Sustainability e-News Q2 2019 Edition

We are pleased to share the new edition of our Go Green Brief – DHL Global Forwarding's Sustainability Newsletter. With this quarterly newsletter we are aiming to share our insights and knowledge on carbon reporting, reduction approaches and climate change abatement trends as well as other related sustainability topics. We hope you find it of value and we welcome your comments and suggestions.

Weighing Your Ocean Shipping Options to Reduce CO_2

Ocean Freight (OFR) shipping is considered one of the most carbon and cost-efficient transportation modes available today. As companies look to shift to more sustainable practices, alternative OFR shipping options can play a key role in reducing each shipper's carbon footprint. This is why some companies decide to optimize their container utilization and choose the LCL shipping method, rather than FCL.

Taking responsibility for the environment and reducing carbon emissions are high on the agenda in most of today's industries, and ocean freight is well positioned on that front. Generally considered the most sustainable option among conventional shipping methods, it, along with rail, is more carbon efficient than air or road freight. Even so, there are some choices available within ocean freight container shipping that bear consideration: Less than Container Load (LCL) or Full Container Load (FCL), which is best for the environment?

For shipping containerized goods via ocean freight, companies can choose between FCL or LCL shipping.

- *FCL* refers to a single container booked by a shipper to transport exclusively their cargo. This service is commonly used by shippers who have enough cargo to fill the whole container.
- *LCL* refers to a single container filled with cargo from several different shippers. This allows shippers to transport smaller volumes of cargo via ocean freight without paying for a full container.

Generally speaking, LCL is for smaller shipments and FCL for larger freight. Analyzing it from a cost perspective, there is a breakeven point at which a small shipment's LCL cost would equal the flat rate of an entire FCL container. When selecting FCL or LCL, shippers typically aim to balance cost of shipping with delivery time, fees and potential delays or damage.

But it is important to add another element to this decision making: CO_2. The logic for cost also applies to CO_2, and in a similar way. When shipping **FCL**, the **shipper will be accountable for the CO_2 emissions for that full container**. When shipping **LCL**, the **shipper will be accountable only for their cargo's share of the container**. This is because, in LCL, the total container's carbon footprint will be split between each shipper, based proportionately on the volume share of each shipment. This means that while the container's carbon footprint remains the same, it is distributed between all parties involved shipping as LCL goods in the same container, not only to one owner as it happens in FCL, providing benefits akin to those of carpooling.

Doing the Math to Lower CO_2

On a tradelane like Antwerp to New York, one 20 ft. container produces approximately 640 kilograms of CO_2.[1] When shipping 15 cubic meter (cbm) (6 tons) of freight as FCL on this tradelane, the cargo owner will be accountable for 640 kilograms of CO_2, even if their cargo would only be responsible for 376 kilograms of CO_2 according to cbm share *(Figure 1)*.

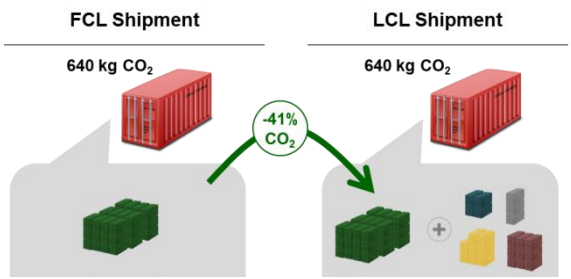


Figure 1: FCL vs. LCL CO_2 accountability distribution

Assuming an average maximum fill rate of 25 cbm in a 20 ft. container (TEU), the carbon savings for shipping cargo with less than 25 cbm in a consolidated LCL container become apparent. This option to share containers can result in benefits for shippers. For example, when shipping a 20 cbm container as LCL, it is possible to achieve CO_2 savings of 22 percent (https://www.dhl-carboncalculator.com).

Despite these benefits, LCL is not per se better for the environment than FCL, because the container itself is still "producing" the same amount of CO_2. But relatively speaking, it is. The more shippers choose to share a container, the fewer containers will need to be transported, which reduces the overall carbon footprint of ocean freight container shipping.

Consequently, it comes down to not only reducing the number of FCL containers by shifting to LCL, but also maximizing the use of each one. A fully utilized FCL container is as carbon-efficient as a fully utilized LCL container, but if an LCL container is not filled to capacity, the

[1] All indicated CO_2 emissions in CO_2e TtW.

CO_2 emissions share per shipper will be much higher—every spare inch is wasted space, uselessly accounting for carbon emissions.

With the impact of climate change more pronounced than ever before, we all have a responsibility to contribute to cutting CO_2 emissions. Replacing underutilized FCL containers with full LCL shipments will help the sector to live up to its responsibilities and meet its sustainability goals.

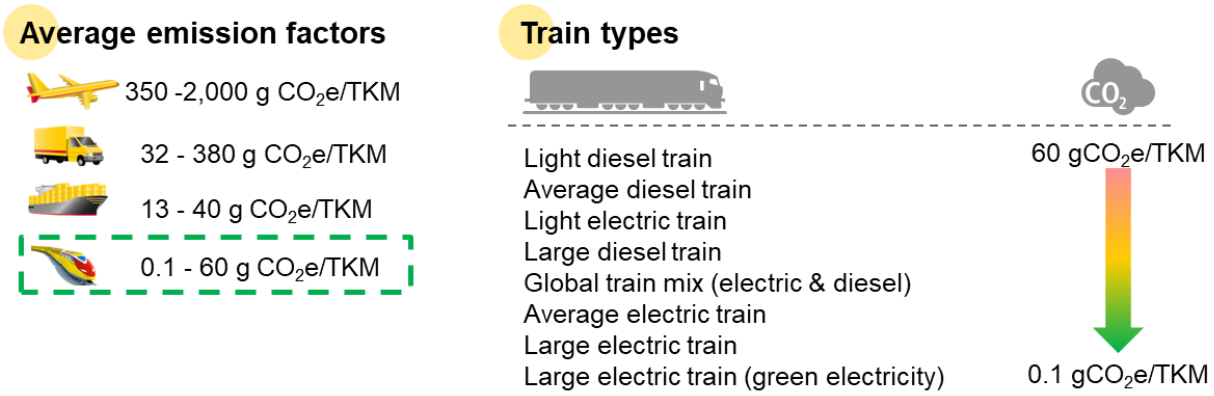
Is Rail the Most Sustainable Option for Cargo Transport?

Rail is emerging as a competitive alternative mode of cargo transport due to its attractive sustainable characteristics, as it has proven to be a significant way to limit greenhouse gas emissions. While proving beneficial in one area, other modes of transport have lower-cost alternatives and transit times. What will it take for the rail industry and local governments to transition into a full electric-powered rail system?

Rail freight is often being positioned as the greenest transport mode, above shipping cargo via air, road or ocean. However, this all depends on the type of energy used—whether trains are powered by diesel or electricity. It is only the greenest transport mode if the train is running on electricity—which must come from sustainable sources—that rail is the greenest transport alternative, with almost zero carbon emissions.

To compare air, road, ocean and rail in terms of how sustainable they are, it is important to consider the emission factors, the figure that defines how much carbon is typically emitted by a transport mode for one ton of freight over 1 km. For reference, rail represents a wide range of environmental impact, with emission factors between 0.1g and 60g of CO_2e/TKM. This shows that, when looking at rail as an alternative primary transportation mode, a large electric train powered by green or renewable electricity is the most efficient transport available. Conversely, a light diesel train (short train) is less efficient than deep sea ocean freight container vessels (13-40g CO_2e/TKM), though it is still significantly more carbon efficient than air freight (350-2,000g CO_2e/TKM).

Comparing rail with road is becoming increasingly relevant when modes of transport for inland logistics components are considered—for example, connecting the origin location to the port/airport, or port/airport to the destination location. Here it is evident that, depending on the source of energy used, trains are far more efficient than trucks (which can reach up to 380g CO_2e/TKM). This adds both positive and negative factors for rail. On the one hand, trains provide an additional benefit, as they can carry more cargo per trip when compared to road transport. On the other hand, however, not all locations can be reached by train, and many will need to factor an additional leg of trucking to and from the train station, which can ultimately decrease rail's CO_2 balance and increase operational complexity and transit time for door-to-door transport.



From an Environmental Perspective, When is Rail the Best Solution?

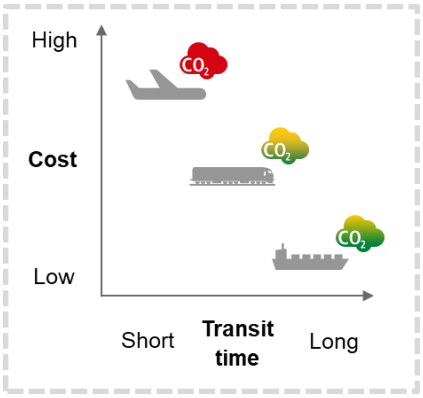
There are three factors to consider: train type, cost vs. transit time and CO_2 emissions.

Train types vary across countries, though rail transport is most commonly used in countries and continents with long transit times, such as China, Russia, the United States and parts of Europe. Many countries, such as France, have train systems powered largely by electricity from nuclear reactors, leading to almost zero carbon emissions. Countries like Switzerland have announced that, starting in 2025, their trains are set to run on electricity entirely from renewable energy sources, leading to a clean carbon footprint. Other countries, such as the U.S. have trains mostly powered by diesel.

Cost vs. transit time is the second factor to consider when choosing a transport mode. For example, when transporting goods from Central Europe to China, shippers can choose between air freight, ocean freight and rail freight. On average, rail is approximately six times cheaper than air freight, but twice as expensive as ocean freight. When considering transit time, rail is 17 days slower than air freight, but 14 days faster than ocean.

Lastly, CO_2 emissions are becoming an important third factor to consider when deciding which transport mode to choose, and it reinforces rail's competitive edge. Rail is 95 percent

less carbon intense than air freight and 66 percent more carbon intense than ocean freight (for the tradelane from Central Europe to China).



When considering the full picture of rail, one must also account for the construction of railroads, which can also contribute to the fragmentation of ecosystems and wildlife habitats. Railways also act as physical barriers for animals. According to a study, there are four broad types of impacts that cause barrier effects for wildlife: physical and behavioral barriers, disturbances (i.e., noise, vibrations, pollution), mortality and habitat loss and fragmentation.

Environmental sustainability is becoming an increasingly central issue in the transportation and logistics sector. The transition to rail is gaining momentum, but the true CO_2 savings in comparison to road or air will depend on how fast the rail infrastructure adapts to green electricity. First, rail system providers will need to change their infrastructure from diesel trains to electric. Next, countries must shift their electricity generators from fossil fuels to renewable sources that can support the entire rail system. Only when the energy used to power trains comes from renewable sources will rail be a true green alternative, both in short- and long-distance transportation. Once these requirements are fulfilled, however, rail becomes a truly sustainable and recommendable logistics solution.