

PANORAMA

Global Transport: What does the future hold beyond COVID-19?

2
**COVID-19 CRISIS:
A CATALYST OF
GLOBAL TRANSPORT
VULNERABILITIES**

5
**RECOVERY SCENARIO
AND INNOVATIONS
FOLLOWING THE
COVID-19 IMPACT**

The COVID-19 pandemic has triggered a mobility crisis, mainly because of physical distancing requirements and the necessity to avoid confined spaces, to limit the virus' propagation. This has had a disastrous impact on the global transport sector¹, with air passenger transport being the most affected segment. According to IATA (International Air Transport Association), air traffic decreased by 94% year-on-year (YoY) in April 2020, and is not expected to return to its pre-COVID level before several years. Moreover, other segments of the transport sector (maritime, rail) are also experiencing a strong deterioration in activity at the global level, even though some markets (such as rail freight between China and Europe) are benefiting from the situation. The crisis is also affecting planemakers and their suppliers, whose financial health heavily relies on aircraft activity.

COVID-19's impact on global transport is all the more important as economic activity was already decelerating before the crisis. Additionally, the sector already had to deal with several issues and challenges, like the Boeing 737 MAX crisis for air transport.

Overall, Coface does not expect the sector to recover to fourth quarter (Q4) 2019 level before 2022 and will be strongly impacted in 2020. In Coface's central scenario, the turnover of listed companies of the global transport sector will be 32% lower in Q4 2020 than in Q4 2019. By contrast, in a "risk scenario", in which a second wave of the pandemic materializes in Q3 2020, the turnover would be 57% lower in Q4 2020.

¹ In Coface's sector assessment methodology, the transport sector is divided into several segments: air, maritime, road and rail transport, which all take into account both individual and freight transport. In this study, we are focusing on air and rail transport, as well as maritime transport.



1 COVID-19 CRISIS: A CATALYST OF GLOBAL TRANSPORT VULNERABILITIES

Activity in the sector was decelerating before the COVID-19 pandemic

Economic activity in the transport sector was already slowing down before the COVID-19 crisis, mainly because of the global economic slowdown. The YoY growth rate of the world trade monitor² was negative in Q4 2019, for the first time since 2009. Consequently, global airfreight (measured in freight ton kilometers, FTKs) decreased by 3.3% in 2019, the worst figure since 2009. The container throughput index, a measure of container volume carried by container ships, increased by 2.0% in 2019, the lowest reading since 2015. Air passenger demand was on the decline as well: Revenue Passenger Kilometers (RPKs) increased by 4.2% in 2019, and for the first time since the Global Financial Crisis, RPK growth was below its long-term trend of 5.5%, according to IATA.

Air passenger transport is very sensitive to economic conjuncture, particularly in Europe, where the market has to deal with strong overcapacity issues that dampen companies' margins. Furthermore, the growing importance of low-cost carriers, whose business is based upon small margins and large volumes, led to numerous bankruptcies in the air transport market in the past years.



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Emblematic examples of this are Flybe, a British low-cost carrier, which ceased operations on 4 March 2020, or WOW Air, which ceased activity on 28 March 2019 and was the second largest Icelandic airlines, carrying more than a third of passengers travelling to Iceland.

Maritime freight had also decelerated: the Container Throughput Index, a proxy for the volume of containers carried by sea each month⁵ decreased by 2.2% YoY in December 2019, and increased by only 2.0% in 2019 after 4.3% in 2018.

An emblematic pre-COVID shock in air transport: the Boeing 737 MAX case

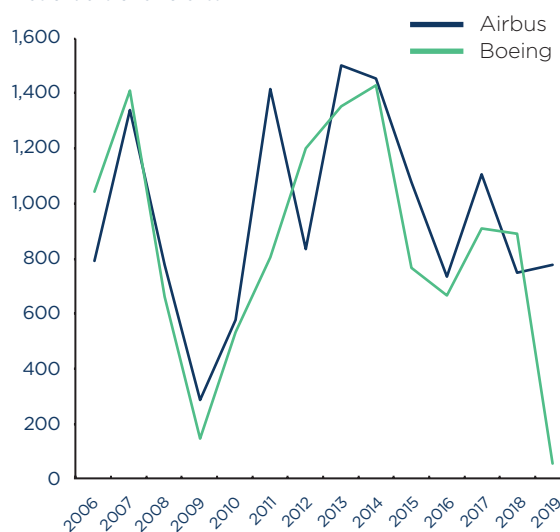
Two deadly crashes of the Boeing 737 MAX – Lion Air Flight 610 (October 2018) and Ethiopian Airlines Flight 302 (March 2019) – due to technical issues led to the grounding of the plane in a large number of countries. This has had an important impact on air transport companies, as many of them (mainly North American carriers) were using the Boeing 737 Max. In February 2019, the three companies that owned the most 737 MAX were Southwest Airlines (US), American Airlines (US) and Air Canada with 34 planes

INSERT 1:

COVID-19 shock impact on supply chain - the example of the aerospace industry

In addition to the impact on airlines, the COVID-19 crisis has also negatively affected the entire aircraft industry, which already had to manage the Boeing 737 MAX crisis. Following the drop in activity, airlines had to delay airplane deliveries, leading to a decrease in plane manufacturing in Q1 2020. Therefore, leading actors of the sector like Airbus, as well as companies in the ecosystem/value chain, experienced financial difficulties. To face reduced demand from airlines, Airbus and Boeing cut production by a third and a half, respectively³. This decrease in production was echoed to aircraft component manufacturers like Rolls Royce (aero-engines producer), who announced the suppression of 9,000 jobs. There is a high proportion of small companies among aerospace suppliers: in France and Germany, nearly 60% of them generated less than EUR 50 million of revenue in 2018⁴. These small suppliers mostly produce for planemakers, so their financial health strongly depends on planemakers' demand, hence on airlines activity.

Chart 1:
Net orders of aircrafts



Source: Airbus, Boeing, Coface

² The world trade monitor is an indicator of world trade developed the Netherlands Bureau for Economic Policy Analysis

³ Hollinger, P., Keohane, D. (4 June 2020), Airbus veterans called up to rescue aviation supply chain, *Financial Times*, <https://www.ft.com/content/3bec9f5b-086f-4757-8022-642b738dd0b7>

⁴ *Ibid.*

⁵ In value, container shipping represents 52% of world sea trade. See World Shipping Council, <http://www.worldshipping.org/>

for Southwest and 24 for American Airlines and Air Canada. Excluding Norwegian Airlines, which owned 18 Boeing 737 MAX before the grounding, European carriers were less affected, as they have less of these planes than their American competitors. With part of their fleet removed by the grounding, carriers often have had to cancel flights, leading to lower turnover. For instance, Southwest Airlines has cancelled more than a hundred flights daily since the grounding and estimates that it caused a USD 828 million reduction in operating income⁶.

However, airlines are not expected to support the cost of the 737 MAX grounding on their own, as many of them requested a compensation from Boeing. For example, Southwest Airlines received a USD 428 million compensation from the American planemaker.

These compensations reduce the weight of the grounding for airlines, but add more pressure on Boeing's finances, which saw a strong deterioration in 2019. Net orders⁷ of Boeing's commercial

airplanes decreased by 94% to 54 aircrafts in 2019 (see **Chart 1**).

Mobility Crisis: COVID-19 is disrupting all segments of the transport sector

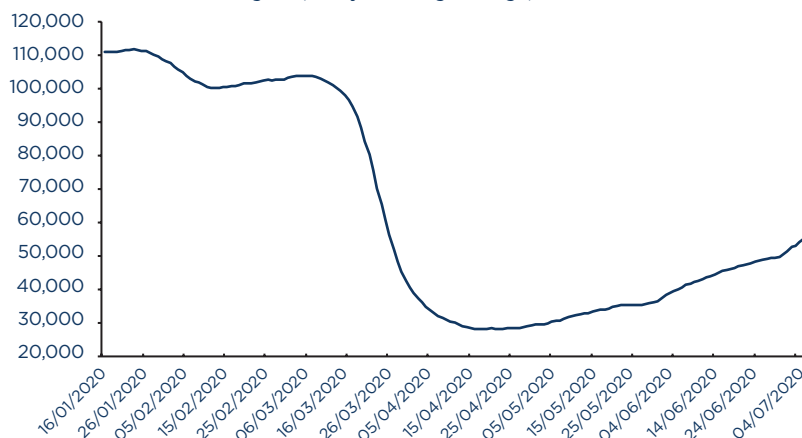
Since the beginning of the COVID-19 pandemic, the transport sector has been one of the sectors at the heart of the crisis⁸: countries have imposed travel restrictions, closed their borders and implemented lockdowns, leading to a strong decrease in freight activity and passenger demand.

Air and maritime segments have been severely hit

The air market is the segment most impacted by COVID-19. To face the drop in passenger demand caused by lockdowns and travel restrictions, airlines reduced capacity and workforce (American Airlines cut 5,100 jobs, Lufthansa said it has a surplus of 26,000 employees) or imposed unpaid vacations to their employees (for instance, Cathay Pacific forced its 27,000 employees to take three weeks of unpaid vacation between 1 March and 30 June).

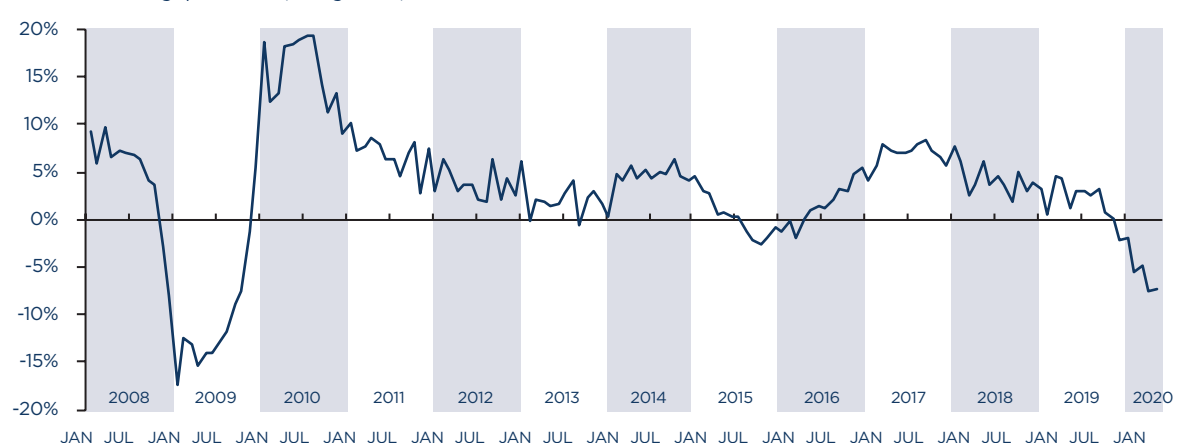
The number of daily commercial flights decreased by 75% between 16 January and 12 April - the lowest point (see **Chart 2**). According to IATA (International Air Transport Association), air passenger capacity (measured in Available Seat Kilometers, ASK) decreased by 87% YoY in April 2020, while air traffic (measured in Revenue Passenger Kilometers, RPKs) fell by 94% YoY in April. The fall in air passenger activity led to a strong decrease in air cargo capacity, as most of air cargo is carried by passenger aircrafts in the "belly" of the plane. In this regard, according to IATA⁹, air cargo volume declined by 27.7% YoY in April 2020 while capacity fell by 42%, leading to an all-time high load factor of 58% (+11.5 pp compared to April 2019) and higher freight rates.

Chart 2:
Number of commercial flights (7-days moving average)



Source: Flightradar 24, Coface
Latest point: 6 July 2020

Chart 3:
Container throughput index (YoY growth)



Source: RWI/ISL, Coface
Latest point: May 2020

6 2019 Annual report to shareholders (2020), Southwest Airlines.
7 Defined as the difference between gross orders and cancellations during a year.
8 Coface Country and Sector Risks Barometer (Q2 2020): From a massive shock to a differentiated recovery.
9 IATA (June 2020), Air cargo market analysis: April 2020, available at: <https://www.iata.org/en/iata-repository/publications/economic-reports/Air-Freight-Monthly-Analysis-Apr-2020/>



Many airlines have received public financial support to compensate falling revenues and prevent bankruptcies. As described later in this study, a whole industry is linked to airlines: airports, planemakers and their suppliers, and tourism. Preventing airlines from collapsing is important to support a given country's economic activity. For instance, the German government has agreed to help Lufthansa with EUR 9 billion (USD 9.8 billion) in aid.

Sea freight has been less impacted than air transport, but it is also suffering from COVID-19. The YoY growth of the container throughput index was negative for the fifth consecutive month in April 2020 at -6.4% (see **Chart 3**). The Baltic Dry Index (BDI), which measures freight rates of dry bulk cargo¹⁰ – and can be seen as a proxy for global dry bulk trade health – strongly decreased at the beginning of the COVID-19 crisis in January-February and rebounded in May and June, when lockdown measures eased. The Harpex index, which measures freight rates for container shipping¹¹, continuously decreased between January and June 2020, suggesting lower demand for container shipping and consistent with the Container Throughput Index decrease.

Contrasted impacts of COVID-19 on railway

For the railway segment, the overall impact is also negative even though some markets may benefit from it. On the one hand, rail passenger transport obviously suffered from lockdowns and closed borders. On the other hand, the effect on rail freight seems to vary from one region to another. Roughly, there are two scenarios. On one side, rail freight is complementary to air and sea freight, but is not

substitutable. In the U.S., for instance, imports from Asia and Europe are transported either by sea or by air, but cannot be carried by railway or road. In this configuration, a decrease in air and sea freight leads to a decrease in railway freight, as it is used (with road transport) to haul merchandise to and from ports and airports. In that respect, Union Pacific, one of the biggest U.S. railway companies, recorded a 22% YoY decrease in volume in Q2 (through 2 June 2020)¹².

That being said, there is some substitutability between air and maritime freight on one side, and railway on the other. In this configuration, a decrease in air and sea freight can lead to an increase in rail freight, like it happened in Russia, where rail transit traffic between China and Europe increased by 35% YoY in the January-May 2020 period and was 180% higher in May 2020 than a year earlier^{13,14}. This surge is due to both COVID-19 and a longer-term project, the Belt and Road Initiative (BRI, see **Insert 2**). Rail freight is a compromise between air and sea freight for China-Europe trade: it is cheaper than airfreight and faster than sea freight. Since COVID-19 reduced airfreight capacity, some companies may have turned towards rail freight instead of airfreight (more expensive than before because of capacity cuts) and sea freight (much slower than railway: for instance, there are 32 days between Shanghai and Hamburg by sea and 19 days by train). This is confirmed by the fact that, last May, China-Europe trains transported 9,381 tons of medical items, such as masks and first-aid kits to fight coronavirus¹⁵, which needed to be transported quickly.

INSERT 2:

Assessing the importance of each mode transport

Transport is divided into four main modes: air, rail, road and sea. Therefore, as previously mentioned, Coface incorporates these segments for the transport sector in its methodology. Assessing the share of each of them at the global level raises analytical challenges for several reasons. First, it is difficult to compare the different modes, as transported volumes are not expressed in the same units. For instance, container shipping is measured in TEU (twenty-foot equivalent unit, the standard size of containers) whereas bulk shipping is expressed in tons (a unit of mass). Thus, if assumptions on the average mass of a container are not made, adding them is impossible. Moreover, there is a strong heterogeneity between transport modes, as the mode is not independent of the value of the carried item. Air transport for instance is more expensive than maritime freight and overall tends to carry more expensive items (like drugs or medical goods). Global airfreight accounted for less than 1% of global freight in volume but represented 35% of it in USD.

Nonetheless, some useful information are worth mentioning on the matter. The share of each mode of transport is different when considering a country's domestic market and international markets. Indeed, road freight transport tends to prevail in domestic markets, while the volume of (inland) shipping seems much lower. Then, looking at international freight, shipping is generally much more important than in domestic freight¹⁶. For example, in France, according to the Ministry for Ecological Transition, shipping accounted for 2.3% of domestic freight in volume in 2017 and road freight for 87.8%, while 80% of French international freight is shipping. Another example that highlights the difference in transport means between domestic and international is the U.S. case. In the U.S., in 2018, road represented 67.4% of domestic freight and 37.9% of international freight, and shipping accounted for 3.3% and 13.9%, respectively, according to the U.S. Bureau of Transportation Statistics.

¹⁰ Dry bulk materials are dry unpacked goods, mainly commodities, such as grains, metals, coal. It is opposed to liquid bulk cargo, which notably includes Liquefied Natural Gas (LNG), petroleum and edible liquid.

¹¹ Container shipping mostly carries intermediate and finite goods.

¹² Union Pacific (9 June 2020), Deutsche Bank Annual Global Industrials and Materials Summit [online], available at: https://www.up.com/cs/groups/public/@uprr/@investor/documents/investordocuments/pdf_unp_slides_db_2020.pdf

¹³ Van Leijen, M. (15 June 2020), Europe-China trains cover 1,231km per day in Russia, *RailFreight.com*, <https://www.railfreight.com/beltandroad/2020/06/15/europe-china-trains-cross-russia-with-speed-of-1231km-per-day/>

¹⁴ Total railway exports from China to Europe increased by 48% in May 2020. It includes trade through Russia but also rail freight getting around Russia (Briginshaw, D. (5 June 2020), China – Europe rail freight up 48% in May, *International Railway Journal*).

¹⁵ Briginshaw, D. (5 June 2020), China – Europe rail freight up 48% in May, *International Railway Journal*, <https://www.railjournal.com/freight/china-europe-rail-freight-up-48-in-may/>

¹⁶ Here, domestic market means that goods departure and arrival are in the same country; international market, that they are in two different countries.

Furthermore, Russia reduced empty container rates from a third country to China by 40% between 1 April and 31 August 2020: transit of loaded containers on the 'China-Europe- route' increased by 33% YoY in March 2020. At the same time, the transit of empty containers decreased by 70%,

creating an imbalance in container flows, since most of loaded containers are moving from China to Europe, and most of empty containers from Europe to China. Consequently, rail freight from Europe to China increased in May 2020, YoY.

2 RECOVERY SCENARIO AND INNOVATIONS FOLLOWING THE COVID-19 IMPACT

The sector is evolving because of environmental concerns

In the past years, several regulations were implemented to reduce the impact of the transport sector's activities on the environment (in 2014, CO₂ emissions from transport accounted for 20% of emissions from fuel combustion¹⁷). Some emblematic regulations were adopted to trigger lasting structural changes in the sector going forward, as detailed in this section.

IMO 2020 is triggering structural changes in the maritime segment

On 1 January 2020, IMO 2020 came into force. This regulation, set by the International Maritime Organization (IMO), limits ship sulphur emission to 0.5% m/m (or 5kg of sulphur per metric ton of fuel oil) against 3.5% before. IMO 2020 applies outside Emission Control Areas (ECAs, at the time of writing ECAs are the Baltic Sea Area, the North Sea Area, the North American Area and the United States Caribbean Sea Area) where the sulphur emission limit is below 0.5%. Ships release between 5% and 10% of global sulphur anthropogenic emissions. Although sulphur oxides are not Greenhouse Gases (GHG), they have negative impacts on environment and health. Sulphur dioxide is known for causing respiratory issues and leading to acid rain, which is harmful to surface water wildlife due to the effect on water acid levels that can kill both flora and fauna. According to IMO¹⁸ this measure "will significantly reduce the amount of sulphur oxide emanating from ships and should have major health and environmental benefits for the world, particularly for populations living close to ports and coasts".

New aircraft emission standard in air transport

Air transport is also subject to a legal framework that aims to reduce its impact on environment. In March 2017, the UN International Civil Aviation Organization (ICAO) "adopted a new aircraft CO₂

emissions standard which will reduce the impact of aviation greenhouse gas emissions on the global climate"¹⁹. Since 2012, European aviation is part of the EU Emissions Trading System (ETS), which should be an incentive to decrease carbon emissions. Some countries have implemented environmental taxes on air tickets in order to reduce demand. For instance, in 2019, the French government set up an Ecotax from EUR 1.5 to EUR 18 per ticket from France. Still in France, the government decided to remove domestic flights "for which there is a rail alternative less than two and a half hours long"²⁰, in exchange of public financial support to French air companies in difficulty in an attempt to reduce transport impact on the environment.

Less polluting transport: an anchored movement that is expected to remain a challenge for companies in the sector

Furthermore, the transport sector may face increased pressure from consumers to be less polluting, as they have become more aware of transport impact on environment. The movement 'flygskam' (literally "flight-shame") popularized by Greta Thunberg in 2018, for example, which aims to replace air travel in favor of rail travel, is spreading in Europe and the United States, and could have a lasting negative impact on passenger air transport. This may in turn benefit the railway segment.

In this context, the aviation industry will have to adapt and look for better efficiency or less polluting fuel, in order to be compliant with the legal framework and remain attractive for consumers. For this purpose, IATA has set up some objectives to reduce air transport CO₂ emissions:

- To improve fuel efficiency by 1.5% per year between 2009 and 2020
- To reduce net aviation CO₂ emission by 50% in 2050 compared to 2005 levels, notably via a higher use of bio-fuels

17 See World Development Indicator, World Bank Group, <https://databank.worldbank.org/source/world-development-indicators>.
18 International Maritime Organization (2019), The 2020 global sulphur limit, Frequently Asked Questions [Online], available at: <http://www.imo.org/en/MediaCentre/HotTopics/GHG/Documents/2020%20sulphur%20limit%20FAQ%202019.pdf>
19 ICAO (6 March 2017), ICAO Council adopts new CO₂ emissions standard for aircraft [online]
20 Le Monde (22 June 2020), « La suppression de certaines lignes aériennes intérieures en France concernera toutes les compagnies » [online]

Global Transport outlook beyond the COVID-19 crisis

Transport activities looking forward: medium and long term scenarios

Table 1:
Coface Regional Sector Risks Assessments on Transport, Barometer Q2 2020²¹

	Asia-Pacific	Central & Eastern Europe	Latin America	Middle East & Turkey	North America	Western Europe
Transport	Medium Risk	High Risk	High Risk	Medium Risk	Medium Risk	Medium Risk

BUSINESS DEFAULT RISK					
Low Risk	Medium Risk	High Risk	Very High Risk	Upgrade	Downgrade

As previously mentioned, transport segments are impacted in different ways but are expected to be significantly and durably affected by the knock-on effects of the COVID-19 crisis. The recovery to pre-crisis levels will take years. To assess the impact of COVID-19 on sectors, Coface proceeded in two steps: first, we forecast the expected turnover of listed companies without the COVID-19 shock, using a combination of ARIMA and Double Exponential Smoothing. Then, we anticipate the potential shock on turnover compared to the scenario without the COVID-19 crisis, according to two scenarios: the baseline scenario and the risk scenario (in which a second wave appears in Q3 2020). According to Coface (see **Chart 4**), the turnover of listed companies of the global transport sector is forecasted to be, in Q4 2021, 5% lower than in Q4 2019 in the baseline scenario and 27% lower in the risk scenario (if a second wave of the pandemic materializes in Q3 2020). While comparing these results with the other

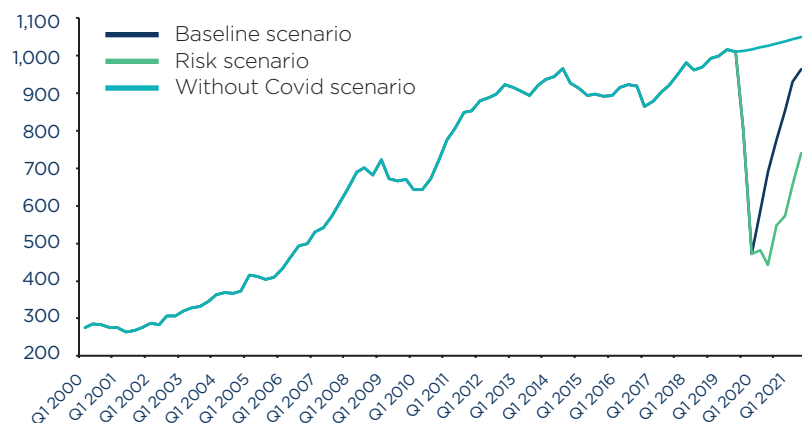
12 sectors for which Coface publishes sector risks assessments, air transport would be the most affected, with its turnover expected to decrease by 51% in the baseline scenario and by 57% in the risk scenario in 2020. According to IATA, the global air industry will lose USD 84 billion in 2020 and register a 50% fall in revenue. In 2021, losses for companies in the industry are forecasted at USD 15.8 billion²². However, air cargo is expected to benefit from COVID-19 spillover effects: the overall carried freight tons should decrease by 17% in 2020, while freight rates are forecasted to increase by 30% due to capacity shortages following the drop in air passenger traffic (most of air cargo is carried by passenger airplanes)²³. This will result in an 8% air-cargo revenue increase in 2020²⁴.

On the longer term, the health of air transport activities will depend on companies' ability to comply with growing environmental concerns, especially where an alternative transport mode (such as train) will be available. In this context, a shift from air to rail travel in EU and China²⁵ is expected, notably because air transport is responsible for 14% CO₂-equivalent emission²⁶ of transport while, by contrast, rail accounts for 0.5%²⁷.

Innovation in the sector could be the key for its development on the long-term

Environmental concerns will remain a challenge for the transport sector, notably for air transport. Innovation, which would enable consumers to use less polluting transport, is expected to be key for transport companies going forward. For example, IATA is aiming to reduce its air transport company members' CO₂ emissions by 50% by 2050, notably by increasing the use of alternative fuels such as biofuels and by developing sustainable fuels²⁸. Halving CO₂ emissions would require strong innovations in both airplanes and the types of fuel used, in a context where air transport traffic is

Chart 4:
Turnover of transport sector (billion USD)



Source: Datastream, Coface
Latest point: Q4 2021

²¹ Coface (June 2020), *op. cit.*

²² IATA (9 June 2020), Industry Losses to Top \$84 Billion in 2020 [online]

²³ *Ibid.*

²⁴ *Ibid.*

²⁵ UBS (2 April 2020), "By train or by plane?" Traveler's dilemma after COVID-19, amid climate change concerns [online], <https://www.ubs.com/global/en/investment-bank/in-focus/covid-19/2020/by-train-or-by-plane.html>

²⁶ Measure used to compare the emissions from various greenhouse gases based on their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.

²⁷ *Railway Gazette International* (7 April 2020), UBS predicts post-pandemic shift from air to high speed rail [online], <https://www.railwaygazette.com/policy/ubs-predicts-post-pandemic-shift-from-air-to-high-speed-rail/56195.article>

²⁸ See IATA (2015), IATA 2015 Report on Alternative Fuels

expected to increase in the long-term on the back of rising middle class population, notably in Asia. IATA had forecasted air traffic to double by 2037, before the COVID-19 crisis. If the traffic doubles by 2050, halving CO₂ emissions for the sector would mean that planes would have to reduce CO₂ emissions by 75% on average. Some actors

are trying to develop alternative sources of power, such as the Solar Impulse Foundation, whose plane ‘Solar Impulse 2’ was the first to go around the world solely using sun power²⁹. However, it is difficult to assess, at the time of writing, if such planes could be available for airlines.

INSERT 3:

The Belt and Road Initiative: a case study that reveals the rising potential of rail transport

In 2013, China’s President Xi Jinping launched the Belt and Road Initiative (BRI). This project aims to increase China’s connectivity with the rest of Asia, Africa and Europe *via* significant infrastructure investments: the Silk Road Economic Belt (the “Belt”) and the New Maritime Silk Road (the “Road”).

The Belt, which links China to Central and South Asia and Europe, is composed of six overland corridors:

- the China–Mongolia–Russia Economic Corridor
- the China–Central Asia–West Asia Economic Corridor
- the China–Indochina Peninsula Economic Corridor
- the China–Pakistan Economic Corridor
- the Bangladesh–China–India– Myanmar Economic Corridor
- the New Eurasian Land Bridge.

The maritime “Road” links China to the nations of South East Asia, the Gulf countries, East and North Africa, and on to Europe³⁰.

According to the World Bank Group, economies of the Belt and Road corridors accounted for almost 40% of global merchandise exports in 2017, almost five times higher than in 2000.

Railway trade between China and Europe strongly increased, from 80 trains in 2013 to almost 5000 in 2018. The number of containers increased from 44,200 TEU (twenty-foot equivalent unit, the standard size of containers) in 2014 to 153,000 TEU in 2016. However, these volumes remain modest in comparison to sea freight: in 2016 more than 10 million TEU were transported between China and Europe using container shipping³¹.

Rail corridors offer a good compromise between air and sea transport, as rail freight is more affordable but slower than air freight and more expensive but faster than sea freight (see **Table 2**). Since transporting goods from ports to their final destination (often by road) is costly, rail transport is more advantageous for places far from sea ports than maritime transport³². The development of rail corridors between China and Europe with the BRI could thus reduce cost and/or time of transport.

Therefore, the belt and road initiative reveals potential promising perspectives for companies in the rail freight transport segment. This is to be considered together with the fact that it compares positively with other segments, as mentioned earlier in the publication, regarding environmental concerns, notably the level of CO₂ emissions.

Table 2: Comparison of the transport cost and time for goods transported between China and Europe³³

	Plane		Train		Ship	
	Price (USD/ container)	Duration (days)	Price (USD/ container)	Duration (days)	Price (USD/ container)	Duration (days)
Shanghai-Gdynia	37,000	5-9	4,500	19	3,600	37-42
Chengdu-Warsaw	37,000	5-9	5,000	15	4,500	43-50
Shanghai-Rotterdam	37,000	5-9	5,000	18	2,200	27-37

29 Fabien, G. (26 July 2016), L’avion solaire Solar Impulse 2 boucle le premier tour du monde aérien sans carburant, *Le Monde*, https://www.lemonde.fr/planete/article/2016/07/26/l-avion-solaire-solar-impulse-2-boucle-le-premier-tour-du-monde-aerien-sans-carburant_4974605_3244.html

30 World Bank Group (2019), *Belt and Road Economics: Opportunities and Risks of Transport Corridors*.

31 Jakóbowski, Jakub and Popławski, Konrad and Kaczmarski, Marcin (2018), *The Silk Railroad. The EU-China rail connections: background, actors, interests*. OSW Studies Number 72, February 2018.

32 *Ibid.*

33 *Ibid.*

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