2.1

Transport Demand

Key findings

Drivers of transport demand

- Global population increased 12% between 2010 and 2020, to an estimated 7.7 billion people, and the urban population grew nearly 20% over this period. As the population expands, more people worldwide need dependable transport services to access socio-economic activities and opportunities.
- Growth in global gross domestic product (GDP) has exceeded growth in transport energy use since 2010. Global GDP grew 27% between 2010 and 2019 (average annual rate of 3%) and 2.2% in 2019, but it fell an estimated 4.3% in 2020 due to the impacts of COVID-19.
- Global oil demand began declining in 2016, and this slide became a freefall in 2020 as the pandemic affected not only oil demand but also prices. The average price of West Texas Intermediate crude oil fell below USD 20 a barrel in 2020 (from USD 57 a barrel in 2019), as the reduction in travel led to a sharp drop in oil demand for transport.
- Battery prices – a major factor behind the cost of electric vehicles – dropped 89% between 2010 and 2020, from USD 1,183 per kilowatt-hour (kWh) to an estimated USD 135 per kWh.

Passenger transport supply and demand

- Global demand for public transport grew 4% per year between 2012 and 2017. Bus rapid transit, metro rail and light rail transit have expanded to varying degrees in nearly all regions, with bus rapid transit systems taking off in Europe and light rail becoming more prevalent in Oceania.
- The movement for better inter-city rail options is spreading not only in Europe, where more routes have been planned and upgraded, but also in Canada, China and Thailand. Heavy rail carries 8% of all passengers travelling between cities. Passenger rail transport activity is 75% electrified, and China and India are home to most of the existing track as well as future projected growth.
- Global air travel increased 4.2% from 2018 to 2019. In late July 2019, around 225,000 airplanes were active on a single day, the largest daily movement of aircraft ever recorded.
- The long-anticipated possibility of "peak car" may now be arriving, due to rising urban congestion as well as expanding shared mobility options. Between 2017 and 2019, total sales of passenger cars fell 7% in member countries of the Organisation for Economic Co-operation and Development (OECD) and 10% in non-OECD countries.

- Despite evidence of reduced car ownership in some cities, the growth in ridesharing appears to be correlated more strongly with a shift away from cycling, walking, taxis, and public transport, not necessarily car driving. A USA study found that the introduction of ridesharing services in a city leads to annual decreases in heavy rail ridership of 1.3% and in bus ridership of 1.7%.
- Motorised two-wheelers, such as mopeds and motorcycles, grew 149% in India and 80% in Vietnam between 2010 and 2019, and the world's largest motorcycle fleets are in China, India, Indonesia, Pakistan and Vietnam. These transport modes are most prevalent in Southeast Asia and have also increased in Latin America and Sub-Saharan Africa.

Freight transport supply and demand

- Although urban road freight accounted for only 1% of the total freight tonne-kilometres moved worldwide in 2015, it represented half of all road vehicle freight-kilometres, simply because urban loads are typically light but the travel is high frequency. Heavy rail carried 7% of all freight between cities in 2015.
- Global freight demand saw modest growth in maritime trade and declines in aviation due to the slow economic growth in 2018 and 2019.

Impacts of the COVID-19 pandemic

- Oil demand in 2020 was an estimated 8 million barrels per day lower than in 2019. Freight transport activity dropped an estimated 36% below projected levels, and carbon dioxide (CO_2) emissions from freight transport fell 30% in 2020.
- As the pandemic disrupted the supply chain, global vehicle production declined 14.5% in 2020, with 13 million fewer vehicles produced during the year. The drop was mostly in passenger car sales, whereas global sales of commercial vehicles fell by some 2.3 million. Only electric vehicles recorded strong growth, for a total of 11.2 million electric cars on the world's roads in 2020 (surpassing 2019 estimates by some 1.9 million cars).
- Bicycle sales in the USA increased 62% between January and October 2020 (compared to the same period in 2019), and e-bike sales increased 144%. Eleven European countries saw an average 8% increase in cycling during 2020.

Overview

Population growth and density, as well as economic growth and development, play an important role in driving transport activity. Urbanisation has had far-reaching effects on transport demand as well as on energy efficiency, economic development, social equity and paratransit (sometimes called "informal transport"). Additional factors influencing transport demand (and related emissions) include energy prices, policies related to transport and land use, as well as people's shifting behaviours and needs. Although comprehensive data for 2019 and 2020 are still emerging, various examples and indicators paint a picture of overall trends in the demand for both passenger and freight transport.

Drivers of transport demand

Population growth, urbanisation and density

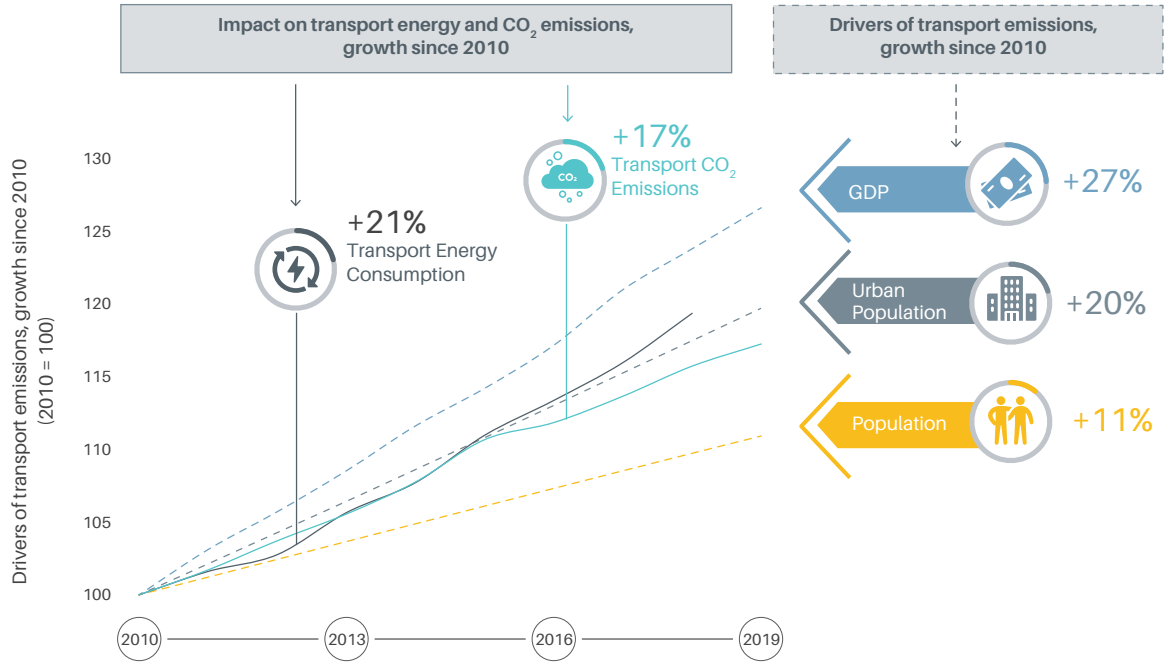
Global population increased 12% between 2010 and 2020, to an estimated 7.7 billion people, and the urban population grew nearly 20% over this period.[1] **As the population expands, more people worldwide need dependable transport services to access socio-economic activities and opportunities.** Africa's population grew fastest during the decade, at 29%, followed by Oceania (16%) and Latin America and the Caribbean (11%).[2] On average, the population in OECD member countries grew 6% over the decade, while the population in non-OECD countries grew 13%.[3]

The world's urban population increased at an average rate of 1.97% annually during 2010-2020, much faster than the rate of overall population growth (1.29%).[4] People are increasingly moving to cities to pursue economic, education, social and other opportunities. Small- to medium-sized urban areas are growing especially rapidly and are projected to account for rising shares of both population and economic growth, although they are often overshadowed by bigger, more visible cities.[5]

The links between population, economic growth, land use and the transport sector are diverse and interrelated. More densely populated areas tend to have higher urban GDP growth, whereas sprawling cities result in increased congestion and energy use. Urbanisation and higher population density can bring economies of scale and efficiency, helping to improve overall energy efficiency on a national level. However, with rising pressure on urban transport systems, cities can succumb to urban sprawl and long-term gridlock in the absence of proactive policies.[6]

Rising populations and consumer demand can make the movement of freight more challenging as the competition for road space increases. As of 2015, the global road network (excluding local urban roads) totalled around 14.5 million kilometres.[7] By 2050, it is expected to increase a further 3.0 to 4.7 million kilometres, especially in developing countries and in regions that are currently mainly wilderness, such as the **Amazon** and **Congo** basins.[8]

Figure 1. Drivers and impacts of transport demand, 2010-2019



Source: See endnote 11 for this section.

Demographic shifts also have implications for the planning of large infrastructure projects, as different age groups tend to have very different mobility patterns. For example, building a rail corridor to connect small- to medium-sized cities might make sense when accounting for projected population growth.

Policies related to the transport of passengers and goods, as well as to land use, play an essential role in ensuring that cities function efficiently for both human and socio-economic development.[9] However, a lack of integrated planning, and insufficient long-term investment in transport, can lead to unnecessary trips or congestion and to higher energy use in the sector.[10]

Economic trends

Growth in global GDP has exceeded growth in transport energy use since 2010. Global GDP grew 27% between 2010 and 2019 (average annual rate of 3%) and 2.2% in 2019 (*see Figure 1*)**, but it fell an estimated 4.3% in 2020 due to the impacts of COVID-19.**[11] These economic trends impact both mobility and transport demand. Although GDP has grown faster than the population overall, the economic benefits have not been distributed equally. Based on most indices, the global economy today is less resilient than it was in 2007, in terms of both economic risks and their consequences, and how to mitigate them.[12] The main challenge for climate action will be decoupling economic growth from rising emissions, particularly in the transport sector.

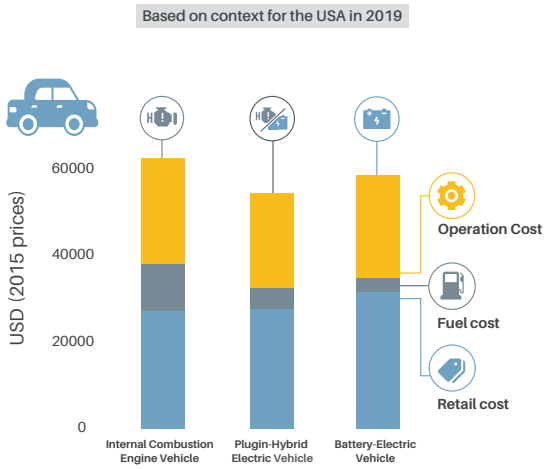
Providing more options to enable mobility can increase the resilience of both transport systems and the overall economy. This is one reason why both public transport and active modes of transport (cycling and walking) have attracted greater attention since the start of the COVID-19 pandemic (*see Box 1*).[13]

Energy consumption and prices

Global oil demand began declining in 2016, and this slide became a freefall in 2020 as the COVID-19 pandemic affected not only oil demand but also prices.[14] **The average price of West Texas Intermediate crude oil fell below USD 20 a barrel in 2020 (from USD 57 a barrel in 2019), as the reduction in travel led to a sharp drop in oil demand for transport.**[15] Energy prices can have a significant impact on both transport demand and related emissions.

The price of oil, which is highly susceptible to market forces, helps determine the financial competitiveness of electric vehicles (specifically those powered by renewable or other non-fossil fuel sources) compared to traditional internal combustion vehicles powered by fossil fuels. Even with the drop in oil prices, the payback period and total cost of ownership for electric cars and buses has become more competitive every year (*see Figure 2*), and electric buses have increasingly displaced diesel fuel use.[16] In 2019, 17% of the world's bus fleet was electric, and China was home to 98% of the global fleet, with its e-buses already displacing more oil than all of the world's electric passenger cars combined.[17]

Figure 2A. Total cost of ownership for cars



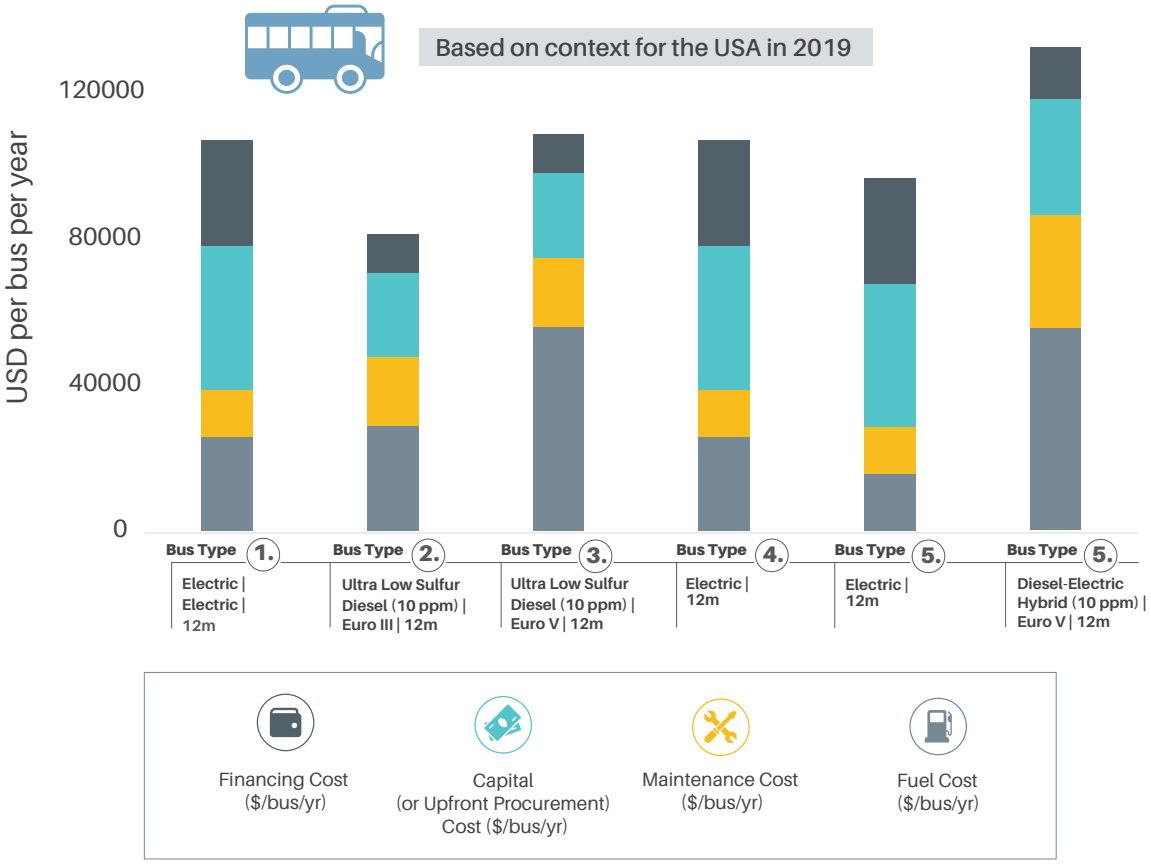
Source: See endnote 16 for this section.

Battery prices – a major factor behind the cost of electric vehicles – dropped 89% between 2010 and 2020, from USD 1,183 per kWh to an estimated USD 135 per kWh[i].[18] Even as oil prices have dipped to historic lows, lithium-ion batteries have become much less expensive and lack the price volatility of oil. The energy density of lithium-ion battery cells nearly tripled between 2010 and 2020, helping to extend the range of electric vehicles.[19]

However, cost comparisons between electric and fossil-fuelled vehicles fail to reflect the ongoing presence of fossil fuel subsidies. Despite progress with subsidy reform in the early 2010s, worldwide subsidies for fossil fuels still totalled USD 500 billion in 2019.[20] Many governments provide financial and non-financial incentives to support the initial uptake of electric vehicles, but these incentives are often designed to be phased out once a certain market share has been reached.[21]

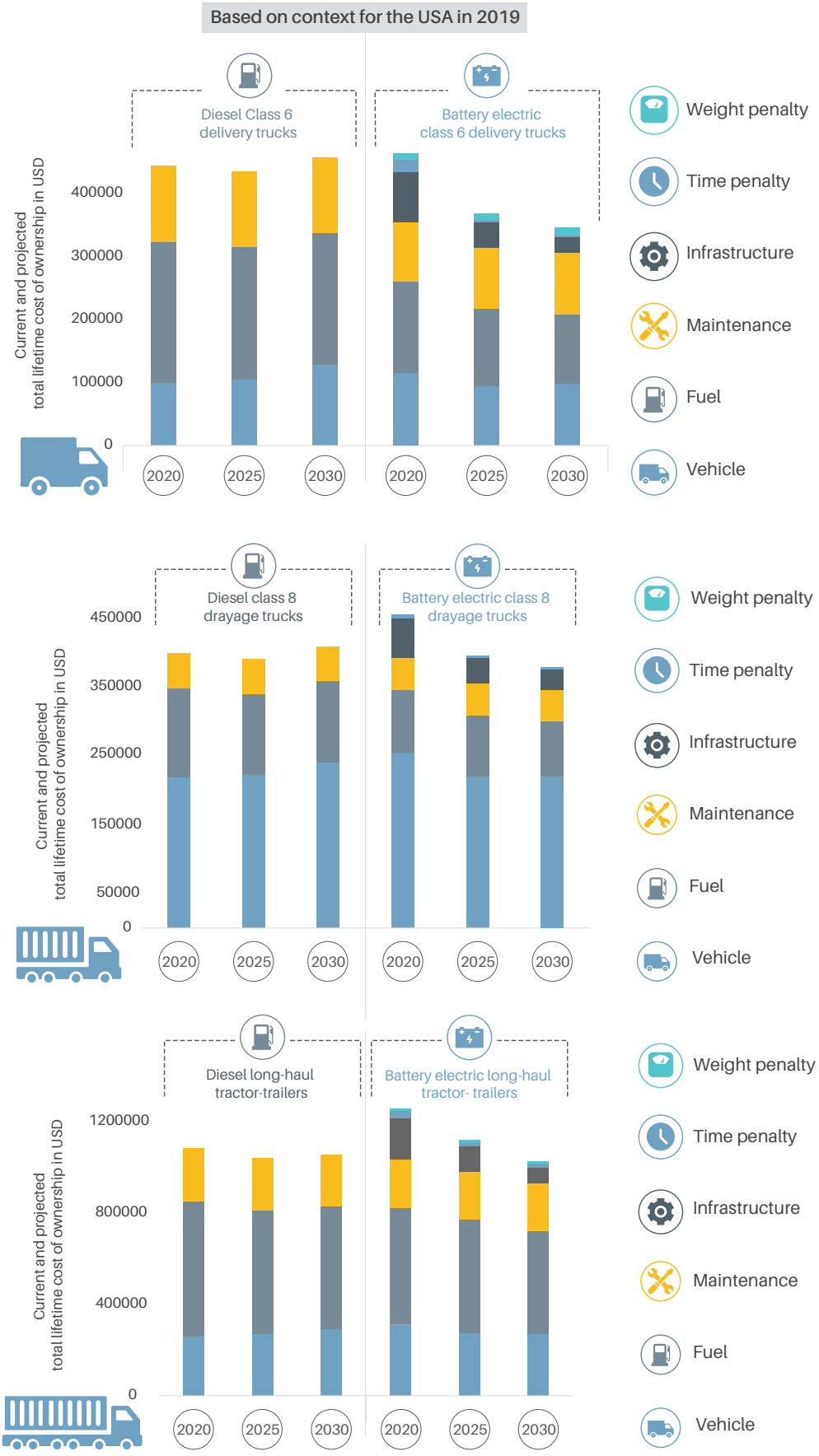
i Battery pack prices per kWh are higher for plug-in hybrid EVs, and vary by vehicle segment, but published figures refer to the volume-weighted industry average.

Figure 2B. Total cost of ownership for buses



Source: See endnote 16 for this section.

Figure 2C. Total cost of ownership for trucks



Source: See endnote [16] for this section.

Shifting behaviours, needs and policies

Additional drivers behind transport demand include people's shifting behaviours and needs, as well as changes in the supply of transport infrastructure. This includes the growing availability of data on the frequency and occupancy of buses and other transport modes, accessed via handheld devices and at public transport stops.

With rising urbanisation, cities have struggled to build adequate infrastructure to provide the needed mobility services for both passengers and freight. The quality of walking and cycling infrastructure in particular is not on par with the many benefits that these options offer to society and the environment.[22]

However, in recent years there has been a shift away from high-emitting modes of transport and towards non-motorised transport. In 2018 and 2019, the anti-flying movement known as *flygskam* or "flight shame" began sweeping across Europe.[23] A study also found that a majority of European urban residents support increased bans on diesel and petrol cars after 2030.[24] Globally, there was a positive correlation between the emergence of "pop-up" walking and cycling infrastructure during the pandemic in 2020, and the share of trips taken via these two modes, which neared 48% in some European cities.[25]

Policies and regulations shape and determine demand for transport in a variety of ways. Cities in particular serve as "laboratories" for testing the dynamic mix of urbanisation trends and evolving workplaces and delivery modes. For example, bicycle sharing schemes are using "nudging" to incentivise users to drop off their bikes at locations (such as transit stations) that are more useful to the operator. Meanwhile, many delivery companies now offer the option for customers to pick up parcels from a nearby shop at their convenience, instead of having to wait for the delivery and potentially miss it, which can increase energy use and emissions.

Passenger transport supply and demand

Mobility options both within and between cities have increased. However, investment in transport has not yet grown to levels that meet the burgeoning demand for mobility services (*see Section 4: Financing Climate Action in Transport*).

Public transport

Global demand for public transport grew 4% per year between 2012 and 2017.[26] Bus rapid transit, metro rail and light rail transit have expanded to varying degrees in nearly all regions, with bus rapid transit systems taking off in Europe and light rail becoming more prevalent in Oceania (*see Figure 3*).[27]

The number of cities with bus rapid transit systems increased from 169 in 2017 to 176 in 2020, and the total length of these lines grew from 5,000 kilometres to 5,282 kilometres during this period.[28] In 2020, bus rapid transit systems worldwide served nearly 34 million passengers per day.[29]

Metro rail grew 36% between 2014 and 2018, reaching a total of 178 metro systems worldwide with 642 lines and a combined length of 13,903 kilometres.[30] In 2019, **Indonesia** unveiled its first metro system, operating in Jakarta, and a new system also opened in **Doha**, Qatar.[31] The following year, the first metro in Pakistan went into operation in **Lahore**.[32]

Light rail and tram systems have experienced a renaissance, and in some cases systems were reinstalled in places where they had been stripped out decades before. Between 2015 and 2018, the length of light rail track added in Europe alone accounted for a third of the total track length worldwide.[33] However, the Asia-Pacific region had more new light rail projects than Europe for the first time as of 2017, and in 2015 Africa's first system was launched in **Addis Ababa,** Ethiopia.[34]

Even with the increase in public transport infrastructure and services, ridership has suffered in many places because public transport is a lower policy priority for many cities.[35] Best practices point to the importance of better route planning as a relatively cost-efficient measure to boost ridership, which in turn leads to greater revenue and potential for investments in improved bus services, especially as more fleets look to electrify.[36]

Heavy rail

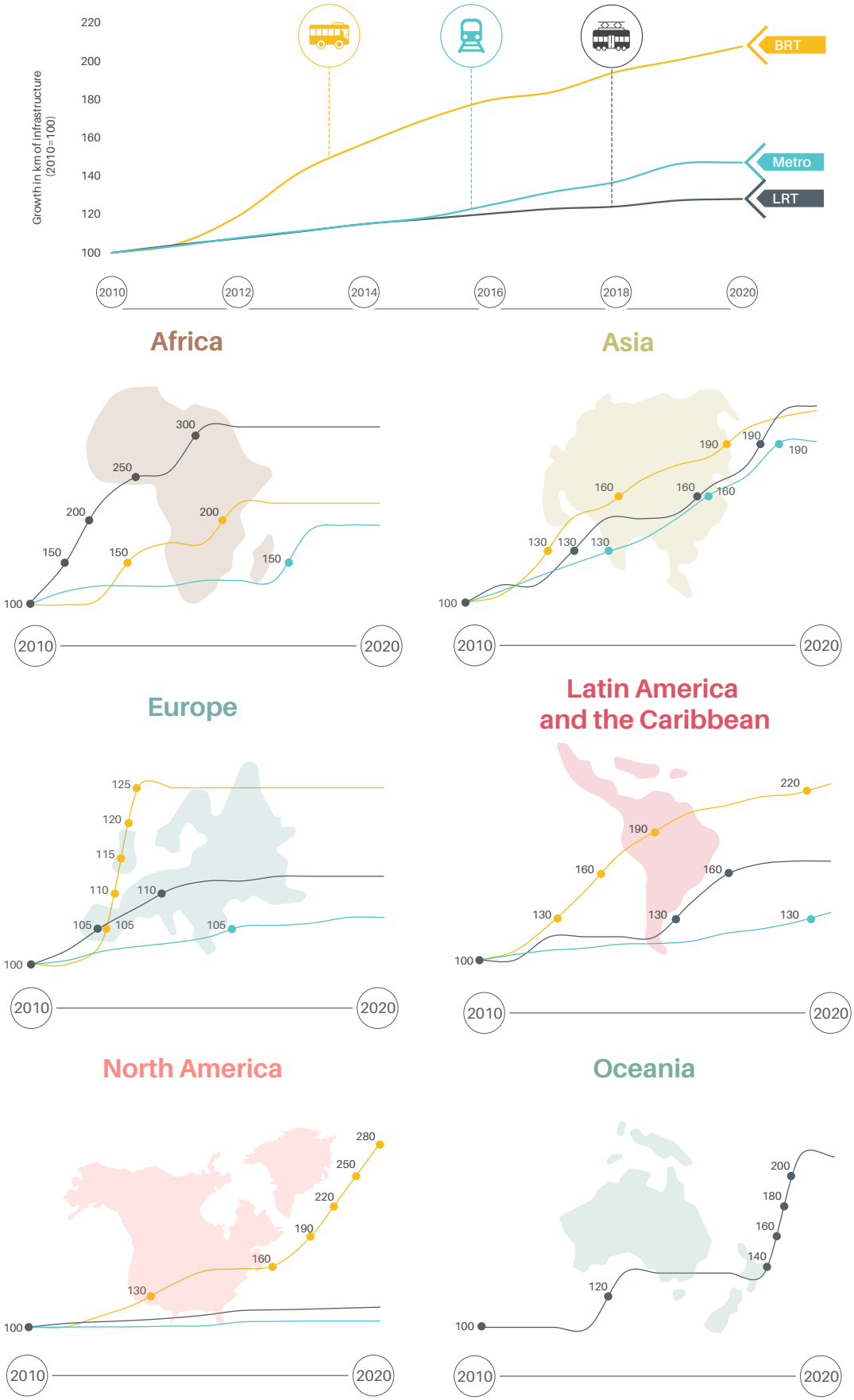
The movement for better inter-city rail options is spreading not only in Europe, where more routes have been planned and upgraded, but also in Canada, China and Thailand.[37] Heavy rail carries 8% of all passengers travelling between cities.[38] Passenger rail transport activity is 75% electrified, and China and India are home to most of the existing track as well as future projected growth.[39] Outside of these countries and Europe, construction of heavy rail lines is lagging, and most inter-city travel occurs via bus or airplane. High-speed rail is spearheading growth in heavy rail, and the total high-speed rail track length grew substantially in 2019 and increased in 2020 as well (*see Figure 4*).[40]

Interest in rail declined in many regions in recent decades as low-cost airlines captured a greater share of the market, expanding access to air travel worldwide. However, with increasing urbanisation (among other factors), the calculation is starting to lean more favourably towards high-speed rail corridors between cities, where previously a flight was the preferred mobility choice due to time savings (not taking into account environmental effects). In areas where high-speed rail systems exist, people tend to take trains instead of flights for trips under 500 kilometres.[41]

In **Europe**, inter-city rail travel – particularly the use of night trains with sleeper compartments – decreased between 2010 and 2018.[42] However, this trend has since reversed, in part because of rising environmental awareness, exemplified by the *flygskam* or "flight shame" movement that became prominent in **Sweden** in 2019.[43]

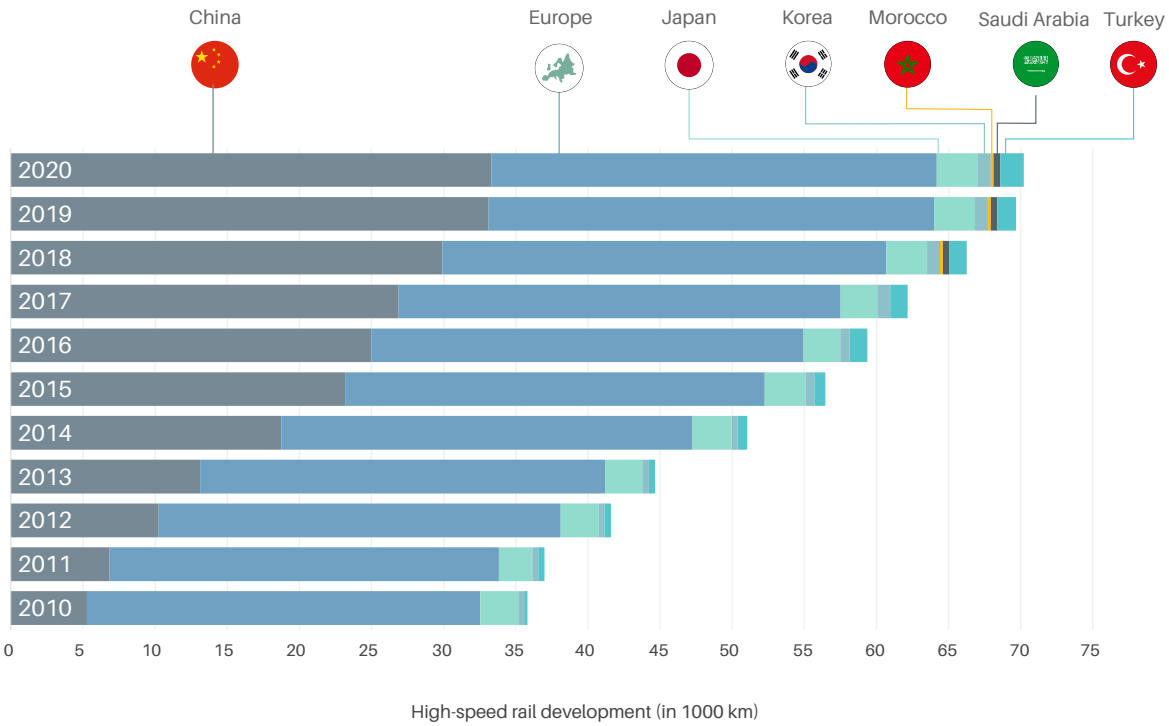
In 2019, international rail travel from the Netherlands went up 13%, while 500,000 fewer passengers flew out of **Amsterdam**'s Schiphol Airport.[44] Air travel in **Sweden** fell 4% in 2019, and night train travel in **Austria** doubled between 2016 and 2017, increasing a further 10% in 2018.[45] The Brussels-to-Vienna night train was reintroduced

Figure 3. Growth in bus rapid transit, metro systems and light rail transit, worldwide and by region, 2010-2020



Source: See endnote 27 for this section.

Figure 4. High-speed rail development by region, 2010-2020



Source: See endnote 40 for this section.

in 2020, nearly 16 years after it closed.[46] Despite integration efforts in the European Union (EU), many structural and technical issues related to inter-city rail have yet to be resolved, including different gauge widths and grid voltages among member countries.[47]

Air travel

Global air travel increased 4.2% from 2018 to 2019.[48] In late July 2019, around 225,000 airplanes were active in a single day, the largest daily movement of aircraft ever recorded.[49] While air travel is dominated by wealthier countries, the launch of the Single African Air Transport Market in 2018, covering 34 countries, will enable more air travel within **Africa**.[50] In **Europe**, aviation represented the second highest share of passenger transport volumes (after road transport) between 2010 and 2019.[51] **Europe** was the driving market for global air travel growth in 2019, with an 8.9% increase in domestic flights and a 6.3% increase in international flights.[52] Jet fuel remains untaxed globally, which amounts to an unequal subsidy.[53]

Air travel infrastructure has struggled to meet demand, and airports are being constructed or expanded in all regions to increase capacity.[54] In 2019, a new airport became operational in Istanbul, **Turkey**, and **China** also opened Beijing's second international airport, with the world's biggest terminal.[55] Despite these developments, total airport capacity grew only 3.4% in 2019, half the pace of the previous year.[56]

Passenger cars

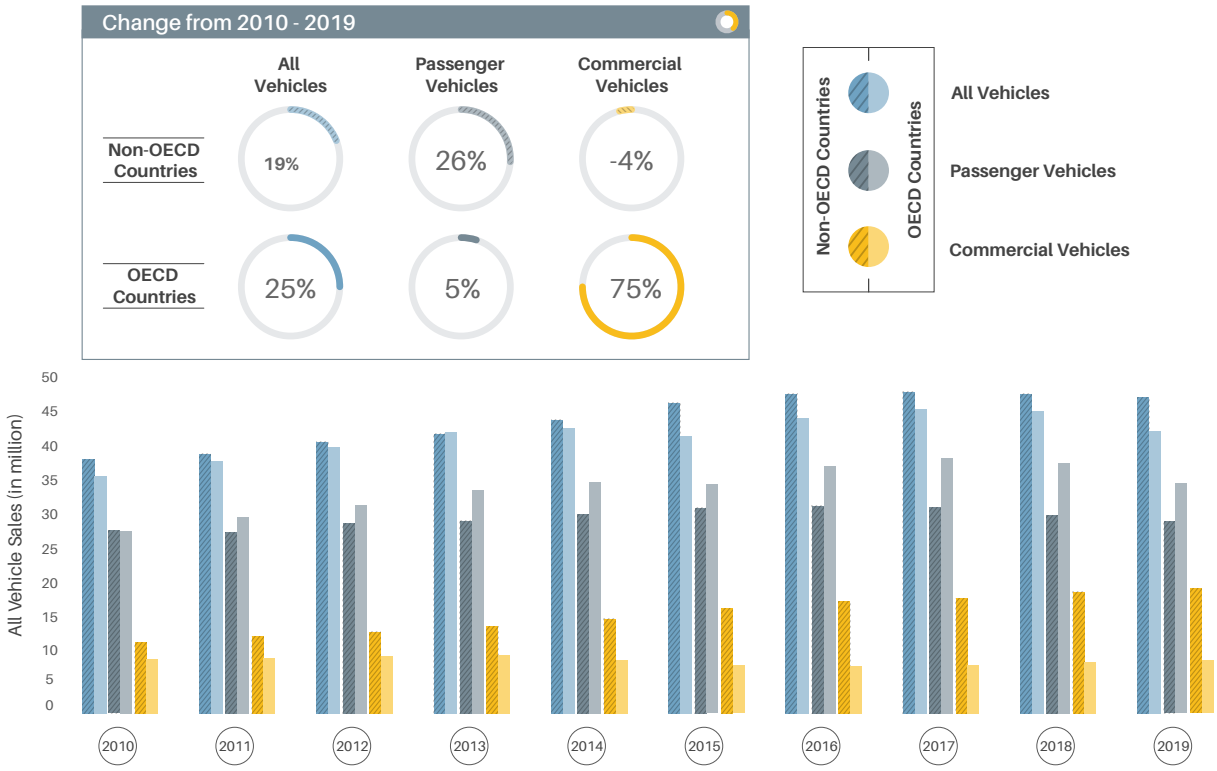
The long-anticipated possibility of "peak car" may now be arriving, due to rising urban congestion as well as expanding shared mobility options.[57] Between 2017 and 2019, total sales of passenger cars fell 7% in OECD countries and 10% in non-OECD countries (*see Figure 5*).[58] These declines occurred even as GDP per capita increased in both regions.[59] Overall, passenger car sales have plateaued since 2015 after expanding rapidly over the previous decade (from 45 million cars in 2005 to 65 million in 2015).[60] Despite declining sales in some developed countries, however, the total number of passenger and commercial vehicles worldwide has continued to increase, due to the continued circulation of older passenger cars.[61]

The three most-discussed car trends of recent years are electric, shared and automated vehicles.[62] Vehicle electrification has continued unabated, although the rate of uptake of electric vehicles remains too slow to meet climate targets (*see Section 3.8: E-mobility*). Meanwhile, shared and automated cars remain far from fulfilling their touted potential (*see Section 3.6: Shared Mobility Services*).

Ridesharing

Despite evidence of reduced car ownership in some cities, the growth in ridesharing appears to be correlated more strongly with a shift away from cycling, walking, taxis, and public transport, not necessarily car driving.[63] A USA study found that the introduction

Figure 5. Vehicle sales in OECD and non-OECD countries, 2010-2019



Source: See endnote 58 for this section.

of ridesharing services in a city leads to annual decreases in heavy rail ridership of 1.3% and in bus ridership of 1.7%.[64] In the USA, however, ridesharing still accounts for less than 1% of the total kilometres driven.[65] In some urban areas worldwide, ridesharing has been found to increase the total vehicle-kilometres travelled, with a 19% increase in New York City in 2016 and a 31.5% increase in Santiago, Chile.[66]

Motorised two- and three-wheelers

Motorised two-wheeler fleets, such as mopeds and motorcycles, grew 149% in India and 80% in Vietnam between 2010 and 2019 (*see Figure 6*), and the world's largest motorcycle fleets are in China, India, Indonesia, Pakistan and Vietnam.[67] These transport modes are most prevalent in Southeast Asia and have also increased in Latin America and Sub-Saharan Africa.[68]

The electric two-wheeler segment continued to grow in 2019, not only in China but also in Latin America and the Caribbean, Southeast Asia and Sub-Saharan Africa.[69] In India, the market grew 11% that year.[70] Three-wheelers, although more of a niche than two-wheelers, are particularly suited for passenger taxi trips and for the delivery of goods in congested cities, and their numbers are rising in China and India.[71]

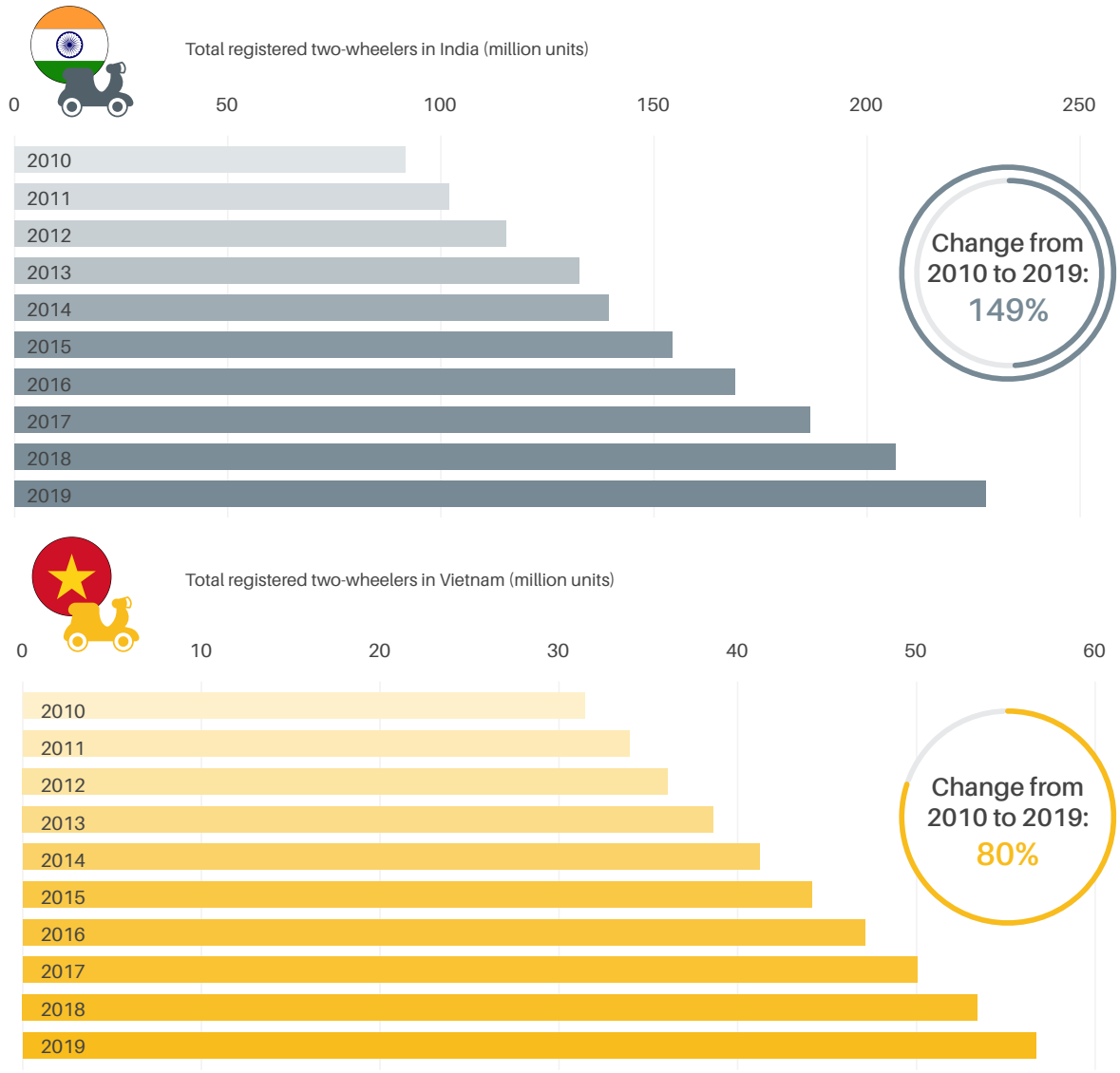
Two-wheelers have a much lower upfront cost than buying a passenger car and can potentially reduce inconveniences related to parking and congestion. Research on Indonesia's popular Gojek motorcycle rideshare service found that motorcycles can complement public transport by acting as feeder services to high-capacity public transport routes.[72]

Freight transport supply and demand

Although urban road freight accounted for only 1% of the total freight tonne-kilometres moved worldwide in 2015, it represented half of all road vehicle freight-kilometres, simply because urban loads are typically light but the travel is high frequency.[73] Heavy rail carried 7% of all freight between cities in 2015.[74] As freight demand has continued to grow, the total volume of freight tonne-kilometres moved has increased, with the biggest drivers in recent years being food delivery services and e-commerce.[75]

Increased urbanisation and the overall growth in GDP have contributed to the rise in urban freight demand. At the same time, a structural shift has occurred as more people order food and goods directly to their homes, and as both the availability of and demand for same-day deliveries have increased. Same-day delivery of goods

Figure 6. Change of motorcycle fleet in India and Vietnam, 2010-2019



Source: See endnote 67 for this section.

is especially prevalent in Chinese cities, which pioneered the trend (often on electric two- or three-wheelers); however, it is increasingly popular across all regions, particularly in tech-savvy cities in high-income countries and in emerging economies.[76]

Statistics tend to overlook many modes of urban freight transport, including the use of passenger cars for freight delivery or movement, the proliferation of motorcycle food and parcel deliveries, and the use of walking and cycling.[77] A case study in **London** found that up to 62% of a parcel carrier's round may include walking, and that the overall impacts of urban freight depend on a wide range of factors, including whether or not the first delivery attempt was successful.[78]

The order-return behaviour of consumers also influences freight transport, as purchase policies that enable easy returns can result in unnecessary trips.

Just as ridesharing is considered the marquee business model of the past decade in passenger mobility (upending taxi services around the world), innovation is also taking place in the freight sector. Both small and large companies have entered the sector in new ways. For example, **Uber** launched its Uber Freight service in the **USA**, **Netherlands** and **Germany** in 2017, then expanded it in 2019, and **Gojek** shifted in 2020 from just shuttling passengers to also delivering goods within and between cities.[79] **Doddle**,

launched in several regions in 2015, seeks to avoid missed deliveries by providing physical drop-off locations that are not contingent on someone being home during daytime hours (also known as parcel consolidation).[80]

Amazon has entered the market with its Flex service, which invites eligible drivers with their own vehicles to deliver parcels as part of their daily routine, in an approach called "crowd shipping".[81] It expanded this service to India in 2020.[82] The company Lori has established a similar crowd shipping platform in Kenya.[83] Early indications suggest that this has the potential to help solve the last-mile problem but could also add considerably to emissions.[84] This issue is discussed further in *Section 2.2: Transport Emissions* and underscores the importance of tracking the movement of freight to gauge its current status.

Global freight demand saw modest growth in maritime trade and declines in aviation due to the slow economic growth in 2018 and 2019. Seaborne trade increased only 0.5% in 2019 (down from 2.8% growth in 2018), the lowest rate since the 2009 financial crisis.[85] Air freight represents a minimal share of global freight movement.[86] In 2019, air freight traffic fell 3.3% from the previous year, its first decline since 2012.[87]

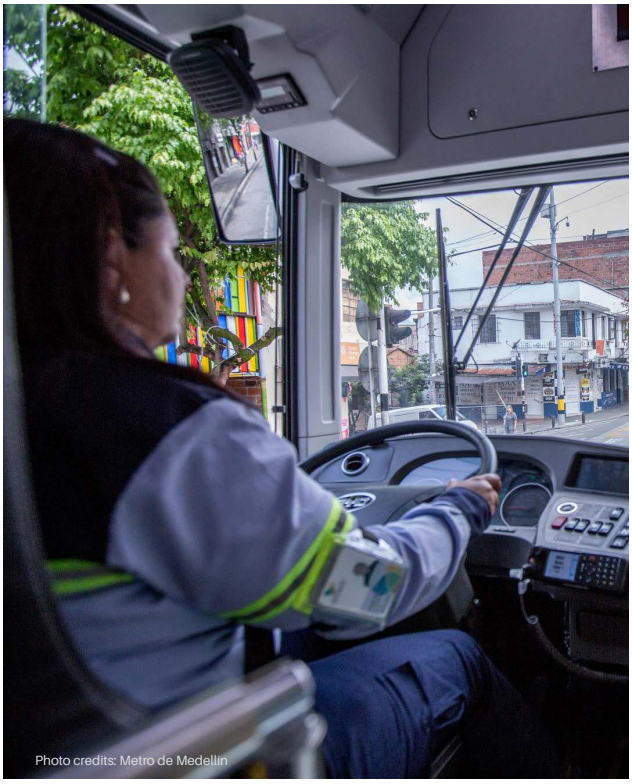


Photo credits: Metro de Medellin

Box 1. Impacts of the COVID-19 pandemic on transport demand

Total transport activity plummeted in early 2020 as countries enacted flight restrictions and issued stay-at-home mandates or guidelines due to the COVID-19 pandemic. Reductions in road transport and aviation, the world's two major oil consumers, led to a large drop in oil demand and prices. **Oil demand in 2020 was an estimated 8 million barrels per day lower than in 2019. Freight transport activity dropped an estimated 36% below projected levels, and CO_2 emissions from freight transport fell 30% in 2020.**

With the decline in air travel, the impacts of the pandemic led to rising interest in inter-city rail. Overall, the number of flights fell 33% in 2020, with 15 million fewer flights compared to 2019. The largest declines were in the **Middle East**, **Africa** and **Europe.** Air freight transport fell only 10.6% in 2020, and by December it was almost back to pre-COVID-19 levels from a year prior, as many flights were used to transport goods and medical supplies. Although home delivery services proved increasingly popular, the overall contraction of the world economy led total freight tonne-kilometres to fall for the year. World seaborne trade was down an estimated 4% in 2020.

As the pandemic disrupted the supply chain, global vehicle production declined 14.5% in 2020, with 13 million fewer vehicles produced during the year. The drop was mostly in passenger car sales, whereas global sales of commercial vehicles fell by some 2.3 million. Only electric vehicles recorded strong growth, for a total of 11.2 million electric cars on the world's roads in 2020 (surpassing 2019 estimates by some 1.9 million cars).

Walking and cycling attracted greater attention following the start of the pandemic. The need for social distancing contributed to accelerated implementation of temporary bike lanes, reallocation of street space and other responses (*see Section 3.2: Sustainable Mobility Planning and Transport Demand Management*). **Bicycle sales in the USA increased 62% between January and October 2020 (compared to the same period in 2019), and e-bike sales increased 144%. Eleven European countries saw an average 8% increase in cycling during 2020.** Walking declined sharply in March and April 2020 but recovered quickly to exceed pre-pandemic baseline levels by July.

A growing number of banks, financial and related stakeholders are considering ways to better manage both the pandemic and the climate crisis by linking COVID-19 recovery with investments in economic- and climate-resilient projects. For example, the World Economic Forum, among others, has explored how to "build back better".

The pandemic has had drastic impacts on travel behaviours *(see Focus Feature 6: Paratransit as a Complement to Formal Transport Networks)* and could have long-term impacts on people's perceptions and travel choices. Pandemic-induced conditions led to more trips within communities, remote working and an increase in health-related trips. However, the long-term direction of passenger and freight transport developments remains unclear, and decision makers must initiate and implement the shift to more sustainable, energy-efficient transport options.

Source: See endnote 13 for this section.

Annex: Methodological Note

Data usage

Time period for data:
The report strives to utilise the most recent publicly available data and information just prior to the time of publication (as of 31 May 2021). The figures in the report were developed between September and December 2020 using the most recent data available.

Secondary data:
SLOCAT relies on secondary data and information collected and provided by SLOCAT partners and other entities and does not make use of any internal modelling tools.

Data on sustainable mobility: A call to action

The report benefits directly from data collected by a wide range of stakeholders working in different areas of transport.

Data are important for providing a comprehensive picture of the status of sustainable, low carbon transport and are essential for both policy and investment decision making. In these times of change, it is critical to upgrade data and policy collection and interpretation capacities to better understand progress and the hurdles that must be addressed.

The data limitations mentioned below are not new. Obtaining regular, reliable and public data across regions and transport modes remains an outstanding issue. When an increasing number of stakeholders are collecting data and policy information, more and better open-access data and capacity building efforts for data interpretation are supported by many multi-stakeholder partnerships in the sustainable, low carbon movement.

If you share our passion for open-access data and knowledge towards greater impact on policy and investment decision making worldwide and/or would like to contribute data or knowledge to our collective efforts on this report, **please reach out to the research team in the SLOCAT Secretariat at tcc-gsr@slocatpartnership.org**.

Specific data used in this report

Data on emissions

The data in this edition of the report point to the direct carbon emissions from transport activity; they do not cover the indirect emissions and land-use impacts associated with certain modes of transport. The report primarily utilises CO_2 emission data compiled in the Emissions Database for Global Atmospheric Research (EDGAR) from the Joint Research Centre of the European Commission, as this represents the most recent, comprehensive dataset on transport CO_2 emissions. However, this global dataset does not convey in full detail the unique situations of individual countries.

EDGAR provides estimates for fossil CO_2 emissions from all anthropogenic activities with the exception of land use, land-use change, forestry and the large-scale burning of biomass. The main activities covered are CO_2 emissions emitted by the power sector (i.e., power and heat genertion plants), by other industrial combustion (i.e., combustion for industrial manufacturing and fuel production) and by buildings and other activities such as industrial process emissions, agricultural soils and waste. Transport activities covered within EDGAR include road transport, non-road transport, domestic aviation, and inland waterways on a country level, as well as international aviation and shipping.[1]

For the world, regions and countries, the CO_2 emission data (provided by EDGAR) span through 2019. In a few places in the report, CO_2 data for 2020 are shown to illustrate the impact of the COVID-19 pandemic; however, these data are based on a different methodology than the EDGAR dataset and should not be compared directly with the data from previous years.

The latest CO_2 emission data for individual transport modes are for 2018 and have been compiled only at the global level. For passenger and freight transport, the data on global CO_2 emissions are for 2017, as this is the latest year with robust data. Data on passenger activity (passenger-kilometres) and freight activity (tonne-kilometres) – provided mainly in the country fact sheets – are based on the latest available year, as indicated in the report analysis.

Information on greenhouse gas emissions – provided in CO_2 equivalent (CO_{2eq}) – include not only CO_2 but also methane, nitrous oxide, and industrial gases such as hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride.[2] These data are less up-to-date. As of 31 May 2021, data on greenhouse gas emissions were not readily available for the period 2019-2020. In some cases, additional data sources were used to provide detailed information about other climate pollutants besides CO_2.

All data on CO_2 and other greenhouse gas emissions, as well as CO_{2eq}, are provided in metric tonnes.

Data on car ownership

Information on car ownership rates is based on a global dataset from the International Organization of Motor Vehicle Manufacturers (OICA), with the latest release (as of 31 May 2021) dating from 2015.[3] Although newer information is available for some individual countries, using these data would hinder accurate global comparisons. Data on passenger and commercial vehicle sales were available only up to 2019.

Policy landscape data

The policy-related information presented in this report is not intended to be comprehensive. The data for the policy landscape indicators provided in Section 3 were gathered through desk research unless otherwise indicated. Barriers to accessing such information include language and limited availability of information through online media (e.g., websites, press releases and news articles).

Data in country fact sheets

Information in the fact sheets is based on desk research and on contributions from the national focal points. The data were collected to the best of the authors' knowledge and based on data availability, and thus may not be complete or show the most recent status. When no information was available for a given indicator, the term "Not available" is used.

Data gaps

Major data gaps exist in areas where there is no globally accepted data collection methodology. For example, the mapping of cycling and walking infrastructure is not currently done in all regions. Also, the modal share can be surveyed through different methods, leading to inconsistencies in available data. In addition, data on paratransit (informal transport), a predominant form of transport in many parts of the world, are largely lacking. This results in an incomplete picture of the impact of transport on climate change and sustainable development.

Methodological approach

Countries and regions

The report follows the M49 Standard of the United Nations Statistics Division.[4] In total, 196 countries have official United Nations membership and are also party to the United Nations Framework Convention on Climate Change. The available data have been put in a common structure for the United Nations member countries, regions and income groups to enable a consistent assessment. Income groups are based on the World Bank's classification of 2019.[5]

Economic calculations

The per capita and gross domestic product (GDP) calculations are based on the United Nations World Population Prospects 2019 and on World Bank GDP data using constant 2010 USD.[6]

Spatial and temporal scales

The geographic scale (global, national, city-level, etc.) as well as time scale (annual, monthly, daily) used in this report depends largely on the available dataset, as noted in the relevant figures and text. The detailed data forming the basis of the calculations and analysis are provided in the SLOCAT Transport Knowledge Base.[7]

Criteria for selection

The report covers policies, targets, emission reductions (achieved or envisioned) and market measures. To merit inclusion in the analysis, the policies, projects and trends must have been announced or completed between 2018 and 2020. Significant developments from January through May 2021 were included when deemed relevant, with the understanding that the next edition of the *Transport and Climate Change Global Status Report* will cover a period starting in 2021.

Pre- and post-COVID-19 pandemic trends

The year 2020 was pivotal for the world, and the COVID-19 pandemic has had substantial impacts on many of the transport trends monitored in this report. This edition attempts to differentiate between long-term trends and impacts due to the pandemic. To the extent possible, the analysis notes "pre-pandemic" (up to the end of 2019 or latest by February 2020) and "during pandemic" trends (starting in March 2020 until the end of 2020), as in some cases the pandemic led to reversals in long-term trends, at least for a specific period of time. In each section, a box describes the impacts that the pandemic has had on specific regions and sub-sectors.

Assembling the report

Global Strategy Team

This edition of the report was guided by a global strategy team consisting of 20 experts in the field who provided inputs over the span of six meetings between September 2019 and October 2020. Additionally, small group consultations were organised in February 2021, following the peer review process.

Authors and contributors

The report was collaboratively drafted by 22 authors and contributors from 16 organisations, led by the SLOCAT Secretariat. This includes additions and high-level inputs from the copy editor and from the special advisor who also co-authored the Executive Summary. Authors researched and compiled relevant facts and figures for the five sections of the report, including the Focus Features, with supporting review and inputs from several other organisations.

Peer review: A peer review process was carried out from 18 December 2020 to 20 January 2021 with 1,700 comments received from 74 reviewers. Each comment was individually reviewed by the SLOCAT Secretariat and considered in finalising the report.

National focal points: The report benefited from the contributions of voluntary national focal points, or experts from various regions and countries who have been essential to overcome language and information barriers. A public call for participation to provide information on policies and data resulted in several hundred initial registrations. Out of these registrations, 78 national focal points provided inputs through a first survey from 24 January to 3 February 2020; and through a second survey (focused on the country fact sheets) from 6 to 30 August 2020. All national focal points that contributed to the surveys are listed in the Acknowledgements.

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