the form of car pool lane access, and new car registration (specifically in China where ICE\*\*\* engine new car registration are banned in some urban areas) the **increasing vehicle range, better availability of charging infrastructure and proactive participation by automotive OEMs\*\*\*\*** would drive the global electric vehicle sales. The long-term outlook for EVs remains bright, as fundamental cost and technology improvements outweigh the short-term impacts of the pandemic. By 2025, EVs are expected to hit 10% of global passenger vehicle sales, rising to 28% in 2030 and 58% in 2040. Some markets achieve much higher penetrations, but low adoption in emerging markets reduces the global average.



## Shared Mobility (MaaS)

**Mobility-as-a-Service (MaaS)** represents the value that will be created by the shift in transportation expenditures by consumers and business from vehicle ownership, taxi use, rental car use and public transport to the use of third party transportation services based on autonomous vehicles. Mobility-as-a-Service solutions will represent the essential nature of future transportation and open the door to the passenger economy of the future.

**Shared mobility** refers to the behavior of people sharing various forms of transportation, such as cars, bikes, taxis and buses. The aim of encouraging shared mobility is to **reduce carbon emissions and ease congestion on public roads**, all the while, reducing travel costs for individuals. According to Statista, **transportation accounts for 24 percent of the world's CO2 emissions**. With fewer vehicles on our roads, carbon dioxide levels will reduce, providing us with cleaner air and a healthier environment. Shared mobility can also help solve our urban density problems, to the benefit of commuters and cities themselves. Travel times will be quicker on public roads, car parking will be freely available, and cities will be able to reclaim land to be used for other purposes.

\* SAE is the society of automotive engineers, which it's main goal is the development of standards for every kind of vehicles. They have done the classification of different levels of autonomous vehicles

\*\* These estimations are provided by Mordor Intelligence

\*\*\* ICE is an acronym that means Internal Combustion Engine

\*\*\*\* OEM stands for Original Equipment Manufacturer



## Examples of companies in Future of Transport



**Geely Automobile Holdings** Limited manufactures automobiles.

It sells passenger vehicles under the Geely Auto, Lotus, Lynk & Co, PROTON, and **Volvo** brands as well as commercial only vehicles under the London EV Company and Yuan Cheng Auto brands.

The group sold over 1.5 million cars in 2018. It completed the acquisition of British taxi maker **The London Electric Vehicle Company** in 2013 and acquired a majority stake in British sports carmaker Lotus Cars in 2017.

## Uber

**Uber Technologies**, Inc. provides ride hailing services.

The company operates as a **technology platform for people and things mobility**. The firm offers multi-modal people transportation, restaurant food delivery, and connecting freight carriers and shippers.

Uber recently acquired **Postmates**, who has been an early pioneer of **"delivery-as-a-service"**. This transaction complements Uber's growing efforts in the delivery of groceries, essentials, and other goods.



**Samsung SDI Co., Ltd.** specializes in developing **Lithium Ion Battery (LIB) technology**.

The Company also manufactures cathode ray tubes (CRTs) for televisions and computer monitors.

Samsung SDI also produces liquid crystal display (LCD) components and **rechargeable batteries for cellular phones**, personal digital assistants (PDAs), Energy Storage Systems and solar panels. Samsung SDI has ranked **number one in terms of the global market share of the lithium-ion batteries since 2010** through continuous technological innovation and market-driven activities\*.



**Tesla** Inc. designs, manufactures, and sells **high-performance electric vehicles** and electric vehicle powertrain components.

The Company owns its sales and service network and sells electric powertrain components to other automobile manufacturers. When **Tesla went public in 2010**, it became the first American car company to do so since Ford Motor Company in 1956.

Since then, Tesla's stock has soared as the company keeps rolling out new features and models.



**Aptiv** is developing solutions enabling the transition to software-defined vehicles supported by intelligently connected architectures – which will combine to **power the future of mobility**.

Aptiv's strategically positioned product portfolio in key growth spaces addresses **mobility's toughest challenges** and meets consumer needs for advanced technologies.

Aptiv has expertise in centralized computing platforms, advanced safety systems and automated driving.



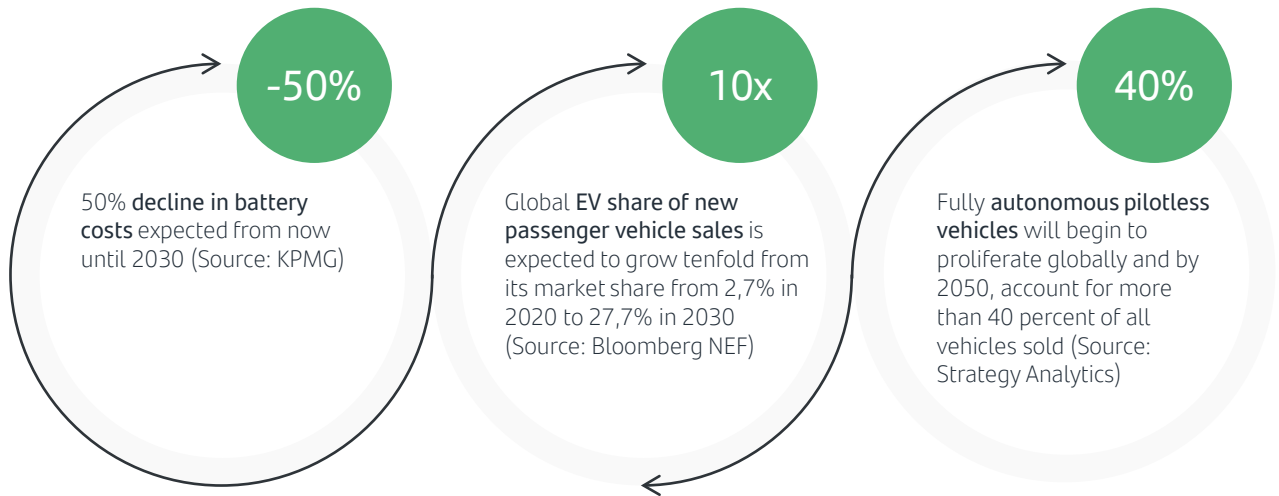
**Lumentum Holdings Inc.** is a provider of optical and photonic products for a range of end market applications, including data communications and telecommunications networking and commercial lasers for manufacturing, inspection and life-science applications.

**Evolving 3D sensing technology** will play an increasingly critical role in improving the **safety and capabilities of smart and autonomous vehicles**.

\* Source: Samsung SDI website



## Did you Know that?



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