

# Macroeconomic Outlook 2024

## Energy Demand and Transport Infrastructure



REPORT

Infrastructure Investment Opportunities



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SYNOPSIS

This paper will begin by assessing general trends in the global macroeconomy and energy sectors which serve as key drivers of the transport industry, following which we will assess trends in infrastructure markets and investments in each of these transport segments (Port, Road, Rail and Air) individually.

GLOBAL MACROECONOMIC OUTLOOK

Our analysis of the key macroeconomic variables, namely global GDP growth (and as an extension, unemployment and inflation) can be segmented into two time periods – a near term forecast over the next 24 months from late 2020 and an analysis of longer-term trends playing out over the next 5-10 years. We will also be analysing the performance of the financial markets throughout the crisis analysing both global equity and credit markets.

GLOBAL ENERGY MARKETS

The next section will analyse global energy markets, conducting a deep dive into the energy mix and the prevalence of various energy sources in powering today's economy. We will also investigate the drivers of energy demand particularly in the aftermath of the COVID-19 pandemic.

TRANSPORT INFRASTRUCTURE

Following our analysis of global macroeconomic and energy trends, we will delve into our analysis of key developments and trends in transport infrastructure across 2021-2024.

Our analysis will begin with the ports sector, where we uncover a trend of regionalisation of port activities amidst heightened protectionism and on-shoring of global trade activity.

We then analyse the aviation industry and the impacts of Covid-19 pandemic. We look at how the pandemic has accelerated changes in business models and geographical markets within the industry, specifically the rise of low-cost carriers and the Asia-Pacific opportunity as the region rapidly recovers from Covid-19.

Next, we analyse the rail industry, and how infrastructure demand is driven by development of high-speed rail infrastructure globally. We analyse how rail infrastructure is correlated to economic development and ESG goals, and how emerging markets especially in China have picked up on the high-speed rail opportunity.

Finally, we conclude the paper with road infrastructure, where we see sustained global demand for road infrastructure amidst increasing global road travel. We identify a key investment opportunity as the development of Electronic Vehicle (EV) infrastructure, and how EVs will become a key driver of road infrastructure investments in the upcoming years.

GLOBAL MACROECONOMIC OUTLOOK:

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SHORT-TERM MACRO TRENDS AND FORECASTS:

At the beginning of 2020, global growth had consistently hovered between 2% and 3% in the prior decade. Across regions, this broke down into a growth rate of between 1.5% - 2.0% across OECD economies and faster growth rates across emerging economies such as India and China, both growing in excess of 5% per annum over the past decade. Entering 2020, the pace of economic growth and job creation across major developed economies slowed owing to increasingly serious trade tensions emanating from the US and within Europe. Further risk factors stemmed from the overleveraging of consumer balance sheets in the US and the impacts of deflationary pressures on debt-servicing abilities. However, despite such pressures, global growth was poised to stabilise and recover through 2020 and into 2021 (Exhibit 1).

However, the global pandemic and financial crisis has, of course, drastically altered the world's economic growth trajectory. Global growth for FY 2020 was -3.3%<sup>1</sup> against a pre-crisis IMF projection of +3.2%. Moreover, despite upbeat projections for growth in 2021 of 6.0%, this only puts global GDP c.1% higher than 2019 levels, implying the continuing presence of negative potential output gaps across major economies. A key assumption underlying these forecasts centres on a continuation of social distancing through 2021 but with progressive transition towards normalisation of economic activity in H2 of 2021 due to widespread vaccine distribution across the world.

Important sources of uncertainties to acknowledge in these projections come from two factors. The first is the difficulty in predicting government response policies and whether governments are willing to extend stimulus payments and other forms of fiscal support until widespread vaccine distribution has been achieved despite burgeoning government debt burdens. The other source of uncertainty stems from the difficulty in predicting private sector investment demand across different markets in the global economy.

Exhibit 1: Latest World Economic Outlook Growth Projections

(real GDP, annual percent changes)		Projections		
Country	2020	2021	2022	
World Output	-3.3	6.0	4.4	
Advanced Economies	-4.7	5.1	3.6	
United States	-3.5	6.4	3.5	
Euro Area	-6.6	4.4	3.8	
Germany	-4.9	3.6	3.4	
France	-8.2	5.8	4.2	
Italy	-8.9	4.2	3.6	
Spain	-11.0	6.4	4.7	
Japan	-4.8	3.3	2.5	
United Kingdom	-9.9	5.3	5.1	
Canada	-5.4	5.0	4.7	
Other Advanced Economies	-2.1	4.4	3.4	
Emerging Markets and Developing Economies	-2.2	6.7	5.0	
Emerging and Developing Asia	-1.0	8.6	6.0	
China	2.3	8.4	5.6	
India	-8.0	12.5	6.9	
ASEAN-5	-3.4	4.9	6.1	
Emerging and Developing Europe	-2.0	4.4	3.9	
Russia	-3.1	3.8	3.8	
Latin America and the Caribbean	-7.0	4.6	3.1	
Brazil	-4.1	3.7	2.6	
Mexico	-8.2	5.0	3.0	
Middle East and Central Asia	-2.9	3.7	3.8	
Saudi Arabia	-4.1	2.9	4.0	
Sub-Saharan Africa	-1.9	3.4	4.0	
Nigeria	-1.8	2.5	2.3	
South Africa	-7.0	3.1	2.0	
Emerging Market and Middle-Income Economies	-2.4	6.9	5.0	
Low-Income Developing Countries	0.0	4.3	5.2	

For India, data and forecasts are presented on a fiscal year basis, with FY 2020/21 starting in April 2020. India's growth projections are -7.1% in 2020 and 11.3% in 2021 based on calendar year.

Source: IMF, World Economic Outlook, April 2021.

1 IMF. (2021). World Economic Outlook, April 2021: A Long and Difficult Ascent. <<https://www.imf.org/en/Publications/WEO/Issues/2021/03/23/world-economic-outlook-april-2021>>

## MEDIUM TERM OUTLOOK:

Leading on from our short-term forecasts and outlooks, there is widespread consensus that the medium-term growth path of the global economy has also been altered. The 5-year ahead growth path now yields a lower GDP outlook than pre-crisis due to the damage to supply potential across many regions which is impinging on potential growth. This can be thought of as a form of 'scarring' of the global economy. The crisis has also resulted in lower labour force participation due to higher unemployment rates and has also resulted in higher levels of bankruptcies across enterprises. The combination of these factors is likely to obstruct the reallocation of resources (between well-affected and poorly-affected sectors) required to realise productivity gains and drive long-term economic growth. Additionally demographic shifts, such as ageing populations, will diminish labour supply and productivity going forward.

Grouping all the emerging economies together, growth over the next 5 years is projected to be 4.7% as opposed to a pre-pandemic projection of 5.6%. The primary drivers of this downward revision include the deceleration of China's growth, subdued commodity prices (given many emerging economies are net exporters of commodities and also rely on mining investment to drive economic growth) and a reduction in global tourism for tourism-dependent emerging economies.

## THE FINANCIAL MARKETS:

Globally, the coronavirus-induced lockdowns and the uncertainty regarding the normalisation of economic activity resulted in a sharp sell-off in equities. As such, the S&P 500 index lost close to 1,000 index points resulting in a 31.9% downward movement from February peak to March trough in 2020. Such drastic sell-offs were echoed across other major indices globally. However, a combination of monetary and fiscal stimulus led to an equally sharp recovery across many major global equity indices. In particular, the Federal Reserve's decision to provide a backstop for investment-grade corporate bonds proved particularly effective in easing concerns regarding rising bankruptcies and thus boosting asset prices.

However, notable exceptions to this general recovery include the sluggish response of the UK equity markets. The FTSE 100 index listed on the London Stock Exchange has recovered by 32% from its March 2020 lows whereas US indices have seen recoveries of 50-60%. A potential reason for this disparity lies in the composition of these indices. Whilst the US indices consist of high-growth technology companies which are essentially 'long-duration' assets, the UK indices consist of stocks more readily classified as 'value' stocks trading at lower multiples to fundamental metrics. As such, these 'long-duration' assets exhibit higher interest rate sensitivity and have benefitted more from the easing of rates allowing for a greater recovery.

Turning to the credit markets, sovereign bond yields increased temporarily in the initial phases of the pandemic. However, aggressive monetary stimulus along with the strong involvement of global central banks in government bond markets along with measures such as yield curve control in some markets such as Australia has helped keep bond yields low throughout the crisis. But recent breakthroughs in Covid-19 vaccines have reignited inflationary expectations resulting in yields growing slightly towards the end of 2020.

The corporate bonds market however behaved quite similarly to the equity markets. The high yield market traded at high spreads to the risk free rate but has since declined since the March spike in both Europe and the US. Investment-grade bonds on the other hand have recovered fully and trade at spreads resembling pre-crisis trading conditions.

## GLOBAL ENERGY MARKETS:

2020 was a remarkable year for global energy markets. The year started off with an oil price war that lead to major oil producers flooding the market with excess supply. To complicate matters further, the 'once-in-a-century' Covid-19 pandemic led to a sudden and rapid decrease in global oil demand, the magnitude of which was unprecedented even in previous recessions. The result of this was seen in April 2020 where the supply-demand mismatch led to a shortage in oil storage leading to 'negative' oil prices and oil tanker rates skyrocketing.

Putting all these headlines aside, a more thorough examination of the world's energy markets needs to focus on two dimensions: 1) trends in global energy demand and 2) changes in the global energy mix and the rising role of renewable energy sources.

## GLOBAL ENERGY DEMAND:

Over the past 20 years, primary global energy demand growth has averaged 2% per annum. The fundamental drivers of energy demand are threefold: 1) population growth, 2) GDP per capita and 3) energy intensity (energy used per unit of GDP – essentially a measure of *energy efficiency*).

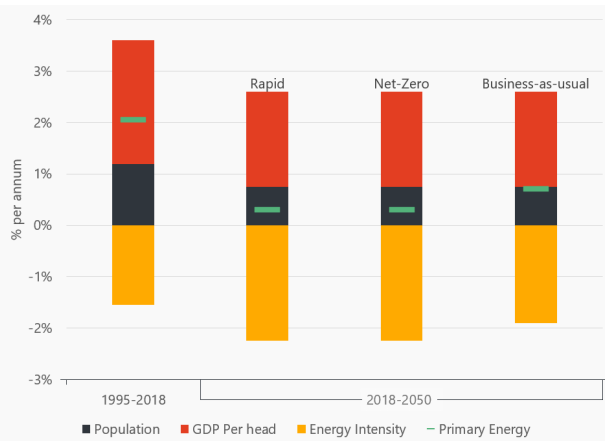
As such, any analysis of energy demand will need to take into account the likely path of GDP growth over the coming years. Thus in the near-term, it will be useful to project likely recovery scenarios from the current Covid-19 crisis to forecast trends in energy demand. The consensus forecasts from organisations such as the IMF indicate that a central scenario is one where GDP in 2025 is around 2.5% lower than pre-crisis estimates primarily owing to permanent demand destruction arising from the crisis. Despite this, population growth is forecasted to slow only slightly from the pace exhibited over the past two decades to reach a steady growth of c. 0.5% per annum.

With regard to energy intensity, there has been continuous technological innovation across various industries to shrink energy consumption. Such efforts will likely lead to an increase in energy efficiency, thus acting as a headwind to primary energy demand.

The pandemic may also lead to a number of behavioural changes; for example, if people choose to travel less, switch from using public transport to other modes of travel, or work from home more frequently. Many of these behavioural changes are likely to dissipate over time as the pandemic is brought under control and public confidence is restored. But some changes, such as increased working from home, may persist.

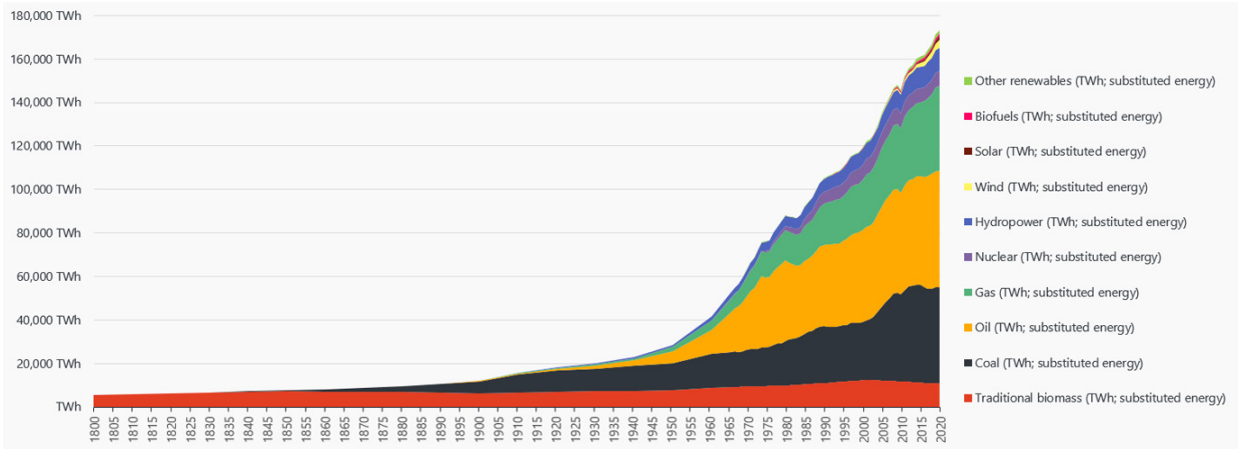
The following chart<sup>2</sup> provides a breakdown on the projected contributions of each of the fundamental drivers of energy demand identified above (Exhibit 2). As can be seen, primary energy demand is projected to be between 0.4% and 0.7% p.a. over the period 2018-2050 under the various efficiency scenarios drawn out by BP.

Exhibit 2: Contribution to primary energy demand growth



Source: BP

Exhibit 3: Global primary energy consumption by source



Source: Our World in Data

- BP. (2020). Energy Outlook 2020 Edition. <[https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2020.pdf?utm\\_source=newsletter&utm\\_medium=email&utm\\_campaign=newsletter\\_axiosgenerate&stream=top](https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2020.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top)>
- Richie, H., Roser, M. (2020). Energy. Our World in Data. <<https://ourworldindata.org/energy>>
- Buckley, T. (2019). Over 100 Global Financial Institutions Are Exiting Coal, With More to Come. Institution for Energy Economics and Financial Analysis. <[http://ieefa.org/wp-content/uploads/2019/02/IEEFA-Report\\_100-and-counting\\_Coal-Exit\\_Feb-2019.pdf](http://ieefa.org/wp-content/uploads/2019/02/IEEFA-Report_100-and-counting_Coal-Exit_Feb-2019.pdf)>

## CHANGES IN GLOBAL ENERGY MIX

Today our energy mix consists of a variety of energy sources: traditional fossil fuels such as coal, oil and gas; renewable sources such as hydropower, solar, wind and biofuels, as well as non-renewable but zero-carbon sources such as nuclear. Traditional fossil fuels were the primary energy sources for most of the preceding century and still comprise a majority of global fuel supply today. It is interesting to note, however, that the past two decades have seen remarkable developments in renewable energy, both in terms of improved efficiencies and also outright capacity additions. Exhibit 3 shows the change in the global energy mix over the past 200 years.<sup>3</sup>

Primary energy is calculated based on the "substitution method" which takes account of the inefficiencies in fossil fuel production by converting non-fossil energy into the energy inputs required if they had the same conversion losses as fossil fuels.

Thinking ahead over the next 30 years or so, there are several trends in terms of the evolving energy mix that are worth highlighting.

The fossil fuel source facing the most powerful headwind is coal. This is partly because an important driver for coal demand is global electricity demand and its use in industry is projected to decline due to lower economic activity. More significantly, coal is one of the most carbon-intensive forms of power generation and, unabated, can lead to poor air quality in regions where it is used. For these reasons, coal use as a form of power generation is falling out of favour with policy makers, particularly in the developed world. Moreover, international financial institutions, insurance companies and even multilateral banks such as the World Bank are no longer financing coal mining projects and coal-fired power plants. Since January 2018, at least one bank or insurer announced their divestment from coal mining and/or coal-fired power plants every month, and a financial institution announced a divestment/exclusion policy every two weeks.<sup>4</sup>



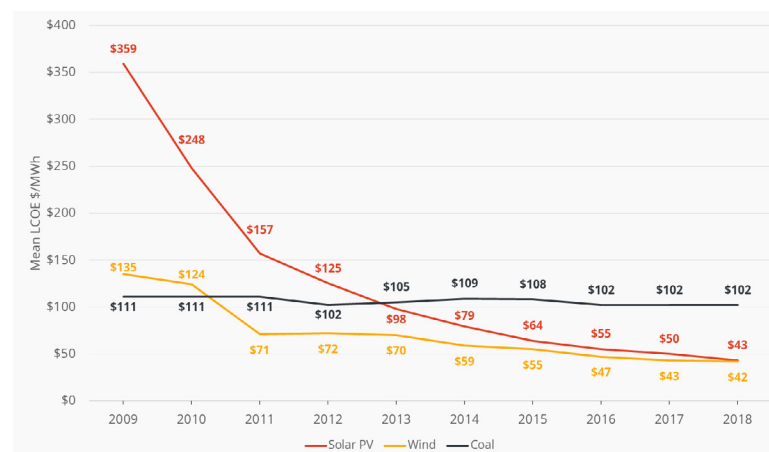
Some governments have been quite aggressive in phasing out coal and encouraging the usage of renewables in power generation, especially in advanced economies. In addition to the threat from renewable sources, there has been strengthening competition from natural gas in energy generation with the so-called “natural gas as a bridge fuel” being a particularly relevant theme to be potentially played out in Asia over the coming years. The International Energy Agency (IEA) estimates coal’s share of the energy mix to fall below 20% by 2040 and for 275 GW of coal-fired capacity to be retired by 2025.

Natural gas is projected to fare better than the other fossil fuels but its growth path is highly dependent on various policy stances. Natural gas faces the most accommodative policy settings in regions of South and East Asia where a historically high reliance on coal (~60% energy mix share) combined with worsening air quality have led to increasing pressure to substitute coal with natural gas. As such, an increase in natural gas infrastructure investment is projected to result in a 30% increase in natural gas demand from Asia over the coming decade.

We have finally reached an inflection point where renewable energy sources are able to grow rapidly and become a more prominent component of the energy mix over the coming few decades.

While over the past two decades subsidies have been quite important in incentivising incremental capacity increases for renewable power generation, the maturation of key technologies has meant that the levelised cost of electricity (a measure of the average cost of electricity over the life of a project, including the costs of capital, operations and maintenance, fuel if any, and financing) for renewables has started to drop below traditional fossil fuel-based energy sources. Exhibit 4 illustrates this effect in an example of coal generation versus wind and solar.<sup>5</sup>

**Exhibit 4: Historical unsubsidised LCOE of utility-scale generation**



Source: National Renewable Energy Laboratory

Within the renewables space, although hydropower remains the largest renewable source by generation, solar and wind seem to be the main drivers of growth and the most economical compared to conventional energy sources. As such, it is estimated by the IEA that renewables will meet 80% of the growth in global electricity demand through to 2030 driven by the adoption of solar and wind (both onshore and offshore projects). Finally, given that most renewable power sources are intermittent, energy storage is likely to play an increasingly vital role in allowing for the flexible operation of power systems.

An important driver of the changing composition of the global energy mix are the effects of Joe Biden’s clean energy policies. The Biden government is targeting a carbon-free electricity grid by 2035 and as such, investments in clean energy technologies and projects are key components of his fiscal spending programs. The linchpin of Biden’s plan is the creation of a national standard requiring utilities to use specific amount of solar, wind and other renewable energy to power American homes, businesses and factories. The amount would increase over time, cutting the nation’s use of coal, gas and oil over the next 15 years. Furthermore, Biden’s stimulus plans consist of significant incentives for continued research into the development of renewable energy sources to increase their competitiveness against traditional oil-based energy sources. For instance, Biden plans to provide \$174 billion to boost the U.S. market share of electric vehicles and their supply chains from raw materials to retooled factories. He has set a goal to establish 50,000 electric vehicle charging stations by 2030 and seeks to electrify 20% of the nation’s bus fleet. Finally, it is worth noting that the government plans to increase taxation of carbon emitters to further expedite the transition away from coal and oil-based energy investment.

## TRANSPORT INFRASTRUCTURE: AN INDUSTRY IN FLUX

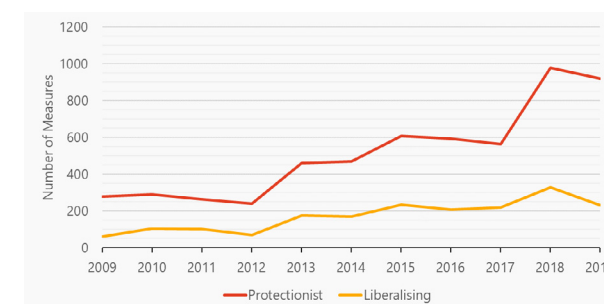
### PORTS: A CHANGING COMPETITIVE LANDSCAPE

As a result of geopolitical, financial, and technological shifts, the port industry is expected to undergo significant changes from 2020 to 2025.

#### Regionalisation & Protectionism

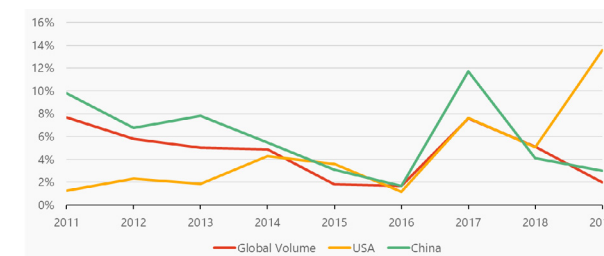
Historical data indicates a strong inverse correlation between protectionist measures and container port throughput, especially amongst traditional major port players such as the USA and China (Exhibit 5a & b). International trade uncertainties, fuelled by the US-China trade war and global protectionist policies arising from the economic fallout of Covid-19, cast uncertainty on traditional port activities amongst major players.<sup>6</sup>

**Exhibit 5a: Global protectionist trade measures**



Source: Global Trade Alert database

**Exhibit 5b: Container port throughput**



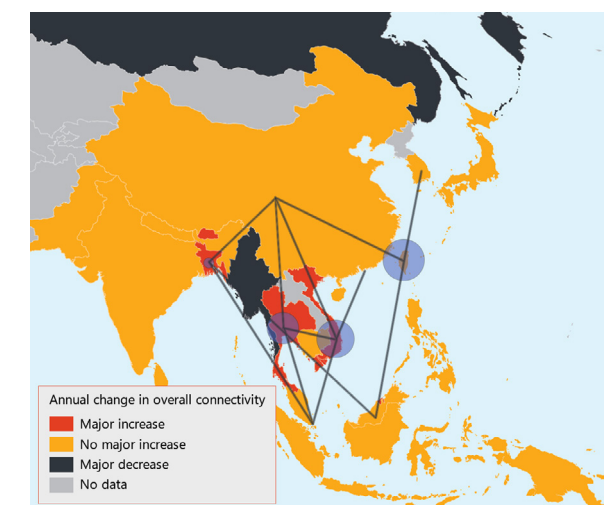
Source: Stirling Infrastructure Partners

At the same time, however, regionalisation has provided new growth opportunities for ports serving regional corridors. For instance, ports in Bangladesh, Thailand, Vietnam and Taiwan have, in recent years, seen major increases in trade activity by serving regional trading hubs such as China,

Singapore and South Korea. (Exhibit 6). An increase in port activity and connectivity amongst regional ports has been driven by changing trade routes and global supply chains. This trend is enhanced by:

1. Growth in consumer spending power in developing economies
2. Diversification of supply chains to manage risks and reduce over-reliance on traditional major exporters like China (e.g. shifting of low-cost labour-intensive supply chains from China to other Indo-Pacific countries)
3. Reshoring and near-shoring of industries as a result of protectionist measures

**Exhibit 6: Regionalisation of port connectivity**



Blue Discs represent the port interconnectivity of Bangladesh, Thailand, Vietnam, and Taiwan respectively (from left to right)

Source: UNCTAD, Handbook of Statistics 2019

As a result, we forecast that a growth in short-sea shipping will fuel alternative trade routes and corresponding demand for port infrastructure investments amongst ports serving these more regional and alternative trade routes.

### AVIATION: THE RECOVERY ROADMAP

The aviation industry is one of the hardest hit by the Covid-19 pandemic, with global passenger air transport revenue down 90% year-on-year during the height of the pandemic in April 2020.<sup>7</sup>

Economic forecasts for the aviation industry remain uncertain even after pandemic recovery. Demand and supply shocks have not just hit the

<sup>5</sup> Fu et al. (2017). U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017. National Renewable Energy Laboratory. <<https://www.nrel.gov/docs/fy17osti/68925.pdf>>

<sup>6</sup> Global Trade Alert Database. (2020). <[www.globaltradealert.org](http://www.globaltradealert.org)>

<sup>7</sup> OECD. (2020). COVID-19 and the aviation industry: Impact and policy responses. <<http://www.oecd.org/coronavirus/policy-responses/covid-19-and-the-aviation-industry-impact-and-policy-responses-26d521c1/>>

cash flows of airline companies, but have changed the shape of the global air travel industry across aviation industry verticals.

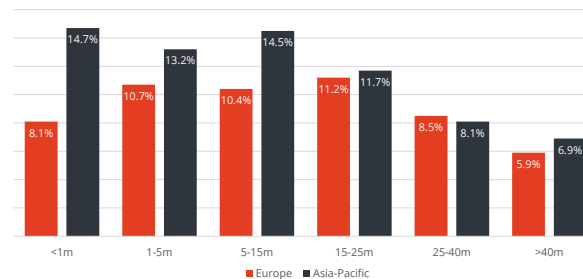
A macroeconomic infrastructure outlook forecast for the aviation industry must engage not just the direct impacts of Covid-19 and the economic crisis, but also the long-term behavioural and economic trends which the industry must manage and from which it must seek to recover.

## Airports – Emerging Business Models

Even before Covid-19, the aviation sector had experienced an increase in competition and diversification of business models. Traditional hub airports have seen competition for aeronautical revenue from cheaper, secondary airports which serve Low-Cost Carriers (LCCs).

As the search for value propelled LCCs to the forefront of air travel, secondary airports have correspondingly seen rapid growth, not just in terms of relative growth rates from lower passenger bases, but also in terms of absolute gains in passenger throughput. In 2017, airports with less than 25 million passengers per annum (mppa) contributed 57.7% and 60.7% of all passenger-traffic growth for Asia-Pacific and Europe respectively (Exhibit 7).<sup>8</sup>

**Exhibit 7: Growth in passenger traffic by airport size category in 2017**



Source: ACI World Airport Traffic Database, 2018

Secondary airports today play a significant role in the aviation ecosystem and have been a core facet of LCCs' cost reduction strategies, generating an average 4% per seat cost reduction as compared to using primary airports (Exhibit 8).

Beyond serving LCCs, secondary airports alleviate capacity constraints and bottlenecks at primary airports in the geographies they serve and allow efficient resource redistribution across the airport networks. They generate significant economic synergies – by serving largely domestic and short-haul flights, they catalyse and feed passenger traffic towards hub airports serving long-haul international destinations (Exhibit 9). Therefore, as

**Exhibit 8: LCC cost reduction strategies and cost reduction per seat (%)**

	Cost Reduction	Cost per seat
<b>Full-service carrier</b>		100%
<b>Low-cost carrier</b>		
<b>Operating advantages</b>		
Higher seating density	-16	84
Higher aircraft utilisation	-2	82
Lower flight and cabin crew costs	-3	79
Use cheaper secondary airports	-4	75
Outsourcing maintenance/single aircraft type	-2	73
<b>Product/service features</b>		
Minimal station costs and outsourced handling	-7	66
No free in-flight catering, fewer passenger services	-5	61
<b>Differences in distribution</b>		
No agents or GDS commissions	-6	55
Reduced sales/reservation costs	-3	52
<b>Other advantages</b>		
Smaller administration and fewer staff/offices	-3	49
<b>Low-cost carrier compared with a full-service carrier</b>		49%

Source: oneducation.org.uk

<sup>8</sup> Lucas, P. (2019). Mid-sized airports have their day in the sun. ACI Insights. <<https://blog.aci.aero/mid-sized-airports-have-their-day-in-the-sun/>>

air traffic grows in major travel hubs post-Covid-19, we forecast that substantial infrastructure demand will be diverted to secondary airports in order to meet increasing demand from LCCs.

**Exhibit 9: Percentage of LCC seats in hub airports**

Airport	Pax 2018 (Millions)	Percentage of LCC seats, w/c 11-Feb-2019
London Heathrow	80.1	2.4
London Gatwick	46.1	62.2
London Stanstead	28.0	96.7

Source: CAPA Centre for Aviation

## A Low-Cost Carrier Opportunity Amongst Primary Airports

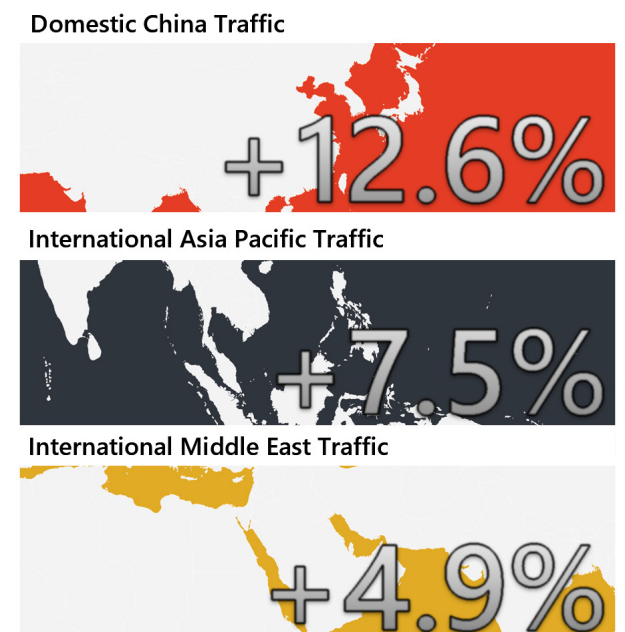
However, at the same time, current business model trends in the aeronautical revenue models remain in flux. The market has in recent years moved towards LCC 'hybridisation' – where LCCs have started to move from traditional secondary airports serving short-haul point-to-point flight models into primary airports with full service suites.<sup>9</sup> By doing so, LCCs seek to capture a larger client base and economies of scale through network connectivity (where short-haul flight passengers can transit to long-haul flight routes within the same airport), and expand their product offerings through charging premiums in high-end travel and corporate business travel.

While the net benefits of a hybrid model remain to be seen, infrastructure investment trends will ultimately be guided by the evolving demands of aviation market players. Infrastructure investors must therefore engage with airlines to identify their growth and business models, and identify strategies which can ultimately generate greater returns in the long run.

## Geographical Infrastructure Demand – A Changing Landscape

Continued air travel infrastructure investments will be required in Asia to accommodate anticipated growth. (Exhibit 10).

**Exhibit 10: 2018 passenger traffic growth in developing economies**



Source: IATA

Many hubs are already operating beyond capacity, which has resulted in a high volume of delays over the past several years. Most major airports in the region are planning to build or are already adding runways and passenger terminals. The Civil Aviation Administration of China released a report at the end of December that estimated China would have 450 airports by 2035, nearly twice what it has now.

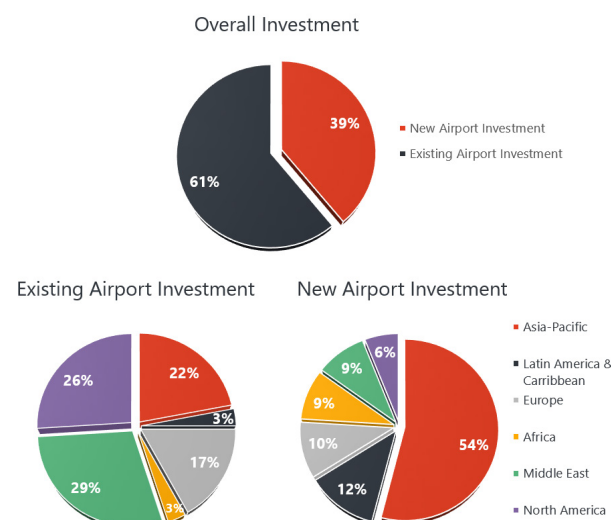
In fact, Asia will account for almost 35 percent of planned airport investment scheduled to take place primarily over the next decade, according to Business Monitor International, with a large proportion going into greenfield airports.

Despite the investment planned in Asia, the spend will not be evenly distributed across countries. For instance, despite growing demand, India is far behind in infrastructure investment, yet is expected to spend less than one-fifth of what China has planned (Exhibit 11).

<sup>9</sup> CAPA Centre for Aviation. LCC experiences: how was it for you? Hybridisation and Airlines in Transition? <<https://centreforaviation.com/analysis/reports/lcc-experiences-how-was-it-for-you-hybridisation-and-airlines-in-transition-144868>>



**Exhibit 11: Planned airport investment for existing airports versus new airports**



Source: Business Monitor International

As demand in the region continues to accelerate, it will be important to have the necessary and appropriate infrastructure to accommodate these passengers.

## RAIL: HOW HIGH-SPEED RAIL DRIVES INFRASTRUCTURE NEEDS

Railway as an advanced transportation mode has traditionally experienced strong growth in advanced economies with mature transport ecosystems, such as Western European countries like the UK and Spain.

We see two main areas for potential investment into rail infrastructure.

Firstly, while transport infrastructure in Western Europe is relatively well developed, rail investments are still poised for growth due to constant expansion and upgrading of rail infrastructure. For instance, Spain, with the world's second largest high-speed rail (HSR)<sup>10</sup> network (3,086km) has released an infrastructure plan to build a 8,740km high speed rail network with a minimum investment requirement of €73bn.<sup>11</sup>

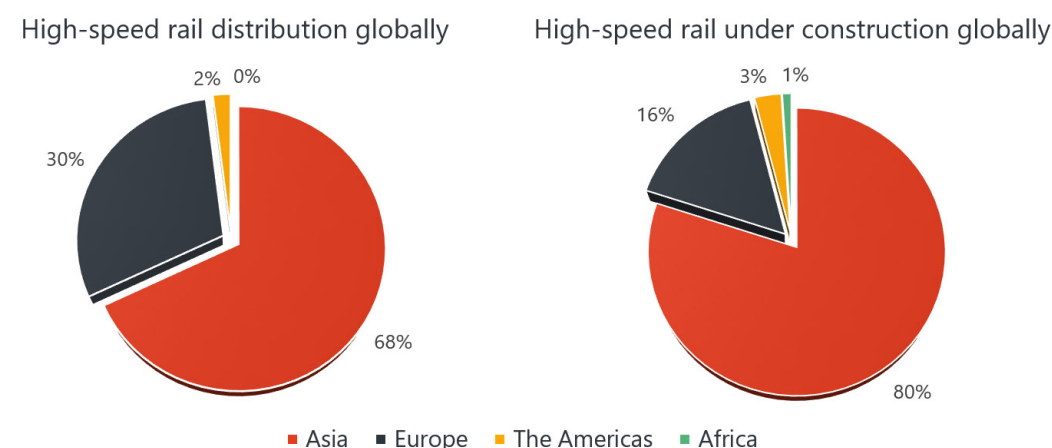
Secondly, growing economies, especially in the Asia-Pacific, offer the highest investment potential due to their large populations and increasing urbanisation (Exhibit 12). China has in recent years grown to possess the world's largest HSR network.<sup>12</sup> Out of more than 17,000 km of high-speed rail projects currently under construction globally, the vast majority (14,000 km) resides in Asia.

## Funding Gap

In the next 20 years, USD 1.3 trillion will be required to satisfy the need for rail infrastructure development. BCG also noted that in a best-case scenario, governments will be able to fund half of the capital requirements for this infrastructure build out.

This gap in funding creates a wide range of opportunities for private investors looking to commit their capital. Countries such as Turkey have already developed policies to attract private investment either solely in the financing of new developments or for public-private partnerships, where investors will build and operate new rail infrastructure for a period of time, as a build-operate-transfer (BOT) delivery method.

**Exhibit 12: High-speed rail distribution & under construction globally**

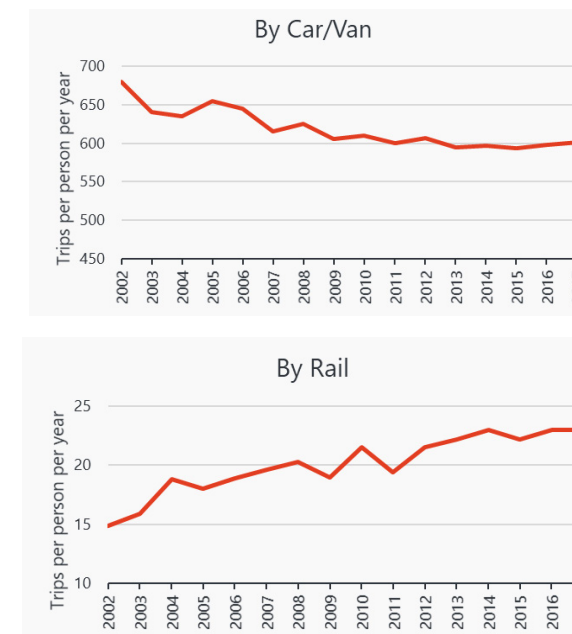


Source: Dentons, data from Go-Euro

## Sustained Demand

Commuting trip frequency has steadily decreased, accompanied by an increase in leisure travel, over the past years. This has seen a global increase in the use of rail transportation as compared to others such as car/bus (Exhibit 13).

**Exhibit 13: Comparison of historical (2002-18) car/van vs rail trips**



Source: Williams Rail Review

In terms of freight transportation, governments have also started to introduce incentives for freight to use the existing rail networks instead of the more common road method, so as to reduce the number of trucks on the road and improve both road traffic and local air quality, as well as reduce road maintenance cost and greenhouse emissions.

Finally, demand for rail infrastructure is also slated to rise alongside increasing emphasis on environment, social and corporate governance (ESG) investing, due to rail transport's greener credentials. According to a study made by UNIFE (Union des Industries Ferroviaires Européennes, the European rail manufacturing industry), from the almost 22% of total energy-related carbon emissions made by transport (cars, trucks, ships, airplanes and rail), only 0.7% was generated by rail (while meeting 9% of global mobility demand).

## The Chinese High-Speed Opportunity

China has led the global growth in rail infrastructure investment in the 21st Century. After commissioning its first high-speed line in 2007, China rapidly developed the world's largest network within four years. Today, it accounts for more than 2/3 of the world's total high speed lines.<sup>13</sup>

China's commitment to developing its rail infrastructure shows no signs of waning. Despite the impact of Covid-19, China invested US \$46.3bn into rail assets in the first half of 2020, up 1.2% from the same period in 2019.<sup>14</sup> China National Railways is set to open 4,400km of new lines in 2020.

China has also utilised such infrastructure investments as a counter-cyclical tool amidst slowing economic growth and fallout from the US-China trade wars. In 2019, China increased its rail investment budget by 10% to alleviate the impact of US tariffs.<sup>15</sup>

Investment in Chinese rail infrastructure is attractive, with high volumes of activity and government support. In the past, the government has deployed stimulus measures, including the acceleration of construction projects, tax cuts, boosting money supply and tweaking banking regulations, to improve growth in its infrastructure sector.

**Exhibit 14: Chinese high-speed projects due to start in 2019**

Project title	Status	Start date	Completion	Length (km)	Cost (US\$Bn)	Stations
Xi'an - Yan'an	Planned	2019	2025	291.7	8.216	11
Xi'an - Shiyan	Planned	2019	2022	266	8.669	7
Longchuan - Longyan	Under Construction	2019	2023	265	6.551	11
Nanning - Yulin	Under Construction	2019	2021	193.1		
Chengdu - Zigong	Under Construction	2019	2023	178	6.172	8
Xi'an - Ankang	Planned	2019	2024	170.4	5.124	
Shanghai - Suzhou - Huzhou	Planned	2019	2023	163.5	5.481	6
Yichang - Xingchan	Planned	2019	2025	108	2.909	3
Longyan - Wuping	Feasibility Study	2019	2023	92.6	1.275	4

Source: IRJ Pro

<sup>10</sup> High Speed Rail: refers to rail transport systems which operate significantly faster than traditional rail via the use of dedicated tracks and specialised rolling stock, usually travelling in excess of 200 kilometres per hour

<sup>11</sup> Burroughs, D. (2020). Spain urged to rebalance high-speed and suburban rail investment. International Railway Journal. <<https://www.railjournal.com/passenger/high-speed/spain-urged-to-rebalance-high-speed-and-suburban-rail-investment/>>

<sup>12</sup> Machiraju, V. (2019). Top five trends that will shape the global rail industry in 2019. Global Railway Journal. <<https://www.globalrailwayreview.com/article/78793/top-five-rail-trends-in-2019/>>

<sup>13</sup> Sinclair, O. (2019). China plans largest-ever rail investment in 2019. International Railway Journal. <[https://www.railjournal.com/in\\_depth/china-rail-investment-2019/](https://www.railjournal.com/in_depth/china-rail-investment-2019/)>

<sup>14</sup> Burroughs, D. (2021). China invests yuan 325 BN in rail in first half of 2020. International Railway Journal. <<https://www.railjournal.com/infrastructure/china-invests-yuan-325-8bn-in-rail-in-first-half-of-2020/>>

<sup>15</sup> Sinclair, O. (2019). China plans largest-ever rail investment in 2019. International Railway Journal. <[https://www.railjournal.com/in\\_depth/china-rail-investment-2019/](https://www.railjournal.com/in_depth/china-rail-investment-2019/)>

However, despite these optimistic ambitions, investors must exercise due diligence in investing in Chinese rail infrastructure which has attracted concern over its economic soundness. Specifically, China's high-speed rail investment programme is highly leveraged due to tax cuts and cheap stimulus debt. The China Rail Corporation (CRC) reported debts of around ¥ 5.28 trillion (US \$811 million) in the final quarter of 2018, and it is estimated that as much as 80% of CRC's debt burden is related to high-speed rail construction. These projects may potentially incur significant financial risk for both the CRC and investors when combined with operating losses from current and future high-speed services.

### Covid-19 Impacts

Covid-19 has severely impacted the global high-speed rail sector. Just between January and April 2020, operators lost USD 19 billion in revenue in Asia and USD 2.5 billion in Europe. Social distancing regulations reduce maximum rail car occupancy and increase sanitation requirements, raising operational costs and reducing profitability.

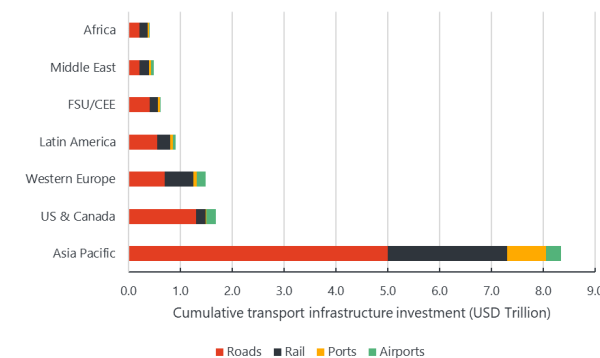
Nevertheless, policy initiatives could benefit high-speed rail, for instance by allocating stimulus funding to new lines that could be opened rapidly to serve corridors among major cities. Governments could also tie airline bailouts (e.g. government debt financing programmes, financial aid packages) to restrictions on short-distance domestic segments already served by high-speed rail. These examples highlight policy opportunities to couple short-term bailouts with long-term sustainability goals.<sup>16</sup>

## ROADS: RISING LEDC<sup>17</sup> PROSPERITY AND SHIFT TOWARDS ELECTRIC VEHICLES

Roads, as the primary form of passenger and freight travel, will remain the largest area of investment within the transport infrastructure market through 2025 in terms of gross dollar investment, especially amongst growth markets where a rise in prosperity has fuelled increased car ownership (Exhibit 15).

This is especially so in LEDC nations within Latin America, the Middle East and Asia Pacific. Road spending in Latin America is expected to increase by an average of 11% per year between 2014 and 2025, more than double the world average rate, while investment in roads in the Middle East is expected to increase by 116% over 2015-2025, equivalent to USD 31 billion per year. Road infrastructure development in Asia Pacific is driven by high growth markets like China, whose Belt-and-Road five-year plan will see road developments to link China to Laos, Pakistan, Thailand, and Russia.

**Exhibit 15: Cumulative transport infrastructure investment to 2025**

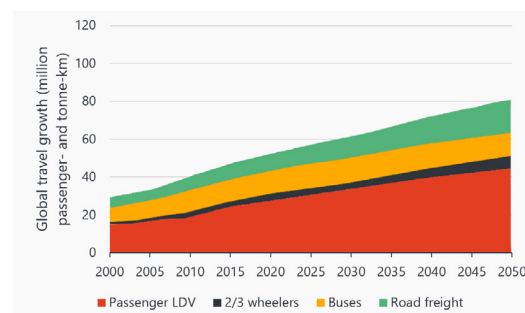


Source: Oxford Economics

### Demand Drivers

Demand for global road infrastructure remains strong, with nearly 25 million paved road-lane kilometres expected to be added globally by 2050. This would require US\$45 trillion in investment by 2050, accounting for 0.7% of global GDP (Exhibit 16).

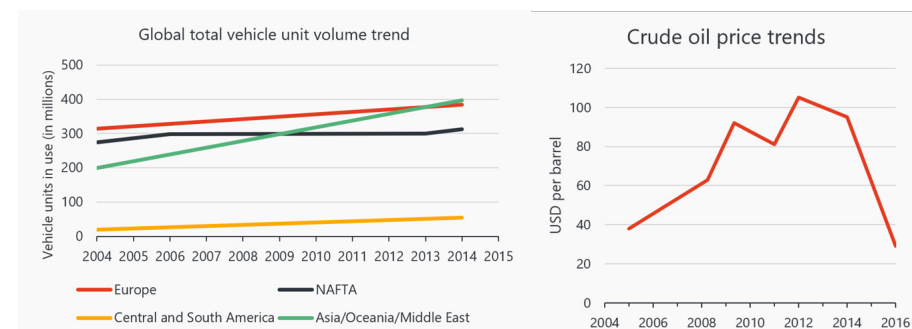
**Exhibit 16: Expected global travel growth under current trends**



Source: IEA data analysis

<sup>16</sup> IEA. (2020). The Covid-19 Crisis and Clean Energy Progress. <https://www.iea.org/reports/the-covid-19-crisis-and-clean-energy-progress/transport#abstract>  
<sup>17</sup> Less Economically Developed Countries

**Exhibit 17: Global total vehicle unit volume vs crude oil price**



Source: IEA data analysis

A key trend in global road travel growth is urbanisation and population growth. Analysis of historical trends from the IRF and IEA shows that car ownership growth remains resilient to past uncertainties in cost-side factors such as crude oil price trends, showing the price inelasticity of demand for vehicles amidst increasingly affluent populations in growing economies (Exhibit 17).

### Covid-19 Impacts

Between January and April 2020, global car sales dropped by about 9 million (roughly one-third of sales during the same period in 2019). The timing and extent of plummeting sales were dictated by the timing and stringency of lockdowns. In China, the world's largest car market, February 2020 sales were 80% lower than in February 2019. By April, US sales relative to 2019 had dropped by 50%, in Germany by 60%, and in France by 90%.

As lockdowns ease, initial signs point to robust latent demand for cars, and demand rebounds may be bolstered by the perceived safety and security benefits of cars compared with active and public transport.

### The Electronic Vehicle Shift

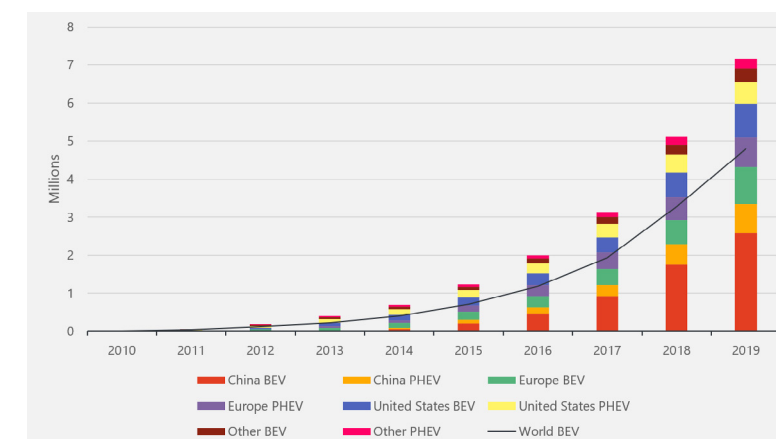
Electronic vehicles (EVs) are set to take over the automobile industry. Sales of EVs have skyrocketed in the past 10 years, with EV cars accounting for 2.6% of global car sales in 2019, registering a 40% year-on-year increase (Exhibit 18).

The growth in EVs has been driven not just by consumer trends, but also government and social shifts towards environmental consciousness. For example, the UK government is aiming to end the sale of all new petrol and diesel cars by 2030 in its bid to reach net-zero emissions, and has invested £1.8 billion in infrastructure and grants to increase access to zero-emission vehicles and promote a green economic recovery.<sup>18</sup>

The trend has also been picked up by traditional vehicle OEMs (Original Equipment Manufacturers), with most of the largest vehicle manufacturers unveiling plans to move into the EV space by 2030 (Exhibit 19).

The EV industry's pattern of continued growth has prompted a concurrent growth in demand for EV infrastructure, such as publicly accessible EV charging stations. The requirement for EV charging infrastructure has been surveyed to be a key factor in consumer decisions to adopt EVs (Exhibit 20).

**Exhibit 18: Global electric car stock, 2010-2019**

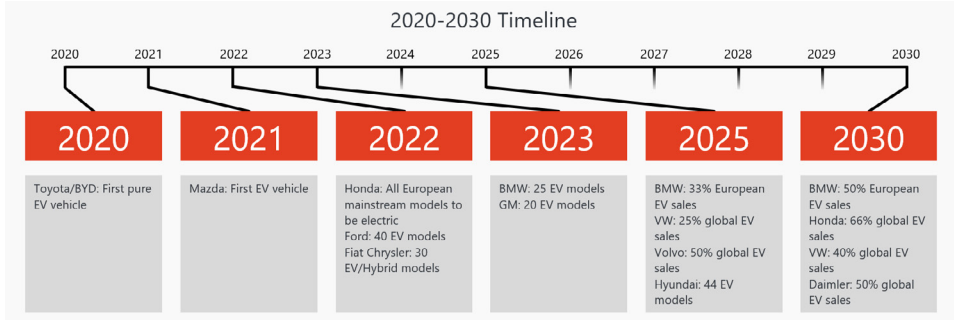


Source: IEA

<sup>18</sup> UK Government. (2020). Government takes historic step towards net-zero with end of sale of new petrol and diesel cars by 2030. <https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030>



Exhibit 19: Timeline of major strategic OEM targets for EVs



Source: Stirling Infrastructure Partners

As consumer and policy sentiments increasingly point towards EVs as the future of automobiles, development of public EV infrastructure has become a focal point in cementing the future of the industry. In fact, despite a temporary dampening of EV sales during the Covid-19 crisis, various governments have doubled down on EV infrastructure in their Covid-19 recovery plans. For example, Germany has designated \$2.8 billion to EV charging infrastructure as part of its Covid-19 economic recovery, while China (which already has the world's largest EV charging infrastructure network) has announced an additional \$378 million investment in charging infrastructure as part of its Covid-19 recovery plan.

Challenges

Whilst there is an active market for private investment in seaports and airports that have strong commercial business cases, the funding of railways and roads is more challenging because they tend to be more dependent on public sector subsidies.

Funding for roads, for example, has been in decline due to reduced revenue from traditional fuel consumption-based taxes as a result of the production of more fuel-efficient vehicles.

At the same time, the alternative source of road infrastructure revenue, tollgates, often lacks political support in certain countries. Yet toll roads are often the only option for a cash-constrained government as the toll revenue is seen as a commercially viable basis for non-government project financing.

Investors seeking to invest in road infrastructure projects must therefore be able to clearly identify the valuation drivers accruing from such projects, so as to achieve sustainable long term returns on invested capital.

FOR FURTHER INFORMATION

This paper provides insights into trend data with analysis for institutional investors to make an informed investment decision into the infrastructure asset class.

The firm provides a comprehensive range of services which includes M&A transaction services, raising both debt and equity to finance infrastructure projects globally and the objective selection of asset managers for capital allocation.

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Exhibit 20: 2020 Global Auto Consumer Study results

	France		Germany		Italy		UK		China		US	
	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020	2018	2020
Driving range	31%	28%	35%	33%	4%	27%	26%	22%	25%	22%	24%	25%
Cost/proce premium	32%	22%	22%	15%	19%	13%	24%	16%	9%	12%	26%	18%
Tiem requiredto charge	11%	15%	11%	14%	18%	16%	13%	16%	12%	15%	10%	14%
Lack of electric vehicle charging infrastructure	16%	22%	20%	25%	44%	32%	22%	33%	18%	20%	22%	29%
Safety concerns with battery technology	4%	11%	5%	10%	7%	10%	6%	12%	22%	31%	8%	13%
Others	6%	2%	7%	3%	8%	2%	9%	1%	14%	0%	10%	1%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Sample Size	1,083	1,266	1,287	3,002	1,048	1,274	965	1,264	1,606	3,019	1,513	3,006

Source: Deloitte Global Auto Consumer Study



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