



Working towards a global sustainable transport system

Committee: EC

Student Officer: Ginevra Benezzoli

Forum: Environmental committee (EC)

Issue: Working towards a global sustainable transport system

Name: Ginevra Benezzoli

Position: Chair

Introduction

Millions of people are employed directly in the transportation industry, which also defines modern living choices. However, the sector's negative impact on the environment undermines the important role that transportation plays in promoting economic progress due to a significant portion of the global greenhouse gas emissions being contributed by the transportation industry.

In terms of CO₂ emissions in 2019, transportation was second only to the electricity industry. 30% of the world's total final energy consumption and 23% of the direct CO₂ emissions from the energy sector that year were attributed to transportation. The outbreak of the global pandemic Covid-19 in 2020 decreased global emissions from transportation by 5.4% giving hope that even the population's customs would change in terms of using fewer private vehicles and more public transportation. However, by 2022 we have already returned to pre-Covid levels of CO₂ emissions.

Transportation can be divided into two macro areas: cargo and people. Each of these two involves different transportation systems at different percentages such as private road vehicles (cars and scooters), heavy trucks (for freight), shipping, aviation, two- or three-wheel transportation (also known as unconventional transport diffused mainly in LEDCs), buses and rail.

LEDCs have fewer financial means to sustain the turnover in transportation vehicles from the old and highly polluting ones to the electric ones limiting emissions. This requires organizations to financially assist and enhance LEDCs' capacity building in order to develop a condition such that even these poorer countries can strive the combat climate change by adhering to the global targets of decreasing carbon emissions.

Fortunately, with continuous global treaties attempting to limit carbon emissions from transportation alongside our ever-advancing technology, we still have a chance at reversing climate change by implementing new legislation, limitations and subsidies, and alternative technologies to carbon-emitting transportation. However, this is possible only if all countries fully endorse and implement decisive actions with the aim to adhere to these treaties' terms imposing objectives and targeting carbon emissions.

Definition of Key Terms

Greenhouse gases

Gases in the earth's atmosphere trap heat. The sun shines through the atmosphere during the day, warming the earth's surface. The earth's surface gets colder during the night, thus releasing heat into the atmosphere. However, part of the heat is retained in the atmosphere by greenhouse gases.

Freight

Goods transported in bulk by truck, rail, ship or aviation.

LEDC

LEDC (less economically developed countries) are all countries which have a lower GDP (gross domestic product) and a lower standard of living. Indicators used to differentiate LEDCs from MEDCs (more economically developed countries) include industrial development and education.

Catalytic converter

A device implemented in the engine of a motor vehicle with the function of filtering and converting pollutant gases into less harmful ones.

Subsidy

A sum of money granted by the state or a public body to help an industry or business keep the price of a commodity or service low.

Sustainable transport

“The provision of services and infrastructure for the mobility of people and goods—advancing economic and social development to benefit today’s and future generations—in a manner that is safe, affordable, accessible, efficient, and resilient, while minimizing carbon and other emissions and environmental impacts”- The UN Secretary-General’s High-Level Advisory Group

General Overview

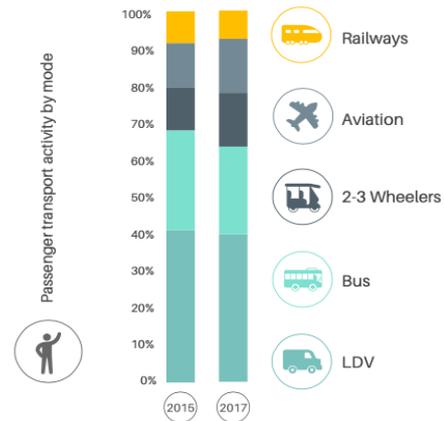
Air pollution emitted from transportation is the main cause of smog and low air quality which provides serious risks to citizens’ health and welfare. The main pollutants emitted from transportation which contribute to polluted air are Nitrogen oxides (NO_x), Particulate matter (PM) and volatile organic compounds (VOCs) ranked by the number of emissions in this order.

Global passenger transport demand

55 trillion passenger kilometres were travelled by passengers worldwide in 2017, with 78% of those kilometres being travelled by road. Rail, which has the lowest CO₂ emissions per passenger and is by far the most carbon-efficient mode of transportation, only accounted for less than 8% of passenger activity in 2015. Between 2015 and 2017, motorized two- and three-wheelers and aviation saw the largest increases in passenger transport activity, increasing by a combined amount of about 25%. Two- and three-wheelers are the fastest-growing form of motorized transportation in many emerging nations. In many southern European cities as well as most Asian cities, motorcycles and three-wheel vehicles play significant roles in meeting both personal and business transportation demands. Motorcycles reduced physical size makes it possible for locals to move around crowded areas reasonably quickly. The types of inexpensive motorbikes offered throughout most of Asia and Southern Europe are more economically efficient mobility options, especially for individuals with lower incomes, because they have lower purchase and maintenance expenses than even tiny automobiles. Nearly 85% of new motorbike purchases take place in Asia, with only 8% occurring in Europe. Asia has had rapid development in motorbike sales in recent years, with most nations experiencing yearly growth rates at or above 5%. However, these vehicles contribute to a large extent to

the air pollution from transportation because their engines are often old-type engines meaning that they combust more fuels producing more pollution. Thus, many local governments of countries where three-wheeled vehicles are commonly spread have attempted to limit or ban their use in order to improve the air quality within such areas. The majority of the air pollution from passenger transportation comes from private vehicles and cars, and is high, especially in highly congested urban areas.

Figure 1. Share of passenger transport activity (passenger-kilometres) by mode, 2015 and 2017



Global freight transport demand

Trucks are carrying more products than ever before as freight activity has increased and surpassed 120 trillion tonne/kilometres in 2017 alone. This rise is primarily attributable to the increased demand for consumer items that are sent by land and sea. The lack of comprehensive laws and established technological choices contributes to the assumption that the freight sector will be the hardest to decarbonize of all the transportation sectors. The limited availability of zero-emission freight vehicles, the ageing and inefficient existing freight network, and the lack of resources in underdeveloped and emerging countries to buy new fleets are major obstacles to decarbonizing road freight. In fact, there is a higher trend of carbon emissions in LEDCs as there is a limited opportunity of transitioning to low-emitting vehicles or electric ones due to their high costs contrasted with the prevalent low incomes in such areas.

Emission trends

Road transport for both, passengers and freight, accounted for three-quarters of the emissions released by transportation while rail represented only 5%. Passenger transport contributes to the largest part of urban emissions whereas freight is more present in rural areas. However, growth in emissions from freight will continue to progress as trade

does even with new improving technologies reaching a peak of 8.132Mt CO₂ by 2050, a 290% increase from 2019 from freight.

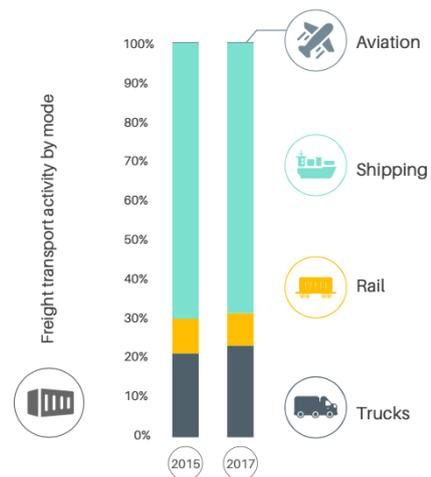
Health concerns

Road transportation emits around 11% of particulate matter and adds up to 30% of global urban emissions. Black carbon, which derives from the incomplete combustion of fuels, other than being a major contributor to emissions, is also of concern for public health. Particulate matter, which is mainly created by black carbon, is known to penetrate the lungs and lead to premature deaths, and cardiovascular and respiratory diseases. These health problems, other than being tragic alone, can also result in economic decrease as, if people get sick, the productivity of the companies lowers whilst public health



care costs rise, impacting negatively a country's economy. High quantities of nitrogen dioxide are also bad for vegetation because they injure the leaves, slow down growth, or lower crop yields. Nitrogen dioxide can react with surfaces, fade and discolour textiles and furniture, as well as diminish visibility.

Figure 2. Share of freight transport activity (tonne-kilometres) by mode, 2015 and 2017



Regional emissions

Over the last decade, transport CO₂ emissions have risen all over the world except for Europe, where they have fallen by 2%. The improvement in Europe is due to the advanced fuel economy regulations and “strong sustainable urban mobility planning frameworks” alongside efficient alternatives to fuel-consuming vehicles and improved technology. For example, the high use of public transport such as buses or rail, incentivized by subsidies and amplification of public transportation systems imposed by governments, allows for urban centres to be less congested. This means that if more people use public transport there will be fewer private passenger vehicles in circulation improving the air

quality. Furthermore, investments in alternative methods of movement such as public bicycles and bicycle lanes encourage people to travel carbon-free, distance permitting, as we can see in many regions of Northern Europe. On the other hand, countries such as the United States, China and India, which are the three top emitters contributing to 50% of the global air pollution prioritize economic growth over environmental damage. Asia has experienced the largest growth in transport CO₂ emissions over the last decade with an increase of 41%. In Latin America, the increase in transportation over the last decade has been 3%. International aviation and shipping recorded a great growth in the last decades singularly emitting more CO₂ than Latin America, the Caribbean, Africa and Oceania altogether. International aviation activity grew 7.1% between 2017 and 2018 eventually reaching 627 million tonnes of CO₂ emissions by 2019. Whereas aviation is present in passenger transportation as shown in Figure 1, international shipping is almost exclusively used for freight (see figure 2) being the backbone of global trading. As trading has increased, therefore, also carbon dioxide emissions, totalled 730 million tonnes in 2019. However, emissions from shipping have risen more slowly compared to those from aviation, but still equally harmful to sea life.

Types of incentives

It is important to increase investment in energy supplies that can fulfil global demand while still being environmentally friendly. Solar, wind, and hydropower are all viable and widely available sources of clean energy, but investment in them has been inconsistent. In some locations, oil's affordability, ease of supply, and technological maturity have led to a delayed acceptance of renewable energy initiatives.

Research and development (R&D)

R&D incentives are provided to improve existing technology by establishing research facilities and developing new technologies. These incentives absolutely need the help of governments and major stakeholders such as investors. Countries that produce their own solar panels and wind turbines can become self-sufficient in RE generation and may improve their economy since importing RE infrastructures from other countries is much costlier.

Market development incentives

Getting government permission for projects for renewable energy usage may be difficult, and projects aren't always given on their merits. As a result, potential investors may lose faith in the industry. Setting up standard policies under the supervision of a regulatory authority will encourage RE investors to invest in clean energy projects. Standard testing and certification for small power producers may also help to boost the renewable energy sector.

Taxation

Another method to encourage RE is to impose a tax on shipping goods and buying fuel-based cars for example, which would raise its cost of consumption and influence competition between the two contrasting methods of passenger and freight transportation.

Subsidy incentives

Promoting subsidies on bus/rail tickets, the use of bicycles and the purchasing of electric vehicles, for example, would mean lowering their price and therefore encourage people to increase consumption.

Timeline of Key Events

Date	Description of event
1972	Stockholm Plan of Action
1992	UN Conference on Environment and Development (Earth Summit)
February 9 th , 1999	Electric Discount and Energy Competition Act (EDECA)
2002	World Summit on Sustainable Development
December 31 st , 2005	Regional Greenhouse Gas Initiative (RGGI)
January 1 st , 2007	Global Warming Response Act (GWRA)
2008	UN launched program "Share the Road".
August 2010	Offshore Wind Economic Development Act (OWEDA)
December 6 th , 2011	New Jersey Draft Energy Master Plan
July 23 rd , 2012	Solar Act

2014	UN secretary general launched the High-Level Advisory Group on Sustainable Transport
2016	New Urban Agenda
2017	Global Sustainable Transport Conference in Ashgabat
August 27 th , 2018	Clean Energy Plan
2018	Vehicle Scrapping and Recycling Program in Egypt
2019	Global electricity generation from renewables increased 440 TWh
December 2020	Signing of Paris Agreement
November 15 th , 2021	182 Parties had included <i>renewable energy</i> components in their NDCs, of which only 144 had a quantified target

Major Parties Involved

China

China's government has mandated that by 2030, natural gas and zero-emission cars must account for 40% of all new vehicle sales, leading to an increase in the use of LNG trucks. Notably, China has invested five times as much in renewable energy as it had in fossil fuels as of January 2021. China, which prioritized electrification of its public transit with subsidies and national regulations, has more than 400,000 electric buses, fairly above the 90% of the world's total.

Norway

Norway is the first country in the world in terms of electric vehicle (EV) usage. This is because of their longstanding incentivizing scheme encouraging people to switch to EVs. In fact, in 2020 Norway sold 50% of new cars that were EVs. Norway is the country with the most EVs on the roads. Furthermore, it has extended bicycle lanes and rail services and infrastructure permitting citizens and tourists to comfortably use them to move around the cities and suburbs.

The United States of America

The United States accounts for only about five per cent of the global population but is responsible for 30 per cent of global energy use and 28 per cent of carbon emissions. This results in a U.S. emissions rate 2.2 times greater than that of China, which houses about 20 per cent of the world's population however making it the largest emitter of CO₂ in the world.

India

India is ranked third worldwide for emissions from transport contributing to 11% of the world's emissions. More importantly, its emissions in the transportation sector are growing at a faster rate than any other sector. Given their tight connections to manufacturing and infrastructure development, transportation services in India are essential to the country's future progress. India, therefore, needs policies that emphasize a sustainable and low-carbon transport industry in order to maintain its developmental trajectory while balancing its climate ambitions.

International Council on Clean Transportation (ICCT)

The International Council on Clean Transportation is an independent non-profit organization. It provides technical and scientific analysis to environmental regulators and imposes targets against CO₂ emissions and ensures they are met. The global target is to be carbon-free globally by 2050, imposed by the Paris Agreement.

Possible Solutions

In the freight sector

Regarding shipping, possible solutions to promote low emissions vessels are through progressively restrictive legislations at international level such as rising insurance policies' premiums for higher polluting ships or electrification of shipping operations at ports. Another idea is the progressive de-globalization of productive chains through the so-called "reshoring" of some productions in nearer countries also to increase resilience in case of "disruptive events" like pandemics and wars and reduce dependency from non-democratic states. Instead, in the area of land

transportation, possible solutions can be a modal shift from road to rail investing in infrastructure and through incentive/taxation policies to enhance the choice of train cargo transportation or promoting the turnover of road fleets to low emissions vehicles (electric/LNG) through innovation (incentives to R&D) and increasing taxation on higher polluting trucks.

In the people moving sector

A common solution undertaken to attempt to achieve a sustainable transportation web revolves around EV-Electric vehicles. Strategies include incentivizing EVs through subsidies to their purchasing and, on the other hand, raising taxation on conventional ones and carbon fuels or expanding the electric recharging infrastructure, both public and private. In addition, promoting R&D in the fuel cell batteries industry in order to make them lighter, long-lasting and, moreover, less “lithium dependent”, which is a highly polluting mining with mineral resources concentrated in very limited countries, would decrease even more emissions from the creation of EVs alongside with enhancing mitigation strategies to limit traditional private car circulation (like traffic bans on certain days/hours) and, at the same time, to promote/force modal shifting to public transport. Especially in LEDCs, where far lower pro-capita income can’t afford the purchasing of EV or new cars, promoting the application of catalytic converters (retrofit) on traditional obsolete cars in order to reduce emissions would be significant. Lastly, digitalization focused on reducing the “dead time” of car driving as, for example, car parking or EV charging spots searching through apps would be a convenient solution for consumers and the environment itself as it would reduce the emissions from driving around looking for parking spots. Also investing in bike lanes and pedestrian-only urban areas to encourage people to use such as transportation means would decrease emissions.

In the area of public transportation (PT), promoting it through subsidies in order to lower its price and through digitalization to make the travel experience easier and faster as well as heavily investing in rail and tram/metro infrastructure and services in order to promote the “modal shift” from private vehicles would then reduce road congestion and emissions.

In the area of aviation transportation, promoting low emissions aircraft through progressively restrictive legislations at the international level including the electrification of airport ground operations would all be plausible solutions. In addition, as a last possible solution, there would be raising taxation at the global level, so as not to ingenerate anti-competitive practices by certain airlines, in order to raise money to be invested in general policies such as the regeneration of forests and humid areas.

Bibliography

Green Suzanne, “Freight Transportation”, Climate Portal, Sep 4 2020, <https://climate.mit.edu/explainers/freight-transportation>

“Smog, Soot, and Other Air Pollution from Transportation”, United States Environmental Protection Agency, January 14 2022, [https://www.epa.gov/transportation-air-pollution-and-climate-change/smog-soot-and-other-air-pollution-transportation#:~:text=Air%20pollution%20emitted%20from%20transportation,volatile%20organic%20compounds%20\(VOCs\)](https://www.epa.gov/transportation-air-pollution-and-climate-change/smog-soot-and-other-air-pollution-transportation#:~:text=Air%20pollution%20emitted%20from%20transportation,volatile%20organic%20compounds%20(VOCs))

Meszler Dan, “Air emissions from Two and Three Wheelers; Initial Issue Assesment”, July 2 2007, <https://theicct.org/publication/air-emissions-from-two-and-three-wheelers-initial-issues-assessment/>

“Auto Rickshaw”, 9 Nov 2008, https://en.wikipedia.org/wiki/Auto_rickshaw#/media/File:Banaue_Philippines_Local-Taxi-01.jpg

“The Carbon Footprint of Global Trade”, International Transport Forum, <https://www.itf-oecd.org/sites/default/files/docs/cop-pdf-06.pdf>

“The Road to Sustainable Transport”, International Institute for Sustainable Development, <https://www.iisd.org/articles/deep-dive/road-sustainable-transport>

“Take steps to Advance Sustainability in the Transportation Sector”, United Nations Global Compact, 5 Nov 2015, <https://www.unglobalcompact.org/take-action/action/transportation-sector>

Saeidizand Pedram, “Public transport and Urban Mobility Data”, UITP, <https://www.uitp.org/data/>

“Air Pollutants”, Queensland Government, <https://www.qld.gov.au/environment/management/monitoring/air/air-pollution/pollutants/nitrogen-oxides#:~:text=Environmental%20and%20health%20effects%20of,can%20cause%20chronic%20lung%20disease>

“Independent research to benefit public health and mitigate climate change”, The International Council on Clean Transportation, <https://theicct.org/>

Kamboj Puneet, “India Transport Energy Outlook”, Council on Energy, Environment and Water, 19 July 2022, <https://www.ceew.in/publications/india-transport-energy-use-carbon-emissions-and-decarbonisation#:~:text=In%20India%2C%20although%20the%20transport,rate%20compared%20to%20other%20sectors.>