USED HEAVY-DUTY VEHICLES AND THE ENVIRONMENT

A Global Overview of Used Heavy-Duty Vehicles: Flow, Scale and Regulation

UN environment programme

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Key Findings

Key Findings

This report analyses the flow and scale of used heavy-duty vehicles (HDVs) from three major used HDVs exporters – Japan, the European Union (EU) and Republic of Korea (ROK). It also reviews the regulatory environment for used HDVs import in 146 countries, 122 of which are low- and middle- income countries (LMICs).

It is the first attempt to quantify and qualify used heavy-duty vehicles globally. Its findings are based on limited data sets. At the time of the study, data on the export of used HDVs from the US was not available due to the inclusion of both new and used HDVs in the export data. In addition, even though China is a major manufacturer of HDVs, its global export share is low and only recently (2019) started to export used HDVs.

The report makes the following key findings:

The global sale of new and used HDVs doubled between 2000 and 2015, with CO2 emissions increasing by about one third in the same period. 2018 saw the peaking of the export of both new and used HDVs, however, 2019 and 2020 saw a decline due to the COVID-19 pandemic.

In 2015, 6.3 million new and used HDVs were sold globally. Among which, 3.4 million units were newly manufactured, making used HDVs account for nearly half of the total sales.

The major exporters of new and used HDVs are Japan, the EU, ROK, Mexico, the US, and China.

Notably, Japan, the EU and ROK collectively make up about 60% of the total new and used HDVs export market share. In terms of used HDVs, these three exported about 2.4 million units between 2015 to 2020.

Vehicles above 3.5 tons are categorized as heavy-duty vehicles (HDVs) and these include different types of trucks and buses.

In terms of value and volume, between 2015 and 2020, Japan was the largest exporter of used HDVs, exporting around 1.3 million units (about 67,000 used buses and 1.2 million used trucks). In the same time span, the EU exported close to 1 million used HDVs (75,000 used buses and 898,000 used trucks). In addition, 1 million used HDVs were traded within the EU. Used HDVs exported from, and traded within the EU together had a value of US$ 21 billion. ROK exported about 134,000 used HDVs globally (106,000 used buses and 28,000 used trucks) worth US$ 850 million in the same period.

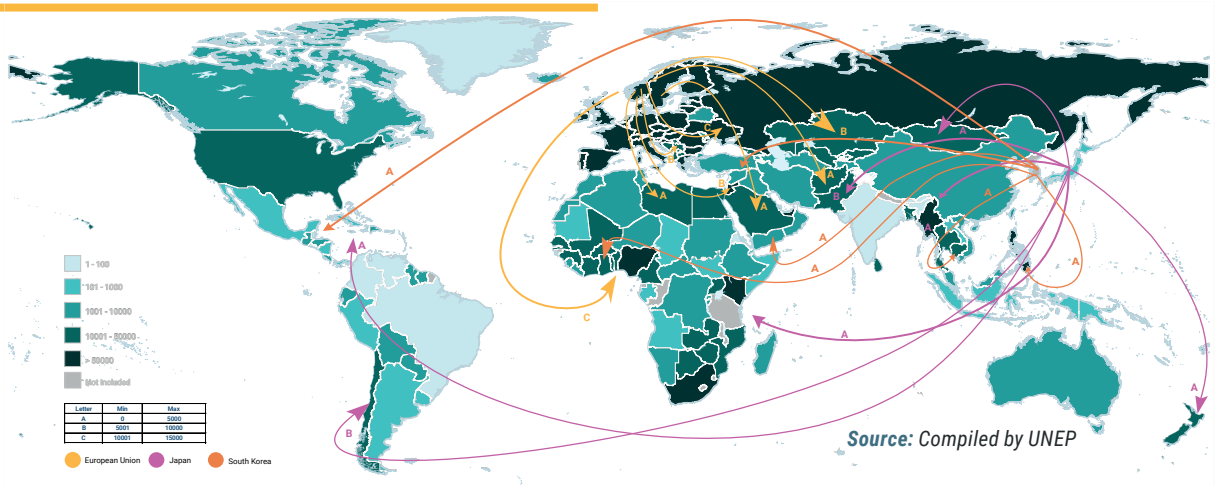
A significant share of used HDVs (60%) is traded in high income or upper-middle-income countries. **One-third of the total global used HDVs is absorbed within the EU, 20% is exported to Africa, another 20% to Asia-Pacific and the rest is exported to the other regions.**

Many low- and middle-income countries rely on import of used buses and trucks.

Even though HDVs are significantly fewer in number compared to light duty vehicles (LDVs) in countries across the world, they are a major contributor to:

- **air pollution**
- **road accidents**
- **high fuel consumption**
- **climate emissions (black carbon, CO2, etc.)**

FIGURE 1. Main Destination of Used HDVs by Volume from the EU, Japan, ROK (2015-2020)



Source: Compiled by UNEP

Used Vehicles and the Environment

While used HDVs are generally more polluting than used LDVs, regulations on used HDVs are usually less strict than those for used LDVs. Many developing countries lack minimum regulations to incentivise import of cleaner and safer used HDVs, and where regulations exist, enforcement is either lacking or weak. At the same time, no used HDV exporting countries has minimum requirements for export of quality used HDVs.

HDVs standards (used and new) are often not prioritised in global, regional, and national strategies for air pollution control, climate mitigation and improved road safety. Only two countries, Sierra Leone and Suriname, have included used vehicles import in their national strategic climate plans, for example nationally determined contributions (NDCs).

Used HDV regulations can take many forms from age restrictions to fiscal instruments or complete bans.

Most countries surveyed in the report do not employ a combination of diverse strategies to regulate import of used HDVs. Out of the 146 countries surveyed, 18 countries have completely banned import of used HDVs. 123 countries (84%), have limited measures to regulate used HDV imports. Among them, 80 countries use age-based restrictions. Few countries use consumer information tools such as labelling.

Not all countries that have adopted used HDV standards have implemented them. For example, out of the 25 African countries that have adopted standards, 21 are yet to fully implement. See Figure 2 below.

The COVID-19 pandemic led to a reduction of policies on importation of used HDVs in some developing countries.

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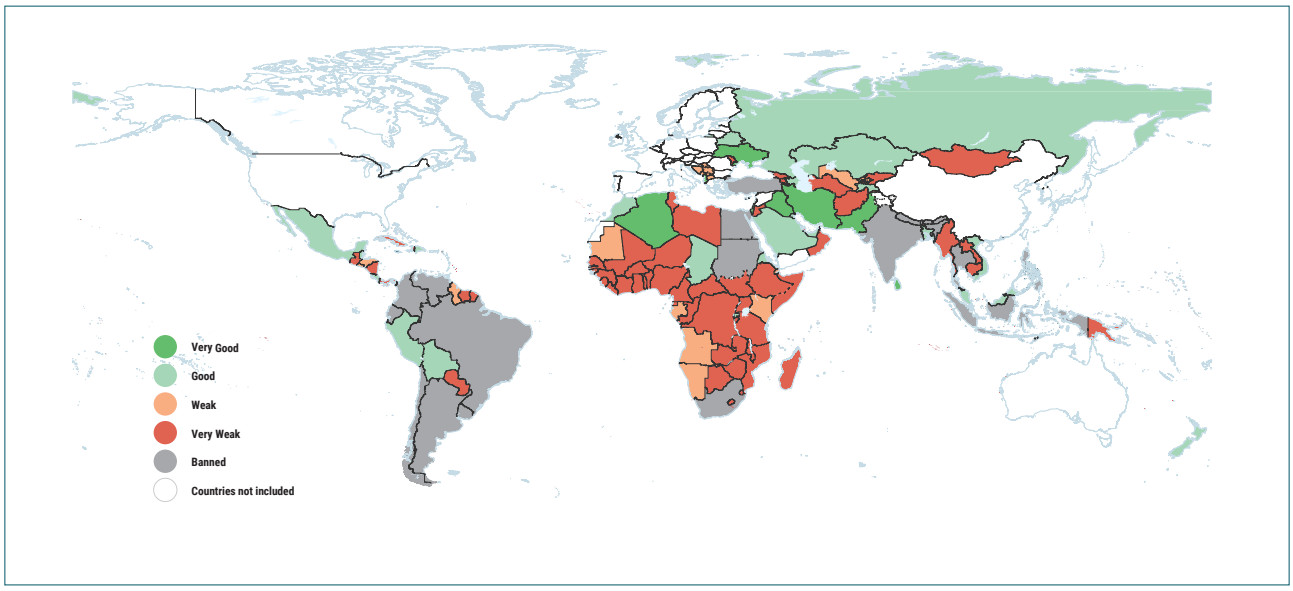
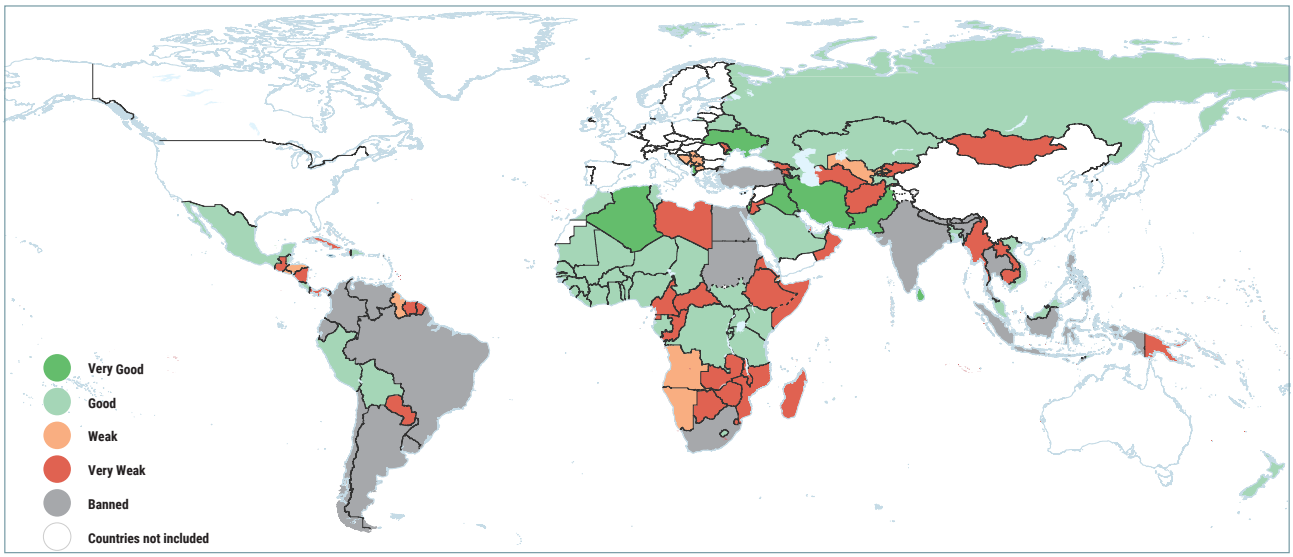
FIGURE 2A and 2B. Regulatory Environment in Used HDVs Importing Countries: Current State and situation with Adopted Measures Implemented



Source: Compiled by UNEP

2A. Current State

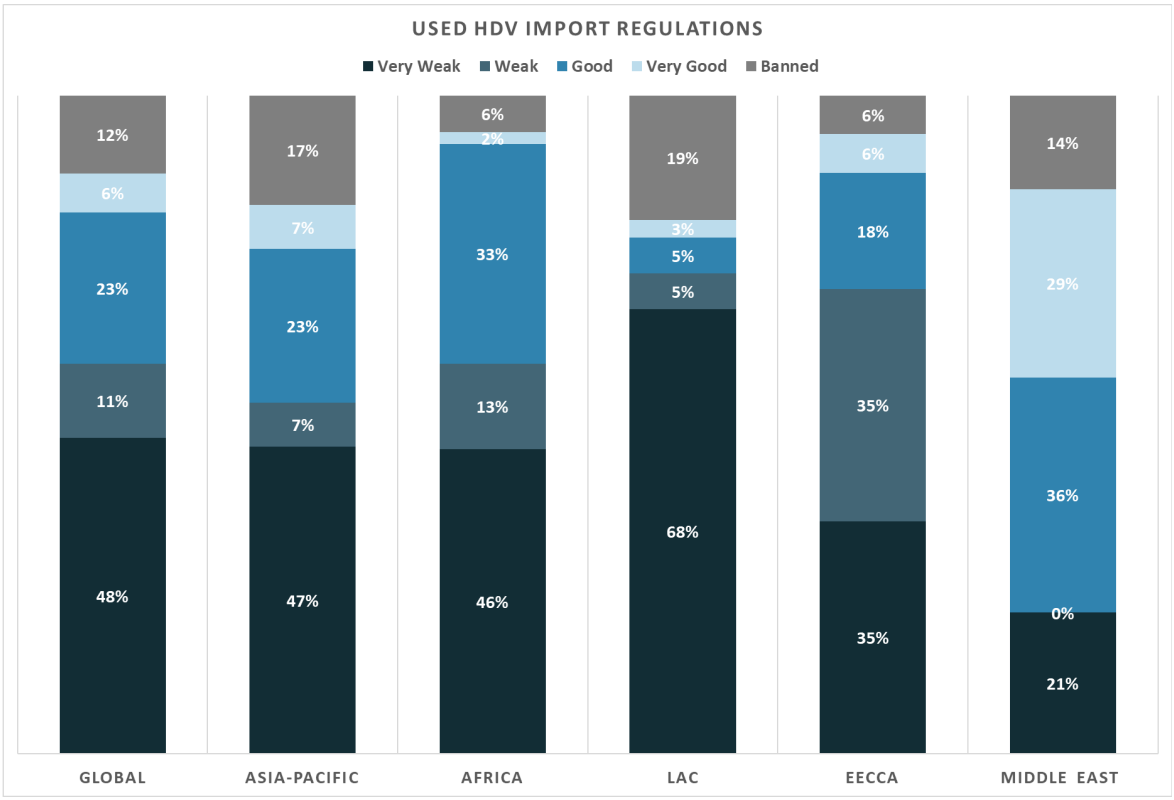


2B. With Adopted Measures Implemented

Even if the adopted standards on import of used HDVs were to be implemented today, there is still a gap in the regulatory environment for import of good quality used HDVs. 76 countries (52%) would still have a 'weak' or 'very weak' regulatory regime to control the import of used HDVs (Fig 2B).

52 countries (35%) would have 'good' or 'very good' policies. Figure 3 below shows the regulatory environment for used HDVs importation by region, assuming the full implementation of agreed standards.

FIGURE 3. Regional distribution of used HDVs import regulations



	Global	Asia-Pacific	Africa	LAC	EECCA	Middle East
Very Weak	66	10	19	25	11	1
Weak	10	1	5	1	2	1
Good	44	8	25	3	3	5
Very Good	8	2	1	1	1	3
Banned	18	5	4	7	1	1
	146	26	54	37	18	11

Recommendations

- **The introduction of minimum quality standards of used HDVs** should be promoted as an affordable way for low- and middle- income countries to access advanced vehicle technologies, including electric buses and trucks.
- **Exporting and importing countries have a shared responsibility** to improve and regulate the quality of used HDVs to minimise their negative impacts and ensure that used HDVs make meaningful contribution towards shifting to cleaner, safer, and affordable mobility, as well as emission reduction in the developing world.
- **From the importers side, existing regional harmonised standards need to be fully implemented**. More and more sub-regions are shifting towards regional harmonisation of new and used HDV standards due to increased regional trade and passenger movement. However, implementation and enforcement are lagging. There is need for continued support to sub-regions that have already adopted harmonised standards such as the West and East African sub-regions to implement them.
- **In regions that have yet to put in place harmonised standards, actions need to be taken to initiate the process.** Having regionally harmonised standards will contribute greatly to deter import of obsolete, unsafe, dirty, and faulty used HDVs. It will bring about benefits such as reducing emissions and administrative costs, facilitating flow of vehicles across borders, enhancing consumer confidence, and promoting experience sharing among countries.
- **From the exporters side, policy measures that can be adopted include banning the export of end-of-life used HDVs, making sure exported vehicles have a valid roadworthiness certificate, and helping importing countries with standards compliance checks.**
- **A strong implementation and enforcement mechanism and a robust public sensitisation campaign should be introduced** to monitor, and check compliance with the agreed regulations.
- **More research** is needed to detail further the impacts of the trade in used HDVs on the environment, economy, and road safety. This research could also target cost-benefit analyses on regulations that could improve the quality of used HDV imports in importing countries.
- **Better quality and more accessible data is needed** to improve future analysis. Data from both used HDVs importing and exporting countries is not easily accessible and at times not segregated for used and new HDVs. Digital platforms where such data could be easily shared should be encouraged.
- **Cleaner, low carbon soot-free buses for the planned bus rapid transit corridors in cities in developing countries should be encouraged** as they can provide opportunities to leapfrog to cleaner bus standards, including electric buses.
- **Green freight strategies are needed** as freight are a major contributor to emissions and road accidents.

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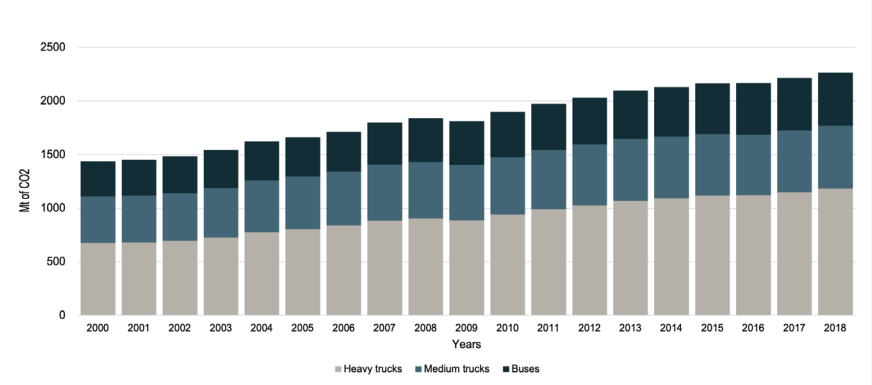
Introduction

1. Introduction

Global sale of new and used heavy-duty vehicles (HDVs), has increased at an annual rate of 4.6% since 2000, from 3.2 million units in 2000 to nearly 6.3 million units in 2015 (IEA 2021). In 2020, about 2.9 million (Divis 2020) units of new HDVs were sold compared to 3.4 million units in 2015, meaning a 14.7% percent drop in demand for new commercial vehicles during the 2020 Covid-19 pandemic year. HDV registrations and activity (vehicle kilometre travel) increased at an annual rate of 2.3% & 3.1% respectively from 2000 to 2015, generating high economic benefits due to increased freight and passenger transport. Subsequently, the global HDV tailpipe CO2 emissions have increased by 2.6% per year from 2000 to 2018 (as shown in figure 4 below), with trucks being responsible for more than 80% of this growth (IEA 2021).

FIGURE 4. Global CO_2 emissions from trucks and buses (2000-2018)



Source: *IEA (2021), Net Zero by 2050, IEA, Paris https://www.iea.org/reports/net-zero-by-2050*

In many developing countries, used HDV imports make up a significant share of additional HDVs registered annually. However, there is hardly any attempt to understand their environmental consequences. This report attempts to gather, analyse, and presents the first overview of the global trade in used HDVs, including the flow, scale and regulation for environmental compliance in importing countries.

This report details the complex supply chains, magnitude, and the physical 'flows' of used HDVs from exporting to importing markets. The report also collates and evaluates the regulatory environments in 146 countries, which influences the flow and quality of used HDVs. The flow of used HDVs is usually from higher-income countries to lower-income developing markets that are motorising rapidly. Regulations on "direction of drive" -whether a country is left or right-hand drive, has a significant impact on the source and destination of the used HDVs. The HDV flows occur significantly between Japan and countries mainly in Africa and Asia-Pacific that drive on the left-hand side of the road, while the European Union (EU), United States of America (US) and Mexico export used HDVs to countries in Africa, Latin American, Central Asian and the Middle East that drive on the right-hand side of the road.

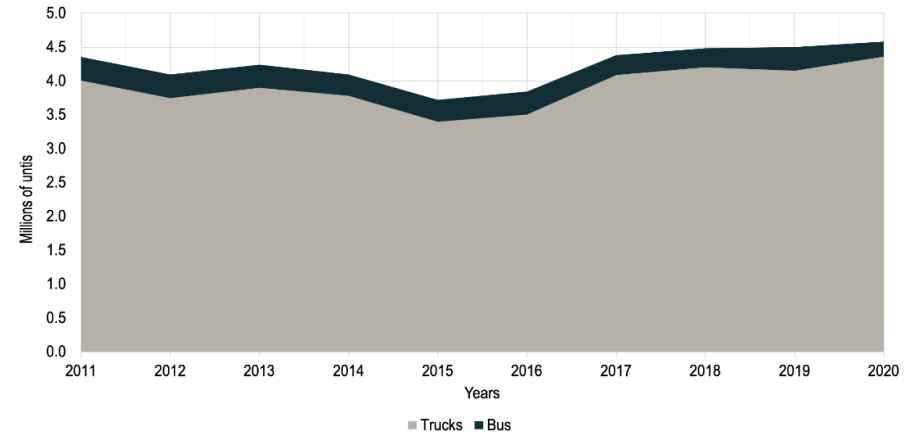
Heavy duty vehicles and engines are a major source of exhaust emissions (Lingzhi Jin *et al*. 2021), globally accounting for 44% of on-road nitrogen oxides (NOx) emissions and 63 % of on-road particulate matter (PM 2.5) in 2015 (ICCT 2023). They are also a major source of black carbon emissions, a short-lived climate pollutant. The adoption of Euro VI equivalent vehicle emission standards coupled with cleaner fuels (10 parts per million sulphur fuels) could result in 300 -700 thousand avoided premature deaths by 2030. UNEP and the Climate and Clean Air Coalition (CCAC) are leading in the implementation of low sulphur fuels and the adoption of cleaner HDVs technologies in developing and transitional countries.

International Flow of HDVs

Statistics from the International Organisation of Motor Vehicle Manufacturers (OICA) reveals that the total number of HDVs manufactured globally increased at an annual rate of 0.6% over the last decade, from 4.3 million units in 2011 to 4.6 million units in 2020 (figure 5). The top 5 major manufacturers of HDVs in 2020 included – China (67%), Japan (9%), USA (5%), India (3%) and Mexico (3%), with close to 83% of HDVs manufactured in the Asia-Pacific Region and 95% of HDVs manufactured being trucks. The global HDV manufacturing market shifted from Western Europe and North America to emerging economies in the last two decades. In terms of sales, the International Energy Agency has reported that in 2015, 6.3 million new and used HDVs were sold globally (IEA 2017). The importance of used HDVs to total HDV sales can be estimated by comparing the total sale of new and used HDVs to the proportion of newly manufactured HDV units. In 2015, 3.4 million HDVs were manufactured globally while 6.3 million used and new HDVs units were sold, indicating a significant share of used HDVs in global HDV sales (46%).

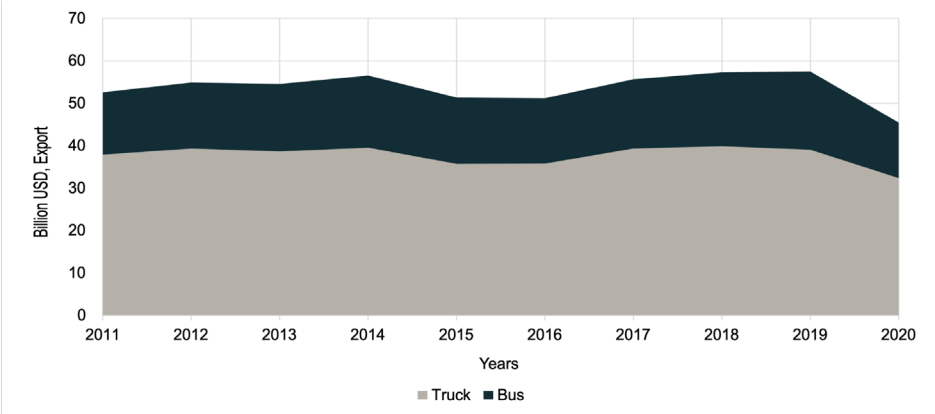
In 2020, the global trade of all vehicle types was worth 1.2 trillion US$. The international trade of HDVs (new and used) was about 45 billion US$ (figure 6). Thus, the export of HDVs constitutes a small fraction of the total trade of vehicles, i.e., about 3.6% of the total value of the automotive trade. Furthermore, of the total HDV trade (in $), buses constitute only about 30%.

FIGURE 5. Total number of HDV units manufactured globally



Source: *UNEP based on OICA, https://www.oica.net/production/*

FIGURE 6. Value of HDV Global Trade (Used + New)

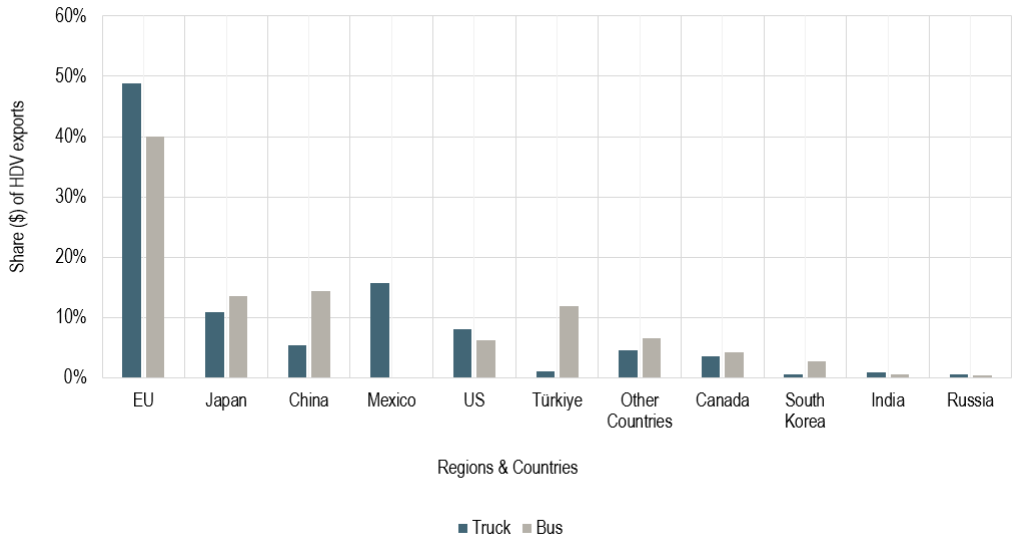


Source: *UNEP based on Trade Map (ITC UNCTAD/WTO (ITC)), https://www.intracen.org/*

The major exporters of HDVs (used & new) are the EU, Japan, Republic of Korea (ROK), Mexico, the US, and China. However, while China manufactures 67% of global HDVs, its share of used HDV exports was only 8% in 2020, see figure 7. This is changing rapidly as the policy to expand trade in used vehicles is being implemented and from 2022 more than 30 cities in China have been approved to export used vehicles globally. Countries along the "Belt and Road[1]" are the main used vehicle importers from China. The EU exported about 46% of used HDVs (2020) [2] while contributing to about 6% of global HDVs manufacturing. Thus, while the worldwide HDV manufacturing market shifted from Western Europe and North America to emerging economies in the last two decades, currently the exporters of used HDVs are primarily high-income economies.

Data on used HDVs is not publicly available globally. UNEP has collated used HDV information from the EU, ROK and Japan that together contribute to about 60% of total used and new HDV exports. Segregated data for used HDVs exports from the US was not available. This report provides a comprehensive overview of the global flows of used HDVs between 2015 and 2020 to the five regional markets (Africa; Asia- Pacific; Eastern Europe, the Caucasus, and Central Asia; Latin America and the Caribbean; and the Middle East) from the three main used HDVs exporters namely, the EU, ROK and Japan.

FIGURE 7.Global Share ($) of HDV Exports - New and Used (2020)



Source: *UNEP based on Trade Map (ITC UNCTAD/WTO (ITC)), https://www.intracen.org/*

1 The Belt and Road Initiative is a China-led effort to promote economic development and inter-regional connectivity in over 115 countries.
2 In 2019, China and EU's share in HDV manufacturing was 52% and 7% while their share in used HDV export was 7.8% and 43.5% respectively

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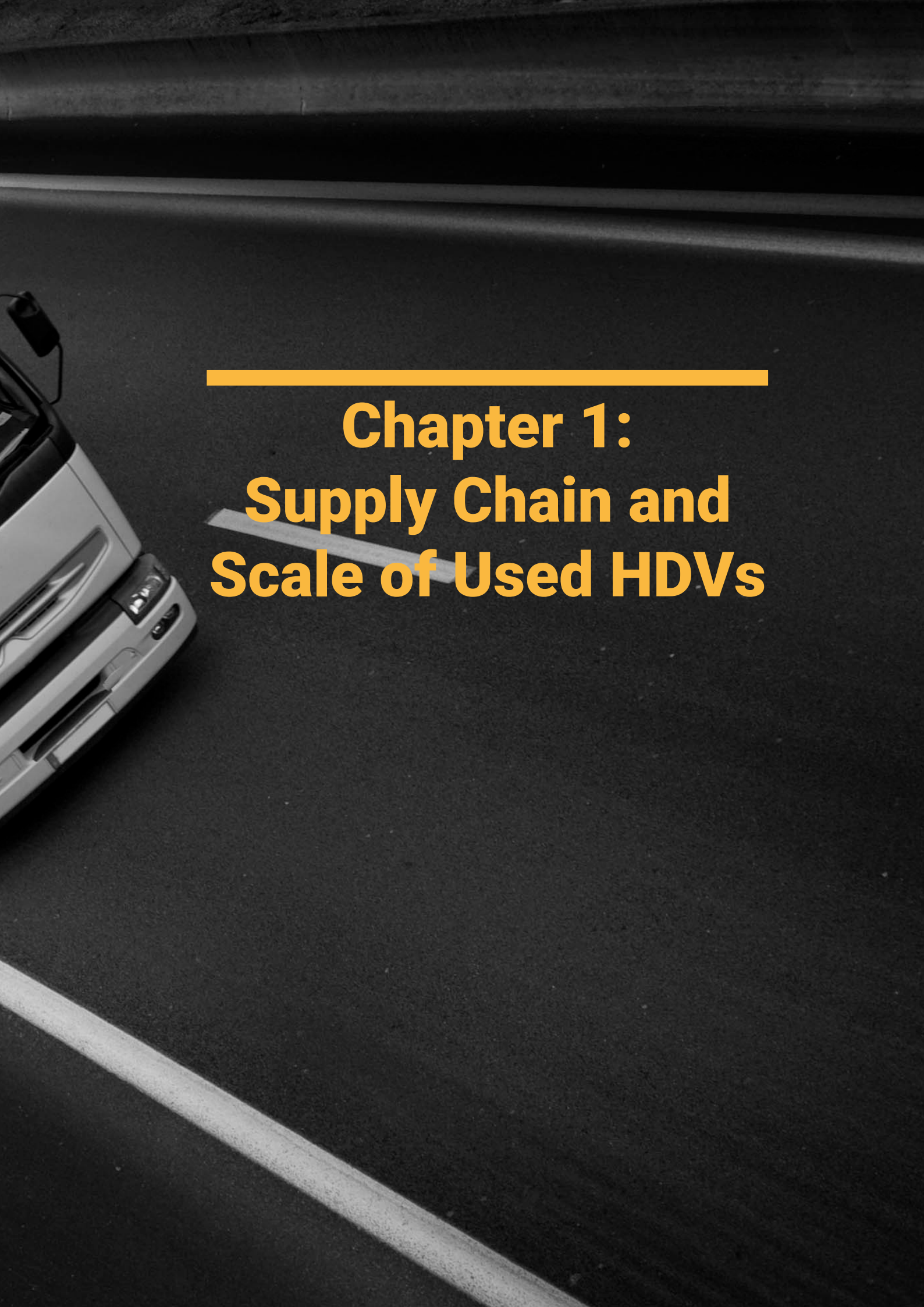


Chapter 1: Supply Chain and Scale of Used HDVs

Supply Chain and Scale of Used HDVs

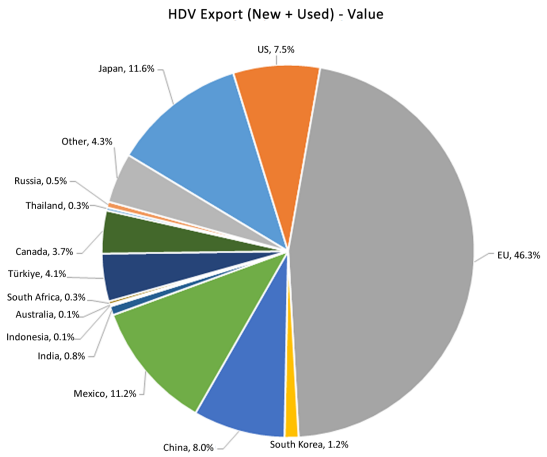
This chapter provides an overview of the three main global exporters of used HDVs: the EU, ROK and Japan (figure 8). These three major exporting markets have disaggregated export data for new and used HDVs and provide market size and the directional flow of used HDV exports to Africa, Asia-Pacific, Eastern Europe, the Caucasus and Central Asia (EECCA), Latin America and the Caribbean, and the Middle East. At the time of the study, data on exports of used HDVs from the US, Mexico and China was not available.

The data used in this report was collected for 2015-2020[3] from the following websites - European Commission's Eurostat Comext Database, Korea International Trade Agency (KITA) and the Japanese International Auto Trade Association (iATA). The three major exporters are all high-income economies with significant HDV manufacturing capacity, consolidated markets, leading technology standards, innovating logistics industry with international best practices, stringent environmental regulations, and well-developed vehicle inspection and maintenance regimes. However, HDV ownership levels are primarily saturated. Hence, a significant share of new HDV sales does not add to total HDV stock but rather replaces older HDVs.

In the HDV exporting economies considered in the analysis, fuel and maintenance costs dominate the total cost of ownership. At the same time, the purchase price is crucial in developing economies, creating a demand for the trade of used HDVs with some useful economic life remaining. Thus, the high rates of HDV replacement in exporting markets create a continuous supply of used HDVs for importing lower-income markets. Despite formal HDV scrappage schemes and End of Life Vehicles (ELV) directives promoting circular economy in the EU, Japan, ROK and China (Sakai, Si., Yoshida, H., Hiratsuka, J. *et al.* 2014), there are studies that show illegal shipment of end-of-life vehicles destined for scrappage to Africa, Asia, Latin America, and Eastern Europe (UNEP 2020) causing material loss for the countries' circular economy goals and dumping of poor quality used vehicles.

The trade of used HDVs has a dynamic landscape and will continue to evolve with regulations in both exporting and importing markets.

FIGURE 8. New and used HDV exports from 2015-2020



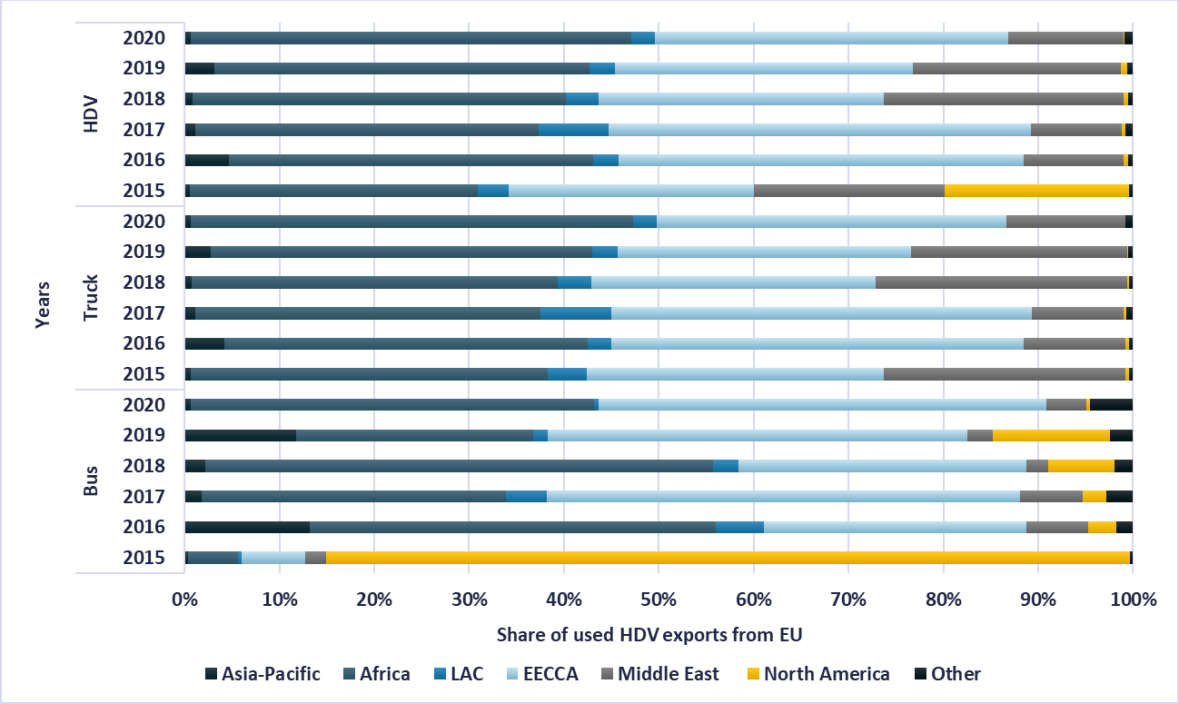
1.1 European Union (EU)

Between 2015 - 2019, the value of used HDV trade increased at an annual rate of 1.7%. In 2020, close to 248,500 units of used HDVs worth US$ 5.5 billion were exported. In this same year, the value of used HDVs trade increased by 70% despite the number of units decreasing by 39%, this could be explained by the COVID-19 pandemic. Over the 2015-2020 period, the EU exported close to 1 million used HDVs (75,000 used buses and 898,000 used trucks). In addition, 1 million used HDVs were traded within the EU. Used HDVs exported from, and traded within the EU together had a value of US$ 21 billion.

About 45% of the used HDVs were exported to developing countries. Since 2015, the EU has exported around 75,000 buses and about 898,000 trucks to developing regions. For every single used bus shipped, 12 used trucks were exported from the EU. The top destinations for EU exports are West Africa and the EECCA block (Eastern Europe, Caucasus, and Central Asia), matching the trade supply chain of used light-duty vehicles (UNEP 2020). The top 10 countries that the EU exports used HDVs to (in units) are – Jordan, Nigeria, Saudi Arabia, Serbia, Russian Federation, United Republic of Tanzania, Zimbabwe, Guinea, Afghanistan and Kazakhstan (see figure 10 below).

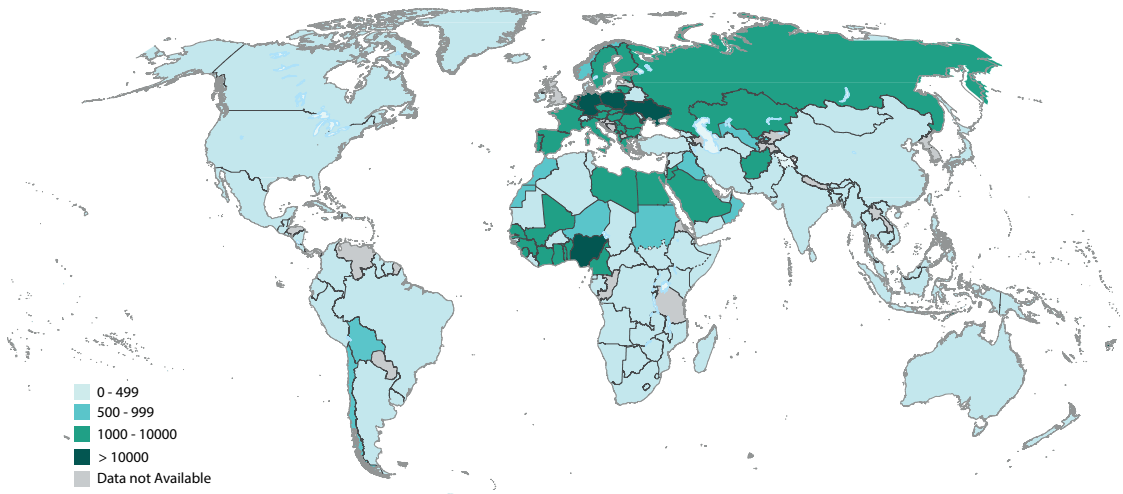
3 Data from Japan was collected for 2015-2020 and covers 97 per cent of Japanese total worldwide exports (top 50 countries)

FIGURE 9. Export of used HDVs from the EU by region from 2015-2020



Source: UNEP based on European Commission's Eurostat Comext Database, http://epp.eurostat.ec.europa.eu/newxtweb/

FIGURE 10. Main Destination Markets for Used HDVs from the EU in 2020 (units)



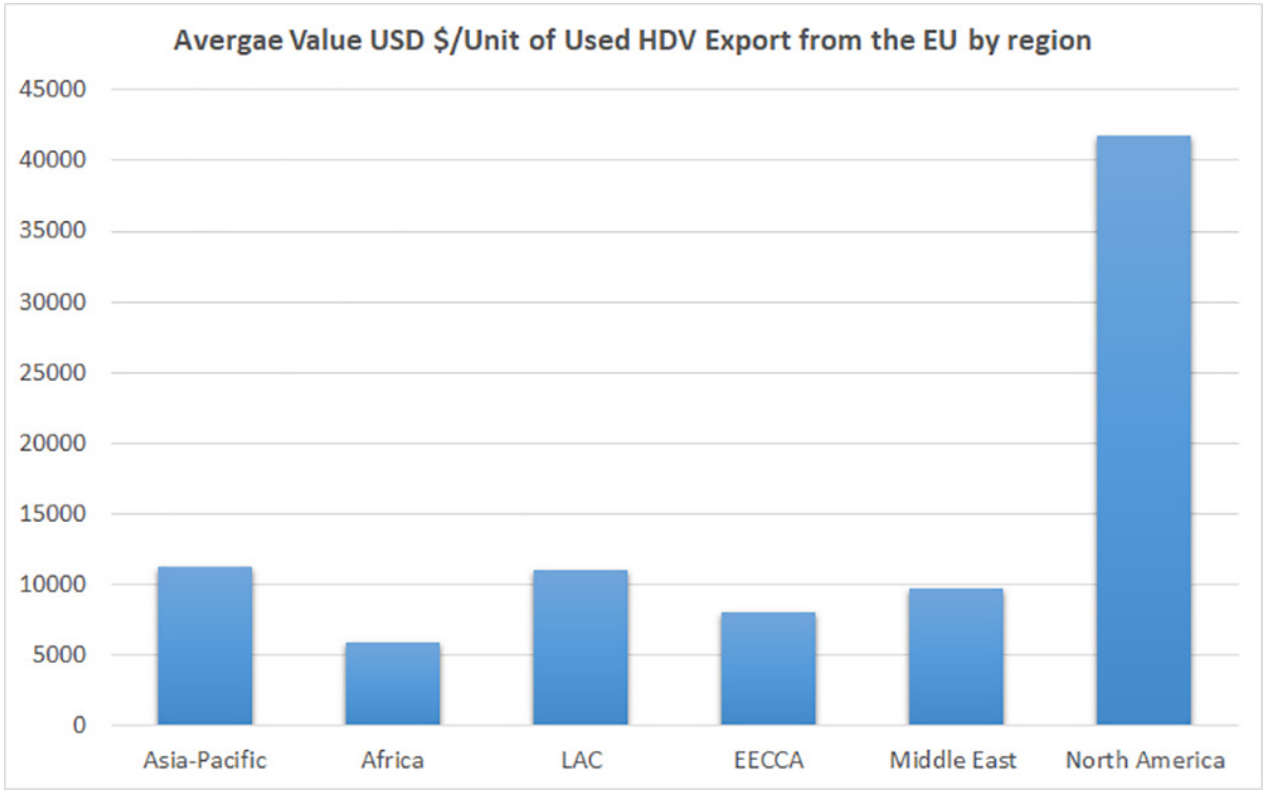
Source: UNEP based on European Commission's Eurostat Comext Database, http://epp.eurostat.ec.europa.eu/newxtweb/

The Eurostat Comext Database data does not include the level of detail necessary to determine the quality of the traded used vehicles in terms of environmental and safety specifications, only the quantity (figure 10). For example, vehicle specifications like type, model year, emission and safety ratings are not reported. However, several broad inferences can be made by combining the historical trade data with other statistics, as summarised below:

- 97% and 73% of all newly registered trucks and buses respectively in the EU run on diesel (ACEA 2021). Electrically chargeable trucks accounted for about 0.4% of all new trucks registered across the European Union, indicating that the trade of used HDVs to developing countries are predominantly diesel fuel based.

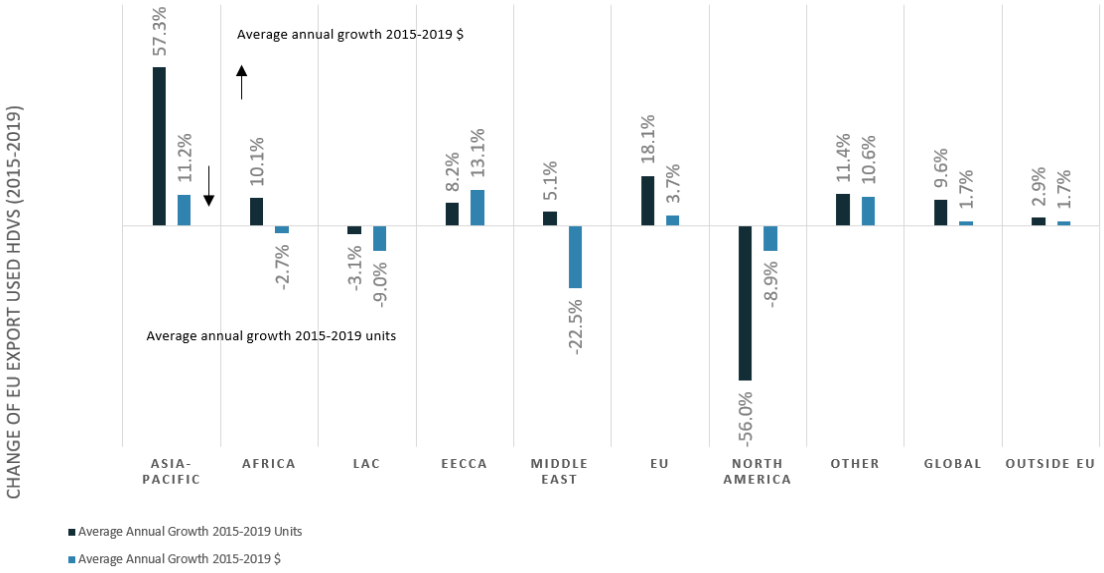
- The cheapest HDVs are exported to Africa. In 2020, the average price of a used HDV in Africa was close to US$5,900 while it was US$11,200 in Asia Pacific, US$11,100 in Latin America and the Caribbean, US$8,000 in EECCA block (Eastern Europe, Caucasus, and Central Asia) and US$9,700 in the Middle East (figure 11). Such a significant price difference could point to several factors – the HDVs exported to Africa could be of lower quality, poor technology penetration and fuel efficiency or lower gross weight. Further, considering that the value of HDV depreciates with age, there is also a possibility that the oldest HDVs are exported to Africa. In contrast, relatively newer HDVs are exported to other regions.
- In 2019, the average age of the bus and truck in operation in the EU was about 12 and 13 years (ACEA 2021) respectively. In 2000 it was about 9 and 7 years (EEA 2021) respectively. Considering that the average age of the HDVs on European roads is increasing, the used-HDV trade could consist of a significant share of trucks with little economic life remaining.
- Before the COVID-19 pandemic, the increase in value of used HDV exports to the Asia Pacific, Africa, Latin America and the Caribbean, and the Middle East was not commensurate with the number of units exported, indicating that the efficiency and quality of the used HDVs was decreasing over time, while the average age of exports was most probably increasing (figure 12). In contrast, in the EECCA block (Eastern Europe, Caucasus, and Central Asia) and North America, the average trade value has risen more than the average number of units imported, suggesting better quality HDVs being imported in these regions due to change in consumer demand and regulatory environment.

FIGURE 11. Average Value US$/Unit of used HDV exports from the EU by region



Source: *UNEP based on European Commission's Eurostat Comext Database, http://epp.eurostat.ec.europa.eu/newxtweb/*

FIGURE 12. Average annual growth in EU Used HDVs Exports by Region (2015-2019)



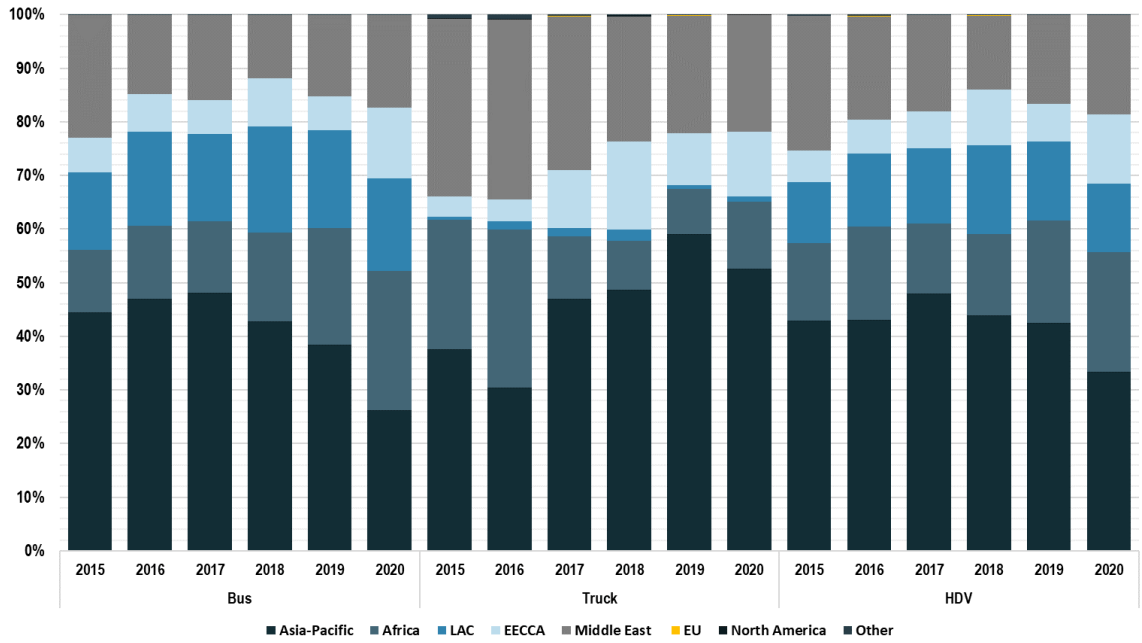
Source: *UNEP based on European Commission's Eurostat Comext Database, http://epp.eurostat.ec.europa.eu/newxtweb/*

1.2 Republic of Korea

In 2019, the Republic of Korea (ROK) earned a total of US$1.7bn (MarketLine 2021) from the HDV market, consisting of 1.14 million HDV units or 5.2% of the total registered vehicles in ROK. The HDV market comprises buses, trucks, and tractors which represent 17.6%, 78%, and 4.4% of the vehicles market respectively (Jigu S., Hyungjun K., Sungwook P. 2018). In 2020, close to 18,000 used HDVs worth just over US$ 100 million were exported. Over the 2015-2020 period, the ROK exported about 134,000 used HDVs worth US$ 850 million globally, comprising about 106,000 used buses and about 28,000 used trucks. Thus, for every single used truck shipped, close to 4 used buses were exported. Therefore, the used HDV export market is very different from the local HDV composition, which is comprised of 18% buses and 82% trucks and tractors.

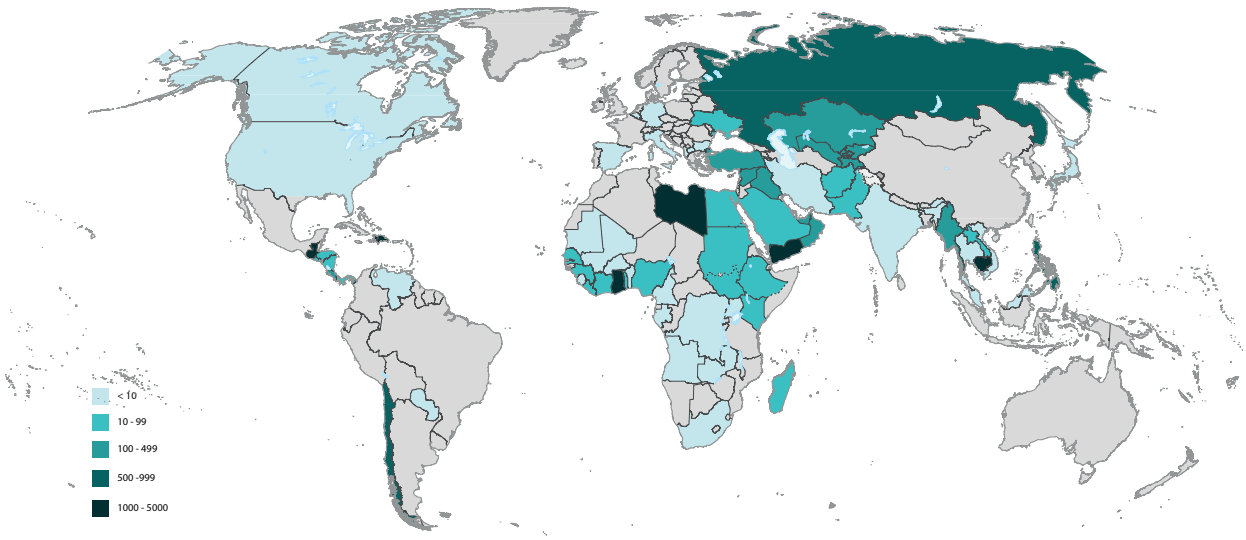
Between 2015-2019, the value of the used HDV trade decreased at an annual rate of 2.1%. In contrast, used HDV exports in units increased at an annual rate of 3.8%. In 2020, due to the COVID-19 pandemic, the value of used HDV trade decreased by 34%, while the number of units decreased by 28%. The top destination for used HDV exports from ROK is the Asia-Pacific region, which accounts for about 42% of the exports, followed by Middle East (18.5%), West Africa (16.9%) and the EECCA block (8.2%). The top 10 used HDVs importing countries (in units) are – Cambodia, Ghana, Jordan, Libya, Yemen, Guatemala, Mongolia, Philippines, Russia, and Chile. In 2020, due to the COVID-19 pandemic, the HDV trade decreased across all the regions except the EECCA region (Eastern Europe, Caucasus, and Central Asia), where imports increased by 32% (units). The trade in used HDVs from ROK is highly concentrated to a few countries, with the top 10 importing countries accounting for 76% of the total exports (see figures 13 & 14 for regional and country overview).

FIGURE 13. Export of Used HDVs from ROK (2015-2020)



Source : UNEP based on Korea International Trade Agency (KITA), http://www.kita.org/

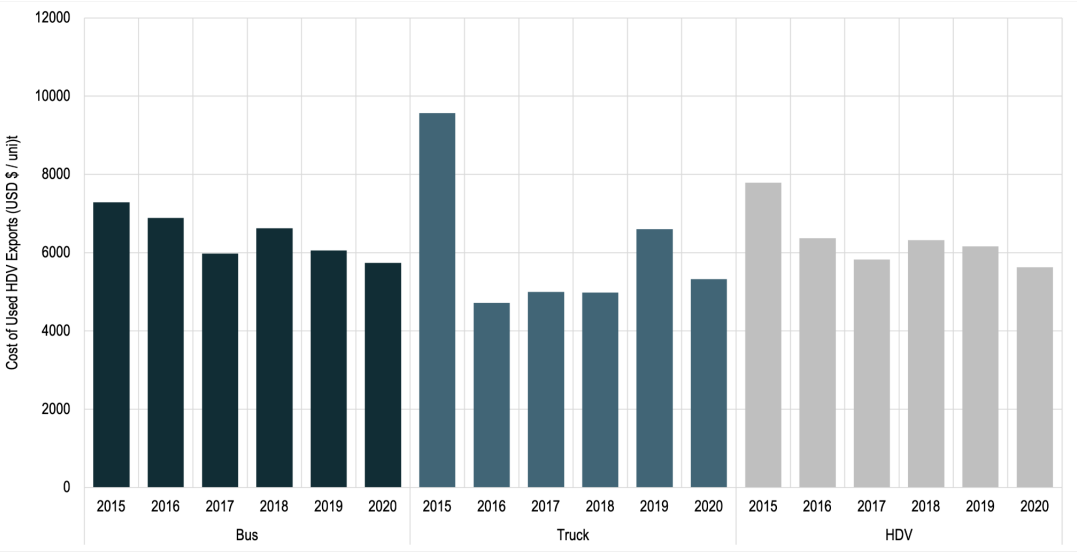
FIGURE 14. Used HDVs and Flow to Main Destination Markets from the ROK in 2020 (units)



Source: *UNEP based on Korea International Trade Agency (KITA), http://www.kita.org/*

Over the 2015-2020 period, the average price of HDVs exported from the ROK has reduced from about US$7,800 to about US$5,600 (figure 15). This reduction could be due to a variety of reasons - increase in age, lower gross weight, lower quality, poor technology penetration and fuel efficiency or simply lower margins due to increased competition from other exporters. Most exports are diesel-powered used HDVs (USITC 2018). ROK has established a target to achieve 1.8 million fuel-cell electric vehicles (FCEVs) on their roads by 2030 (Amir 2019). To achieve its targets, the government has increased subsidies and has mandated local government units to increase the number of fuel-cell electric buses to 2,000 by 2022. In 2020, ROK started exports of new FCEV HDVs to Europe (Kotaro Hosokawa 2020).

FIGURE 15. Unit Cost of used HDV exported by ROK (US$/Unit)



Source : UNEP based on Korea International Trade Agency (KITA), http://www.kita.org/

1.3 Japan

Japan is the largest exporter of used HDVs. Over the period 2015-2020, Japan exported around 1.3 million used HDVs. Between 2015 to 2019, export of used HDVs from Japan reduced by about 3% annually. In 2020, used HDV export further reduced by about 16% due to the COVID-19 impact. Over the 2015-2020 period, Japan exported about 67,000 used buses and about 1.2 million used trucks. Thus, for every single used bus shipped, close to 18 used trucks were exported. The top 5 used HDVs importing countries in 2015-2020 are the Philippines, United Arab Emirates (UAE), United Republic of Tanzania, Nigeria, and Myanmar. Some of these countries re-export these used HDVs to other countries, for example the UAE re-exports used HDVs to Africa and Chile to Paraguay.

TABLE 1: Top 10 Developing Countries Importing used HDVs from Japan

2015	2016	2017	2018	2019	2020
MYANMAR	MYANMAR	MYANMAR	PHILIPPINES	PHILIPPINES	NIGERIA
PHILIPPINES	PHILIPPINES	PHILIPPINES	UNITED ARAB EMIRATES	UNITED ARAB EMIRATES	MYANMAR
UNITED ARAB EMIRATES	UNITED ARAB EMIRATES	UNITED ARAB EMIRATES	MYANMAR	MYANMAR	KENYA
KENYA	PAKISTAN	SOUTH AFRICA	SOUTH AFRICA	UNITED REPUBLIC OF TANZANIA	CHILE
SOUTH AFRICA	KENYA	PAKISTAN	UNITED REPUBLIC OF TANZANIA	KENYA	MONGOLIA
SRI LANKA	UNITED REPUBLIC OF TANZANIA	UNITED REPUBLIC OF TANZANIA	KENYA	SOUTH AFRICA	MOZAMBIQUE
UNITED REPUBLIC OF TANZANIA	CHILE	KENYA	CHILE	CHILE	JAMAICA
UGANDA	SOUTH AFRICA	SRI LANKA	PAKISTAN	NIGERIA	DEMOCRATIC REPUBLIC OF CONGO
CHILE	UGANDA	UGANDA	UGANDA	SRI LANKA	BANGLADESH
PAKISTAN	BANGLADESH	CHILE	SRI LANKA	UGANDA	PAKISTAN

Source : UNEP based on International Auto Trade Association (iATA) www.iata-odo.jp

1.4 Global Supply of Used HDVs by Combining Exports from EU, Japan and Republic of Korea

Between 2015 to 2020, the EU, Japan, and the ROK together exported about 2.4 million used HDVs. The export trend indicates peaking of trade of used HDVs in 2018 and a reduction since then. A significant share of used HDVs were exported to high income or upper-middle-income countries, i.e., 60% of total import in 2015 to 2020. Among the regions, one-third of the total used HDV trade was absorbed within the EU, 20% each by Africa and the Asia-Pacific regions, and the rest in the other areas (figure 16). The share of buses and trucks in total used HDV exports between 2015 to 2020 was 10% and 90%, respectively.

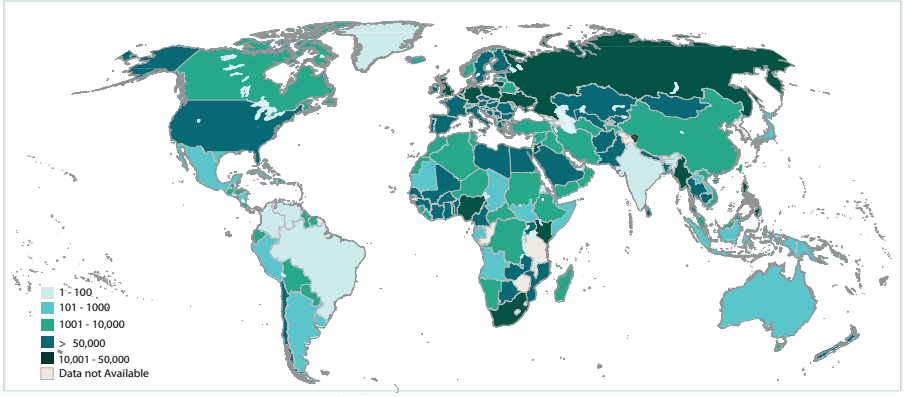
The share of buses and trucks in total used HDV exports between 2015 to 2020 was 10% and 90%, respectively.

TABLE 2: Top 10 Countries Importing used HDVs from EU, Japan & Republic of Korea

2015	2016	2017	2018	2019	2020
MYANMAR	MYANMAR	MYANMAR	JORDAN	PHILIPPINES	NIGERIA
UNITED ARAB EMIRATES	UKRAINE	PHILIPPINES	PHILIPPINES	SAUDI ARABIA	UKRAINE
PHILIPPINES	PHILIPPINES	UNITED ARAB EMIRATES	TANZANIA	UNITED ARAB EMIRATES	MYANMAR
UNITED STATES	UNITED ARAB EMIRATES	RUSSIAN FEDERATION	UNITED ARAB EMIRATES	TANZANIA	KENYA
JORDAN	NIGERIA	UKRAINE	MYANMAR	NIGERIA	JORDAN
UKRAINE	RUSSIAN FEDERATION	SOUTH AFRICA	SERBIA	UKRAINE	CHILE
KENYA	JORDAN	PAKISTAN	UKRAINE	MYANMAR	KAZAKHSTAN
NIGERIA	SINGAPORE	TANZANIA	ZIMBABWE	RUSSIAN FEDERATION	MONGOLIA
RUSSIAN FEDERATION	KENYA	KENYA	RUSSIAN FEDERATION	ZIMBABWE	LIBYA
SOUTH AFRICA	PAKISTAN	NIGERIA	NIGERIA	KENYA	GUINEA

Source : UNEP based on International Auto Trade Association (iATA), Korea International Trade Agency (KITA), European Commission's Eurostat Comext Database

FIGURE 16. Main Destination of Used HDVs by Volume from the EU, Japan and ROK (2015-2020)



Source : UNEP based on International Auto Trade Association (iATA), Korea International Trade Agency (KITA), European Commission's Eurostat Comext Database

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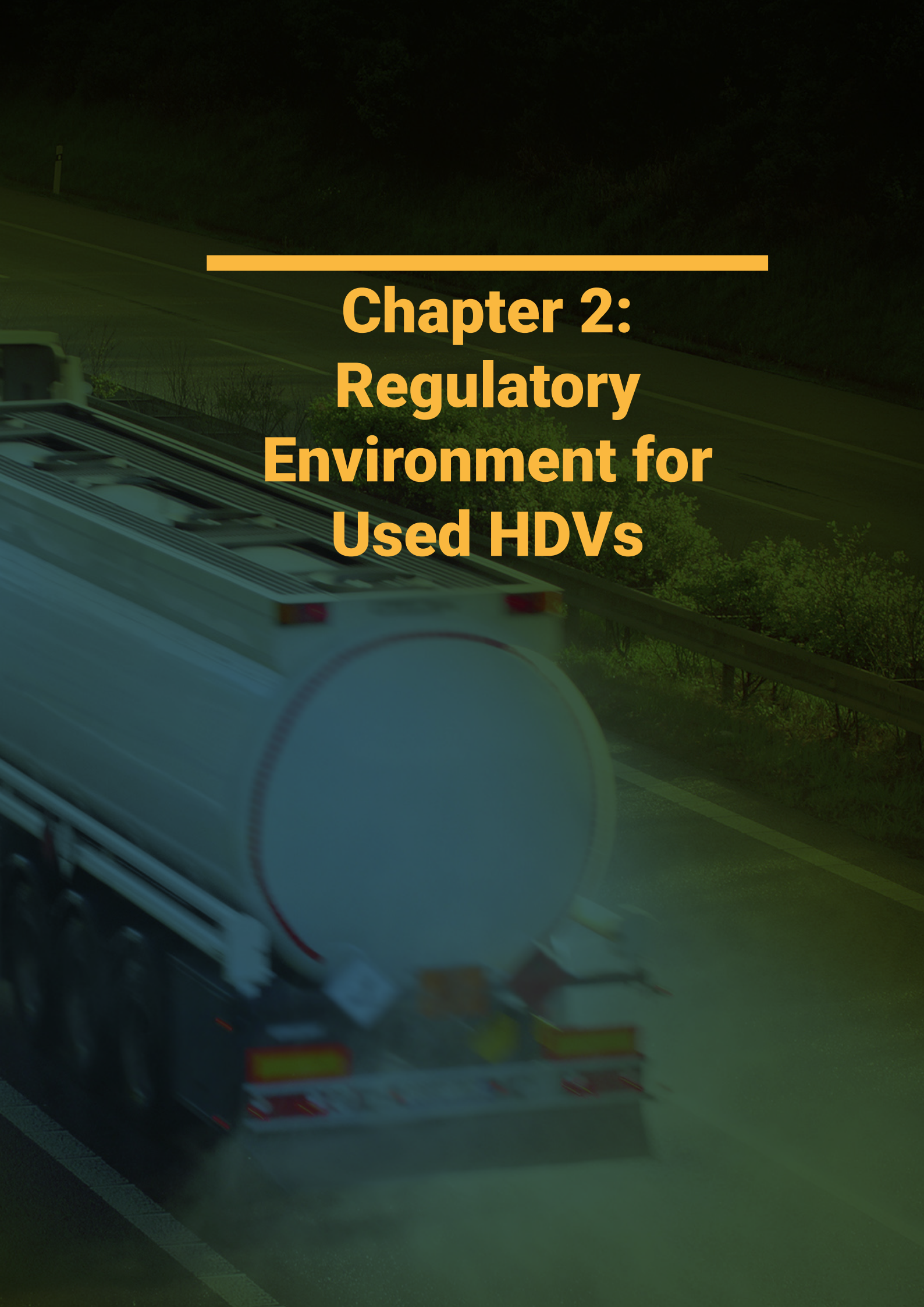


Chapter 2: Regulatory Environment for Used HDVs

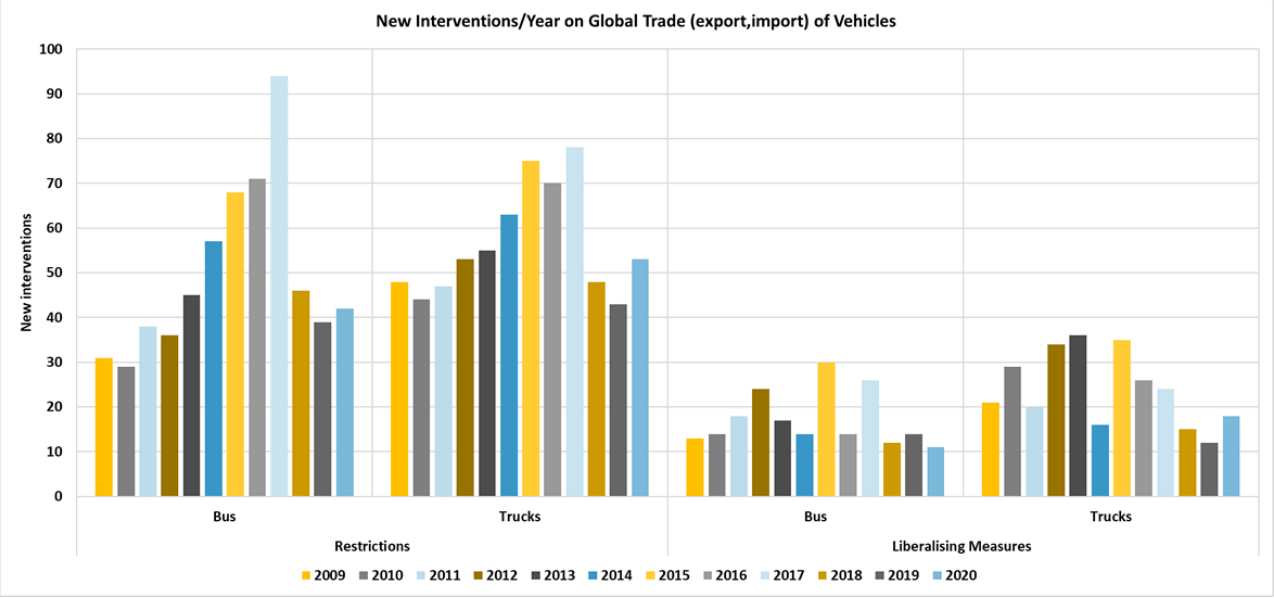
The Global Regulatory Environment analyzes current national and (sub) regional regulatory environments as well as policy measures that seek to incentivize cleaner, more energy-efficient used HDVs.

Regulatory Environment for Used HDVs

Developing countries prefer used HDVs mainly due to their affordability. A general observation from the analysis is that the quality of HDVs traded globally has improved over time. The Global Trade Alert (GTA) records that in the last decade, there have been increasing interventions restricting trade (export & import) when compared with those empowering trade of HDVs (figure 17). The interventions restricting trade increased until 2017 and since then have reduced. However, regulations empowering the trade of HDVs have not correspondingly increased to facilitate trade. While the GTA interventions are not deconstructed into the new HDVs and used HDVs, this chapter provides an overview of the current regulations in 146 countries, majority of whom allow import of used HDVs (18 countries have banned used HDVs import).

The regulatory environment for import of used HDVs can take multiple forms – from complete used HDV bans, age restrictions, fiscal incentives, to labelling and consumer information requirements. Sometimes regulations are harmonised at regional and sub-regional level. However, many times there are vast differences regarding harmonisation, implementation, and enforcement of these regulations at national level. The challenge of used HDVs is not often prioritised in global, regional, and national strategies for air pollution control, climate mitigation and improved road safety. For example, in the current nationally determined contributions (NDCs) and Long-Term Strategies, used vehicle import is considered only in two countries, i.e., Sierra Leone and Suriname. However, several other proposed strategies and regulations can indirectly influence the trade of used HDVs (Table 3).

FIGURE 17. New Interventions/Year on Global Trade (export & import) of HDVs



Source : UNEP based on https://www.globaltradealert.org/

TABLE 3: Policies and Regulations in Nationally Determined Contributions Influencing Used HDV Import

Import Restrictions	Sierra Leone, Suriname
Electric Vehicles	Austria, Azerbaijan, Barbados, Belize, Bhutan, Canada, Cape Verde, Chile, Congo, Costa Rica, Denmark, Dominican Republic, Ethiopia, Honduras, Israel, Japan, Mexico, Norway, Panama, Qatar, Rwanda, Seychelles, Sierra Leone, Slovakia, Sri Lanka, Switzerland, Ukraine, Vanuatu, Viet Nam, EU
Other Alternate Fuels	Angola, Austria, Chile, Costa Rica, Denmark, Dominican Republic, France, Japan, Nigeria, Sierra Leone, Slovakia, Switzerland, Viet Nam, EU
Taxation/Incentives	Fiji, Korea, Republic Of (South Korea), Panama, Slovakia, Sweden, United Kingdom
I&M	Belize, Dominican Republic, Morocco, Nigeria, Sierra Leone, Viet Nam
Energy Efficiency standards	Austria, Belize, Canada, Denmark, France, Japan, South Korea, Nigeria, Slovakia, South Africa, Sweden, Switzerland, Viet Nam, EU
Emission Standard & Fuel Quality	Canada, Costa Rica, Slovakia, Viet Nam
Green HDV Procurement	Barbados, Denmark, Slovakia
Vehicle Scrappage	Argentina, Costa Rica, Denmark, Dominican Republic
General HDV improvements	Nigeria
Diesel ban	Canada, Denmark

Source: Compiled by UNEP, based on https://changing-transport.org/about-the-database/

In this report, 146 countries are surveyed to understand the typology of measures implemented to regulate the import and modal purpose of used HDVs. From the 146 countries reviewed [4], 123 countries accounting for 84 per cent have some measures to regulate used HDV imports. The report assumes that all adopted standards at national and regional level are fully implemented.

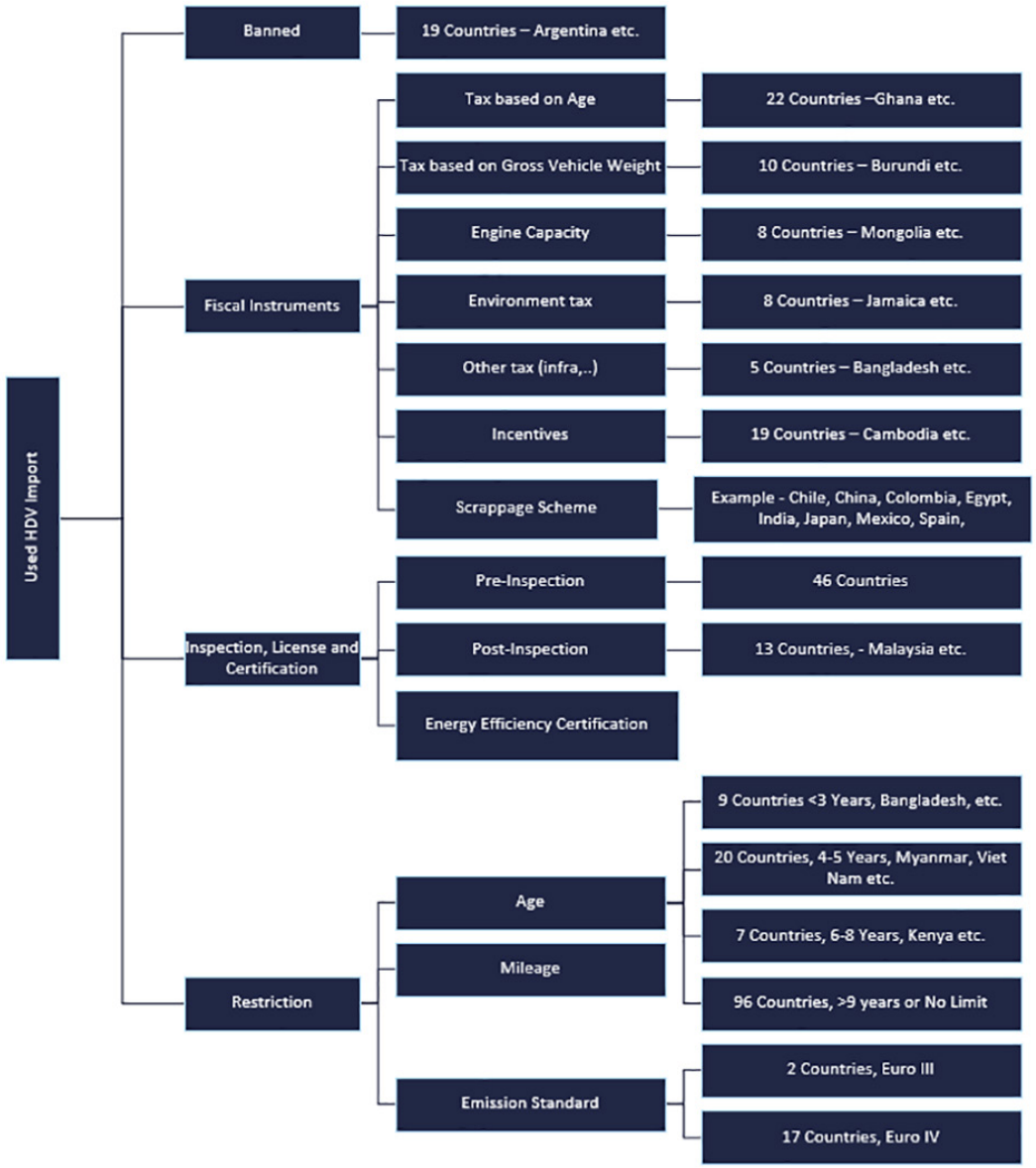
The countries surveyed often do not use diverse sets of policy instruments to control vehicle intake (Figure 18). These policy instruments are discussed in detail in the next sections.

HDV policies may include:

- A complete ban on used HDVs entering the country;
- Age limit, whereby an HDV's model year must fall below a specified age/year before it can be registered locally;
- Emissions standard, whereby a vehicle must meet a minimum emissions standard (and by default, age). The most used global emissions-equivalent standard is the Euro standard;
- Fiscal instruments or (dis)incentives including differential customs and registration tariffs, e.g.
  - based on vehicle age, gross vehicle weight, occupancy/loading
  - based on vehicle emission standards or technology (e.g., VAT exemptions for hybrid, electric vehicles)
  - based on environmental, health, infrastructure taxes and incentives to trigger behavioural change (based on age/size, weight)
- Inspection regulations and minimum safety standards that include roadworthiness and crash ratings; and
- Other strategies such as selective technology ban, e.g. a ban on the import of diesel engines, communication instruments, the most common of which are vehicle labels (for both new and used vehicles) that include emission and fuel economy information, etc.

4 Data for this review comes from a variety of sources including UNEP, local customs websites, automotive companies websites, news reports. These sources are documented in the annexure.

FIGURE 18. Typology Example for Used HDV Import Regulations Adopted by Countries



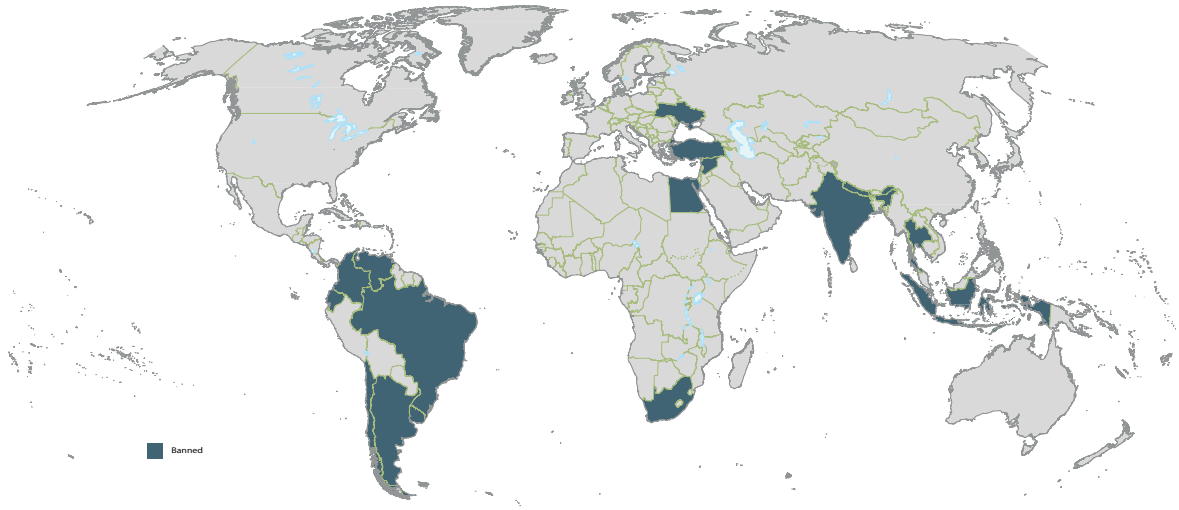
Source: *Compiled by UNEP, based on data collected from import countries, 2021*

2.1 Used HDV Import Bans

Out of the 146 countries surveyed, 18 have adopted a complete ban on imported used HDVs for various economic, environmental, and social considerations (figure 19). Most countries that have imposed a ban on used HDVs import have a local HDV manufacturing or assembling industry. However, a ban on used HDVs import does not necessarily translate to a good regulatory environment. This is because some countries that have banned import of used HDVs to protect their domestic manufacturing or assembling industry also have weak vehicle emission standards and policies. In addition, used HDV bans may result in HDV owners extending the length of ownership of their HDVs due to high purchase price[5] of new HDVs, thus negating any efficiency improvements, and environmental benefits from fleet renewal. For example, Ecuador and South Africa ban the import of used trucks while retaining emission standards of new HDVs at Euro II levels. In contrast, India complements a used vehicle import ban with Euro VI vehicle emission standard for newly registered HDVs.

5 Since older second-hand HDVs are cheaper than new HDVs.

FIGURE 19. Countries with Used Heavy Duty Vehicle Import Ban



Source: *Compiled by UNEP, based on data collected from import countries, 2021*

2.2 HDV Age Restrictions

Age restrictions are the most popular policy globally to regulate the import of used HDVs because they are easier to enforce than other regulations. Of the 146 countries surveyed, 80 have an age restriction on the importation of used HDVs, equivalent to about 55 percent. Currently, close to 21 percent of countries allow the import of used HDVs with a maximum age of five years, 28 percent allow HDVs above nine years and close to one-third do not impose any age restrictions.

Among the regions, 58 percent of countries in Asia-Pacific, 19 percent in Africa[6], 30 percent in Latin America & the Caribbean, 22 percent in Eastern Europe, Caucasus and Central Asia, and 82 percent of Middle East countries have an age restriction of 5 years or younger or a complete ban on import of used HDVs (figure 19 & 20).

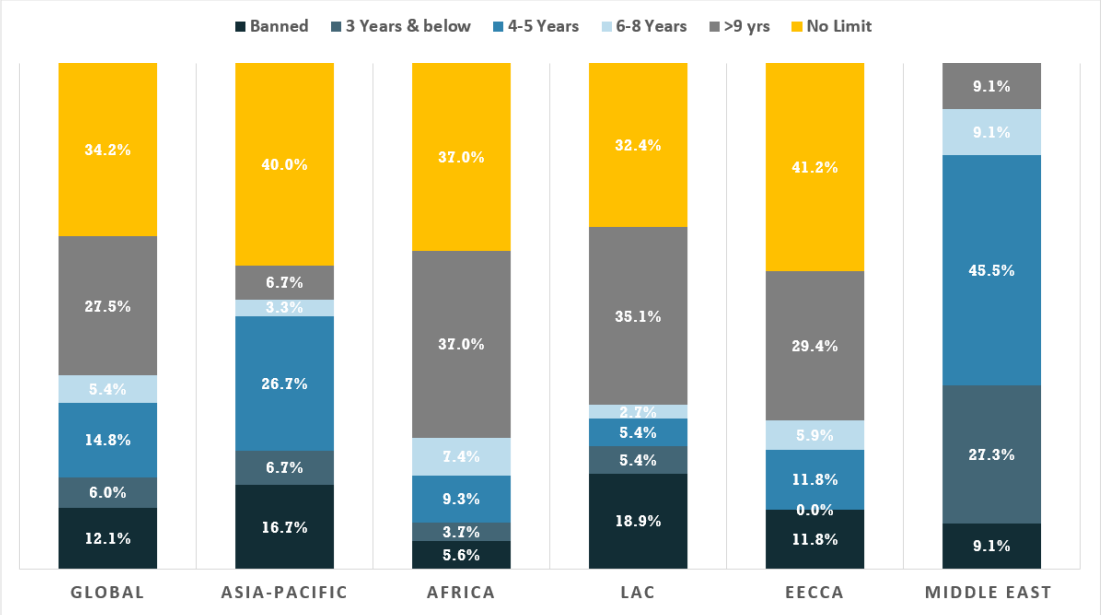
One action that could make an immediate impact on the used HDV market is exporting countries taking the lead and banning the export of HDVs that are close to the end of their economic mileage under the circular economy principle. However, no exporting country or region has implemented such legislation yet. In developing countries, there is a growing demand for regional harmonisation of legislations. For example, the 15 countries of the Economic Community of West African States (ECOWAS) have adopted a regional directive limiting the age for used HDVs to 10 years and five years for LDVs with a ten-year implementation period (CCAC 2020).

Used HDVs generally have higher emissions than used LDVs. However, developing countries often prioritise age restrictions for LDVs over HDVs due to cost considerations and availability of limited models from source markets. As a result, all the countries with age restrictions have used HDV age limits set higher than those for used LDVs, except in 24 countries. In contrast, HDV age restrictions are stricter in Bangladesh and Peru than for LDVs. Further, few countries impose age restrictions where stringency levels are relaxed for heavier vehicles. For example, in Sri Lanka, used buses have an age restriction of 3.5 years for buses with 10-12 seat capacity, five years for 13-24 seat capacity and ten years for more than 25 seat capacity.

In some countries, cleaner vehicles are exempted from strict age restrictions to encourage their purchase, for example, in Fiji, age restrictions for diesel vehicles is five years or lower. In contrast, alternative fuel-powered vehicles such as LPG, CNG, Solar, Electric, and Hybrid can be imported at eight years or more.

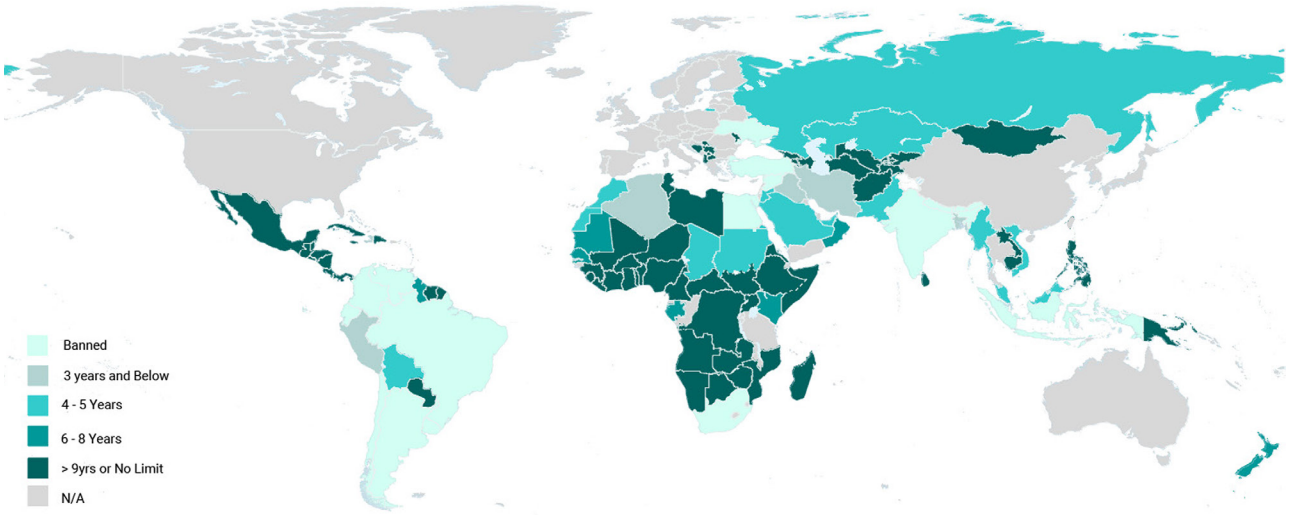
6 Mainly due to ECOWAS (West Africa) although Directive not fully implemented

FIGURE 20. Used Heavy Duty Vehicles Age Restriction



Source: *Compiled by UNEP, based on data collected from import countries, 2021*

FIGURE 21. Used Heavy Duty Vehicles Age Restriction Map

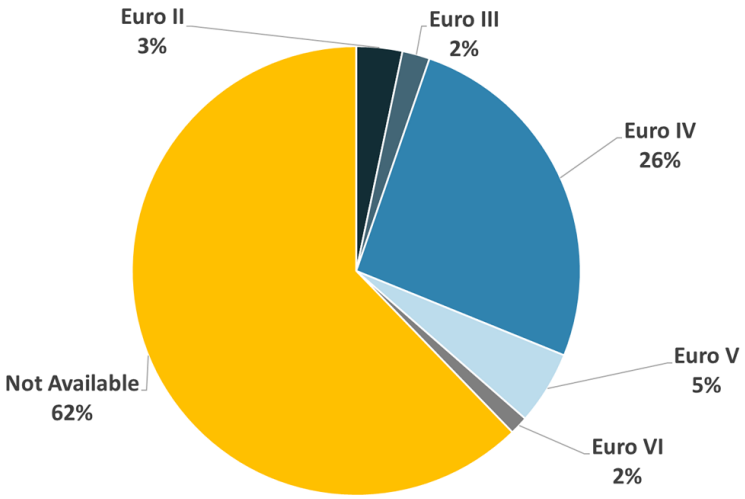


Source: *Compiled by UNEP, based on data collected from import countries, 2021*

2.3 HDV Emissions Standards Restrictions

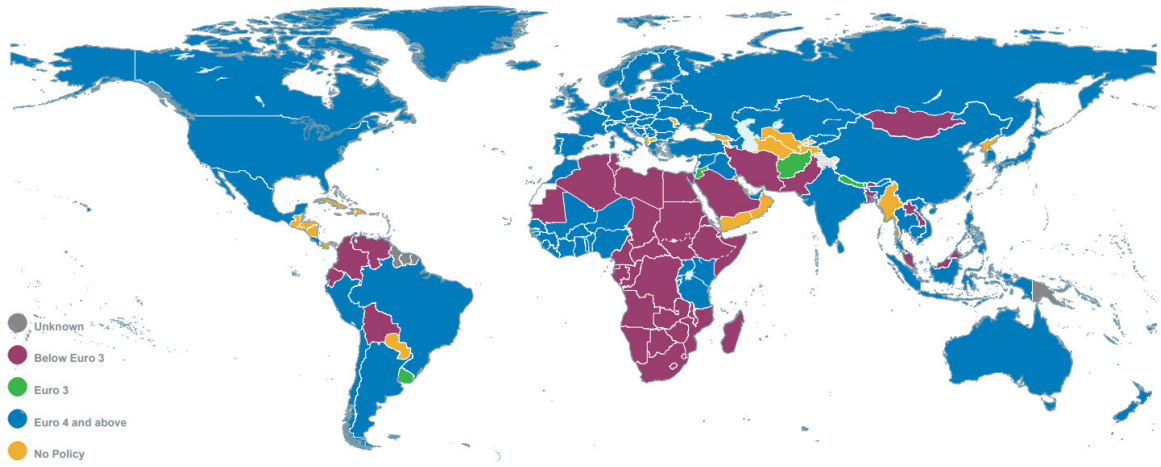
The history of emissions standards for HDVs is much shorter than for LDVs. Currently, most of the HDV exporting markets have legislated world-class tailpipe emissions standards for HDVs (Euro VI). However, the export market still consists of used trucks, with 30 years of usage. For new HDVs, from the 146 countries surveyed, HDV emissions standards are either lacking or no information exists for 62 percent of countries (figure 22). Close to one-third of the countries have implemented Euro IV equivalent vehicle emissions standard or better. However, countries that have introduced emissions standards sometimes apply these to both new and used vehicles, sometimes explicitly separating between new and used HDVs and sometimes considering only new HDVs with lower standards for used HDVs. In 2020, the 15 West African countries adopted Euro IV regulations for new and used HDVs into the region and matching fuel quality. In 2022, the 7 Member States of the East African Community also adopted regionally harmonised Euro IV regulations for new and used HDVs and LDVs.

FIGURE 22. Proportion of countries with new HDV Emission Standards



Source: *Compiled by UNEP, based on data collected from import countries, 2022*

FIGURE 23. HDV Emissions Standards Adopted



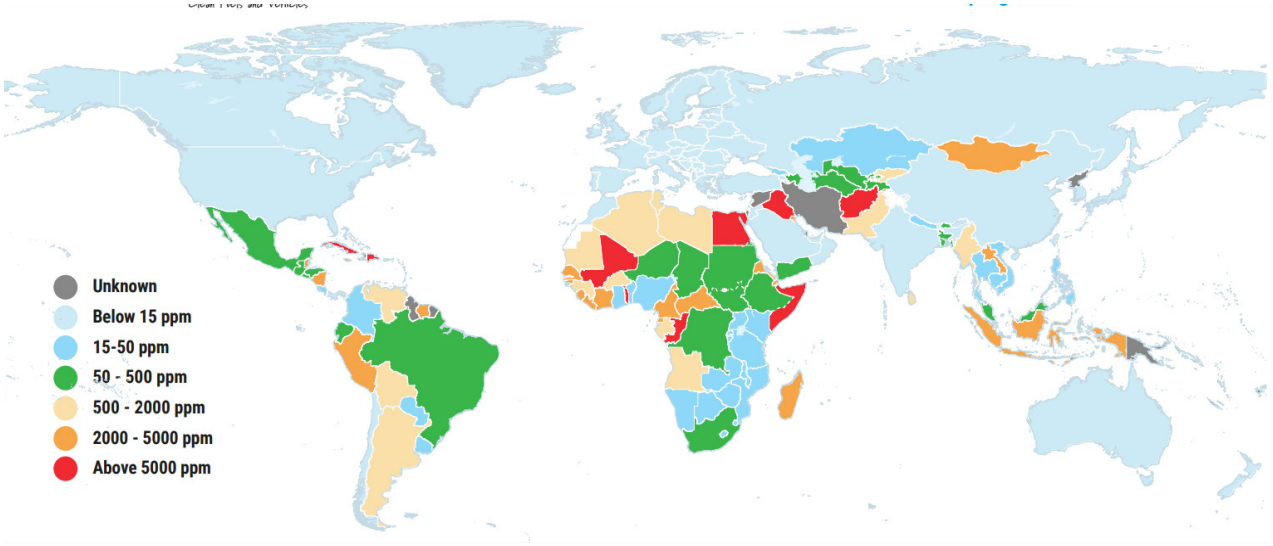
Source: *Compiled by UNEP, based on data collected from import countries, June 2023*

Research (GFEI 2013) indicates that HDVs that fail annual emission inspections, mandatory in many developed countries, are exported rather than repaired or scrapped. In many cases, advanced emission control devices are illegally removed before export because of their economic value.

An essential consideration for setting age or vehicle emission standards is the quality of the diesel fuel available in the countries. Lack of clean diesel can prevent the optimal use of advanced emission control technologies introduced in exporting markets. For example, HDVs that meet Euro VI emissions requirements need ideally 10 parts per million (ppm) or a maximum of 50 ppm low sulphur fuels to function advanced vehicle emission control technologies effectively. So, countries that have low sulphur fuels could introduce vehicle emission standards of Euro VI and ideally combine with an age restriction 5 years or less. The United Nations Environment Programme supports developing countries to implement low and ultra-sulphur fuel standards and complementary more stringent vehicle emission standards. Since 2010, 53 countries worldwide have transitioned to low or ultra-low sulphur fuels, including the West African countries that are in the process of implementing regionally harmonised vehicle standards adopted in September 2020 (figure 24). At the same time,

more countries have lowered their sulphur levels in fuels and are in the process of implementing roadmaps to reduce fuel sulphur levels further.

FIGURE 24. Diesel Fuel Sulphur Levels: Global Status



Source: Compiled by UNEP, June 2023

2.4 Mileage Restrictions

Countries often prioritise age restrictions for LDVs over HDVs mainly due to cost considerations, limited models, and market availability. However, this is inefficient primarily due to two main reasons – i) HDVs are more emission-intensive and less energy efficient per kilometre than LDVs, and ii) HDVs on average travel much further than any other vehicle type annually.

One potential solution is to set mileage restrictions on used HDVs. However, currently, rarely does any country (both exporting and importing) impose restrictions based on odometer mileage. These restrictions could be more efficient if set upstream, i.e., in exporting countries, ideally if odometer readings were registered and made available.

2.5 HDV Fiscal Instruments

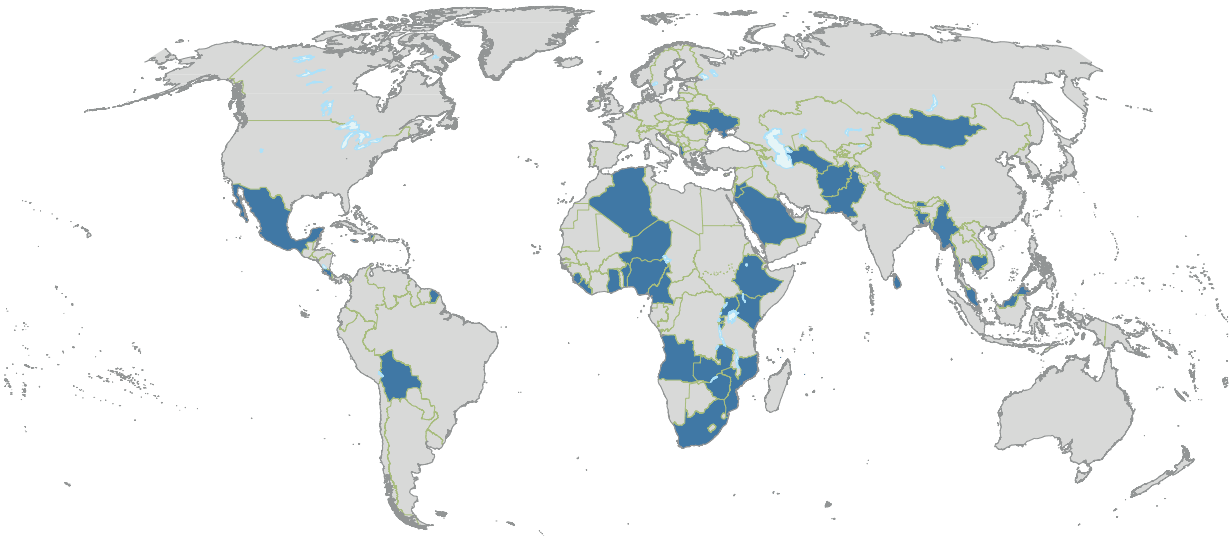
Fiscal instruments effectively induce behavioural changes and help rationalise and improve the quality of used HDVs. The budgetary tools used could take various forms - customs duties, surtax, VAT, registration fees, circulation taxes, feebates, etc. Taxes on imported HDVs are generally based on the value of the HDV or based on CIF (Cost, Insurance and Freight). Since used HDVs are cheaper, the overall magnitude of taxation is relatively lower. In the survey of 146 countries, a diverse set of fiscal instruments were identified - incremental and fixed taxes on age, gross vehicle weight, type of HDV (bus vs truck), engine size (i.e., higher rates for higher cylindrical capacity), simple environmental tax, infrastructure tax and fuel type vehicle import tax, and scrappage scheme (figure 25).

For example,

- The most common fiscal instrument adopted in the countries surveyed includes incremental and fixed taxes on age. About 22 countries have imposed age-based taxation but with diverse and sometimes contradictory objectives.
    - For example, Grenada's primary goal is to restrict the import of used HDVs. Hence used vehicles between 1-4 years old are charged a 2% environmental levy while HDVs older than five years old are charged 30%.
    - In Tonga, vehicles exceeding 3000 cc are charged 1$/cc for age less than ten years, while vehicles imported with the usage of more than ten years are charged 50 cents/cc.
    - In the Dominican Republic, environmental surcharge includes $3,000.00 per unit on motor vehicles manufactured five years or older; otherwise, 1% of the customs value for vehicles manufactured less than five years.

- Gross vehicle weight or engine size is also used as a proxy for environmental taxation in many countries. For example, in Belize, buses with occupancy 10 to 20 are charged between 27% to 35%, while buses with more than 21 are charged 35%. Further, buses are charged a lower percentage of taxes than cars, SUVs & minivans.
- Ghana charges National Health Insurance Levy tax to restrict the import of used vehicles. The vehicles are taxed between 0% or 2.5%.
- Fiscal instruments are also employed to change the typology of vehicles being imported. For example, HDVs are more efficient per passenger or tons being transported when compared to LDVs. To promote the purchase of HDVs, Jordan has implemented a special tax that favours HDVs - with trucks more than 4.5 tons being taxed 0 per cent, and trucks less than 4.5 tons, pickups and vans at 30 percent while passenger vehicles attract a 56 per cent tax.
- In Bermuda, LDVs are taxed at 75 per cent on the first $10,000 and 150 per cent on the value more than $10,000. But for HDVs and hybrids, the taxes are 33.5%. Vehicles principally designed for the transport of goods usually are dutiable at 33.5 per cent.
- In Afghanistan, buses are charged lower customs tax (10%) than LDVs (30% to 50%) to promote the import of used buses over passenger cars.
- Incentives to lower taxes for specific low and no emissions HDVs, especially hybrid and electric vehicles, are gaining penetration in used HDV importing markets. For example, Bolivia enacted Supreme Decree No. 4539 of July 7th, 2021, which establishes tax and financial incentives for importing electric and hybrid vehicles and assembling electric and hybrid agricultural machinery to promote energy efficiency (GFL 2021) Similarly, in 2021 the Ukrainian government implemented amendments to the Tax Code of Ukraine, which provide for certain tax exemptions for the implementation of electric vehicles (EVs) in Ukraine. The EV Tax Amendments, among others, provide for the following tax incentives:
    - Exception from import VAT and customs duty between January 1, 2022 and December 31, 2030 for equipment and spare parts used in manufacturing of EVs, electric HDVs, and vehicles using natural gas or biogas.
    - Until December 31, 2025 the sale of electric HDVs, vehicles and cargo vehicles using natural gas or biogas in the internal Ukrainian market is exempted from VAT.
    - Until December 31, 2035 companies that exclusively manufacture electric engines, batteries, charging equipment and EVs, and transport that uses gas, are exempted from income tax (Radchenko, *et al*. 2021).
- HDV scrappage schemes are becoming popular to address the challenge of old HDVs on the roads. Scrappage schemes adopted in the exporting market provide a viable substitute for international trade in used HDVs. Such systems offer HDV operators incentives to retire their inefficient, polluting HDVs rather than shipping them to other countries. Implementing a scrappage scheme in importing markets could also ensure HDV operators trade in older fleets for newer, more efficient vehicles if combined with appropriate policy instruments. For example, India launched a vehicle scrappage scheme in 2021 to replace older trucks with newer trucks in combination with other fiscal instruments, i.e., taxes on registration, subsidy, inspection costs etc. and used import restrictions. In the proposed NDCs, Argentina, Costa Rica, Denmark, and the Dominican Republic have launched vehicle scrappage schemes.
- Further, early introduction of low and no emissions HDVs can also be stimulated by such financial instruments as preferential road toll rates. But no developing country has employed such a strategy yet.

FIGURE 25. Countries using fiscal instruments to restrict import of used HDVs



Source: *Compiled by UNEP, based on data collected from import countries, 2021*

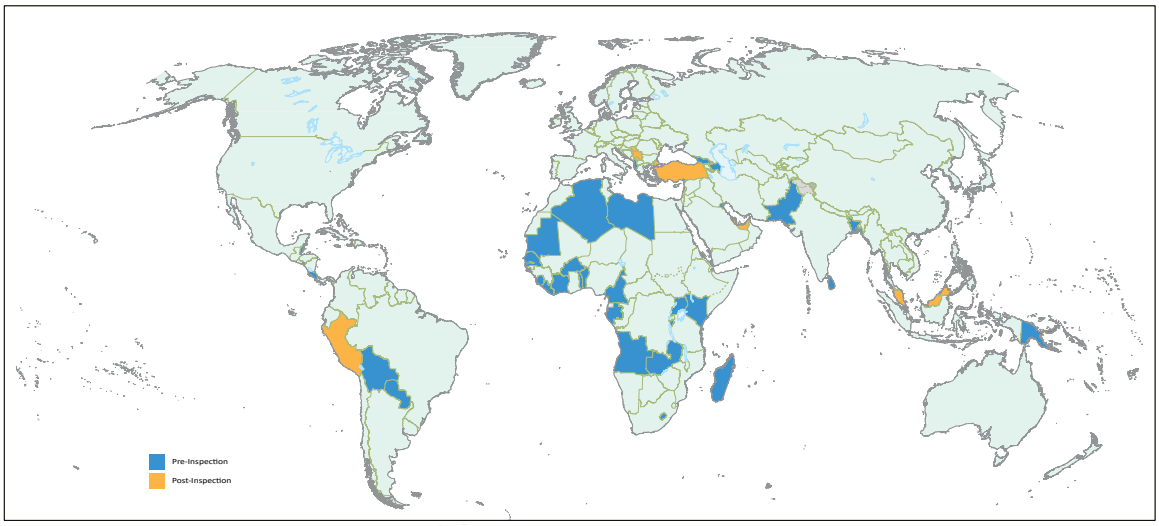
2.6 Inspection, Licensing and Certification

Currently, trade in HDVs often includes HDVs with compromised efficiency, roadworthiness, and crashworthiness, sometimes in several orders of magnitude higher than their usage, age, degree of wear and tear and technical designs. Present inspection, licensing and certification regimes have not proved effective in reducing the environmental impact of used HDVs in many countries. There is diversity in introducing such regulatory processes with countries employing different rules based on income levels, access to used vehicles, type of infrastructure and environment regulation, which is further compounded by lack of suitable performance audit mechanisms. The pre- and post-inspection protocols could include roadworthiness performance standards, crashworthiness test standards, energy efficiency standards, emission standards, stolen vehicle checks, odometer checks, radiation checks etc. Pre-shipment inspections (PSI) are only required when legally mandated by the government of the importing country. However, based on the survey, only a few importing countries rely on pre-shipment inspections to minimise the risk of importing faulty and unsafe vehicles. 47 countries were found to mandate pre-shipment inspections (PSI) (figure 26). The PSI is performed by the company designated by the importing country. For example, companies such as Intertek, Japan Export Vehicle Inspection Center (JEVIC), Bureau Veritas provide such testing services. For instance, in 2018, Jamaica mandated the PSI process for used vehicles entering the island due to tampering of motor-vehicle odometers to reflect lower mileages, discrepancies in model year and to ensure consumer protection and fair trade.

In terms of post-inspection regulations, only 13 countries rely on enhanced post-inspection regulations for imported HDVs. For example, Brunei Land Transport Department ensures technical inspection of imported vehicles before road qualification. In case the HDV fails the examination, the HDV is not allowed to enter the country.

Some countries also have a preferential entry allowance for imported used vehicles. For example, since 2015, the Mexican government has implemented an entry allowance of used HDVs from the United States and Canada. As a result, companies can import one used HDV from these two countries within twelve months without the requirement of registering with the "Patron de Importadores", which is Mexico's official importers' registry. However, if they intend to import more used HDVs, they must register with "Padron de Importadores". Further, they are mandated to provide import records monthly to the Mexican Government Entity for Taxation (ITA 2021). The majority of HDV export countries have already implemented mandatory vehicle labelling; thus, importing countries without type approval facilities can adopt and use the results from export markets to label used HDV and could also tailor fiscal policies (targeting inefficient vehicles) to reallocate market share to energy-efficient used HDVs.

FIGURE 26. Used HDV Import Inspection Regime



Source: *Compiled by UNEP, based on data collected from import countries, 2021*

2.7 Combining the Different Policies

This report examines the used HDV regulatory performance in 146 countries, which could help countries identify gaps, necessary steps, and appropriate tools to improve the import of used HDVs. The categorization classifies the regulatory measures in the countries from 'very good' to 'very weak' considering primarily restrictions on the age and used HDV emissions standards. Countries that ban used HDVs are included but not categorized on this scale.

The scale below was used to categorise used HDV Regulatory Environment for the 146 countries.[7]

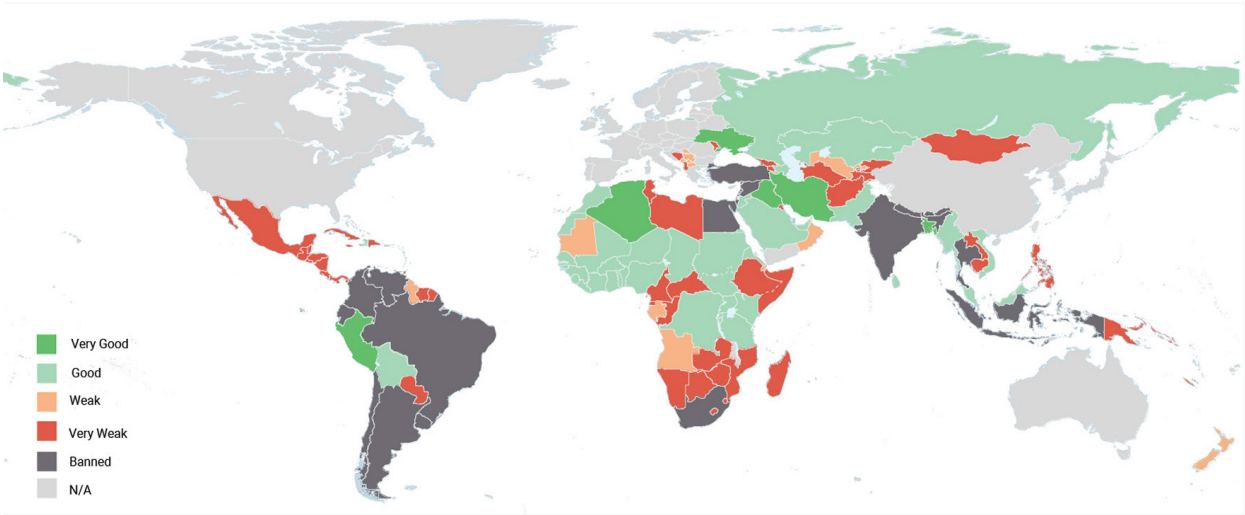
Regulatory Environment	
	Very Good - a used HDV Euro V or more emissions standard adopted and/or age limit of 3 years or below
	Good - a used HDV Euro IV emissions standard adopted and/or age limit of 4 or 5 years
	Weak – a used HDV Euro III emissions standard adopted and/or age limit of between 6- 8 years
	Very weak - No used HDV Euro emissions standard adopted and/or age limit of 9 years plus or no age limit
	Banned - represents a complete restriction on used vehicle imports
	Countries not included in the analysis

7 This scaling does not include other policies such as communication and fiscal policies as these are difficult to compare and change frequently

Table 4 - Used HDV Regulatory Environment Rankings (June 2023)

Regulatory Environment Ranking (UNEP)	Countries	Region
Very Good	Algeria, Bangladesh, Singapore, Peru, Iran, Iraq, Israel, Ukraine	**Total: 8** Africa (1) Asia-Pacific (2) EECCA (1) LAC (1) ME (3)
Good	Antigua and Barbuda, Azerbaijan, Bahrain, Benin, Bolivia, Brunei Darussalam, Burkina Faso, Burundi, Cape Verde, Chad,Côte d'Ivoire, Democratic Republic of the Congo, Eritrea, Fiji, Gambia, Ghana, Guinea, Guinea-Bissau, Haiti, Jordan, Kazakhstan, Kenya, Liberia, Malaysia, Mali, Morocco, Myanmar, Niger, Nigeria, Pakistan, Qatar, Rwanda, Russian Federation, Saudi Arabia, Senegal, Sierra Leone, Sri Lanka, South Sudan, Timor-Leste, Togo, United Arab Emirates, Uganda, United Republic of Tanzania, Viet Nam	**Total: 44** Africa (25) Asia-Pacific (8) EECCA (3) LAC (3) ME (5)
Weak	Angola, Djibouti, Former Yugoslav Republic of North Macedonia, Gabon, Guyana, Mauritania, Mauritius, Montenegro, Oman, New Zealand	**Total: 10** Africa (5) Asia-Pacific (1) EECCA (2) LAC (1) ME (1)
Very Weak	Afghanistan, Albania, Armenia, Aruba, Bahamas, Barbados, Belarus, Belize, Bermuda, Bosnia and Herzegovina, Botswana, Cambodia, Cameroon, Central African Republic, Comoros, Congo, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Equatorial Guinea, Eswatini, Ethiopia, French Guiana, Georgia, Grenada, Guatemala, Honduras, Jamaica, Kuwait, Kyrgyzstan, Lao PDR, Lesotho, Libya, Madagascar, Malawi, Maldives, Mexico, Republic of Moldova, Mongolia, Mozambique, Namibia, Nauru, Nicaragua, Palau, Panama, Papua New Guinea, Paraguay, Philippines, Samoa, Sao Tome and Principe, Serbia, Somalia, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Tajikistan, Trinidad and Tobago, Tunisia, Turkmenistan, Turks and Caicos Islands, Uzbekistan, Zambia, Zimbabwe	**Total: 66** Africa (19) Asia-Pacific (10) EECCA (11) LAC (25) ME (1)
Banned	Egypt, Seychelles, South Africa, Sudan, Bhutan, India, Indonesia, Lebanon, Nepal, Thailand, Türkiye, Argentina, Brazil, Chile, Colombia, Ecuador, Uruguay, Venezuela	**Total: 18** Africa (4) Asia-Pacific (5) EECCA (1) LAC (7) ME (1)
***ECOWAS and EAC countries have adopted regionally harmonised standards, some are still to implement. DRC and South Sudan have just joined EAC.**		**Total:146**

FIGURE 27. Regulatory Ranking for Used HDV Import



Source: *Compiled by UNEP, based on data collected from import countries, 2023*

Out of the 146 countries surveyed, 76 countries, about 52 per cent, have a 'weak' or 'very weak' regulatory regime to control the import of used HDVs (figure 26 above). 52 countries, close to 35%, have 'good' or 'very good' policies. Among all regions, Latin America and the Caribbean region

(especially the Caribbean region), where close to three-fourth of countries have weak regulations, needs urgent attention. In addition, 42% of Asia-Pacific region, 44% of Africa, 72% of Eastern Europe, Caucasus, Central Asia, and 18% of Middle East countries have weak regulations (figure 27).

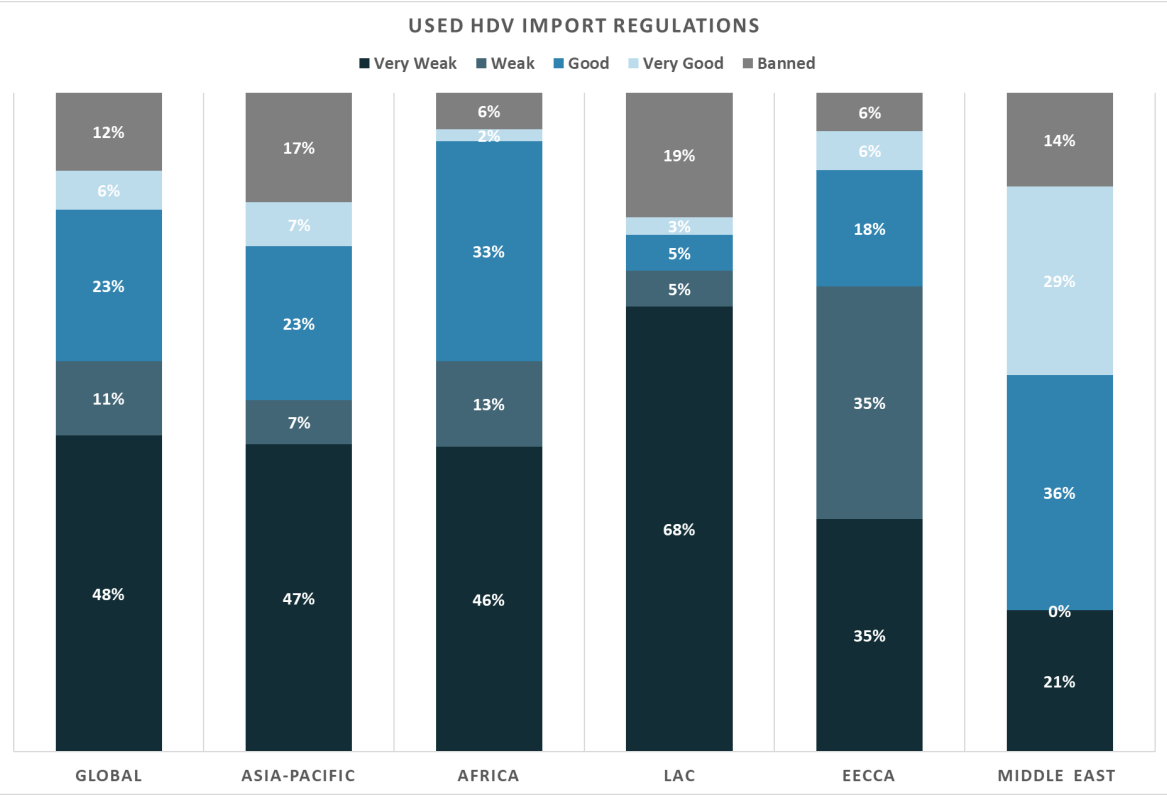
Of the 146 countries surveyed, 23 countries do not employ any instrument to regulate the import of used HDVs. Further, of all countries which allow the import of used HDVs, only ten countries have adopted a multi-pronged strategy with fiscal instruments, age and weight restrictions with progressive emission standards to regulate the entry of used HDVs, these are Albania, Bangladesh, Benin, Bolivia, Costa Rica, Liberia, Pakistan, Sierra Leone, Singapore, and Sri Lanka.

The Covid-19 crisis has compounded the diverse regulatory responses from governments towards used HDV imports, especially on the fiscal impact. For example, in 2020, Algeria resumed used vehicle import after banning it in 2014. In 2021, Cambodia's Ministry of Economy and Finance has proposed a reduction in vehicle import duty. The customs duty on HDVs is proposed to be cut from 40 to 25 and 30 per cent depending on the type of HDV to contribute to an increase in the demand for imports and reduce logistics costs. However, these responses are uneven, and it remains to be seen how the future landscape of regulations will change in the forthcoming years.

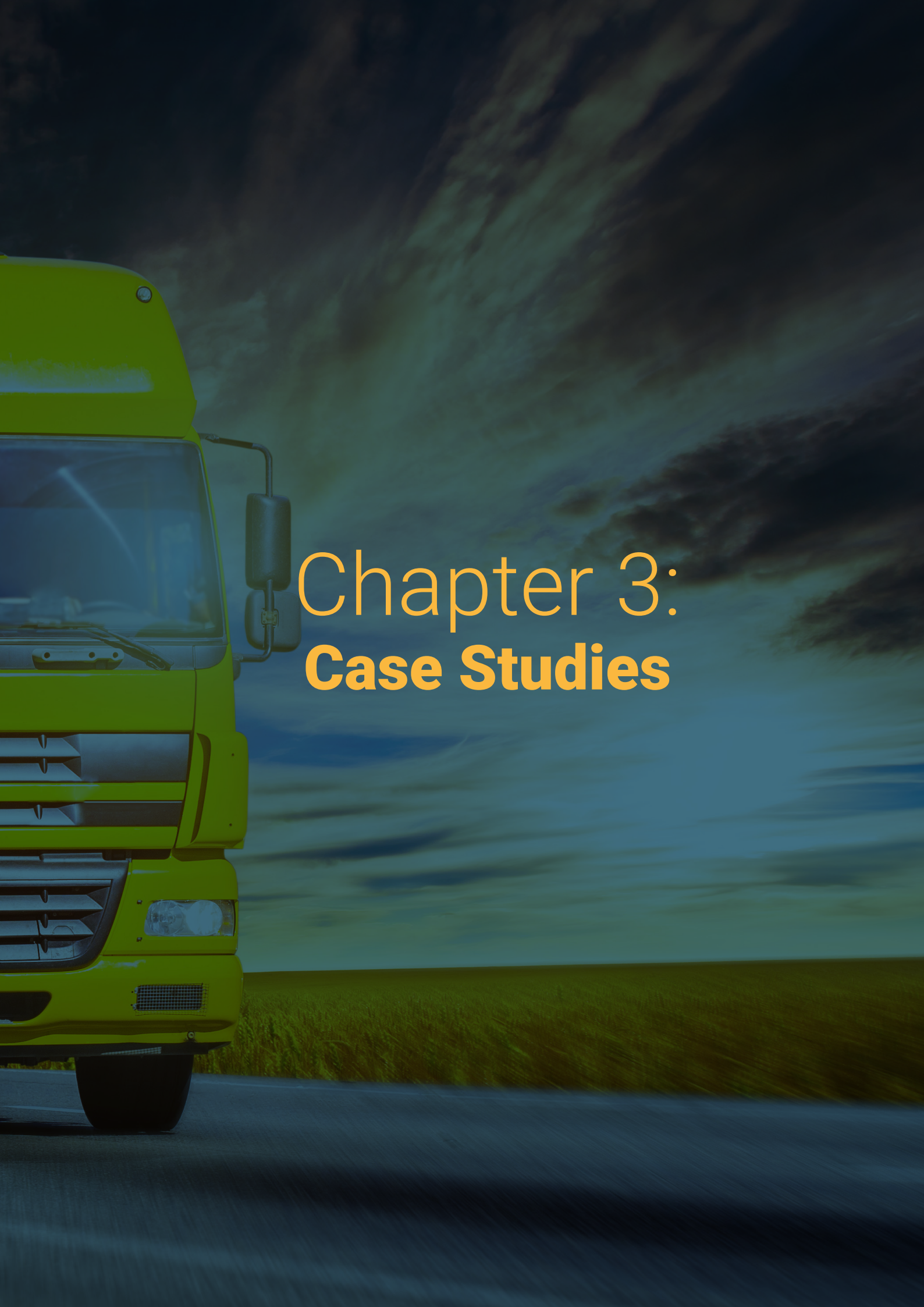
HDVs increasingly operate across borders, so the assortment of diverse regulations does not yield significant impacts. Nevertheless, harmonisation of used HDV trade policies is vital. With UNEP's support, the fifteen countries of the ECOWAS region demonstrated their leadership in Africa by adopting the first consistent policy of a minimum Euro IV emissions standard, and a 10-year age limit for HDVs.

Figure 28 below provides a regional overview of used HDVs import regulations.

FIGURE 28. Used HDV Import Regulatory Environment - Regional Overview



Source: Compiled by UNEP, based on data collected from import countries, 2021



Chapter 3:
Case Studies

CHAPTER 3
CASE STUDY – AFRICA

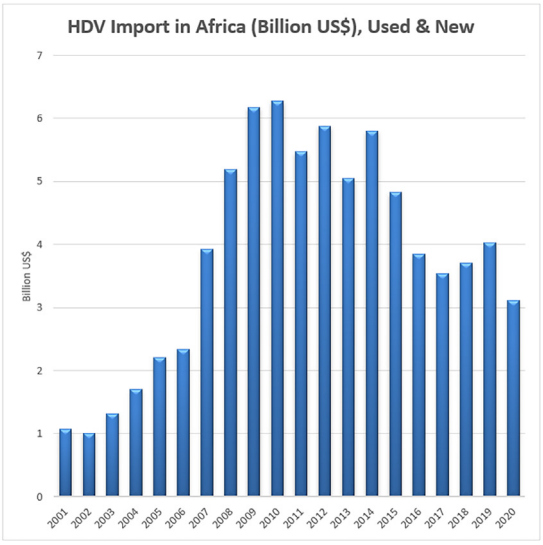
3.1 Introduction

This chapter explores the import of used HDVs in Africa. Historically, this trade has been the most significant one worldwide. Often Africa is labelled as the final frontier for the fossil-fuelled automotive industry (Bardhan 2015). The demand for used HDVs is mainly due to the lack of local assembly and manufacturing plants leading to limited new offers with high price differentials. The value of imported HDVs (new and used) in the continent was estimated at US$ 1 billion in 2001, increasing to US$ 6.2 billion in 2010 (figure 29). However, since 2010 this value has declined to US$4 billion in 2019 and ultimately US$3.1 billion in 2020 possibly due to the COVID pandemic enforced lockdowns and restrictions.

Buses constituted about one-third of HDVs imported (new and old in value) with trucks making up two-thirds of the value. HDV imports into Africa are valued at about 7% of the global HDV trade. It is worth noting that one of the reasons for this low value, despite importing a high number of HDVs, is that the continent imports predominantly an ageing HDV fleet. This is as a result of many countries still lacking or having limited capacity to enforce minimum regulations for HDV imports - as demonstrated in the picture below - coupled with relatively low purchasing power of fleet operators.

This chapter summarises the supply chain, magnitude, and the physical 'flows' of used HDVs into Africa. It also provides the latest status of national and sub-regional regulatory environments influencing the quality of used HDVs into the continent.

FIGURE 29. Value of HDVs Imported into Africa (US$ Billions)



Source: *Compiled by UNEP, based on data collected from Trade Map, https://www.intracen.org/*

The next few sections provided a detailed overview of used HDVs imports into Africa by the three largest exports – namely the EU, ROK and Japan.

3.2 Import of used HDVs from EU

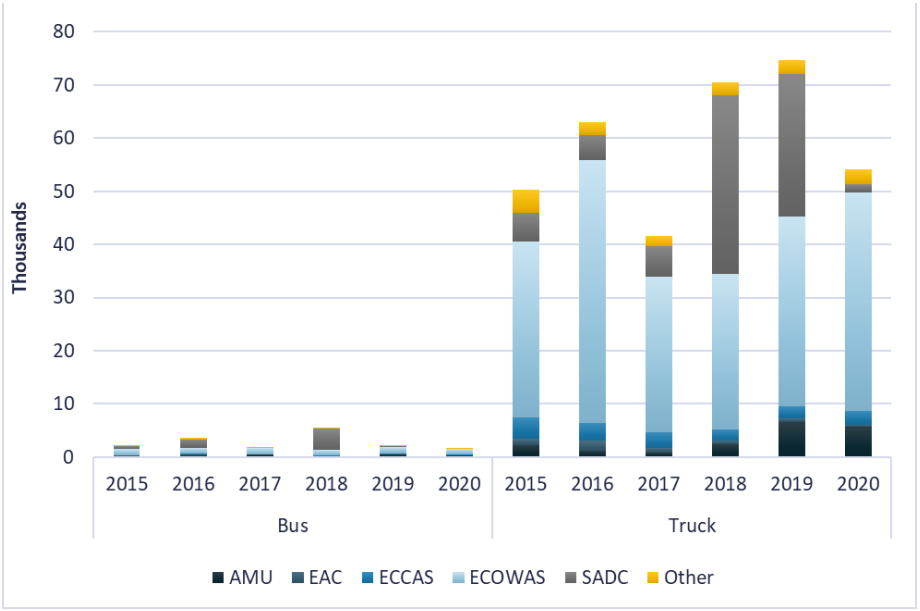
Between 2015 and 2019, the number of used HDVs imported into Africa increased at an annual rate of 10.1%, while the value of the used HDVs decreased by 2.7% annually. There could be several reasons for this reduction - increased age of the HDVs being imported, poor quality of HDVs being imported, possibly higher competition leading to reduced profit margins etc. In 2020 due to the COVID pandemic, HDVs imported into the region declined by 27% in units and 13% in value. Most HDVs imported to Africa from the EU are trucks (97%), with buses comprising only 3%. The EU predominantly exports to the West African States and Southern African countries, accounting for 83% of HDV imports in 2019 (figure 30).

Further, the cheapest HDVs are exported to Southern African countries with an average HDV value of 2,780 $/unit in 2019. On the other hand, the highest-priced HDVs are exported to Eastern African countries at 15,400 US$/unit. The top importing countries for used HDVs from the EU between 2015 to 2020 were Nigeria, the United Republic of Tanzania, Zimbabwe, Guinea, and Libya. For the analysis, countries in Africa have been divided into six geographic regions, as indicated below (table 5)

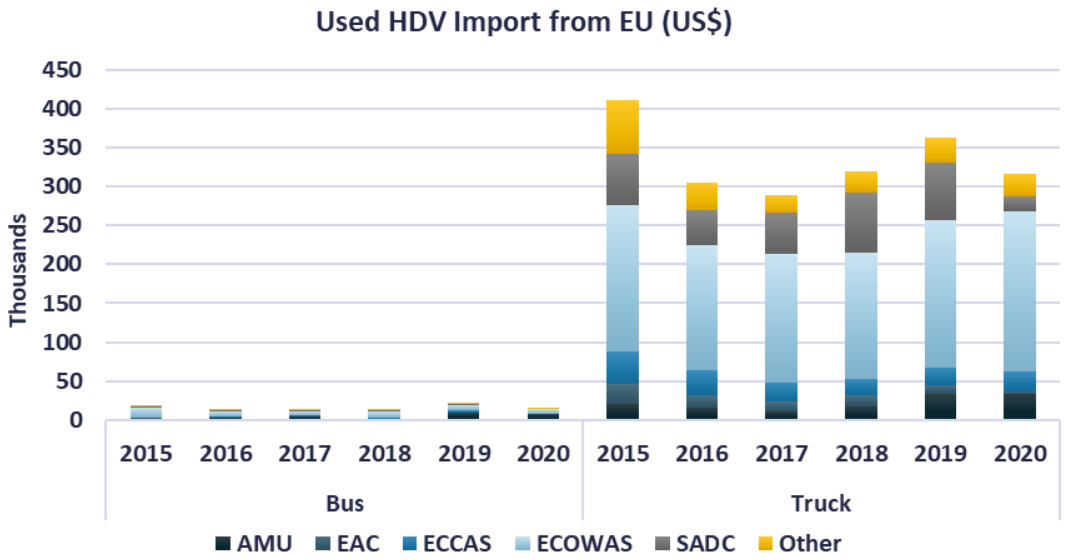
Table 5: Regional Classification Considered for the Analysis[8]

Arab Maghreb Union (AMU)	East African Community (EAC)	Economic Community of Central African States (ECCAS)	Economic Community of West African States(ECOWAS)	Other	Southern African Development Community (SADC)
ALGERIA	BURUNDI	CAMEROON	BENIN	DJIBOUTI	ANGOLA
LIBYA	KENYA	CENTRAL AFRICAN REPUBLIC	BURKINA FASO	EGYPT	BOTSWANA
MAURITANIA	RWANDA	CHAD	CAPE VERDE	EQUATORIAL GUINEA	COMOROS
MOROCCO	SOUTH SUDAN	CONGO	CÔTE D'IVOIRE	ERITREA	DEMOCRATIC REPUBLIC OF THE CONGO
TUNISIA	UGANDA	GABON	GAMBIA	ETHIOPIA	ESWATINI
		SAO TOME AND PRINCIPE	GHANA	SOMALIA	LESOTHO
			GUINEA	SUDAN	MADAGASCAR
			GUINEA-BISSAU		MALAWI
			LIBERIA		MAURITIUS
			MALI		MOZAMBIQUE
			NIGER		NAMIBIA
			NIGERIA		SEYCHELLES
			SENEGAL		SOUTH AFRICA
			SIERRA LEONE		TANZANIA, UNITED REPUBLIC OF
			TOGO		ZAMBIA
					ZIMBABWE

FIGURE 30. Used Heavy Duty Vehicle Import in Africa from EU



8 Regional classification is purely for the basis of analysis in this report. Some countries may belong to more than one regional economic community.

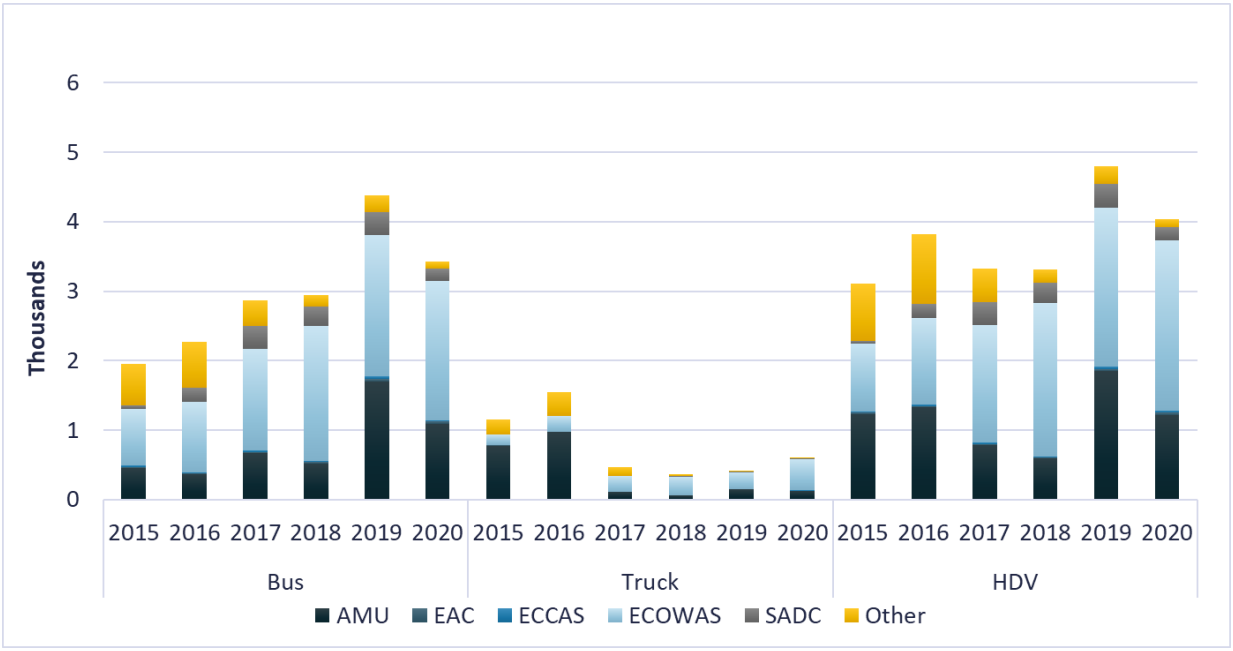


Source: UNEP based on European Commission's Eurostat Comext Database, http://epp.eurostat.ec.europa.eu/newxtweb/

3.3 Import of used HDVs from the Republic of Korea

Most HDVs imported into Africa from the ROK are buses (80%), with trucks only constituting about 20%. Between 2015 and 2019, the import of used HDVs (in units) increased at an annual rate of 11.4% (figure 31). However, in 2020 due to the COVID pandemic, HDV imports fell by 16%. The ROK predominantly exports to the West African States and Arab Maghreb Union members, accounting for 86% of imports in 2019. The top importing countries for used HDVs from the ROK between 2015 and 2020 were Ghana, Libya, Madagascar, Sudan, and Djibouti.

FIGURE 31. Used Heavy Duty Vehicle Import in Africa from the Republic of Korea

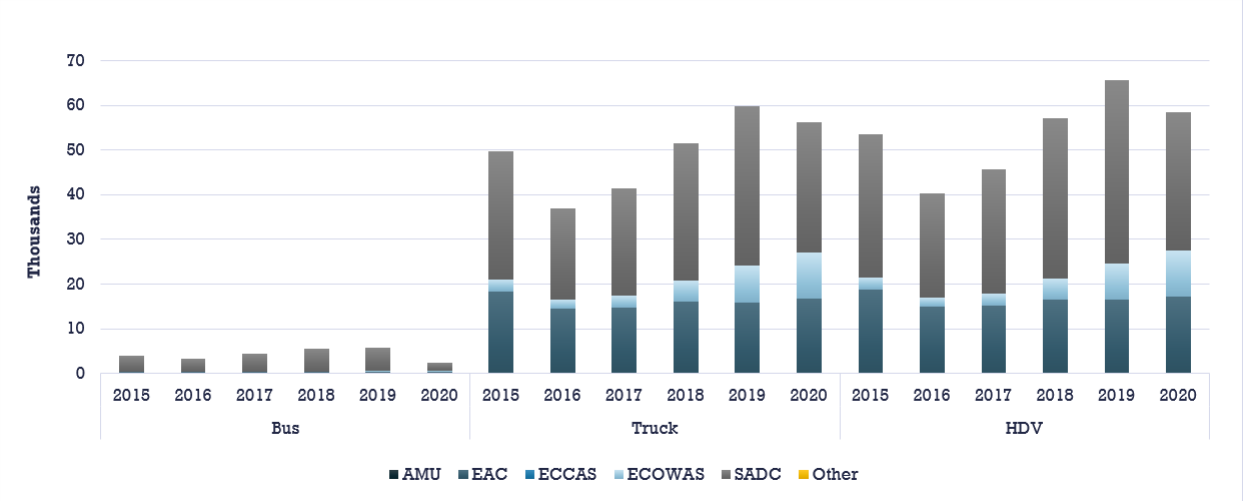


Source: UNEP based on data from Korea International Trade Agency (KITA)

3.4 Import of used HDVs from Japan

91% of HDVs imported into Africa from Japan are trucks, with buses only representing about 9%. Between 2015 and 2020, the import of used HDVs (in units) increased at an annual rate of 1.7% (figure 32). While used buses imported from Japan fell at an annual rate of 10%, used trucks increased at a yearly rate of 2.5%. Japan predominantly exports to the Southern African countries and the East African Community members, who account for 82% of imports in 2020. The top importing countries for used Japanese HDVs between 2015 and 2020 were the United Republic of Tanzania, Kenya, South Africa, Uganda, Nigeria, Mozambique, Botswana, Democratic Republic of the Congo, Zambia, and Malawi.

FIGURE 32. Used Heavy Duty Vehicle Import in Africa from Japan

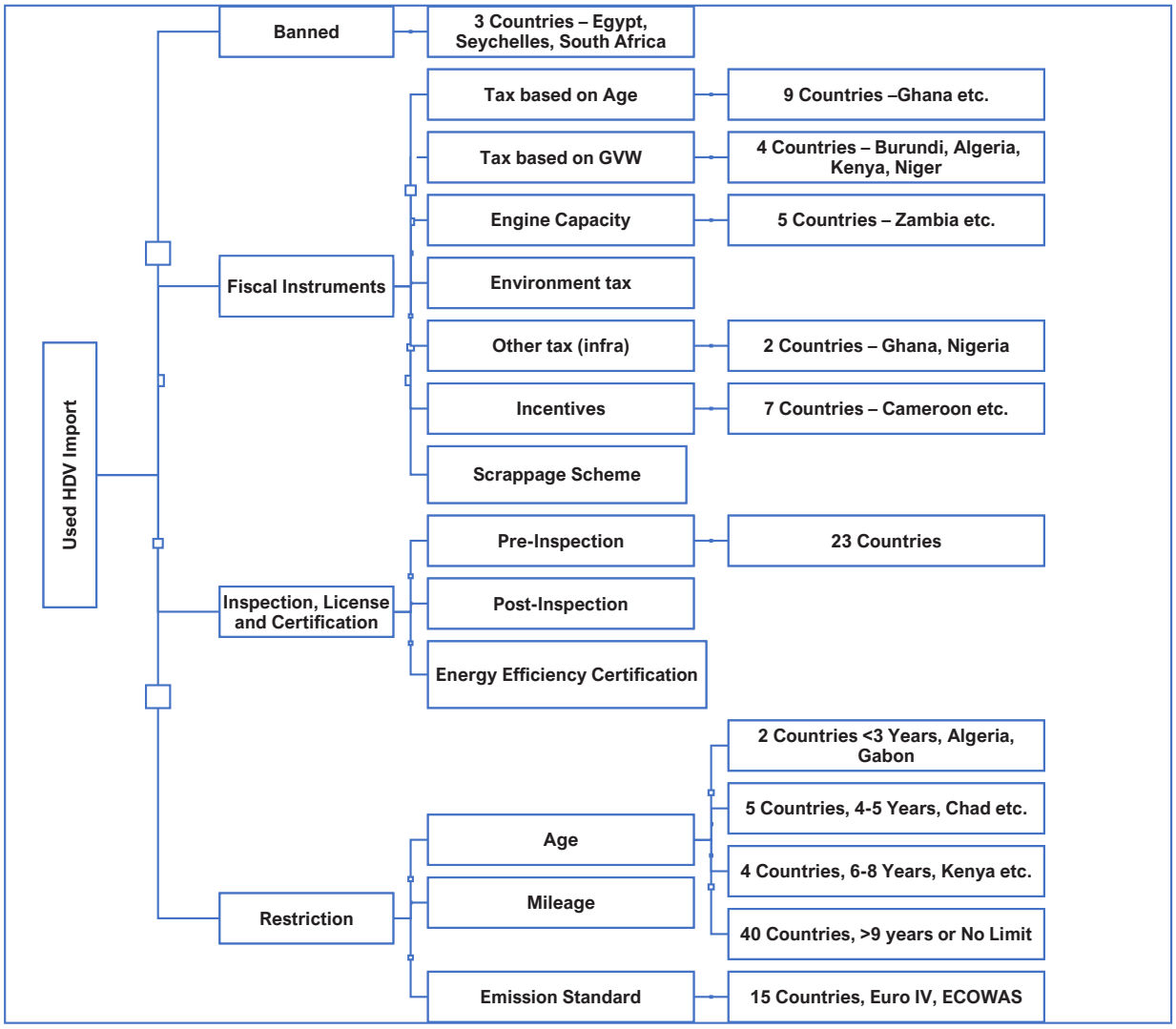


Source: UNEP based on International Auto Trade Association (iATA) www.iata-odo.jp

3.5. Regulatory Environment for Used HDVs

The typology of measures considered to regulate the import of used HDVs in Africa is summarised in figure 33 below.

FIGURE 33. Policies and Regulations Influencing Used HDV Import in Africa



Source: *Compiled by UNEP, based on data collected from import countries, 2021*

From the 54 African countries reviewed in this report[9]forty-eight (48) countries accounting for 89 per cent, have inadequate measures to regulate used HDV imports (figure 34). The main findings from the regulatory survey are:

About 55% of countries in Africa do not regulate used HDV imports or lack a comprehensive set of regulations for used HDV imports, thus could potentially become a lucrative market for the dumping of obsolete HDVs.

The most common approach to regulate the import of used HDVs is age restrictions. Close to 63% of African countries impose age-based limits on the import of HDVs. A further nine African countries have proposed measures that may directly or indirectly influence used HDV imports in their nationally determined contributions.

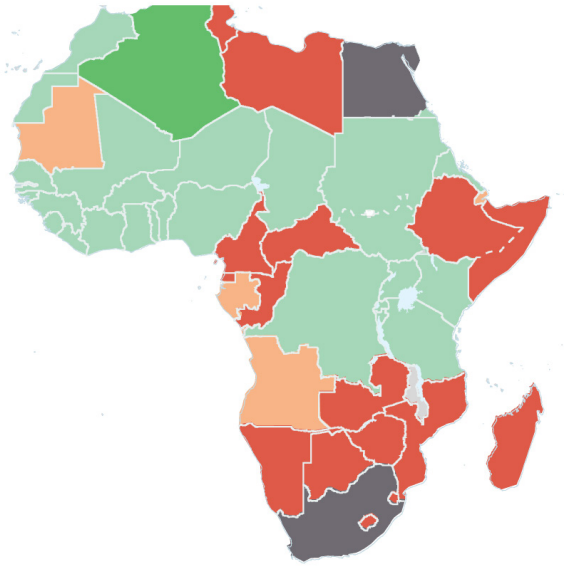
Two different models of the regulatory process are being pursued in Africa. Some countries have followed a national approach to regulate used HDVs imports – for example, South Africa, Egypt, Algeria, etc. On the other hand, some regulatory reforms are being done at the sub-regional levels through sub-regional economic bodies.
For example - the fifteen ECOWAS countries have

9 Data for the review comes from a variety of sources i.e., local customs websites, automotive companies' websites, news reports. These sources are documented in the annexure.

adopted a consistent policy of a minimum of Euro IV emissions standard and an age limit of ten years.

The harmonisation of used HDV policies amongst sub-regions is vital. This is because HDVs increasingly travel across borders, so the collection of diverse regulations among the countries has not resulted in significant environmental and social benefits (Ayetor *et al*. 2021). UNEP's effort in partnership with the ECOWAS countries and the ECOWAS Commission will have considerable impact on the quality of HDVs in West Africa when fully implemented. Similar efforts have been achieved in the East Africa Community with the adoption of Euro IV standard and in-use emissions limits. There is an urgent need for such regional or global approaches that rationalise the flow of used HDVs. Implementing the African Continental Free Trade Area (AfCFTA) offers a unique opportunity for regional harmonisation of used HDV import standards.

FIGURE 34. Regulatory Ranking of Used HDV Imports into Africa (2022)



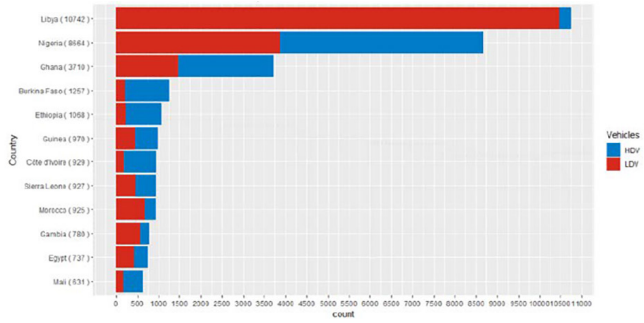
Regulatory Environment Ranking	
	Very Good - a used HDV Euro V or more emissions standard adopted and/or age limit of 3 years or below
	Good - a used HDV Euro IV emissions standard adopted and/or age limit of 4 or 5 years
	Weak – a used HDV Euro III emissions standard adopted and/or age limit of between 6- 8 years
	Very Weak - No used HDV Euro emissions standard adopted and/or age limit of 9 years plus or no age limit
	Banned - represents a complete restriction on used vehicle imports

Source: *Compiled by UNEP, based on data collected from import countries, 2022*

Key Findings from a Survey of HDVs Exports to Africa by the Netherlands

A study on the quality of used vehicles exported to Africa was carried out by the Netherlands Human Environment and Transport Inspectorate, Ministry of Infrastructure and Water Management (2020). This study found that an estimated share of 40% of vehicles exported from the Netherlands to African countries have foreign registries (mainly German). The study compared end of life vehicles (ELVs) and export light duty vehicles, and found that vehicles being shipped to Africa were quite similar to ELVs dismantled in the Netherlands, in terms of age (between 16-20yrs), Euro emission class (Euro 2 and 3), and mileage. The highest number of HDVs exported from the Netherlands ports were destined for Nigeria, Ghana and Burkina Faso (figure 35).

FIGURE 35. Exports of Used Vehicles into Africa from Dutch Ports (2020)



Source: *Used Vehicles Exported to Africa, Netherlands Human Environment and Transport Inspectorate, Ministry of Infrastructure and Water Management, 2020*

The average age of medium and heavy commercial vehicles in the EU was 12.4 years in 2019. The oldest HDVs with an average age of 17-20 years are exported to Gambia, Guinea, Nigeria, and Sierra Leone. The study also found that most used vehicles did not have valid roadworthiness certificates at the time of export to African countries.

Despite used vehicles age restrictions in Nigeria (15-years), Ghana at 10 years and Cote d'Ivoire at 5 years (from 2018), older HDVs were still exported (Table 6). A quarter of the HDVs exported to Nigeria were 22 years and above, while for Côte d'Ivoire, Gambia, Guinea, and Sierra Leone a quarter were 18 years and above. Also, despite a 5-year import age restriction of HDVs in Morocco, the average age of imported HDVs was 7.7 years indicating a loophole in the enforcement of restrictions.

Table 6. Age Distribution of Used HDVs into Africa from Dutch Ports

Age distribution retrieved HDV

Country	count	mean	Q1	Median	Q3
Burkina Faso	402	14.8	11.3	13.3	16.4
Côte d'Ivoire	165	15.7	12.4	15.9	18.3
Egypt	29	8.4	6.8	7.1	7.5
Ethiopia	178	12.0	9.4	11.3	15.3
Gambia	89	17.1	14.6	16.2	19.0
Ghana	1045	14.5	11.1	14.7	18.0
Guinea	120	17.5	14.6	17.5	20.6
Libya	30	14.3	11.4	14.4	15.6
Mali	65	16.4	13.4	15.6	17.9
Morocco	73	7.7	4.2	6.8	9.7
Nigeria	1452	18.9	15.3	18.3	22.1
Sierra Leone	130	20.0	17.0	19.1	22.6

Source: *Used Vehicles Exported to Africa, Netherlands Human Environment and Transport Inspectorate, Ministry of Infrastructure and Water Management, 2020*

Most exported vehicles to the top destinations in Africa had a mileage of over 250,000 km (Table 7). A quarter of the HDVs exported to Ghana, Nigeria, Gambia, Burkina Faso, Morocco, Guinea, Côte d'Ivoire, and Mali had a mileage of over 300,000 km. The high mileage figures indicate a likelihood that most of these vehicles were meant to be dismantled but ended up being exported. In addition, during the field inspections, several trucks were found to have mileage readings of 600,000 km or more on odometer. Field inspections also demonstrated that the overall condition of many trucks could best be described as worn-out, rusty, and with a deteriorated interior.

Most vehicles exported to West Africa had Euro 3/ III or lower emission standards (figure 36).

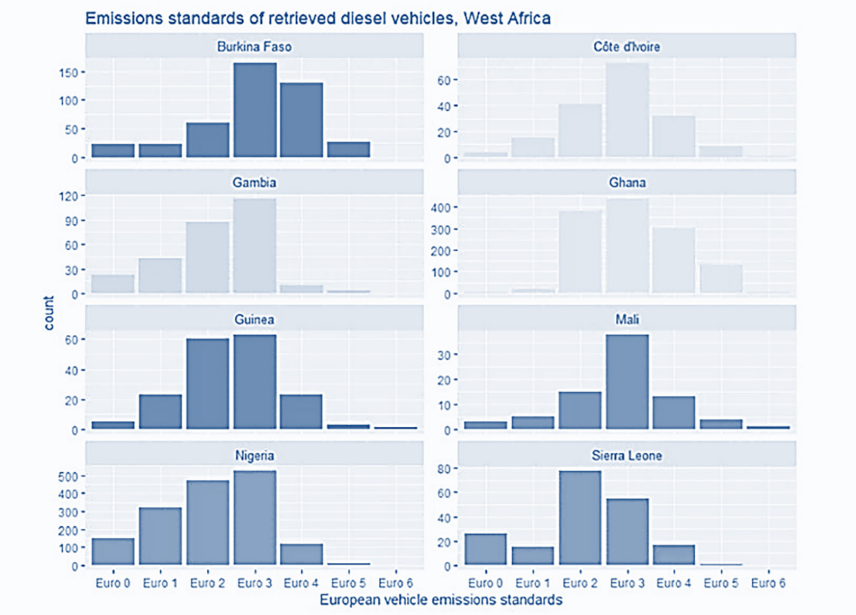
Table 7. Mileage of Used HDVs Exported into Africa from Dutch Ports

HDV mileage (x 1000) retrieved vehicles

Country	count	Mean	Q1	Median	Q3
Ghana	802	257	172	231	303
Nigeria	600	274	196	253	321
Ethiopia	169	219	147	201	283
Sierra Leone	78	234	163	230	293
Gambia	67	286	186	233	308
Burkina Faso	60	303	219	274	357
Morocco	52	317	223	295	388
Guinea	41	306	204	273	334
Côte d'Ivoire	31	277	208	279	333
Mali	17	306	242	301	366
Libya	7	252	208	245	278

This truck from 1994 for Lagos Nigeria, price 5,750 Euros has been dismantled in 2017 according to information in the vehicle register

FIGURE 36. Emission Standards of Used Diesel Vehicles to West Africa from Dutch Ports



Source: Used Vehicles Exported to Africa, Netherlands Human Environment and Transport Inspectorate, Ministry of Infrastructure and Water Management, 2020

Conclusion

It is observed that countries that have put in place minimum regulations for imported used buses and trucks, generally import better quality vehicles, even when there are challenges with enforcement of these regulations. Ideally, enforcement and monitoring of compliance of minimum adopted regulations is highly recommended. In addition, in the absence of regulations requiring exhaust aftertreatment technologies, HDV importers have tended to provide the least expensive vehicle emission control options, including removal of these technologies.

The Netherlands study, for example, showed several vehicles had their catalytic converters removed before shipment to Africa. Moreover, because of their old age, they did not have Diesel Particulate Filters. The shift to cleaner and safer vehicles is a joint responsibility of importing and exporting countries.

After publishing of the ILT report, the Netherlands Government took actions, specifically promoting better EU regulation on improving the quality of used vehicles exported, that led to the new EU proposal on end-of-life vehicle regulation, and improving the quality of the fuels exported to LMICs.

UNEP is leading in promoting cleaner fuels and minimum vehicle emission standards in developing and transitional countries to address harmful air pollution as well as short-lived climate pollutants. The introduction of low-carbon medium and HDVs, with the shift towards electric modes, will also support climate change mitigation.

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Annexes

Annex 1: Information Used in this Report

A Global Overview of Used Heavy Duty Vehicles: Flow, Scale and Regulatory Environment, is an inaugural report surveying and analysing the global flow of used heavy duty vehicles from three major global used vehicle exporters – Japan, the EU and the Republic of Korea. It also gives an overview of existing national and regional regulatory environments, as well as policy measures that seek to incentivize cleaner, more energy-efficient and safer used heavy duty vehicles.

UNEP's Sustainable Mobility Unit guided the development of this report with the aim of providing a comprehensive overview of the used HDV market and the regulatory instruments used to control the flow of used HDVs. It was found that such data was not available, despite the role of used HDVs in supporting a global shift to safer, low and no emissions mobility, and thus in addressing pollution and climate change globally. In addition, the development of regional or global agreements that harmonise and govern the flow of used HDVs would require a solid understanding of the scale of the used HDVs markets, the flow of these vehicles and regulations affecting their import and export.

This report is therefore a first step in supporting policy makers to identify key issues and to develop instruments that contribute to better road safety, air quality, reduced climate emissions, and fuel and repair cost savings.

Data used in this report has been collected from many sources. Used vehicles export data has been collected from available international data sources including European Commission's Eurostat Comext Database, Korea International Trade Agency (KITA) and the Japanese International Auto Trade Association (iATA). The report covers 146 used vehicles importing countries in five regions - Africa, Asia-Pacific, Eastern Europe, the Caucasus and Central Asia (EECCA), Latin America and the Caribbean, and the Middle East. Most of the data in the report comes from reviewing national importation /vehicle registration data and through consultations with government and industry partners in these countries.

This report thus reviews globally available data surveyed in the period 2015-2020.

The report also investigates the regulatory environment of the importing countries. Among the regulations considered are total bans on used HDVs imports, compliance to vehicle emissions standards, vehicle age limitations, and fiscal instruments. This policy data comes from UNEP reviews of national used vehicles regulations and policies through consultations with national governments.

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Limitations of the report

This report is a first global overview for used HDVs flow and the regulatory environment. While due diligence has been done to ensure that the information therein is factual, the following limitations and challenges are acknowledged:

Scope: Compared to LDVs, little is known about the international trade of used heavy- duty trucks and buses and two-wheelers, despite these categories being responsible for a disproportionate amount of fine particle and black carbon pollution.

Data availability and disaggregation: Many vehicle importing countries do not disaggregate used vehicles from overall vehicle imports, sales and registrations in their trade statistics. In addition to making analysis a challenge, this also impedes the development and application of policy and fiscal instruments that could serve to improve the quality of vehicles entering importing markets.

Discrepancies in trade statistics: Export and import data reported at the national level are not harmonized across markets.

More research is needed to establish the quality of used HDVs exported in terms of environmental and safety standards.

Annex 2: Country Lists

Africa = 54 countries included				
Country	**Used Vehicle EURO Emission Standards**	**Used Vehicles Banned**	**HDV Age Limit**	**Ranking[10]**
Algeria			3	Very Good
Angola			8	Weak
Benin	Euro IV		10	Good
Botswana				Very Weak
Burkina Faso	Euro IV		10	Good
Burundi	Euro IV			Good
Cameroon				Very Weak
Cape Verde	Euro IV		10	Good
Central African Republic				Very Weak
Chad			5	Good
Comoros				Very Weak
Congo				Very Weak
Democratic Republic of the Congo	Euro IV		7 Bus 10 Truck	Good
Côte d'Ivoire	Euro IV		10	Good
Djibouti			8	Weak
Egypt		Banned		Banned
Equatorial Guinea			12	Very Weak
Eritrea			5	Good
Eswatini			15	Very Weak
Ethiopia				Very Weak
Gabon			6	Weak
Gambia	Euro IV		10	Good
Ghana	Euro IV		10	Good
Guinea	Euro IV		10	Good
Guinea-Bissau	Euro IV		10	Good
Kenya	Euro IV		8	Good
Lesotho				Very Weak
Liberia	Euro IV		10	Good
Libya			10	Very Weak
Madagascar			15	Very Weak
Malawi				Very Weak
Mali	Euro IV		10	Good
Mauritania			8	Weak
Mauritius			3 to 6	Weak

10 this ranking is made with the assumption that if all policies adopted were implemented.

Morocco	Euro IV		5	Good
Mozambique				Very Weak
Namibia			18	Very Weak
Niger	Euro IV		10	Good
Nigeria	Euro IV		10	Good
Rwanda	Euro IV			Good
Sao Tome and Principe				Very Weak
Senegal	Euro IV		6 or 10?	Good
Seychelles		Banned		Banned
Sierra Leone	Euro IV		10	Good
Somalia				Very Weak
South Africa				Banned
South Sudan	Euro IV			Good
Sudan		Banned	5	Banned
United Republic of Tanzania	Euro IV			Good
Togo	Euro IV		10	Good
Tunisia			9	Very Weak
Uganda	Euro IV			Good
Zambia				Very Weak
Zimbabwe			10	Very Weak

Latin America and the Caribbean = 37 countries included				
Country	Vehicle EURO Emission Standards	Used Vehicles Banned	HDV Age Limit	Ranking
Antigua And Barbuda			5	Good
Argentina		Banned		Banned
Aruba				Very Weak
Bahamas			10	Very Weak
Barbados				Very Weak
Belize				Very Weak
Bermuda				Very Weak
Bolivia (Plurinational State of)			5	Good
Brazil		Banned		Banned
Chile		Banned		Banned
Colombia		Banned		Banned
Costa Rica			12	Very Weak
Cuba				Very Weak
Dominica				Very Weak
Dominican Republic			15	Very Weak

Ecuador		Banned		Banned
El Salvador			15	Very Weak
French Guiana				Very Weak
Grenada			10	Very Weak
Guatemala			10	Very Weak
Guyana			8	Weak
Haiti			3	Good
Honduras			13	Very Weak
Jamaica			12 to 30	Very Weak
Mexico			10	Very Weak
Nicaragua			10	Very Weak
Panama				Very Weak
Paraguay			10	Very Weak
Peru	Euro IV		2	Very Good
Saint Kitts and Nevis				Very Weak
Saint Lucia				Very Weak
Saint Vincent and the Grenadines				Very Weak
Suriname			15 Bus	Very Weak
Trinidad and Tobago			10	Very Weak
Turks And Caicos Islands				Very Weak
Uruguay		Banned		Banned
Venezuela		Banned		Banned

Asia Pacific = 26 countries included				
Country	Vehicle EURO Emission Standards	Used Vehicles Banned	HDV Age Limit	Ranking
Afghanistan				Very Weak
Bangladesh			3	Very Good
Bhutan		Banned		Banned
Brunei Darussalam			5	Good
Cambodia				Very Weak
Fiji	Euro IV		5	Good
India		Banned		Banned
Indonesia		Banned		Banned
Lao People's Democratic Republic				Very Weak
Malaysia			5	Good
Maldives				Very Weak
Mongolia				Very Weak

Myanmar			4	Good
Nauru				Very Weak
Nepal		Banned		Banned
New Zealand			8	Weak
Pakistan			5	Good
Palau				Very Weak
Papua New Guinea			15	Very Weak
Philippines				Very Weak
Samoa			12	Very Weak
Singapore			3	Very Good
Sri Lanka			4	Good
Thailand		Banned		Banned
Timor-Leste			5	Good
Viet Nam			5	Good

Eastern Europe, the Caucasus, and Central Asia = 18 countries				
Country	Vehicle EURO Emission Standards	Used Vehicles Banned	HDV Age Limit	Ranking
Albania	Euro III		15	Very Weak
Armenia				Very Weak
Azerbaijan	Euro IV			Good
Belarus				Very Weak
Bosnia and Herzegovina			10	Very Weak
North Macedonia			15	Very Weak
Georgia				Very Weak
Kazakhstan			5	Good
Kyrgyzstan			10	Very Weak
Moldova				Very Weak
Montenegro	Euro III		7	Weak
Russian Federation			5	Good
Serbia				Very Weak
Tajikistan				Very Weak
Türkiye		Banned		Banned
Turkmenistan			20	Very Weak
Ukraine	Euro V			Very Good
Uzbekistan				Very Weak

Middle East = 11 countries

Country	Vehicle EURO Emission Standards	Used Vehicles Banned	HDV Age Limit	Ranking
Bahrain			5	Good
Iran (Islamic Republic of)			3	Very Good
Iraq			2	Very Good
Israel			2	Very Good
Jordan			5	Good
Kuwait			10	Very Weak
Lebanon		Banned		Banned
Oman			7	Weak
Qatar			5	Good
Saudi Arabia			5	Good
United Arab Emirates			4	Good

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